FINAL
WELL INSTALLATION REPORT

Prepared for:

Camp Stanley Storage Activity
Boerne, Texas

September 2011

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
3D	three-dimensional
AOC	Area of Concern
bgs	below ground surface
BS	Bexar Shale
cis-1,2-DCE	*cis*-1,2-dichloroethene
CSSA	Camp Stanley Storage Activity
DIGW	discrete interval groundwater
e. coli	*Escherichia coli*
EDN	Earth Data Northeast, Inc.
EE	Environmental Encyclopedia
EXW	extraction well
GPI	GeoProjects International, Inc.
gpm	gallons per minute
hp	horsepower
IDM	investigation-derived media
LGR	Lower Glen Rose
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
MW	monitoring well
NSF	National Sanitation Foundation
NTU	nephelometric turbidity units
PCE	tetrachloroethene
PCL	protective concentration level
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
SAP	Sampling and Analysis Plan
SIW	steam injection well
SVE	soil vapor extraction
SWMU	Solid Waste Management Unit
SWS	Schlumberger Water Services
TCE	trichloroethylene

TCEQ	Texas Commission on Environmental Quality
TRRP	Texas Risk Reduction Program
TVH	total volatile hydrocarbon
UGR	Upper Glen Rose
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VEW	vapor extraction well
VOC	volatile organic compound
WBS	Work Breakdown Structure

EXECUTIVE SUMMARY

This report provides a summary and evaluation of drilling activities at Camp Stanley Storage Activity (CSSA) between March and July 2011. These drilling activities were conducted in support of CSSA's groundwater investigation and treatability studies at Solid Waste Management Unit (SWMU) B-3 and Area of Concern (AOC)-65. Parsons installed 11 new wells and rehabilitated two wells. In addition, ten wells were geophysically logged by the United States Geological Survey (USGS). The types and purposes of the 11 new wells ranged significantly, and included:

- Two deep (385 and 440 feet deep) wells installed to aid in the horizontal and vertical delineation of solvent contamination within the Lower Glen Rose Formation (LGR);
- Seven shallower (between 28 and 44 feet deep) wells installed to support the treatability study at AOC-65; and
- Two LGR (335 and 350 feet deep) extraction wells drilled to support the bioreactor treatability study at SWMU B-3.

The well rehabilitations included replacing a damaged multi-port Westbay™ well at SWMU B-3 and installing a new pump at a CSSA supply well CS-1. This report describes the field methods, results, and conclusions associated with the monitoring well installation and rehabilitation activities.

SECTION 1
INTRODUCTION

1.1 PURPOSE

This report provides a summary and evaluation of drilling activities at Camp Stanley Storage Activity (CSSA) between March and July 2011. These drilling activities were conducted in support of CSSA's groundwater investigation and treatability studies at Solid Waste Management Unit (SWMU) B-3 and Area of Concern (AOC)-65. Parsons installed 11 new wells and rehabilitated two wells, at locations shown in **Figure 1.1**. In addition, ten wells were geophysically logged by the United States Geological Survey (USGS). The types and purposes of the 11 new wells ranged significantly, and included:

- Two deep (385 and 440 feet deep) wells installed to aid in the horizontal and vertical delineation of solvent contamination within the Lower Glen Rose Formation (LGR);
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The well rehabilitations included replacing a damaged multi-port Westbay™ well at SWMU B-3 and installing a new pump at a CSSA supply well CS-1. This report describes the field methods, results, and conclusions associated with the monitoring well installation and rehabilitation activities.

1.2 OVERVIEW

This report summarizes work associated with installation of the new monitoring wells at CSSA, and presents limited interpretation of data collected during installation, as well as preliminary analytical results from groundwater samples. Further analysis and detailed interpretation of the analytical data collected will be incorporated in update reports associated with the *Quarterly Groundwater Monitoring Program* (CSSA Environmental Encyclopedia, Volume 5: Groundwater), and the *Annual Performance Reports for the AOC-65 and SWMU B-3 Remediation Systems* (CSSA Environmental Encyclopedia, Volumes 3.1 and 3.2: Investigation and Closure Reports). The entire CSSA groundwater program has been overseen by the U.S. Environmental Protection Agency (USEPA) and Texas Commission on Environmental Quality (TCEQ) since October 1993.

A chronology of work conducted in association with the CSSA groundwater investigation is provided in Volume 1.1 of the Environmental Encyclopedia (EE) online at http://www.stanley.army.mil/. Detailed reviews of the regulatory basis for investigation, historical groundwater monitoring, and previous monitoring well installation reports, as well as specific construction and logging methods, decontamination procedures, and investigation-derived media (IDM) management procedures are contained in Volume 4.1 of the EE.

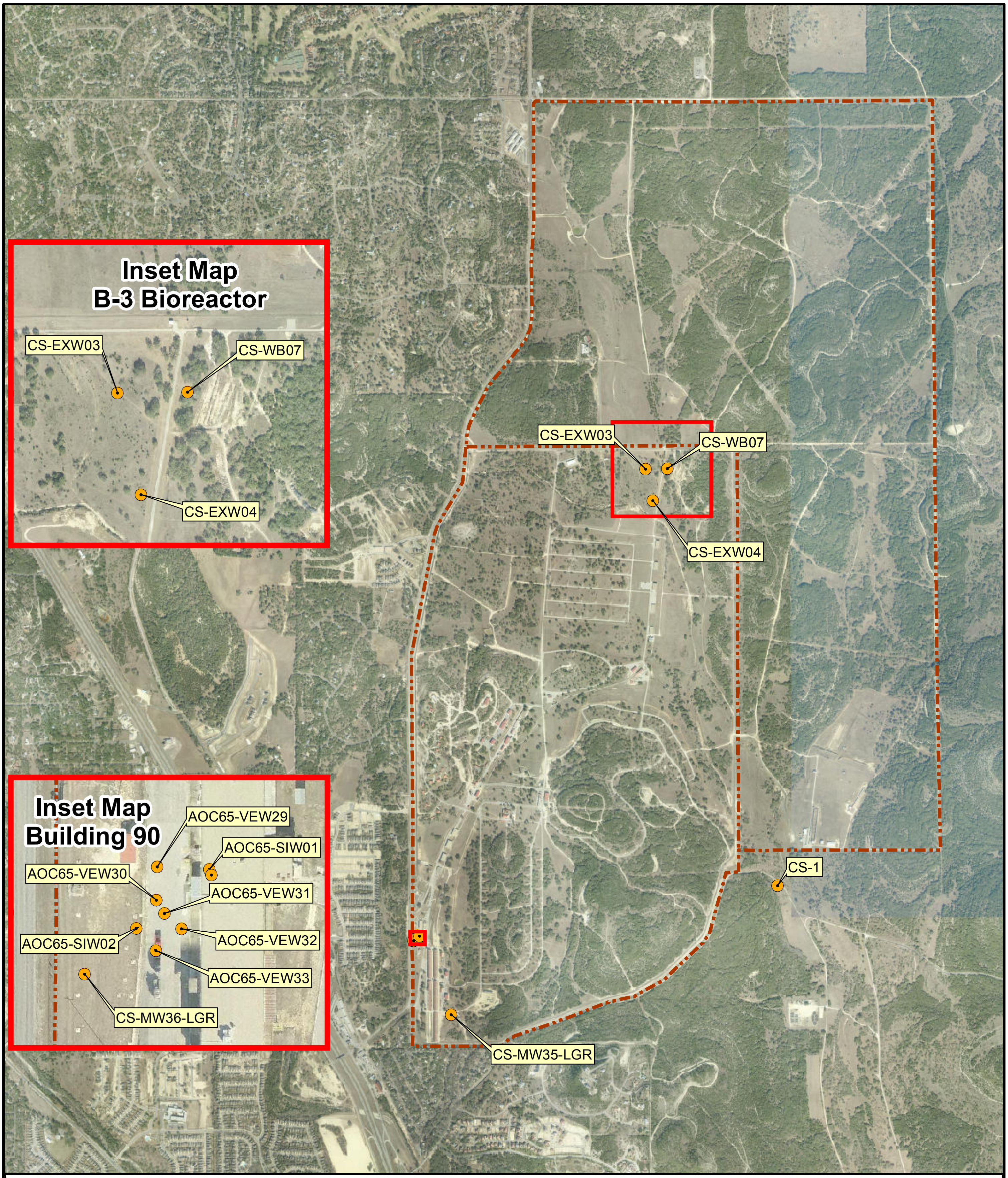

Figure 1.1

New and Rehabilitated Wells
Surveyed Locations

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1.3 OBJECTIVES OF INVESTIGATION

The objective of the investigation was to provide sources of additional data for determining the extent of groundwater contamination in the aquifer at CSSA, and to support active treatability studies at AOC-65 and SWMU B-3. The well installation efforts included the following specific objectives:

1. Install two 4-inch-diameter monitoring wells (MWs) in the LGR portion of the aquifer. Collect up to four discrete groundwater samples from selected hydrologic zones at each well borehole. Analyze samples for volatile organic compounds (VOCs).
2. Install two, 8-inch-diameter open borehole steam injection wells (SIWs) at AOC-65, and install steam delivery systems.
3. Install five, 4-inch-diameter vapor extraction wells (VEWs) at AOC-65.
4. Install two, 8-inch-diameter open borehole extraction wells (EXWs) with submersible pumps at SWMU B-3.
5. Replace damaged Westbay well B3-WB07 with new equipment.
6. Replace submersible pump at supply well CS-1.
7. Perform geophysical and/or video inspection surveys in each well.
8. Survey new monitoring well locations.
9. Provide logistical support to USGS for geophysical surveys at six on-post well locations and four off-post locations.
10. Manage IDM and construction debris.
11. Prepare a well installation report.

1.4 REPORT ORGANIZATION

This report consists of seven sections. Section 1 presents an overview, including the project purpose, and objectives of the well installation work accomplished under contract. Section 2 provides narrative on the installation of two LGR monitoring wells used for groundwater plume detection and long-term monitoring. This includes discussion of the drilling activities, geophysical logging, discrete interval sampling, monitoring well construction, surface completions, and well development. Section 3 describes the installation of two steam injection wells and five vapor extraction wells at the AOC-65 soil vapor extraction (SVE) system. Section 4 details the installation and equipping of two open-hole groundwater extraction wells to be incorporated into the SWMU B-3 bioreactor system. Narratives for this effort include well construction methods, geophysical logging activities, pumping tests, equipment installation, and sampling results. Section 5 documents the USGS logging effort commissioned by CSSA under separate contract, and logistically supported by Parsons under this project. Interpretive results of this effort are being incorporated into a postwide visualization model by the USGS. The physical results of the USGS well inspections are included for completeness and documentation purposes only. Parsons assisted with the emergency rehabilitation of water supply well CS-1, and those activities are presented in Section 6. Finally, the inspection and replacement of damaged Westbay well B3-WB07 is presented Section 7. Supporting data and electronic data DVDs are included in the appendices.

SECTION 2
LOWER GLEN ROSE FORMATION WELL INSTALLATION

2.1 DETERMINATION OF WELL LOCATIONS

An LGR well was drilled and installed at each of two locations within the CSSA facility, one on the west side of AOC-65 (CS-MW36-LGR) and one south, southeast of AOC-65 (CS-MW35-LGR). The well locations, shown on **Figure 1.1**, were chosen to aid in the delineation of VOC contamination within the primary drinking water aquifer for CSSA and the surrounding communities, and may support future activities such as tracer testing to determine groundwater flowpaths and velocities.

Well CS-MW35-LGR was drilled east of the warehouse section, and southeast of AOC-65 (Building 90), shown in **Figure 2.1**. The well is located approximately 250 feet northeast of the former CSSA Wastewater Treatment Plant (WWTP). This site had been selected to fill in data gaps between areas of groundwater contamination known to be above the maximum contaminant level (MCL) thresholds for tetrachloroethene (PCE) and trichloroethene (TCE), and the CSSA southern boundary, where contaminant concentrations are increasing at off-post well LS-1. The well is also located in the vicinity of significant structural features (faulting) mapped by the USGS, and confirmed by previous drilling at the CS-MW11 well cluster location.

Well CS-MW36-LGR was drilled west of Building 90, in the vicinity of the AOC-65 Weather Station. The intent of this well is to monitor the LGR production zone within the aquifer during the steam injection treatability study, as well as to monitor the VOC levels in the vicinity of AOC-65. This well will be routinely monitored for changes in condition or contaminant characteristics or concentrations during the study.

2.2 DRILLING NARRATIVE

Monitoring well installation at each location began with establishment of a safety and quality assurance/quality control (QA/QC) exclusion zone created around the drilling rig and work area. The size of each exclusion zone depended on the well location and anticipated volume of water and cuttings that might be produced. A containment area consisting of 2 feet by 10 feet wood planks and heavy gauge plastic sheeting was constructed to surround the wellhead and the drilling table to capture drilling fluids and solid cuttings.

Each well was drilled using air rotary methods in accordance with the Sampling and Analysis Plan (SAP). The subcontractor for drilling operations was GeoProjects International, Inc. (GPI). Non-chlorinated water used for fluid injection during drilling was obtained from CSSA water supply well CS-10. Drilling through the dry portions of the limestone formation requires small amounts of injected water for lubrication, cooling, and to assist in lifting the drill cuttings out of the hole.

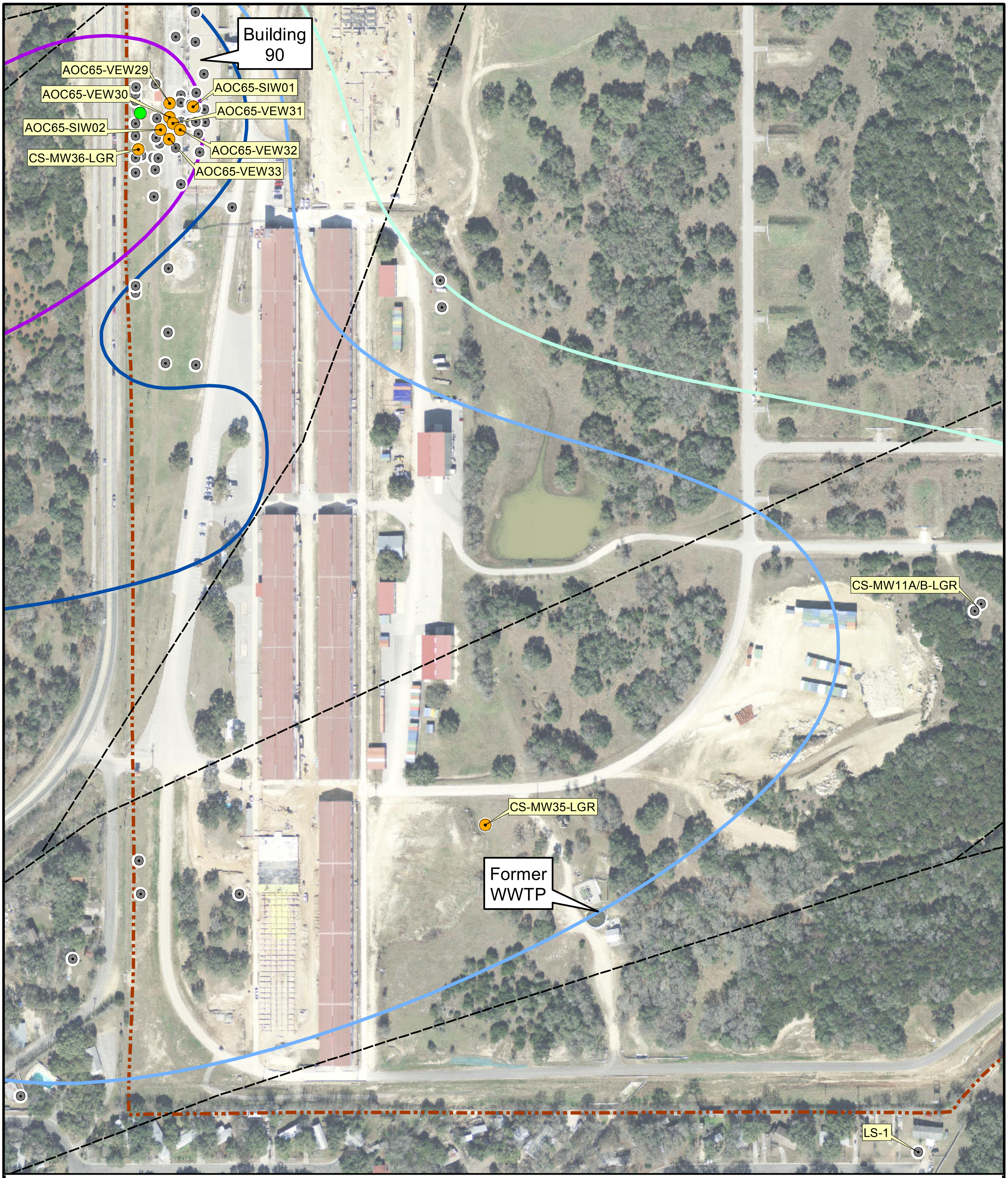

Figure 2.1

Newly Installed Wells
AOC-65 Area

Camp Stanley Storage Activity

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Boreholes were drilled with a 7-$^7/_8$ inch diameter tri-cone roller bit to their total depths. Drilling depth was based on direct observations of cuttings and geophysical logs from previously drilled wells were used to estimate total depth of each new well. Continuous observation of cuttings was performed to provide indication of unusual or unexpected changes in rock characteristics. The boreholes were intended to penetrate several feet into the top of the underlying Bexar Shale (BS) to accommodate logging of the entire thickness of the LGR.

A "TOTCO" single shot declination tool was used during drilling after every 50 feet of borehole advancement to check borehole plumbness. Borehole declination did not deviate more than 2 degrees from true vertical. A summary of results for the declination surveys is included in **Appendix C**.

For safety purposes, air at active wellheads was periodically screened by photoionization detector (PID) to monitor for the presence of VOCs. Water, soil, and cuttings generated during well construction were characterized by laboratory analysis prior to final disposition. IDM generated during drilling and development included solids and liquids.

2.2.1 CS-MW35-LGR

The borehole drilling for well CS-MW35-LGR began March 14, 2011 and the total depth of 440 feet below ground surface (bgs) was reached on March 21, 2011. The lithology was monitored and logged by observing the rock cuttings collected at predetermined drilling intervals or when suspected changes occurred as noted by the driller. The well penetrates approximately 107 feet of Upper Glen Rose (UGR) and 325 feet of LGR, making contact with the Bexar Shale at 432 feet below grade. Well construction was completed April 14, 2011 and an aboveground locking well cover was added for the surface completion (**Photo 2.1**). Additional well construction details are provided in Section 2.5.

2.2.2 CS-MW36-LGR

The borehole drilling for well CS-MW36-LGR began March 23, 2011 and the total depth of 385 feet bgs was reached on March 30, 2011 (**Photo 2.2**). Like CS-MW35-LGR, the lithology was logged by rock cuttings. The well penetrates approximately 43 feet of UGR and 328 feet of LGR, making contact with the Bexar Shale at 371 below grade. Well construction was completed April 15, 2011 and a flush mount locking well cover was added for the surface completion. Additional well construction details are provided in Section 2.5.

2.3 GEOPHYSICAL LOGGING

Geophysical logs are useful for identifying fractures and other geologic features that might intersect the boreholes. These characteristics aid evaluations of lithologic and hydraulic correlation between wells and the correlation of the lithology in these wells with transmissive zones across CSSA. Geophysical logging of the well boreholes was performed by the USGS between May and June 2011 and is described in Section 5 of this report.

Photo 2.1 – Installation of CS-MW35-LGR.

Photo 2.2 – Installation of CS-MW36-LGR.

2.4 DISCRETE INTERVAL GROUNDWATER SAMPLING

Analytical data provide information for plume delineation and potential migration pathways for groundwater contamination. Discrete intervals were selected based on interpretation of the geologic and geophysical logs. Samples were collected to gather groundwater data from saturated, permeable zones in the local LGR, and to determine differences in vertical contamination, if present. Yield of these zones is dependent on many factors, such as porosity, permeability, and transmissivity. Other major factors affecting sample collection are seasonal effects on groundwater levels. Some zones that could be easily sampled during wet seasons may be dry during the summer and fall months. The operation of the GPI straddle packer system was the same as previous sampling efforts (see ***RL83*** and ***TO42 Well Installation Reports*** and ***Sampling Plan***s in the CSSA ***Encyclopedia, Volume 5***).

Each sampling interval was purged of three volumes of water prior to sample collection. Occasionally, low yielding zones and/or turbidity problems caused samples to be collected before the normal purging quantity and quality standards were satisfied. In some instances, purging was carried out over an extended period of time for critically located intervals with poor yield. In those cases, a sample was collected after alternate periods of pumping and recovery. The data generated by discrete interval groundwater (DIGW) sampling is considered screening data and is not for compliance purposes. Some sampling prerequisites of the ***CSSA Quality Assurance Project Plan*** **(QAPP)** (***Volume 1-4.1***, ***Encyclopedia***) such as field-parameter stabilization were bypassed for DIGW samples sample intervals with low yield (see **Table 2.1** for volumes purged).

The DIGW samples were collected in 7-7/8-inch diameter boreholes utilizing a dual packer apparatus with an open interval of 12 feet. The system was raised and lowered in the borehole by the drilling rig and the isolation packers were inflated by compressed nitrogen gas. A 1.5 horsepower (hp) pump was installed between the packers on a 1.25-inch diameter pipe string. The packer systems were assembled, maintained, and operated by GPI. Parsons project geologists selected the intervals, collected the samples, and supervised the effort. Table 2.1 summarizes the data collected at each selected zone during groundwater sampling. Analytical results of the groundwater samples show PCE and toluene detections, and in some intervals at levels above the reporting limits, in all three samples collected in CS-MW35-LGR (**Table 2.2**). Due to the exceptional drought conditions, groundwater samples were only collected from two intervals in well CS-MW36-LGR although four intervals were isolated in an attempt to obtain samples. During the video survey, perched water was observed entering the borehole at 120 feet bgs at several gallons per minute (gpm), which was unexpected considering the drought conditions. A groundwater sample was collected from that interval. The presence of chloroform and chloromethane may be indicative of a potable waterline leak. Both samples showed reportable levels of PCE and TCE and detections of *cis*-1,2-dichloroethene (*cis*-1,2-DCE), chloroform, and chloromethane. A complete list of all analytical results for the DIGW sampling is shown in **Appendix E**.

Table 2.1 Discrete Interval Groundwater Samples March and April 2011

Well ID	Date	Sampled	12-foot Interval Depth	Rock Unit	Interval Volume	Interval Volumes Purged	Total Purged	Average Purging Rate	Pumping Duration
		(Y/N)	(ft bgs)	Formation	(gal)	--	(gal)	(gpm)	(minutes)
CS-MW35-LGR	3/31/2011	Y	259-271	LGR	31.9	0	25	1.0	25
	4/1/2011	Y	374-386	LGR	31.9	8.15	260	2.9	90
	4/1/2011	Y	414-426	LGR	31.9	6.6	210	7	30
CS-MW36-LGR	4/8/2011	Y	320-332	LGR	31.9	10.3	330	8.3	40
	4/8/2011	N	294-306	LGR	31.9	0	14	1	15
	4/8/2011	N	270-282	LGR	31.9	0	1	0.5	120
	4/11/2011	Y	0-142	UGR	71.8 [a]	2.5	181	9	20

a = Top packer disabled, water level at 115 bgs after 48 hours of recharge with bottom packer set.

Table 2.2 Summary of LGR Wells Analytical Results

Well ID	Sample Interval	Date	Chloroform		Chloromethane		*cis*-1,2-Dichloroethene		PCE		Toluene		TCE	
	ft bgs		µg/L		µg/L		µg/L		µg/L		µg/L		µg/L	
CS-MW35-LGR	259-271	3/31/2011	0.060	U	0.16	U	0.070	U	**0.30**	F	**5.4**		0.050	U
	374-386	4/1/2011	0.060	U	0.16	U	0.070	U	**2.8**		**0.58**	F	0.050	U
	414-426	4/1/2011	0.060	U	0.16	U	0.070	U	**2.7**		**0.30**	F	0.050	U
CS-MW36-LGR	320-332	4/8/2011	**0.11**	F	0.16	U	**0.34**	F	**23**		0.060	U	**15**	
	0-142	4/11/2011	0.060	U	**0.44**	F	**0.32**	F	**25**		0.060	U	**13**	

2.5 WELL CONSTRUCTION

Monitoring well design and construction followed CSSA specifications and met TCEQ requirements. Construction materials for each well included 4-inch diameter Schedule 80 polyvinyl chloride (PVC) risers, 25 feet of 40-slot, 4-inch diameter stainless steel well screen, clean 8/16 silica sand, bentonite, and Volclay™ grout. Volclay was selected as the grouting material rather than Portland cement to eliminate a possibility of elevated pH. The PVC casing utilizes threaded joints without glues, screws, or other adhesives. Surface completions were constructed with concrete and steel protectors.

Stainless steel centralizers were attached every 50 feet. Using a decontaminated scoop and approximately 1 to 2 gpm of clean water, the sand pack was deposited downhole into the annulus between the well screen and the rock formation. Dehydrated bentonite chips were added to create a sealed plug above the sand. These uncoated chips were added by hand to prevent bridging in the upper portions of the well. The bentonite chips were allowed to hydrate per manufacturer's recommendations before proceeding with grouting of the annular space above. The annular space was pressure-grouted in lifts by the positive displacement exterior method from the bottom of the hole to 2 feet bgs. The remaining 2 feet were filled with cement during well pad construction to satisfy the TCEQ atmospheric barrier requirement. Grout mixtures consisted of clean water and Volclay, usually 160 gallons per lift, using 25 to 30 gallons of water per sack of Volclay according to the manufacturer's recommendations.

CS-MW35-LGR was completed with a riser extending approximately 2.5 feet above ground surface. A 6-inch square, steel, locking well protector housing was installed over the PVC riser (**Photo 2.1**). The housing is a 5-foot length of 1/8-inch square tubing. The protective cover was set 2 feet bgs into the annular concrete, leaving a remaining total stick-up of 3 feet. The top portion of the square well protector has a hinged lid and a locking hasp. The height difference between the terminal end of the 4-inch PVC riser and the outer protector allows for operation of low-flow sampling equipment.

Also at the CS-MW35-LGR wellhead, a 4-feet square and 6-inches thick concrete pad was poured, and a 2-inch diameter brass marker stamped with the well identification was set within (**Photo 2.3**). Protective bollards of 4-inch-diameter hollow carbon steel in 5-foot lengths were placed at the corners of the well pad to protect the wellhead. The bollards were set in concrete to 2 feet below grade, leaving 3 feet above grade. The steel well protector was painted white and the bollards are yellow. Surface completions meet standard TCEQ and industry specifications.

The surface completion for CS-MW36-LGR was constructed as a flush mount to minimize the number of well heads protruding from the ground in the vicinity of AOC-65 (**Photo 2.4**). The well riser was cut 0.5-feet bgs and a prefabricated steel vault with a 12-inch diameter manway was cemented over the riser.

Photo 2.3 – Installation of CS-MW35-LGR.

Photo 2.4 – Surface completion for CS-MW36-LGR.

2.6 WELL DEVELOPMENT

Well development was completed by pumping the well with a decontaminated Grundfos^{TM} 1.5-hp submersible pump attached to 1.25-inch diameter galvanized steel pipe. The developed volume of each well was monitored by rate/time calculations. Field parameters including turbidity, odor, temperature, pH, and conductivity were periodically monitored. Field parameters were collected using an YSI-556 which includes probes for temperature, conductivity, dissolved oxygen, pH, and oxidation reduction potential unless otherwise noted in **Table 2.3**. Development continued until the water appeared clear, the field parameters had stabilized, and the volume withdrawn had equaled or surpassed the estimated volume of water injected during drilling. Stabilization was achieved when water appeared sediment-free, turbidity remained stable within 10 nephelometric turbidity units (NTUs), temperature was ±1.0 degree Celsius (˚C), pH was ±0.1 units and within a range of 6.5 to 8, and conductivity was ±5 percent, for a period of at least 30 minutes. Extremely low water levels due to the regional drought affected some well development such that recharge rates were extremely slow and continuous pumping was not possible. All developed groundwater was contained as IDM and disposed following Waste Management Plan protocols.

Table 2.3 Well Development Stabilization Parameters

Well ID	Date	Time	Turbidity	Temperature	Conductivity	Dissolved Oxygen	pH	Oxidation Reduction Potential	Volume Pumped
			(NTUs)	(˚C)	(mS/cm)	(mg/L)		(mv)	(gal)
CS-MW35-LGR	4/21/2011	1445	>100	24.06	0.495	5.35	7.28	32.0	682
	4/22/2011	1146	80	24.32	0.466	4.88	7.11	-39.6	680
	4/25/2011*	1330	5.3	24.6	0.618	---	6.72	---	28
	4/25/2011	1652	20	26.27	0.700	2.68	6.93	-41.3	644
	4/25/2011	1713	18	23.57	0.685	2.71	6.88	-27.1	35
	4/26/2011*	0943	3.0	23.5	0.707	---	6.93	---	571
CS-MW36-LGR	5/6/2011	1316	26	24.12	0.465	5.85	7.05	9.0	2,470
	5/6/2011	1504	36	24.24	0.466	5.00	7.04	-11.6	2,800
	5/10/2011	0915	---	22.99	0.450	5.10	7.14	0.4	750

* Field parameters were collected using an YSI-63 which includes probes for temperature, conductivity and pH.

2.7 WASTE DISPOSITION

All fluid and solid IDM was disposed according to ***CSSA RCRA Facility Investigation and Interim Measures Waste Management Plan*** (***Volume 1-1***, ***Work Plan***) approved by USEPA and TCEQ. Fluids were captured in the containment pits then collected and transported by vacuum truck to the SWMU B-3 bioreactor for on-site treatment. All solid media were analyzed for the full list of VOCs using the EPA 8620B method. All solid media were below Texas Risk Reduction Program (TRRP) Tier 1 residential protective concentration levels (PCLs), and the media were used to augment the East Pasture Berm. Summary tables of IDM sample results can be found in **Appendix E**.

After each borehole was drilled, the drilling rig was driven to the decontamination pad and washed. All equipment that entered a borehole or could directly or indirectly contact samples was also washed in the designated decontamination area. IDM generated during the decontamination procedures were managed with the drilling fluid IDM in the bioreactor. Total volumes of IDM generated from each well are listed on **Table 2.4**.

Table 2.4 Summary of LGR Well Construction

Well ID	**CS-MW35-LGR**	**CS-MW36-LGR**
Easting (meters)	535,913.650	535,673.212
Northing (meters)	3,283,233.943	3,283,702.697
Elevation (feet MSL)	1186.97	1218.74
Date drilled	3/15/2011 - 3/21/2011	3/23/2011 - 3/30/2011
Ground Elevation (feet MSL) (ground, asphalt, or vat base)	1183.89	1219.08
Total Depth of Borehole (feet bgs) (8-inch diameter)	440	385
Well set depth/ Open borehole depth (ft bgs)	430	370
Cement/grout	Volclay	Volclay
Date constructed	4/13/2011 - 4/15/2011	4/14/2011 - 4/15/2011
Casing (ft bgs)	0 - 405 PVC	0 - 345 PVC
Screened Interval/ Perforation Interval (ft bgs)	405 - 430	345 – 370
Grout (number of 50 lb bags)	43 (2 – 395 ft bgs)	26 (2 – 335 ft bgs)
Bentonite Chips (number of 50 lb bags)	3 (395 – 400 ft bgs)	3.5 (335 – 340 ft bgs)
Sand - 8/16 (number of 50 lb bags)	16 (400 – 432 ft bgs)	17 (340 – 372 ft bgs)
Backplug (holeplug) (number of 50 lb bags)	4 (432 – 440 ft bgs)	6 (385 – 372 ft bgs)
Drilling Rig	Gardner-Denver 1500	Gardner-Denver 1500

SECTION 3
AOC-65 WELL INSTALLATION

3.1 DETERMINATION OF WELL LOCATIONS

Two SIWs and five VEWs were installed at AOC-65 under this project as part of a treatability study at AOC-65 (Figure 2.1). The SIWs provide a means to inject steam into the shallow subsurface, to test if providing heat significantly increases the volatilization of contaminants. The VEWs provide a means to remove and monitor the volatilized contaminants. Drilling of the wells was performed by GPI under direct supervision of Parsons geologists. The wells were drilled to the base of the UGR or into the upper portion of the LGR in the Middle Trinity Aquifer. The SIWs are located in areas in AOC-65 that are suspected of having elevated contaminant levels. AOC-SIW01 is located in the northwest corner of the Building 90 solvent vat. The second potential source is a drainage ditch located outside Building 90 where drainage from the vat was released. AOC-SIW02 is located near a drainage ditch outside Building 90 and adjacent to the vat, 15 feet south of VMP-4B.

AOC-VEW29 through AOC-VEW33 were arranged to contain and remove vapors volatilized during steam injection activities, west of Building 90.

3.2 DRILLING NARRATIVE

Drilling operations began on April 5, 2011 and continued through May 11, 2011 when the last VEW was installed. Each of the SIWs and VEWs were continuously sampled via 2-inch core and subsequently reamed to an 8-inch diamter. The following description of each SIW or VEW is a narrative of the coring/drilling efforts. Photographs of the cores, well logs, and coring log forms are presented in (**Appendix D**).

GPI mobilized a modified Deeprock RAM10 on April 4, 2011 to drill one SIW at a former solvent vat located inside Building 90. A Gardner-Denver 1500 was already on location for other drilling activities as well as a CME-75, a Smead Pump Hoist truck, a 2,900-gallon vacuum truck, and several other smaller support vehicles, all of which were used to complete drilling activities at AOC-65. Two drill crews, operating two drill rigs concurrently, were utilized to complete the bulk of the drilling tasks located outside Building 90. The Deeprock RAM10 was modified so that it could be operated inside Building 90. Modifications included lowering the mast to 12 feet to fit inside a building with 13-foot-high ceilings and replacing the gas-powered engine with a 75-hp electric motor to drive the hydraulic system.

A rolloff container for IDM management was provided by USA Environmental, Inc., and all cuttings associated with reaming the SIWs and VEWs were kept within a containment built around each drilling location then transported to the rolloff. A decontamination area was maintained near the drilling area for core barrels and a decontamination pad for equipment was located to the southeast of AOC-65 near CS-MW35-LGR.

3.2.1 Steam Injection Wells

Drilling at AOC-SIW01, the location inside the Building 90 vat, began on April 5, 2011. No containment was built around the drilling location as the vat provided the containment for cuttings and drilling fluids associated with AOC-SIW01. A cement corer was initially used to cut through the base of the vat to expose the soil below. A PID was used to collect total volatile hydrocarbon (TVH) readings from beneath the cement plug (0.0 parts per million [ppm]) and soil samples were collected from 0 to 6 inches and 6 to 8 inches, and screened using the PID (0.0 ppm). A steel plate covering the vat required modifications so that it could remain over the vat during drilling (**Photo 3.1**). This reduced exposure to dust associated with drilling activities. A hot work permit was obtained to cut a 9-inch hole in the plate. The plate was ultimately bisected through the hole so that a smaller, lighter portion of the plate could be removed and accessed for well maintenance.

Photo 3.1 – Modified steel plate surrounding completed AOC-SIW01.

Coring began and was completed at AOC-SIW01 on April 6, 2011. The total depth of the 2-inch-diameter AOC-SIW01 corehole was 24.65 feet from the base of the vat. Samples were collected from the intervals 8 to 8.5 feet bgs and 24 to 24.5 feet bgs. The following day, the corehole was reamed to 8 inches in diameter down to 24.65 feet bgs. Cuttings derived from reaming that accumulated in the vat were removed by hand to the rolloff. The vat was rinsed, and the rinse water was vacuumed out using the vacuum truck and summarily managed in the bioreactor. Installation of the well materials was completed on April 12, 2011.

A CME-75 was used to core and ream AOC-SIW02 on May 3, 2011. Containment was constructed around the drilling location to manage cuttings and drilling fluids. The total depth of the 2-inch-diameter corehole was 26.5 feet bgs. The corehole was reamed to an 8-inch diameter down to 28.2 feet bgs. Cuttings were manually moved from the containment to the rolloff. TVH readings at AOC-SIW02 ranged from non-detect to 20.5 ppm with the highest reading from depths 10 and 11 feet bgs, 20.5 and 13.9 ppm respectively. Drilling activities for both SIWs are summarized in **Table 3.1**.

Table 3.1 Summary of SIW Drilling

SIW ID	Date Drilled	Total Depth (ft bgs)
AOC-SIW01	4/6/2011	24.65
AOC-SIW02	5/3/2011	28.2

3.2.2 Vapor Extraction Wells

Five VEWs were cored and reamed between April 28 and May 5, 2011. Two drill crews operating a CME-75 and a Gardner-Denver 1500 concurrently to core and ream VEWs located outside Building 90. VEWs 29, 30, and 31 were drilled with the GD-1500, and VEWs 32 and 33 were drilled with the CME-75. Two-inch cores were collected at each VEW, and the coreholes were subsequently reamed to 8 inches to total depth. Containments were constructed at each VEW location to manage cuttings derived from reaming. Cuttings were manually removed from the containment and placed in the rolloff for waste characterization and eventual management. VEW drilling is summarized in **Table 3.2**.

Table 3.2 Summary of VEW Drilling

VEW ID	Date Drilled	Total Depth (ft bgs)
AOC-VEW29	5/4/2011	44
AOC-VEW30	5/5/2011	30
AOC-VEW31	5/3/2011	45
AOC-VEW32	4/28/2011	28
AOC-VEW33	5/4/2011	32

Previous data from the SVE system at AOC-65 has indicated that the most productive VEWs are screened shallow (6 to 20 feet bgs) wells. Total depths (TDs) for the new VEWs are based on these data. Three of the VEWs have TDs of 25 feet bgs and the other two VEWs have TDs of 40 feet bgs. These deeper VEWs provide two additional monitoring points for the upper portion of the LGR formation while also being screened in the shallow more productive portion of the UGR.

3.3 GEOPHYSICAL LOGGING

Downhole video, caliper and natural gamma logging was completed for each new VEW and AOC-SIW02. Logging was conducted by GeoCam on May 6, 2011. The downhole videos are located in the accompanying DVDs and the logs for each of the VEWs are included in **Appendix B**.

3.4 WELL CONSTRUCTION

Construction of SIWs and VEWs occurred between April 11 and May 11, 2011. SIW construction was completed by GPI with surface completion installed by USA Environmental. VEWs were set by GPI and wellhead construction was completed by USA Environmental. The

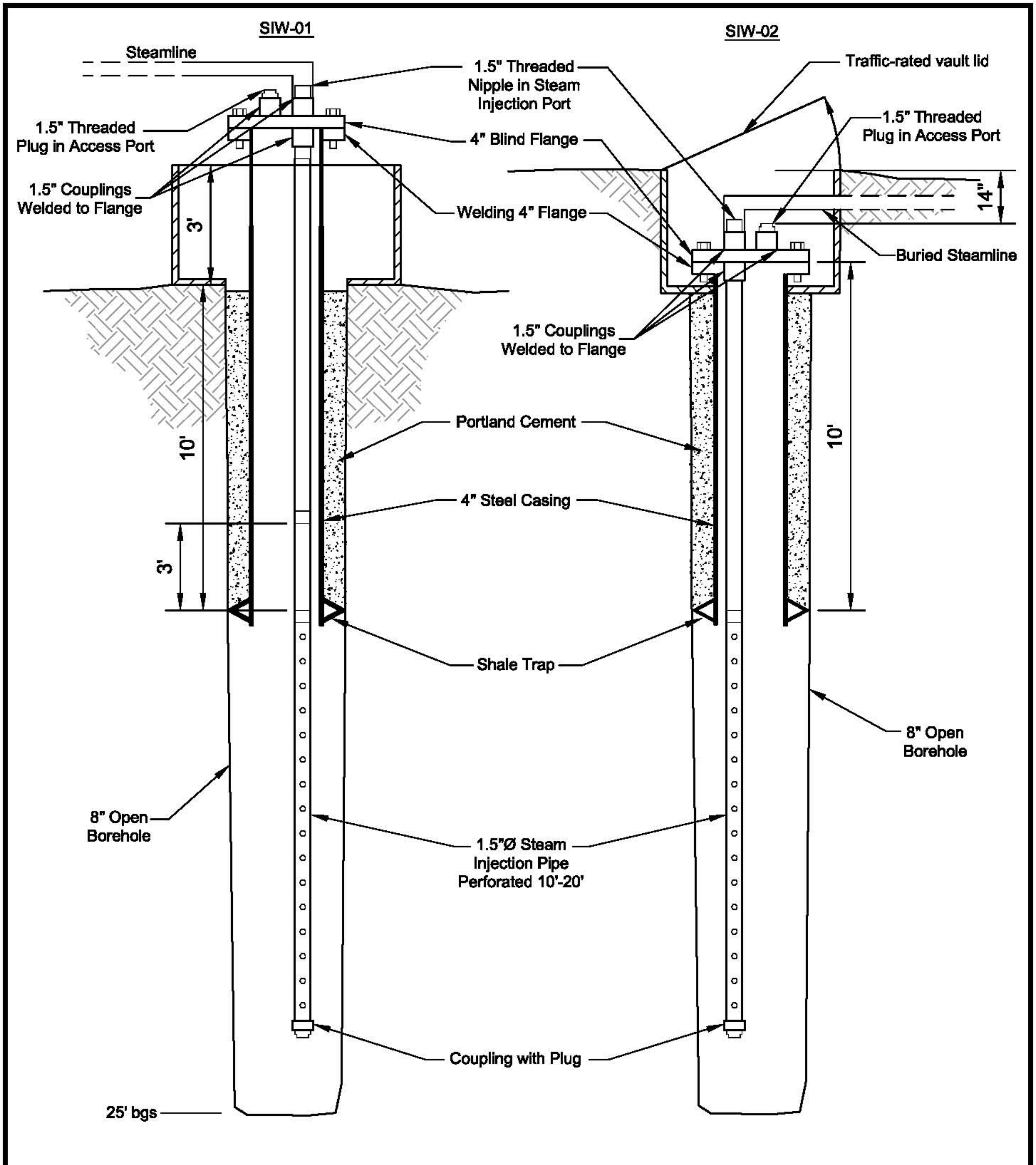
VEWs are 4-inch, flush-mount completed wells either roughly 25 or 40 feet in depth. SIWs are cased with 4-inch steel casing, and the wellheads were prefabricated and welded to the casing prior to installation. The wellheads are essentially two flanges bolted together: one welded to the casing and the second, a blind flange, bolted to the first. The blind flange has two 1.5-inch, threaded access ports, to attach the perforated steam injection pipe and steam line, and for access to the well for sampling or water level collection. A summary of the well construction details for SIWs and VEWs are provided in **Table 3.3**.

Table 3.3 Summary of SIW and VEW Well Construction

Well ID	**AOC-SIW01**	**AOC-SIW02**	**AOC-VEW29**	**AOC-VEW30**	**AOC-VEW31**	**AOC-VEW32**	**AOC-VEW33**
Easting (meters)	535,710.358	535,688.635	535,694.814	535,694.612	535,697.010	535,702.087	535,694.421
Northing (meters)	3,283,733.729	3,283,716.207	3,283,734.530	3,283,724.661	3,283,720.691	3,283,716.081	3,283,709.681
Elevation (ft MSL)	1223.37	1216.36	1218.30	1218.15	1218.44	1218.73	1218.10
Ground Elevation (ft MSL) (ground, asphalt, or vat base)	1220.12	1217.61	1218.17	1218.57	1218.86	1219.08	1218.55
Total Depth of Borehole (ft bgs) (8-inch diameter)	24.65	28.2	44	30	45	27.89	32
Well set depth/Open borehole depth (ft bgs)	24.65	28.2	40	25	40	25	25
Backplug (holeplug) (ft bgs)	---	---	42 - 44	---	42 - 45	---	---
Cement/grout	portland	portland	cement	cement	cement	cement	cement
Date drilled	4/7/2011	5/3/2011	5/4/2011	5/5/2011	5/3/2011	4/28/2011	5/4/2011
Date constructed	4/11/2011 - 4/12/2011	5/10/2011 - 5/11/2011	5/10/2011	5/9/2011	5/11/2011	5/9/2011	5/9/2011
Casing	13' steel (4"Ø)	10' steel (4"Ø)	5' sch. 40 PVC (4"Ø)	5' sch. 40 PVC (4"Ø)	5' sch. 40 PVC (4"Ø)	5' sch. 40 PVC (4"Ø)	5' sch. 40 PVC (4"Ø)
Screened Interval/ Perforation Interval (ft bgs)	10 - 20 (8-inch open borehole)	11.17 - 21.17 (8-inch open borehole)	5 - 40 (4-inch 0.040-slot PVC)	5 - 20 (4-inch 0.040-slot PVC)	5 - 40 (4-inch 0.040-slot PVC)	5 - 20 (4-inch 0.040-slot PVC)	5 - 20 (4-inch 0.040-slot PVC)
Sand - 8/16 (# bags to fill to 3 ft bgs)	---	---	19.5	13.75	19.5	10.5	16
Drilling Rig	Deeprock Ram10 (modified)	CME-75	Gardner-Denver 1500	Gardner-Denver 1500	Gardner-Denver 1500	CME-75	CME-75

3.4.1 Steam Injection Wells

The general design of the two SIWs is provided in **Figure 3.1**. Construction of these two wells was completed by GPI, however, the surface completion for AOC-SIW02 and the connection of the steam lines to each well were completed by USA Environmental and their subcontractors.



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Not to Scale

Figure 3.2

Typical Steam Injection Well Design

Camp Stanley Storage Activity

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Construction of AOC-SIW01 was completed on April 12, 2011. Originally, the well was due to be set inside the vat (below the floor level), but due to access concerns, the wellhead was instead installed above the top of the vat. To accommodate this, a 3-foot section of well casing was welded to the base of the 10-foot section of casing prior to installation (**Photo 3.2**). Similarly, an additional 3-foot section of black-iron pipe was added to the steam injection pipe. The casing was set 10 feet bgs (13 feet below the top of the vat) and a shale trap was used to cement the 4-inch steel casing in place. Portland cement was used rather than volclay to seal the well due to concerns regarding the effects the steam-injection operational temperatures might have on the integrity of Volclay. The cement was added in two lifts over a two-day period, and a total of 3.5 bags were used to cement up to ground surface. The upper portion of the wellhead consists of a 4-inch blind flange with a 1.5-inch-diameter, 23-foot-long steam injection pipe attached. The 23-foot-long black-iron, steam injection pipe is perforated from 13 to 23 feet to deliver steam to the open borehole (from 10 to 25 feet bgs). The top portion of the well head, with steam injection pipe attached, was lowered over the casing and bolted in place.

Photo 3.2 – Wellhead construction for AOC-SIW01.

Construction of AOC-SIW02 was completed on May 11, 2011. The area around the borehole was excavated to a depth of 18 inches to accommodate a 3-by-3-foot vault to house the wellhead and steam line, and to provide a slope for condensate in the steam line to drain into the well (**Photo 3.3**). The casing was set 11.17 feet bgs, with the top of casing at 14 inches bgs, and cemented in place with the aid of a shale trap. The cement was added in two lifts over a two-day period, and a total of 3 bags were used to cement up to the base of the excavation. The wellhead consists of a 4-inch flange with a 1.5-inch steam injection pipe attached. The black-iron, steam injection pipe is perforated from 10 to 20 feet to deliver steam to the open borehole (from 11.17 to 25 feet bgs).

The installation of the 3-by-3-foot traffic-rated vault at AOC-SIW02 and steam lines to both AOC-SIW01 and AOC-SIW02 were completed on June 10, 2011 (**Photo 3.4**). The height of the vault

Photo 3.3 – Wellhead construction for AOC-SIW02.

Photo 3.4 – Vault covering AOC-SIW01.

was cut down from 3 feet to 2 feet to fit within the excavation around AOC-SIW02, and a hole was cut in the side of the vault to allow access for the steam line. The steam line originates inside Building 90 where it taps into the existing "Summer" line near the vat (**Figure 3.2**). The steam line then enters the vat where it splits to each of the SIWs. The steam line exits Building 90 through a drain line within the vat. Once outside, the steam line runs south underneath the loading dock before it turns west toward AOC-SIW02. The steam line is buried within the trench excavated for the installation of the VEWs 32 and 33. The steam line is insulated where above ground to prevent burns from incidental contact.

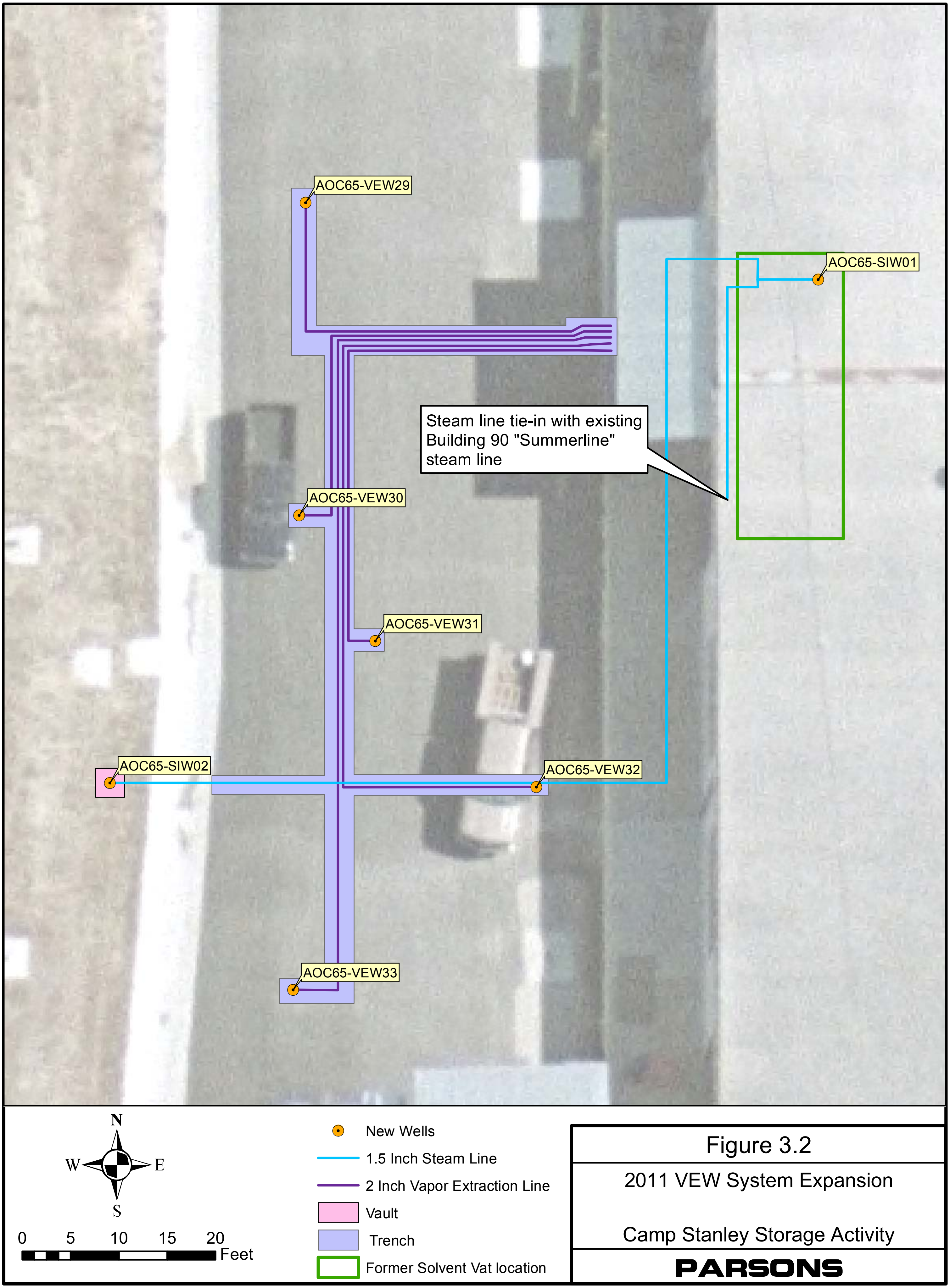

Figure 3.2

2011 VEW System Expansion

Camp Stanley Storage Activity

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3.4.2 Vapor Extraction Wells

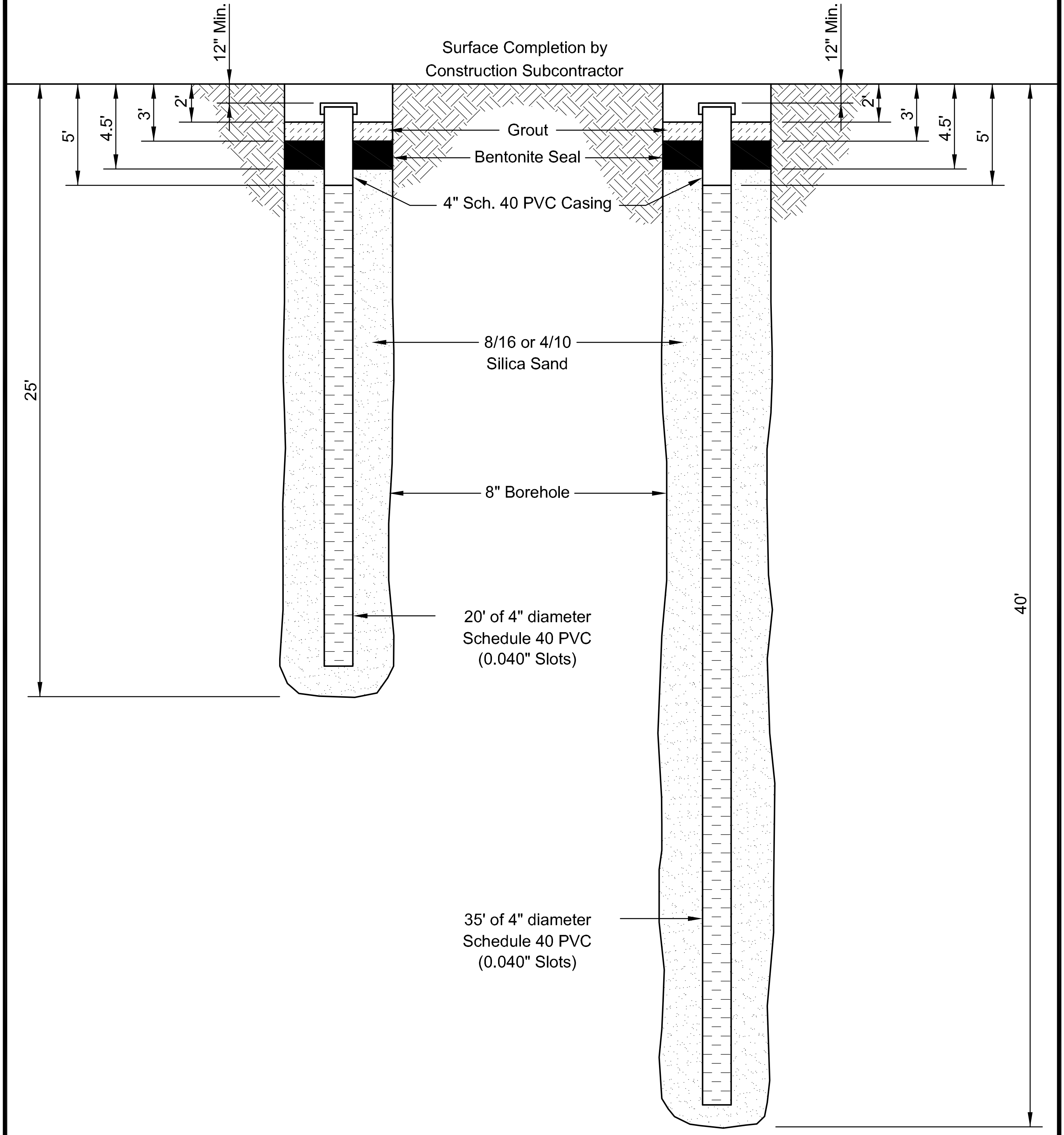
VEWs were constructed in two phases. The first phase included setting the well materials and adding sand and bentonite up to 3 feet bgs. This phase was completed for all VEWs by May 11, 2011. The typical VEW design for both the 25-foot and 40-foot VEWs is provided on **Figure 3.3**. The second phase of construction included excavation of a trench for the installation of vapor extraction lines, wellhead construction, and surface completion; and this phase was completed for all VEWs by June 10, 2011. The typical VEW wellhead construction design is provided on **Figure 3.4**.

AOC-VEW29 (**Photo 3.3**) is installed in a 44-foot-deep, 8-inch-diameter borehole. One bag of holeplug was used to fill the bottom of the borehole to 42 feet bgs. 8/16 sand was then added to 40 feet bgs. The well material consisted of 35 feet of 4-inch schedule 40 PVC with 0.040-inch factory-slotted screen followed by 5 feet of 4-inch schedule 40 PVC casing. The annulus was filled with 19.5 bags of sand up to 4.5 feet bgs. One-half bag of bentonite chips was then added to 3 feet bgs.

Photo 3.3 – Installation of AOC-VEW29 (photo is representative of all VEWs in this report).

AOC-VEW30 is installed in a 30-foot-deep, 8-inch-diameter borehole. 8/16 sand was added to 25 feet bgs. The well material consisted of 20 feet of 4-inch schedule 40 PVC with 0.040-inch factory-slotted screen followed by 5 feet of 4-inch schedule 40 PVC casing. The annulus was filled with 13.75 bags of sand up to 4.5 feet bgs. One-quarter bag of bentonite chips was then added to 3 feet bgs.

AOC-VEW31 is installed in a 44.7-foot-deep, 8-inch-diameter borehole. 1.25 bags of holeplug were used to fill the bottom of the borehole to 42 feet. 8/16 sand was then added to 40 feet bgs. The well material consisted of 35 feet of 4-inch schedule 40 PVC with 0.040-inch factory-slotted screen followed by 5 feet of 4-inch schedule 40 PVC casing. The annulus was filled with 19.5 bags of sand to 4.5 feet bgs. One-half bag of bentonite chips was added to 3 feet bgs.



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Not to Scale

Figure 3.3

Typical Vapor Extraction Well Design

Camp Stanley Storage Activity

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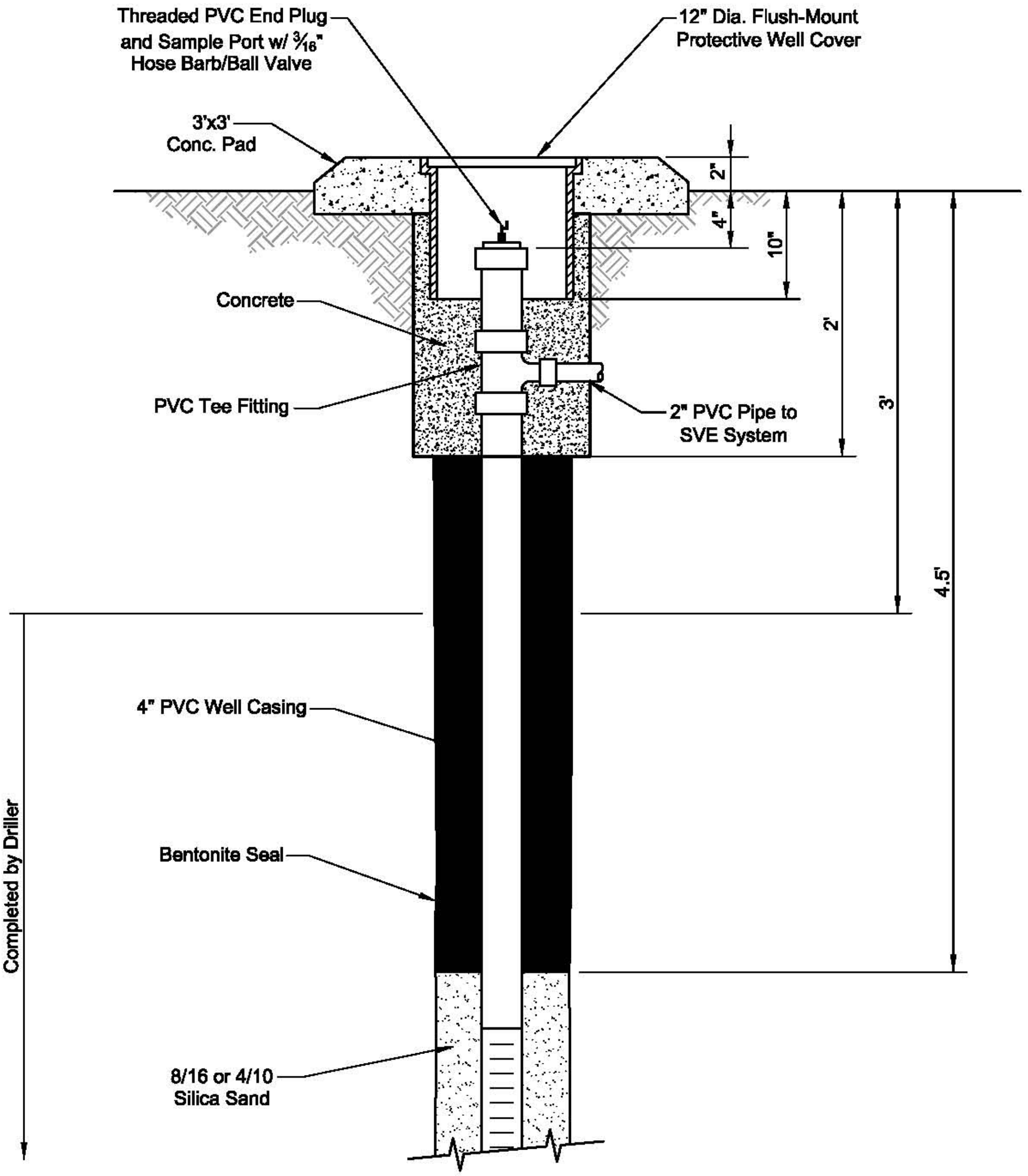

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Not to Scale

Figure 3.5

Typical Vapor Extraction Well
Well Head Design

Camp Stanley Storage Activity

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AOC-VEW32 is installed in a 27.89-foot-deep, 8-inch-diameter borehole. 8/16 sand was then added to 25 feet bgs. The well material consisted of 20 feet of 4-inch schedule 40 PVC with 0.040-inch factory-slotted screen followed by 5 feet of 4-inch schedule 40 PVC casing. The annulus was filled with 10.5 bags of sand up to 4.5 feet bgs. One-half bag of bentonite chips was then added to 3 feet bgs.

AOC-VEW33 is installed in a 33-foot-deep, 8-inch-diameter borehole. 8/16 sand was then added to 25 feet bgs. The well material consisted of 20 feet of 4-inch schedule 40 PVC with 0.040-inch factory-slotted screen followed by 5 feet of 4-inch schedule 40 PVC casing. The annulus was filled with 16 bags of sand up to 4.5 feet bgs. One-half bag of bentonite chips was then added to 3 feet bgs.

During the second phase of construction, a trench was excavated originating from the Exterior SVE system manifold to each of the new VEWs (**Photos 3.4 and 3.5**). The trench was excavated such that the PVC connecting each VEW to the manifold maintained a grade toward the well allowing any condensate generated would drain to a VEW and not remain in the lines.

Photo 3.4 - AOC-65 asphalt prior to trenching.

Photo 3.5- PVC lines to VEWs originating from Building 90 exterior manifold.

The PVC well casing was cut at various depths (depending on the depth of the trench) and a 4-inch-to-2-inch PVC tee fitting was attached to each. Two-inch PVC pipe was installed connecting each VEW at the tee connection to the manifold located on the western dock at Building 90 (Figure 3.2). The trench was backfilled with road base and 1.5 bags of bentonite chips were added at each VEW location. The bentonite chips were hydrated and 12-inch-diameter traffic rated flush-mount vaults were cemented in place. The vaults extend 2 inches above the road surface, and the top of casing for each VEW lie 6 inches below the vault lid. A threaded PVC end plug is affixed to the tops of the casing; a sample port was drilled through the plug and a 3/16-inch hose barb and ball-valve was attached.

3.5 SAMPLING RESULTS

After the vat was cored to expose the soil, and prior to initiating drilling inside the vat, two soil samples were collected. The two samples were collected from 0 to 6 inches and from 6 to 8 inches, and analyzed for VOCs. Results of the two samples indicated PCE concentrations of 0.015 and 0.010 milligrams per kilogram (mg/kg), respectively. Two samples of the core were also sent for VOC analysis. As the core was recovered, each section was screened using a PID. Two sections indicated TVH readings of 1.5 and 9.1 ppm. These two sections were from 8 to 8.5 and 23.5 to 24 feet. Both sections of core were sent for VOC analysis and both resulted in non-detect results for PCE.

One water sample was collected from AOC-SIW01. This last sample was collected from accumulated water in the borehole following reaming and sent for VOC analysis. The results of the water sample indicated a positive result for PCE (272.71 micrograms per liter [µg/L]). These data are included in Appendix E and are summarized in **Table 3.4**.

Table 3.4 Summary of AOC-SIW01 Sampling

Date	Depth (ft)	Media	PCE
4/5/2011	0-0.5	Soil	0.015 mg/kg
4/5/2011	0.5-0.75	Soil	0.010 mg/kg
4/6/2011	8-8.5	Core	BDL (0.008 mg/kg)
4/6/2011	23.5-24	Core	BDL (0.008 mg/kg)
4/11/2011	20.5	Groundwater	272.71 µg/L

BDL = Below detection limits, the detection limits are shown in parentheses.

Cuttings derived from drilling activities associated with the five VEWs and AOC-SIW02 were managed at Covel Gardens Landfill, along with asphalt and construction debris resulting from trenching and VEW installation activities, following waste characterization.

SECTION 4
SWMU B-3 WELL INSTALLATION

4.1 DETERMINATION OF WELL LOCATIONS

Two additional extraction wells, B3-EXW03-LGR and B3-EXW04-LGR, were installed on the west side of the SWMU B-3 bioreactor as part of this drilling effort. The purpose of these wells is to capture additional contaminated groundwater for the bioreactor. Previous analytical samples collected west of the suspected source area have confirmed the migration of VOCs in that direction, and the new extraction wells were placed in locations that best utilized the local groundwater gradient and CSSA's geologic substructure. **Figure 4.1** shows the location of these wells and their relationship to the Bioreactor.

4.2 DRILLING AND GEOPHYSICAL LOGGING

The wells were drilled using the same methodology previously described in Section 2.2 of this report; however, since the purpose of the extraction wells is different than that of the monitoring wells, the final well design is different than was previously described. The well design of the extraction wells is described in Section 4.4.

Geophysical logging was conducted May 25, 2011 on well B3-EXW03-LGR and on June 16, 2011 for well B3-EXW04-LGR. The logging was performed by GeoCam, Inc of San Antonio. GeoCam deployed tools that collected spontaneous potential, resistivity, natural gamma, and a caliper. A separate borehole camera survey was also performed on each of the borings.

4.2.1 B3-EXW03-LGR

Drilling for B3-EXW03-LGR began on May 18, 2011 and was completed on May 24, 2011. The total drilled depth of the well was 350 feet bgs even though the planned depth was approximately 330 feet. The reason for the additional footage was because the true location of the BS/LGR contact could not be determined by the drill cuttings that were recovered. The area surrounding the proposed drilling locations is highly faulted and the field geologist, as well as the experienced driller, had difficulty visually identifying the true contact.

The well was geophysically logged on May 25, 2011 and the contact between the BS and the LGR was determined to be at 321 feet bgs. The boring was backfilled to 340 feet bgs and the surface casing was set on May 26, 2011. A pump test was performed on June 15, 2011 to determine the best pump application for the treatment system.

The survey data showed that the chosen well locations intersect subsurface fault features as both the caliper and borehole camera data indicated many fractured zones throughout the boring. The video confirmed that the borehole was highly faulted with large vertical fractures that intersected with the lithologic contact of the Bexar Shale.

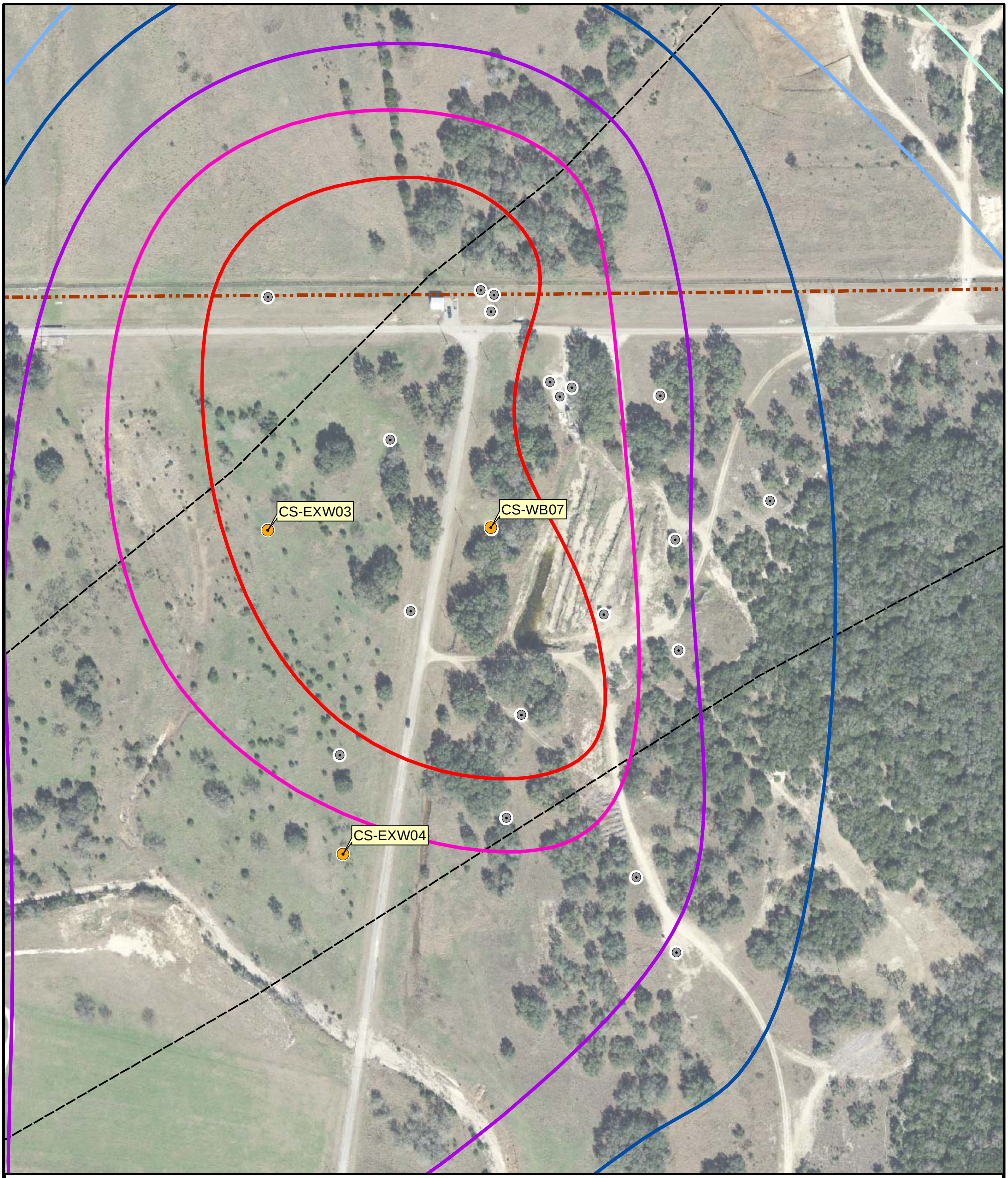

Figure 4.1

New and Rehabilitated Wells
B-3 Area

Camp Stanley Storage Activity

PARSONS

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4.2.2 B3-EXW04-LGR

Drilling for B3-EXW04-LGR began on June 1, 2011 and was completed on June 10, 2011. The total drilled depth of the well was 335 feet and the BS/LGR contact was determined to be 317 feet bgs. The contact was identified by the geophysical logging that was conducted on June 13, 2011. The camera survey conducted at that time also showed a shallow weeping cavity at 21 feet bgs. A grab sample of this fluid was collected from the shallow cavity after the reaming for the surface casing was completed. After several unsuccessful attempts were made on June 14th and 15th, the field team was successful at obtaining a sample from the zone.

The surface casing was set on June 15, 2011 and well development began the following day. A pump test was performed on June 21, 2011 to determine the best pump application for the treatment system.

4.3 WELL CONSTRUCTION

Extraction wells, unlike monitoring wells, are designed to remove large volumes of media from the subsurface and not just the small quantities needed for analytical evaluation. Therefore, the wells were designed in an “open borehole” fashion with the only installed well material consisting of Schedule 80 PVC surface casing to protect against surface contamination. A summary of well construction details is provided in **Table 4.1**.

Each well was initially drilled with an 8-inch bit and later reamed with a 12-inch bit to facilitate the installation of the 8-inch diameter surface casing. The surface casing was set in place by utilizing a shale trap to hold the Volclay grout that was placed into the annular space with a tremmie pipe.

Well B3-EXW03-LGR (**Photo 4.1**) was designed with a surface casing of 55 feet bgs, and well B3-EXW04-LGR (**Photo 4.2**) was designed with a 65 foot (bgs) surface casing. The final surface completion for each will be constructed under a separate contract, and will include a 10-foot square pad, equipment stanchion, and operational controls for inclusion into the SWMU B-3 bioreactor.

Photo 4.1 – Completed B3-EXW03-LGR

Photo 4.2 – Completed B3-EXW04-LGR

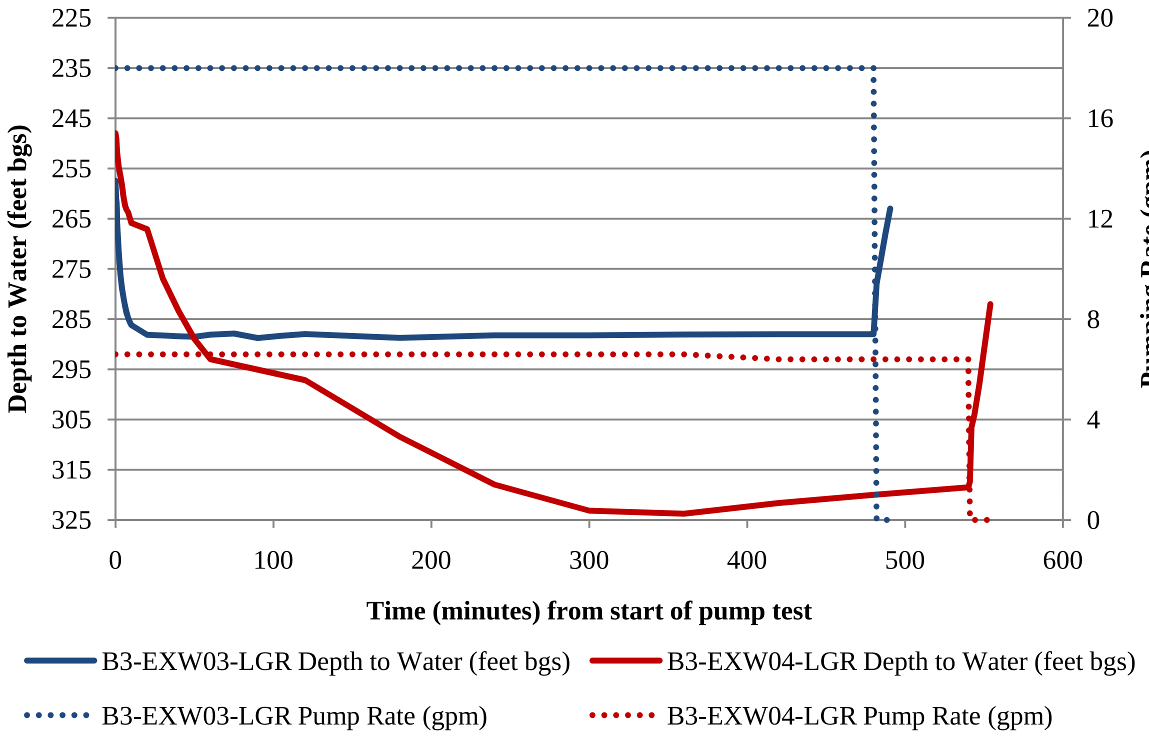
Table 4.1 Summary of Extraction Well Construction

Well ID	EXW-03	EXW-04
Easting (meters)	537,145.031	537,191.735
Northing (meters)	3,286,694.994	3,286,493.127
Elevation (ft MSL)	1234.73	1228.14
Ground Elevation (ft MSL) (ground, asphalt, or vat base)	1229.78	1222.94
Total Depth of Borehole (ft bgs) (8-inch diameter)	350	335
Well set depth/Open borehole depth (ft bgs)	340	335
Backplug (holeplug) (ft bgs)	340 - 350	---
Casing Cement	Volclay	Volclay
Date drilled	5/18/2011 - 5/24/2011	6/1/2011 - 6/14/2011
Date constructed	5/26/2011 - 6/1/2011	6/15/2011 - 6/16/2011
Casing	65 ft PVC (8-inch diameter)	55 ft PVC (8-inch diameter)
Open Interval	65-340 (8-inch open borehole)	55-335 (8-inch open borehole)
Drilling Rig	Gardner-Denver 1500	Gardner-Denver 1500

4.4 PUMPING TESTS

Pump tests were performed at each of the newly drilled extraction wells at SWMU B-3. Pump tests provide data essential to understand the general hydraulic properties of the aquifer at that location, and ultimately aid in the decision making process for pump selection for each well. For each of these tests, a submersible pump, capable of pumping up to 75 gpm, was installed approximately 10 feet above the bottom of the borehole. An initial water level measurement was collected prior to pumping and multiple measurements were collected during the test. The pump test at B3-EXW03-LGR was conducted on June 15, 2011 and included the sustained pumping of the well at 18 gpm for eight hours. The pump test at B3-EXW04-LGR was conducted on June 21, 2011 and was initially pumped at 6.6 gpm, but the rate was lowered to 6.4 gpm during the latter stages of the test due to continued drawdown. The pump test at B3-EXW04-LGR lasted for nine hours. Results of the two pump tests are graphically depicted in **Figure 4.2**. Based on the results of the pump tests, a Grundfos 5-hp pump was selected for both wells. The pump specifications for each well are listed in **Appendix F**.

Figure 4.2 Pumping Test Data for Installed SWMU B-3 Extraction Wells



4.5 SAMPLING RESULTS

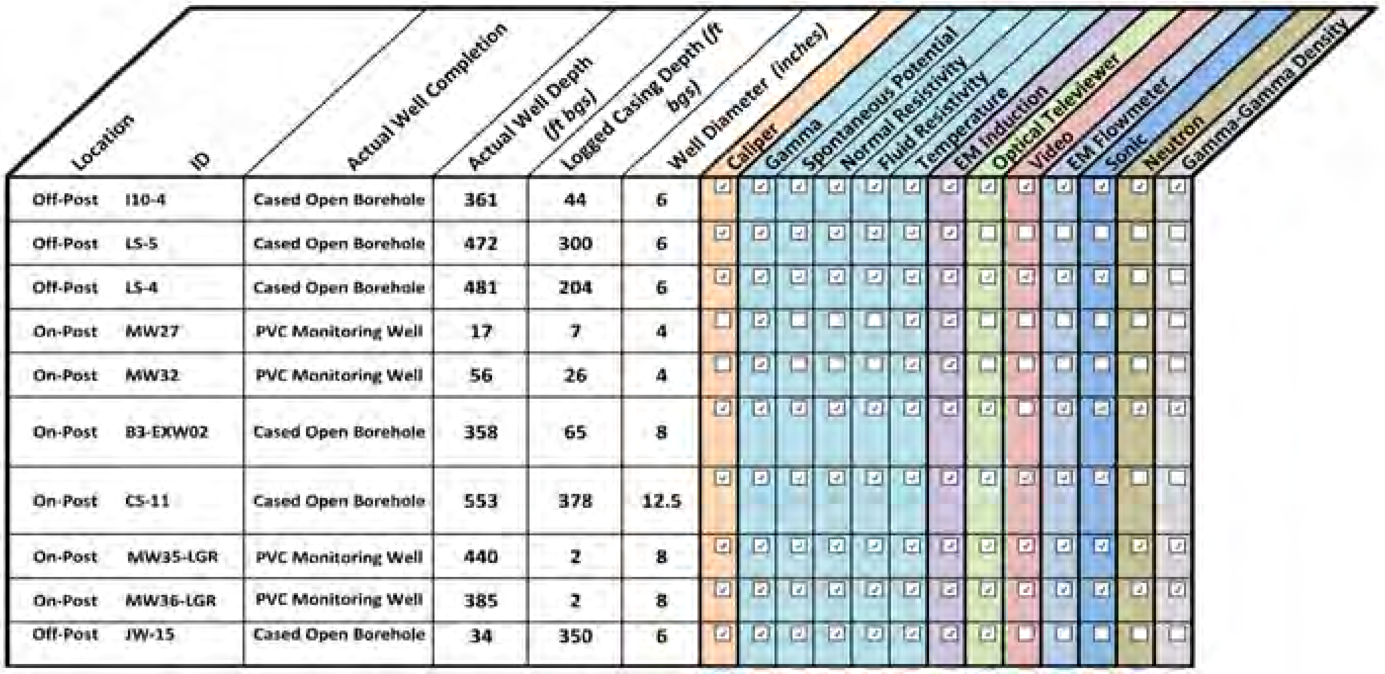
One analytical sample was collected from the groundwater in the extraction wells, and that was the sidewall sample collected in B3-EXW04-LGR at 21 feet. The sample was analyzed for VOCs, and results showed no detectable contaminants of concern (COCs) were present. All other analytical data were for the characterization of the IDM. The analytical results of those samples are listed in **Appendix E**.

SECTION 5
USGS WELL LOGGING SERVICES

5.1 BOREHOLE GEOPHYSICS

Under direct contract with CSSA, the USGS conducted borehole geophysics in a select number of on- and off-post wells in order to further define the hydrostratigraphic model of the Middle Trinity Aquifer (**Figure 5.1**). The borehole logging activities included the standard suite of geophysical methods, advanced video imaging, and nuclear logging tools to aid in the estimation of stratigraphy, porosity, and permeability. Parsons and their subcontractors provided logistical support for activity coordination and well access. In order to facilitate such access, pumps were pulled from wells LS-5, B3-EXW02-LGR, and OFR-1. Pulling pumps from wells for USGS provided an opportunity for well servicing including the replacement of the pump and well controls at LS-5. While this work was not directly contracted by Parsons, the results are included in this report for completeness and documentation purposes. USGS is combining this newly-acquired data with existing geologic data from CSSA to build a three-dimensional (3D) visualization model using the EarthVision software. Geophysical logs and associated video for the surveyed wells are included in **Appendix B**.

Figure 5.1 CSSA Wells Surveyed by USGS in 2011



Location	ID	Actual Well Completion	Actual Well Depth (ft bgs)	Logged Casing Depth (ft bgs)	Well Diameter (inches)	Caliper	Gamma	Spontaneous Potential	Normal Resistivity	Fluid Resistivity	Temperature	EM Induction	Optical Televiewer	Video	EM Flowmeter	Sonic	Neutron	Gamma-Gamma Density
Off-Post	I10-4	Cased Open Borehole	361	44	6	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Off-Post	LS-5	Cased Open Borehole	472	300	6	☑	☑	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐
Off-Post	LS-4	Cased Open Borehole	481	204	6	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☐	☐
On-Post	MW27	PVC Monitoring Well	17	7	4	☐	☑	☐	☐	☐	☑	☑	☐	☐	☐	☐	☐	☐
On-Post	MW32	PVC Monitoring Well	56	26	4	☐	☑	☐	☐	☐	☑	☑	☐	☐	☐	☐	☐	☐
On-Post	B3-EXW02	Cased Open Borehole	358	65	8	☑	☑	☑	☑	☑	☑	☑	☑	☐	☑	☑	☑	☑
On-Post	CS-11	Cased Open Borehole	553	378	12.5	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☐	☐
On-Post	MW35-LGR	PVC Monitoring Well	440	2	8	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
On-Post	MW36-LGR	PVC Monitoring Well	385	2	8	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Off-Post	JW-15	Cased Open Borehole	34	350	6	☑	☑	☑	☑	☑	☑	☑	☑	☐	☐	☐	☐	☐

SECTION 6
CS-1 PUMP REPLACEMENT

6.1 FIELD NARRATIVE

CS-1 is one of three (also CS-10 and CS-12) public supply wells that provide water to CSSA. On June 8, 2011 the pump at CS-1 began to malfunction resulting in periodic pump shut downs. At least two of the supply wells are required to maintain the reservoir at CSSA at any given time to ensure service. At the time CS-1 began to malfunction, CS-12 was experiencing chlorinator problems and was not in service. GPI visited CS-1 and identified deficiencies in the electrical panel controlling the CS-1 pump; specifically, the thermal overload conductors were not operating correctly. CSSA decided to continue to use CS-1 until the chlorinator at CS-12 could be repaired before replacing the pump and pump motor at CS-1.

Following the repair of CS-12 and at the direction of CSSA, repairs for well CS-1 began on June 21, 2011. The pump, pump motor, and 19 joints of 21-foot column pipe were pulled and inspected. New column pipe was ordered to replace all existing pipe. Once the pump was pulled, GeoCam collected downhole imaging of CS-1, and USGS collected various geophysical data to create a comprehensive log of the well (**Appendix B**). A new 15-hp Franklin Electric pump motor and submersible pump was installed with new THW4 double-jacketed wire and the new column pipe. The pump was set at 399 feet bgs, the same depth at which it was originally set, with the pump motor at 404 feet bgs. The electrical panel and well control panel are scheduled to be replaced following a redesign of the pump house and chlorination system at CS-1. The new design calls for the same electrical panels and chlorinator system that were installed at CS-12.

Prior to returning CS-1 to service, the borehole and column pipe were disinfected with sodium hypochlorite. National Sanitation Foundation (NSF)-approved chlorine was mixed with approximately 3,000 gallons of water from CS-10. One half of the chlorine batch was pumped into CS-1, and the rest was allowed to gravity feed overnight into the well. The following morning, approximately 11,760 gallons of water was purged from the well, reducing the chlorine concentration. Following the initial 11,760-gallon purge, the chlorine concentration was 2.9 ppm and the nearby fire suppression line was charged with purged well water so that it could be accessed for use via a nearby fire hydrant for construction efforts on-post. The well continued to pump through the afternoon at which time the chlorine concentration had been reduced to 0.03 ppm at the well and 0.9 ppm at the fire hydrant. Purging continued the following two days with 12,000 and 9,962 gallons purged, respectively, each day and chlorine concentrations ranging from 0.02 to 0.08 ppm. The next day the chlorine concentration at the well was 0.0 ppm, the pump was set to auto, and CSSA staff continued to sample for chlorine.

In accordance with TCEQ regulations, the raw well water was sampled for the presence of coliforms and *Escherichia coli* (*e.coli*) bacteria for 3 consecutive days (June 27-29, 2011) following the purging of the disinfection treatment. All three samples confirmed that coliforms were not present in the CS-1 borehole and groundwater. The well was returned to service on July 1, 2011.

6.2 GEOPHYSICAL LOGGING

Geophysical logging at CS-1 was completed on June 22, 2011 by the USGS, and included gamma, resistivity, spontaneous potential, caliper, and optical televiewer logs. Prior to geophysical logging, GeoCam conducted a borehole video survey to inspect the condition of the well, from which no anomalies were noted at the time. Both the downhole video and geophysical log are located in **Appendix B**.

6.3 EQUIPMENT REPLACEMENT

The replacement pump motor is a 15-hp Franklin Electric, Sand Fighter type motor (model number 2366038120). The replacement pump is also a Franklin Electric brand (model number 70SR15F6A-1563). New wire was installed with the new pump and pump motor. The wire is type THW4, double-jacketed wire (#4-3 with ground). Nineteen new joints of 3-inch galvanized steel pipe were installed with the new pump, motor, and wire. Two, one-inch diameter PVC access tubes were installed to 399 feet bgs to provide access for water level instrumentation to gauge the level of the groundwater. Specifications for the pump and pump motor are included in **Appendix F**.

SECTION 7
CS-WB07 REPAIR

7.1 BACKGROUND

In May 2011, during the course of normal monthly groundwater sampling at Westbay well CS-WB07 (Figure 4.1), the communication cable, which connects the sample probe and four full sampling tubes to the reel, broke off within the cablehead housing. The separated probe, sample tubes, and cablehead housing fell approximately 50 feet into the casing before hitting water at approximately 254 feet bgs. Per standard Westbay well construction, the water inside the casing was added at the time of original installation to submerge the fully-constructed well into the water column within the borehole and verify the materials were leak-proof. When the sampling assembly struck the interior water column, its components (probe and tubes) broke apart and became wedged within the well casing.

Initially, field staff believed that no damage had occurred to the well, and that retrieval of the probe and sample tubes would allow CS-WB07 to be returned to service. Retrieval tools designed to latch onto the spearhead (located at the top of the cablehead housing) were shipped from the manufacturer (Schlumberger Water Services [SWS]), and the recovery of the probe and all sample tubes was achieved.

Following the retrieval effort, and as part of returning CS-WB07 to service, normal pressure profiling was conducted. While the probe was being lowered, resistance was met near the location where the tool and tubes were recovered, however, with some effort, the probe was lowered to the bottom zone (LGR-04) and profiling commenced. It was noted at that time that the inside pressure at that zone was significantly different from previous profile readings. Similarly, both the inside and zone pressure readings for the next zone (LGR-03B) were different from previous profiles. These pressure differences suggested that the casing had been compromised. Upon reeling the probe up to the next zone, the probe again became wedged within the casing. As the probe was still attached to the reel, retrieval tools were not required.

In order to free the probe, the reel was removed from the tripod and bolted onto a trailer approximately one foot off the ground. A second pulley was attached to the protective well cover, also approximately one foot off the ground, and the communication cable was run through both pulleys. Cranking the reel with the mechanical advantage of two pulleys freed the probe from the obstruction. Once the probe was freed the second time, the decision was made to remove CS-WB07 from service until the integrity of the well could be investigated.

Downhole imaging was performed by GeoCam to ascertain the condition of the well and determine the source of the obstruction that caused the probe to become stuck the second time (**Appendix B**). Nothing unusual was noted until the camera reached the water inside the casing, at which point pieces of PVC well material were observed floating in the water column. It was also noted that there appeared to be a section that had a slightly larger diameter than the rest of the well near the original water level. Several of these pieces of PVC were curved such that, as the camera pushed them down the well, they would lie flat against the inner wall of the well. When this occurred, the camera would have to knock it loose in order to proceed. It is theorized that, when profiling, the probe was able to move past the pieces of PVC material, but as the probe was reeled in, one of the larger pieces laid flat against the casing, and the additional thickness caused the 1.25-inch probe to become wedged inside the 1.5–inch-diameter well. Pieces of PVC and a section with an apparently larger diameter indicated the casing had separated, and the increase in water within the casing (noted during profiling and observed in downhole imaging) confirmed that the casing was compromised and would require replacement.

7.2 CS-WB07 REMOVAL/RECOVERY

Efforts to remove the damaged casing began on July 18, 2011. Earth Data Northeast, Inc. (EDN) was subcontracted to provide technical support for the removal and installation of the well components, and GPI was subcontracted to remove the damaged casing and install the new well materials. Efforts to remove the damaged well were supervised by a Parsons geologist. A specialized packer deflation tool, provided by SWS, was attached to the communication cable reel and sent downhole. Arriving at the top packer location (5 to 10 feet bgs), the tool was pulled up, deploying a small blade that perforated the casing thereby deflating the packer. Sagging of the well casing at the surface provided visual confirmation of packer deflation. The casing was suspended by a water well service rig (SMEAL) to ensure that no further sagging would occur as subsequent packers were deflated. Three other packers (located 25 to 30, 100 to 105, and 185 to 190 feet bgs) all above the damaged section were similarly deflated. Attempts to perforate the deepest packer, located 267 to 272 feet bgs, with the entire well material still in place were unsuccessful, as the separated sections were no longer aligned and the perforation tool could not be lowered to the appropriate depth.

The upper section of intact well material was pulled so the lower section could be accessed. Inspection of the casing indicated that the inside portion of the coupler located at 247 feet bgs had broken off. The break compromised the integrity of the well and allowed formation water to enter the casing. Accessing the lower section of well material required GPI to fabricate a recovery “fishing” tool that would engulf the casing so the perforation tool could be lowered to the final packer location. Once perforated, a second fishing tool was used to retrieve the rest of the damaged well materials. The last joint of well material contained pieces of PVC, seen in the downhole video, indicating that little, if any, foreign objects were left in the borehole. By July 22, 2011, all components of the Westbay well had been removed leaving and open borehole, approximately 336 feet deep.

7.3 CS-WB07 REPLACEMENT

Replacement of well materials in CS-WB07 began on July 22, 2011 by EDN with assistance from GPI and supervision by a Parsons geologist. Prior to installation, all well components were arranged from deepest to shallowest and numbered in order of installation following the original well design. Each casing component was visually inspected for any damage or defect, and all couplings were pressure tested to confirm a hydraulic seal prior to installation.

Once all well components were lowered, the water level inside the casing was monitored for over an hour to confirm hydraulic integrity. Assured that there were no leaks, the casing string was positioned for final emplacement and secured for packer inflation. Prior to packer inflation, a pressure profile was performed to ensure proper operation and location of sample ports and magnetic collars. Schlumberger's vented inflation tool and clean water was used to inflate the packers sequentially, beginning at the bottom. Following packer inflation, a second pressure profile was conducted to ensure intervals between packers were isolated. The EDN completion report for the installation of CS-WB07 well components is provided in **Appendix C**.

APPENDIX A

State of Texas Well Reports

STATE OF TEXAS WELL REPORT for Tracking #265236

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**CS-MW35-LGR**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 RALPH FAIR ROAD** **Boerne , TX 78015**	Latitude:	**29° 40' 43" N**
Well County:	**Bexar**	Longitude:	**098° 37' 43" W**
Elevation:	**1178 ft.**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **3/15/2011** Completed: **3/21/2011**
Diameter of Hole:	Diameter: **7-7/8 in From Surface To 440 ft**
Drilling Method:	**Air Rotary**
Borehole Completion:	Gravel Packed From: **400 ft to 432 ft** Gravel Pack Size: **8/16**
Annular Seal Data:	1st Interval: **From 0 ft to 2 ft with 1-Cement (#sacks and material)** 2nd Interval: **From 2 ft to 395 ft with 44-Bent. Grout (#sacks and material)** 3rd Interval: **From 395 ft to 400 ft with 4-BentonitePlug (#sacks and material)** Method Used: **Pumped via Tremie** Cemented By: **Lee Gebbert** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Slab Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing left in well: Cement/Bentonite left in well: From (ft) To (ft) From (ft) To (ft) Cem/Bent Sacks Used **Plug Back with 4 sks Bentonite Plug from 440 to 432**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **Fresh** Depth of Strata: **No Data** Chemical Analysis Made: **No** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Geoprojects International, Inc.** **8834 Circle Drive** **Austin , TX 78736**
Driller License Number:	**2525**
Licensed Well Driller Signature:	**Lee Gebbert**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #**265236**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 102 Limestone, Upper Glen Rose Formation
102 to 432 Limestone, Lower Glen Rose Formation
432 to 440 Shale, Bexar Shale Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New SCH 80 Flush Joint Threaded (FJT) PVC Casing set from +3 to 405
4 New 304SSWWRB FJT Screen set from 405 to 430 with 0.040-inch slot

STATE OF TEXAS WELL REPORT for Tracking #265239

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**CS-MW36-LGR**
Address:	**25800 Ralph Fair Road Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 RALPH FAIR ROAD Boerne , TX 78015**	Latitude:	**29° 40' 59" N**
Well County:	**Bexar**	Longitude:	**098° 37' 52" W**
Elevation:	**1220 ft.**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:
Started: **3/23/2011**
Completed: **3/30/2011**

Diameter of Hole:
Diameter: **7-7/8 in From Surface To 385 ft**

Drilling Method:
Air Rotary

Borehole Completion:
Gravel Packed From: **372 ft to 340 ft**
Gravel Pack Size: **8/16**

Annular Seal Data:
1st Interval: **From 0 ft to 2 ft with 1-Cement (#sacks and material)**
2nd Interval: **From 2 ft to 335 ft with 33-Bent. Grout (#sacks and material)**
3rd Interval: **From 335 ft to 340 ft with 4-BentonitePlug (#sacks and material)**
Method Used: **Pumped via Tremie**
Cemented By: **Lee Gebbert**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion:
Surface Slab Installed

Water Level:
Static level: **No Data**
Artesian flow: **No Data**

Packers:
No Data

Plugging Info:
Casing left in well: Cement/Bentonite left in well:
From (ft) To (ft) From (ft) To (ft) Cem/Bent Sacks Used
Plug Back with 6 sks Bentonite Plug from 385 to 372

Type Of Pump:
No Data

Well Tests:
No Data

Water Quality:
Type of Water: **Fresh**
Depth of Strata: **No Data**
Chemical Analysis Made: **No**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data:
The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Geoprojects International, Inc.
8834 Circle Drive
Austin , TX 78736

Driller License Number:
2525

Licensed Well Driller Signature:
Lee Gebbert

Registered Driller Apprentice Signature:
No Data

Apprentice Registration Number:
No Data

Comments:
No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Please include the report's Tracking number (Tracking #**265239**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 38 Limestone, Upper Glen Rose Formation
38 to 371 Limestone, Lower Glen Rose Formation
371 to 385 Shale, Bexar Shale Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New SCH 80 Flush Joint Threaded (FJT) PVC Casing set from +3 to 345
4 New 304SSWWRB FJT Screen set from 345 to 370 with 0.040-inch slot

STATE OF TEXAS WELL REPORT for Tracking #264621

Owner: **Camp Stanley Storage Activity**

Owner Well #: **SIW-01**

Address: **25800 Ralph Fair Road**
Boerne , TX 78015

Grid #: **68-19-6**

Well Location: **25800 Ralph Fair Road**
Boerne , TX 78015

Latitude: **29° 40' 59" N**

Well County: **Bexar**

Longitude: **098° 37' 52" W**

Elevation: **1220 ft.**

GPS Brand Used: **Garmin**

Type of Work: **New Well**

Proposed Use: **Injection**

Drilling Date:
Started: **4/5/2011**
Completed: **4/7/2011**

Diameter of Hole:
Diameter: **7-7/8 in From Surface To 25 ft**

Drilling Method: **Air Rotary**

Borehole Completion: **Open Hole**

Annular Seal Data:
1st Interval: **From 0 ft to 2 ft with 1-Cement (#sacks and material)**
2nd Interval: **From 2 ft to 13 ft with 2-Bent. Grout (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Pumped from surface**
Cemented By: **Lee Gebbert**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level:
Static level: **No Data**
Artesian flow: **No Data**

Packers: **Rubber Shale Trap at 13-ft**

Plugging Info:
Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump: **No Data**

Well Tests: **No Data**

Water Quality:
Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data:
The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Geoprojects International, Inc.
8834 Circle Drive
Austin , TX 78736

Driller License Number: **2525**

Licensed Well Driller Signature: **Lee Gebbert**

Registered Driller Apprentice Signature: **No Data**

Apprentice Registration Number: **No Data**

Comments: **No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Please include the report's Tracking number (Tracking #**264621**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 25 Limestone, Lower Glen Rose Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New Steel Casing 0.25-inch wall set from 0 to 10

STATE OF TEXAS WELL REPORT for Tracking #264593

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**SIW-02**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Latitude:	**29° 40' 59" N**
Well County:	**Bexar**	Longitude:	**098° 37' 52" W**
Elevation:	**1220 ft.**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Injection**

Drilling Date:	Started: **5/3/2011** Completed: **5/3/2011**
Diameter of Hole:	Diameter: **7-7/8 in From Surface To 27 ft**
Drilling Method:	**Air Rotary**
Borehole Completion:	**Open Hole**
Annular Seal Data:	1st Interval: **From 0 ft to 2 ft with 1-Cement (#sacks and material)** 2nd Interval: **From 2 ft to 10 ft with 2-Bent. Grout (#sacks and material)** 3rd Interval: **No Data** Method Used: **Pumped from Surface** Cemented By: **Evan Schaefer TDLR # 58772** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Slab Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**Rubber Shale Trap at 10-ft**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Geoprojects International, Inc.** **8834 Circle Drive** **Austin , TX 78736**
Driller License Number:	**2551**
Licensed Well Driller Signature:	**Jose Landeros**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

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Please include the report's Tracking number (Tracking #**264593**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL	CASING, BLANK PIPE & WELL SCREEN DATA
From (ft) To (ft) Description	Dia. New/Used Type Setting From/To
0-27 Limestone, Upper Glen Rose Formation	**4 New Steel Casing, 0.25" wall set from 0 to 10**

STATE OF TEXAS WELL REPORT for Tracking #264901

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**VEW-29**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 RALPH FAIR ROAD** **Boerne , TX 78015**	Latitude:	**29° 40' 59" N**
Well County:	**Bexar**	Longitude:	**098° 37' 52" W**
Elevation:	**1220 ft.**	GPS Brand Used:	**Garmin**

Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **5/4/2011** Completed: **5/4/2011**
Diameter of Hole:	Diameter: **7-7/8 in From Surface To 45 ft**
Drilling Method:	**Air Rotary**
Borehole Completion:	Gravel Packed From: **4.5 ft to 42 ft** Gravel Pack Size: **8/16**
Annular Seal Data:	1st Interval: **From 0 ft to 3 ft with 1-Cement (#sacks and material)** 2nd Interval: **From 3 ft to 4.5 ft with 1-Bentonite (#sacks and material)** 3rd Interval: **From 42 ft to 45 ft with 2-Bentonite (#sacks and material)** Method Used: **Poured from Surface** Cemented By: **Evan Schaefer TDLR # 58772** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Slab Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Geoprojects International, Inc.** **8834 Circle Drive** **Austin , TX 78736**
Driller License Number:	**2525**
Licensed Well Driller Signature:	**Lee Gebbert**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Please include the report's Tracking number (Tracking #**264901**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 35 Limestone, Upper Glen Rose Formation
35 to 45 Limestone, Lower Glen Rose Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New SCH 40 PVC Flush Joint Threaded (FJT) Casing set from 0 to 5
4 New SCH 40 PVC (FJT) Mill Slot Screen set from 5 to 40 with 0.040-inch slot

STATE OF TEXAS WELL REPORT for Tracking #264904

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**VEW-30**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 RALPH FAIR ROAD** **Boerne , TX 78015**	Latitude:	**29° 40' 59" N**
Well County:	**Bexar**	Longitude:	**098° 37' 52" W**
Elevation:	**1220 ft.**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:
Started: **5/5/2011**
Completed: **5/5/2011**

Diameter of Hole:
Diameter: **7-7/8 in From Surface To 30 ft**

Drilling Method:
Air Rotary

Borehole Completion:
Gravel Packed From: **4.5 ft to 30 ft**
Gravel Pack Size: **8/16**

Annular Seal Data:
1st Interval: **From 0 ft to 3 ft with 1-Cement (#sacks and material)**
2nd Interval: **From 3 ft to 4.5 ft with 1-Bentonite (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Poured from Surface**
Cemented By: **Evan Schaefer TDLR # 58772**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion:
Surface Slab Installed

Water Level:
Static level: **No Data**
Artesian flow: **No Data**

Packers:
No Data

Plugging Info:
Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump:
No Data

Well Tests:
No Data

Water Quality:
Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data:
The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Geoprojects International, Inc.
8834 Circle Drive
Austin , TX 78736

Driller License Number:
2525

Licensed Well Driller Signature:
Lee Gebbert

Registered Driller Apprentice Signature:
No Data

Apprentice Registration Number:
No Data

Comments:
No Data

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking number (Tracking #**264904**) on your written request.

Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 30 Limestone, Upper Glen Rose Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New SCH 40 PVC Flush Joint Threaded (FJT) Casing set from 0 to 5
4 New SCH 40 PVC (FJT) Mill Slot Screen set from 5 to 25 with 0.040-inch slot

STATE OF TEXAS WELL REPORT for Tracking #264904

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**VEW-30**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 RALPH FAIR ROAD** **Boerne , TX 78015**	Latitude:	**29° 40' 59" N**
Well County:	**Bexar**	Longitude:	**098° 37' 52" W**
Elevation:	**1220 ft.**	GPS Brand Used:	**Garmin**

Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **5/5/2011** Completed: **5/5/2011**
Diameter of Hole:	Diameter: **7-7/8 in From Surface To 30 ft**
Drilling Method:	**Air Rotary**
Borehole Completion:	Gravel Packed From: **4.5 ft to 30 ft** Gravel Pack Size: **8/16**
Annular Seal Data:	1st Interval: **From 0 ft to 3 ft with 1-Cement (#sacks and material)** 2nd Interval: **From 3 ft to 4.5 ft with 1-Bentonite (#sacks and material)** 3rd Interval: **No Data** Method Used: **Poured from Surface** Cemented By: **Evan Schaefer TDLR # 58772** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Slab Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Geoprojects International, Inc.** **8834 Circle Drive** **Austin , TX 78736**
Driller License Number:	**2525**
Licensed Well Driller Signature:	**Lee Gebbert**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 30 Limestone, Upper Glen Rose Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New SCH 40 PVC Flush Joint Threaded (FJT) Casing set from 0 to 5
4 New SCH 40 PVC (FJT) Mill Slot Screen set from 5 to 25 with 0.040-inch slot

STATE OF TEXAS WELL REPORT for Tracking #265243

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**VEW-32**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 Ralph Fair Road** **Boenre , TX 78015**	Latitude:	**29° 40' 59" N**
Well County:	**Bexar**	Longitude:	**098° 37' 52" W**
Elevation:	**1220 ft.**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **4/28/2011** Completed: **4/28/2011**
Diameter of Hole:	Diameter: **8 in From Surface To 28 ft**
Drilling Method:	**Air Rotary**
Borehole Completion:	Gravel Packed From: **4.5 ft to 28 ft** Gravel Pack Size: **8/16**
Annular Seal Data:	1st Interval: **From 0 ft to 3 ft with 1-Cement (#sacks and material)** 2nd Interval: **From 3 ft to 4.5 ft with 1-Bent. Grout (#sacks and material)** 3rd Interval: **No Data** Method Used: **Poured from Surface** Cemented By: **Evan Schaefer TDLR # 58772** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Slab Installed**

Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**No Data**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**No Data**
Well Tests:	**No Data**

Water Quality:	Type of Water: **No Data** Depth of Strata: **No Data** Chemical Analysis Made: **No** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Geoprojects International, Inc.** **8834 Circle Drive** **Austin , TX 78736**
Driller License Number:	**2551**
Licensed Well Driller Signature:	**Jose Landeros**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-28 Limestone, Upper Glen Rose Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New SCh 40 PVC Flush Joint Threaded (FJT) Casing set from 0 to 5

4 New SCh 40 PVC (FJT) Mill Slotted Screen set from 5 to 25 with 0.040-inch slot

STATE OF TEXAS WELL REPORT for Tracking #265244

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**VEW-33**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-19-6**
Well Location:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Latitude:	**29° 40' 58" N**
Well County:	**Bexar**	Longitude:	**098° 37' 52" W**
Elevation:	**1220 ft.**	GPS Brand Used:	**Garmin**

Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:
Started: **5/4/2011**
Completed: **5/4/2011**

Diameter of Hole:
Diameter: **8 in From Surface To 32 ft**

Drilling Method:
Air Rotary

Borehole Completion:
Gravel Packed From: **4.5 ft to 32 ft**
Gravel Pack Size: **8/16**

Annular Seal Data:
1st Interval: **From 0 ft to 3 ft with 1-Cement (#sacks and material)**
2nd Interval: **From 3 ft to 4.5 ft with 1-Bent. Grout (#sacks and material)**
3rd Interval: **No Data**
Method Used: **Poured from Surface**
Cemented By: **Evan Schaefer TDLR # 58772**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion:
Surface Slab Installed

Water Level:
Static level: **No Data**
Artesian flow: **No Data**

Packers:
No Data

Plugging Info:
Casing or Cement/Bentonite left in well: **No Data**

Type Of Pump:
No Data

Well Tests:
No Data

Water Quality:
Type of Water: **No Data**
Depth of Strata: **No Data**
Chemical Analysis Made: **No**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data:
The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:
Geoprojects International, Inc.
8834 Circle Drive
Austin , TX 78736

Driller License Number:
2551

Licensed Well Driller Signature:
Jose Landeros

Registered Driller Apprentice Signature:
No Data

Apprentice Registration Number:
No Data

Comments:
No Data

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Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0-32 Limestone, Upper Glen Rose Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
4 New SCh 40 PVC Flush Joint Threaded (FJT) Casing set from 0 to 5

4 New SCh 40 PVC (FJT) Mill Slotted Screen set from 5 to 25 with 0.040-inch slot

STATE OF TEXAS WELL REPORT for Tracking #265231

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**B3-EXW-03**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-20-1**
Well Location:	**25800 RALPH FAIR ROAD** **Boerne , TX 78015**	Latitude:	**29° 42' 36" N**
Well County:	**Bexar**	Longitude:	**098° 36' 55" W**
Elevation:	**1230 ft.**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:

Started: **5/18/2011**
Completed: **5/27/2011**

Diameter of Hole:

Diameter: **12-3/4 in From Surface To 65 ft**
Diameter: **7-7/8 in From 65 ft To 350 ft**

Drilling Method: **Air Rotary**

Borehole Completion: **Open Hole**

Annular Seal Data:

1st Interval: **From 0 ft to 2 ft with 1-Cement (#sacks and material)**
2nd Interval: **From 2 ft to 63 ft with 15-Bent. Grout (#sacks and material)**
3rd Interval: **From 63 ft to 65 ft with 1-Bentonite Plu (#sacks and material)**
Method Used: **Pumped via Tremie**
Cemented By: **Lee Gebbert**
Distance to Septic Field or other Concentrated Contamination: **No Data**
Distance to Property Line: **No Data**
Method of Verification: **No Data**
Approved by Variance: **No Data**

Surface Completion: **Surface Slab Installed**

Water Level:

Static level: **No Data**
Artesian flow: **No Data**

Packers: **Rubber Shale Trap at 65-ft**

Plugging Info:

Casing left in well: Cement/Bentonite left in well:
From (ft) To (ft) From (ft) To (ft) Cem/Bent Sacks Used
Back Plugged with 6 sks Bentonite Hole Plug from 350 to 340

Type Of Pump:

Submersible
Depth to pump bowl: **333 ft**

Well Tests: **No Data**

Water Quality:

Type of Water: **Fresh**
Depth of Strata: **No Data**
Chemical Analysis Made: **No**
Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**

Certification Data:

The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.

Company Information:

Geoprojects International, Inc.
8834 Circle Drive
Austin , TX 78736

Driller License Number: **2525**

Licensed Well Driller Signature: **Lee Gebbert**

Registered Driller Apprentice Signature: **No Data**

Apprentice Registration Number: **No Data**

Comments: **No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 6 Limestone, Upper Glen Rose Formation
6 to 321 Limestone, Lower Glen Rose Formation
321 to 350 Shale, Bexar Shale Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
8 New SDR-17 PVC Certalock Casing set from +3 to 65

STATE OF TEXAS WELL REPORT for Tracking #265233

Owner:	**Camp Stanley Storage Activity**	Owner Well #:	**B3-EXW-04**
Address:	**25800 Ralph Fair Road** **Boerne , TX 78015**	Grid #:	**68-20-4**
Well Location:	**25800 RALPH FAIR ROAD** **Boerne , TX 78015**	Latitude:	**29° 42' 26" N**
Well County:	**Bexar**	Longitude:	**098° 36' 56" W**
Elevation:	**1217 ft.**	GPS Brand Used:	**Garmin**
Type of Work:	**New Well**	Proposed Use:	**Monitor**

Drilling Date:	Started: **6/1/2011** Completed: **6/14/2011**
Diameter of Hole:	Diameter: **12-3/4 in From Surface To 55 ft** Diameter: **7-7/8 in From 55 ft To 335 ft**
Drilling Method:	**Air Rotary**
Borehole Completion:	**Open Hole**
Annular Seal Data:	1st Interval: **From 0 ft to 2 ft with 1-Cement (#sacks and material)** 2nd Interval: **From 2 ft to 55 ft with 27-Bent. Grout (#sacks and material)** 3rd Interval: **No Data** Method Used: **Pumped via Tremie** Cemented By: **Lee Gebbert** Distance to Septic Field or other Concentrated Contamination: **No Data** Distance to Property Line: **No Data** Method of Verification: **No Data** Approved by Variance: **No Data**
Surface Completion:	**Surface Slab Installed**
Water Level:	Static level: **No Data** Artesian flow: **No Data**
Packers:	**Rubber Shale Trap at 55-ft**
Plugging Info:	Casing or Cement/Bentonite left in well: **No Data**
Type Of Pump:	**Submersible** Depth to pump bowl: **328 ft**
Well Tests:	**No Data**
Water Quality:	Type of Water: **Fresh** Depth of Strata: **No Data** Chemical Analysis Made: **No** Did the driller knowingly penetrate any strata which contained undesirable constituents: **No**
Certification Data:	The driller certified that the driller drilled this well (or the well was drilled under the driller's direct supervision) and that each and all of the statements herein are true and correct. The driller understood that failure to complete the required items will result in the log(s) being returned for completion and resubmittal.
Company Information:	**Geoprojects International, Inc.** **8834 Circle Drive** **Austin , TX 78736**
Driller License Number:	**2525**
Licensed Well Driller Signature:	**Lee Gebbert**
Registered Driller Apprentice Signature:	**No Data**
Apprentice Registration Number:	**No Data**
Comments:	**No Data**

IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

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Texas Department of Licensing & Regulation
P.O. Box 12157
Austin, TX 78711
(512) 463-7880

DESC. & COLOR OF FORMATION MATERIAL

From (ft) To (ft) Description
0 to 319 Limestone, Lower Glen Rose Formation
319 to 335 Shale, Bexar Shale Formation

CASING, BLANK PIPE & WELL SCREEN DATA

Dia. New/Used Type Setting From/To
8 New SDR-17 PVC Certalock Casing set from +3 to 55

APPENDIX B

Geophysical Logs

USGS

science for a changing world

SERVICE COMPANY USGS
file type ORIGINAL
field office TWSC - AUSTIN
latitude 29 42 32.90
longitude -098 36 53.10
eng units or cps

company CSSA - U.S. GEOLOGICAL SURVEY
well MW - 27
field CSSA
county BEXAR state TEXAS

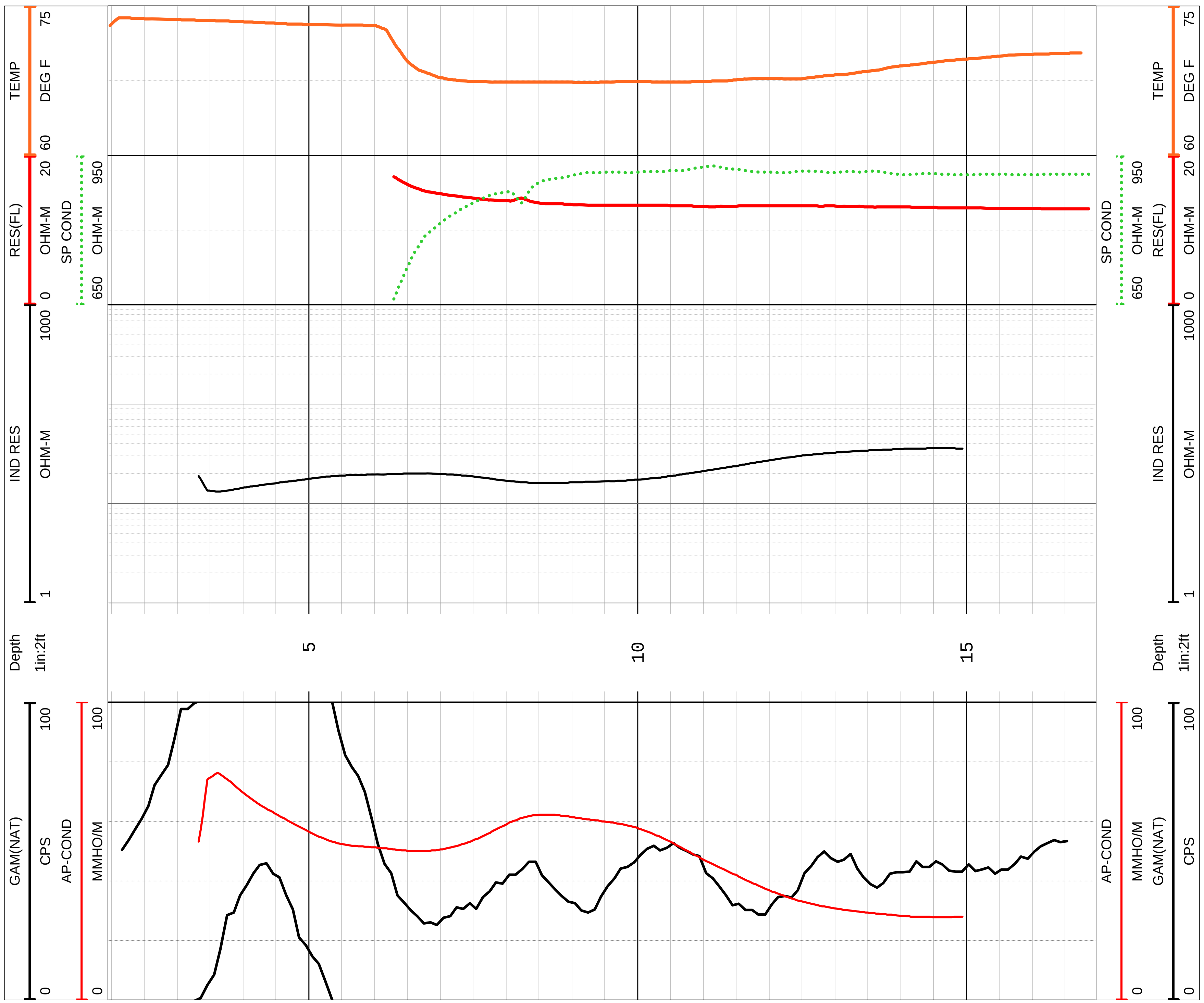
UNIQUE WELL ID
LOCATION
PROVINCE
section township range

other1serv
other2serv
other3serv

permanent datum GL
log meas from GL
logging unit FT
drl meas from GL

elev gl 1219
elev kb NA
elev df NA
elev perm datum1219

DATE	02-16-2011	time circ stopped	
log direction	UP/DN	log sample int	0.1
file type id		feet or meter	
depth driller	17'	sys serial	
fluid type	H2O	sys version	
log bottom	17'	casing diameter	2"
log top	0	casing bottom	7'
time	CST	casing type	PVC
recorded by	THOMAS	casing thick	40
tool serial num	NA	bit size	NK
fluid density		fluid viscosity	
Name Prn AP		truck cal num	503
mean surface temp		mud sample source	
temp gradient		mud res	
mag declination		mud temp	
density matrix		res mud filtrate	
neutron matrix		res mud cake	
deltat matrix		temp mud filtrate	
deltat fluid		temp mud cake	
fluid ph		elect cutoff	
remarks2		remarks1	WL: 7.05 ft below lsd



science for a changing world

SERVICE COMPANY USGS
file type ORIGINAL
field office TWSC - AUSTIN
latitude 29 42 35.00
longitude -098 36 44.70
eng units or cps E

company CSSA - U.S. GEOLOGICAL SURVEY
well MW-32
field CAMP STANLEY
county BEXAR state TX

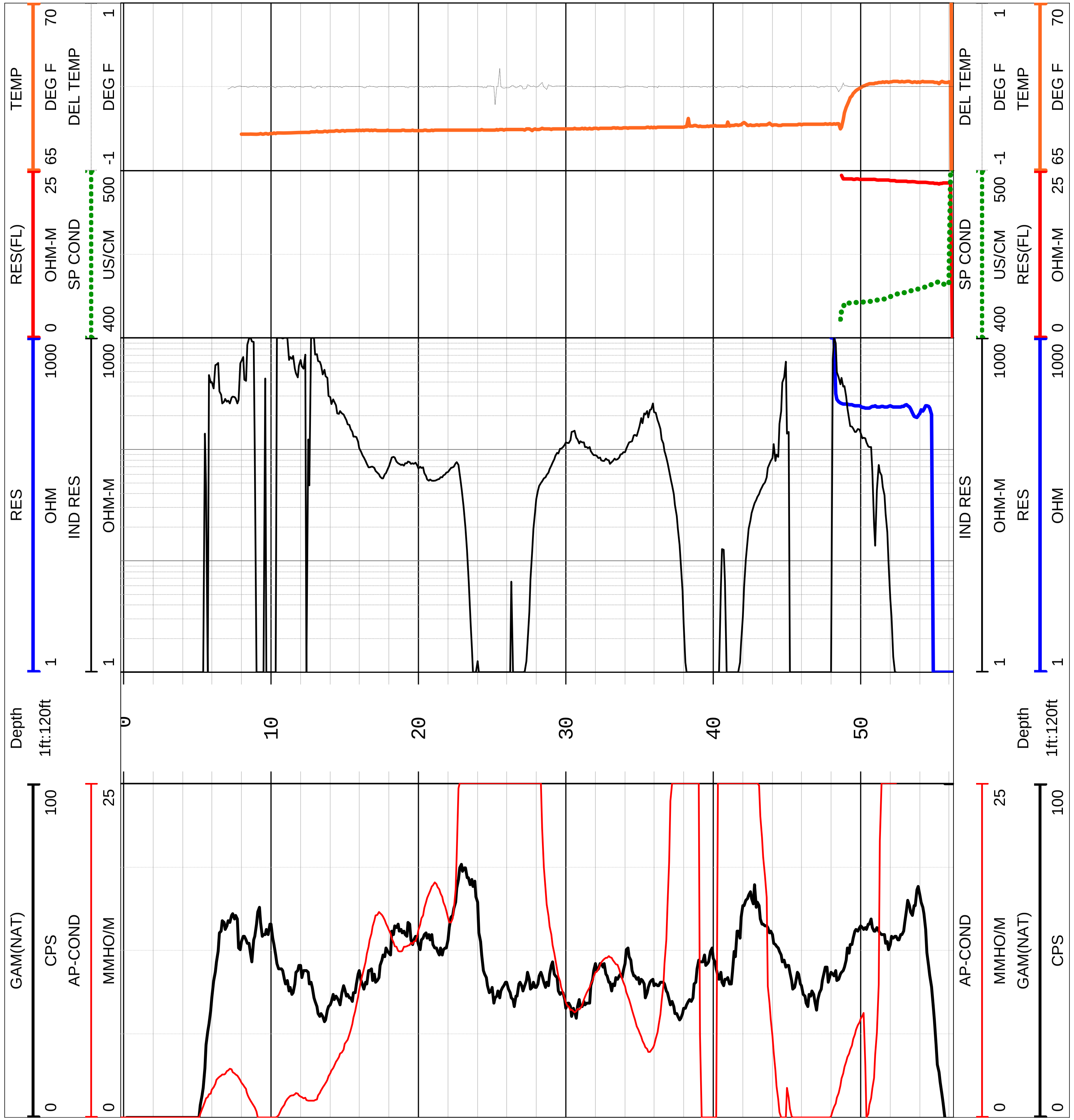
UNIQUE WELL ID
LOCATION
PROVINCE
section NA township NA range NA

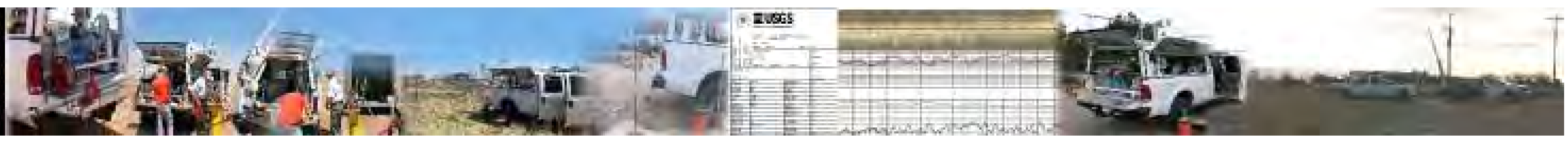
other1serv
ZW
other2serv
ZI
other3serv
ZE

permanent datum LSD
log meas from LSD
logging unit 302
drl meas from NA

elev gl 1282
elev kb NA
elev df NA
elev perm datum1282

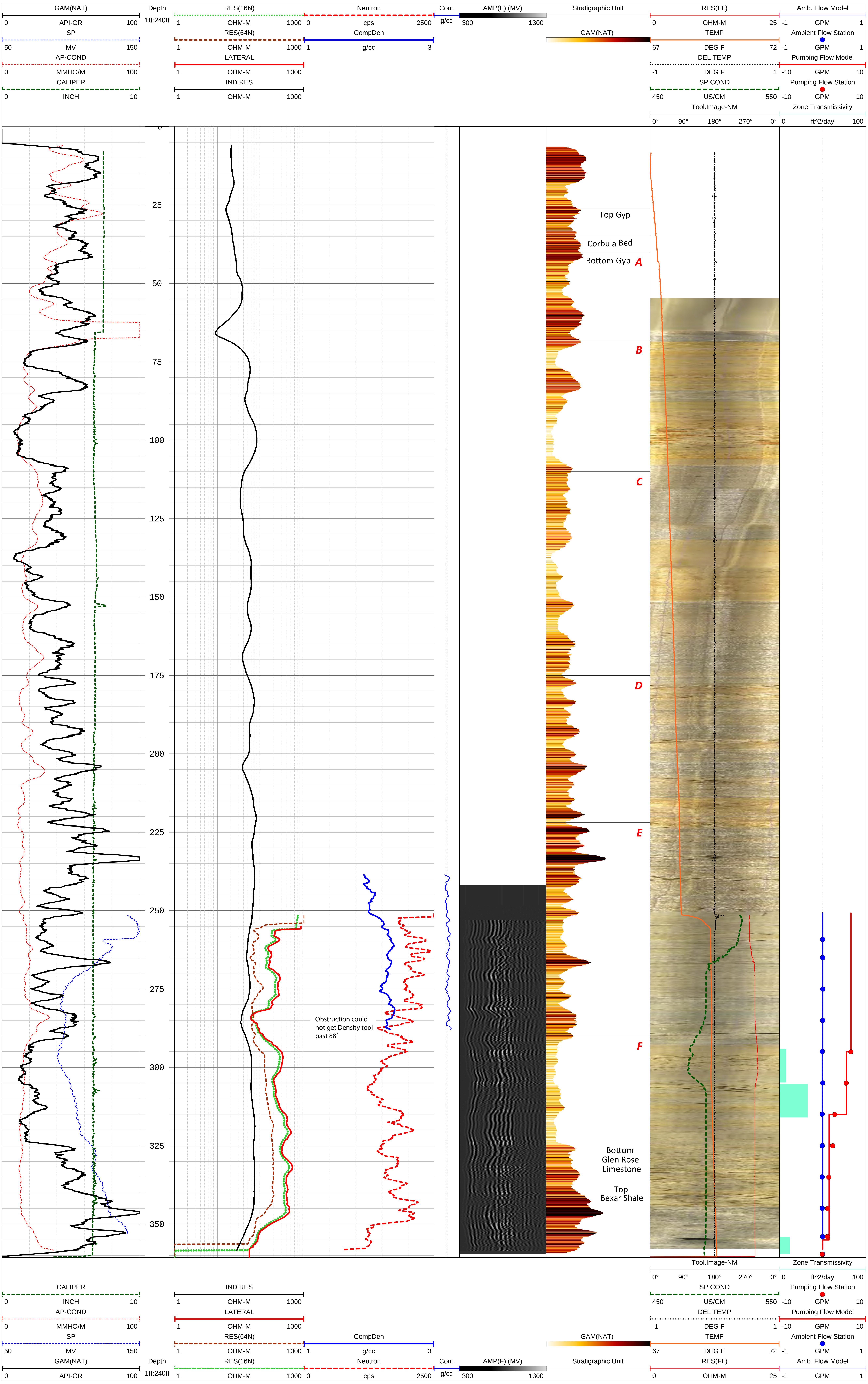
DATE	02/16/11	time circ stopped	NA
log direction	U	log sample int	.10
file type id	8144A	feet or meter	F
depth driller	56	sys serial	1
fluid type	H2O	sys version	3.58R
log bottom	56.30	casing diameter	10.
log top	0.20	casing bottom	26
time	10:36:	casing type	PVC
recorded by	THOMAS	casing thick	0
tool serial num	919	bit size	6.125
fluid density		fluid viscosity	
Name Prn AP		truck cal num	0.50081
mean surface temp		mud sample source	NA
temp gradient	0	mud res	NA
mag declination	0	mud temp	NA
density matrix	2.85	res mud filtrate	
neutron matrix	DOLOMITE	res mud cake	NA
deltat matrix	44	temp mud filtrate	
deltat fluid		temp mud cake	
fluid ph		elect cutoff	9999
remarks2	NONE	remarks1	





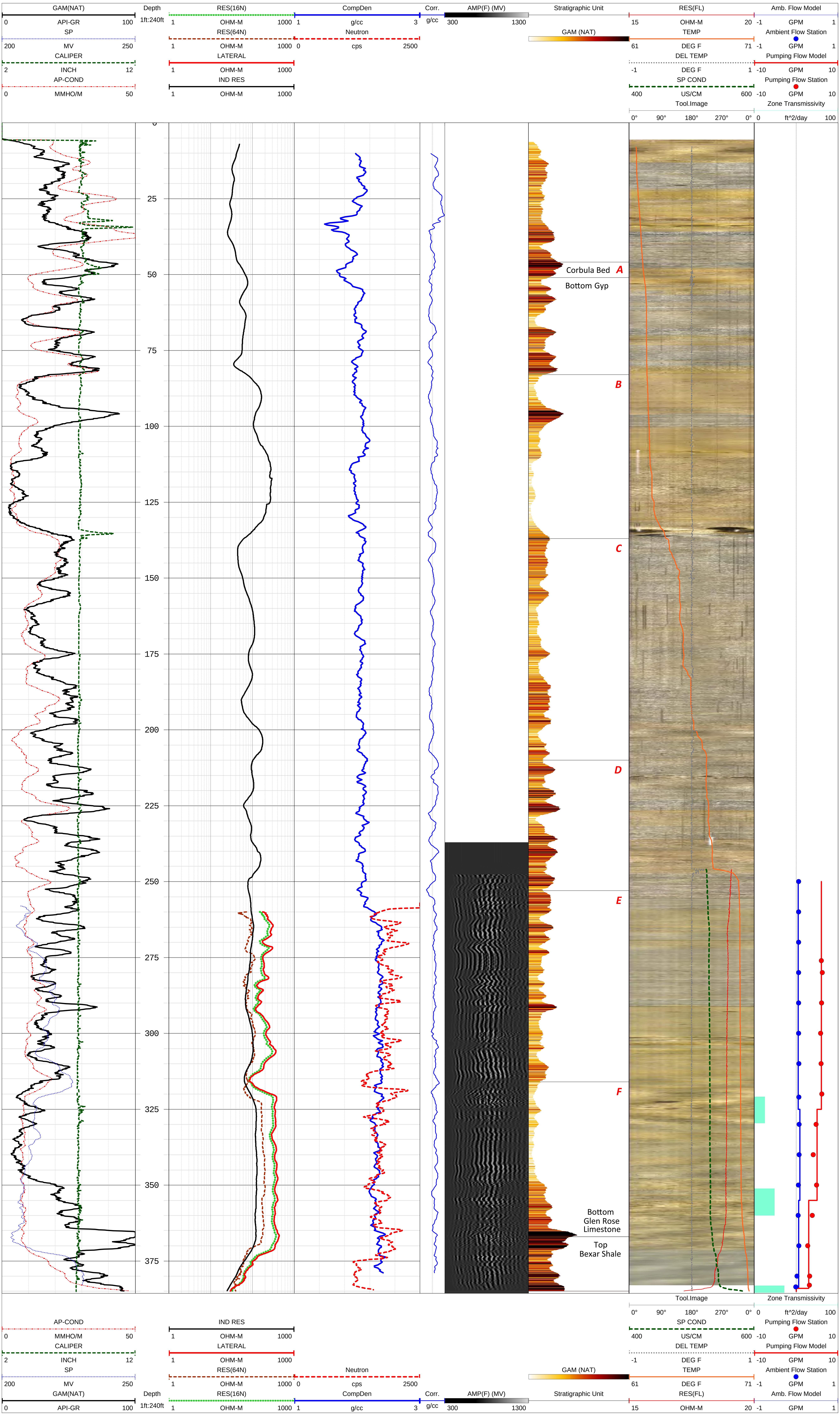
Well name MW - 35 - LGR Date of log 03-23-2011 County Bexar State TX Owner Camp Stanley - CSSA

Well name B3 - EXW - 02 Date of log 03-25-2011 County Bexar State TX Owner Camp Stanley - CSSA



USGS science for a changing world

Well name MW - 36 - LGR Date of log 03-31-2011 County Bexar State TX Owner Camp Stanley - CSSA



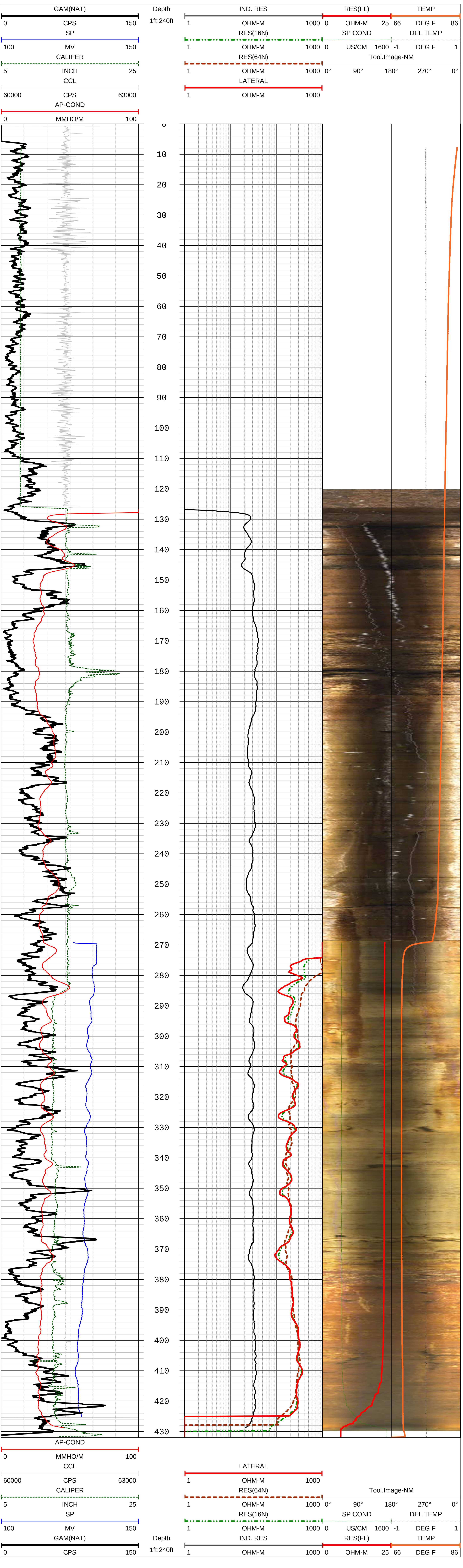
SERVICE COMPANY USGS
file type ORIGINAL
field office TWSC - AUSTIN
latitude 29 41 08.7
longitude -098 36 25.5
eng units or cps E

company USGS
well CS-MW-01-LGR
field CSSA
county BEXAR state TX
UNIQUE WELL ID
LOCATION
PROVINCE
section NA township NA range NA

other1serv ZE
other2serv ZI
other3serv OT

permanent datum LSD
elev gl 1178
log meas from LSD
elev kb NA
logging unit 302
elev df NA
drl meas from NA
elev perm datum

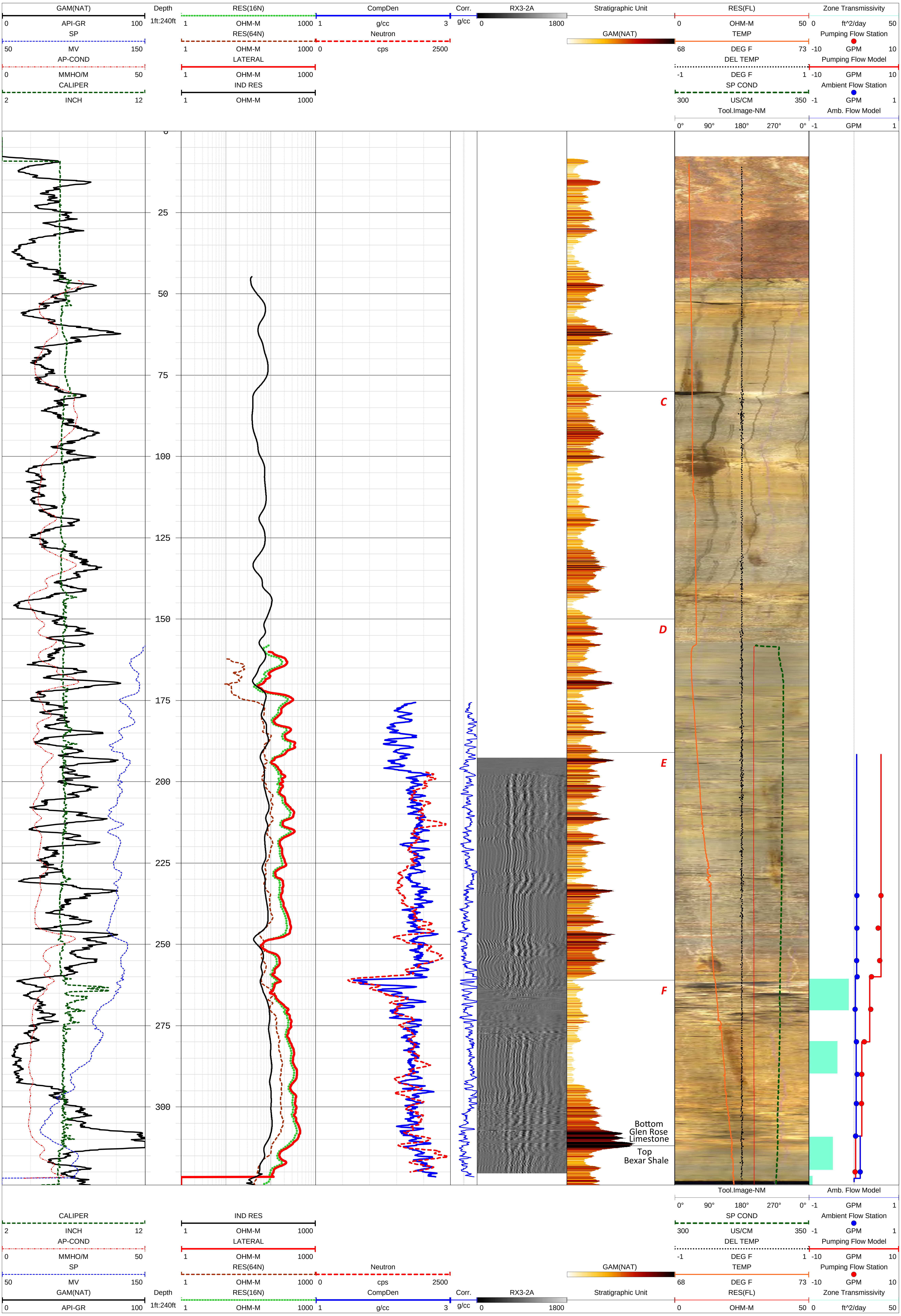
DATE	06/22/11	time circ stopped	NA
log direction	U	log sample int	.10
file type id	8144A	feet or meter	F
depth driller	434	sys serial	1
fluid type	H2O	sys version	3.59T
log bottom	432.30	casing diameter	10.
log top	0.90	casing bottom	125.7
time	14:08:	casing type	STEEL
recorded by	THOMAS	casing thick	0
tool serial num	4393	bit size	10
fluid density		fluid viscosity	
Name Prn AP		truck cal num	.599
mean surface temp		mud sample source	NA
temp gradient	0	mud res	NA
mag declination	0	mud temp	NA
density matrix	2.85	res mud filtrate	
neutron matrix	DOLOMITE	res mud cake	NA
deltat matrix	44	temp mud filtrate	
deltat fluid		temp mud cake	
fluid ph		elect cutoff	9999
remarks2		remarks1	WL=268.13



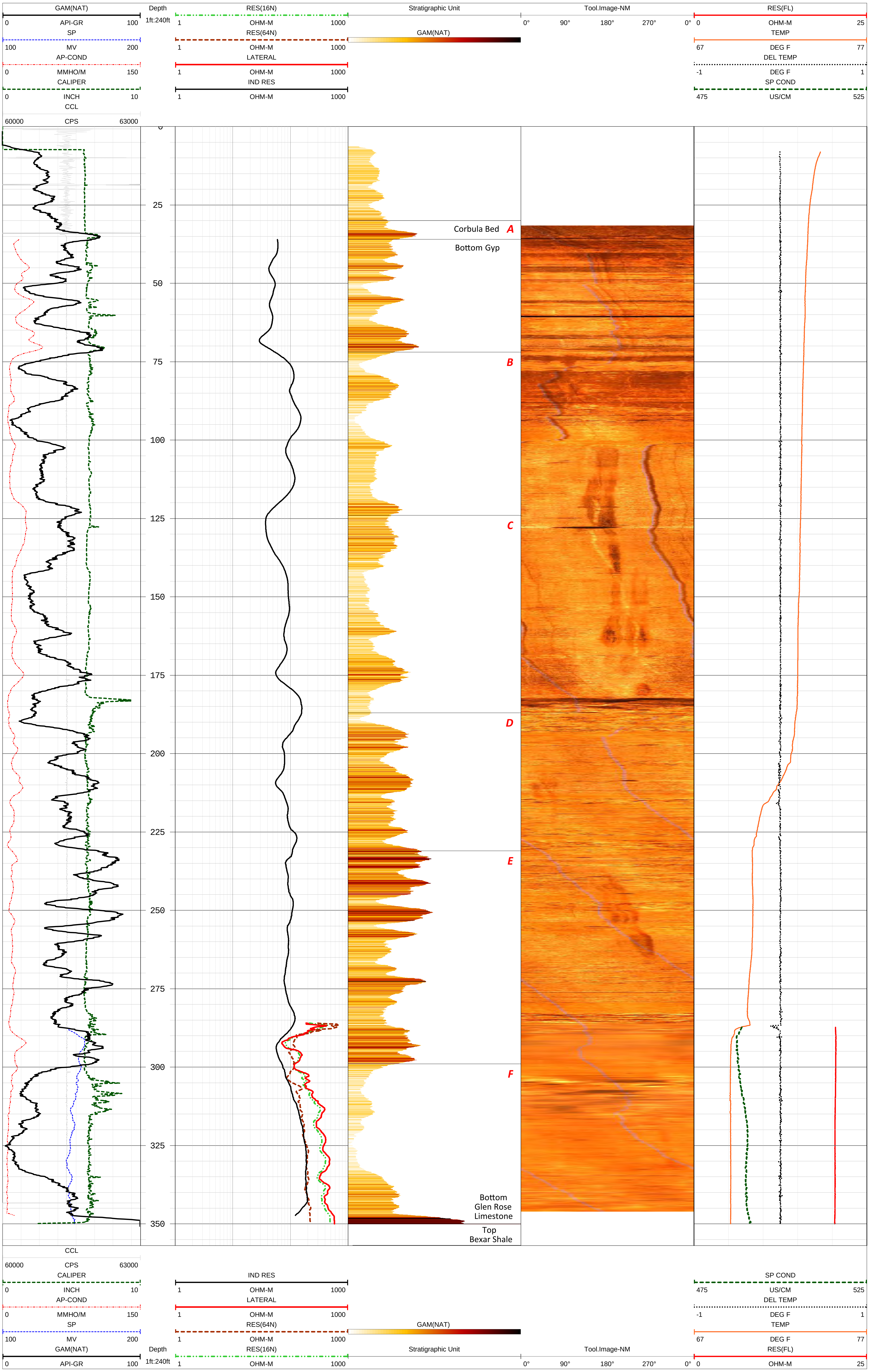
Well name CS-11 Date of log 3-22-2011 County Bexar State TX Owner Camp Stanley - CSSA

Well name LS - 05 Date of log 04-18-2011 County Bexar State TX Owner Camp Stanley - CSSA

Well name I10 - 04 Date of log 02-17-2011 County Bexar State TX Owner Camp Stanley - CSSA



Well name OFR - 01 Date of log 04-19-2011 County Bexar State TX Owner Camp Stanley - CSSA



Borehole: **WELL NO. SIW-02**

Logs: **GAMMA, CALIPER**

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY BUILDING 90**
Client: **GEO PROJECTS**
Location:

Date: 05-06-11
County: BEXAR
State: TX

BOREHOLE DATA

Drilling Contractor: GEO PROJECTS
Elevation: NA
Depth Ref: G.L.

Driller T.D. (ft) : 26.5'
Logger T.D. (ft) : 27'
Date Drilled: NA

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8"	0	26.5	NONE		
2						
3						

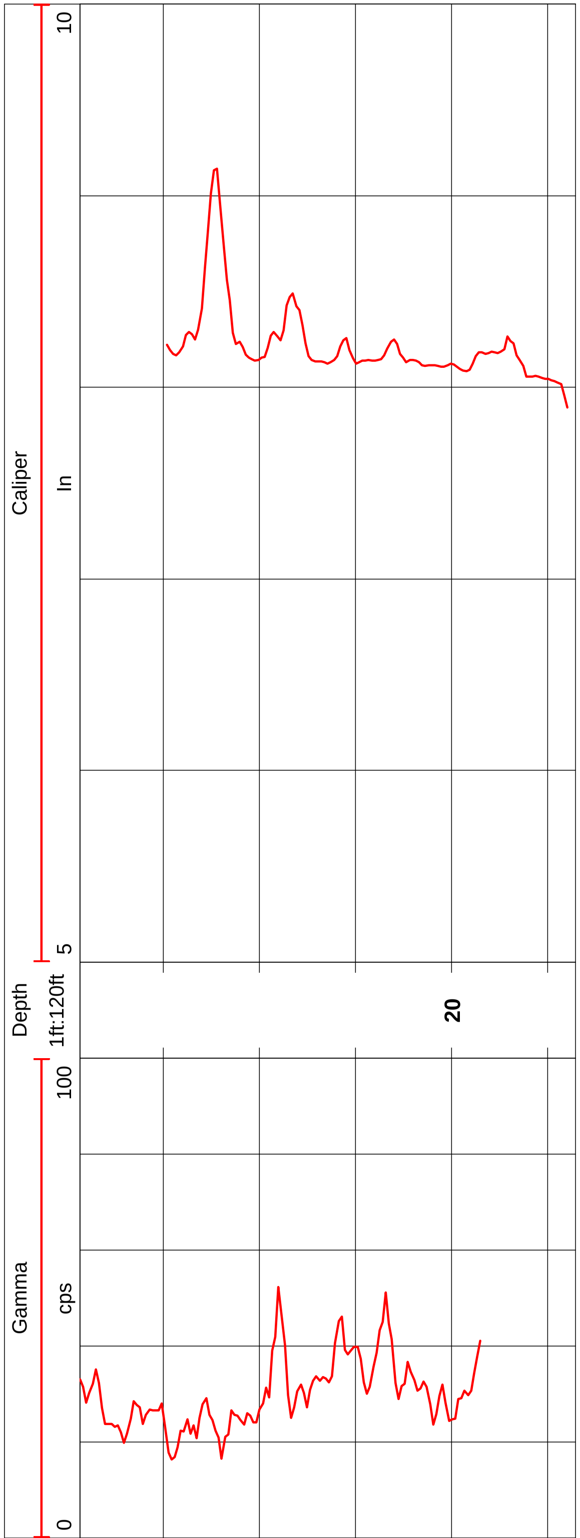
Drill Method: AIR ROTARY
Weight:
Fluid Level (ft) : 25'
Hole Medium:
Mud Type:
Time Since Circ:
Viscosity:
Rm: at: Deg C

GENERAL DATA

Logged by: Kelly Tuten
Unit/Truck: 05
Witness: Samantha Elliot

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	15	21.5	.7	20
CALIPER	1	15	26	5.2	20

Comments:



Borehole: **WELL NO. VEW-29**

Logs: **GAMMA, CALIPER**

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY BUILDING 90** Date: 05-06-11

Client: **GEO PROJECTS** County: BEXAR

Location: State: TX

BOREHOLE DATA

Drilling Contractor: GEO PROJECTS **Driller T.D. (ft) : 45'**

Elevation: NA Logger T.D. (ft) : 45'

Depth Ref: G.L. Date Drilled: NA

BIT RECORD / CASING RECORD

RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8"	0	45	NONE		
2						
3						

Drill Method: AIR ROTARY Weight: **Fluid Level (ft) :** 41.7'

Hole Medium: Mud Type: Time Since Circ:

Viscosity: Rm: at: Deg C

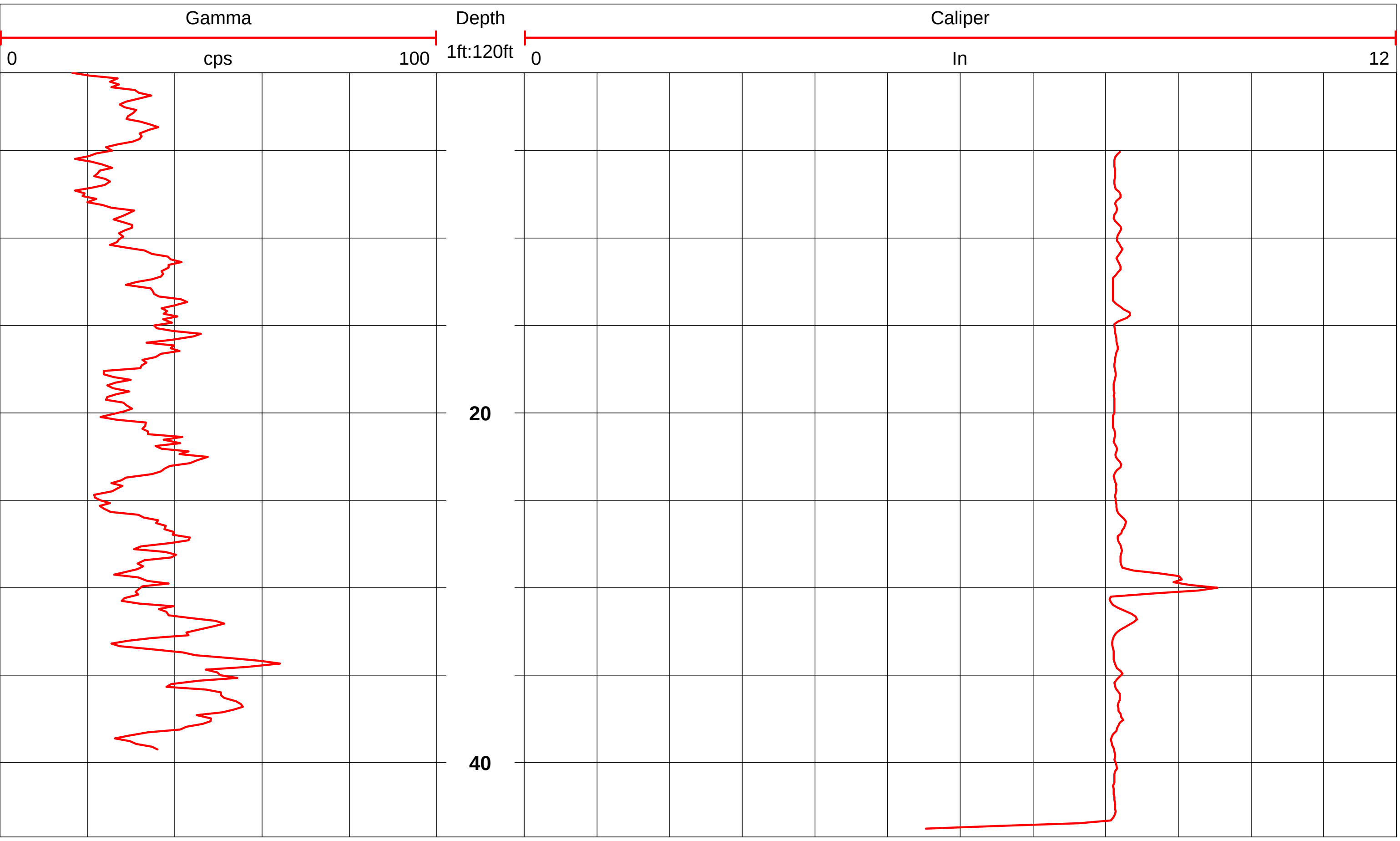
GENERAL DATA

Logged by: Kelly Tuten Unit/Truck: 05

Witness: Samantha Elliot

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	15	39.3	.6	20
CALIPER	1	15	43.8	5.1	20

Comments:



Water Well Logging & Video Recording Services

Borehole: **WELL NO. VEW-30**

Logs: **GAMMA, CALIPER**

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY BUILDING 90**

Date: 05-06-11

Client: **GEO PROJECTS**

County: BEXAR

Location:

State: TX

BOREHOLE DATA

Drilling Contractor: GEO PROJECTS

Driller T.D. (ft) : 30'

Elevation: NA

Logger T.D. (ft) : 30'

Depth Ref: G.L.

Date Drilled: NA

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8"	0	30	NONE		
2						
3						

Drill Method: AIR ROTARY

Weight:

Fluid Level (ft) : NA

Hole Medium:

Mud Type:

Time Since Circ:

Viscosity:

Rm: at: Deg C

GENERAL DATA

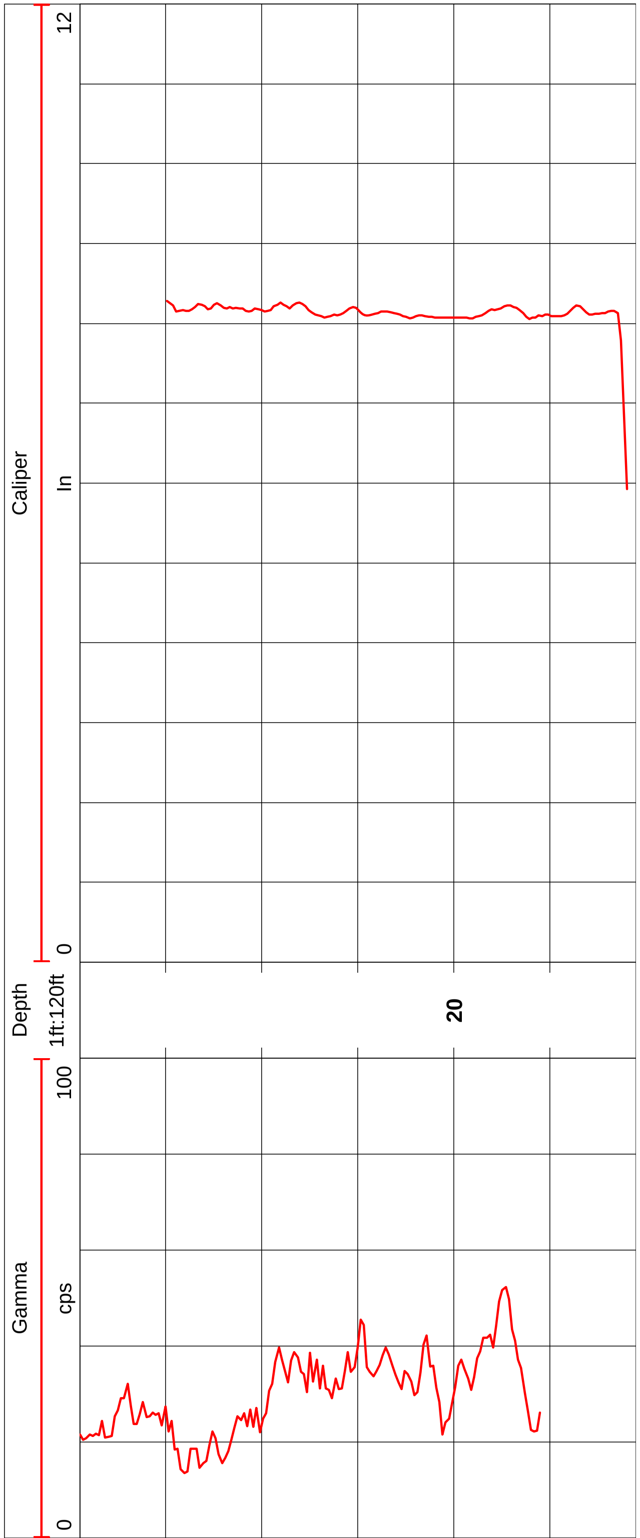
Logged by: Kelly Tuten

Unit/Truck: 05

Witness: Samantha Elliot

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	15	24.5	.6	20
CALIPER	1	15	29	5.1	20

Comments:



GEO CAM

Borehole: **WELL NO. VEW-31**

Logs: **GAMMA, CALIPER**

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY BUILDING 90**
Date: 05-06-11
Client: **GEO PROJECTS**
County: BEXAR
Location:
State: TX

BOREHOLE DATA

Drilling Contractor: GEO PROJECTS
Driller T.D. (ft) : 45'
Elevation: NA
Logger T.D. (ft) : 45'
Depth Ref: G.L.
Date Drilled: NA

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8"	0	45	NONE		
2						
3						

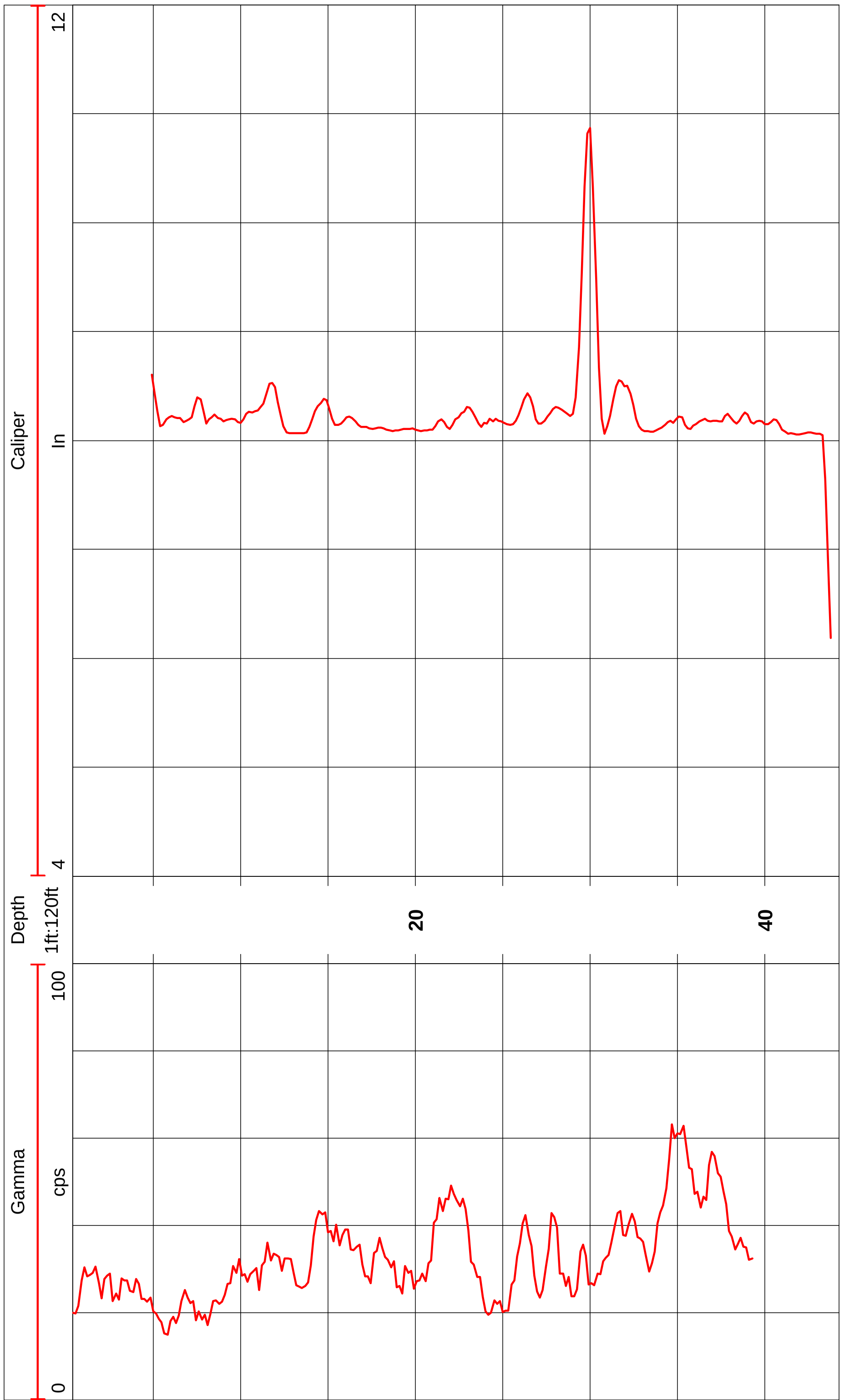
Drill Method: AIR ROTARY
Weight:
Fluid Level (ft) : 39.7'
Hole Medium:
Mud Type:
Time Since Circ:
Viscosity:
Rm: at: Deg C

GENERAL DATA

Logged by: Kelly Tuten
Unit/Truck: 05
Witness: Samantha Elliot

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	15	39.3	.4	20
CALIPER	1	15	43.8	4.9	20

Comments:



Borehole: **WELL NO. VEW-32**

Logs: **GAMMA, CALIPER**

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY BUILDING 90**
Client: **GEO PROJECTS**
Location:

Date: 05-06-11
County: BEXAR
State: TX

BOREHOLE DATA

Drilling Contractor: GEO PROJECTS
Elevation: NA
Depth Ref: G.L.

Driller T.D. (ft) : 35'
Logger T.D. (ft) : 27.4'
Date Drilled: NA

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8"	0	35	NONE		
2						
3						

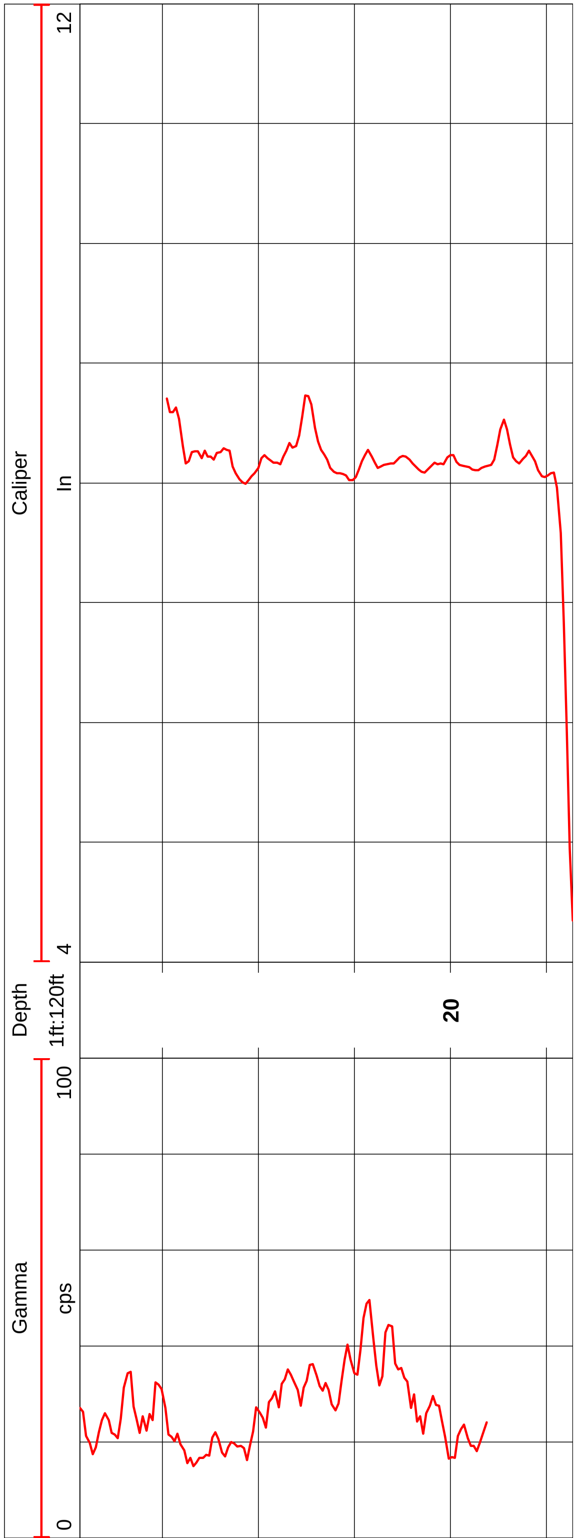
Drill Method: AIR ROTARY
Weight:
Fluid Level (ft) : 17.2'
Hole Medium:
Mud Type:
Time Since Circ:
Viscosity:
Rm:
at:
Deg C

GENERAL DATA

Logged by: Kelly Tuten
Unit/Truck: 05
Witness: Samantha Elliot

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	15	21.9	.7	20
CALIPER	1	15	26.4	5.2	20

Comments:



Borehole: **WELL NO. VEW-33**

Logs: **GAMMA, CALIPER**

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY BUILDING 90**

Client: **GEO PROJECTS**

Location:

Date: 05-06-11

County: BEXAR

State: TX

BOREHOLE DATA

Drilling Contractor: GEO PROJECTS

Elevation: NA

Depth Ref: G.L.

Driller T.D. (ft) : 32'

Logger T.D. (ft) : 32'

Date Drilled: NA

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	8"	0	32	NONE		
2						
3						

Drill Method: AIR ROTARY

Weight:

Fluid Level (ft) : 31'

Hole Medium:

Mud Type:

Time Since Circ:

Viscosity:

Rm: at: Deg C

GENERAL DATA

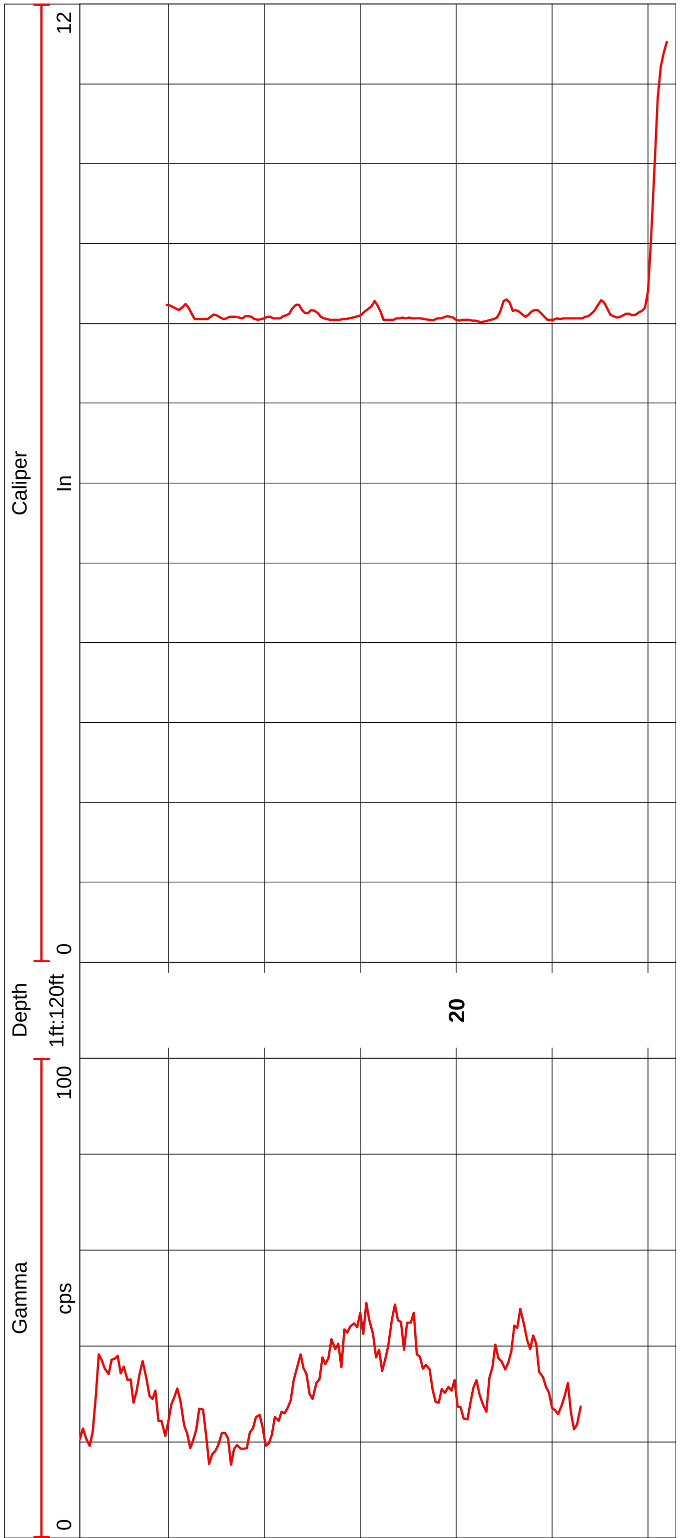
Logged by: Kelly Tuten

Unit/Truck: 05

Witness: Samantha Elliot

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	1	15	26.5	.4	20
CALIPER	1	15	31	4.9	20

Comments:



GEO CAM

Borehole: B3 EXW03

Logs: GAMMA, RESISTIVITY, CALIPER

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY STORAGE FACILITY**
Date: 05-25-11

Client: **GEOPROJECTS INTERNATIONAL**
County: BEXAR

Location: **N 29* 42' 35.4", W 98* 36' 57.5"**
State: TX

BOREHOLE DATA

Drilling Contractor: G.P.I.
Driller T.D. (ft) : 350'

Elevation: 1,215'
Logger T.D. (ft) : 350.8'

Depth Ref: G.L.
Date Drilled: 05-24-11

	BIT RECORD			CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	7 7/8"	0'	350'	NIPPLE	1 FT.	
2						
3						

Drill Method: AIR ROTARY
Weight:
Fluid Level (ft) : 250.4'

Hole Medium:
Mud Type:
Time Since Circ:

Viscosity:
Rm:
at:
Deg C

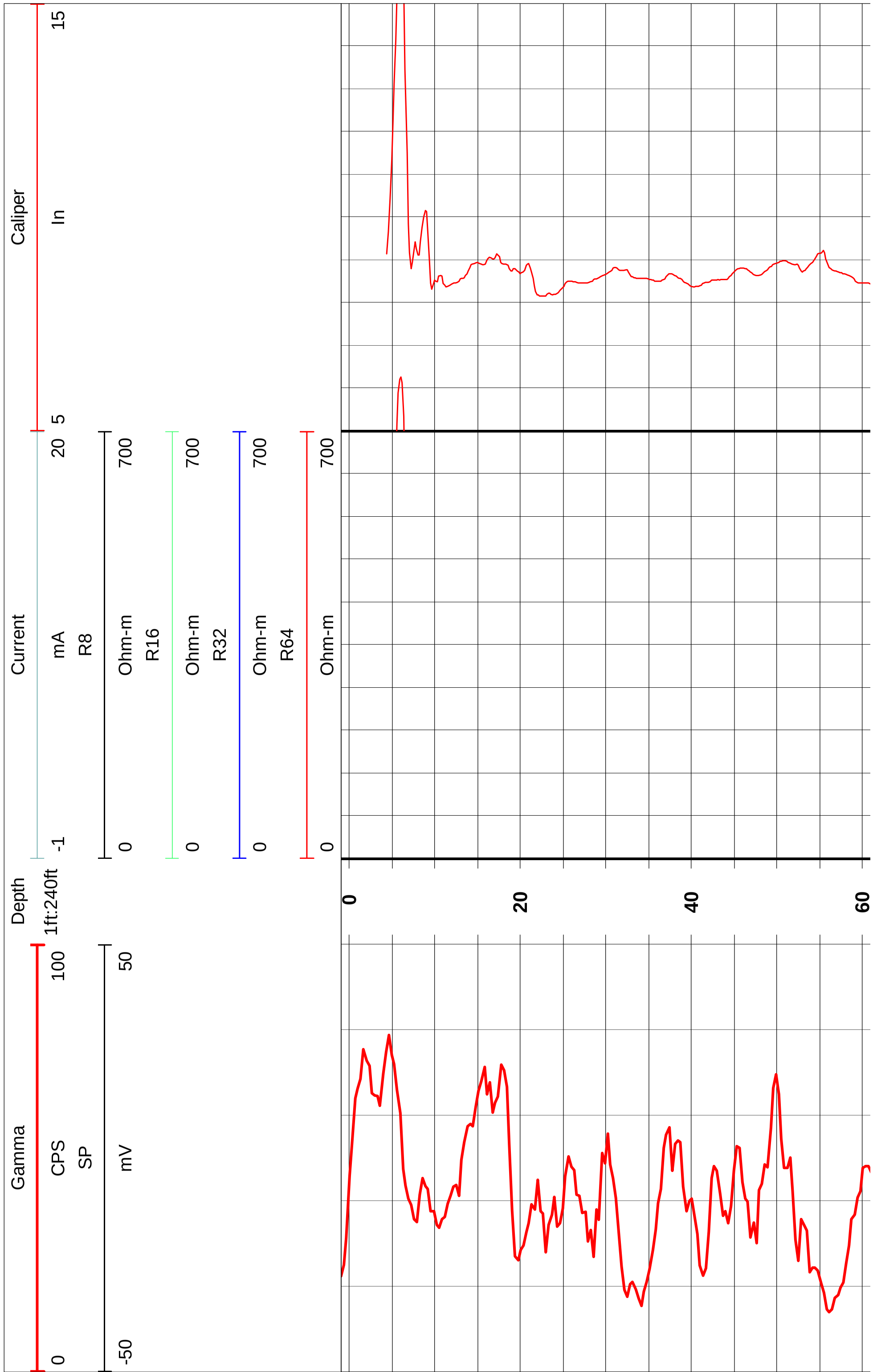
GENERAL DATA

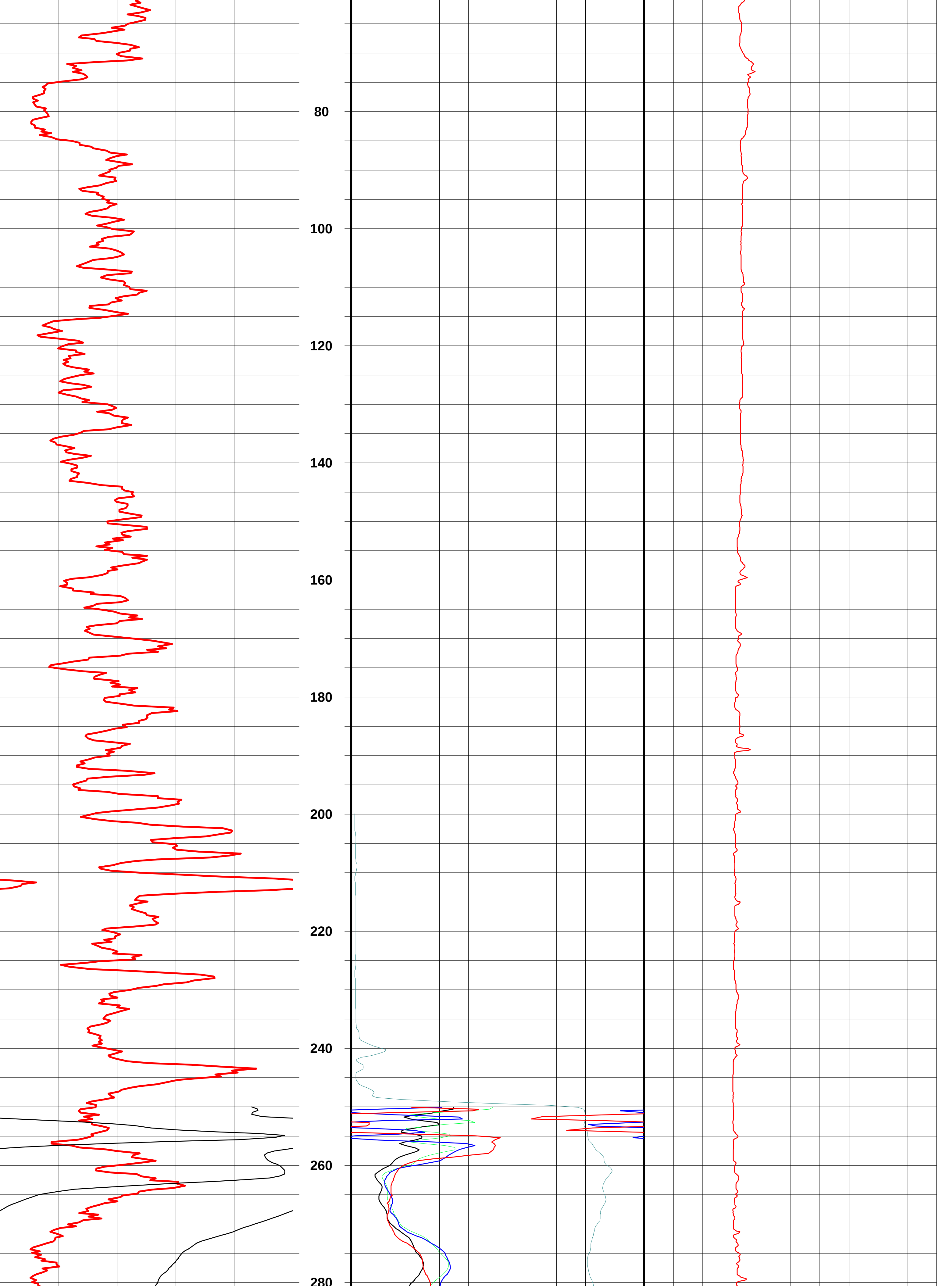
Logged by: Michael G. Miller
Unit/Truck: 05

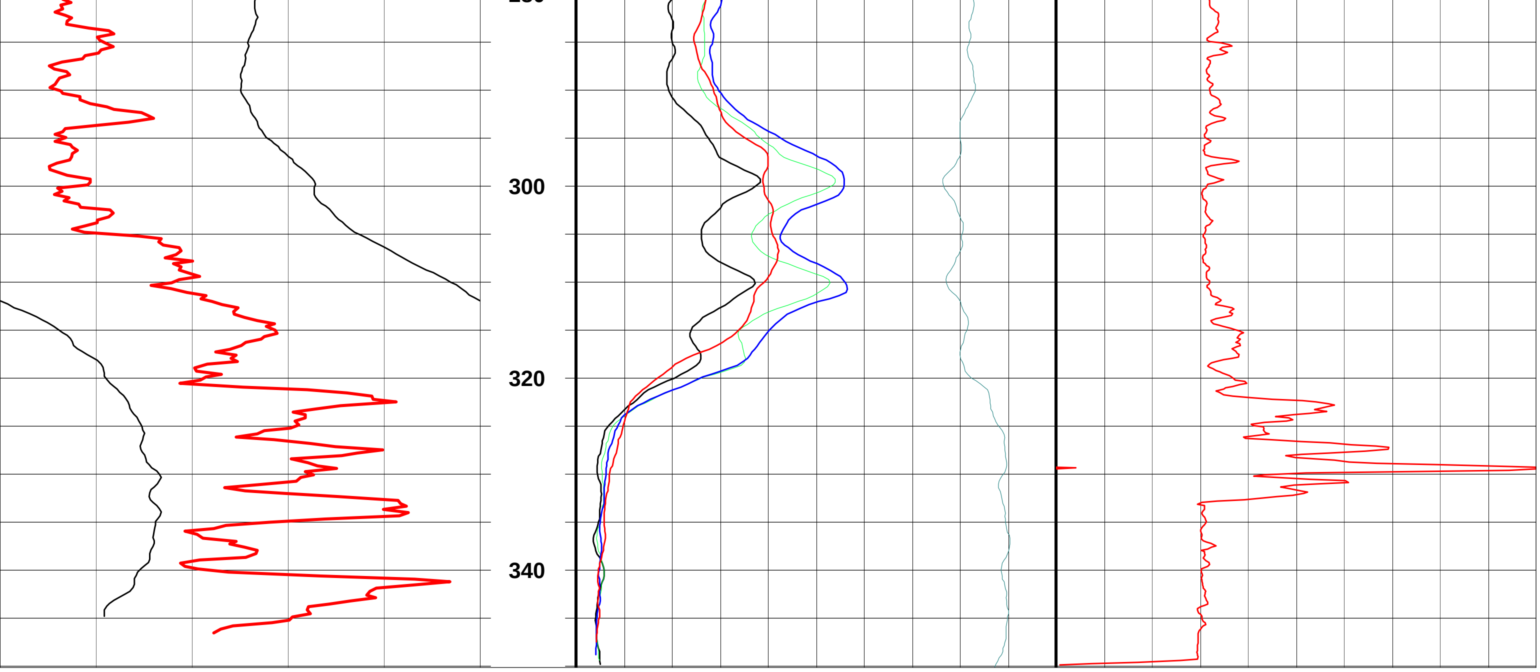
Witness: BRAD MARTIN, LEE GEBERT

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	2	25'	346'	4'	20
RESISTIVITY	2	25'	350'	249'	20
CALIPER	1	25'	350'	5'	20

Comments:




80
100
120
140
160
180
200
220
240
260
280



300
320
340

GEO CAM

Borehole: **B-3 EXWO4**

Logs: **GAMMA, RESISITIVITY, CALIPER**

Water Well Logging & Video Recording Services

Geo Cam, Inc. 126 Palo Duro, San Antonio, TX 210-495-9121

Project: **CAMP STANLEY STORAGE FACILITY**
Date: 06-13-11
Client: **GEOPROJECTS INTERNATIONAL**
County: BEXAR
Location: **N29* 42' 29.07" W98* 36' 55.9"**
State: TX

BOREHOLE DATA

Drilling Contractor: G.P.I.
Elevation: 1140' GPS
Depth Ref: G.L.
Driller T.D. (ft) : 335'
Logger T.D. (ft) : 335'
Date Drilled: 06-10-11

BIT RECORD				CASING RECORD		
RUN	BIT SIZE (in)	FROM (ft)	TO (ft)	SIZE/WGT/THK	FROM (ft)	TO (ft)
1	7 7/8'	0'	TD	NA		
2						
3						

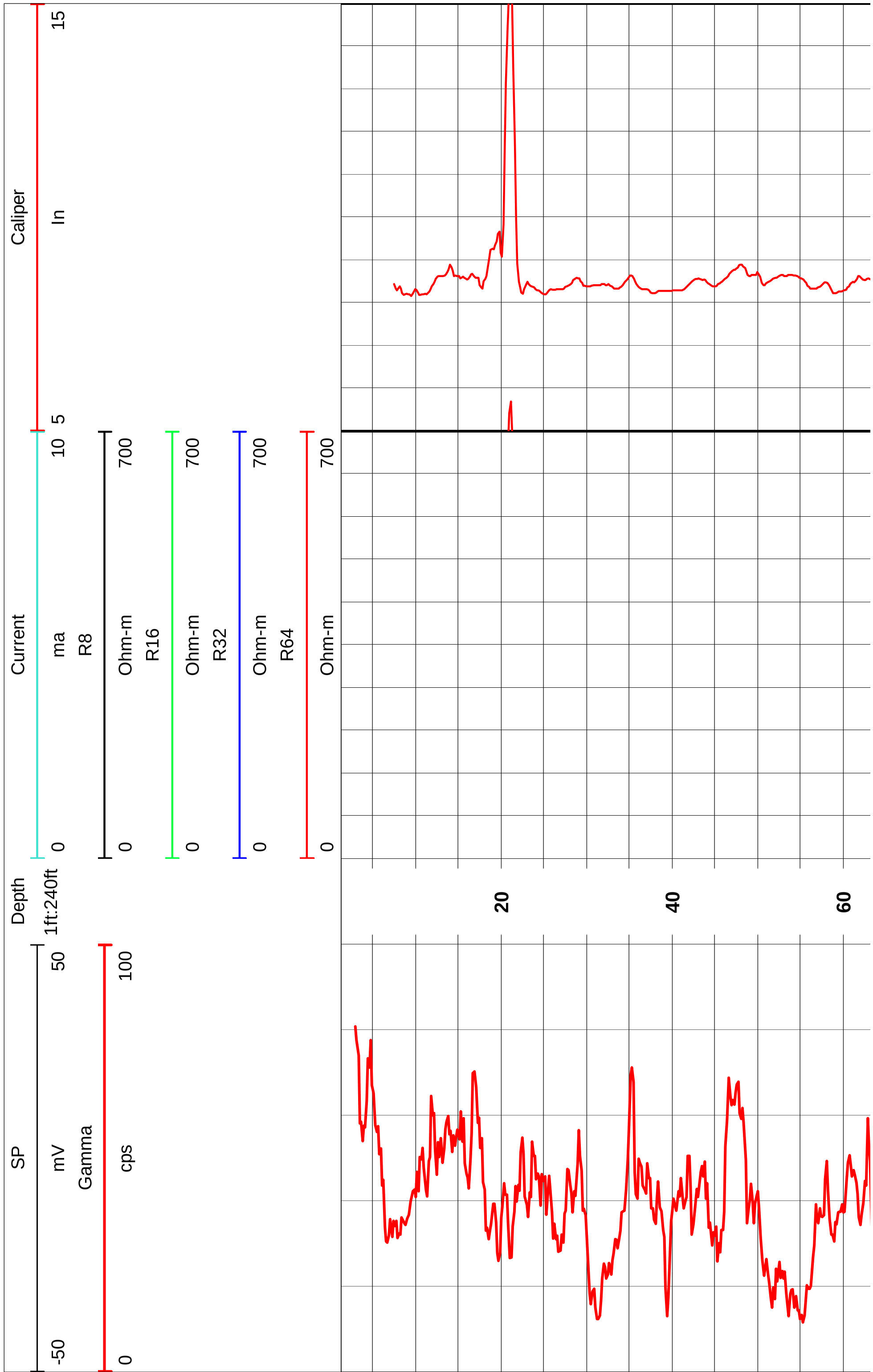
Drill Method: AIR ROTARY
Weight:
Fluid Level (ft) : 242'
Hole Medium:
Mud Type:
Time Since Circ:
Viscosity:
Rm:
at:
Deg C

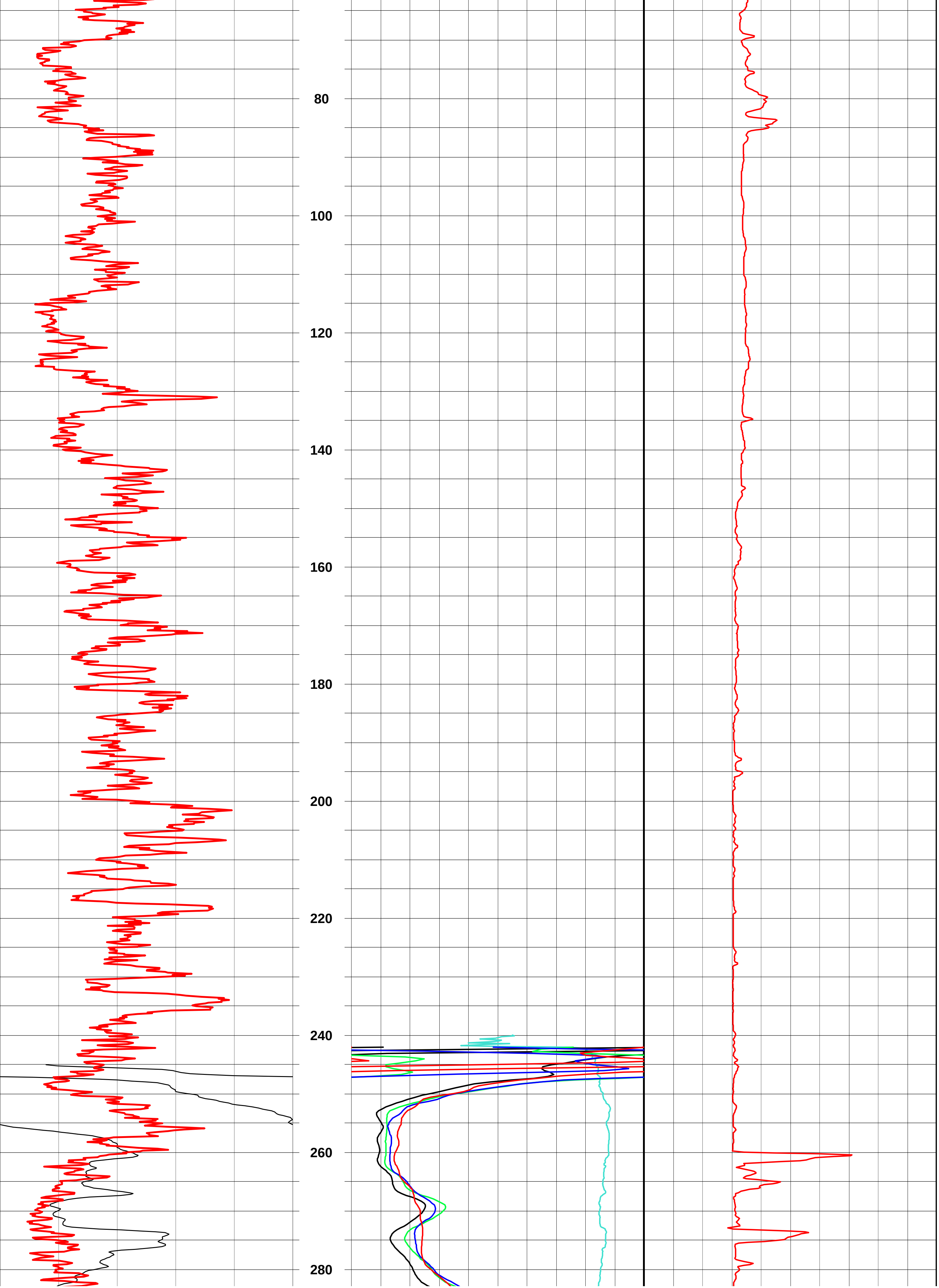
GENERAL DATA

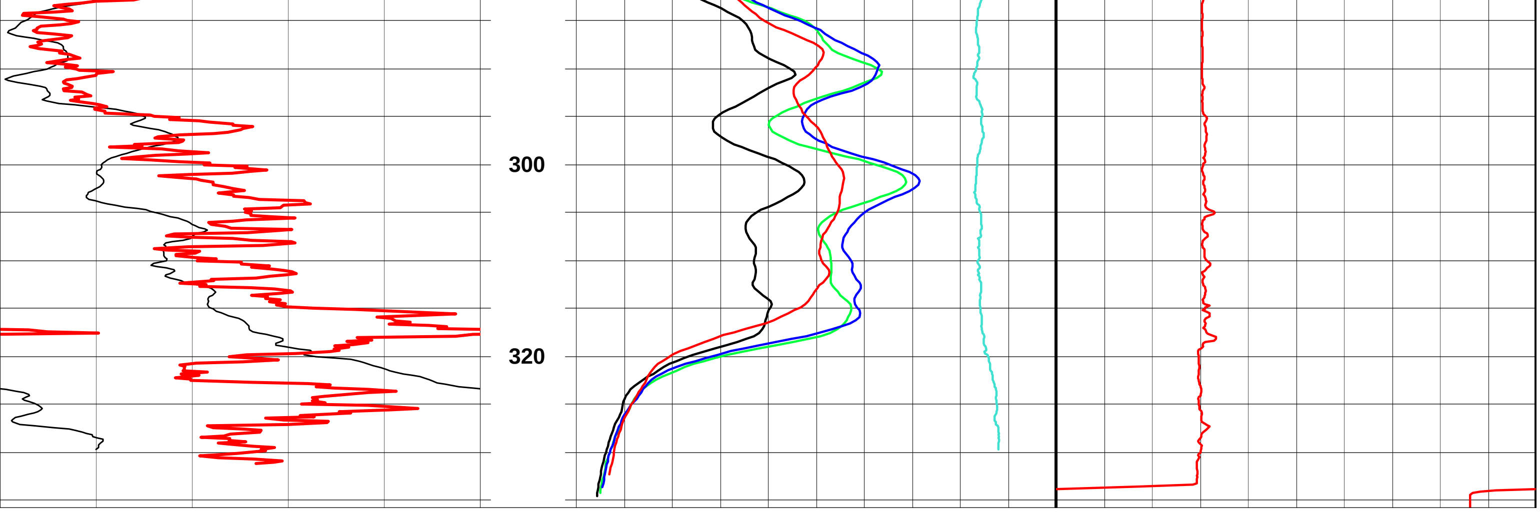
Logged by: Robert Becknal
Unit/Truck: 05
Witness:

LOG TYPE	RUN NO	SPEED (ft/min)	FROM (ft)	TO (ft)	FT./ IN.
GAMMA	2	25'	331'	3'	20
RESISITIVITY	2	25'	335'	8'	20
CALIPER	1	25'	242'	334'	20

Comments:




80
100
120
140
160
180
200
220
240
260
280


300
320

APPENDIX C

Well Completion Logs

PARSONS

BOREHOLE LOG

BOREHOLE NO.: **CS-MW35-LGR**

TOTAL DEPTH: **430 feet**

PROJECT INFORMATION

PROJECT: **CSSA**

SITE LOCATION: **CSSA**

JOB NUMBER: **747781.04000**

LOGGING GEOLOGIST: **Adrien Lindley**

PROJECT MANAGER: **Scott Pearson**

DATES DRILLED: **March 15, 2011**

DRILLING INFORMATION

DRILLING COMPANY: **GeoProjects Intl., Inc.**

LEAD DRILLER: **Lee Gebbert**

RIG TYPE: **CME-75**

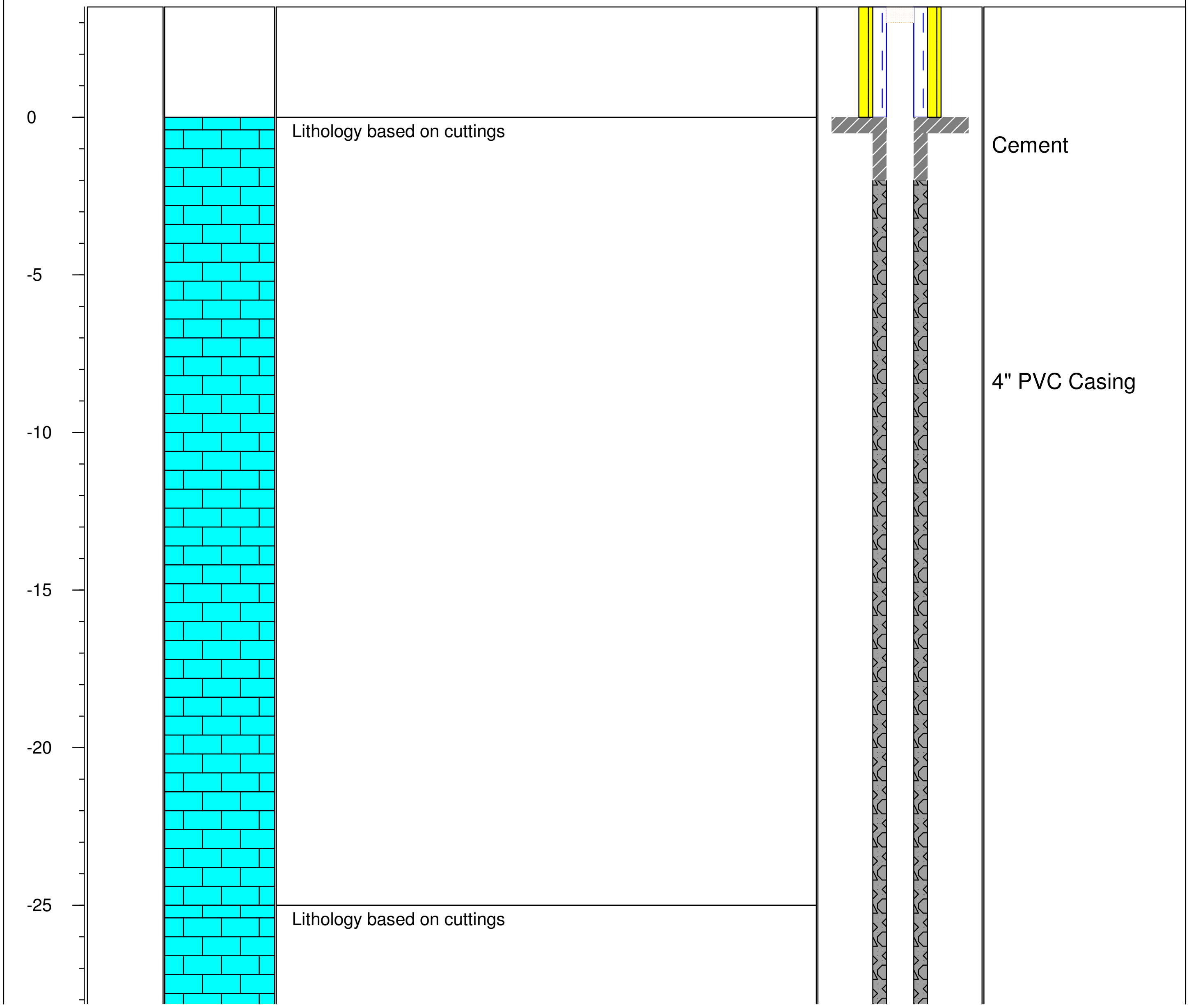
METHOD OF DRILLING: **Air-Rotary**

SAMPLING METHOD: **Core**

BORING DIAMETER **8 in.**

NOTES: Located in the southern area of CSSA, near WWTP

Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes

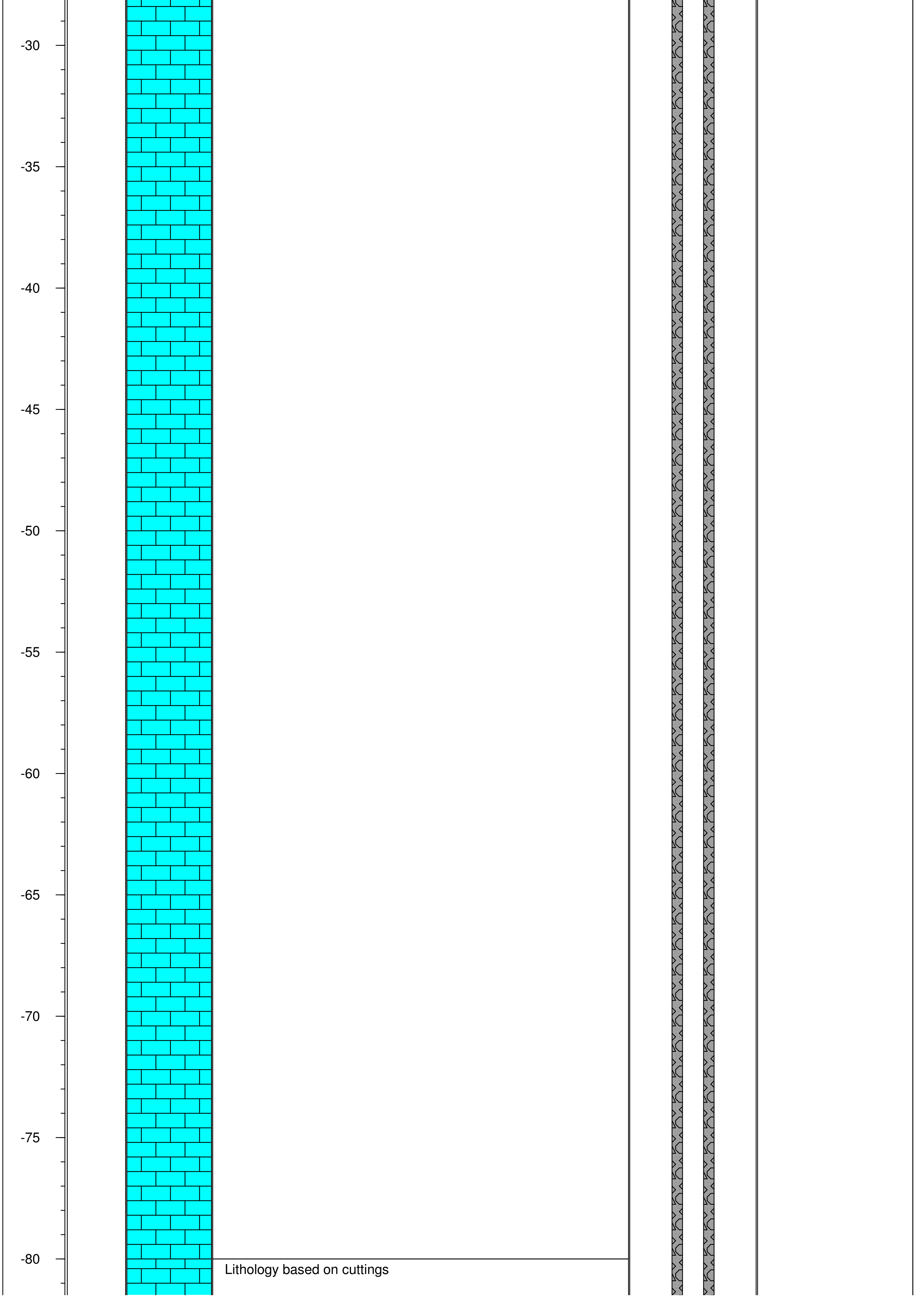


Lithology based on cuttings

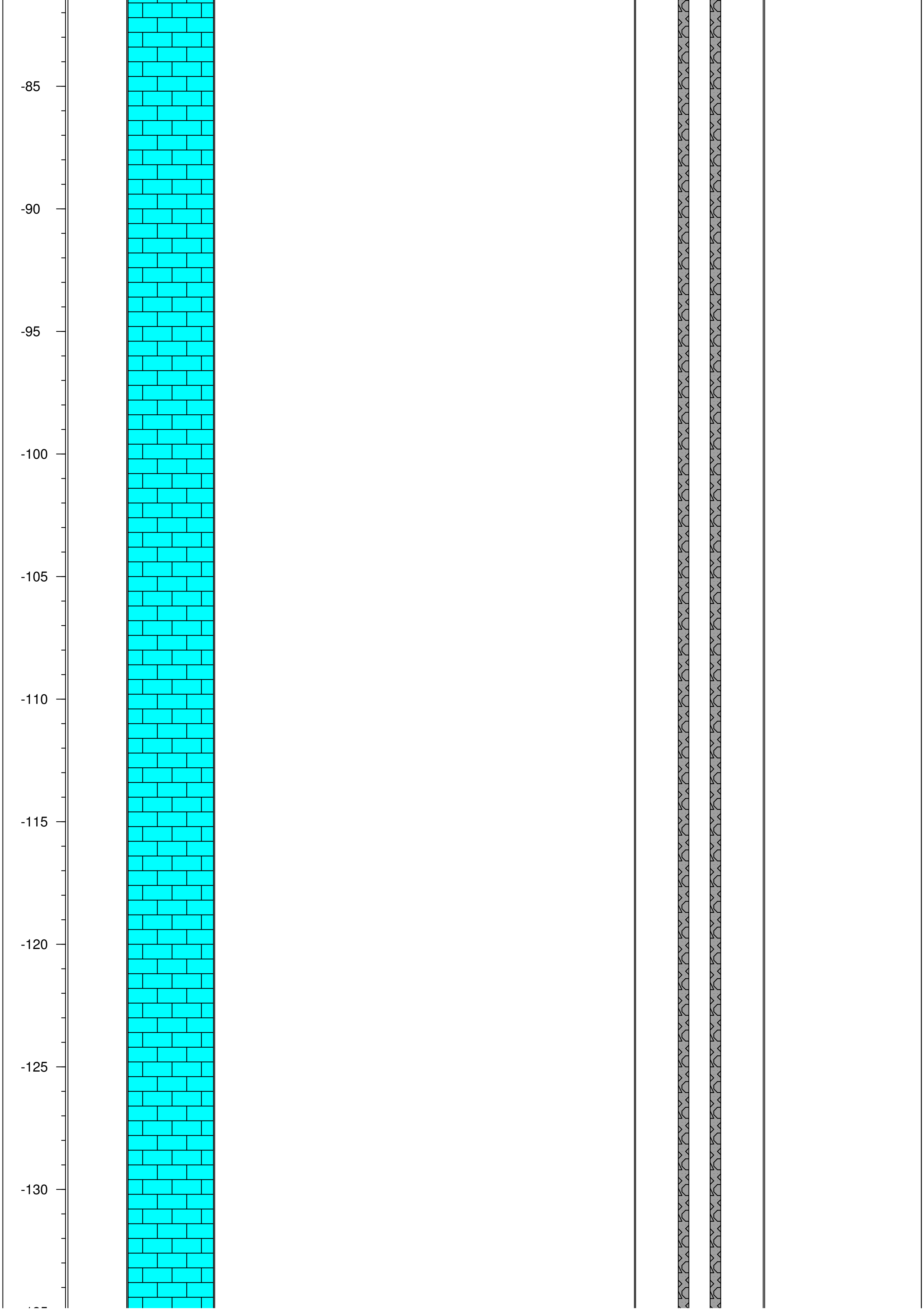
Cement

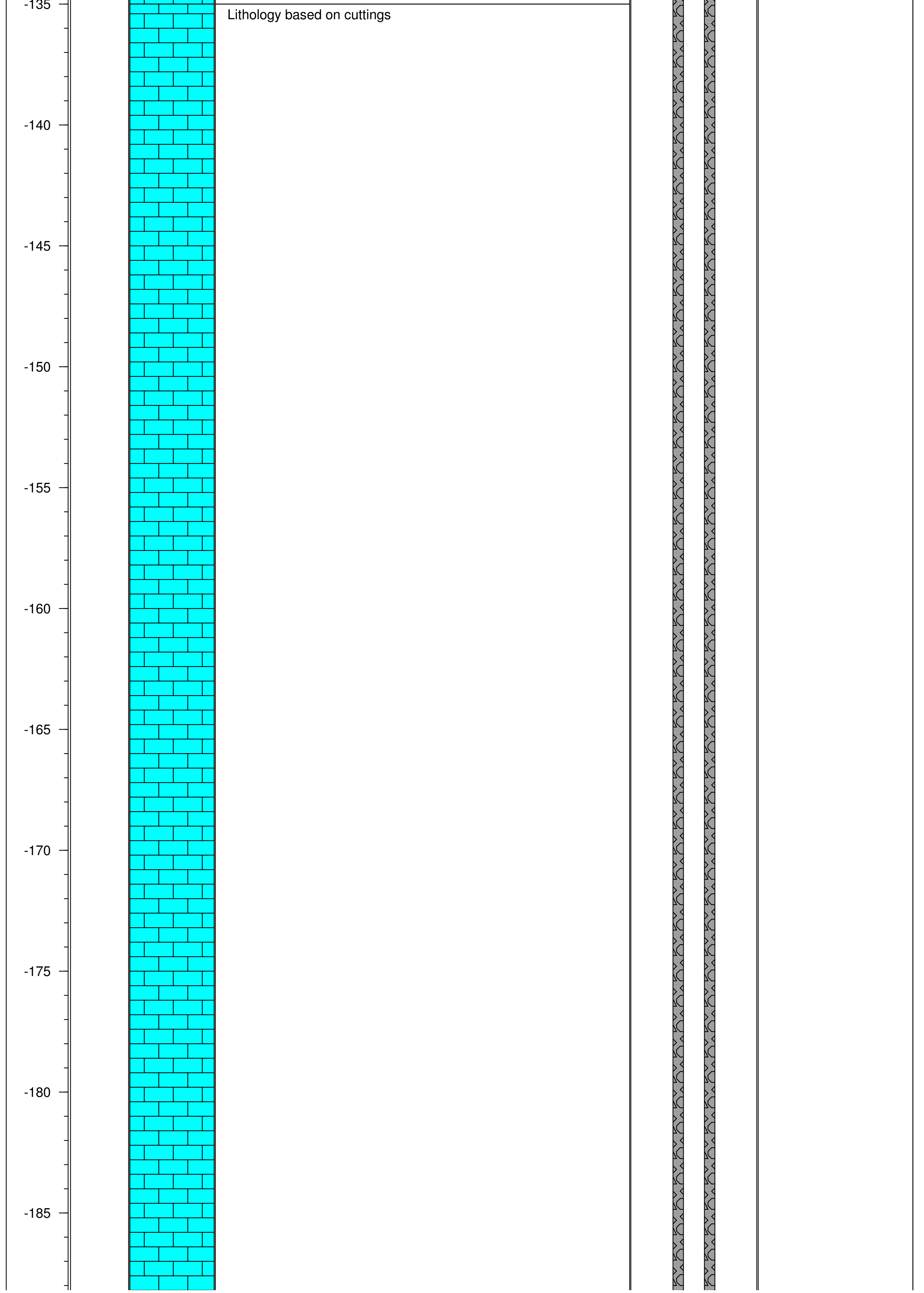
4" PVC Casing

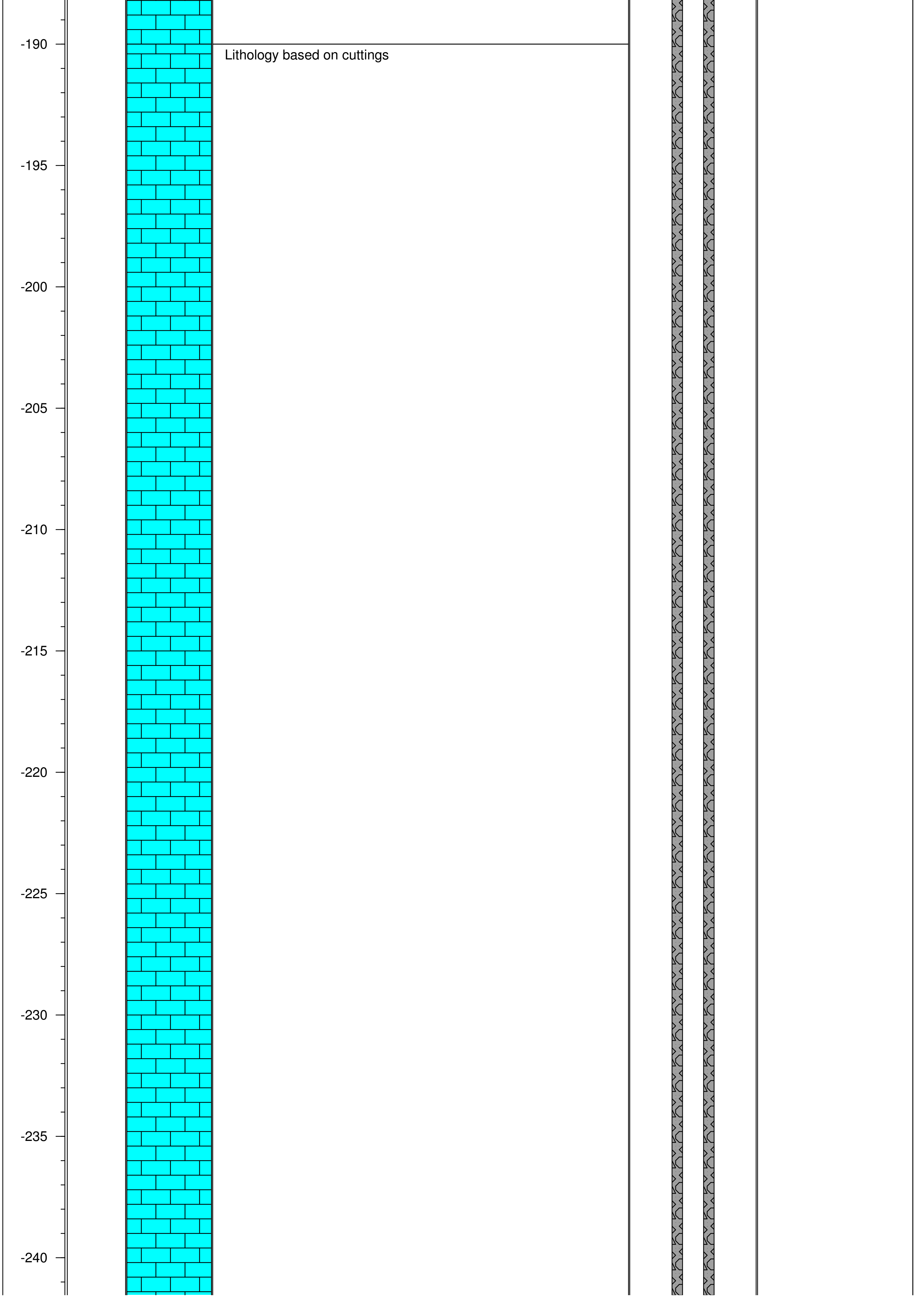
Lithology based on cuttings



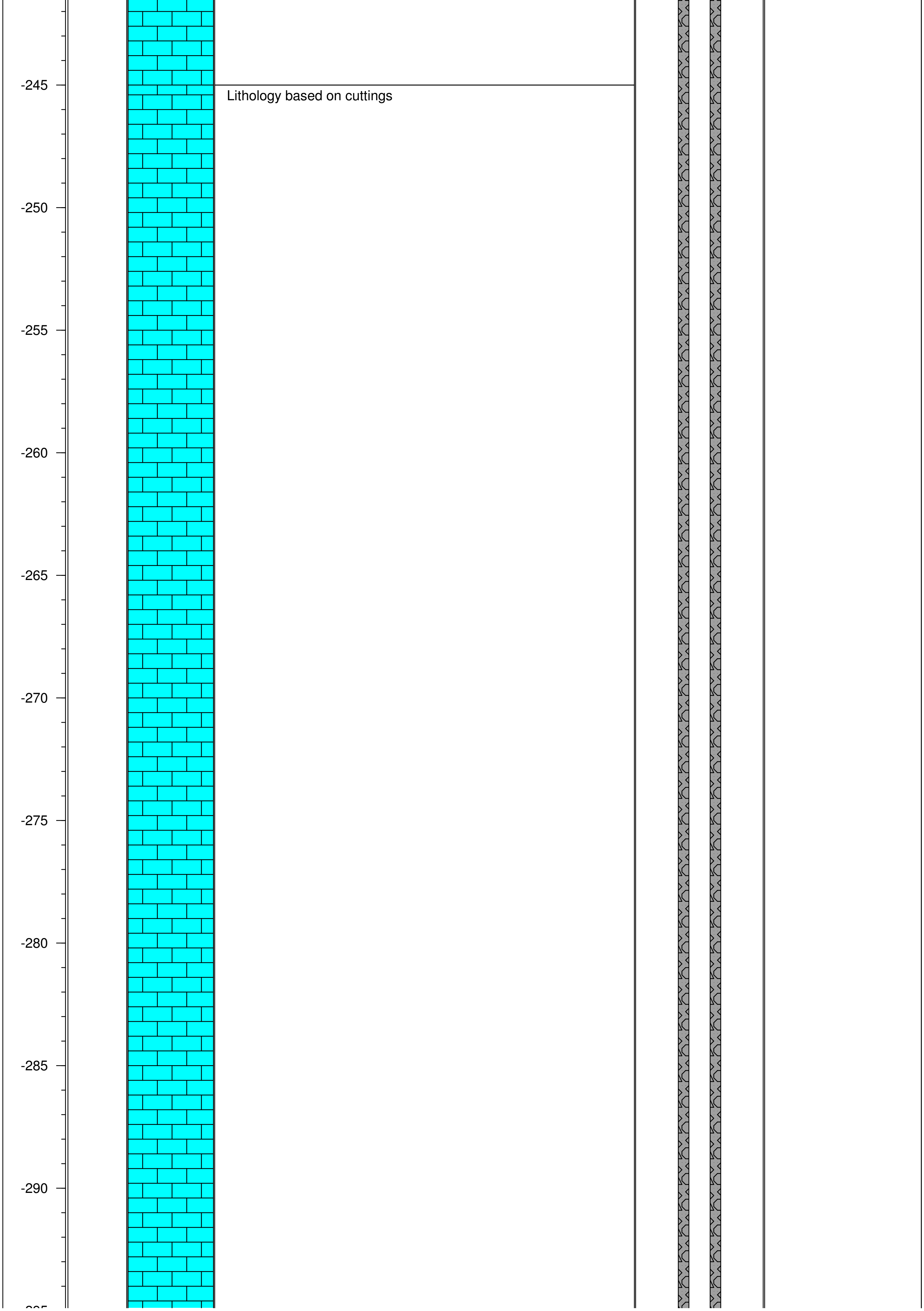
Lithology based on cuttings

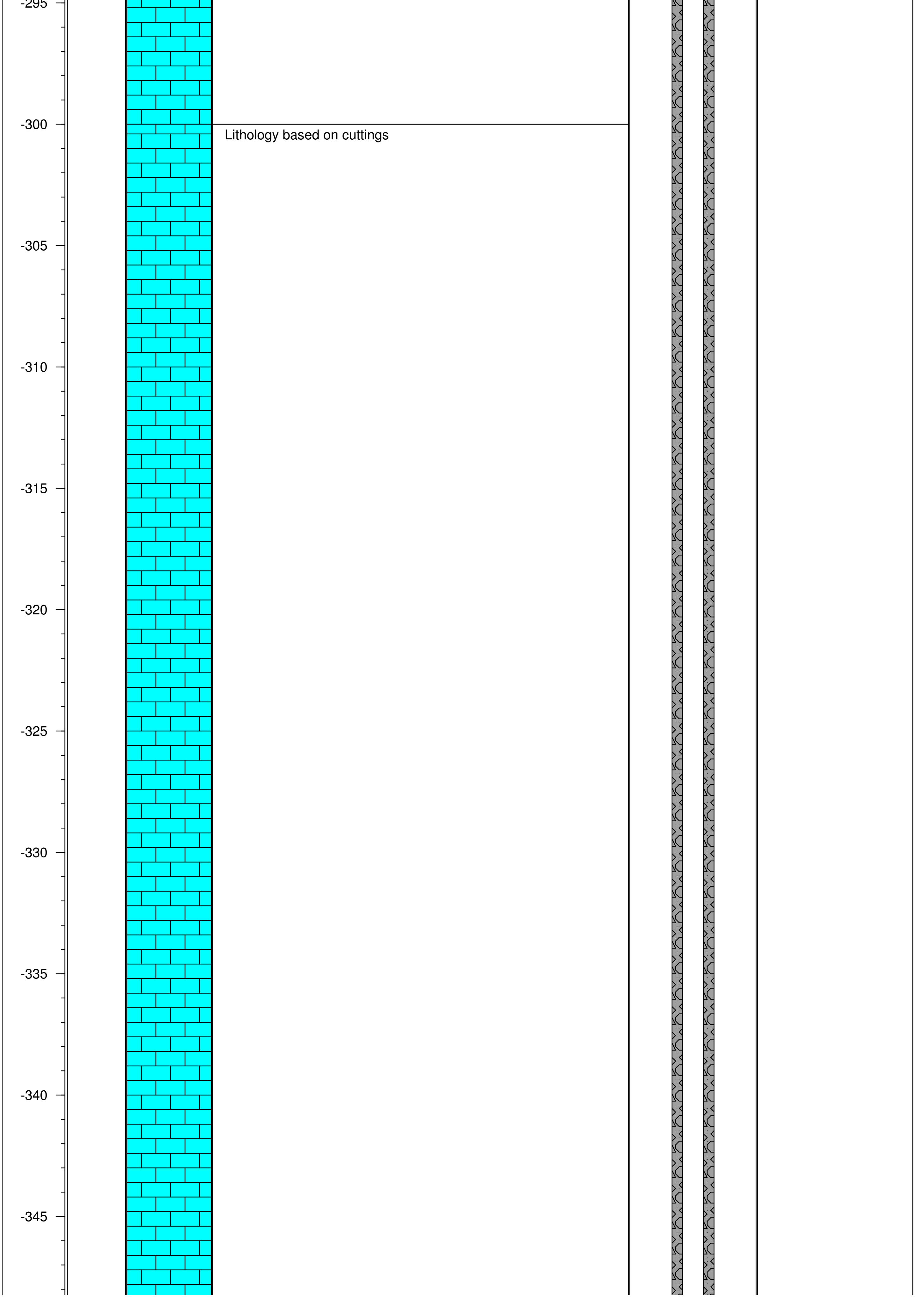

-85
-90
-95
-100
-105
-110
-115
-120
-125
-130

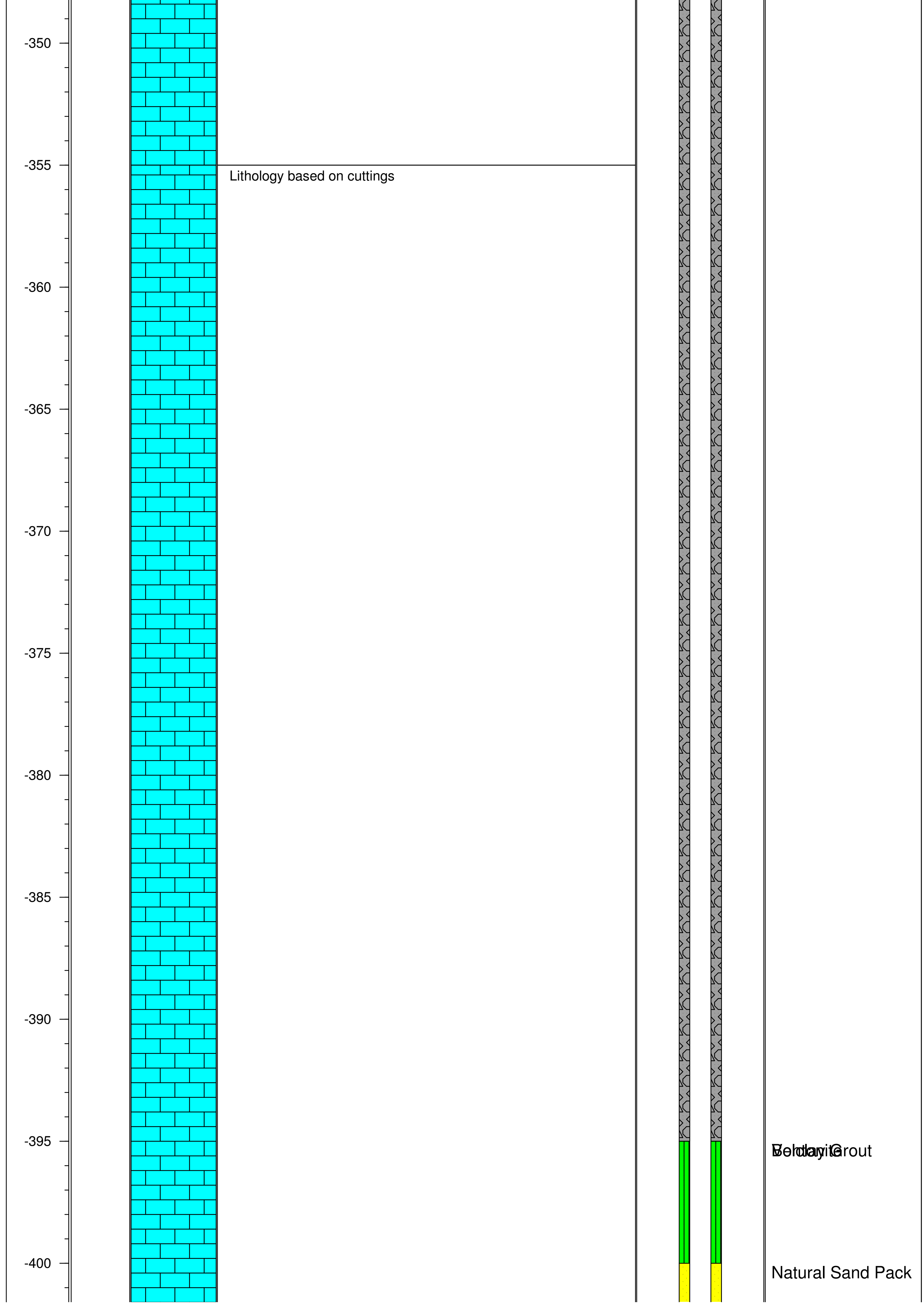

-135
Lithology based on cuttings
-140
-145
-150
-155
-160
-165
-170
-175
-180
-185

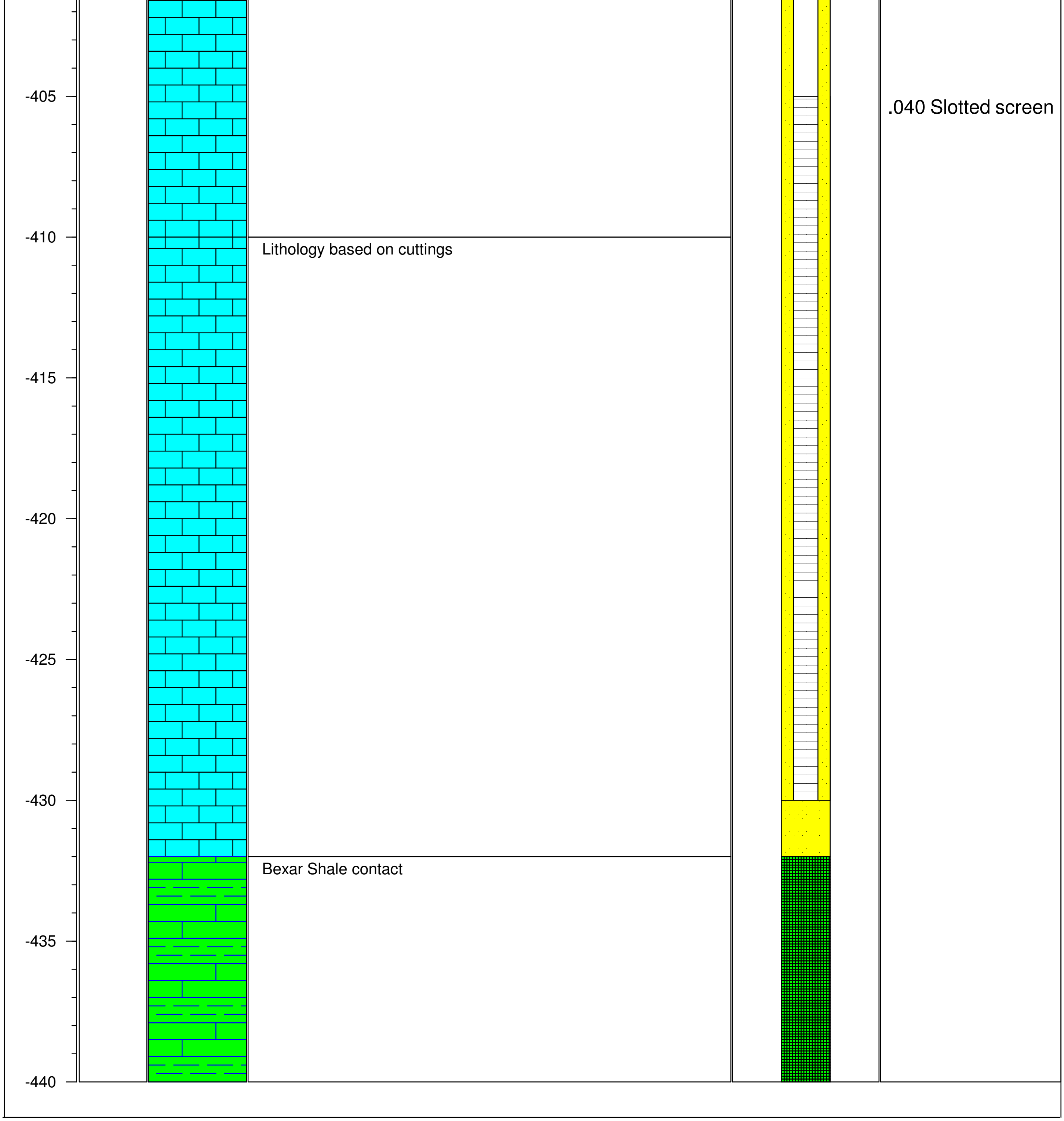


Lithology based on cuttings


-245
Lithology based on cuttings
-250
-255
-260
-265
-270
-275
-280
-285
-290


-295
-300
Lithology based on cuttings
-305
-310
-315
-320
-325
-330
-335
-340
-345


-350
-355
-360
-365
-370
-375
-380
-385
-390
-395
-400
Lithology based on cuttings
Bentonite
Volclay Grout
Natural Sand Pack


-405
-410
-415
-420
-425
-430
-435
-440
Lithology based on cuttings
Bexar Shale contact
.040 Slotted screen

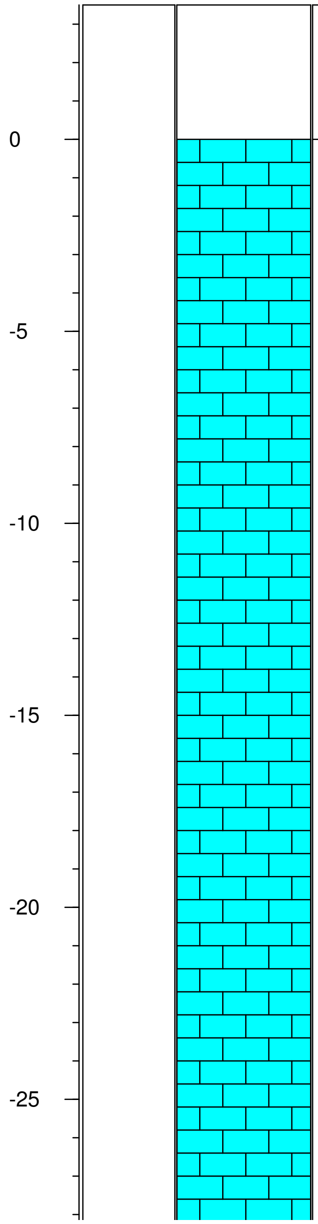
BOREHOLE LOG

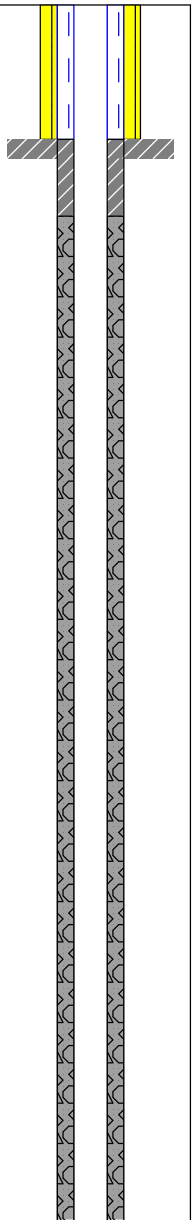
BOREHOLE NO.: **CS-MW36-LGR**
TOTAL DEPTH: **370 feet**

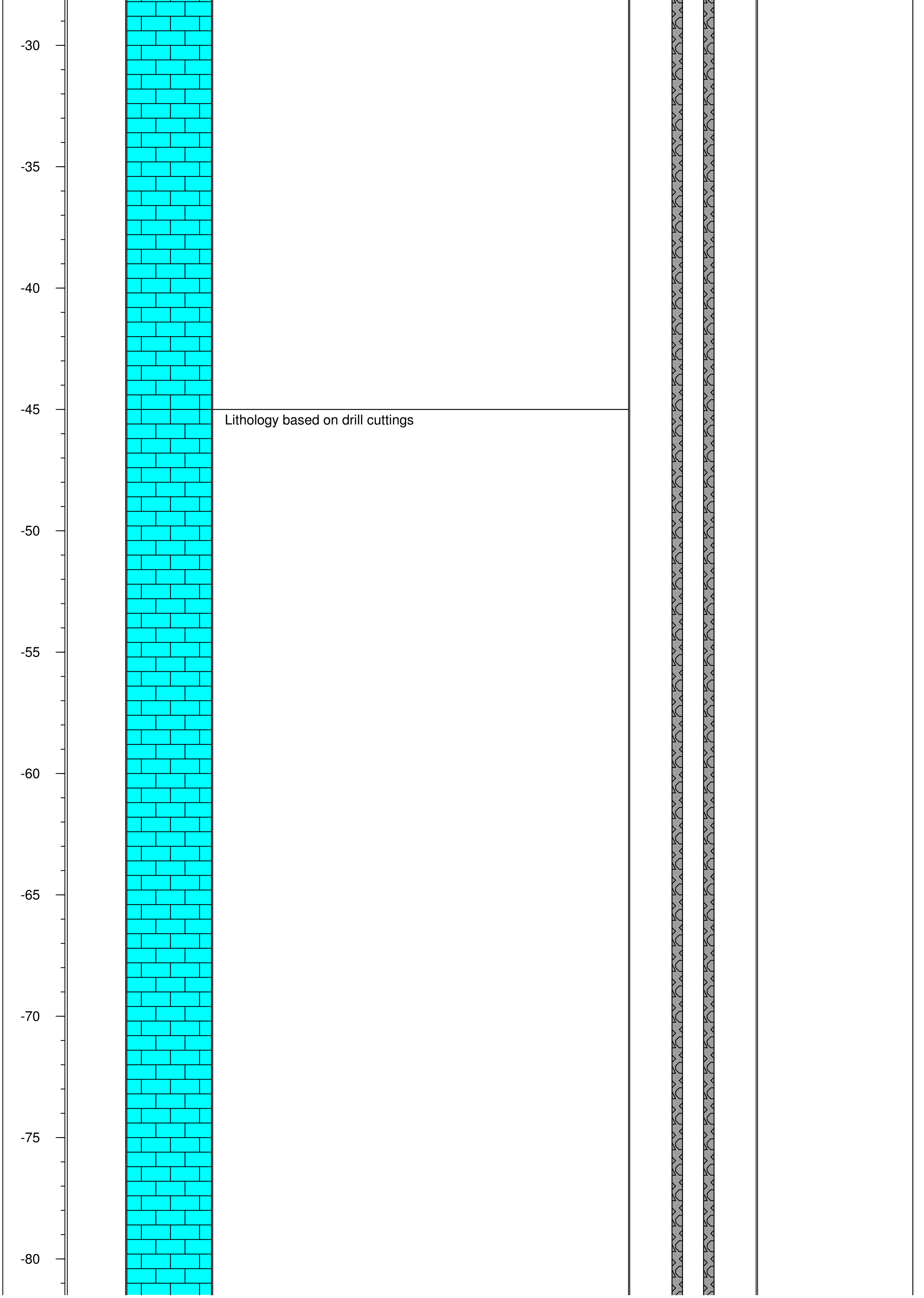
PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**CSSA**	DRILLING COMPANY:	**GeoProjects Intl., Inc.**
SITE LOCATION:	**CSSA**	LEAD DRILLER:	**Lee Gebbert**
JOB NUMBER:	**747781.04000**	RIG TYPE:	**CME-75**
LOGGING GEOLOGIST:	**Julie Bouch**	METHOD OF DRILLING:	**Air-Rotary**
PROJECT MANAGER:	**Scott Pearson**	SAMPLING METHOD:	**Core**
DATES DRILLED:	**March 23, 2011**	BORING DIAMETER	**8 in.**

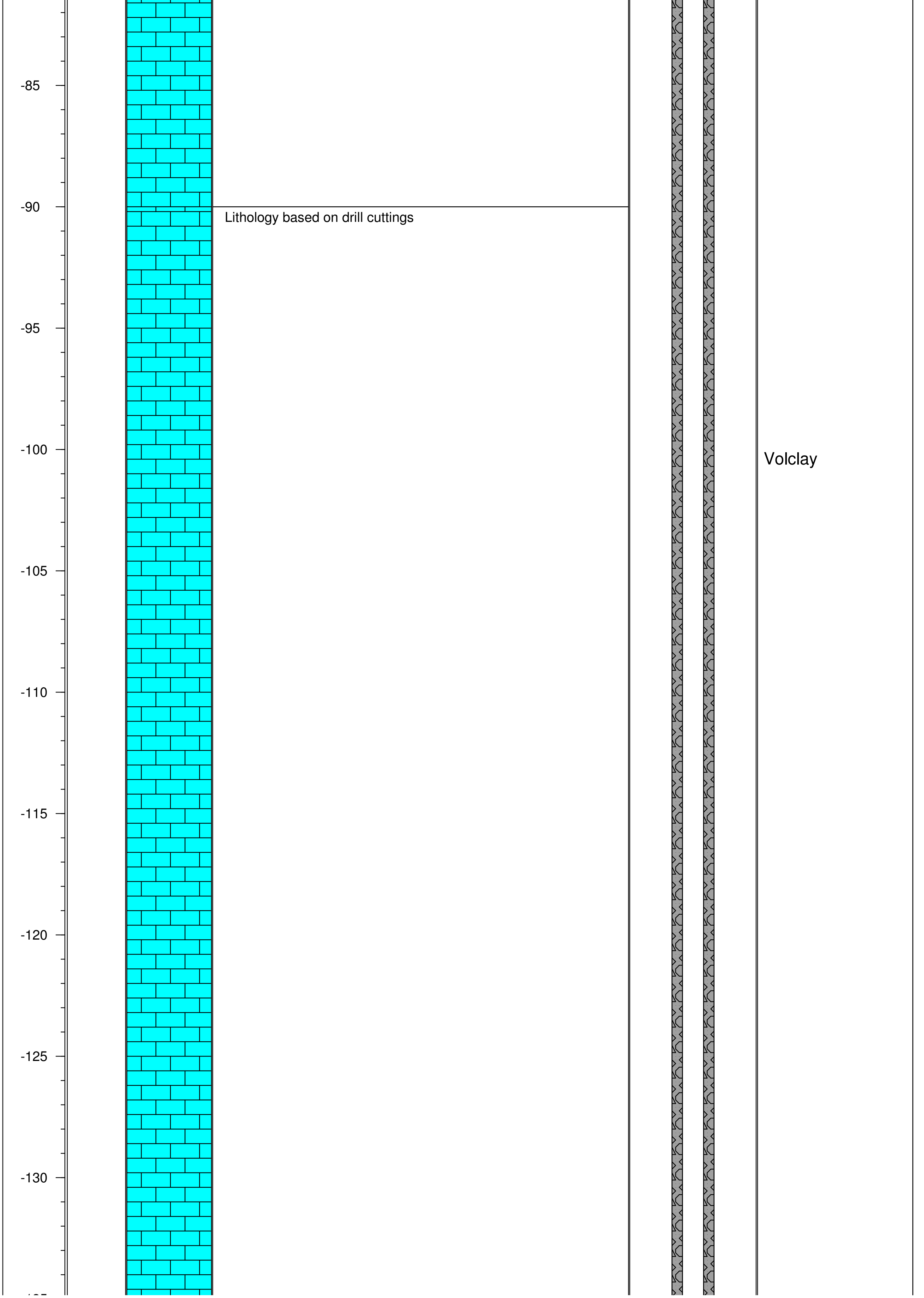
NOTES: Located at AOC-65

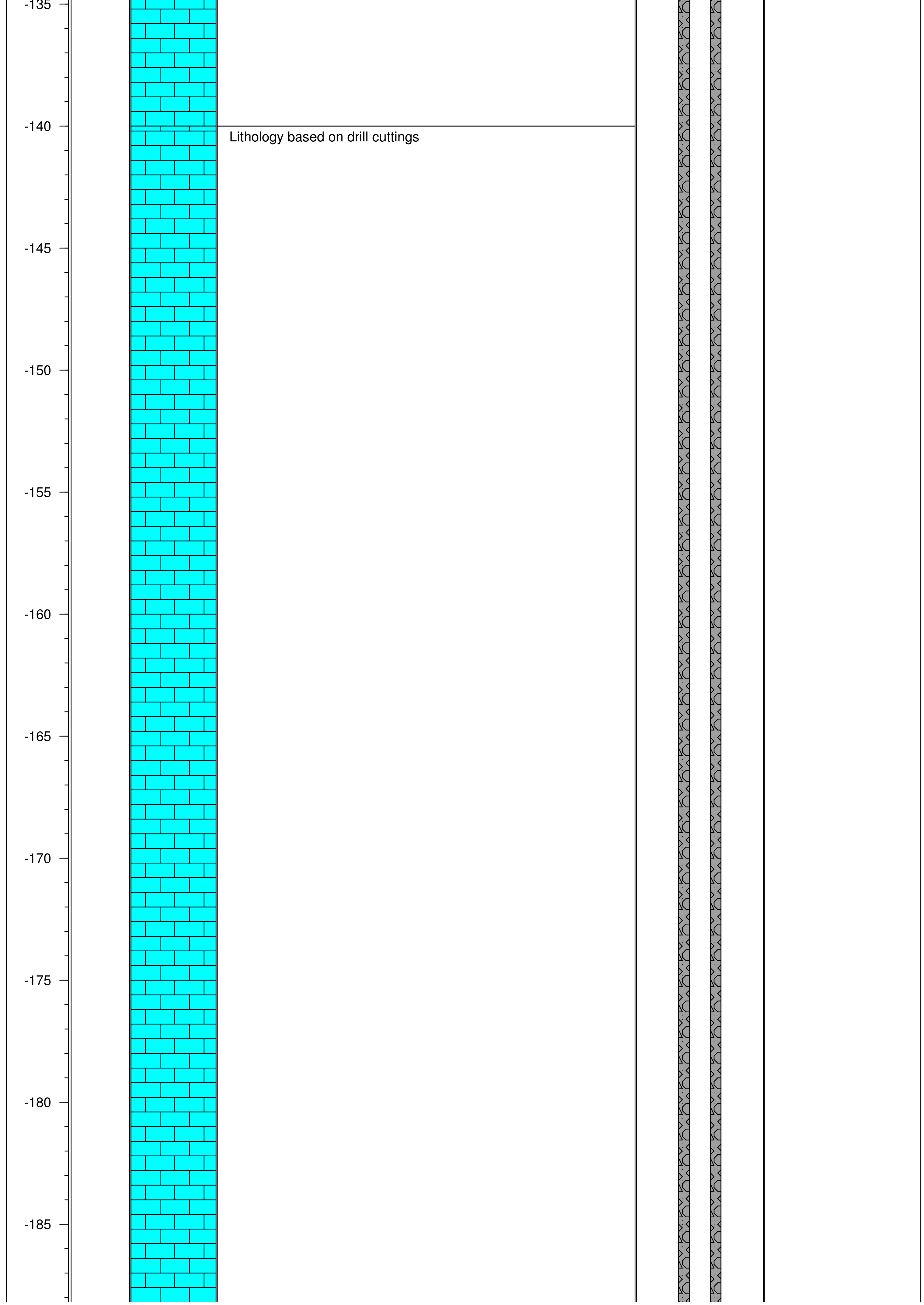
Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes
			Lithology based on drill cuttings		Cement 4" PVC Casing Volclay



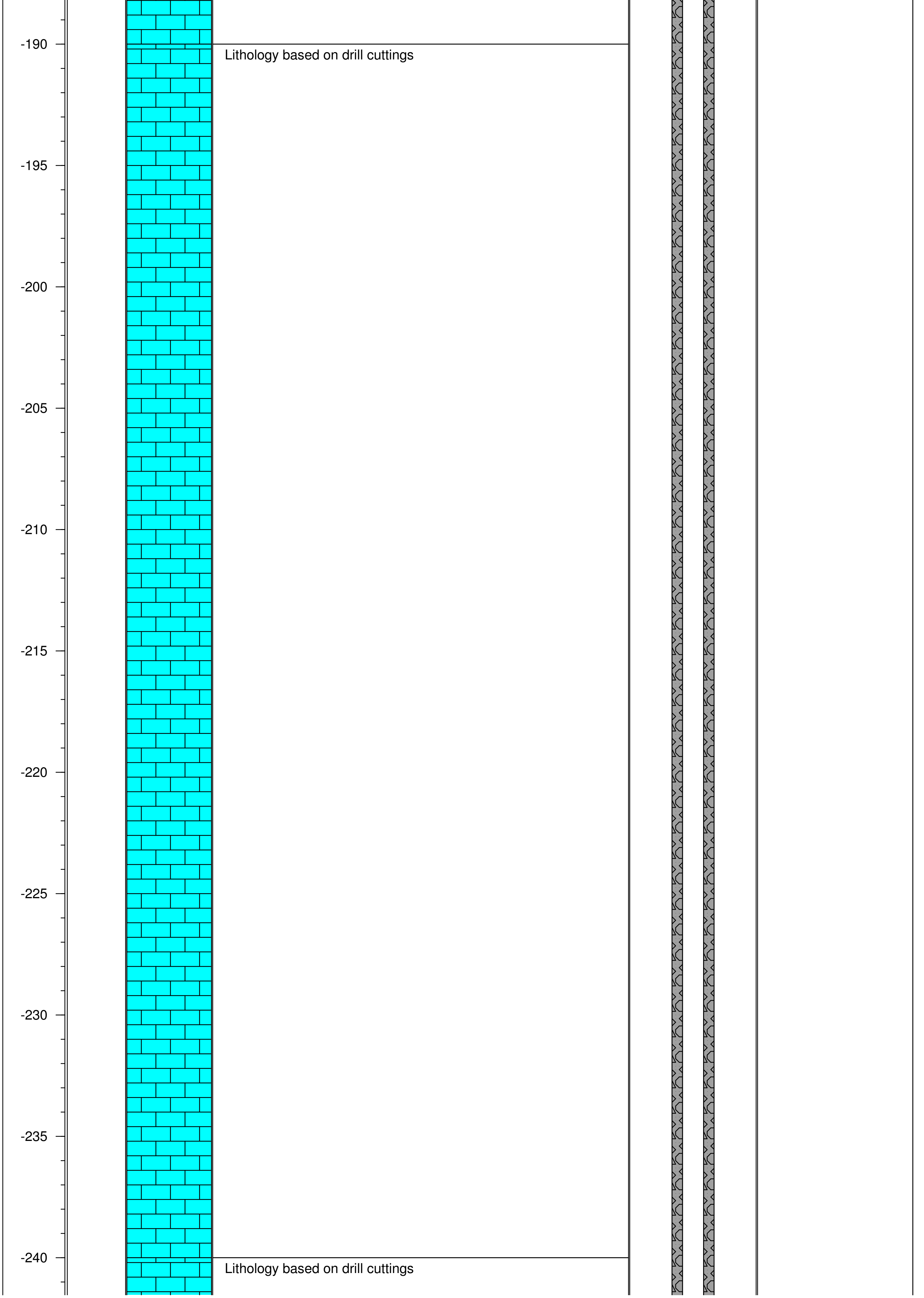


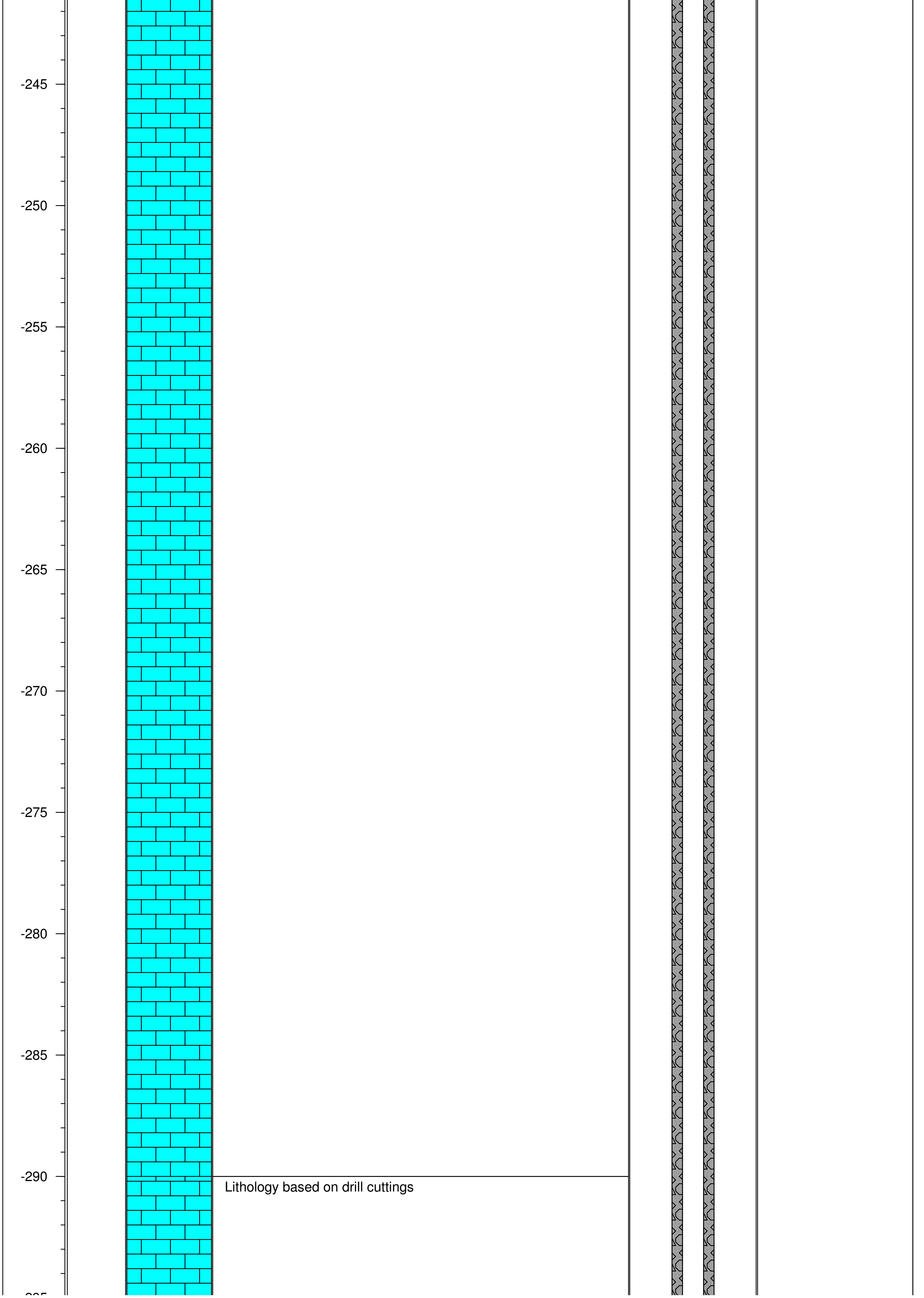

-30
-35
-40
-45
Lithology based on drill cuttings
-50
-55
-60
-65
-70
-75
-80


-85
-90
Lithology based on drill cuttings
-95
-100
Volclay
-105
-110
-115
-120
-125
-130

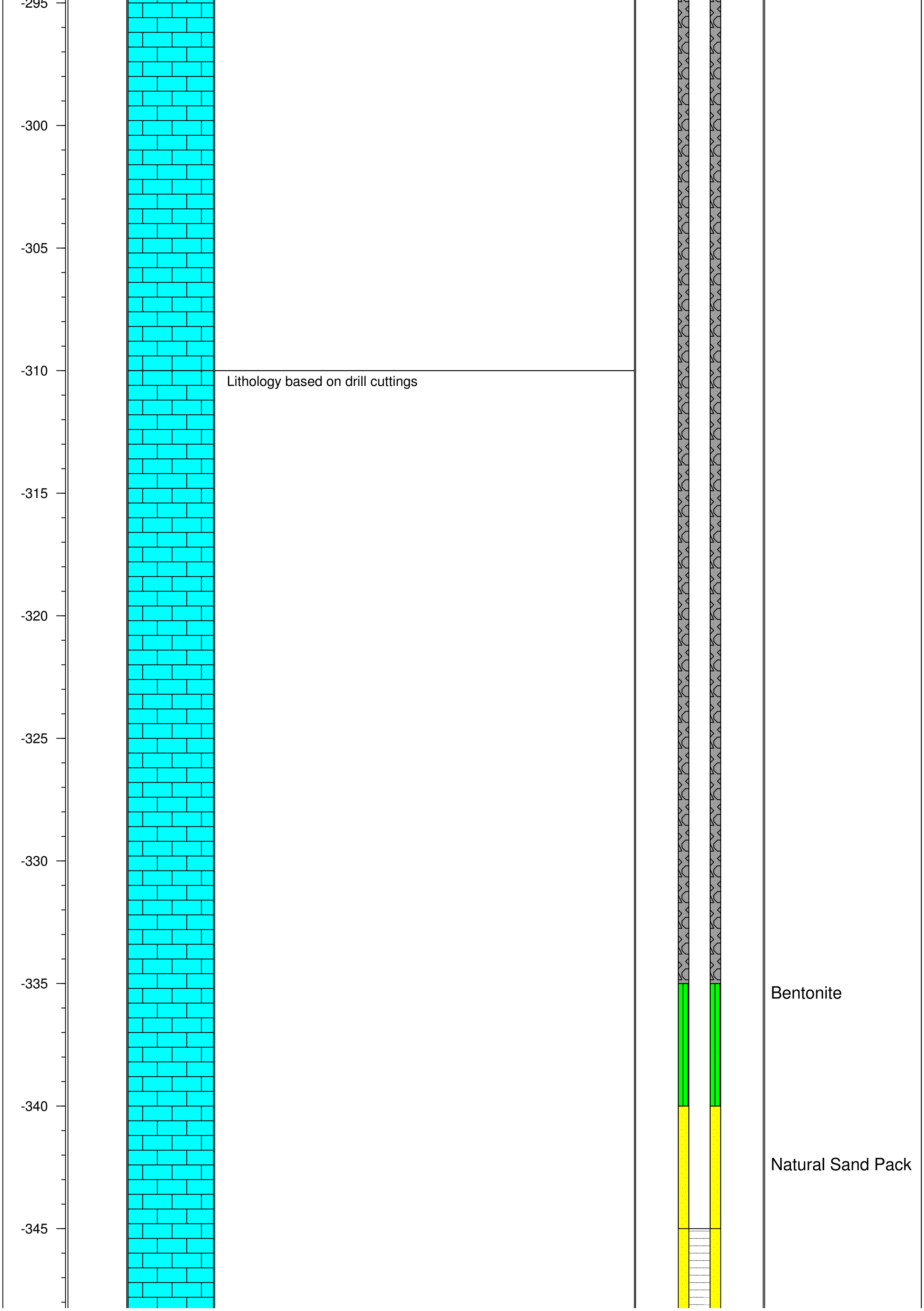


Lithology based on drill cuttings

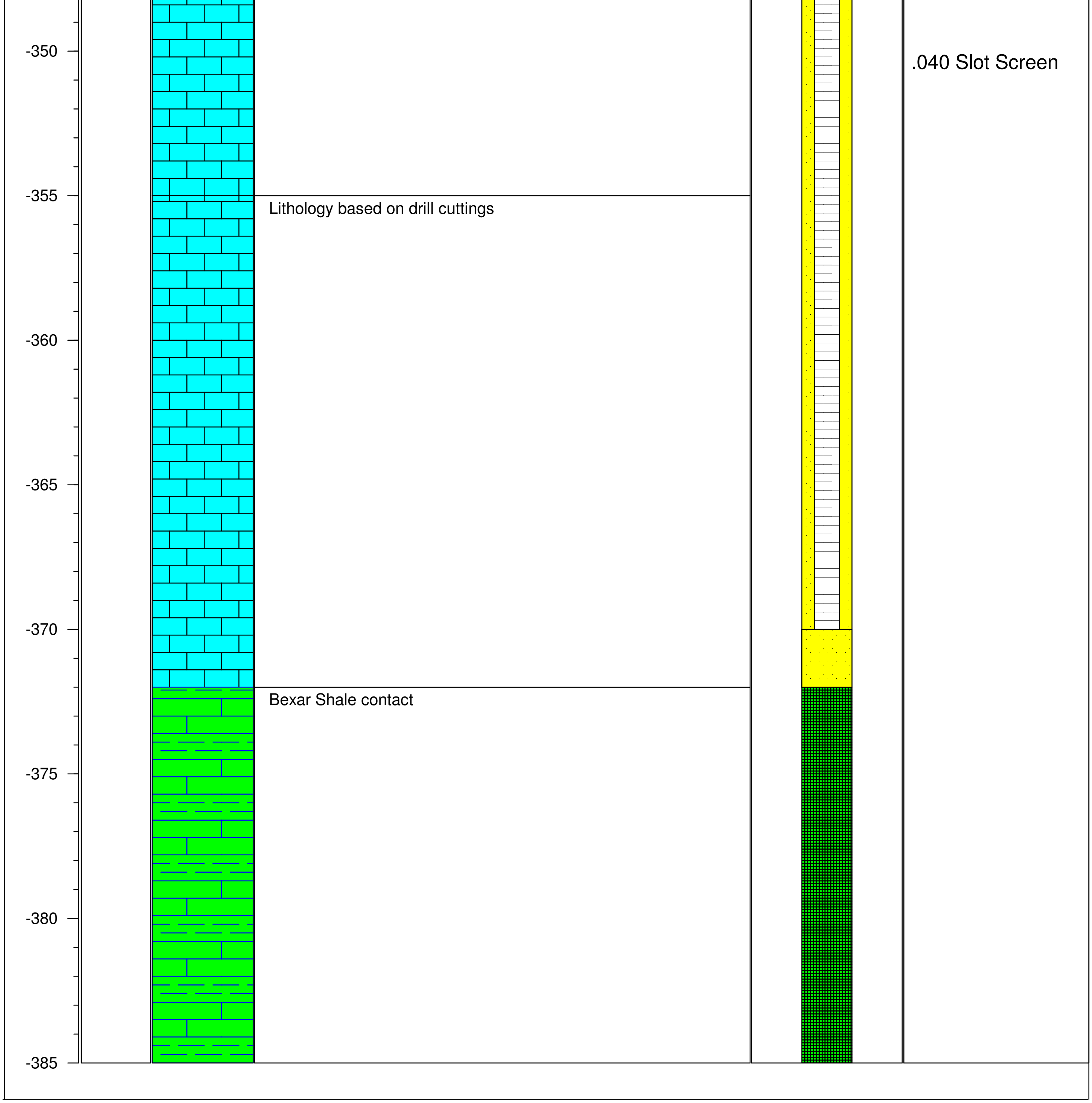

-190
Lithology based on drill cuttings
-195
-200
-205
-210
-215
-220
-225
-230
-235
-240
Lithology based on drill cuttings



Lithology based on drill cuttings



Lithology based on drill cuttings


-350
-355
-360
-365
-370
-375
-380
-385
Lithology based on drill cuttings
Bexar Shale contact
.040 Slot Screen

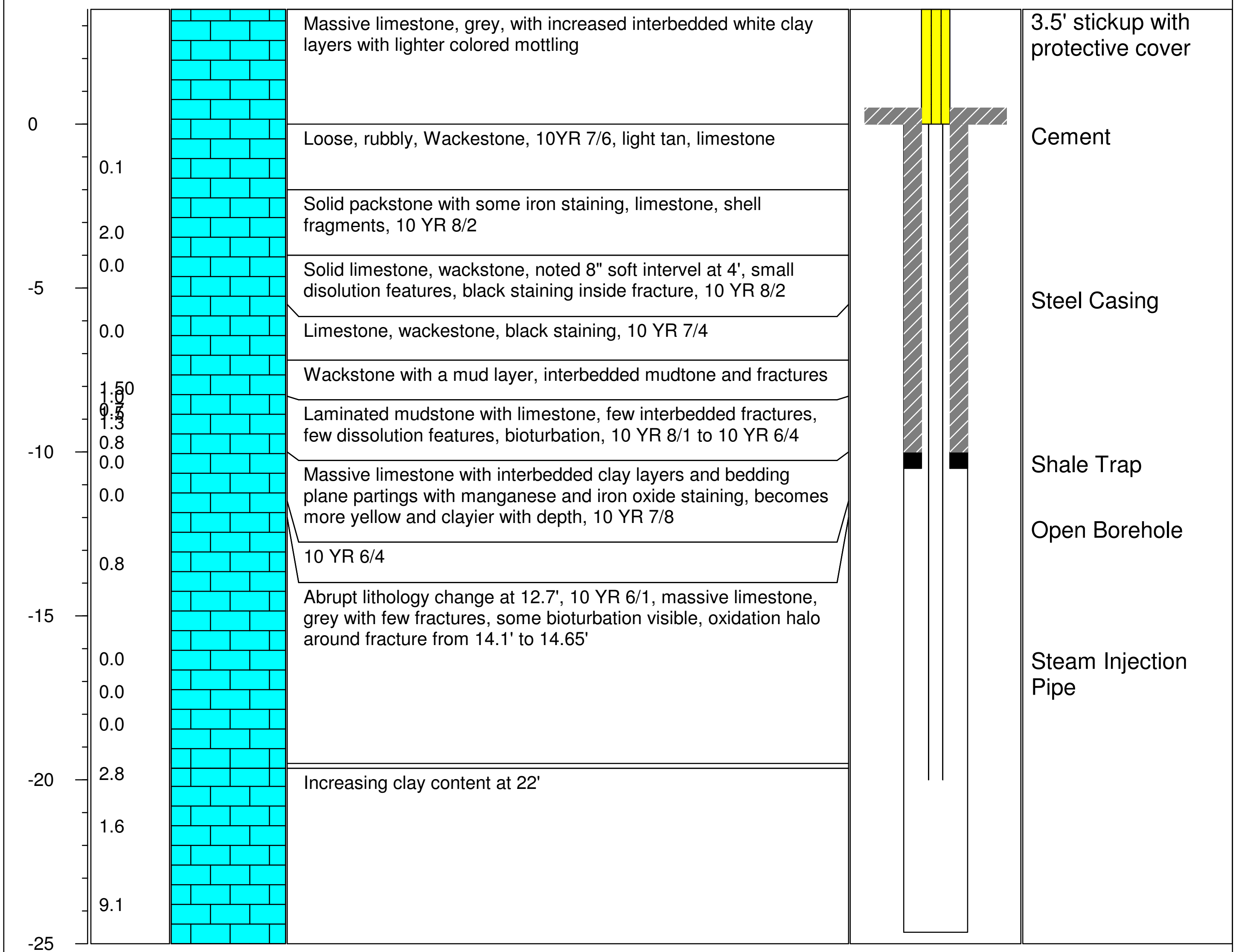
BOREHOLE LOG

BOREHOLE NO.: **SIW-01**
TOTAL DEPTH: **25 feet**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**CSSA**	DRILLING COMPANY:	**GeoProjects Intl., Inc.**
SITE LOCATION:	**AOC-65**	LEAD DRILLER:	**Lee Gebbert**
JOB NUMBER:	**747781.04000**	RIG TYPE:	**Deeprock Ram10 (modified)**
LOGGING GEOLOGIST:	**Adrien Lindley**	METHOD OF DRILLING:	**Air-Rotary**
PROJECT MANAGER:	**Scott Pearson**	SAMPLING METHOD:	**Core**
DATES DRILLED:	**April 6, 2011**	BORING DIAMETER	**8 in.**

NOTES: SIW-01 drilled in former solvent vat inside Building 90.

Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes



Massive limestone, grey, with increased interbedded white clay layers with lighter colored mottling

Loose, rubbly, Wackestone, 10YR 7/6, light tan, limestone

Solid packstone with some iron staining, limestone, shell fragments, 10 YR 8/2

Solid limestone, wackstone, noted 8" soft interval at 4', small disolution features, black staining inside fracture, 10 YR 8/2

Limestone, wackestone, black staining, 10 YR 7/4

Wackstone with a mud layer, interbedded mudtone and fractures

Laminated mudstone with limestone, few interbedded fractures, few dissolution features, bioturbation, 10 YR 8/1 to 10 YR 6/4

Massive limestone with interbedded clay layers and bedding plane partings with manganese and iron oxide staining, becomes more yellow and clayier with depth, 10 YR 7/8

10 YR 6/4

Abrupt lithology change at 12.7', 10 YR 6/1, massive limestone, grey with few fractures, some bioturbation visible, oxidation halo around fracture from 14.1' to 14.65'

Increasing clay content at 22'

PARSONS

BOREHOLE LOG

BOREHOLE NO.: **SIW-02**

TOTAL DEPTH: **25 feet**

PROJECT INFORMATION

PROJECT: **CSSA**

SITE LOCATION: **AOC-65**

JOB NUMBER: **747781.04000**

LOGGING GEOLOGIST: **Adrien Lindley**

PROJECT MANAGER: **Scott Pearson**

DATES DRILLED: **April 6, 2011**

DRILLING INFORMATION

DRILLING COMPANY: **GeoProjects Intl., Inc.**

LEAD DRILLER: **Lee Gebbert**

RIG TYPE: **CME-75**

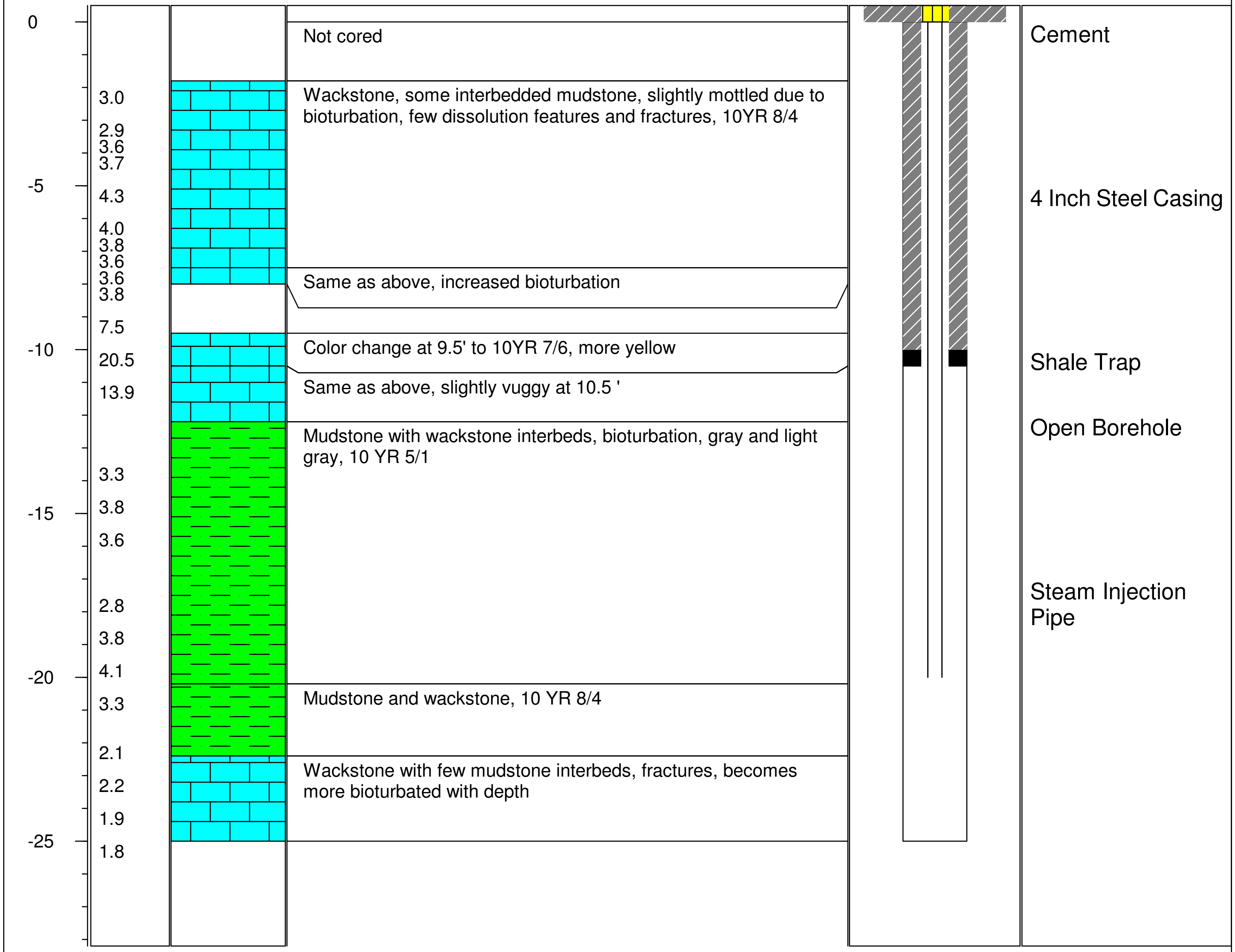
METHOD OF DRILLING: **Air-Rotary**

SAMPLING METHOD: **Core**

BORING DIAMETER **8 in.**

NOTES: SIW-02 is located west of Building 90

Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes



Not cored

Wackstone, some interbedded mudstone, slightly mottled due to bioturbation, few dissolution features and fractures, 10YR 8/4

Same as above, increased bioturbation

Color change at 9.5' to 10YR 7/6, more yellow

Same as above, slightly vuggy at 10.5 '

Mudstone with wackstone interbeds, bioturbation, gray and light gray, 10 YR 5/1

Mudstone and wackstone, 10 YR 8/4

Wackstone with few mudstone interbeds, fractures, becomes more bioturbated with depth

PARSONS

BOREHOLE LOG

BOREHOLE NO.: **VEW-29**
TOTAL DEPTH: **40 feet**

PROJECT INFORMATION

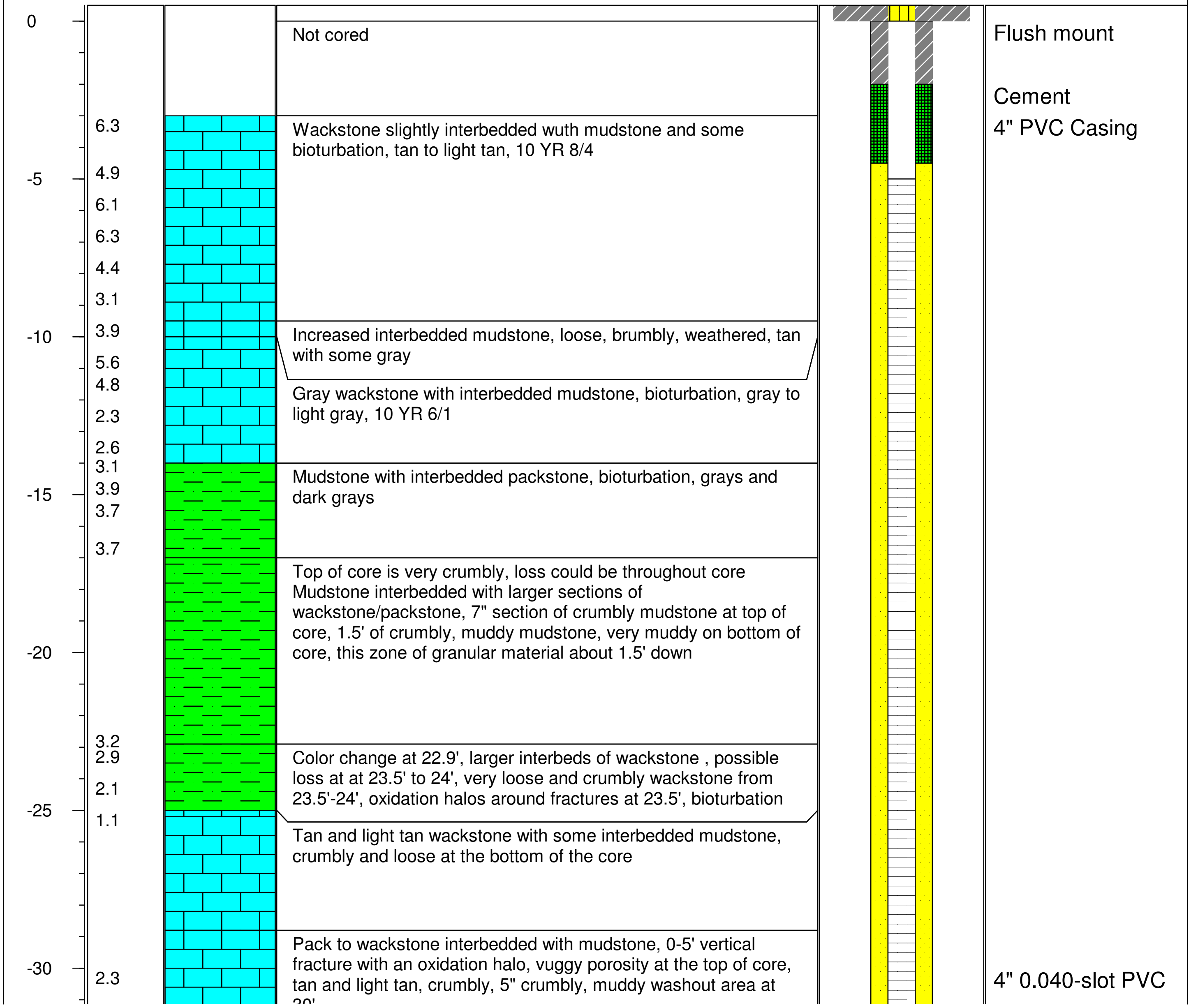
PROJECT: **CSSA**
SITE LOCATION: **AOC-65**
JOB NUMBER: **747781.04000**
LOGGING GEOLOGIST: **Julie Bouch**
PROJECT MANAGER: **Scott Pearson**
DATES DRILLED: **May 4, 2011**

DRILLING INFORMATION

DRILLING COMPANY: **GeoProjects Intl., Inc.**
LEAD DRILLER: **Lee Gebbert**
RIG TYPE: **Gardner-Denver 1500**
METHOD OF DRILLING: **Air-Rotary**
SAMPLING METHOD: **Core**
BORING DIAMETER **8 in.**

NOTES: VEW-29 is located west of Building 90

Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes



Not cored

Wackstone slightly interbedded wuth mudstone and some bioturbation, tan to light tan, 10 YR 8/4

Increased interbedded mudstone, loose, brumbly, weathered, tan with some gray

Gray wackstone with interbedded mudstone, bioturbation, gray to light gray, 10 YR 6/1

Mudstone with interbedded packstone, bioturbation, grays and dark grays

Top of core is very crumbly, loss could be throughout core Mudstone interbedded with larger sections of wackstone/packstone, 7" section of crumbly mudstone at top of core, 1.5' of crumbly, muddy mudstone, very muddy on bottom of core, this zone of granular material about 1.5' down

Color change at 22.9', larger interbeds of wackstone , possible loss at at 23.5' to 24', very loose and crumbly wackstone from 23.5'-24', oxidation halos around fractures at 23.5', bioturbation

Tan and light tan wackstone with some interbedded mudstone, crumbly and loose at the bottom of the core

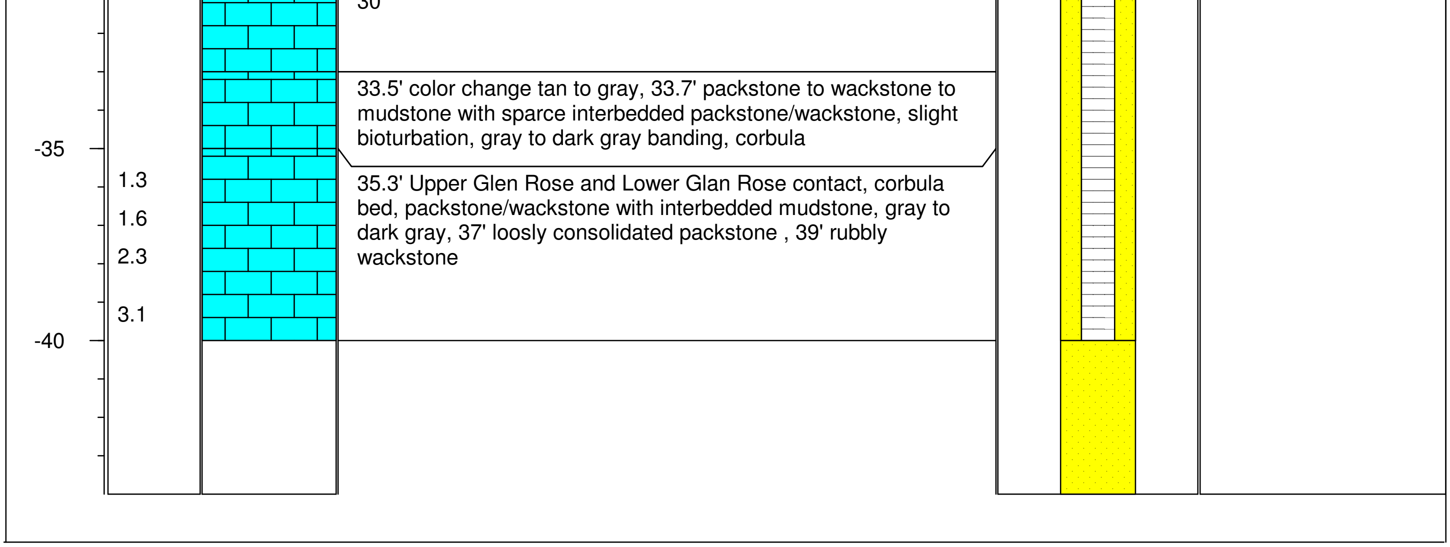
Pack to wackstone interbedded with mudstone, 0-5' vertical fracture with an oxidation halo, vuggy porosity at the top of core, tan and light tan, crumbly, 5" crumbly, muddy washout area at 30'

Flush mount

Cement

4" PVC Casing

4" 0.040-slot PVC



30'

33.5' color change tan to gray, 33.7' packstone to wackstone to mudstone with sparce interbedded packstone/wackstone, slight bioturbation, gray to dark gray banding, corbula

35.3' Upper Glen Rose and Lower Glan Rose contact, corbula bed, packstone/wackstone with interbedded mudstone, gray to dark gray, 37' loosely consolidated packstone , 39' rubbly wackstone

PARSONS

BOREHOLE LOG

BOREHOLE NO.: **VEW-30**
TOTAL DEPTH: **25 feet**

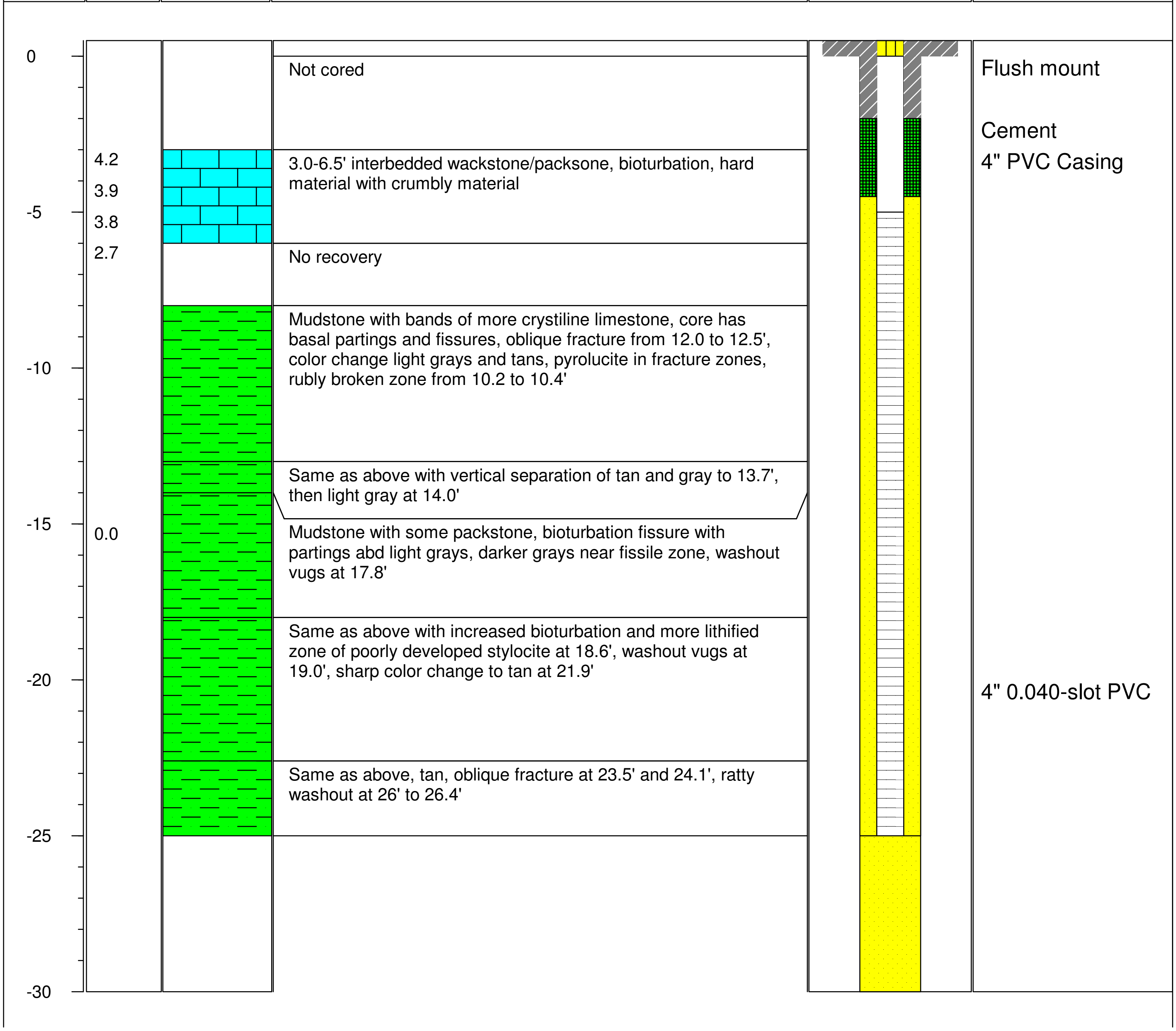
PROJECT INFORMATION

PROJECT: **CSSA**
SITE LOCATION: **AOC-65**
JOB NUMBER: **747781.04000**
LOGGING GEOLOGIST: **Brad Martin**
PROJECT MANAGER: **Scott Pearson**
DATES DRILLED: **May 5, 2011**

DRILLING INFORMATION

DRILLING COMPANY: **GeoProjects Intl., Inc.**
LEAD DRILLER: **Lee Gebbert**
RIG TYPE: **Gardner-Denver 1500**
METHOD OF DRILLING: **Air-Rotary**
SAMPLING METHOD: **Core**
BORING DIAMETER **8 in.**

NOTES: VEW-30 is located west of Building 90



Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes
0			Not cored		Flush mount Cement
-5	4.2 3.9 3.8 2.7		3.0-6.5' interbedded wackstone/packsone, bioturbation, hard material with crumbly material		4" PVC Casing
			No recovery		
-10			Mudstone with bands of more crystiline limestone, core has basal partings and fissures, oblique fracture from 12.0 to 12.5', color change light grays and tans, pyrolucite in fracture zones, rubly broken zone from 10.2 to 10.4'		
			Same as above with vertical separation of tan and gray to 13.7', then light gray at 14.0'		
-15	0.0		Mudstone with some packstone, bioturbation fissure with partings abd light grays, darker grays near fissile zone, washout vugs at 17.8'		
-20			Same as above with increased bioturbation and more lithified zone of poorly developed stylocite at 18.6', washout vugs at 19.0', sharp color change to tan at 21.9'		4" 0.040-slot PVC
			Same as above, tan, oblique fracture at 23.5' and 24.1', ratty washout at 26' to 26.4'		
-25					
-30					

PARSONS

BOREHOLE LOG

BOREHOLE NO.: **VEW-31**
TOTAL DEPTH: **40 feet**

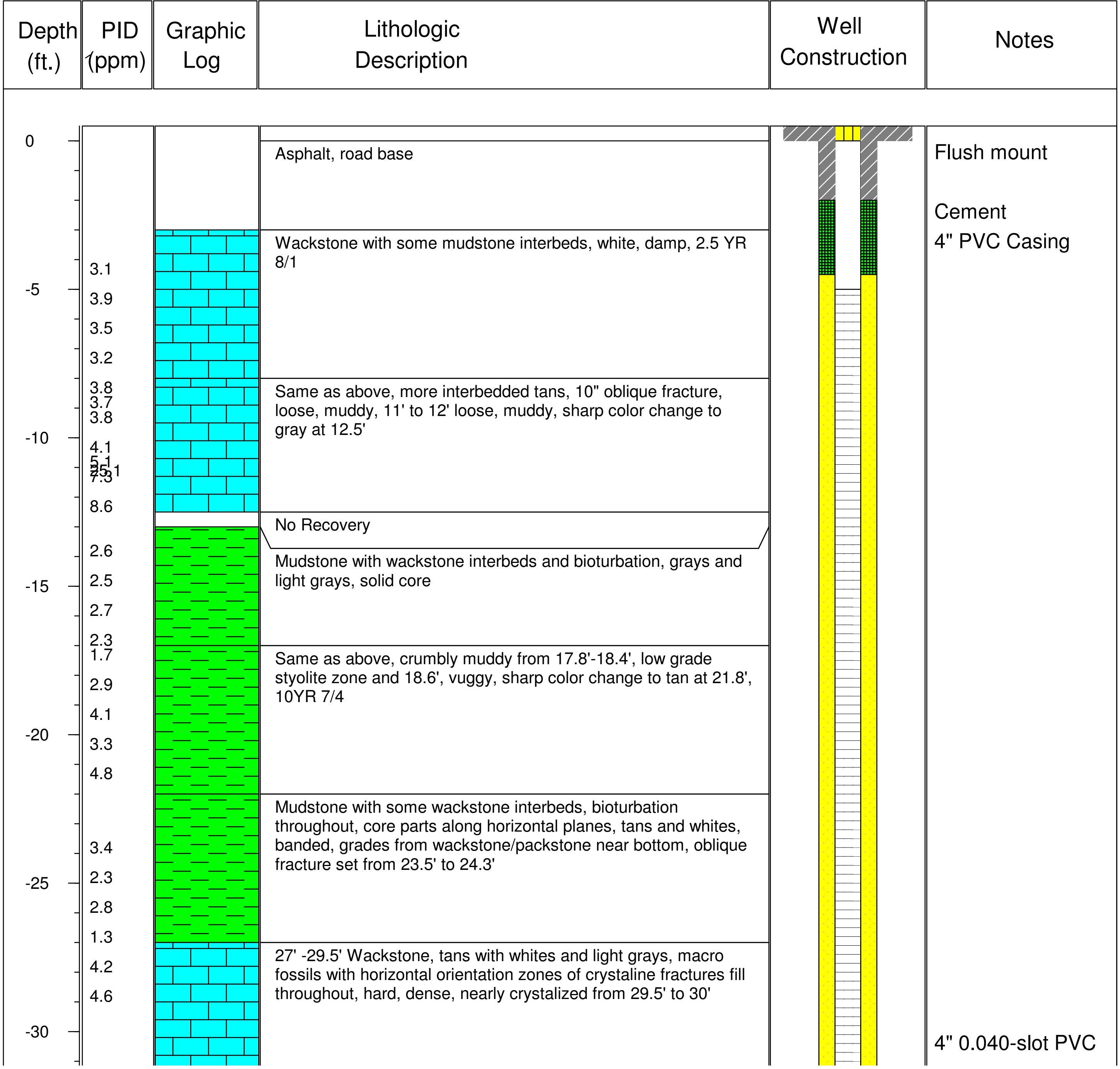
PROJECT INFORMATION

PROJECT: **CSSA**
SITE LOCATION: **AOC-65**
JOB NUMBER: **747781.04000**
LOGGING GEOLOGIST: **Julie Bouch**
PROJECT MANAGER: **Scott Pearson**
DATES DRILLED: **May 3, 2011**

DRILLING INFORMATION

DRILLING COMPANY: **GeoProjects Intl., Inc.**
LEAD DRILLER: **Lee Gebbert**
RIG TYPE: **Gardner-Denver 1500**
METHOD OF DRILLING: **Air-Rotary**
SAMPLING METHOD: **Core**
BORING DIAMETER **8 in.**

NOTES: VEW-31 is located west of Building 90



Asphalt, road base

Wackstone with some mudstone interbeds, white, damp, 2.5 YR 8/1

Same as above, more interbedded tans, 10" oblique fracture, loose, muddy, 11' to 12' loose, muddy, sharp color change to gray at 12.5'

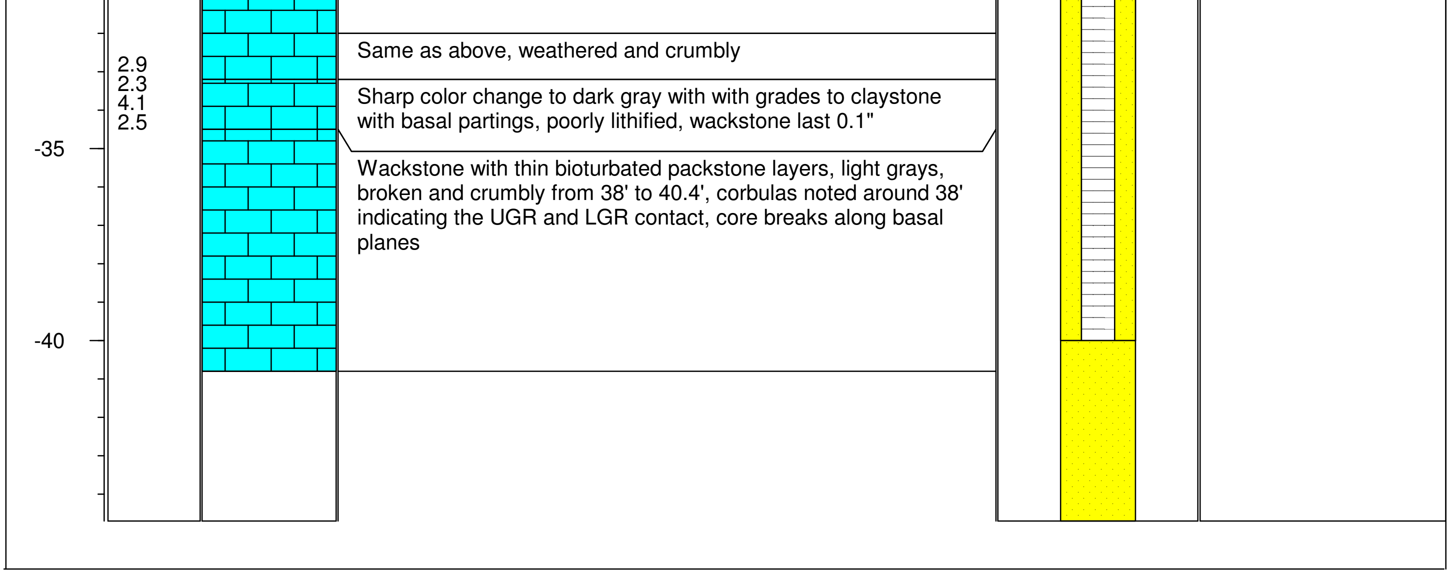
No Recovery

Mudstone with wackstone interbeds and bioturbation, grays and light grays, solid core

Same as above, crumbly muddy from 17.8'-18.4', low grade styolite zone and 18.6', vuggy, sharp color change to tan at 21.8', 10YR 7/4

Mudstone with some wackstone interbeds, bioturbation throughout, core parts along horizontal planes, tans and whites, banded, grades from wackstone/packstone near bottom, oblique fracture set from 23.5' to 24.3'

27' -29.5' Wackstone, tans with whites and light grays, macro fossils with horizontal orientation zones of crystaline fractures fill throughout, hard, dense, nearly crystalized from 29.5' to 30'



Same as above, weathered and crumbly

Sharp color change to dark gray with with grades to claystone with basal partings, poorly lithified, wackstone last 0.1"

Wackstone with thin bioturbated packstone layers, light grays, broken and crumbly from 38' to 40.4', corbulas noted around 38' indicating the UGR and LGR contact, core breaks along basal planes

PARSONS

BOREHOLE LOG

BOREHOLE NO.: **VEW-32**
TOTAL DEPTH: **25 feet**

PROJECT INFORMATION

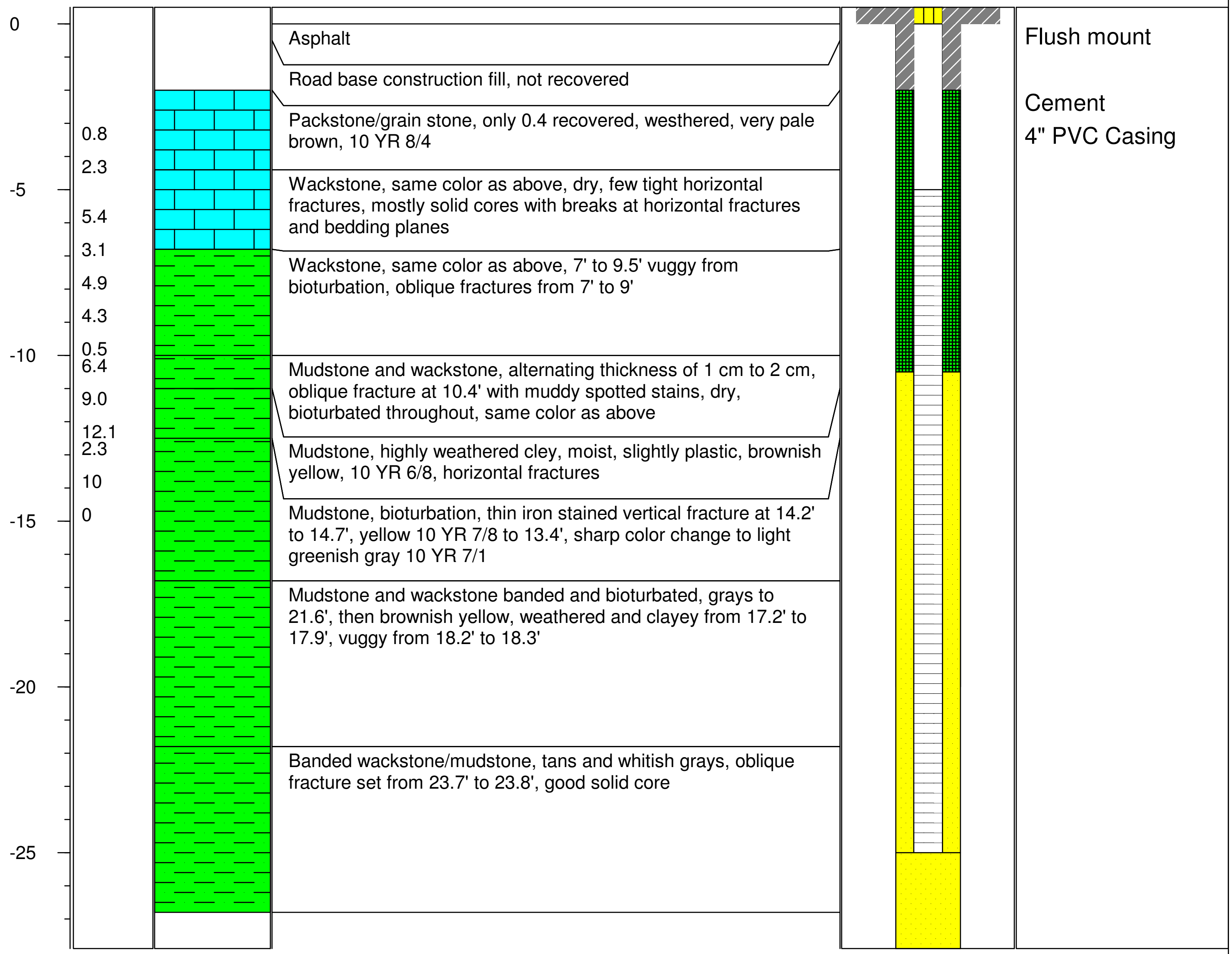
PROJECT: **CSSA**
SITE LOCATION: **AOC-65**
JOB NUMBER: **747781.04000**
LOGGING GEOLOGIST: **Julie Bouch**
PROJECT MANAGER: **Scott Pearson**
DATES DRILLED: **April 28, 2011**

DRILLING INFORMATION

DRILLING COMPANY: **GeoProjects Intl., Inc.**
LEAD DRILLER: **Lee Gebbert**
RIG TYPE: **Gardner-Denver 1500**
METHOD OF DRILLING: **Air-Rotary**
SAMPLING METHOD: **Core**
BORING DIAMETER **8 in.**

NOTES: VEW-32 is located west of Building 90

Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes



Asphalt

Road base construction fill, not recovered

Packstone/grain stone, only 0.4 recovered, westhered, very pale brown, 10 YR 8/4

Wackstone, same color as above, dry, few tight horizontal fractures, mostly solid cores with breaks at horizontal fractures and bedding planes

Wackstone, same color as above, 7' to 9.5' vuggy from bioturbation, oblique fractures from 7' to 9'

Mudstone and wackstone, alternating thickness of 1 cm to 2 cm, oblique fracture at 10.4' with muddy spotted stains, dry, bioturbated throughout, same color as above

Mudstone, highly weathered cley, moist, slightly plastic, brownish yellow, 10 YR 6/8, horizontal fractures

Mudstone, bioturbation, thin iron stained vertical fracture at 14.2' to 14.7', yellow 10 YR 7/8 to 13.4', sharp color change to light greenish gray 10 YR 7/1

Mudstone and wackstone banded and bioturbated, grays to 21.6', then brownish yellow, weathered and clayey from 17.2' to 17.9', vuggy from 18.2' to 18.3'

Banded wackstone/mudstone, tans and whitish grays, oblique fracture set from 23.7' to 23.8', good solid core

Flush mount

Cement
4" PVC Casing

BOREHOLE LOG

BOREHOLE NO.: **VEW-33**
TOTAL DEPTH: **25 feet**

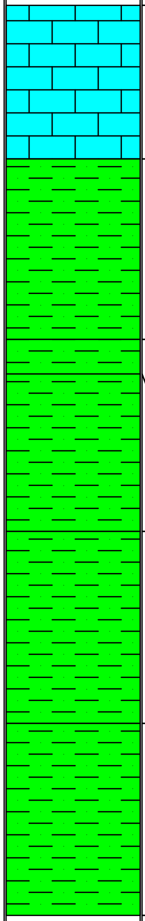
PROJECT INFORMATION

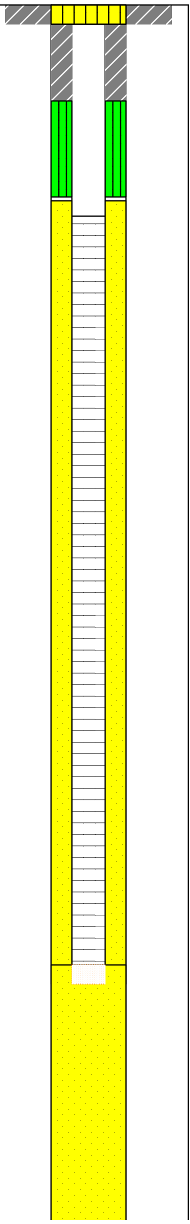
PROJECT: **CSSA**
SITE LOCATION: **AOC-65**
JOB NUMBER: **747781.04000**
LOGGING GEOLOGIST: **Brad Martin**
PROJECT MANAGER: **Scott Pearson**
DATES DRILLED: **May 4, 2011**

DRILLING INFORMATION

DRILLING COMPANY: **GeoProjects Intl., Inc.**
LEAD DRILLER: **Lee Gebbert**
RIG TYPE: **Gardner-Denver 1500**
METHOD OF DRILLING: **Air-Rotary**
SAMPLING METHOD: **Core**
BORING DIAMETER **8 in.**

NOTES: VEW-33 is located west of Building 90





Depth (ft.)	PID (ppm)	Graphic Log	Lithologic Description	Well Construction	Notes
0			Ashpalt, road base		Flush mount Cement
-5	2.6 5.1 5.8		Interbedded wackstone/packstone, some bands of harder crystalized material between weathered loose material, oblique fracture set, tans and light grays		4" PVC Casing
-10	5.6 4.1 2.5 4.0		Mudstone with some interbedded packstone, bioturbation, shows fissility where not crystaline, oblique fractures at 6.7', 6.9', 8.2' and 11.6', fractures have pyrolucite coatings		
	4.2		11.7' to 12.6' Mudstone as above, tans becoming more lithified at sharp color change to gray at 12.6'		
-15	4.0 4.6 3.5		12.6' to 16.7' Wackstone/mudstone interbeds, bioturbation throughout core, zones of mudstone are fissile, grays and dark grays		
-20	2.7 1.9 2.6 2.8 1.6		Same as above		4" 0.040-slot PVC
-25	0.7 0.0 0.9 1.1		Same as above, color change to tans and light grays at 21.7', 23'-24.5' mostly mudstone, fissle, becoming crystaline at 24', 24-26.7' is the same as above		
-30			Ream		

APPENDIX D

Core Photographs


WELL ID SIW-01
START 0 FT
STOP 10 FT
DATE 4/06/2011
TOP BOTTOM
No Recovery
No Recovery
No Recovery
Sample


WELL ID SIW-01
START 10 FT
STOP 20 FT
DATE 4/06/2011
TOP BOTTOM


WELL ID SIW-01
START 20 FT
STOP 24.65 FT
DATE 4/06/2011
TOP BOTTOM
SAMPLE
TD 24.65'


NO RECOVERY
WELL ID ACC-65 VEW-29
START 0.0 FT
STOP 13.0 FT
DATE 5/04/11
TOP BOTTOM


NO RECOVERY
WELL ID AOC-65 VEW-29
START 13.0 FT
STOP 23.0 FT
DATE 5/04/11
TOP → BOTTOM


NO RECOVERY
NO RECOVERY
NO RECOVERY
WELL ID AOC-65 VEW-29
START 23.0 FT
STOP 33.0 FT
DATE 5/04/11
TOP → BOTTOM


WELL ID AOC-65 VEW-29
START 33.0 FT
STOP 40.0 FT
DATE 5/04/11
TOP BOTTOM
No Recovery
NR

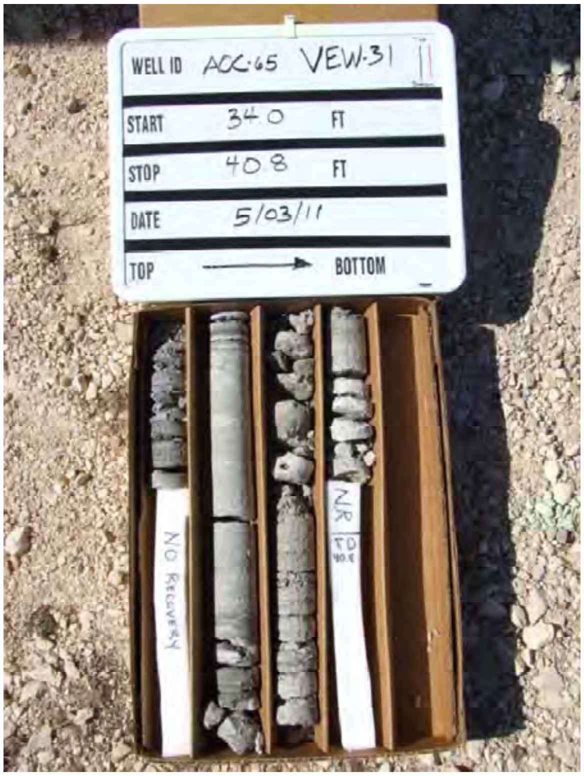

WELL ID AOC-65 VEW-30
START 0.0 FT
STOP 14.0 FT
DATE 5/05/2011
TOP BOTTOM
No Recovery


WELL ID AOC-65 VEW-30
START 14.0 FT
STOP 24.0 FT
DATE 5/05/2011
TOP BOTTOM


WELL ID AOC-65 VEW-30
START 24.0 FT
STOP 28.0 FT
DATE 5/05/2011
TOP BOTTOM


WELL ID ACC-65 VEW-31
START 14.0 FT
STOP 24.0 FT
DATE 5/03/11
TOP BOTTOM


WELL ID ACC-65 VEW-31
START 24.0 FT
STOP 34.0 FT
DATE 5/03/11
TOP BOTTOM


WELL ID ACC-65 VEW-31
START 34.0 FT
STOP 40.8 FT
DATE 5/03/11
TOP → BOTTOM
NO RECOVERY
NR
TD 40.8


WELL ID ACC-65 VEW-33
START 3.1 FT
STOP 14.7 FT
DATE 5/04/11
TOP → BOTTOM


WELL ID ACC-65 VEW-33
START 14.7 FT
STOP 24.7 FT
DATE 5/04/11
TOP BOTTOM


WELL ID ACC-65 VEW-33
START 24.7 FT
STOP 26.7 FT
DATE 5/04/11
TOP BOTTOM

APPENDIX E

Laboratory Results

Laboratory Report

Parsons

RECEIVED
4/11/2011

CSSA

Project #: 747781.04000 CSSA

#22

MW35 Drilling

ARF: 64211

Samples collected: March 22, 2011

APPL, Inc.

EPA METHOD 8260B
Volatile Organic Compounds

Data Validation Package
for

EPA METHOD 8260B
Volatile Organic Compounds

TABLE OF CONTENTS

LABORATORY NAME: *APPL, Inc.*

EPA METHOD 8260B
Volatile Organic Compounds
Case Narrative

Volatile Organic Compounds
EPA Method 8260B
Case Narrative

ARF: 64211

Project: 747781.04000 CSSA MW 35 Drilling

California State Certification Number: CA1312 (DW & WW)

NELAP Certification number: 05233CA (HW)

Texas Certificate Number: T104704242-10-3

Results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Sample Receipt Information:

The samples were received March 23, 2011, at 3.0°C. The samples were assigned Analytical Request Form (ARF) number 64211. The sample numbers and requested analysis were compared to the chain of custody. The VOC analyte list was revised, as instructed. No other exception was noted.

Sample Table

CLIENT ID	APPL ID	Matrix	Date Sampled	Date Received
MW35-WC-01	AY34315	WATER	03/22/11	03/23/11
MW35-WC-02	AY34316	SOIL	03/22/11	03/23/11

Percent moisture was determined using CLP 4.0.

Sample Preparation:

The water sample was purged according to EPA method 5030B and the soil sample was purged according to EPA method 5035. All holding times were met.

Sample Analysis Information:

The samples were analyzed according to EPA method 8260B using a Hewlett Packard Gas Chromatograph with a mass spectrometer detector. All holding times were met.

Quality Control/Assurance

Spike Recovery

Laboratory Control Spikes (LCS) were used for quality assurance. A second-source standard was used for the LCSs. All recoveries were acceptable.

No sample was designated by the client for MS/MSD analysis.

Surrogates

All surrogate recoveries met acceptance criteria.

Method blanks

No target compound was detected above the reporting limit in the method blanks.

Calibration

Initial and continuing calibrations were analyzed according to the method. All acceptance criteria were met.

Tuning:

The instrument was tuned using BFB. All method criteria were met.

Internal Standards

The internal standard area counts were compared to the mid-point of the initial calibration according to method 8260. All acceptance criteria were met.

Summary:

No analytical exception is noted. All data are acceptable.

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. These test results meet all requirements of NELAC. Release of the hard copy has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Leonard Fong by TA 4/7/11

Leonard Fong, Ph.D, Laboratory Director / Date

EPA METHOD 8260B
Volatile Organic Compounds
Chain of Custody and ARF

APPL - Analysis Request Form 64211

Client: **Parsons**
Address: **8000 Centre Park Drive Ste 200**
Austin, TX 78754
Attn: **Tammy Chang**
Phone: **512-719-6092** Fax: **512-719-6099**
Job: **747781.04000 CSSA MW35 DRILLING**
PO #: **747780.30002**
Chain of Custody (Y/N): **Y** # **032211APPFA**
RAD Screen (Y/N): **Y** pH (Y/N): **N**
Turn Around Type: **24 HOURS**

Received by: **TBV**
Date Received: **03/23/11** Time: **10:25**
Delivered by: **FED EX**
Shuttle Custody Seals (Y/N): **Y**
Chest Temp(s): **3.0°C**
Color: **VOA FRIG**
Samples Chilled until Placed in Refrig/Freezer: **Y**
Project Manager: **Diane Anderson** DA
QC Report Type: **DVP3/AFCEE/ERPIMS/TX**
Due Date: **03/24/11**

Comments:

pdf ARF to Tammy & Pam; send 2 DVP3 to Tammy
Data screening project: analyze samples ONCE; report deficiencies; do NOT re-analyze.
Case Narrative. CSSA + AFCEE 3.1 QAPP. Only report MS/MSD when requested.
Use AFCEE forms with AFCEE flagging to report sample & QC data only.
APPL forms for everything else and APPL DVP3.
EDD: ERPIMS 4 Lab PC4 checked TXF to Pam.Ford@parsons.com
Samples are SOAPY.

3-24 Sent ARF

Sample Distribution:
VOA: 1-$826AW, 1-$826AF
Wetlab: 1-MOIST

Charges:

Invoice To:

8000 Centre Park Drive Ste 200
Austin, TX 78754-5140
Attn: Ellen Felfe

Client ID	APPL ID	Sampled	Analyses Requested
1. MW35-WC-01	AY34315W	03/22/11 08:10	$826AW -- Soapy sample
2. MW35-WC-02	AY34316S	03/22/11 14:00	$826AF, MOIST -- Soapy sample

Initials ______ Date ________

APPL Sample Receipt Form

ARF# **64211**

Sample	Container Type	Count	pH	Sample	Container Type	Count	pH
AY34315	^{13}VOAs - HCL	3					
AY34316	^{20}4oz Jar	1					

642

Camp Stanley Storage Activity Chain Of Custody

COC ID: **032211APPFA**
Project Location: **MW35 Drilling**
Job Number: **747781.04000**
Creation Date: **3/22/2011**
Task Manager **Scott Pearson**

Relinquish_Date: **3/22/2011**
Relinquished_By: **AL**
Relinquish_Time: **5:00 PM**
Collection Team: **AL**
Sample Data Type **Screening**

Cooler ID: **A**
LabCode: **APPF**
Carrier: **FedEx**
Airbill Carrier: **873526388225**
TAT: **24 Hour TAT**

Sampler(s):
Adrian Lindley

LOCID: **MW35-WC-01** LOGDATE: **3/22/2011** MATRIX: **LD** TBLOT:
SBD: **0** LOGTIME: **8:10** SACODE: **N** SMCODE: **G** ABLOT:
SED: **0** FLDSAMPID **MW35-WC-01_032211_N0810** EBLOT: Containers: **3**
Remarks:

Analysis Required:

SW8260	VOLATILE ORGANIC CO

LOCID: **MW35-WC-02** LOGDATE: **3/22/2011** MATRIX: **SD** TBLOT:
SBD: **0** LOGTIME: **14:00** SACODE: **N** SMCODE: **G** ABLOT:
SED: **0** FLDSAMPID **MW35-WC-02_032211_N1400** EBLOT: Containers: **1**
Remarks:

Analysis Required:

SW8260B	TOLUENE	SW8260B	cis-1,2-DICHLOROETHY
SW8260B	trans-1,2-DICHLOROETH	SW8260B	METHYL ETHYL KETON
SW8260B	TETRACHLOROETHYLE	SW8260B	TRICHLOROETHYLENE

full list per TC email 3-23-11 rp

Relinquished by: A. Lindley Date 3/22/11 Time 1700
Recieved by: Date 3/23/11 Time 1025

Relinquished by:________ Date____ Time____
Recieved by:________ Date____ Time____

Relinquished by:________ Date____ Time____
Recieved by:________ Date____ Time____

Page 1 of 1

Receiving

From: "Renee Patterson" <rpatterson@applinc.com>
To: <receiving@applinc.com>
Sent: Wednesday, March 23, 2011 10:10 AM
Attach: COC MW-35-WC-01, MW-35-WC-02.pdf
Subject: FW: COC MW-35

Though VOA-land has been warned, please warn them again to analyze these two samples at a dilution. They are soapy.

From: Chang, Tammy [mailto:Tammy.Chang@parsons.com]
Sent: Wednesday, March 23, 2011 10:09 AM
To: Renee Patterson; Diane Anderson
Cc: Pearson, William Scott
Subject: FW: COC MW-35

Please run VOC full list for both samples. Watch out for foaming.
Thanks
Tammy

From: Lindley, Adrien
Sent: Wednesday, March 23, 2011 7:04 AM
To: Chang, Tammy
Subject: FW: COC MW-35

Tammy-

Here's the pdf of the COC from yesterday.

Thanks,

Adrien Lindley, P.G.
512.719.6052

From: Brenda Shirley [mailto:shirleyb@cssamma.com]
Sent: Tuesday, March 22, 2011 4:31 PM
To: Lindley, Adrien
Cc: Bouch, Julie
Subject: COC MW-35

As requested!

COOLER RECEIPT FORM

1) Project: 747781.04000 MW35 Drilling Date Received: 3/23/11

2) Coolers: Number of Coolers: 1

3) [✓ YES] NO Were coolers and samples screened for radioactivity?

4) [✓ YES] NO Were custody seals on outside of cooler? How many? 1 Date on seal? 3/22/11

5) Name on seal? see label (see below Deficiencies)

6) [✓ YES] NO NA Were custody seals unbroken and intact at the time of arrival?

7) [✓ YES] NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: FedEX

8) Shipping slip numbers:1) 873526388225 2) 3)

9) [✓ YES] NO NA Was the shipping slip scanned into the database?

10) YES NO [✓ NA] If cooler belongs to APPL, has it been logged into the ice chest database?

11) Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): Bubbl wrap, wet Ice

12) YES NO [✓ NA] For hand delivered samples was sufficient ice present to start the cooling process?

13) [✓ YES] NO Was a temperature blank included in the cooler?

14) Serial number of certified NIST thermometer used: A39267 Correction factor: 0

15) Cooler temp(s): 1) 3.0°C 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

16) [✓ YES] NO Was a chain of custody received?

17) [✓ YES] NO Were the custody papers signed in the appropriate places?

18) [✓ YES] NO Was the project identifiable from custody papers?

19) [✓ YES] NO Did the chain of custody include date and time of sampling?

20) [✓ YES] NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

21) [✓ YES] NO Were container labels in good condition?

22) [✓ YES] NO Was the client ID on the label?

23) [✓ YES] NO Was the date of sampling on the label?

24) [✓ YES] NO Was the time of sampling on the label?

25) [✓ YES] NO Did all container labels agree with custody papers?

Sample Containers:

26) [✓ YES] NO Were all containers sealed in separate bags?

27) [✓ YES] NO Did all containers arrive unbroken?

28) YES [✓ NO] Was there any leakage from samples?

29) YES [✓ NO] Were any of the lids cracked or broken?

30) [✓ YES] NO Were correct containers used for the tests indicated?

31) [✓ YES] NO Was a sufficient amount of sample sent for tests indicated?

32) YES [✓ NO] NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

33) [✓ YES] NO NA Was a sufficient amount of holding time remaining to analyze the samples?

34) YES NO [✓ NA] Do the sample containers contain the same preservative as what is stated on the COC?

35) YES NO [✓ NA] Was the pH taken of all non-VOA preserved samples and written on the sample container?

36) YES NO [✓ NA] Was the pH of acid preserved non-VOA samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: LO 3/23/11 ~~Custody seal~~ Seal was wet and difficult to recover for Cooler Receipt Form. Name hard to read

Signature of personnel receiving samples: Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

CUS O SEAL

APP inc.

59) 275-2175

Initials

Date 3/22/11

EPA METHOD 8260B
Volatile Organic Compounds
QC Summary

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: M110322

AAB #: 110323AM-153425
Contract #: 2010*1286022*000
Method Blank ID: 110323AM-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64211, Sample: AY34315

AFCEE FORM O-6

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: M110322

AAB #: 110323AM-153425
Contract #: 2010*1286022*000
Method Blank ID: 110323AM-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	108	69-139	
SURROGATE: 4-BROMOFLUOROBE	93.2	75-125	
SURROGATE: DIBROMOFLUOROME	104	75-125	
SURROGATE: TOLUENE-D8 (S)	96.5	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, Sample: AY34315

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: T110324

AAB #: 110324AT-153500
Contract #: 2010*1286022*000
Method Blank ID: 110324AT-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.003	U
1,1,1-TCA	< RL	0.004	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.002	U
1,1,2-TCA	< RL	0.005	U
1,1-DCA	< RL	0.002	U
1,1-DCE	< RL	0.006	U
1,1-DICHLOROPROPENE	< RL	0.005	U
1,2,3-TRICHLOROBENZENE	< RL	0.004	U
1,2,3-TRICHLOROPROPANE	< RL	0.020	U
1,2,4-TRICHLOROBENZENE	< RL	0.004	U
1,2,4-TRIMETHYLBENZENE	< RL	0.007	U
1,2-DCA	< RL	0.003	U
1,2-DCB	< RL	0.002	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	0.010	U
1,2-DICHLOROPROPANE	< RL	0.002	U
1,2-EDB	< RL	0.003	U
1,3,5-TRIMETHYLBENZENE	< RL	0.003	U
1,3-DCB	< RL	0.006	U
1,3-DICHLOROPROPANE	< RL	0.002	U
1,4-DCB	< RL	0.002	U
1-CHLOROHEXANE	< RL	0.003	U
2,2-DICHLOROPROPANE	< RL	0.020	U
2-CHLOROTOLUENE	< RL	0.002	U
4-CHLOROTOLUENE	< RL	0.003	U
BENZENE	< RL	0.002	U
BROMOBENZENE	< RL	0.002	U
BROMOCHLOROMETHANE	< RL	0.002	U
BROMODICHLOROMETHANE	< RL	0.004	U
BROMOFORM	< RL	0.006	U
BROMOMETHANE	< RL	0.005	U
CARBON TETRACHLORIDE	< RL	0.010	U
CHLOROBENZENE	< RL	0.002	U
CHLOROETHANE	< RL	0.005	U
CHLOROFORM	< RL	0.002	U
CHLOROMETHANE	< RL	0.007	U
CIS-1,2-DCE	< RL	0.006	U
CIS-1,3-DICHLOROPROPENE	< RL	0.005	U
DIBROMOCHLOROMETHANE	< RL	0.003	U
DIBROMOMETHANE	< RL	0.010	U
DICHLORODIFLUOROMETHANE	< RL	0.005	U
ETHYLBENZENE	< RL	0.003	U

Comments: ARF: 64211, Sample: AY34316

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

Concentration Units: mg/kg

Initial Calibration ID: T110324

AAB #: 110324AT-153500

Contract #: 2010*1286022*000

Method Blank ID: 110324AT-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	0.005	U
ISOPROPYLBENZENE	< RL	0.008	U
M&P-XYLENE	< RL	0.007	U
METHYLENE CHLORIDE	< RL	0.005	U
N-BUTYLBENZENE	< RL	0.005	U
N-PROPYLBENZENE	< RL	0.002	U
NAPHTHALENE	< RL	0.020	U
O-XYLENE	< RL	0.005	U
P-ISOPROPYLTOLUENE	< RL	0.006	U
SEC-BUTYLBENZENE	< RL	0.007	U
STYRENE	< RL	0.002	U
TCE	< RL	0.010	U
TERT-BUTYLBENZENE	< RL	0.007	U
TETRACHLOROETHENE	< RL	0.007	U
TOLUENE	< RL	0.005	U
TRANS-1,2-DCE	< RL	0.003	U
TRANS-1,3-DICHLOROPROPENE	< RL	0.005	U
TRICHLOROFLUOROMETHANE	< RL	0.004	U
VINYL CHLORIDE	< RL	0.009	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	106	52-149	
SURROGATE: 4-BROMOFLUOROBE	87.9	65-135	
SURROGATE: DIBROMOFLUOROME	101	65-135	
SURROGATE: TOLUENE-D8 (S)	95.4	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, Sample: AY34316

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64211
Matrix: SOIL

SDG No: 64211
Date Analyzed: 3/24/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110324AT-LCS	Lab Control Spike	95.6	107
110324AT-BLK	Blank	106	87.9
AY34316	MW35-WC-02	108	91.7

Comments: Batch: #826AF-110324AT

Printed: 3/29/11 8:57:20 AM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64211
Matrix: SOIL

SDG No: 64211
Date Analyzed: 3/24/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110324AT-LCS	Lab Control Spike	96.0	103
110324AT-BLK	Blank	101	95.4
AY34316	MW35-WC-02	107	99.4

Comments: Batch: #826AF-110324AT

Printed: 3/29/11 8:57:20 AM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.

Case No: 64211

Matrix: WATER

SDG No: 64211

Date Analyzed: 3/23/11

Instrument: Max

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110323AM-LCS	Lab Control Spike	93.7	114
110323AM-BLK	Blank	108	93.2
AY34315	MW35-WC-01	105	100

Comments: Batch: #826AW-110323AM

Printed: 3/29/11 8:57:20 AM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64211
Matrix: WATER

SDG No: 64211
Date Analyzed: 3/23/11
Instrument: Max

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110323AM-LCS	Lab Control Spike	101	105
110323AM-BLK	Blank	104	96.5
AY34315	MW35-WC-01	103	97.8

Comments: Batch: #826AW-110323AM

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110323AM LCS
Concentration Units: ug/L

AAB #: 110323AM-153425
Contract #: 2010*1286022*000
Initial Calibration ID: M110322

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	10.55	106	72-125	
1,1,1-TCA	10.00	10.80	108	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	9.72	97.2	74-125	
1,1,2-TCA	10.00	9.93	99.3	75-127	
1,1-DCA	10.00	10.21	102	75-125	
1,1-DCE	10.00	10.39	104	75-125	
1,1-DICHLOROPROPENE	10.00	11.05	111	75-125	
1,2,3-TRICHLOROBENZENE	10.00	9.66	96.6	75-137	
1,2,3-TRICHLOROPROPANE	10.00	9.25	92.5	75-125	
1,2,4-TRICHLOROBENZENE	10.00	9.39	93.9	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	10.15	102	75-125	
1,2-DCA	10.00	9.87	98.7	68-127	
1,2-DCB	10.00	10.52	105	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	8.42	84.2	59-125	
1,2-DICHLOROPROPANE	10.00	10.07	101	70-125	
1,2-EDB	10.00	10.02	100	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	10.28	103	72-125	
1,3-DCB	10.00	10.63	106	75-125	
1,3-DICHLOROPROPANE	10.00	10.42	104	75-125	
1,4-DCB	10.00	9.72	97.2	75-125	
1-CHLOROHEXANE	10.00	10.38	104	75-125	
2,2-DICHLOROPROPANE	10.00	11.80	118	75-125	
2-CHLOROTOLUENE	10.00	10.17	102	73-125	
4-CHLOROTOLUENE	10.00	10.38	104	74-125	
BENZENE	10.00	10.64	106	75-125	
BROMOBENZENE	10.00	11.33	113	75-125	
BROMOCHLOROMETHANE	10.00	10.03	100	73-125	
BROMODICHLOROMETHANE	10.00	10.40	104	75-125	
BROMOFORM	10.00	9.69	96.9	75-125	
BROMOMETHANE	10.00	11.59	116	72-125	
CARBON TETRACHLORIDE	10.00	10.75	108	62-125	
CHLOROBENZENE	10.00	10.27	103	75-125	
CHLOROETHANE	10.00	10.57	106	65-125	
CHLOROFORM	10.00	10.36	104	74-125	
CHLOROMETHANE	10.00	10.60	106	75-125	
CIS-1,2-DCE	10.00	11.16	112	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	9.59	95.9	74-125	
DIBROMOCHLOROMETHANE	10.00	10.10	101	73-125	
DIBROMOMETHANE	10.00	9.87	98.7	69-127	
DICHLORODIFLUOROMETHANE	10.00	11.83	118	72-125	

Comments: ARF: 64211, QC Sample ID: AY34315

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110323AM LCS

Concentration Units: ug/L

AAB #: 110323AM-153425

Contract #: 2010*1286022*000

Initial Calibration ID: M110322

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	11.46	115	75-125	
HEXACHLOROBUTADIENE	10.00	10.55	106	75-125	
ISOPROPYLBENZENE	10.00	9.92	99.2	75-125	
M&P-XYLENE	20.00	20.65	103	75-125	
METHYLENE CHLORIDE	10.00	10.51	105	75-125	
N-BUTYLBENZENE	10.00	10.20	102	75-125	
N-PROPYLBENZENE	10.00	10.26	103	75-125	
NAPHTHALENE	10.00	8.29	82.9	75-125	
O-XYLENE	10.00	9.89	98.9	75-125	
P-ISOPROPYLTOLUENE	10.00	10.23	102	75-125	
SEC-BUTYLBENZENE	10.00	10.24	102	75-125	
STYRENE	10.00	9.74	97.4	75-125	
TCE	10.00	10.18	102	71-125	
TERT-BUTYLBENZENE	10.00	10.08	101	75-125	
TETRACHLOROETHENE	10.00	10.89	109	71-125	
TOLUENE	10.00	11.97	120	74-125	
TRANS-1,2-DCE	10.00	10.30	103	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	9.28	92.8	66-125	
TRICHLOROFLUOROMETHANE	10.00	10.86	109	67-125	
VINYL CHLORIDE	10.00	11.05	111	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	93.6	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	114	75-125	
SURROGATE: DIBROMOFLUOROMETH	101	75-125	
SURROGATE: TOLUENE-D8 (S)	105	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, QC Sample ID: AY34315

AFCEE FORM O-7

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110324AT LCS
Concentration Units: mg/kg

AAB #: 110324AT-153500
Contract #: 2010*1286022*000
Initial Calibration ID: T110324

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	0.0500	0.0532	106	62-125	
1,1,1-TCA	0.0500	0.0477	95.4	65-135	
1,1,2,2-TETRACHLOROETHANE	0.0500	0.0450	90.0	64-135	
1,1,2-TCA	0.0500	0.0474	94.8	65-135	
1,1-DCA	0.0500	0.0501	100	62-135	
1,1-DCE	0.0500	0.0463	92.6	65-135	
1,1-DICHLOROPROPENE	0.0500	0.0490	98.0	65-135	
1,2,3-TRICHLOROBENZENE	0.0500	0.0405	81.0	65-147	
1,2,3-TRICHLOROPROPANE	0.050	0.049	98.0	65-135	
1,2,4-TRICHLOROBENZENE	0.0500	0.0419	83.8	65-145	
1,2,4-TRIMETHYLBENZENE	0.0500	0.0431	86.2	65-135	
1,2-DCA	0.0500	0.0494	98.8	58-137	
1,2-DCB	0.0500	0.0508	102	65-135	
1,2-DIBROMO-3-CHLOROPROPANE	0.050	0.047	94.0	49-135	
1,2-DICHLOROPROPANE	0.0500	0.0500	100	60-135	
1,2-EDB	0.0500	0.0464	92.8	65-135	
1,3,5-TRIMETHYLBENZENE	0.0500	0.0424	84.8	62-135	
1,3-DCB	0.0500	0.0414	82.8	65-135	
1,3-DICHLOROPROPANE	0.0500	0.0454	90.8	65-135	
1,4-DCB	0.0500	0.0438	87.6	65-135	
1-CHLOROHEXANE	0.0500	0.0496	99.2	65-135	
2,2-DICHLOROPROPANE	0.050	0.051	102	65-135	
2-CHLOROTOLUENE	0.0500	0.0436	87.2	63-135	
4-CHLOROTOLUENE	0.0500	0.0423	84.6	64-135	
BENZENE	0.0500	0.0493	98.6	65-135	
BROMOBENZENE	0.0500	0.0462	92.4	65-135	
BROMOCHLOROMETHANE	0.0500	0.0452	90.4	63-135	
BROMODICHLOROMETHANE	0.0500	0.0526	105	65-135	
BROMOFORM	0.0500	0.0434	86.8	65-135	
BROMOMETHANE	0.0500	0.0537	107	62-135	
CARBON TETRACHLORIDE	0.050	0.047	94.0	52-135	
CHLOROBENZENE	0.0500	0.0480	96.0	65-135	
CHLOROETHANE	0.0500	0.0463	92.6	55-135	
CHLOROFORM	0.0500	0.0501	100	64-135	
CHLOROMETHANE	0.0500	0.0482	96.4	65-135	
CIS-1,2-DCE	0.0500	0.0504	101	65-135	
CIS-1,3-DICHLOROPROPENE	0.0500	0.0540	108	64-135	
DIBROMOCHLOROMETHANE	0.0500	0.0450	90.0	63-135	
DIBROMOMETHANE	0.050	0.050	100	59-137	
DICHLORODIFLUOROMETHANE	0.0500	0.0481	96.2	65-135	

Comments: ARF: 64211, QC Sample ID: AY34316

AFCEE FORM O-7

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110324AT LCS
Concentration Units: mg/kg

AAB #: 110324AT-153500
Contract #: 2010*1286022*000
Initial Calibration ID: T110324

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	0.0500	0.0489	97.8	65-135	
HEXACHLOROBUTADIENE	0.0500	0.0444	88.8	65-135	
ISOPROPYLBENZENE	0.0500	0.0431	86.2	65-135	
M&P-XYLENE	0.1000	0.0847	84.7	65-135	
METHYLENE CHLORIDE	0.0500	0.0448	89.6	65-135	
N-BUTYLBENZENE	0.0500	0.0450	90.0	65-135	
N-PROPYLBENZENE	0.0500	0.0420	84.0	65-135	
NAPHTHALENE	0.0500	0.0439	87.8	65-135	
O-XYLENE	0.0500	0.0484	96.8	65-135	
P-ISOPROPYLTOLUENE	0.0500	0.0419	83.8	65-135	
SEC-BUTYLBENZENE	0.0500	0.0404	80.8	65-135	
STYRENE	0.0500	0.0417	83.4	65-135	
TCE	0.0500	0.0492	98.4	61-135	
TERT-BUTYLBENZENE	0.0500	0.0423	84.6	65-135	
TETRACHLOROETHENE	0.0500	0.0454	90.8	61-135	
TOLUENE	0.0500	0.0540	108	64-135	
TRANS-1,2-DCE	0.0500	0.0476	95.2	65-135	
TRANS-1,3-DICHLOROPROPENE	0.0500	0.0519	104	56-135	
TRICHLOROFLUOROMETHANE	0.0500	0.0454	90.8	57-135	
VINYL CHLORIDE	0.0500	0.0542	108	36-144	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	95.6	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	108	65-135	
SURROGATE: DIBROMOFLUOROMETH	95.7	65-135	
SURROGATE: TOLUENE-D8 (S)	102	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, QC Sample ID: AY34316

EPA 8260B

Form 4

Blank Summary

Lab Name:	APPL, Inc.	SDG No:	64211
Case No:	64211	Date Analyzed:	3/23/11
Matrix:	WATER	Instrument:	Max
Blank ID:	110323AM-BLK	Time Analyzed:	0952

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110323AM-LCS	Lab Control Spike	0323M01	3/23/11 0744
110323AM-BLK	Blank	0323M04	3/23/11 0952
AY34315	MW35-WC-01	0323M21	3/23/11 1752

Comments: Batch: #826AW-110323AM

Printed: 3/29/11 8:57:15 AM
Form 4, Blank Summary

EPA 8260B

Form 4

Blank Summary

Lab Name: APPL, Inc.
SDG No: 64211
Case No: 64211
Date Analyzed: 3/24/11
Matrix: SOIL
Instrument: Thor
Blank ID: 110324AT-BLK
Time Analyzed: 2202

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110324AT-LCS	Lab Control Spike	0324T16	3/24/11 2034
110324AT-BLK	Blank	0324T18	3/24/11 2202
AY34316	MW35-WC-02	0324T21	3/24/11 2308

Comments: Batch: #826AF-110324AT

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 64211
Matrix: Water
ID: 20ug/mL BFB Std 03-11-11A

SDG No: 64211
Date Analyzed: 3/23/11
Instrument: Max
Time Analyzed: 7:02

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1	Lab Control Spike	110323A LCS-1WM	0323M01W.D	3/23/11 7:44
2	Blank	110321A BLK-1WM	0323M04W.D	3/23/11 9:52
3	MW35-WC-01	AY34315W02	0323M21W.D	3/23/11 17:52
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19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	17.2
75	30 - 60% of mass 95	45.3
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	7.0
173	0 - 2% of mass 174	0.1
174	50 - 100% of mass 95	84.4
175	5 - 9% of mass 174	7.1
176	95 - 101% of mass 174	96.8
177	5 - 9% of mass 176	6.9

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 64211
Matrix: Soil
ID: 20ug/mL BFB Std 03-23-11A

SDG No: 64211
Date Analyzed: 3/24/11
Instrument: Thor
Time Analyzed: 19:06

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1	Lab Control Spike	110324A LCS-1ST(SS)	0324T16S.D	3/24/11 20:34
2	Blank	110324A BLK-1ST	0324T18S.D	3/24/11 22:02
3	MW35-WC-02	AY34316S01 5.047	0324T21S.D	3/24/11 23:08
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21				
22				

m/e		
50	15 - 40% of mass 95	24.4
75	30 - 60% of mass 95	57.5
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	8.9
173	0 - 2% of mass 174	0.8
174	50 - 100% of mass 95	65.7
175	5 - 9% of mass 174	6.8
176	95 - 101% of mass 174	95.9
177	5 - 9% of mass 176	5.5

8A

INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.
Contract: Review

Lab Code:
SDG No.: 64211

Lab File ID (Standard): 0322M08W.D
Date Analyzed: 03/22/11

Instrument ID: Max
Time Analyzed: 18:10

GC Column:
ID:
Heated Purge: (Y/N)

		Fluorobenzene (IS)		Chlorobenzene-D5 (IS)		1,4-Dichlorobenzene-D (IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	696256	6.74	629824	10.62	494976	12.44
	UPPER LIMIT	1392512	7.24	1259648	11.12	989952	12.94
	LOWER LIMIT	348128	6.24	314912	10.12	247488	11.94
	SAMPLE NO.						
01	110323A LCS-1WM	651584	6.74	586816	10.62	467968	12.44
02	110321A BLK-1WM	576448	6.74	548736	10.62	368064	12.44
03	AY34315W02	558592	6.75	507904	10.62	383232	12.44
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05							
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22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A

INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.
Contract: Review
Lab Code:
SDG No.: 64211
Lab File ID (Standard): 0324T07S.D
Date Analyzed: 03/24/11
Instrument ID: Thor
Time Analyzed: 16:53
GC Column:
ID:
Heated Purge: (Y/N)

		Fluorobenzene (IS)		Chlorobenzene-D5 (IS)		1,4-Dichlorobenzene-D (IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	733376	6.79	657152	10.67	876352	12.48
	UPPER LIMIT	1466752	7.29	1314304	11.17	1752704	12.98
	LOWER LIMIT	366688	6.29	328576	10.17	438176	11.98
	SAMPLE NO.						
01	110324A LCS-1ST(SS)	830720	6.79	808256	10.67	1110210	12.48
02	110324A BLK-1ST	607808	6.79	576960	10.67	649728	12.48
03	AY34316S01 5.047	560512	6.79	518400	10.67	549248	12.48
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22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

EPA METHOD 8260B
Volatile Organic Compounds
Sample Data

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110323AM-153425
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: MW35-WC-01 Lab Sample ID: AY34315 Matrix: Water
% Solids: NA Initial Calibration ID: M110322
Date Received: 23-Mar-11 Date Prepared: 23-Mar-11 Date Analyzed: 23-Mar-11
Concentration Units: ug/L

Analyte	**MDL**	**RL**	**Concentration**	**Dilution**	**Confirm**	**Qualifier**
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.06	1		U
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments:

ARF: 64211

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B   Preparatory Method: 5030B   AAB #: 110323AM-153425
Lab Name: APPL, Inc   Contract #: 2010*1286022*000
Field Sample ID: MW35-WC-01   Lab Sample ID: AY34315   Matrix: Water
% Solids: NA   Initial Calibration ID: M110322
Date Received: 23-Mar-11   Date Prepared: 23-Mar-11   Date Analyzed: 23-Mar-11
Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.07	1		U
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.33	1		F
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	2.37	1		
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	1.29	1		
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	0.05	1		U
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	0.06	1		U
TOLUENE	0.06	1.1	0.06	1		U
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	105	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	100	75-125	
SURROGATE: DIBROMOFLUOROMETH	103	75-125	
SURROGATE: TOLUENE-D8 (S)	97.8	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64211

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B   Preparatory Method: 5035   AAB #: 110324AT-153500

Lab Name: APPL, Inc   Contract #: 2010*1286022*000

Field Sample ID: MW35-WC-02   Lab Sample ID: AY34316   Matrix: Soil

% Solids: 83.6   Initial Calibration ID: T110324

Date Received: 23-Mar-11   Date Prepared: 24-Mar-11   Date Analyzed: 24-Mar-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		U
1,1,1-TCA	0.0009	0.004	0.0009	1		U
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		U
1,1,2-TCA	0.0009	0.005	0.0009	1		U
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		U
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		U
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		U
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		U
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		U
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		U
1,3-DCB	0.0011	0.006	0.0011	1		U
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,4-DCB	0.0008	0.002	0.0008	1		U
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		U
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		U
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		U
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		U
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		U
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		U
BROMOFORM	0.0011	0.006	0.0011	1		U
BROMOMETHANE	0.0007	0.005	0.0007	1		U
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		U
CHLOROBENZENE	0.0007	0.002	0.0007	1		U
CHLOROETHANE	0.0015	0.005	0.0015	1		U
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		U

Comments:

ARF: 64211

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110324AT-153500
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: MW35-WC-02 Lab Sample ID: AY34316 Matrix: Soil
% Solids: 83.6 Initial Calibration ID: T110324
Date Received: 23-Mar-11 Date Prepared: 24-Mar-11 Date Analyzed: 24-Mar-11
Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		U
DIBROMOMETHANE	0.001	0.010	0.001	1		U
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		U
ETHYLBENZENE	0.0010	0.003	0.0010	1		U
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		U
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		U
M&P-XYLENE	0.0018	0.007	0.0018	1		U
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		U
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		U
NAPHTHALENE	0.0010	0.020	0.0010	1		U
O-XYLENE	0.0007	0.005	0.0007	1		U
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		U
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		U
STYRENE	0.0009	0.002	0.0009	1		U
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		U
TETRACHLOROETHENE	0.0008	0.007	0.0008	1		U
TOLUENE	0.0010	0.005	0.0010	1		U
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		U
VINYL CHLORIDE	0.0013	0.009	0.0013	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	108	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	91.7	65-135	
SURROGATE: DIBROMOFLUOROMETH	107	65-135	
SURROGATE: TOLUENE-D8 (S)	99.4	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64211

AFCEE FORM O-2

EPA METHOD 8260B
Volatile Organic Compounds
Calibration Data

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64211
Initial Cal. Date: 3/22/11
Instrument: Max

Initials:

0322M03W.D 0322M04W.D 0322M05W.D 0322M06W.D 0322M07W.D 0322M08W.D 0322M09W.D 0322M10W.D 0322M11W.D

		Compound	0.3	0.5	1	2	5	10	20	40	100		Avg	%RSD		
1	I	Fluorobenzene (IS)	ISTD													
2	TM	Dichlorodifluoromethane		0.6073	0.5196	0.5064	0.4304	0.4613	0.4902	0.5300	0.4903		0.50	10	TM	
3	TM**	Chloromethane		0.9098	0.8549	0.8280	0.7738	0.7326	0.7764	0.7765	0.6979		0.79	8.6	TM**	
4	TM*	Vinyl chloride		0.7668	0.6488	0.6679	0.6200	0.6233	0.6643	0.7017	0.6497		0.67	7.1	TM*	
5	TML	Bromomethane		0.6995	0.5234	0.3895	0.4372	0.3473	0.3286	0.3225	0.2963		0.42	32	TML	0.999
6	TM	Chloroethane		0.5072	0.4133	0.3991	0.4026	0.3820	0.4214				0.42	11	TM	
7	TM	Trichlorofluoromethane		1.096	0.9104	0.9127	0.8424	0.8402	0.8615	0.9050	0.8653		0.90	9.2	TM	
8	TM*	1,1-DCE		0.5472	0.4900	0.4860	0.4385	0.4269	0.4486	0.4628	0.4536		0.47	8.1	TM*	
9	TML	Methylene chloride		0.9123	0.6485	0.6044	0.5603	0.5077	0.5276	0.5328	0.5073		0.60	23	TML	1.000
10	TM	Trans-1,2-DCE		0.7015	0.5481	0.5158	0.5291	0.4854	0.5128	0.5187	0.5057		0.54	13	TM	
11	TM**	1,1-DCA	1.028	0.9822	0.8850	0.8415	0.8543	0.8254	0.8939	0.9022	0.8619		0.90	7.5	TM**	
12	TM	Cis-1,2-DCE		0.4503	0.4732	0.4593	0.5353	0.5287	0.5816	0.6071	0.5911		0.53	12	TM	
13	TM	2,2-Dichloropropane		0.1565	0.1322	0.1322	0.1353	0.1342	0.1470	0.1532	0.1516		0.14	7.2	TM	
14	TM*	Chloroform	0.9471	0.8890	0.8443	0.8314	0.8779	0.8057	0.8572	0.8745	0.8456		0.86	4.7	TM*	
15	TM	Bromochloromethane	0.2511	0.2953	0.2564	0.2350	0.2564	0.2377	0.2559	0.2600	0.2520		0.26	6.7	TM	
16	S	Dibromofluoromethane(S)		0.5514	0.5091	0.4964	0.4998	0.4752	0.5180	0.5445	0.5201		0.51	4.9	S	
17	TM	1,1,1-TCA		0.7235	0.6523	0.6401	0.6600	0.6348	0.6818	0.7200	0.7001		0.68	5.2	TM	
18	TM	1,1-Dichloropropene		0.5607	0.4843	0.4943	0.5292	0.5244	0.5779	0.6176	0.6192		0.55	9.4	TM	
19	S	1,2-DCA-D4(S)		0.6541	0.5840	0.5401	0.5422	0.5076	0.5441	0.5612	0.5236		0.56	8.1	S	
20	TM	Carbon Tetrachloride		0.5874	0.5104	0.5364	0.5214	0.5130	0.5533	0.5869	0.5873		0.55	6.2	TM	
21	TM	1,2-DCA		0.6935	0.6074	0.6077	0.6594	0.5901	0.6200	0.6302	0.5978		0.63	5.6	TM	
22	TM	Benzene	2.101	1.992	1.820	1.807	1.936	1.894	2.080	2.158	2.145		2.0	6.8	TM	
23	TM	TCE		0.5264	0.4720	0.4620	0.4848	0.4680	0.5085	0.5418	0.5193		0.50	6.0	TM	
24	TM*	1,2-Dichloropropane	0.5625	0.6008	0.5179	0.5207	0.5383	0.4981	0.5295	0.5360	0.5197		0.54	5.6	TM*	
25	TM	Bromodichloromethane		0.6167	0.5623	0.5233	0.5932	0.5532	0.6058	0.6372	0.6444		0.59	7.2	TM	
26	TM	Dibromomethane		0.3078	0.2653	0.2585	0.2756	0.2521	0.2654	0.2723	0.2631		0.27	6.3	TM	
27	TML	Cis-1,3-Dichloropropene		0.4923	0.4176	0.4439	0.5414	0.5656	0.6974	0.7637	0.7930		0.59	25	TML	0.999
28	TM*	Toluene		1.306	1.354	1.619	2.043	2.072	2.269	2.396	2.390		1.9	23	TM*	
29	TML	Trans-1,3-Dichloropropene		0.3410	0.3501	0.3712	0.4668	0.4766	0.5673	0.6415	0.6781		0.49	27	TML	0.999
30	TM	1,1,2-TCA		0.3616	0.3320	0.3215	0.3551	0.3387	0.3565	0.3697	0.3642		0.35	4.9	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD													
32	S	Toluene-D8(S)				1.554	1.911	1.952	2.182	2.369	2.294		2.0	15	S	
33	TM	1,2-EDB		0.3902	0.3456	0.3717	0.4330	0.3980	0.4373	0.4680	0.4680		0.41	11	TM	
34	TM	Tetrachloroethene		0.5248	0.4773	0.4877	0.5124	0.4699	0.4920	0.5172	0.5131		0.50	4.1	TM	
35	TML	1-Chlorohexane		0.5209	0.5830	0.5818	0.6825	0.6984	0.7679	0.8552	0.8694		0.69	19	TML	1.000

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64211
Initial Cal. Date: 3/22/11
Instrument: Max

Initials:

		Compound	0.3	0.5	1	2	5	10	20	40	100		Avg	%RSD		
36	TM	1,1,1,2-Tetrachloroethane		0.5128	0.5147	0.5181	0.5718	0.5318	0.5799	0.6206	0.6247		0.56	8.3	TM	
37	TML	m&p-Xylene		0.7163	0.7248	0.8551	1.115	1.088	1.182	1.242	1.260		1.0	22	TML	1.000
38	TML	o-Xylene		0.5706	0.6096	0.6899	0.9203	0.9546	1.119	1.215	1.220		0.91	29	TML	1.000
39	TML	Styrene	0.9277	0.9183	0.9941	1.228	1.811	1.783	2.009	2.182	2.260		1.6	35	TML	0.999
40	S	4-Bromofluorobenzene(S)				0.6491	0.7810	0.7823	0.8613	0.9460	0.9431		0.83	14	S	
41	TM	1,3-Dichloropropane	0.6958	0.6538	0.6222	0.6664	0.7858	0.7484	0.8225	0.8780	0.8672		0.75	13	TM	
42	TM	Dibromochloromethane		0.4012	0.3933	0.3828	0.4548	0.4235	0.4886	0.5320	0.5472		0.45	14	TM	
43	TM**	Chlorobenzene	1.874	1.847	1.741	1.732	1.844	1.685	1.785	1.863	1.857		1.8	3.8	TM**	
44	TM*	Ethylbenzene		1.915	1.932	2.153	2.652	2.611	2.918	3.146	3.276		2.6	21	TM*	
45	TM**	Bromoform		0.2510	0.2317	0.2372	0.2707	0.2497	0.2819	0.3227	0.3498		0.27	15	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD													
47	TML	Isopropylbenzene		1.622	1.760	2.032	2.756	3.049	3.524	3.833	3.949		2.8	33	TML	1.000
48	TM**	1,1,2,2-Tetrachloroethane	0.6921	0.7041	0.6302	0.6055	0.6994	0.6435	0.6587	0.6970	0.7129		0.67	5.7	TM**	
49	TM	1,2,3-Trichloropropane		0.2849	0.2116	0.2269	0.2476	0.2281	0.2361	0.2423	0.2328		0.24	9.0	TM	
50	TM	Bromobenzene	0.6926	0.7416	0.7317	0.7874	0.9383	0.9038	0.9569	1.002	0.9772		0.86	14	TM	
51	TML	n-Propylbenzene	2.023	2.202	2.420	2.909	4.057	4.146	4.535	4.841	4.755		3.5	32	TML	1.000
52	TML	2-Chlorotoluene	1.659	1.750	1.989	2.366	2.900	2.821	3.018	3.141	3.160		2.5	24	TML	1.000
53	TML	1,3,5-Trimethylbenzene		1.424	1.825	2.383	3.076	3.014	3.239	3.380	3.446		2.7	28	TML	1.000
54	TML	4-Chlorotoluene		1.816	2.159	2.660	3.117	2.960	3.094	3.255	3.262		2.8	19	TML	1.000
55	TML	Tert-Butylbenzene		1.382	1.477	1.673	2.240	2.440	2.747	3.007	3.114		2.3	30	TML	1.000
56	TML	1,2,4-Trimethylbenzene		1.387	1.664	2.143	3.049	3.028	3.281	3.520	3.618		2.7	32	TML	1.000
57	TML	Sec-Butylbenzene		1.953	2.257	2.724	3.516	3.643	4.052	4.428	4.333		3.4	28	TML	1.000
58	TML	p-Isopropyltoluene		1.597	1.833	2.320	3.180	3.306	3.605	3.935	4.040		3.0	32	TML	1.000
59	TM	1,3-DCB		1.688	1.685	1.777	2.014	1.872	1.969	2.085	2.126		1.9	9.1	TM	
60	TM	1,4-DCB	2.569	2.303	2.146	1.982	2.149	1.959	2.047	2.149	2.153		2.2	8.5	TM	
61	TML	n-Butylbenzene		1.718	1.757	1.883	2.540	2.735	3.032	3.366	3.487		2.6	28	TML	0.999
62	TM	1,2-DCB	1.694	1.717	1.715	1.725	1.925	1.842	1.887	1.998	1.971		1.8	6.6	TM	
63	TML	1,2-Dibromo-3-chloropropane		0.1019	0.1137	0.1083	0.1203	0.1243	0.1395	0.1583	0.1681		0.13	18	TML	0.999
64	TML	1,2,4-Trichlorobenzene	0.8397	0.8979	0.8380	0.8324	1.056	1.112	1.326	1.476	1.461		1.1	25	TML	0.999
65	TM	Hexachlorobutadiene		0.6363	0.5844	0.5482	0.6134	0.5885	0.6358	0.6864	0.6794		0.62	7.7	TM	
66	TML	Naphthalene	1.085	1.100	1.099	1.203	1.894	2.271	2.752	3.092	3.080		2.0	45	TML	0.999
67	TML	1,2,3-Trichlorobenzene	0.8386	0.8847	0.8727	0.9216	1.172	1.200	1.301	1.394	1.331		1.1	20	TML	1.000
68																
69																
70																

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64211
Date Analyzed: 3/22/11
Instrument: Max
Initial Cal. Date: 3/22/11
Data File: 0322M15W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.5044	0.5012	0.64	TM	
3	TM**	Chloromethane	0.7937	0.7975	0.48	TM**	
4	TM*	Vinyl chloride	0.6678	0.6583	1.4	TM*	
5	TML	Bromomethane	0.4180	0.4015	3.9	TML	18
6	TM	Chloroethane	0.4209	0.4165	1.1	TM	
7	TM	Trichlorofluoromethane	0.9042	0.8534	5.6	TM	
8	TML	Freon-113	1.000	1.000	0.00	TML	4.2
9	TM*	1,1-DCE	0.4692	0.4362	7.0	TM*	
10	TML	Methylene chloride	0.6001	0.5239	13	TML	2.2
11	TML	Methyl t-butyl ether (MtBE)	1.000	1.000	0.00	TML	11
12	TM	Trans-1,2-DCE	0.5396	0.4869	9.8	TM	
13	TM**	1,1-DCA	0.8971	0.8192	8.7	TM**	
14	TM	Cis-1,2-DCE	0.5283	0.5478	3.7	TM	
15	TM*	Chloroform	0.8636	0.8252	4.5	TM*	
16	S	Dibromofluoromethane(S)	0.5143	0.5006	2.7	S	
17	TM	1,1,1-TCA	0.6766	0.6492	4.0	TM	
18	S	1,2-DCA-D4(S)	0.5571	0.5240	5.9	S	
19	TM	Carbon Tetrachloride	0.5495	0.5345	2.7	TM	
20	TM	1,2-DCA	0.6258	0.5889	5.9	TM	
21	TM	Benzene	1.993	1.975	0.89	TM	
22	TM	TCE	0.4978	0.4852	2.5	TM	
23	TM*	1,2-Dichloropropane	0.5360	0.5108	4.7	TM*	
24	TM	Bromodichloromethane	0.5920	0.5637	4.8	TM	
25	TM	Dibromomethane	0.2700	0.2472	8.4	TM	
26	TML	2-Chloroethyl vinyl ether	1.000	1.000	0.00	TML	5.6
27	TML	Cis-1,3-Dichloropropene	0.5894	0.5848	0.78	TML	13
28	TM*	Toluene	1.931	2.092	8.3	TM*	
29	TML	Trans-1,3-Dichloropropene	0.4866	0.4741	2.6	TML	14
30	TM	1,1,2-TCA	0.3499	0.3302	5.6	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	S	Toluene-D8(S)	2.044	2.175	6.4	S	
33	TM	Tetrachloroethene	0.4993	0.4936	1.1	TM	
34	TM	1,1,1,2-Tetrachloroethane	0.5593	0.5623	0.54	TM	
35	TML	m&p-Xylene	1.023	1.143	12	TML	2.3
36	TML	o-Xylene	0.9124	1.019	12	TML	6.6
37	S	4-Bromofluorobenzene(S)	0.8271	0.9645	17	S	
38	TM	Dibromochloromethane	0.4529	0.4371	3.5	TM	
39	TM**	Chlorobenzene	1.803	1.769	1.9	TM**	
40	TM*	Ethylbenzene	2.575	2.794	8.5	TM*	
		Average			4.8		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: 0

SDG No: 64211
Date Analyzed: 3/22/11
Instrument: Max
Cal. Date: 3/22/11
Data File: 0322M15W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM**	Bromoform	0.2743	0.2472	9.9	TM**	
42	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
43	TM**	1,1,2,2-Tetrachloroethane	0.6715	0.6210	7.5	TM**	
44	TM	Bromobenzene	0.8591	0.9548	11	TM	
45	TM	1,3-DCB	1.902	1.994	4.9	TM	
46	TM	1,4-DCB	2.162	2.085	3.5	TM	
47	TM	1,2-DCB	1.830	1.910	4.3	TM	
48	TML	1,2-Dibromo-3-chloropropane	0.1293	0.1150	11	TML	17
49	TML	Naphthalene	1.953	2.194	12	TML	16
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80							
		Average			8.0		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64211
Date Analyzed: 3/23/11
Instrument: Max
Initial Cal. Date: 3/22/11
Data File: 0323M01W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.5044	0.5966	18	TM	
3	TM**	Chloromethane	0.7937	0.8413	6.0	TM**	
4	TM*	Vinyl chloride	0.6678	0.7382	11	TM*	
5	TML	Bromomethane	0.4180	0.3895	6.8	TML	16
6	TM	Chloroethane	0.4209	0.4447	5.7	TM	
7	TM	Trichlorofluoromethane	0.9042	0.9822	8.6	TM	
8	TM*	1,1-DCE	0.4692	0.4875	3.9	TM*	
9	TML	Methylene chloride	0.6001	0.5607	6.6	TML	5.1
10	TM	Trans-1,2-DCE	0.5396	0.5556	3.0	TM	
11	TM**	1,1-DCA	0.8971	0.9163	2.1	TM**	
12	TM	Cis-1,2-DCE	0.5283	0.5896	12	TM	
13	TM	2,2-Dichloropropane	0.1428	0.1685	18	TM	
14	TM*	Chloroform	0.8636	0.8945	3.6	TM*	
15	TM	Bromochloromethane	0.2555	0.2562	0.27	TM	
16	S	Dibromofluoromethane(S)	0.5143	0.5178	0.68	S	
17	TM	1,1,1-TCA	0.6766	0.7310	8.0	TM	
18	TM	1,1-Dichloropropene	0.5509	0.6089	11	TM	
19	S	1,2-DCA-D4(S)	0.5571	0.5228	6.2	S	
20	TM	Carbon Tetrachloride	0.5495	0.5906	7.5	TM	
21	TM	1,2-DCA	0.6258	0.6175	1.3	TM	
22	TM	Benzene	1.993	2.121	6.4	TM	
23	TM	TCE	0.4978	0.5068	1.8	TM	
24	TM*	1,2-Dichloropropane	0.5360	0.5398	0.72	TM*	
25	TM	Bromodichloromethane	0.5920	0.6157	4.0	TM	
26	TM	Dibromomethane	0.2700	0.2665	1.3	TM	
27	TML	Cis-1,3-Dichloropropene	0.5894	0.6529	11	TML	4.1
28	TM*	Toluene	1.931	2.311	20	TM*	
29	TML	Trans-1,3-Dichloropropene	0.4866	0.5235	7.6	TML	7.2
30	TM	1,1,2-TCA	0.3499	0.3475	0.68	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	S	Toluene-D8(S)	2.044	2.137	4.6	S	
33	TM	1,2-EDB	0.4140	0.4146	0.16	TM	
34	TM	Tetrachloroethene	0.4993	0.5439	8.9	TM	
35	TML	1-Chlorohexane	0.6949	0.8163	17	TML	3.8
36	TM	1,1,1,2-Tetrachloroethane	0.5593	0.5900	5.5	TM	
37	TML	m&p-Xylene	1.023	1.213	19	TML	3.3
38	TML	o-Xylene	0.9124	1.087	19	TML	1.1
39	TML	Styrene	1.568	1.972	26	TML	2.6
40	S	4-Bromofluorobenzene(S)	0.8271	0.9422	14	S	
		Average			8.1		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: 0

SDG No: 64211
Date Analyzed: 3/23/11
Instrument: Max
Cal. Date: 3/22/11
Data File: 0323M01W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	1,3-Dichloropropane	0.7489	0.7801	4.2	TM	
42	TM	Dibromochloromethane	0.4529	0.4573	0.96	TM	
43	TM**	Chlorobenzene	1.803	1.851	2.7	TM**	
44	TM*	Ethylbenzene	2.575	2.952	15	TM*	
45	TM**	Bromoform	0.2743	0.2657	3.1	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
47	TML	Isopropylbenzene	2.816	3.430	22	TML	0.82
48	TM**	1,1,2,2-Tetrachloroethane	0.6715	0.6527	2.8	TM**	
49	TM	1,2,3-Trichloropropane	0.2388	0.2210	7.5	TM	
50	TM	Bromobenzene	0.8591	0.9731	13	TM	
51	TML	n-Propylbenzene	3.543	4.634	31	TML	2.6
52	TML	2-Chlorotoluene	2.534	3.067	21	TML	1.7
53	TML	1,3,5-Trimethylbenzene	2.723	3.299	21	TML	2.8
54	TML	4-Chlorotoluene	2.790	3.239	16	TML	3.8
55	TML	Tert-Butylbenzene	2.260	2.757	22	TML	0.83
56	TML	1,2,4-Trimethylbenzene	2.711	3.325	23	TML	1.5
57	TML	Sec-Butylbenzene	3.363	4.141	23	TML	2.4
58	TML	p-Isopropyltoluene	2.977	3.704	24	TML	2.3
59	TM	1,3-DCB	1.902	2.021	6.3	TM	
60	TM	1,4-DCB	2.162	2.101	2.8	TM	
61	TML	n-Butylbenzene	2.565	3.123	22	TML	2.0
62	TM	1,2-DCB	1.830	1.926	5.2	TM	
63	TML	1,2-Dibromo-3-chloropropane	0.1293	0.1171	9.4	TML	16
64	TML	1,2,4-Trichlorobenzene	1.093	1.246	14	TML	6.1
65	TM	Hexachlorobutadiene	0.6216	0.6559	5.5	TM	
66	TML	Naphthalene	1.953	2.206	13	TML	17
67	TML	1,2,3-Trichlorobenzene	1.102	1.253	14	TML	3.4
68							
69							
70							
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							
		Average			13.2		

VOLATILE ORGANIC ANALYSIS BY EPA METHOD 8260B

Form 6

Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64211
Initial Cal. Date: 3/24/11
Instrument: Thor

Initials:

			0324T03S.D	0324T04S.D	0324T05S.D	0324T06S.D	0324T07S.D	0324T08S.D	0324T09S.D							
		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
1	I	Fluorobenzene (IS)														
2	TM	Dichlorodifluoromethane	0.3988	0.4813	0.4565	0.4724	0.4516	0.4708	0.4177				0.45	6.8	TM	
3	TM**	Chloromethane		0.7701	0.8173	0.8139	0.7380	0.7729	0.7018				0.77	5.8	TM**	
4	TM*	Vinyl chloride		0.7378	0.6223	0.5430	0.6670	0.6068	0.5489				0.62	12	TM*	
5	TML	Bromomethane	1.558	1.695	1.361	1.114	0.9484	0.9671	0.8547				1.2	27	TML	0.997
6	TM	Chloroethane	0.4947	0.6704	0.6030	0.5260	0.5143	0.4786					0.55	13	TM	
7	TM	Trichlorofluoromethane	0.8791	1.014	1.112	1.171	0.9494	1.110					1.0	11	TM	
8	TM*	1,1-DCE	0.4756	0.5280	0.5100	0.5099	0.4150	0.5488	0.5099				0.50	8.7	TM*	
9	TM	Methylene chloride	0.8870	0.8247	0.7172	0.7150	0.6243	0.7460	0.6792				0.74	12	TM	
10	TM	Methyl t-butyl ether (MtBE)	1.459	1.857	1.862	2.011	1.792	2.256	2.134				1.9	14	TM	
11	TM	Trans-1,2-DCE	0.5278	0.6067	0.5738	0.5812	0.4855	0.5969	0.5490				0.56	7.6	TM	
12	TM**	1,1-DCA	0.9839	1.221	1.181	1.059	1.057	1.263	1.121				1.1	8.9	TM**	
13	TM	Cis-1,2-DCE	0.3538	0.4250	0.4556	0.4845	0.4463	0.5670	0.5444				0.47	15	TM	
14	TM	2,2-Dichloropropane	0.3875	0.4738	0.4843	0.4970	0.4647	0.6109	0.5923				0.50	15	TM	
15	TM*	Chloroform	0.4799	0.8476	0.8302	0.8342	0.7510	0.9118	0.8541				0.79	18	TM*	
16	TML	Bromochloromethane	0.0258	0.2176	0.2370	0.2382	0.2074	0.2525	0.2356				0.20	39	TML	0.997
17	S	Dibromofluoromethane(S)	0.3883	0.4474	0.3639	0.4856	0.4060	0.4826	0.5135				0.44	13	S	
18	TM	1,1,1-TCA	0.4692	0.5555	0.5332	0.5590	0.5156	0.6440	0.6201				0.56	11	TM	
19	TM	1,1-Dichloropropene	0.4200	0.4698	0.4439	0.4838	0.4572	0.5846	0.5570				0.49	12	TM	
20	S	1,2-DCA-D4(S)	0.7081	0.6760	0.6041	0.6825	0.5879	0.6833	0.6926				0.66	7.0	S	
21	TM	Carbon Tetrachloride		0.4244	0.3980	0.4338	0.3979	0.5164	0.4835				0.44	11	TM	
22	TM	1,2-DCA	0.6228	0.7313	0.8037	0.8174	0.7298	0.8666	0.7999				0.77	10	TM	
23	TM	Benzene	1.310	1.706	1.692	1.730	1.621	2.062	1.945				1.7	14	TM	
24	TM	TCE	0.3760	0.3966	0.4148	0.4495	0.4025	0.5097	0.4659				0.43	11	TM	
25	TM*	1,2-Dichloropropane	0.4675	0.5662	0.6196	0.5762	0.5568	0.6893	0.6187				0.58	12	TM*	
26	TM	Bromodichloromethane	0.4938	0.5717	0.6007	0.6449	0.6179	0.7748	0.7286				0.63	15	TM	
27	TM	Dibromomethane	0.2818	0.3250	0.3359	0.3473	0.3166	0.3889	0.3638				0.34	10	TM	
28	TML	Cis-1,3-Dichloropropene	0.3100	0.4664	0.5496	0.6092	0.6679						0.52	27	TML	0.999
29	TM*	Toluene	1.059	1.500	1.601	1.857	1.828	2.320	2.236				1.8	25	TM*	
30	TML	Trans-1,3-Dichloropropene	0.2672	0.3737	0.4734	0.5831	0.6169						0.46	31	TML	0.999
31	TML	1,1,2-TCA	0.3003	0.2420	0.4083	0.4545	0.4190	0.5132	0.4857				0.40	24	TML	0.998
32	I	Chlorobenzene-D5 (IS)														
33	S	Toluene-D8(S)		1.292	1.448	1.818	1.640	1.964	1.848				1.7	15	S	
34	TML	1,2-EDB	0.3835	0.3890	0.4359	0.5202	0.4849	0.5883	0.4943				0.47	16	TML	0.991
35	TM	Tetrachloroethene	0.2718	0.2782	0.3013	0.3318	0.3010	0.3463	0.2906				0.30	9.0	TM	

VOLATILE ORGANIC ANALYSIS BY EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64211
Initial Cal. Date: 3/24/11
Instrument: Thor

Initials:

		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
36	TML	1-Chlorohexane	0.3569	0.4957	0.5463	0.6045	0.6078						0.52	20	TML	1.000
37	TM	1,1,1,2-Tetrachloroethane	0.3480	0.4065	0.4776	0.5084	0.4745						0.44	15	TM	
38	TML	m&p-Xylene	0.3815	0.6534	0.8472	0.9696	0.9573	1.197	1.099				0.87	32	TML	0.997
39	TML	o-Xylene	0.3855	0.6043	0.7514	0.8878	0.9517						0.72	32	TML	1.000
40	TML	Styrene	0.5702	1.062	1.366	1.708	1.737	2.272	2.085				1.5	38	TML	0.996
41	S	4-Bromofluorobenzene(S)	0.5360	0.5924	0.5753	0.7771	0.6848						0.63	15	S	
42	TML	1,3-Dichloropropane	0.5781	0.7683	0.8982	0.9852	0.9468	1.137	0.9627				0.90	20	TML	0.992
43	TML	Dibromochloromethane	0.2844	0.3641	0.4144	0.4411	0.4819	0.6020	0.5333				0.45	24	TML	0.995
44	TM**	Chlorobenzene	1.254	1.320	1.506	1.432	1.484	1.785	1.555				1.5	12	TM**	
45	TM*	Ethylbenzene	1.944	1.821	2.059	2.404	2.384	2.946	2.598				2.3	17	TM*	
46	TM**L	Bromoform	0.1451	0.1939	0.2405	0.2734	0.2875	0.3899	0.3533				0.27	32	TM**L	0.995
47	I	1,4-Dichlorobenzene-D (IS)														
48	TML	Isopropylbenzene	0.7263	1.010	1.153	1.335	1.630	2.065	1.832				1.4	34	TML	0.994
49	TM**L	1,1,2,2-Tetrachloroethane	0.3881	0.4635	0.4833	0.4994	0.5347	0.6717	0.6086				0.52	18	TM**L	0.996
50	TM	1,2,3-Trichloropropane		0.1577	0.1604	0.1717	0.1718	0.2019	0.1671				0.17	9.2	TM	
51	TML	Bromobenzene	0.3066	0.3956	0.3947	0.4023	0.4445	0.5320	0.4611				0.42	17	TML	0.994
52	TML	n-Propylbenzene	1.117	1.660	1.916	2.052	2.310	2.823					2.0	29	TML	0.993
53	TML	2-Chlorotoluene	0.7084	1.219	1.384	1.461	1.583	1.893	1.652				1.4	27	TML	0.994
54	TML	1,3,5-Trimethylbenzene	0.7400	1.198	1.374	1.461	1.629	2.082	1.838				1.5	30	TML	0.994
55	TML	4-Chlorotoluene	0.9372	1.511	1.555	1.652	1.739	2.165	1.931				1.6	23	TML	0.995
56	TML	Tert-Butylbenzene	0.4962	0.8456	0.9138	1.026	1.215	1.547	1.404				1.1	34	TML	0.996
57	TML	1,2,4-Trimethylbenzene	0.6416	1.104	1.343	1.579	1.691	2.066	1.806				1.5	33	TML	0.994
58	TML	Sec-Butylbenzene	0.8056	1.371	1.512	1.777	1.997	2.533					1.7	35	TML	0.990
59	TML	p-Isopropyltoluene	0.7272	1.123	1.352	1.531	1.659	2.110	1.816				1.5	31	TML	0.992
60	TML	1,3-DCB	0.6534	0.8130	0.8595	0.8848	0.9020	1.105	0.9822				0.89	16	TML	0.995
61	TM	1,4-DCB	0.8588	0.9838	0.9479	0.9786	0.9548	1.156	1.027				0.99	9.2	TM	
62	TML	n-Butylbenzene	0.9157	1.192	1.377	1.574	1.734						1.4	24	TML	0.999
63	TM	1,2-DCB	0.6777	0.8099	0.8559	0.9396	0.9548						0.85	13	TM	
64	TML	1,2-Dibromo-3-chloropropane		0.0592	0.0749	0.0761	0.0858	0.1071	0.0955				0.08	20	TML	0.995
65	TML	1,2,4-Trichlorobenzene	0.2961	0.3982	0.4825	0.5191	0.5386						0.45	22	TML	1.000
66	TM	Hexachlorobutadiene	0.2105	0.2426	0.2381	0.2469	0.2380	0.2889	0.2580				0.25	9.6	TM	
67	TML	Naphthalene	0.7264	1.049	1.318	1.550	1.680	2.095	1.813				1.5	32	TML	0.993
68	TML	1,2,3-Trichlorobenzene	0.4006	0.4456	0.5146	0.5622	0.5403	0.6830	0.6003				0.54	18	TML	0.994
69																
70																

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration/CCV

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64211
Date Analyzed: 3/24/11
Instrument: Thor
Initial Cal. Date: 3/24/11
Data File: 0324T16S.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.4499	0.4323	3.9	TM	
3	TM**	Chloromethane	0.7690	0.7417	3.6	TM**	
4	TM*	Vinyl chloride	0.6210	0.6728	8.3	TM*	
5	TML	Bromomethane	1.214	1.009	17	TML	7.3
6	TM	Chloroethane	0.5478	0.5076	7.3	TM	
7	TM	Trichlorofluoromethane	1.039	0.9430	9.3	TM	
8	TM*	1,1-DCE	0.4996	0.4630	7.3	TM*	
9	TM	Methylene chloride	0.7419	0.6653	10	TM	
10	TM	Methyl t-butyl ether (MtBE)	1.910	1.944	1.8	TM	
11	TM	Trans-1,2-DCE	0.5601	0.5327	4.9	TM	
12	TM**	1,1-DCA	1.126	1.130	0.28	TM**	
13	TM	Cis-1,2-DCE	0.4681	0.4715	0.73	TM	
14	TM	2,2-Dichloropropane	0.5015	0.5076	1.2	TM	
15	TM*	Chloroform	0.7870	0.7892	0.29	TM*	
16	TML	Bromochloromethane	0.2020	0.2117	4.8	TML	9.7
17	S	Dibromofluoromethane(S)	0.4410	0.4234	4.0	S	
18	TM	1,1,1-TCA	0.5567	0.5316	4.5	TM	
19	TM	1,1-Dichloropropene	0.4880	0.4782	2.0	TM	
20	S	1,2-DCA-D4(S)	0.6621	0.6322	4.5	S	
21	TM	Carbon Tetrachloride	0.4423	0.4172	5.7	TM	
22	TM	1,2-DCA	0.7674	0.7582	1.2	TM	
23	TM	Benzene	1.724	1.699	1.5	TM	
24	TM	TCE	0.4307	0.4236	1.7	TM	
25	TM*	1,2-Dichloropropane	0.5849	0.5847	0.04	TM*	
26	TM	Bromodichloromethane	0.6332	0.6663	5.2	TM	
27	TM	Dibromomethane	0.3371	0.3360	0.32	TM	
28	TML	Cis-1,3-Dichloropropene	0.5206	0.7196	38	TML	8.1
29	TM*	Toluene	1.771	1.914	8.0	TM*	
30	TML	Trans-1,3-Dichloropropene	0.4628	0.6395	38	TML	3.7
31	TML	1,1,2-TCA	0.4033	0.4483	11	TML	5.3
32	I	Chlorobenzene-D5 (IS)	ISTD			I	
33	S	Toluene-D8(S)	1.668	1.716	2.8	S	
34	TML	1,2-EDB	0.4709	0.4788	1.7	TML	7.3
35	TM	Tetrachloroethene	0.3030	0.2753	9.2	TM	
36	TML	1-Chlorohexane	0.5223	0.6041	16	TML	0.79
37	TM	1,1,1,2-Tetrachloroethane	0.4430	0.4717	6.5	TM	
38	TML	m&p-Xylene	0.8722	0.9066	3.9	TML	15
39	TML	o-Xylene	0.7161	0.9182	28	TML	3.1
40	TML	Styrene	1.543	1.661	7.7	TML	17
		Average			7.4		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration/CCV

Lab Name: APPL, Inc.
Case No:
Matrix: 0

SDG No: 64211
Date Analyzed: 3/24/11
Instrument: Thor
Cal. Date: 3/24/11
Data File: 0324T16S.D

		Compound	MEAN	CCRF	%D		%Drift
41	S	4-Bromofluorobenzene(S)	0.6331	0.6767	6.9	S	
42	TML	1,3-Dichloropropane	0.8966	0.9104	1.5	TML	9.2
43	TML	Dibromochloromethane	0.4459	0.4770	7.0	TML	9.9
44	TM**	Chlorobenzene	1.477	1.418	3.9	TM**	
45	TM*	Ethylbenzene	2.308	2.258	2.2	TM*	
46	TM**L	Bromoform	0.2691	0.2941	9.3	TM**L	13
47	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
48	TML	Isopropylbenzene	1.393	1.536	10	TML	14
49	TM**L	1,1,2,2-Tetrachloroethane	0.5213	0.5391	3.4	TM**L	10.0
50	TM	1,2,3-Trichloropropane	0.1718	0.1671	2.7	TM	
51	TML	Bromobenzene	0.4196	0.4344	3.5	TML	7.6
52	TML	n-Propylbenzene	1.980	2.177	10.0	TML	16
53	TML	2-Chlorotoluene	1.414	1.456	3.0	TML	13
54	TML	1,3,5-Trimethylbenzene	1.475	1.533	4.0	TML	15
55	TML	4-Chlorotoluene	1.641	1.620	1.3	TML	15
56	TML	Tert-Butylbenzene	1.064	1.140	7.2	TML	15
57	TML	1,2,4-Trimethylbenzene	1.462	1.556	6.5	TML	14
58	TML	Sec-Butylbenzene	1.666	1.845	11	TML	19
59	TML	p-Isopropyltoluene	1.474	1.520	3.1	TML	16
60	TML	1,3-DCB	0.8857	0.8175	7.7	TML	17
61	TM	1,4-DCB	0.9868	0.8645	12	TM	
62	TML	n-Butylbenzene	1.359	1.543	14	TML	10
63	TM	1,2-DCB	0.8476	0.8619	1.7	TM	
64	TML	1,2-Dibromo-3-chloropropane	0.0831	0.0892	7.4	TML	5.2
65	TML	1,2,4-Trichlorobenzene	0.4469	0.4495	0.58	TML	16
66	TM	Hexachlorobutadiene	0.2462	0.2188	11	TM	
67	TML	Naphthalene	1.462	1.594	9.1	TML	12
68	TML	1,2,3-Trichlorobenzene	0.5352	0.4888	8.7	TML	19
69							
70							
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							
		Average			6.2		

EPA METHOD 8260B
Volatile Organic Compounds
Raw Data

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: M110322

AAB #: 110323AM-153425
Contract #: 2010*1286022*000
Method Blank ID: 110323AM-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64211, Sample: AY34315

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: M110322

AAB #: 110323AM-153425
Contract #: 2010*1286022*000
Method Blank ID: 110323AM-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	108	69-139	
SURROGATE: 4-BROMOFLUOROBE	93.2	75-125	
SURROGATE: DIBROMOFLUOROME	104	75-125	
SURROGATE: TOLUENE-D8 (S)	96.5	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, Sample: AY34315

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: T110324

AAB #: 110324AT-153500
Contract #: 2010*1286022*000
Method Blank ID: 110324AT-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.003	U
1,1,1-TCA	< RL	0.004	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.002	U
1,1,2-TCA	< RL	0.005	U
1,1-DCA	< RL	0.002	U
1,1-DCE	< RL	0.006	U
1,1-DICHLOROPROPENE	< RL	0.005	U
1,2,3-TRICHLOROBENZENE	< RL	0.004	U
1,2,3-TRICHLOROPROPANE	< RL	0.020	U
1,2,4-TRICHLOROBENZENE	< RL	0.004	U
1,2,4-TRIMETHYLBENZENE	< RL	0.007	U
1,2-DCA	< RL	0.003	U
1,2-DCB	< RL	0.002	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	0.010	U
1,2-DICHLOROPROPANE	< RL	0.002	U
1,2-EDB	< RL	0.003	U
1,3,5-TRIMETHYLBENZENE	< RL	0.003	U
1,3-DCB	< RL	0.006	U
1,3-DICHLOROPROPANE	< RL	0.002	U
1,4-DCB	< RL	0.002	U
1-CHLOROHEXANE	< RL	0.003	U
2,2-DICHLOROPROPANE	< RL	0.020	U
2-CHLOROTOLUENE	< RL	0.002	U
4-CHLOROTOLUENE	< RL	0.003	U
BENZENE	< RL	0.002	U
BROMOBENZENE	< RL	0.002	U
BROMOCHLOROMETHANE	< RL	0.002	U
BROMODICHLOROMETHANE	< RL	0.004	U
BROMOFORM	< RL	0.006	U
BROMOMETHANE	< RL	0.005	U
CARBON TETRACHLORIDE	< RL	0.010	U
CHLOROBENZENE	< RL	0.002	U
CHLOROETHANE	< RL	0.005	U
CHLOROFORM	< RL	0.002	U
CHLOROMETHANE	< RL	0.007	U
CIS-1,2-DCE	< RL	0.006	U
CIS-1,3-DICHLOROPROPENE	< RL	0.005	U
DIBROMOCHLOROMETHANE	< RL	0.003	U
DIBROMOMETHANE	< RL	0.010	U
DICHLORODIFLUOROMETHANE	< RL	0.005	U
ETHYLBENZENE	< RL	0.003	U

Comments: ARF: 64211, Sample: AY34316

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: T110324

AAB #: 110324AT-153500
Contract #: 2010*1286022*000
Method Blank ID: 110324AT-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	0.005	U
ISOPROPYLBENZENE	< RL	0.008	U
M&P-XYLENE	< RL	0.007	U
METHYLENE CHLORIDE	< RL	0.005	U
N-BUTYLBENZENE	< RL	0.005	U
N-PROPYLBENZENE	< RL	0.002	U
NAPHTHALENE	< RL	0.020	U
O-XYLENE	< RL	0.005	U
P-ISOPROPYLTOLUENE	< RL	0.006	U
SEC-BUTYLBENZENE	< RL	0.007	U
STYRENE	< RL	0.002	U
TCE	< RL	0.010	U
TERT-BUTYLBENZENE	< RL	0.007	U
TETRACHLOROETHENE	< RL	0.007	U
TOLUENE	< RL	0.005	U
TRANS-1,2-DCE	< RL	0.003	U
TRANS-1,3-DICHLOROPROPENE	< RL	0.005	U
TRICHLOROFLUOROMETHANE	< RL	0.004	U
VINYL CHLORIDE	< RL	0.009	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	106	52-149	
SURROGATE: 4-BROMOFLUOROBE	87.9	65-135	
SURROGATE: DIBROMOFLUOROME	101	65-135	
SURROGATE: TOLUENE-D8 (S)	95.4	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, Sample: AY34316

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110323AM LCS

Concentration Units: ug/L

AAB #: 110323AM-153425

Contract #: 2010*1286022*000

Initial Calibration ID: M110322

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	10.55	106	72-125	
1,1,1-TCA	10.00	10.80	108	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	9.72	97.2	74-125	
1,1,2-TCA	10.00	9.93	99.3	75-127	
1,1-DCA	10.00	10.21	102	75-125	
1,1-DCE	10.00	10.39	104	75-125	
1,1-DICHLOROPROPENE	10.00	11.05	111	75-125	
1,2,3-TRICHLOROBENZENE	10.00	9.66	96.6	75-137	
1,2,3-TRICHLOROPROPANE	10.00	9.25	92.5	75-125	
1,2,4-TRICHLOROBENZENE	10.00	9.39	93.9	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	10.15	102	75-125	
1,2-DCA	10.00	9.87	98.7	68-127	
1,2-DCB	10.00	10.52	105	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	8.42	84.2	59-125	
1,2-DICHLOROPROPANE	10.00	10.07	101	70-125	
1,2-EDB	10.00	10.02	100	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	10.28	103	72-125	
1,3-DCB	10.00	10.63	106	75-125	
1,3-DICHLOROPROPANE	10.00	10.42	104	75-125	
1,4-DCB	10.00	9.72	97.2	75-125	
1-CHLOROHEXANE	10.00	10.38	104	75-125	
2,2-DICHLOROPROPANE	10.00	11.80	118	75-125	
2-CHLOROTOLUENE	10.00	10.17	102	73-125	
4-CHLOROTOLUENE	10.00	10.38	104	74-125	
BENZENE	10.00	10.64	106	75-125	
BROMOBENZENE	10.00	11.33	113	75-125	
BROMOCHLOROMETHANE	10.00	10.03	100	73-125	
BROMODICHLOROMETHANE	10.00	10.40	104	75-125	
BROMOFORM	10.00	9.69	96.9	75-125	
BROMOMETHANE	10.00	11.59	116	72-125	
CARBON TETRACHLORIDE	10.00	10.75	108	62-125	
CHLOROBENZENE	10.00	10.27	103	75-125	
CHLOROETHANE	10.00	10.57	106	65-125	
CHLOROFORM	10.00	10.36	104	74-125	
CHLOROMETHANE	10.00	10.60	106	75-125	
CIS-1,2-DCE	10.00	11.16	112	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	9.59	95.9	74-125	
DIBROMOCHLOROMETHANE	10.00	10.10	101	73-125	
DIBROMOMETHANE	10.00	9.87	98.7	69-127	
DICHLORODIFLUOROMETHANE	10.00	11.83	118	72-125	

Comments: ARF: 64211, QC Sample ID: AY34315

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110323AM LCS

Concentration Units: ug/L

AAB #: 110323AM-153425

Contract #: 2010*1286022*000

Initial Calibration ID: M110322

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	11.46	115	75-125	
HEXACHLOROBUTADIENE	10.00	10.55	106	75-125	
ISOPROPYLBENZENE	10.00	9.92	99.2	75-125	
M&P-XYLENE	20.00	20.65	103	75-125	
METHYLENE CHLORIDE	10.00	10.51	105	75-125	
N-BUTYLBENZENE	10.00	10.20	102	75-125	
N-PROPYLBENZENE	10.00	10.26	103	75-125	
NAPHTHALENE	10.00	8.29	82.9	75-125	
O-XYLENE	10.00	9.89	98.9	75-125	
P-ISOPROPYLTOLUENE	10.00	10.23	102	75-125	
SEC-BUTYLBENZENE	10.00	10.24	102	75-125	
STYRENE	10.00	9.74	97.4	75-125	
TCE	10.00	10.18	102	71-125	
TERT-BUTYLBENZENE	10.00	10.08	101	75-125	
TETRACHLOROETHENE	10.00	10.89	109	71-125	
TOLUENE	10.00	11.97	120	74-125	
TRANS-1,2-DCE	10.00	10.30	103	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	9.28	92.8	66-125	
TRICHLOROFLUOROMETHANE	10.00	10.86	109	67-125	
VINYL CHLORIDE	10.00	11.05	111	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	93.6	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	114	75-125	
SURROGATE: DIBROMOFLUOROMETH	101	75-125	
SURROGATE: TOLUENE-D8 (S)	105	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, QC Sample ID: AY34315

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110324AT LCS
Concentration Units: mg/kg

AAB #: 110324AT-153500
Contract #: 2010*1286022*000
Initial Calibration ID: T110324

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	0.0500	0.0532	106	62-125	
1,1,1-TCA	0.0500	0.0477	95.4	65-135	
1,1,2,2-TETRACHLOROETHANE	0.0500	0.0450	90.0	64-135	
1,1,2-TCA	0.0500	0.0474	94.8	65-135	
1,1-DCA	0.0500	0.0501	100	62-135	
1,1-DCE	0.0500	0.0463	92.6	65-135	
1,1-DICHLOROPROPENE	0.0500	0.0490	98.0	65-135	
1,2,3-TRICHLOROBENZENE	0.0500	0.0405	81.0	65-147	
1,2,3-TRICHLOROPROPANE	0.050	0.049	98.0	65-135	
1,2,4-TRICHLOROBENZENE	0.0500	0.0419	83.8	65-145	
1,2,4-TRIMETHYLBENZENE	0.0500	0.0431	86.2	65-135	
1,2-DCA	0.0500	0.0494	98.8	58-137	
1,2-DCB	0.0500	0.0508	102	65-135	
1,2-DIBROMO-3-CHLOROPROPANE	0.050	0.047	94.0	49-135	
1,2-DICHLOROPROPANE	0.0500	0.0500	100	60-135	
1,2-EDB	0.0500	0.0464	92.8	65-135	
1,3,5-TRIMETHYLBENZENE	0.0500	0.0424	84.8	62-135	
1,3-DCB	0.0500	0.0414	82.8	65-135	
1,3-DICHLOROPROPANE	0.0500	0.0454	90.8	65-135	
1,4-DCB	0.0500	0.0438	87.6	65-135	
1-CHLOROHEXANE	0.0500	0.0496	99.2	65-135	
2,2-DICHLOROPROPANE	0.050	0.051	102	65-135	
2-CHLOROTOLUENE	0.0500	0.0436	87.2	63-135	
4-CHLOROTOLUENE	0.0500	0.0423	84.6	64-135	
BENZENE	0.0500	0.0493	98.6	65-135	
BROMOBENZENE	0.0500	0.0462	92.4	65-135	
BROMOCHLOROMETHANE	0.0500	0.0452	90.4	63-135	
BROMODICHLOROMETHANE	0.0500	0.0526	105	65-135	
BROMOFORM	0.0500	0.0434	86.8	65-135	
BROMOMETHANE	0.0500	0.0537	107	62-135	
CARBON TETRACHLORIDE	0.050	0.047	94.0	52-135	
CHLOROBENZENE	0.0500	0.0480	96.0	65-135	
CHLOROETHANE	0.0500	0.0463	92.6	55-135	
CHLOROFORM	0.0500	0.0501	100	64-135	
CHLOROMETHANE	0.0500	0.0482	96.4	65-135	
CIS-1,2-DCE	0.0500	0.0504	101	65-135	
CIS-1,3-DICHLOROPROPENE	0.0500	0.0540	108	64-135	
DIBROMOCHLOROMETHANE	0.0500	0.0450	90.0	63-135	
DIBROMOMETHANE	0.050	0.050	100	59-137	
DICHLORODIFLUOROMETHANE	0.0500	0.0481	96.2	65-135	

Comments: ARF: 64211, QC Sample ID: AY34316

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110324AT LCS
Concentration Units: mg/kg

AAB #: 110324AT-153500
Contract #: 2010*1286022*000
Initial Calibration ID: T110324

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	0.0500	0.0489	97.8	65-135	
HEXACHLOROBUTADIENE	0.0500	0.0444	88.8	65-135	
ISOPROPYLBENZENE	0.0500	0.0431	86.2	65-135	
M&P-XYLENE	0.1000	0.0847	84.7	65-135	
METHYLENE CHLORIDE	0.0500	0.0448	89.6	65-135	
N-BUTYLBENZENE	0.0500	0.0450	90.0	65-135	
N-PROPYLBENZENE	0.0500	0.0420	84.0	65-135	
NAPHTHALENE	0.0500	0.0439	87.8	65-135	
O-XYLENE	0.0500	0.0484	96.8	65-135	
P-ISOPROPYLTOLUENE	0.0500	0.0419	83.8	65-135	
SEC-BUTYLBENZENE	0.0500	0.0404	80.8	65-135	
STYRENE	0.0500	0.0417	83.4	65-135	
TCE	0.0500	0.0492	98.4	61-135	
TERT-BUTYLBENZENE	0.0500	0.0423	84.6	65-135	
TETRACHLOROETHENE	0.0500	0.0454	90.8	61-135	
TOLUENE	0.0500	0.0540	108	64-135	
TRANS-1,2-DCE	0.0500	0.0476	95.2	65-135	
TRANS-1,3-DICHLOROPROPENE	0.0500	0.0519	104	56-135	
TRICHLOROFLUOROMETHANE	0.0500	0.0454	90.8	57-135	
VINYL CHLORIDE	0.0500	0.0542	108	36-144	

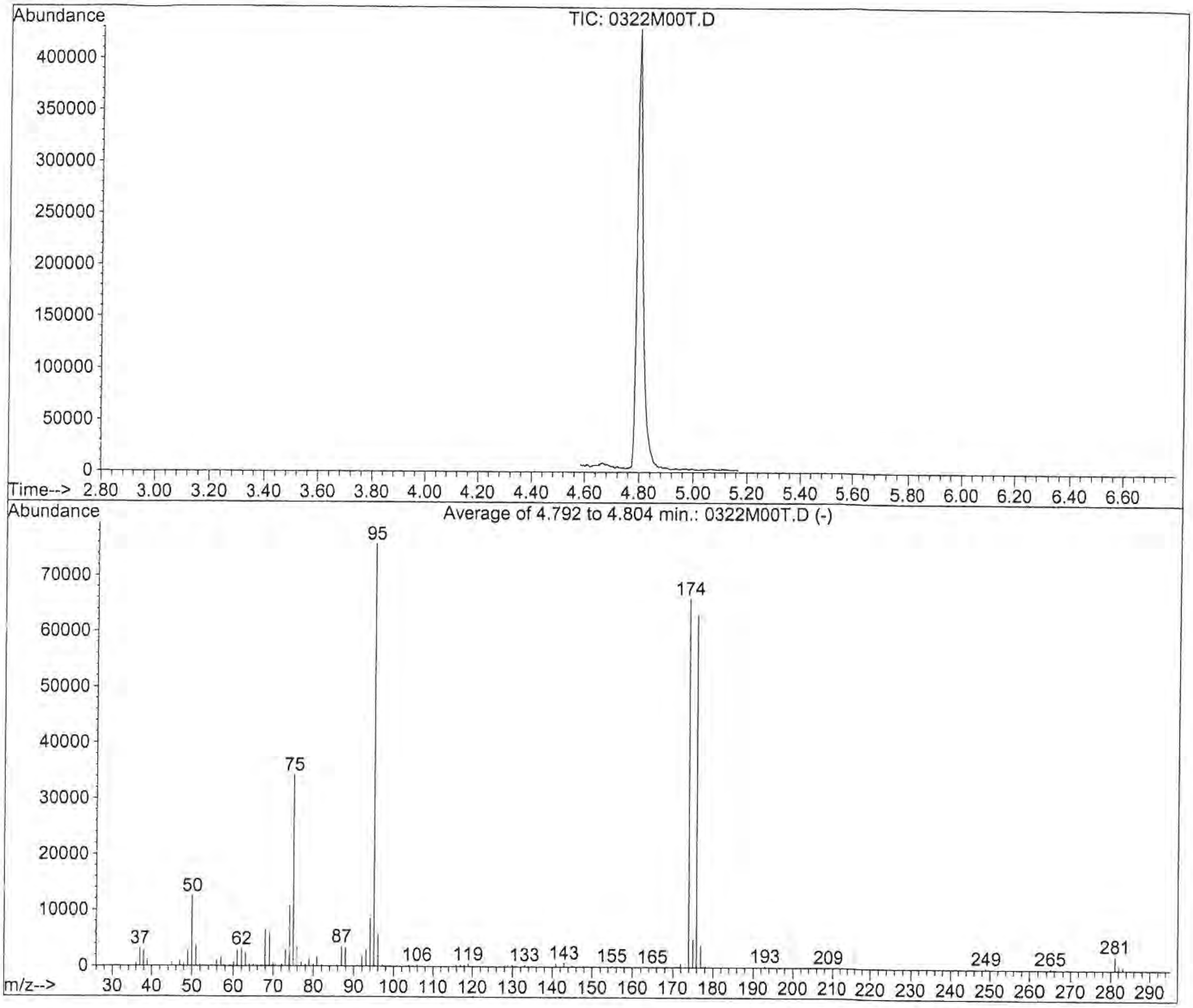
Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	95.6	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	108	65-135	
SURROGATE: DIBROMOFLUOROMETH	95.7	65-135	
SURROGATE: TOLUENE-D8 (S)	102	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64211, QC Sample ID: AY34316

BFB

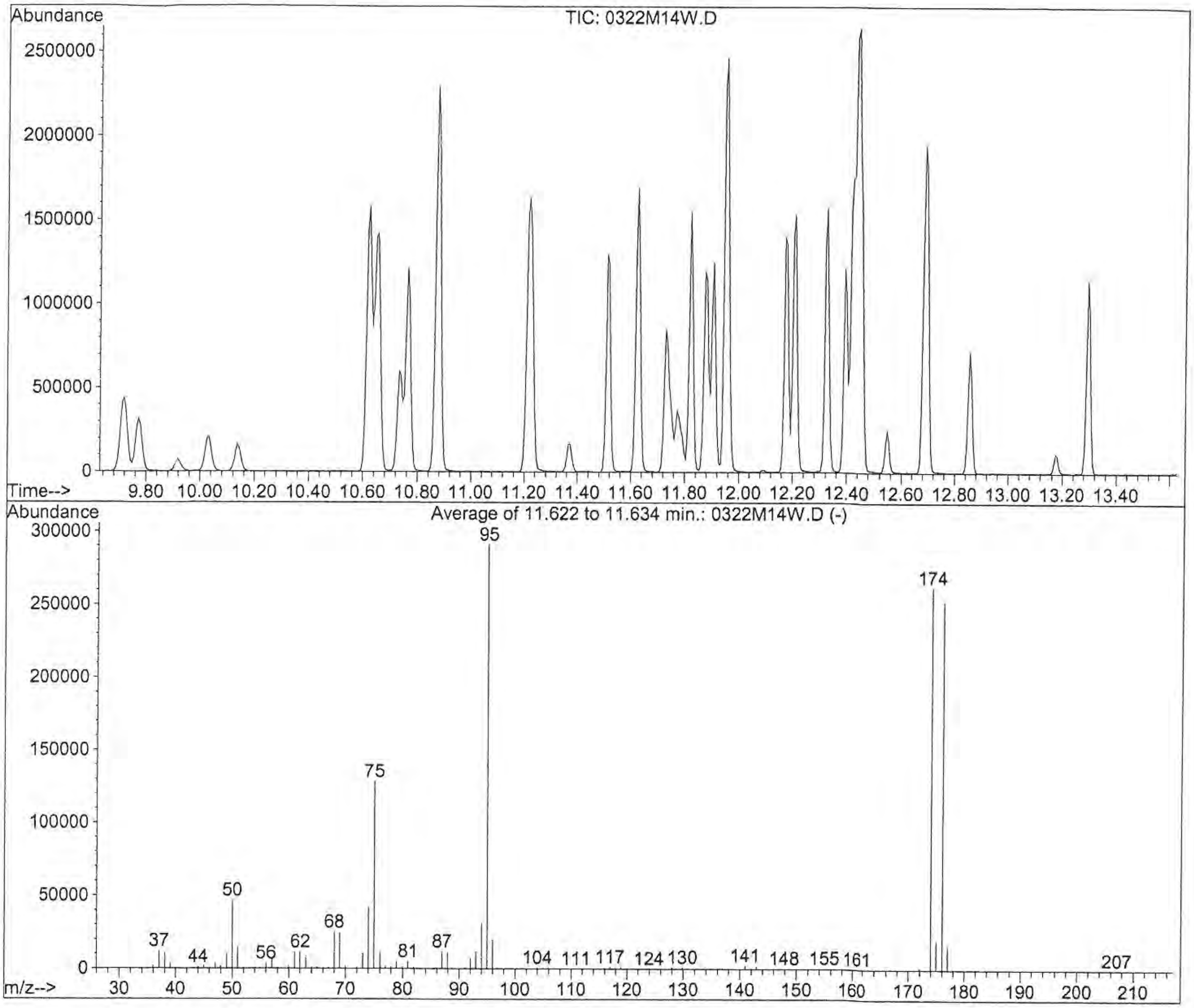
```
Data File : M:\MAX\DATA\M110322\0322M00T.D                Vial: 1
Acq On    : 22 Mar 11  14:46                          Operator: RP
Sample    : 20ug/mL BFB Std 03-11-11A                 Inst    : Max
Misc      : 2uL                                       Multiplr: 1.00

Method   : M:\MAX\DATA\M110322\M826AW.M (RTE Integrator)
Title    : METHOD 8260B
```



```
Spectrum Information: Average of 4.792 to 4.804 min.

| Target | Rel. to | Lower  | Upper  |  Rel.  |    Raw    |   Result   |
|  Mass  |  Mass   | Limit% | Limit% |  Abn%  |    Abn    | Pass/Fail  |
------------------------------------------------------------------------
|   50   |   95    |   15   |   40   |  16.5  |   12499   |    PASS    |
|   75   |   95    |   30   |   60   |  45.2  |   34253   |    PASS    |
|   95   |   95    |  100   |  100   | 100.0  |   75749   |    PASS    |
|   96   |   95    |    5   |    9   |   7.5  |    5703   |    PASS    |
|  173   |  174    |  0.00  |    2   |   0.0  |       0   |    PASS    |
|  174   |   95    |   50   |  100   |  87.3  |   66096   |    PASS    |
|  175   |  174    |    5   |    9   |   7.5  |    4937   |    PASS    |
|  176   |  174    |   95   |  101   |  95.5  |   63131   |    PASS    |
|  177   |  176    |    5   |    9   |   6.1  |    3841   |    PASS    |
------------------------------------------------------------------------
```

BFB

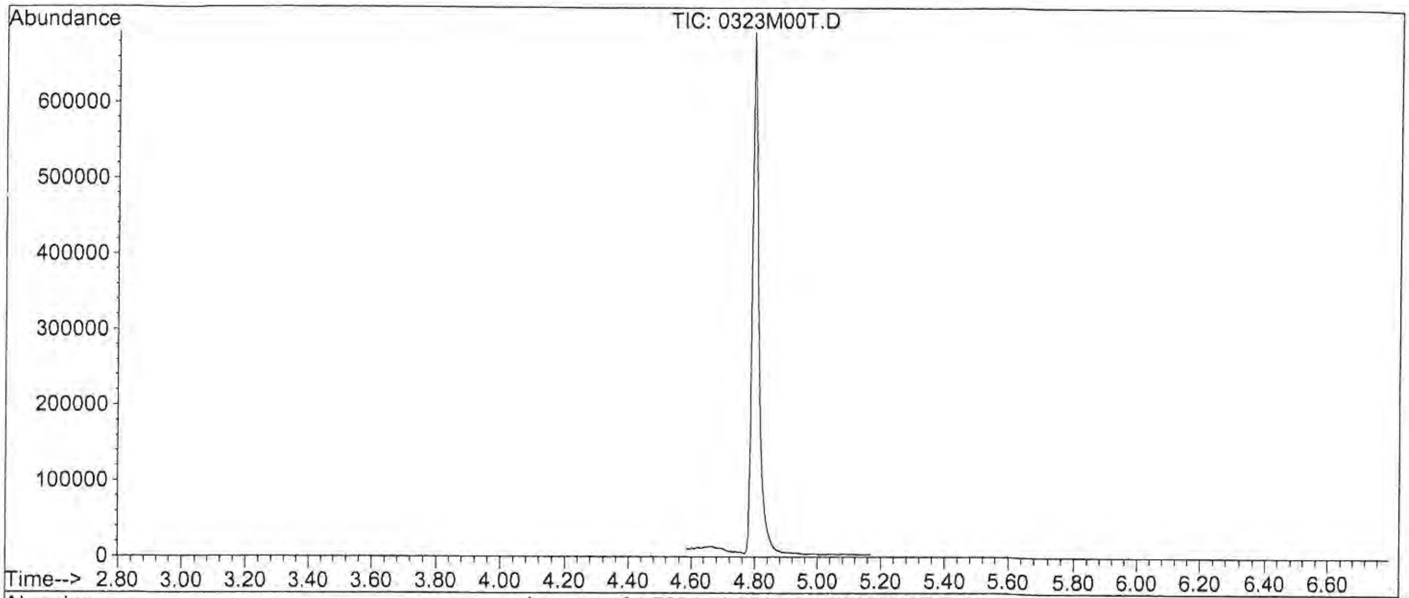
```
Data File : M:\MAX\DATA\M110322\0322M14W.D               Vial: 14
Acq On    : 22 Mar 11  21:35                          Operator: RP
Sample    : 10ug/L Std                                Inst    : Max
Misc      : 10ml w/ IS&S: 5ul of 03-03-11             Multiplr: 1.00

Method    : M:\MAX\DATA\M110322\M826AW.M (RTE Integrator)
Title     : METHOD 8260B
```

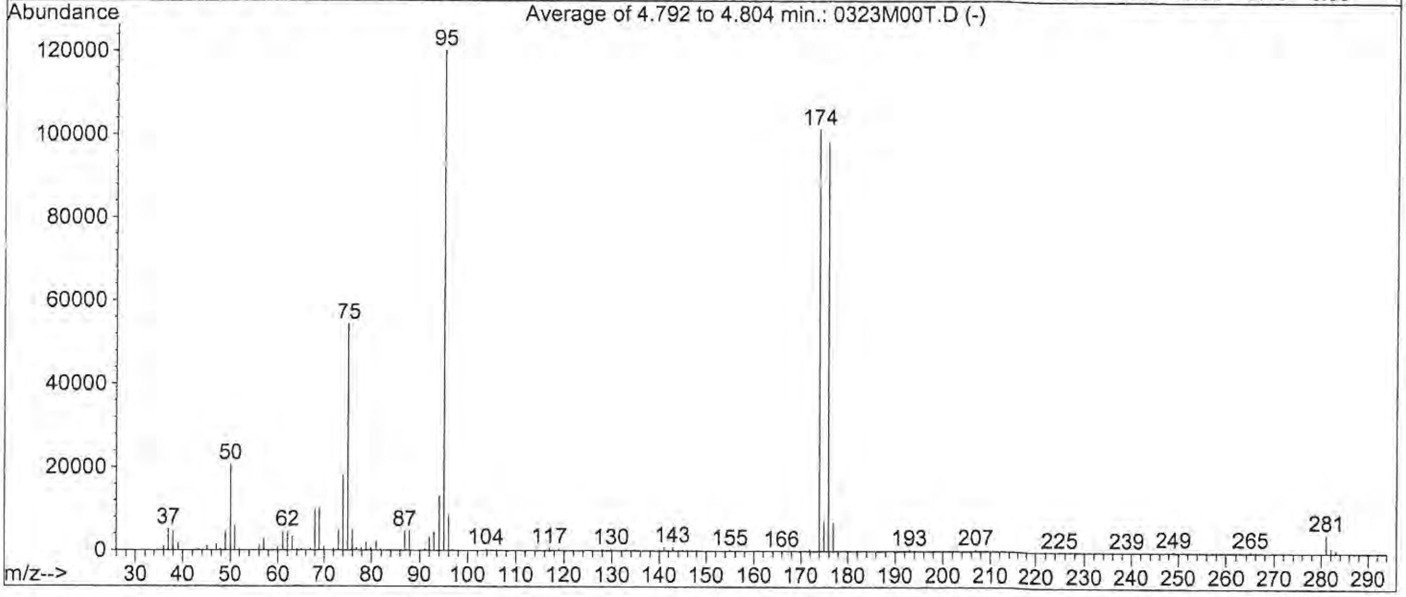


```
Spectrum Information: Average of 11.622 to 11.634 min.

| Target | Rel. to | Lower  | Upper  |  Rel.  |    Raw    |   Result   |
| Mass   |  Mass   | Limit% | Limit% |  Abn%  |    Abn    | Pass/Fail  |
-------------------------------------------------------------------------
|   50   |    95   |    15  |    40  |  16.1  |    46844  |   PASS     |
|   75   |    95   |    30  |    60  |  44.1  |   128328  |   PASS     |
|   95   |    95   |   100  |   100  | 100.0  |   290837  |   PASS     |
|   96   |    95   |     5  |     9  |   6.7  |    19393  |   PASS     |
|  173   |   174   |  0.00  |     2  |   0.0  |        0  |   PASS     |
|  174   |    95   |    50  |   100  |  90.1  |   262101  |   PASS     |
|  175   |   174   |     5  |     9  |   7.5  |    19584  |   PASS     |
|  176   |   174   |    95  |   101  |  96.3  |   252395  |   PASS     |
|  177   |   176   |     5  |     9  |   6.4  |    16106  |   PASS     |
-------------------------------------------------------------------------
```

BFB

```
Data File : M:\MAX\DATA\M110322\0323M00T.D                   Vial: 1
Acq On    : 23 Mar 11   7:02                             Operator: RP
Sample    : 20ug/mL BFB Std 03-11-11A                    Inst     : Max
Misc      : 2uL                                          Multiplr: 1.00

Method    : M:\MAX\DATA\M110322\M826AW.M (RTE Integrator)
Title     : METHOD 8260B
```





Spectrum Information: Average of 4.792 to 4.804 min.

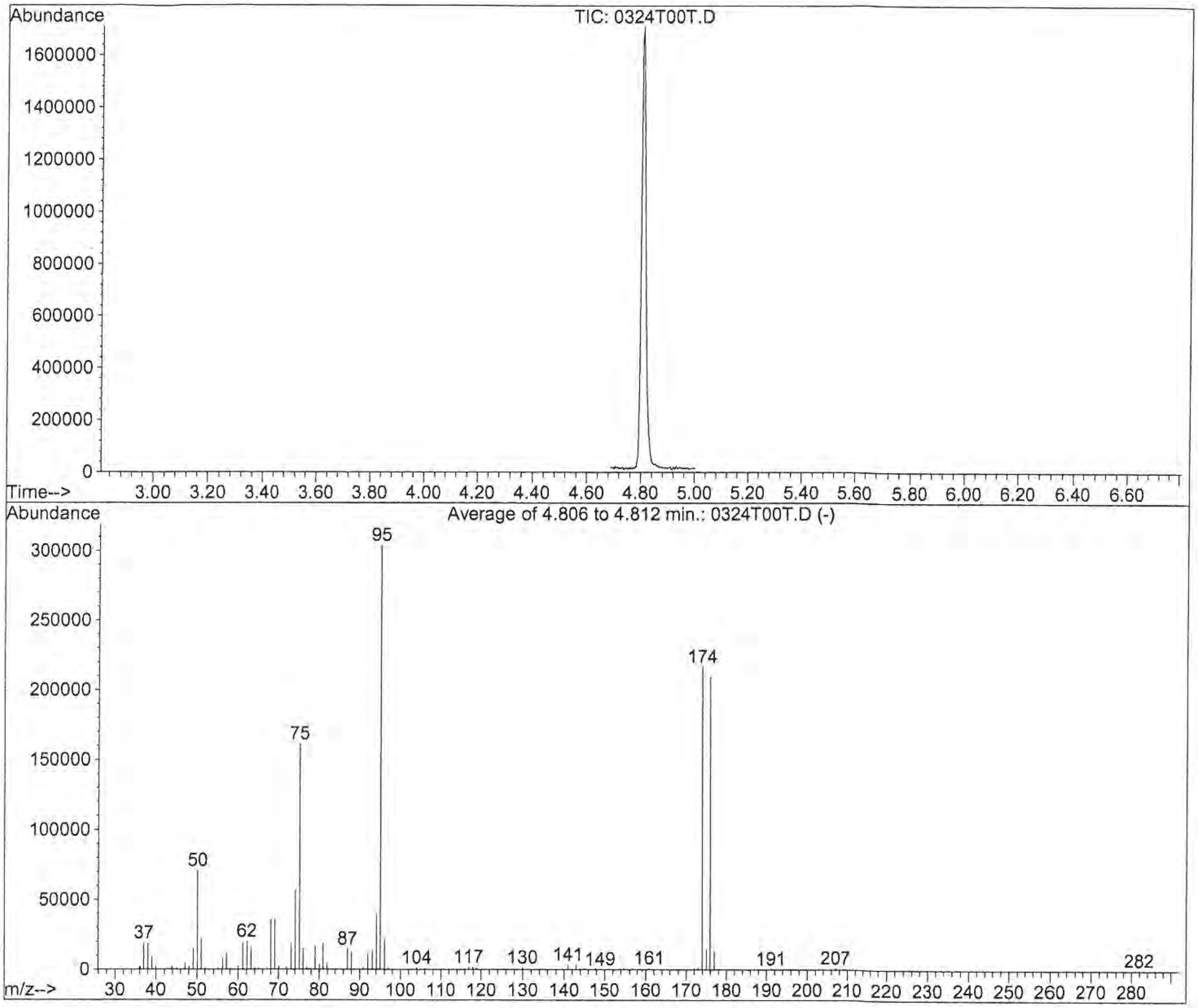
Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	17.2	20668	PASS
75	95	30	60	45.3	54459	PASS
95	95	100	100	100.0	120187	PASS
96	95	5	9	7.0	8387	PASS
173	174	0.00	2	0.1	151	PASS
174	95	50	100	84.4	101395	PASS
175	174	5	9	7.1	7201	PASS
176	174	95	101	96.8	98120	PASS
177	176	5	9	6.9	6789	PASS

BFB

Data File : M:\THOR\DATA\T110324\0324T00T.D
Acq On : 24 Mar 11 14:09
Sample : 20ug/mL BFB Std 03-23-11A
Misc : 2uL

Vial: 1
Operator: RP
Inst : Thor
Multiplr: 1.00

Method : M:\THOR\DATA\T110324\T826AS.M (RTE Integrator)
Title : METHOD 8260B

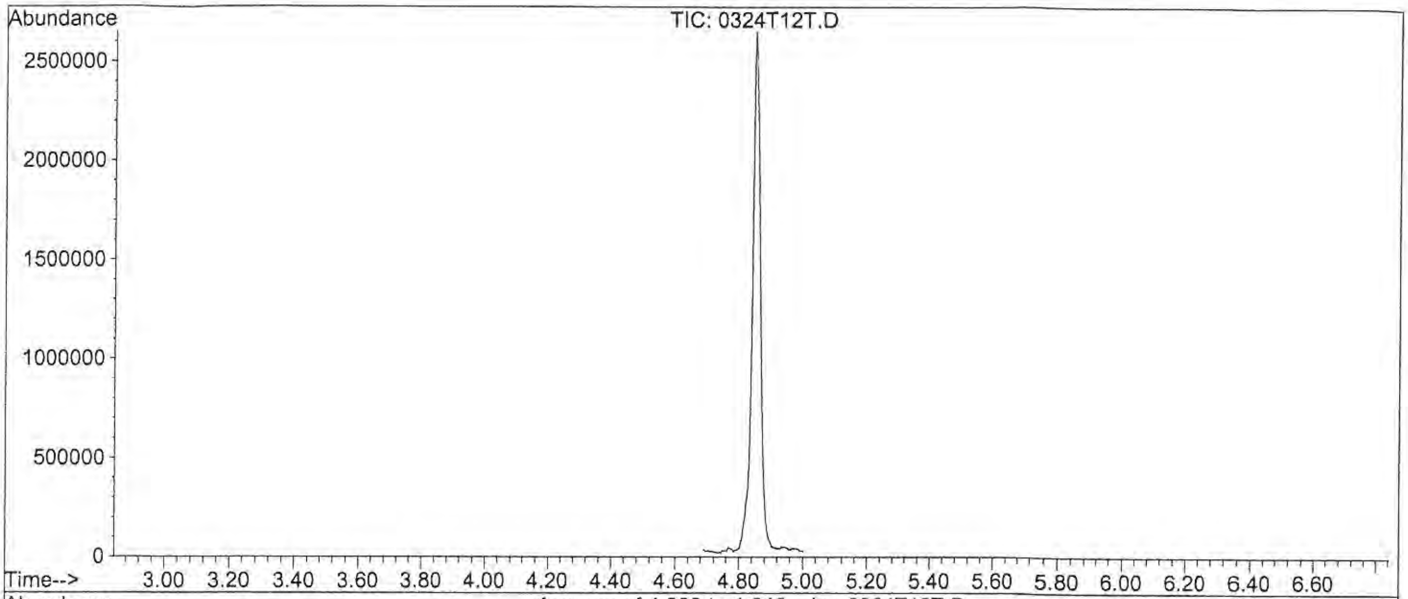


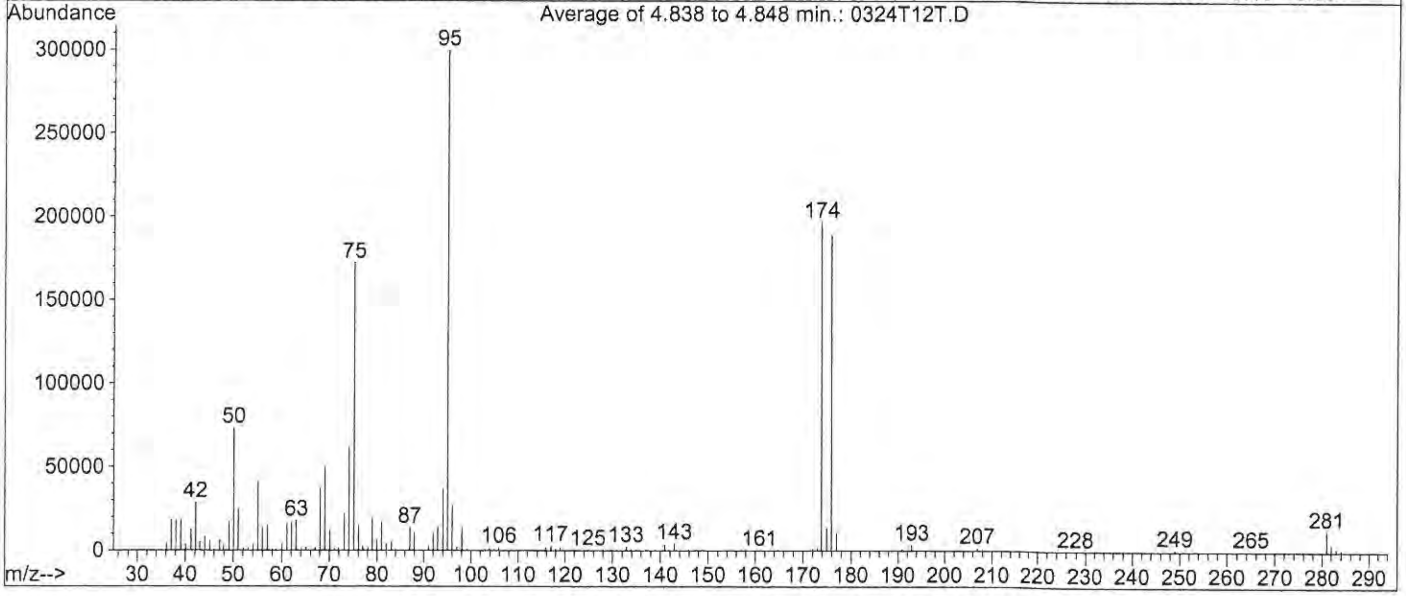
Spectrum Information: Average of 4.806 to 4.812 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	23.3	70931	PASS
75	95	30	60	53.1	161451	PASS
95	95	100	100	100.0	304043	PASS
96	95	5	9	7.0	21241	PASS
173	174	0.00	2	0.5	994	PASS
174	95	50	100	71.3	216725	PASS
175	174	5	9	6.7	14521	PASS
176	174	95	101	96.7	209536	PASS
177	176	5	9	5.9	12276	PASS

BFB

```
Data File : M:\THOR\DATA\T110324\0324T12T.D                 Vial: 12
Acq On    : 24 Mar 11  19:06                            Operator: RP
Sample    : 20ug/mL BFB Std 03-23-11A                   Inst    : Thor
Misc      : 2ul                                         Multiplr: 1.00

Method    : M:\THOR\DATA\T110324\T826AS.M (RTE Integrator)
Title     : METHOD 8260B
```





Spectrum Information: Average of 4.838 to 4.848 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	24.4	73136	PASS
75	95	30	60	57.5	172288	PASS
95	95	100	100	100.0	299696	PASS
96	95	5	9	8.9	26604	PASS
173	174	0.00	2	0.8	1586	PASS
174	95	50	100	65.7	196946	PASS
175	174	5	9	6.8	13364	PASS
176	174	95	101	95.9	188938	PASS
177	176	5	9	5.5	10395	PASS

Injection Log

Directory: M:\MAX\DATA\M110322\

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0322M00T.D	1	20ug/mL BFB Std 03-11-11A	2uL	22 Mar 11 14:46
2	3	0322M03W.D	1	Vol Std 03-22-11@0.3ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 16:01
3	4	0322M04W.D	1	Vol Std 03-22-11@0.5ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 16:27
4	5	0322M05W.D	1	Vol Std 03-22-11@1.0ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 16:53
5	6	0322M06W.D	1	Vol Std 03-22-11@2.0ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 17:18
6	7	0322M07W.D	1	Vol Std 03-22-11@5.0ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 17:44
7	8	0322M08W.D	1	Vol Std 03-22-11@10ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 18:10
8	9	0322M09W.D	1	Vol Std 03-22-11@20ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 18:36
9	10	0322M10W.D	1	Vol Std 03-22-11@40ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 19:01
10	11	0322M11W.D	1	Vol Std 03-22-11@100ug/L	10ml w/ IS: 5ul of 03-03-11	22 Mar 11 19:27
11	14	0322M14W.D	1	20ug/ml BFB Std	2ul	22 Mar 11 21:35
12	15	0322M15W.D	1	110322A LCS-1WM (SS)	10ml w/ IS&S: 5ul of 03-03-11	22 Mar 11 22:00
13	1	0323M00T.D	1	20ug/mL BFB Std 03-11-11A	2uL	23 Mar 11 7:02
14	1	0323M01W.D	1	110323A LCS-1WM	10ml w/ IS&S: 5ul of 03-03-11	23 Mar 11 7:44
15	4	0323M04W.D	1	110321A BLK-1WM	10ml w/ IS&S: 5ul of 03-03-11	23 Mar 11 9:52
16	21	0323M21W.D	1	AY34315W02	10ml w/ IS&S: 5ul of 03-03-11	23 Mar 11 17:52

Injection Log

Directory: M:\THOR\DATA\T110324\

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0324T00T.D	1	20ug/mL BFB Std 03-23-11A	2uL	24 Mar 11 14:09
2	3	0324T03S.D	1	Vol Std 03-24-11@2.0ug/kg	5ml w/5ul of IS: 03-02-11C	24 Mar 11 15:25
3	4	0324T04S.D	1	Vol Std 03-24-11@5.0ug/kg	5ml w/5ul of IS: 03-02-11C	24 Mar 11 15:47
4	5	0324T05S.D	1	Vol Std 03-24-11@10ug/kg	5ml w/5ul of IS: 03-02-11C	24 Mar 11 16:09
5	6	0324T06S.D	1	Vol Std 03-24-11@20ug/kg	5ml w/5ul of IS: 03-02-11C	24 Mar 11 16:32
6	7	0324T07S.D	1	Vol Std 03-24-11@50ug/kg	5ml w/5ul of IS: 03-02-11C	24 Mar 11 16:53
7	8	0324T08S.D	1	Vol Std 03-24-11@100ug/kg	5ml w/5ul of IS: 03-02-11C	24 Mar 11 17:16
8	9	0324T09S.D	1	Vol Std 03-24-11@200ug/kg	5ml w/5ul of IS: 03-02-11C	24 Mar 11 17:38
9	12	0324T12T.D	1	20ug/mL BFB Std 03-23-11A	2ul	24 Mar 11 19:06
10	16	0324T16S.D	1	110324A LCS-1ST(SS)	5ml w/5ul of IS&S: 03-02-11C&D	24 Mar 11 20:34
11	18	0324T18S.D	1	110324A BLK-1ST	5ml w/5ul of IS&S: 03-02-11C&D	24 Mar 11 22:02
12	21	0324T21S.D	1	AY34316S01 5.047	5ml w/5ul of IS&S: 03-02-11C&D	24 Mar 11 23:08

Wetlab Results

ARF: 64211

APPL Inc.
908 North Temperance Avenue
Clovis, CA 93611

Parsons
8000 Centre Park Drive Ste 200
Austin, TX 78754

Attn: Tammy Chang

APPL ID: AY34316 -Client Sample ID: MW35-WC-02 -Sample Collection Date: 03/22/11 Project: 747781.04000 CSSA M

Method	Analyte	Result	PQL	Units	Prep Date	Analysis Date
CLP MOIST	MOISTURE	16.4	2.0	%	03/24/11	03/24/11

Printed: 03/24/11 1:51:11 PM

WETLAB

Sample/Sample Duplicate Results

Parsons
8000 Centre Park Drive Ste 200
Austin, TX 78754

Sample ID: AY34316
Client ID: MW35-WC-02

APPL Inc.
908 North Temperance Avenu
Clovis, CA 93611

Attn: Tammy Chang

Project: 747781.04000 CSSA MW35 DRILLING

ARF: 64211

Method	Analyte	Sample ID	Sample Result	Sample Dup Result	RPD	RPD Max	PQL	Units	Sample Extract Date	Sample Analysis Date	Sample Dup Extract Date	Sample Dup Analysis Date
CLP MOIS	MOISTURE	AY34316	16.4	16.9	3.0	20	2.0	%	03/24/11	03/24/11	03/24/11	03/24/11

Printed: 03/24/11 1:51:02 PM

RECEIVED

Rec'd 4/22/11

Laboratory Report

Parsons

CSSA

Project #: 747781.04000 CSSA

ARF: 64314

Samples collected: March 31, 2011 and April 1, 2011

APPL, Inc.

EPA METHOD 8260B
Volatile Organic Compounds

Data Validation Package
for

EPA METHOD 8260B
Volatile Organic Compounds

TABLE OF CONTENTS

LABORATORY NAME: *APPL, Inc.*

EPA METHOD 8260B
Volatile Organic Compounds
Case Narrative

Volatile Organic Compounds
EPA Method 8260B

Case Narrative

ARF: 64314

Project: 747781.04000 CSSA

California State Certification Number: CA1312 (DW & WW)

NELAP Certification number: 05233CA (HW)

Texas Certificate Number: T104704242-10-3

Results in this report apply to the sample analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Sample Receipt Information:

The sample was received April 5, 2011, at 5.0°C. The samples were assigned Analytical Request Form (ARF) number 64314. The sample numbers and requested analysis were compared to the chains of custody. The sample ID's were amended as per the client's request on April 6, 2011. No other exception was noted.

Sample Table

CLIENT ID	APPL ID	Matrix	Date Sampled	Date Received
CS-MW35LGR-259-271	AY35093	WATER	03/31/11	04/05/11
CS-MW35LGR-374-386	AY35094	WATER	04/01/11	04/05/11
CS-MW35LGR-414-426	AY35095	WATER	04/01/11	04/05/11

Sample Preparation:

The samples were purged according to EPA method 5030B. All holding times were met.

Sample Analysis Information:

The samples were analyzed according to EPA method 8260B using a Hewlett Packard Gas Chromatograph with a mass spectrometer detector. The pH of the samples was measured after analysis. The vials used for analysis had a pH of 2. All holding times were met.

Quality Control/Assurance

Spike Recovery

A Laboratory Control Spike (LCS) was used for quality assurance. A second-source standard was used for the LCS. All LCS criteria were met.

No sample was designated by the client for MS/MSD analysis.

Surrogates

Surrogate recoveries are summarized on the form 2 & 8. All surrogate recoveries met acceptance criteria.

Method blanks

No target analyte was detected above the reporting limits in the method blanks.

Calibration

Initial and continuing calibrations were analyzed according to the method. All calibration criteria were met.

Tuning:

The instrument was tuned using BFB. All method criteria were met.

Internal Standards

The internal standard area counts were compared to the mid-point of the initial calibration according to method 8260. All acceptance criteria were met.

Summary:

No analytical exception is noted. All data are acceptable.

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. These test results meet all requirements of NELAC. Release of the hard copy has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

4/28/11

Leonard Fong, Ph.D/Laboratory Director / Date

EPA METHOD 8260B

Volatile Organic Compounds

Chain of Custody and ARF

APPL - Analysis Request Form

64314

Client: **Parsons**
Address: **8000 Centre Park Drive Ste 200**
Austin, TX 78754
Attn: **Tammy Chang**
Phone: **512-719-6092** Fax: **512-719-6099**
Job: **747781.04000 CSSA**
PO #: **747780.30002**
Chain of Custody (Y/N): **Y** # **040411APPFA**
RAD Screen (Y/N): **Y** pH (Y/N): **N**
Turn Around Type: **1 WEEK**

Received by: **TBV**
Date Received: **04/05/11** Time: **09:30**
Delivered by: **FED EX**
Shuttle Custody Seals (Y/N): **Y**
Chest Temp(s): **2.5°C**
Color: **VOA**
Samples Chilled until Placed in Refrig/Freezer: **Y**
Project Manager: **Diane Anderson**
QC Report Type: **DVP3/AFCEE/ERPIMS/TX**
Due Date: **04/12/11**

Comments:

pdf ARF to Tammy & Pam; send 2 DVP3 to Tammy
Data screening project: analyze samples ONCE; report deficiencies; do NOT re-analyze.
Case Narrative. CSSA + AFCEE 3.1 QAPP. Only report MS/MSD when requested.
Use AFCEE forms with AFCEE flagging to report sample & QC data only.
APPL forms for everything else and APPL DVP3.
EDD: ERPIMS 4 Lab PC4 checked TXF to Pam.Ford@parsons.com
The -SBD-SED was added to sample IDs, per Tammy. 4-6-11 rp

4-6 Sent ARF

Sample Distribution:
VOA: 3-$826AW

Charges:

Invoice To:

8000 Centre Park Drive Ste 200
Austin, TX 78754-5140
Attn: Ellen Felfe

	Client ID	APPL ID	Sampled		Analyses Requested
1.	CS-MW35LGR-259-271	AY35093W	03/31/11	16:15	$826AW
2.	CS-MW35LGR-374-386	AY35094W	04/01/11	10:12	$826AW
3.	CS-MW35LGR-414-426	AY35095W	04/01/11	11:28	$826AW

Initials _____ Date _________

APPL Sample Receipt Form

ARF# **64314**

Sample	Container Type	Count	pH	Sample	Container Type	Count	pH
AY35093	13 VOAs - HCL	3	NA				
AY35094	13 VOAs - HCL	3	NA				
AY35095	13 VOAs - HCL	3	NA				

64314
25

Camp Stanley Storage Activity Chain Of Custody

COC ID:	040411APPFA	Relinquish_Date:	4/4/2011	Cooler ID:	A
Project Location:	CSSA	Relinquished_By:	JDB	LabCode:	APPF
Job Number:	747781.04000	Relinquish_Time:	5:00 PM	Carrier:	FedEx
Creation Date:	4/4/2011	Collection Team:	JDB	Airbill Carrier:	873526387641
Task Manager	Scott Pearson	Sample Data Type	Screening	TAT:	7 Day TAT

Sampler(s):

LOCID: **CS-MW35LGR** LOGDATE: **3/31/2011** MATRIX: **WG** TBLOT:
SED: **259** LOGTIME: **16:15** SACODE: **N** SMCODE: **G** ABLOT:
SED: **271** FLDSAMPID **CS-MW35LGR_033111_N1615** EBLOT: Containers: 3
Remarks:

Analysis Required:

SW8260B	VOC Full List

LOCID: **CS-MW35LGR** LOGDATE: **4/1/2011** MATRIX: **WG** TBLOT:
SBD: **374** LOGTIME: **10:12** SACODE. **N** SMCODE: **G** ABLOT:
SED: **386** FLDSAMPID **CS-MW35LGR_040111_N1012** EBLOT: Containers: 3
Remarks:

Analysis Required:

SW8260B	VOC Full List

LOCID: **CS-MW35LGR** LOGDATE: **4/1/2011** MATRIX: **WG** TBLOT:
SBD: **414** LOGTIME: **11:28** SACODE: **N** SMCODE: **G** ABLOT:
SED: **426** FLDSAMPID **CS-MW35LGR_040111_N1128** EBLOT: Containers: 3
Remarks:

Analysis Required:

SW8260B	VOC Full List

Relinquished by:__________Date 4.4.11 Time 1700 Relinquished by:__________Date______Time____ Relinquished by:__________Date______Time____
Recieved by:__________Date 4/5/11 Time 0930 Recieved by:__________Date______Time____ Recieved by:__________Date______Time____

Page 1 of 1

COOLER RECEIPT FORM

1) Project: 747781.04000 CSSA Date Received: 4/5/11

2) Coolers: Number of Coolers: 1

3) [✓ YES] NO Were coolers and samples screened for radioactivity?

4) [✓ YES] NO Were custody seals on outside of cooler? How many? 1 Date on seal? 4/4/11

5) Name on seal? See label below

6) [✓ YES] NO NA Were custody seals unbroken and intact at the time of arrival?

7) [✓ YES] NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

8) Shipping slip numbers:1) 873526387642) 3)

9) [✓ YES] NO NA Was the shipping slip scanned into the database?

10) YES NO [✓ NA] If cooler belongs to APPL, has it been logged into the ice chest database?

11) Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): Bubble wrapped wet ice

12) YES NO [✓ NA] For hand delivered samples was sufficient ice present to start the cooling process?

13) [✓ YES] NO Was a temperature blank included in the cooler?

14) Serial number of certified NIST thermometer used: A39267 Correction factor: 0

15) Cooler temp(s): 1) 2.5C 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

16) [✓ YES] NO Was a chain of custody received?

17) [✓ YES] NO Were the custody papers signed in the appropriate places?

18) [✓ YES] NO Was the project identifiable from custody papers?

19) [✓ YES] NO Did the chain of custody include date and time of sampling?

20) [✓ YES] NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

21) [✓ YES] NO Were container labels in good condition?

22) [✓ YES] NO Was the client ID on the label?

23) [✓ YES] NO Was the date of sampling on the label?

24) [✓ YES] NO Was the time of sampling on the label?

25) [✓ YES] NO Did all container labels agree with custody papers?

Sample Containers:

26) [✓ YES] NO Were all containers sealed in separate bags?

27) [✓ YES] NO Did all containers arrive unbroken?

28) YES [✓ NO] Was there any leakage from samples?

29) YES [✓ NO] Were any of the lids cracked or broken?

30) [✓ YES] NO Were correct containers used for the tests indicated?

31) [✓ YES] NO Was a sufficient amount of sample sent for tests indicated?

32) [✓ YES] NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: ta) 4/6/4

Smaller than a pea: Ay 35095 W01-W05 W03

Preservation & Hold time:

33) [✓ YES] NO NA Was a sufficient amount of holding time remaining to analyze the samples?

34) YES NO [✓ NA] Do the sample containers contain the same preservative as what is stated on the COC?

35) YES NO [✓ NA] Was the pH taken of all non-VOA preserved samples and written on the sample container?

36) YES NO [✓ NA] Was the pH of acid preserved non-VOA samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies: 3 identical IDs.

CUSTODY SEAL
APPL, Inc.
(559) 275-2175
Date 4.4.11
Initials

Signature of personnel receiving samples: Second reviewer:

Signature of project manager notified: Renee Date and Time of notification: 4-6-11

Name of client notified: Tammy via email Date and Time of notification: 4-6-11

Information given to client: per TC add -SBD-SED to ID. 4-6-11 np

by whom (Initials):

EPA METHOD 8260B
Volatile Organic Compounds
QC Summary

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: C110328

AAB #: 110405AC-154155
Contract #: 2010*1286022*000
Method Blank ID: 110405AC-BLK

Analyte	**Method Blank**	**RL**	**Q**
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64314, Sample: AY35093

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: C110328

AAB #: 110405AC-154155
Contract #: 2010*1286022*000
Method Blank ID: 110405AC-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	115	69-139	
SURROGATE: 4-BROMOFLUOROBE	106	75-125	
SURROGATE: DIBROMOFLUOROME	109	75-125	
SURROGATE: TOLUENE-D8 (S)	96.8	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64314, Sample: AY35093

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64314
Matrix: WATER

SDG No: 64314
Date Analyzed: 4/5/11
Instrument: Chico

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110405AC-LCS	Lab Control Spike	109	111
110405AC-BLK	Blank	115	106
AY35093	CS-MW35LGR-259-271	104	106
AY35094	CS-MW35LGR-374-386	106	108
AY35095	CS-MW35LGR-414-426	112	104

Comments: Batch: #826AW-110405AC

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64314
Matrix: WATER

SDG No: 64314
Date Analyzed: 4/5/11
Instrument: Chico

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110405AC-LCS	Lab Control Spike	107	101
110405AC-BLK	Blank	109	96.8
AY35093	CS-MW35LGR-259-271	104	98.4
AY35094	CS-MW35LGR-374-386	104	103
AY35095	CS-MW35LGR-414-426	111	96.3

Comments: Batch: #826AW-110405AC

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110405AC LCS
Concentration Units: ug/L

AAB #: 110405AC-154155
Contract #: 2010*1286022*000
Initial Calibration ID: C110328

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	10.56	106	72-125	
1,1,1-TCA	10.00	11.46	115	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	10.09	101	74-125	
1,1,2-TCA	10.00	10.63	106	75-127	
1,1-DCA	10.00	10.83	108	75-125	
1,1-DCE	10.00	10.31	103	75-125	
1,1-DICHLOROPROPENE	10.00	10.52	105	75-125	
1,2,3-TRICHLOROBENZENE	10.00	10.86	109	75-137	
1,2,3-TRICHLOROPROPANE	10.00	11.30	113	75-125	
1,2,4-TRICHLOROBENZENE	10.00	10.51	105	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	9.98	99.8	75-125	
1,2-DCA	10.00	11.12	111	68-127	
1,2-DCB	10.00	10.27	103	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	10.90	109	59-125	
1,2-DICHLOROPROPANE	10.00	10.46	105	70-125	
1,2-EDB	10.00	9.78	97.8	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	9.67	96.7	72-125	
1,3-DCB	10.00	10.26	103	75-125	
1,3-DICHLOROPROPANE	10.00	10.54	105	75-125	
1,4-DCB	10.00	10.47	105	75-125	
1-CHLOROHEXANE	10.00	10.55	106	75-125	
2,2-DICHLOROPROPANE	10.00	11.56	116	75-125	
2-CHLOROTOLUENE	10.00	10.48	105	73-125	
4-CHLOROTOLUENE	10.00	10.35	104	74-125	
BENZENE	10.00	9.53	95.3	75-125	
BROMOBENZENE	10.00	9.89	98.9	75-125	
BROMOCHLOROMETHANE	10.00	10.09	101	73-125	
BROMODICHLOROMETHANE	10.00	10.72	107	75-125	
BROMOFORM	10.00	9.83	98.3	75-125	
BROMOMETHANE	10.00	8.57	85.7	72-125	
CARBON TETRACHLORIDE	10.00	11.28	113	62-125	
CHLOROBENZENE	10.00	10.33	103	75-125	
CHLOROETHANE	10.00	9.66	96.6	65-125	
CHLOROFORM	10.00	10.84	108	74-125	
CHLOROMETHANE	10.00	7.97	79.7	75-125	
CIS-1,2-DCE	10.00	10.55	106	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	11.58	116	74-125	
DIBROMOCHLOROMETHANE	10.00	10.80	108	73-125	
DIBROMOMETHANE	10.00	10.75	108	69-127	
DICHLORODIFLUOROMETHANE	10.00	8.98	89.8	72-125	

Comments: ARF: 64314, QC Sample ID: AY35093

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110405AC LCS

Concentration Units: ug/L

AAB #: 110405AC-154155

Contract #: 2010*1286022*000

Initial Calibration ID: C110328

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	9.95	99.5	75-125	
HEXACHLOROBUTADIENE	10.00	10.87	109	75-125	
ISOPROPYLBENZENE	10.00	10.54	105	75-125	
M&P-XYLENE	20.00	19.19	96.0	75-125	
METHYLENE CHLORIDE	10.00	10.46	105	75-125	
N-BUTYLBENZENE	10.00	10.47	105	75-125	
N-PROPYLBENZENE	10.00	10.19	102	75-125	
NAPHTHALENE	10.00	11.34	113	75-125	
O-XYLENE	10.00	10.24	102	75-125	
P-ISOPROPYLTOLUENE	10.00	10.48	105	75-125	
SEC-BUTYLBENZENE	10.00	10.50	105	75-125	
STYRENE	10.00	10.28	103	75-125	
TCE	10.00	10.84	108	71-125	
TERT-BUTYLBENZENE	10.00	10.22	102	75-125	
TETRACHLOROETHENE	10.00	10.21	102	71-125	
TOLUENE	10.00	9.93	99.3	74-125	
TRANS-1,2-DCE	10.00	10.47	105	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	10.75	108	66-125	
TRICHLOROFLUOROMETHANE	10.00	11.04	110	67-125	
VINYL CHLORIDE	10.00	8.18	81.8	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	110	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	112	75-125	
SURROGATE: DIBROMOFLUOROMETH	107	75-125	
SURROGATE: TOLUENE-D8 (S)	100	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64314, QC Sample ID: AY35093

EPA 8260B

Form 4

Blank Summary

Lab Name: APPL, Inc.
Case No: 64314
Matrix: WATER
Blank ID: 110405AC-BLK
SDG No: 64314
Date Analyzed: 4/5/11
Instrument: Chico
Time Analyzed: 1350

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110405AC-LCS	Lab Control Spike	0405C01	4/5/11 1017
110405AC-BLK	Blank	0405C05	4/5/11 1350
AY35093	CS-MW35LGR-259-271	0405C09	4/5/11 1728
AY35094	CS-MW35LGR-374-386	0405C10	4/5/11 1803
AY35095	CS-MW35LGR-414-426	0405C11	4/5/11 1839

Comments: Batch: #826AW-110405AC

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 64314
Matrix: Water
ID: 20ug/ml BFB STD 03-11-11A

SDG No: 64314
Date Analyzed: 4/5/11
Instrument: Chico
Time Analyzed: 9:12

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1	Lab Control Spike	110405A LCS-1WC	0405C01W.D	4/5/11 10:17
2	Blank	110405A BLK-1WC	0405C05W.D	4/5/11 13:50
3	CS-MW35LGR-259-271	AY35093W01	0405C09W.D	4/5/11 17:28
4	CS-MW35LGR-374-386	AY35094W01	0405C10W.D	4/5/11 18:03
5	CS-MW35LGR-414-426	AY35095W01	0405C11W.D	4/5/11 18:39
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	14.9 - 40% of mass 95	22.2
75	30 - 60% of mass 95	47.3
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	6.3
173	0 - 2% of mass 174	0.0
174	50 - 100% of mass 95	86.2
175	5 - 9% of mass 174	7.3
176	95 - 101% of mass 174	100.4
177	5 - 9% of mass 176	6.6

8A
INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.
Contract: Review

Lab Code:
SDG No.: 64314

Lab File ID (Standard): 0328C09W.D
Date Analyzed: 03/28/11

Instrument ID: Chico
Time Analyzed: 22:33

GC Column:
ID:
Heated Purge: (Y/N)

		Fluorobenzene (IS)		Chlorobenzene-D5 (IS)		1,4-Dichlorobenzene-D (IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	629440	12.88	436288	18.07	230848	22.27
	UPPER LIMIT	1258880	13.38	872576	18.57	461696	22.77
	LOWER LIMIT	314720	12.38	218144	17.57	115424	21.77
	SAMPLE NO.						
01	110405A LCS-1WC	551616	12.91	391680	18.09	212352	22.29
02	110405A BLK-1WC	547968	12.91	396800	18.11	207168	22.30
03	AY35093W01	555520	12.92	387200	18.12	202944	22.30
04	AY35094W01	563072	12.92	385088	18.12	215296	22.30
05	AY35095W01	550144	12.92	411776	18.11	218624	22.31
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

EPA METHOD 8260B
Volatile Organic Compounds
Sample Data

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110405AC-154155

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: CS-MW35LGR-259-271 Lab Sample ID: AY35093 Matrix: Water

% Solids: NA Initial Calibration ID: C110328

Date Received: 05-Apr-11 Date Prepared: 05-Apr-11 Date Analyzed: 05-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.06	1		U
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments:

ARF: 64314

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110405AC-154155
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: CS-MW35LGR-259-271 Lab Sample ID: AY35093 Matrix: Water
% Solids: NA Initial Calibration ID: C110328
Date Received: 05-Apr-11 Date Prepared: 05-Apr-11 Date Analyzed: 05-Apr-11
Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.07	1		U
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	0.05	1		U
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	0.30	1		F
TOLUENE	0.06	1.1	5.38	1		
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	104	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	106	75-125	
SURROGATE: DIBROMOFLUOROMETH	104	75-125	
SURROGATE: TOLUENE-D8 (S)	98.4	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64314

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110405AC-154155

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: CS-MW35LGR-374-386 Lab Sample ID: AY35094 Matrix: Water

% Solids: NA Initial Calibration ID: C110328

Date Received: 05-Apr-11 Date Prepared: 05-Apr-11 Date Analyzed: 05-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.06	1		U
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments:

ARF: 64314

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110405AC-154155
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: CS-MW35LGR-374-386 Lab Sample ID: AY35094 Matrix: Water
% Solids: NA Initial Calibration ID: C110328
Date Received: 05-Apr-11 Date Prepared: 05-Apr-11 Date Analyzed: 05-Apr-11
Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.07	1		U
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	0.05	1		U
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	2.84	1		
TOLUENE	0.06	1.1	0.58	1		F
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	106	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	108	75-125	
SURROGATE: DIBROMOFLUOROMETH	104	75-125	
SURROGATE: TOLUENE-D8 (S)	103	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64314

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110405AC-154155

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: CS-MW35LGR-414-426 Lab Sample ID: AY35095 Matrix: Water

% Solids: NA Initial Calibration ID: C110328

Date Received: 05-Apr-11 Date Prepared: 05-Apr-11 Date Analyzed: 05-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.06	1		U
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments:

ARF: 64314

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110405AC-154155
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: CS-MW35LGR-414-426 Lab Sample ID: AY35095 Matrix: Water
% Solids: NA Initial Calibration ID: C110328
Date Received: 05-Apr-11 Date Prepared: 05-Apr-11 Date Analyzed: 05-Apr-11
Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.07	1		U
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	0.05	1		U
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	2.66	1		
TOLUENE	0.06	1.1	0.30	1		F
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	112	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	104	75-125	
SURROGATE: DIBROMOFLUOROMETH	111	75-125	
SURROGATE: TOLUENE-D8 (S)	96.3	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64314

EPA METHOD 8260B
Volatile Organic Compounds
Calibration Data

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64314
Initial Cal. Date: 3/28/11
Instrument: Chico

Initials:

			0328C04W.D	0328C05W.D	0328C06W.D	0328C07W.D	0328C08W.D	0328C09W.D	0328C10W.D	0328C11W.D	0328C12W.D					
		Compound	0.3	0.5	1	2	5	10	20	100	200		Avg	%RSD		
1	I	Fluorobenzene (IS)	ISTD													
2	TM	Dichlorodifluoromethane	0.8604	0.7165	0.9762	0.9593	0.7942	0.9376	0.9084	0.8869	0.8187		0.87	9.7	TM	
3	TM**	Chloromethane	0.4095	0.3997	0.4033	0.3513	0.3579	0.3494	0.3533	0.3429	0.3442		0.37	7.5	TM**	
4	TM*	Vinyl chloride		0.8120	0.7609	0.7833	0.7801	0.8077	0.6619				0.77	7.2	TM*	
5	TML	Bromomethane		0.1193	0.1225	0.1350	0.1728	0.1717	0.1879	0.1884	0.1820		0.16	18	TML	1.000
6	TM	Chloroethane	0.1731	0.1716	0.1710	0.1582	0.1752	0.1589	0.1538	0.1495	0.1444		0.16	7.0	TM	
7	TM	Trichlorofluoromethane	1.276	1.208	1.356	1.411	1.327	1.376	1.274	1.194	1.119		1.3	7.4	TM	
8	TM*	1,1-DCE	0.5559	0.6571	0.6775	0.6762	0.6859	0.7006	0.6632	0.6130	0.5976		0.65	7.4	TM*	
9	TML	Methylene chloride		0.8063	0.5963	0.5275	0.4388	0.4142	0.3922	0.3608	0.3605		0.49	31	TML	1.00
10	TM	Trans-1,2-DCE	0.4944	0.4141	0.4785	0.4370	0.4969	0.4737	0.4618	0.4249	0.4338		0.46	6.7	TM	
11	TM**	1,1-DCA	0.9985	1.070	1.029	1.043	1.101	1.092	0.9922	0.9189	0.8982		1.0	7.0	TM**	
12	TM	Cis-1,2-DCE	0.7487	0.6467	0.6423	0.6250	0.6710	0.6597	0.6334	0.5788	0.5756		0.64	8.0	TM	
13	TM	2,2-Dichloropropane	0.2931	0.2692	0.2842	0.2904	0.2792	0.2520	0.2387	0.2201			0.27	9.9	TM	
14	TM*	Chloroform	1.342	1.244	1.201	1.143	1.227	1.203	1.131	1.048	0.9933		1.2	9.0	TM*	
15	TM	Bromochloromethane	0.2064	0.2055	0.1907	0.1898	0.1943	0.2016	0.1921	0.1916	0.1837		0.20	4.0	TM	
16	S	Dibromofluoromethane(S)	0.6990	0.7182	0.6848	0.6962	0.7478	0.7168	0.6942	0.6815	0.6540		0.70	3.8	S	
17	TM	1,1,1-TCA	1.022	1.065	1.064	1.113	1.103	1.109	1.054	0.9805	0.9240		1.0	6.0	TM	
18	TM	1,1-Dichloropropene	0.6701	0.6803	0.6946	0.7077	0.7188	0.7003	0.6669	0.6356	0.6308		0.68	4.5	TM	
19	S	1,2-DCA-D4(S)	0.5730	0.5749	0.5582	0.5751	0.6073	0.5509	0.5361	0.5296	0.4809		0.55	6.5	S	
20	TM	Carbon Tetrachloride	0.9005	0.8626	0.9628	0.9099	0.9385	0.9237	0.8745	0.8415	0.7813		0.89	6.2	TM	
21	TM	1,2-DCA	0.6100	0.5575	0.5618	0.5553	0.5936	0.5568	0.5288	0.4981	0.4570		0.55	8.5	TM	
22	TM	Benzene	2.611	2.255	2.016	1.972	2.139	2.027	1.907	1.845	1.853		2.1	12	TM	
23	TM	TCE	0.6938	0.5669	0.6259	0.6195	0.6901	0.6707	0.6354	0.5938	0.5657		0.63	7.7	TM	
24	TM*	1,2-Dichloropropane	0.5278	0.5657	0.5318	0.5176	0.5502	0.5183	0.5036	0.4827	0.4620		0.52	6.2	TM*	
25	TM	Bromodichloromethane	0.3058	0.3006	0.2685	0.2706	0.2645	0.2632	0.2603	0.2407	0.2272		0.27	9.4	TM	
26	TM	Dibromomethane	0.2256	0.2172	0.2411	0.2292	0.2518	0.2523	0.2334	0.2282	0.2184		0.23	5.6	TM	
27	TM	Cis-1,3-Dichloropropene	0.6053	0.5809	0.7398	0.7245	0.7954	0.7525	0.7300	0.7173	0.6939		0.70	9.8	TM	
28	TM*	Toluene	2.559	2.476	2.380	2.429	2.539	2.479	2.317	2.187	2.167		2.4	6.0	TM*	
29	TM	Trans-1,3-Dichloropropene	0.6512	0.5706	0.4964	0.5860	0.6161	0.5772	0.5516	0.5586	0.5300		0.57	8.0	TM	
30	TM	1,1,2-TCA	0.2386	0.2409	0.2055	0.2774	0.2783	0.2723	0.2542	0.2489	0.2390		0.25	9.3	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD													
32	S	Toluene-D8(S)	3.749	3.485	3.701	3.533	3.735	3.529	3.479	3.424	3.250		3.5	4.6	S	
33	TM	1,2-EDB		0.4121	0.5054	0.3726	0.4698	0.4459	0.4574	0.4346	0.4144		0.44	9.2	TM	
34	TM	Tetrachloroethene	0.8454	0.7508	0.7752	0.8088	0.8556	0.8159	0.8120	0.7592	0.7317		0.79	5.4	TM	
35	TM	1-Chlorohexane	1.355	1.419	1.350	1.416	1.420	1.399	1.402	1.374	1.341		1.4	2.3	TM	

VOLATILE ORGANIC ANALYSIS BY EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64314
Initial Cal. Date: 3/28/11
Instrument: Chico

Initials:

		Compound	0.3	0.5	1	2	5	10	20	100	200		Avg	%RSD		
36	TM	1,1,1,2-Tetrachloroethane	0.8545	0.9206	0.8770	0.8163	0.9562	0.9175	0.9204	0.8683	0.8178		0.88	5.5	TM	
37	TM	m&p-Xylene	2.142	1.870	1.802	1.655	1.794	1.692	1.690	1.604	1.233		1.7	14	TM	
38	TM	o-Xylene	1.655	1.550	1.537	1.617	1.679	1.639	1.663	1.588	1.497		1.6	4.0	TM	
39	TM	Styrene	2.349	2.425	2.363	2.458	2.719	2.618	2.583	2.430	2.281		2.5	5.8	TM	
40	S	4-Bromofluorobenzene(S)	1.475	1.254	1.189	1.155	1.221	1.194	1.190	1.195	1.110		1.2	8.5	S	
41	TM	1,3-Dichloropropane	0.8018	0.7003	0.7466	0.8238	0.8094	0.7803	0.8029	0.7556	0.7164		0.77	5.6	TM	
42	TM	Dibromochloromethane	0.7430	0.6416	0.6470	0.6468	0.7255	0.6691	0.7047	0.6757	0.6394		0.68	5.7	TM	
43	TM**	Chlorobenzene	2.413	2.243	2.251	2.408	2.552	2.430	2.419	2.281	2.190		2.4	5.0	TM**	
44	TM*	Ethylbenzene	5.333	4.549	4.710	4.454	4.617	4.537	4.494	4.166	3.960		4.5	8.4	TM*	
45	TM**	Bromoform	0.1478	0.1289	0.1334	0.1098	0.1299	0.1438	0.1465	0.1444	0.1317		0.14	9.0	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD													
47	TM	Isopropylbenzene	7.913	8.371	8.690	8.416	9.679	9.063	8.809	7.925	7.793		8.5	7.2	TM	
48	TM**	1,1,2,2-Tetrachloroethane	0.9473	0.7408	0.8240	0.7510	0.8763	0.7984	0.7637	0.7437	0.7561		0.80	8.9	TM**	
49	TM	1,2,3-Trichloropropane		0.1023	0.0692	0.0864	0.0714	0.0926	0.0785	0.0779	0.0790		0.08	13	TM	
50	TM	Bromobenzene	2.036	1.723	2.071	1.890	2.121	1.837	1.809	1.703			1.9	8.4	TM	
51	TM	n-Propylbenzene	10.5	9.740	10.7	9.873	11.2	10.5	10.3	9.269	10.6		10	5.7	TM	
52	TM	2-Chlorotoluene	7.034	7.092	7.313	6.807	7.466	6.894	6.760	6.058	5.675		6.8	8.5	TM	
53	TM	1,3,5-Trimethylbenzene	7.511	7.417	7.459	6.927	7.742	7.235	7.042	6.356	6.281		7.1	7.2	TM	
54		4-Chlortoluene	5.348	5.777	5.878	5.671	6.290	6.079	5.690	5.210	5.197		5.7	6.7		
31	TM	Tert-Butylbenzene	7.272	6.899	7.423	6.843	7.803	7.456	7.361	6.679	6.575		7.1	5.8	TM	
56	TM	1,2,4-Trimethylbenzene	8.828	7.849	7.573	6.974	7.760	7.339	7.030	6.435	6.320		7.3	11	TM	
57	TM	Sec-Butylbenzene	9.003	9.456	9.129	9.210	10.3	9.791	9.688	8.899	8.478		9.3	5.9	TM	
58	TM	p-Isopropyltoluene	7.785	7.489	7.547	7.141	8.275	8.067	7.793	7.237	7.046		7.6	5.5	TM	
59	TM	1,3-DCB	3.879	3.938	3.728	3.792	4.205	4.034	3.904	3.597	3.482		3.8	5.7	TM	
60	TM	1,4-DCB	3.517	3.556	3.443	3.362	3.907	3.674	3.632	3.425	3.318		3.5	5.2	TM	
61	TM	n-Butylbenzene	7.158	7.015	7.393	6.791	7.426	7.200	6.972	6.342	6.210		6.9	6.2	TM	
62	TM	1,2-DCB	2.849	3.085	2.932	3.063	3.363	3.278	3.136	2.919	2.847		3.1	6.0	TM	
63	TM	1,2-Dibromo-3-chloropropane		0.0933	0.1020	0.1117	0.1221	0.1287	0.1306	0.1366	0.1345		0.12	13	TM	
64	TM	1,2,4-Trichlorobenzene	2.599	2.823	2.719	2.336	2.818	2.558	2.561	2.367	2.273		2.6	8.0	TM	
65	TM	Hexachlorobutadiene	0.6468	0.5107	0.5557	0.4835	0.4986	0.4879	0.4719	0.4357	0.4074		0.50	14	TM	
66	TM	Naphthalene	0.9341	1.109	0.9895	0.9491	1.090	1.077	1.057	1.086	1.047		1.0	6.2	TM	
67	TM	1,2,3-Trichlorobenzene	2.207	2.237	1.697	1.868	2.081	1.972	2.025	1.889	1.801		2.0	9.2	TM	
68																
69																
70																

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64314
Date Analyzed: 3/29/11
Instrument: Chico
Initial Cal. Date: 3/28/11
Data File: 0328C15W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.8731	0.9233	5.7	TM	
3	TM**	Chloromethane	0.3679	0.3643	1.00	TM**	
4	TM*	Vinyl chloride	0.7676	0.7677	0.01	TM*	
5	TML	Bromomethane	0.1599	0.1662	3.9	TML	9.2
6	TM	Chloroethane	0.1617	0.1653	2.2	TM	
7	TM	Trichlorofluoromethane	1.283	1.301	1.4	TM	
8	TM*	1,1-DCE	0.6474	0.6594	1.8	TM*	
9	TML	Methylene chloride	0.4871	0.4225	13	TML	7.1
10	TM	Trans-1,2-DCE	0.4572	0.4857	6.2	TM	
11	TM**	1,1-DCA	1.016	1.063	4.6	TM**	
12	TM	Cis-1,2-DCE	0.6424	0.6657	3.6	TM	
13	TM	2,2-Dichloropropane	0.2659	0.2326	13	TM	
14	TM*	Chloroform	1.170	1.179	0.75	TM*	
15	TM	Bromochloromethane	0.1951	0.1919	1.6	TM	
16	S	Dibromofluoromethane(S)	0.6992	0.6911	1.2	S	
17	TM	1,1,1-TCA	1.048	1.060	1.1	TM	
18	TM	1,1-Dichloropropene	0.6783	0.6894	1.6	TM	
19	S	1,2-DCA-D4(S)	0.5540	0.5171	6.7	S	
20	TM	Carbon Tetrachloride	0.8884	0.8594	3.3	TM	
21	TM	1,2-DCA	0.5465	0.5416	0.90	TM	
22	TM	Benzene	2.070	2.055	0.72	TM	
23	TM	TCE	0.6291	0.6720	6.8	TM	
24	TM*	1,2-Dichloropropane	0.5178	0.5186	0.17	TM*	
25	TM	Bromodichloromethane	0.2668	0.2463	7.7	TM	
26	TM	Dibromomethane	0.2330	0.2296	1.5	TM	
27	TM	Cis-1,3-Dichloropropene	0.7044	0.7211	2.4	TM	
28	TM*	Toluene	2.393	2.393	0.01	TM*	
29	TM	Trans-1,3-Dichloropropene	0.5709	0.5409	5.2	TM	
30	TM	1,1,2-TCA	0.2506	0.2446	2.4	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	S	Toluene-D8(S)	3.543	3.524	0.55	S	
33	TM	1,2-EDB	0.4390	0.4490	2.3	TM	
34	TM	Tetrachloroethene	0.7949	0.8449	6.3	TM	
35	TM	1-Chlorohexane	1.386	1.425	2.8	TM	
36	TM	1,1,1,2-Tetrachloroethane	0.8832	0.9157	3.7	TM	
37	TM	m&p-Xylene	1.720	1.726	0.31	TM	
38	TM	o-Xylene	1.603	1.678	4.7	TM	
39	TM	Styrene	2.470	2.571	4.1	TM	
40	S	4-Bromofluorobenzene(S)	1.220	1.229	0.70	S	
		Average			3.3		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: 0

SDG No: 64314
Date Analyzed: 3/29/11
Instrument: Chico
Cal. Date: 3/28/11
Data File: 0328C15W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	1,3-Dichloropropane	0.7708	0.7842	1.7	TM	
42	TM	Dibromochloromethane	0.6770	0.6757	0.19	TM	
43	TM**	Chlorobenzene	2.354	2.434	3.4	TM**	
44	TM*	Ethylbenzene	4.536	4.513	0.51	TM*	
45	TM**	Bromoform	0.1351	0.1278	5.4	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
47	TM	Isopropylbenzene	8.518	8.998	5.6	TM	
48	TM**	1,1,2,2-Tetrachloroethane	0.8001	0.7473	6.6	TM**	
49	TM	1,2,3-Trichloropropane	0.0822	0.0839	2.1	TM	
50	TM	Bromobenzene	1.899	1.878	1.1	TM	
51	TM	n-Propylbenzene	10.3	10.6	2.5	TM	
52	TM	2-Chlorotoluene	6.789	7.027	3.5	TM	
53	TM	1,3,5-Trimethylbenzene	7.108	7.330	3.1	TM	
54		4-Chlortoluene	5.682	6.002	5.6		
55	TM	Tert-Butylbenzene	7.146	7.542	5.5	TM	
56	TM	1,2,4-Trimethylbenzene	7.345	7.269	1.0	TM	
57	TM	Sec-Butylbenzene	9.331	9.836	5.4	TM	
58	TM	p-Isopropyltoluene	7.598	7.996	5.2	TM	
59	TM	1,3-DCB	3.840	3.995	4.0	TM	
60	TM	1,4-DCB	3.537	3.792	7.2	TM	
61	TM	n-Butylbenzene	6.945	7.100	2.2	TM	
62	TM	1,2-DCB	3.053	3.243	6.2	TM	
63	TM	1,2-Dibromo-3-chloropropane	0.1199	0.1160	3.3	TM	
64	TM	1,2,4-Trichlorobenzene	2.562	2.562	0.01	TM	
65	TM	Hexachlorobutadiene	0.4998	0.4818	3.6	TM	
66	TM	Naphthalene	1.038	1.045	0.72	TM	
67	TM	1,2,3-Trichlorobenzene	1.975	2.009	1.7	TM	
68							
69							
70							
71							
72							
73							
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75							
76							
77							
78							
79							
80							
		Average			3.4		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64314
Date Analyzed: 5 Apr 11 10:17
Instrument: Chico
Initial Cal. Date: 3/28/11
Data File: 0405C01W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.8731	0.7842	10	TM	
3	TM**	Chloromethane	0.3679	0.2932	20	TM**	
4	TM*	Vinyl chloride	0.7676	0.6278	18	TM*	
5	TML	Bromomethane	0.1599	0.1569	1.9	TML	14
6	TM	Chloroethane	0.1617	0.1562	3.4	TM	
7	TM	Trichlorofluoromethane	1.283	1.416	10	TM	
8	TM*	1,1-DCE	0.6474	0.6672	3.1	TM*	
9	TML	Methylene chloride	0.4871	0.4136	15	TML	4.6
10	TM	Trans-1,2-DCE	0.4572	0.4786	4.7	TM	
11	TM**	1,1-DCA	1.016	1.100	8.3	TM**	
12	TM	Cis-1,2-DCE	0.6424	0.6777	5.5	TM	
13	TM	2,2-Dichloropropane	0.2659	0.3075	16	TM	
14	TM*	Chloroform	1.170	1.268	8.4	TM*	
15	TM	Bromochloromethane	0.1951	0.1969	0.92	TM	
16	S	Dibromofluoromethane(S)	0.6992	0.7509	7.4	S	
17	TM	1,1,1-TCA	1.048	1.201	15	TM	
18	TM	1,1-Dichloropropene	0.6783	0.7133	5.2	TM	
19	S	1,2-DCA-D4(S)	0.5540	0.6070	9.6	S	
20	TM	Carbon Tetrachloride	0.8884	1.002	13	TM	
21	TM	1,2-DCA	0.5465	0.6078	11	TM	
22	TM	Benzene	2.070	1.972	4.7	TM	
23	TM	TCE	0.6291	0.6818	8.4	TM	
24	TM*	1,2-Dichloropropane	0.5178	0.5418	4.6	TM*	
25	TM	Bromodichloromethane	0.2668	0.2861	7.2	TM	
26	TM	Dibromomethane	0.2330	0.2506	7.5	TM	
27	TM	Cis-1,3-Dichloropropene	0.7044	0.8159	16	TM	
28	TM*	Toluene	2.393	2.375	0.72	TM*	
29	TM	Trans-1,3-Dichloropropene	0.5709	0.6136	7.5	TM	
30	TM	1,1,2-TCA	0.2506	0.2664	6.3	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	S	Toluene-D8(S)	3.543	3.557	0.39	S	
33	TM	1,2-EDB	0.4390	0.4294	2.2	TM	
34	TM	Tetrachloroethene	0.7949	0.8119	2.1	TM	
35	TM	1-Chlorohexane	1.386	1.462	5.5	TM	
36	TM	1,1,1,2-Tetrachloroethane	0.8832	0.9325	5.6	TM	
37	TM	m&p-Xylene	1.720	1.651	4.0	TM	
38	TM	o-Xylene	1.603	1.642	2.4	TM	
39	TM	Styrene	2.470	2.537	2.8	TM	
40	S	4-Bromofluorobenzene(S)	1.220	1.358	11	S	
		Average			7.5		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: 0

SDG No: 64314
Date Analyzed: 5 Apr 11 10:17
Instrument: Chico
Cal. Date: 3/28/11
Data File: 0405C01W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	1,3-Dichloropropane	0.7708	0.8128	5.4	TM	
42	TM	Dibromochloromethane	0.6770	0.7314	8.0	TM	
43	TM**	Chlorobenzene	2.354	2.433	3.3	TM**	
44	TM*	Ethylbenzene	4.536	4.515	0.46	TM*	
45	TM**	Bromoform	0.1351	0.1329	1.7	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
47	TM	Isopropylbenzene	8.518	8.980	5.4	TM	
48	TM**	1,1,2,2-Tetrachloroethane	0.8001	0.8070	0.86	TM**	
49	TM	1,2,3-Trichloropropane	0.0822	0.0929	13	TM	
50	TM	Bromobenzene	1.899	1.878	1.1	TM	
51	TM	n-Propylbenzene	10.3	10.5	1.9	TM	
52	TM	2-Chlorotoluene	6.789	7.113	4.8	TM	
53	TM	1,3,5-Trimethylbenzene	7.108	6.876	3.3	TM	
54		4-Chlortoluene	5.682	5.880	3.5		
55	TM	Tert-Butylbenzene	7.146	7.300	2.2	TM	
56	TM	1,2,4-Trimethylbenzene	7.345	7.330	0.21	TM	
57	TM	Sec-Butylbenzene	9.331	9.802	5.0	TM	
58	TM	p-Isopropyltoluene	7.598	7.966	4.8	TM	
59	TM	1,3-DCB	3.840	3.939	2.6	TM	
60	TM	1,4-DCB	3.537	3.702	4.7	TM	
61	TM	n-Butylbenzene	6.945	7.270	4.7	TM	
62	TM	1,2-DCB	3.053	3.134	2.7	TM	
63	TM	1,2-Dibromo-3-chloropropane	0.1199	0.1307	9.0	TM	
64	TM	1,2,4-Trichlorobenzene	2.562	2.691	5.1	TM	
65	TM	Hexachlorobutadiene	0.4998	0.5432	8.7	TM	
66	TM	Naphthalene	1.038	1.177	13	TM	
67	TM	1,2,3-Trichlorobenzene	1.975	2.145	8.6	TM	
68							
69							
70							
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72							
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75							
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77							
78							
79							
80							
		Average			4.8		

EPA METHOD 8260B
Volatile Organic Compounds
Raw Data

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

Concentration Units: ug/L

Initial Calibration ID: C110328

AAB #: 110405AC-154155

Contract #: 2010*1286022*000

Method Blank ID: 110405AC-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64314, Sample: AY35093

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

Concentration Units: ug/L

Initial Calibration ID: C110328

AAB #: 110405AC-154155

Contract #: 2010*1286022*000

Method Blank ID: 110405AC-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	115	69-139	
SURROGATE: 4-BROMOFLUOROBE	106	75-125	
SURROGATE: DIBROMOFLUOROME	109	75-125	
SURROGATE: TOLUENE-D8 (S)	96.8	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64314, Sample: AY35093

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110405AC LCS

Concentration Units: ug/L

AAB #: 110405AC-154155

Contract #: 2010*1286022*000

Initial Calibration ID: C110328

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	10.56	106	72-125	
1,1,1-TCA	10.00	11.46	115	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	10.09	101	74-125	
1,1,2-TCA	10.00	10.63	106	75-127	
1,1-DCA	10.00	10.83	108	75-125	
1,1-DCE	10.00	10.31	103	75-125	
1,1-DICHLOROPROPENE	10.00	10.52	105	75-125	
1,2,3-TRICHLOROBENZENE	10.00	10.86	109	75-137	
1,2,3-TRICHLOROPROPANE	10.00	11.30	113	75-125	
1,2,4-TRICHLOROBENZENE	10.00	10.51	105	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	9.98	99.8	75-125	
1,2-DCA	10.00	11.12	111	68-127	
1,2-DCB	10.00	10.27	103	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	10.90	109	59-125	
1,2-DICHLOROPROPANE	10.00	10.46	105	70-125	
1,2-EDB	10.00	9.78	97.8	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	9.67	96.7	72-125	
1,3-DCB	10.00	10.26	103	75-125	
1,3-DICHLOROPROPANE	10.00	10.54	105	75-125	
1,4-DCB	10.00	10.47	105	75-125	
1-CHLOROHEXANE	10.00	10.55	106	75-125	
2,2-DICHLOROPROPANE	10.00	11.56	116	75-125	
2-CHLOROTOLUENE	10.00	10.48	105	73-125	
4-CHLOROTOLUENE	10.00	10.35	104	74-125	
BENZENE	10.00	9.53	95.3	75-125	
BROMOBENZENE	10.00	9.89	98.9	75-125	
BROMOCHLOROMETHANE	10.00	10.09	101	73-125	
BROMODICHLOROMETHANE	10.00	10.72	107	75-125	
BROMOFORM	10.00	9.83	98.3	75-125	
BROMOMETHANE	10.00	8.57	85.7	72-125	
CARBON TETRACHLORIDE	10.00	11.28	113	62-125	
CHLOROBENZENE	10.00	10.33	103	75-125	
CHLOROETHANE	10.00	9.66	96.6	65-125	
CHLOROFORM	10.00	10.84	108	74-125	
CHLOROMETHANE	10.00	7.97	79.7	75-125	
CIS-1,2-DCE	10.00	10.55	106	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	11.58	116	74-125	
DIBROMOCHLOROMETHANE	10.00	10.80	108	73-125	
DIBROMOMETHANE	10.00	10.75	108	69-127	
DICHLORODIFLUOROMETHANE	10.00	8.98	89.8	72-125	

Comments: ARF: 64314, QC Sample ID: AY35093

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110405AC LCS

Concentration Units: ug/L

AAB #: 110405AC-154155

Contract #: 2010*1286022*000

Initial Calibration ID: C110328

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	9.95	99.5	75-125	
HEXACHLOROBUTADIENE	10.00	10.87	109	75-125	
ISOPROPYLBENZENE	10.00	10.54	105	75-125	
M&P-XYLENE	20.00	19.19	96.0	75-125	
METHYLENE CHLORIDE	10.00	10.46	105	75-125	
N-BUTYLBENZENE	10.00	10.47	105	75-125	
N-PROPYLBENZENE	10.00	10.19	102	75-125	
NAPHTHALENE	10.00	11.34	113	75-125	
O-XYLENE	10.00	10.24	102	75-125	
P-ISOPROPYLTOLUENE	10.00	10.48	105	75-125	
SEC-BUTYLBENZENE	10.00	10.50	105	75-125	
STYRENE	10.00	10.28	103	75-125	
TCE	10.00	10.84	108	71-125	
TERT-BUTYLBENZENE	10.00	10.22	102	75-125	
TETRACHLOROETHENE	10.00	10.21	102	71-125	
TOLUENE	10.00	9.93	99.3	74-125	
TRANS-1,2-DCE	10.00	10.47	105	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	10.75	108	66-125	
TRICHLOROFLUOROMETHANE	10.00	11.04	110	67-125	
VINYL CHLORIDE	10.00	8.18	81.8	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	110	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	112	75-125	
SURROGATE: DIBROMOFLUOROMETH	107	75-125	
SURROGATE: TOLUENE-D8 (S)	100	75-125	

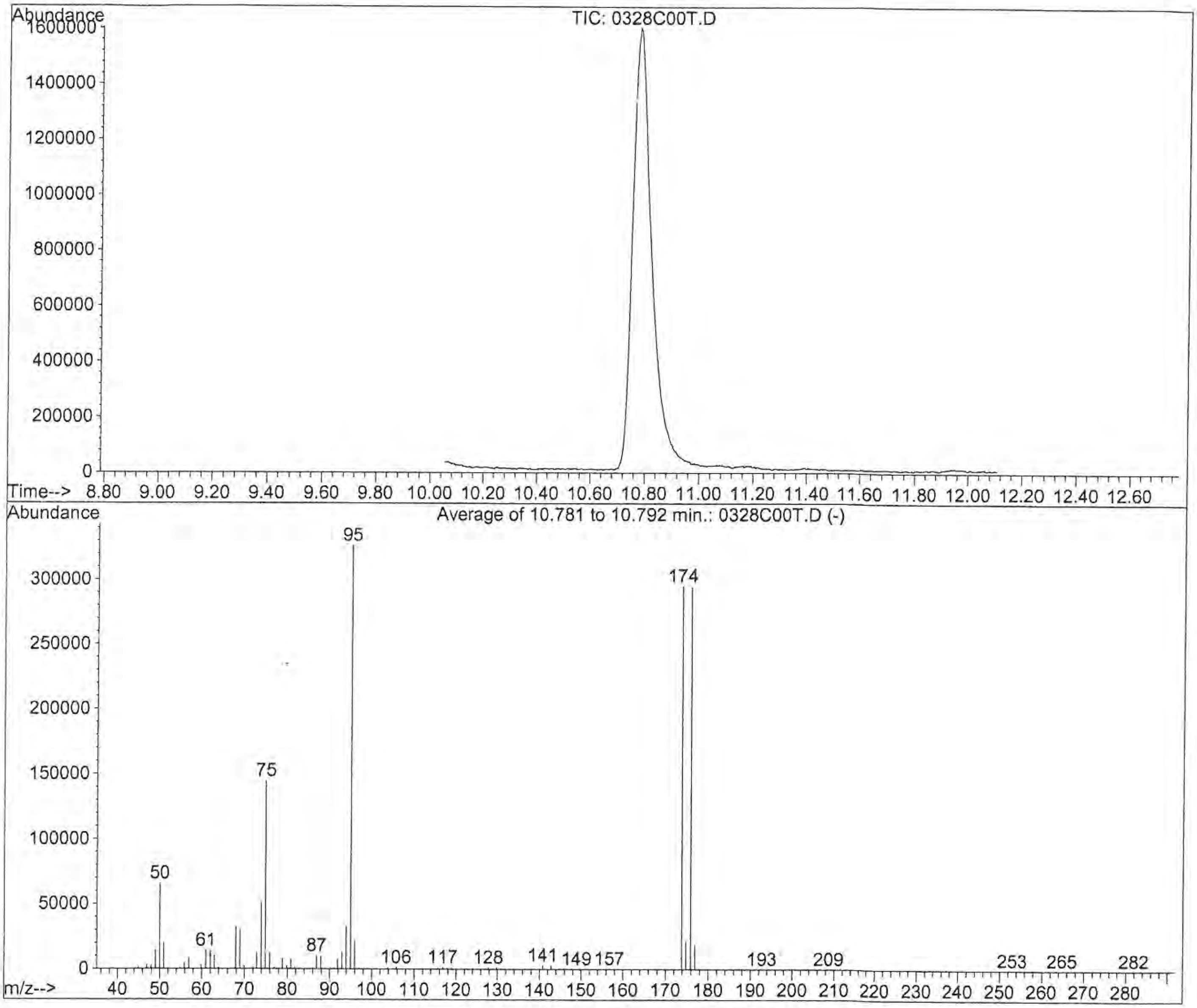
Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64314, QC Sample ID: AY35093

BFB

```
Data File : M:\CHICO\DATA\C110328\0328C00T.D           Vial: 1
Acq On    : 28 Mar 11  17:34                        Operator: RS
Sample    : 20ug/ml BFB STD 03-11-11A               Inst    : Chico
Misc      : 2uL                                     Multiplr: 1.00

Method   : M:\CHICO\DATA\C110328\C826AW.M (RTE Integrator)
Title    : METHOD 8260B
```



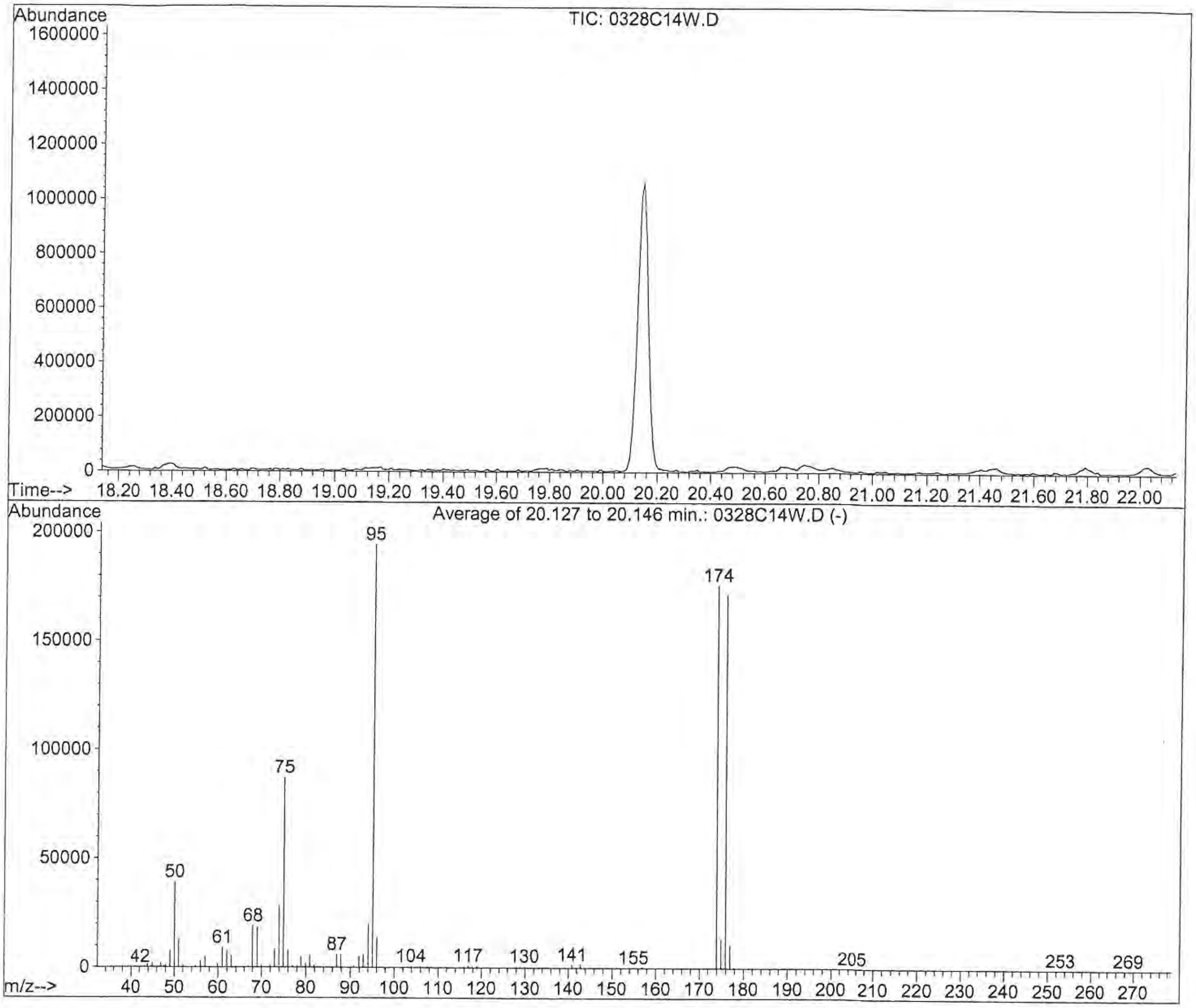
```
Spectrum Information: Average of 10.781 to 10.792 min.

| Target | Rel. to | Lower  | Upper  |  Rel.  |    Raw    |   Result    |
|  Mass  |  Mass   | Limit% | Limit% |  Abn%  |    Abn    |  Pass/Fail  |
-------------------------------------------------------------------------
|   50   |    95   |    15  |    40  |  20.2  |    65913  |    PASS     |
|   75   |    95   |    30  |    60  |  44.4  |   144811  |    PASS     |
|   95   |    95   |   100  |   100  | 100.0  |   326343  |    PASS     |
|   96   |    95   |     5  |     9  |   6.6  |    21487  |    PASS     |
|  173   |   174   |  0.00  |     2  |   0.0  |        0  |    PASS     |
|  174   |    95   |    50  |   100  |  90.5  |   295424  |    PASS     |
|  175   |   174   |     5  |     9  |   7.3  |    21533  |    PASS     |
|  176   |   174   |    95  |   101  |  99.6  |   294101  |    PASS     |
|  177   |   176   |     5  |     9  |   6.4  |    18944  |    PASS     |
-------------------------------------------------------------------------
```

BFB

```
Data File : M:\CHICO\DATA\C110328\0328C14W.D          Vial: 1
Acq On    : 29 Mar 11   2:38                       Operator: RS
Sample    : 20ug/ml BFB STD 03-11-11A              Inst    : Chico
Misc      : 2uL                                    Multiplr: 1.00

Method   : M:\CHICO\DATA\C110328\C826AW.M (RTE Integrator)
Title    : METHOD 8260B
```



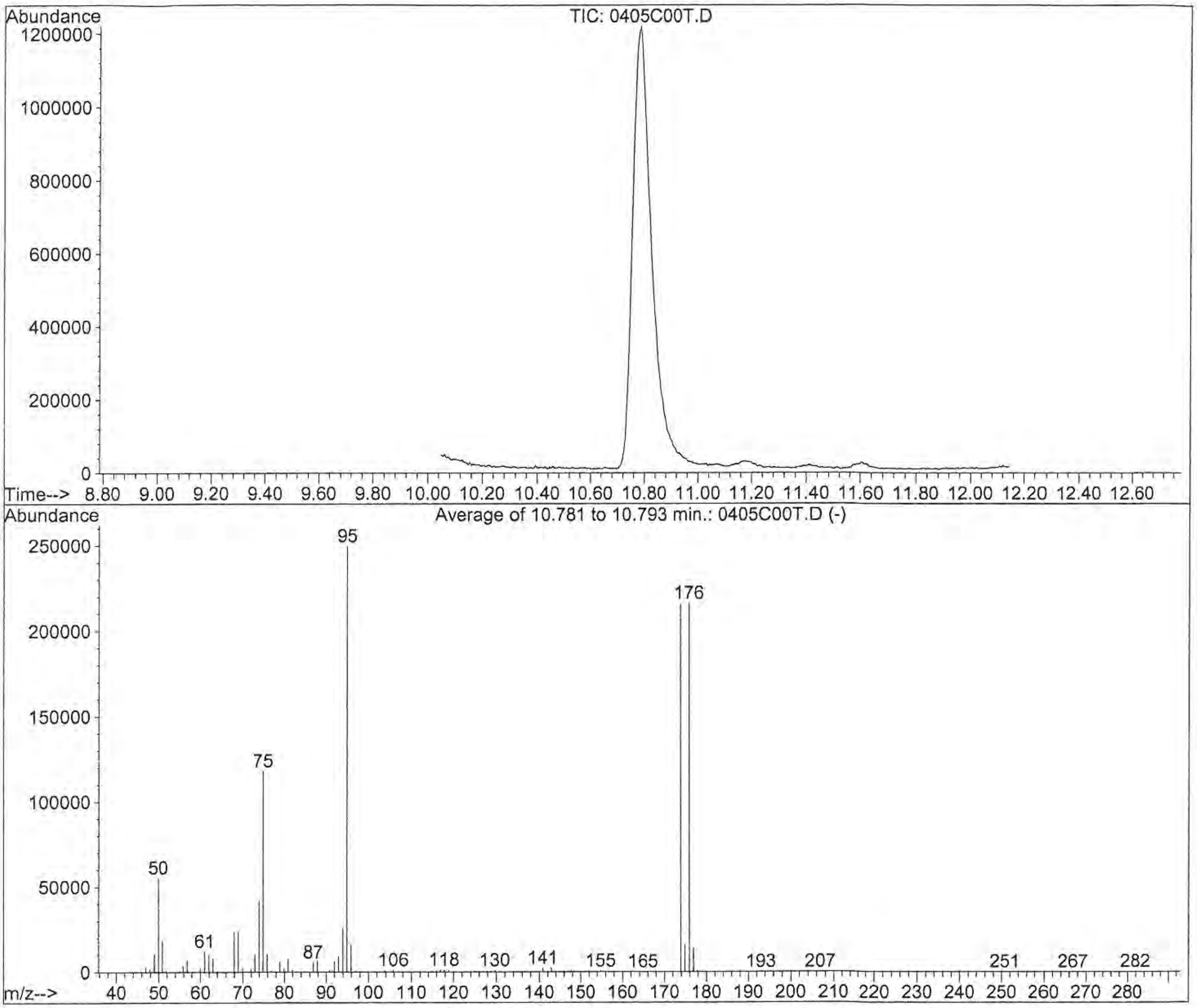
Spectrum Information: Average of 20.127 to 20.146 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	20.2	39205	PASS
75	95	30	60	44.9	87256	PASS
95	95	100	100	100.0	194432	PASS
96	95	5	9	7.0	13707	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	100	90.6	176096	PASS
175	174	5	9	7.5	13239	PASS
176	174	95	101	97.6	171821	PASS
177	176	5	9	6.2	10646	PASS

BFB

```
Data File : M:\CHICO\DATA\C110328\0405C00T.D            Vial: 1
Acq On    :  5 Apr 11   9:12                       Operator: RS
Sample    : 20ug/ml BFB STD 03-11-11A              Inst    : Chico
Misc      : 2uL                                    Multiplr: 1.00

Method    : M:\CHICO\DATA\C110328\C826AW.M (RTE Integrator)
Title     : METHOD 8260B
```



```
Spectrum Information: Average of 10.781 to 10.793 min.

| Target |  Rel. to  |  Lower  |  Upper  |   Rel.   |     Raw     |   Result   |
|  Mass  |   Mass    | Limit%  | Limit%  |   Abn%   |     Abn     | Pass/Fail  |
-------------------------------------------------------------------------------
|   50   |     95    |    15   |    40   |   22.2   |     55312   |    PASS    |
|   75   |     95    |    30   |    60   |   47.3   |    118000   |    PASS    |
|   95   |     95    |   100   |   100   |  100.0   |    249600   |    PASS    |
|   96   |     95    |     5   |     9   |    6.3   |     15771   |    PASS    |
|  173   |    174    |  0.00   |     2   |    0.0   |         0   |    PASS    |
|  174   |     95    |    50   |   100   |   86.2   |    215275   |    PASS    |
|  175   |    174    |     5   |     9   |    7.3   |     15679   |    PASS    |
|  176   |    174    |    95   |   101   |  100.4   |    216064   |    PASS    |
|  177   |    176    |     5   |     9   |    6.6   |     14168   |    PASS    |
-------------------------------------------------------------------------------
```

Injection Log

Directory: M:\CHICO\DATA\C110328\

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0328C00T.D	1	20ug/ml BFB STD 03-11-11A	2uL	28 Mar 11 17:34
2	1	0328C04W.D	1	Vol Std 03-28-11@0.3ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 19:37
3	1	0328C05W.D	1	Vol Std 03-28-11@0.5ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 20:13
4	1	0328C06W.D	1	Vol Std 03-28-11@1.0ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 20:48
5	1	0328C07W.D	1	Vol Std 03-28-11@2.0ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 21:23
6	1	0328C08W.D	1	Vol Std 03-28-11@5.0ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 21:58
7	1	0328C09W.D	1	Vol Std 03-28-11@10ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 22:33
8	1	0328C10W.D	1	Vol Std 03-28-11@20ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 23:08
9	1	0328C11W.D	1	Vol Std 03-28-11@100ug/L	Water 10ml w/IS: 03-18-11C	28 Mar 11 23:43
10	1	0328C12W.D	1	Vol Std 03-28-11@200ug/L	Water 10ml w/IS: 03-18-11C	29 Mar 11 00:18
11	1	0328C14W.D	1	20ug/ml BFB STD 03-11-11A	2uL	29 Mar 11 2:38
12	1	0328C15W.D	1	110328A LCS-1WC (SS)	Water 10ml w/IS&S: 03-18-11C&D	29 Mar 11 3:13
13	1	0405C00T.D	1	20ug/ml BFB STD 03-11-11A	2uL	5 Apr 11 9:12
14	1	0405C01W.D	1	110405A LCS-1WC	Water 10ml w/IS&S: 03-18-11C&D	5 Apr 11 10:17
15	1	0405C05W.D	1	110405A BLK-1WC	Water 10ml w/IS&S: 03-18-11C&D	5 Apr 11 13:50
16	1	0405C09W.D	1	AY35093W01	Water 10ml w/IS&S: 03-18-11C&D	5 Apr 11 17:28
17	1	0405C10W.D	1	AY35094W01	Water 10ml w/IS&S: 03-18-11C&D	5 Apr 11 18:03
18	1	0405C11W.D	1	AY35095W01	Water 10ml w/IS&S: 03-18-11C&D	5 Apr 11 18:39

5/9/11

Laboratory Report

Parsons

CSSA

Project #: 747781.04000 CSSA

ARF: 64352

[illegible] ✓

Samples collected: April 6, 2011

APPL, Inc.

Summary Data Package
for

Project #: 747781.04000

ARF 64352

TABLE OF CONTENTS

LABORATORY NAME: *APPL, Inc.*

CASE NARRATIVE

908 North Temperance Ave. ∇ Clovis, CA 93611 ∇ Phone 559-275-2175 ∇ Fax 559-275-4422

Volatile Organic Compounds
EPA Method 8260B
Case Narrative

ARF: 64352

Project: 747781.04000 CSSA

California State Certification Number: CA1312 (DW & WW)

NELAP Certification number: 05233CA (HW)

Texas Certificate Number: T104704242-10-3

Results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Sample Receipt Information:

The samples were received April 8, 2011, at 3.0°C. The samples were assigned Analytical Request Form (ARF) number 64352. The sample numbers and requested analysis were compared to the chain of custody. The sample IDs were revised, as instructed. No other exception was noted.

Sample Table

CLIENT ID	APPL ID	Matrix	Date Sampled	Date Received
TB-1	AY35295	WATER	04/06/11	04/08/11
ACC65-SIW-01(0-0.6)	AY35296	WATER	04/06/11	04/08/11
ACC65-SIW-01(0-0.6) FD	AY35297	WATER	04/06/11	04/08/11
ACC65-SIW-01(0.6-0.8)	AY35298	WATER	04/06/11	04/08/11
ACC65-SIW-01(8-8.5)	AY35299	WATER	04/06/11	04/08/11
ACC65-SIW-01(23.5-24)	AY35300	WATER	04/06/11	04/08/11

Percent moisture was determined using CLP 4.0.

Sample Preparation:

The water sample was purged according to EPA method 5030B and the soil samples were purged according to EPA method 5035. All holding times were met.

Sample Analysis Information:

The samples were analyzed according to EPA method 8260B using a Hewlett Packard Gas Chromatograph with a mass spectrometer detector. All holding times were met.

Quality Control/Assurance

Spike Recovery

Laboratory Control Spikes (LCS) were used for quality assurance. A second-source standard was used for the LCSs. All recoveries were acceptable.

Sample ACC65-SIW-01(0.6-0.8) was designated by the client for MS/MSD analysis. Forty-nine analytes recovered outside the control limits; they were flagged with a "M" in the parent sample in accordance with CSSA and AFCEE 3.1 QAPP.

Surrogates

All surrogate recoveries met acceptance criteria.

Method blanks

No target compound was detected above the reporting limit in the method blanks.

Calibration

Initial and continuing calibrations were analyzed according to the method. All acceptance criteria were met.

Tuning:

The instrument was tuned using BFB. All method criteria were met.

Internal Standards

The internal standard area counts were compared to the mid-point of the initial calibration according to method 8260. All acceptance criteria were met.

Summary:

No other analytical exception is noted. All data are acceptable.

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. These test results meet all requirements of NELAC. Release of the hard copy has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

5/6/11

Leonard Fong, Ph.D./Laboratory Director / Date

CHAIN OF CUSTODY
AND ARF

APPL - Analysis Request Form 64352

Client: **Parsons**
Address: **8000 Centre Park Drive Ste 200**
Austin, TX 78754
Attn: **Tammy Chang**
Phone: **512-719-6092** Fax: **512-719-6099**
Job: **747781.04000 CSSA**
PO #: **747780.30002**
Chain of Custody (Y/N): **Y** # **040711APPFB**
RAD Screen (Y/N): **Y** pH (Y/N): **N**
Turn Around Type: **STD**

Received by: **TBV**
Date Received: **04/08/11** Time: **10:10**
Delivered by: **FED EX**
Shuttle Custody Seals (Y/N): **Y**
Chest Temp(s): **3.0°C**
Color: **VOA**
Samples Chilled until Placed in Refrig/Freezer: **Y**
Project Manager: **Diane Anderson**
QC Report Type: **DVP4/AFCEE/ERPIMS/TX**
Due Date: **04/29/11**

Comments:

pdf ARF to Tammy & Pam; send 1 DVP4 & 2 DVP3 to Tammy
21-day TAT for final package
New contract: definitive data needs DVP 4; needs AFCEE forms and package.
Case Narrative. CSSA + AFCEE 3.1 QAPP; Only report MS/MSD when requested.
EDD: ERPIMS 4 Lab PC4 checked TXF to Pam.Ford@parsons.com
See attached email for revised sample IDs
Soil/rock samples may require special preparation. Consult Leonard or Diane.

Sample Distribution:
VOA: 1-$826AW, 5-$826AF
Wetlab: 5-MOIST 4-15

Charges:

Invoice To:
8000 Centre Park Drive Ste 200
Austin, TX 78754-5140
Attn: Ellen Felfe

Client ID	APPL ID	Sampled	Analyses Requested
1. TB-1	AY35295W	04/06/11 08:00	$826AW
2. ACC65-SIW-01(0-0.6)	AY35296S	04/06/11 11:00	$826AF, MOIST
3. ACC65-SIW-01(0-0.6) FD	AY35297S	04/06/11 11:00	$826AF, MOIST
4. ACC65-SIW-01(0.6-0.8)	AY35298S MS/MSD	04/06/11 11:45	$826AF, MOIST
5. ACC65-SIW-01(8-8.5)	AY35299S	04/06/11 13:54	$826AF, MOIST
6. ACC65-SIW-01(23.5-24)	AY35300S	04/06/11 15:25	$826AF, MOIST

Initials _____ Date _________

APPL Sample Receipt Form

ARF# **64352**

Sample	Container Type	Count	pH
AY35295	13 VOAs - HCL	2	NA
AY35296	20 4oz Jar	1	NA
AY35297	20 4oz Jar	1	NA
AY35298	20 4oz Jar	2	NA
AY35299	21 8oz Jar	1	NA
AY35300	21 8oz Jar	1	NA

Sample	Container Type	Count	pH

Printed 04/08/11 2:55:19 PM

Receiving

From: "Renee Patterson" <rpatterson@applinc.com>
To: <receiving@applinc.com>
Cc: "'Chue Moua'" <cmoua@applinc.com>
Sent: Friday, April 08, 2011 12:26 PM
Subject: FW: CSSA Log In Followup

From: Ford, Pamela [mailto:Pamela.Ford@parsons.com]
Sent: Thursday, April 07, 2011 12:54 PM
To: Renee Patterson; Diane Anderson
Cc: Pearson, William Scott; Chang, Tammy; Jeremy Hale; rwise
Subject: CSSA Log In Followup

Hi Renee

Follow up to today's phone calls:

For CSSA samples collected at the same LOCID but at different depths, please log in the samples as LOCID(begdepth-enddepth).

For example:

LOCID	Depth	Field Sample ID	Log In As:
SB-01	0-10	SB-01_040811_N1400	SB-01(0-10)
SB-01	10-15	SB-01_040811_N1415	SB-01(10-15)
SB-01	15-20	SB-01_040811_N1430	SB-01(15-20)

This will apply to the soil boring samples and also to monitoring well samples collected at different depths.

Jeremy - This will not affect EDDS. Continue to report the Field Sample IDs in the EDDs just as you have been doing. The SBD and SED are not carried in the Lab Format file. However, as long as the sample collection date/times are unique, then our field sample IDs will be unique for different depths, and we should be OK in the EDD.

Thanks for your assistance,
Pam

64352
3.0

Camp Stanley Storage Activity Chain Of Custody

COC ID: **040711APPFB**
Project Location: **CSSA**
Job Number: **747781.04000**
Creation Date: **4/7/2011**
Task Manager **Scott Pearson**

Relinquish_Date: **4/7/2011**
Relinquished_By: **JDB**
Relinquish_Time: **5:00 PM**
Collection Team: **JB-AL**
Sample Data Type See comments

Cooler ID: **B**
LabCode: **APPF**
Carrier: **FedEx**
Airbill Carrier: **873526388199**
TAT: See comments

Sampler(s): Julie Bunch Adrien Lindley
J.B. ALindley

LOCID: **TB-1** LOGDATE: **4/6/2011** MATRIX: **WQ** TBLOT:
SBD: **0** LOGTIME: **8:00** SACODE: **TB** SMCODE: **NA** ABLOT:
SED: **0** FLDSAMPID **TB-1_040611_TB0800** EBLOT: Containers: **2**
Remarks:
Analysis Required: SW8260B VOC Full List
Standard TAT
definitive data

LOCID: **AOC65-SIW-01** LOGDATE: **4/6/2011** MATRIX: **SD** TBLOT: **06040001**
SBD: **0** LOGTIME: **11:00** SACODE: **N** SMCODE: **G** ABLOT:
SED: **0.6** FLDSAMPID **AOC65-SIW-01_040611_N1100** EBLOT: Containers: **1**
Remarks:
Analysis Required: SW8260B VOC Full List
Standard TAT
definitive data

LOCID: **AOC65-SIW-01** LOGDATE: **4/6/2011** MATRIX: **SD** TBLOT: **06041101**
SBD: **0** LOGTIME: **11:00** SACODE: **FD** SMCODE: **G** ABLOT:
SED: **0.6** FLDSAMPID **AOC65-SIW-01_040611_FD1100** EBLOT: Containers: **1**
Remarks:
Analysis Required: SW8260B VOC Full List
Standard TAT
definitive data

LOCID: **AOC65-SIW-01** LOGDATE: **4/6/2011** MATRIX: **SD** TBLOT: **06041101**
SBD: **0.6** LOGTIME: **11:45** SACODE: **SD** SMCODE: **G** ABLOT:
SED: **0.8** FLDSAMPID **AOC65-SIW-01_040611_SD1145** EBLOT: Containers: **1**
Remarks:
Analysis Required: SW8260B VOC Full List
Standard TAT
definitive data

LOCID: **AOC65-SIW-01** LOGDATE: **4/6/2011** MATRIX: **SD** TBLOT: **06040001**
SBD: **0.6** LOGTIME: **11:45** SACODE: **N** SMCODE: **G** ABLOT:
SED: **0.8** FLDSAMPID **AOC65-SIW-01_040611_N1145** EBLOT: Containers: **1**
Remarks:
Analysis Required: SW8260B VOC Full List
Standard TAT
definitive data

LOCID: **AOC65-SIW-01** LOGDATE: **4/6/2011** MATRIX: **SD** TBLOT: **06041101**
SBD: **0.6** LOGTIME: **11:45** SACODE: **MS** SMCODE: **G** ABLOT:
SED: **0.8** FLDSAMPID **AOC65-SIW-01_040611_MS1145** EBLOT: Containers: **1**
Remarks:
Analysis Required: SW8260B VOC Full List
Standard TAT
definitive data

LOCID: **AOC65-SIW-01** LOGDATE: **4/6/2011** MATRIX: **SD** TBLOT: **06040001**
SBD: **8** LOGTIME: **13:54** SACODE: **N** SMCODE: **G** ABLOT:
SED: **8.5** FLDSAMPID **AOC65-SIW-01_040611_N1354** EBLOT: Containers: **1**
Remarks:
Analysis Required: SW8260B VOC Full List
Standard TAT
definitive data

LOCID: **AOC65-SIW-01** LOGDATE: **4/6/2011** MATRIX: **SD** TBLOT: **06040001**
SBD: **23.5** LOGTIME: **15:25** SACODE: **N** SMCODE: **G** ABLOT:
SED: **24** FLDSAMPID **AOC65-SIW-01_040611_N1525** EBLOT: Containers: **1**
Remarks:
Analysis Required: SW8260B VOC Full List
standard TAT
definitive data

Relinquished by: J.B. Date 4-7-11 Time 1900 Relinquished by:____ Date____ Time____ Relinquished by:____ Date____ Time____
Recieved by:____ Date 4/8/11 Time 1010 Recieved by:____ Date____ Time____ Recieved by:____ Date____ Time____

LO 4/08/11

COOLER RECEIPT FORM

1) Project: ~~747780.30002~~ 747781.04000 CSSA Date Received: 4/08/11

2) Coolers: Number of Coolers: 1

3) [✓ YES] NO Were coolers and samples screened for radioactivity?

4) [✓ YES] NO Were custody seals on outside of cooler? How many? 1 Date on seal? 4/7/11

5) Name on seal? AL

6) [✓ YES] NO NA Were custody seals unbroken and intact at the time of arrival?

7) [✓ YES] NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

8) Shipping slip numbers:1) 8735 2638 8203 2)____ 3)____

9) [✓ YES] NO NA Was the shipping slip scanned into the database?

10) YES NO [✓ NA] If cooler belongs to APPL, has it been logged into the ice chest database?

11) Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): Bubble wrap, wet ice, ziploc bags

12) YES NO [✓ NA] For hand delivered samples was sufficient ice present to start the cooling process?

13) [✓ YES] NO Was a temperature blank included in the cooler?

14) Serial number of certified NIST thermometer used: A34267 Correction factor: 0

15) Cooler temp(s): 1) 3.0°C 2)____ 3)____ 4)____ 5)____ 6)____ 7)____ 8)____

Chain of custody:

16) [✓ YES] NO Was a chain of custody received?

17) [✓ YES] NO Were the custody papers signed in the appropriate places?

18) [✓ YES] NO Was the project identifiable from custody papers?

19) [✓ YES] NO Did the chain of custody include date and time of sampling?

20) [✓ YES] NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

21) [✓ YES] NO Were container labels in good condition?

22) [✓ YES] NO Was the client ID on the label?

23) [✓ YES] NO Was the date of sampling on the label?

24) [✓ YES] NO Was the time of sampling on the label?

25) [✓ YES] NO Did all container labels agree with custody papers?

Sample Containers:

26) [✓ YES] NO Were all containers sealed in separate bags?

27) [✓ YES] NO Did all containers arrive unbroken?

28) YES [✓ NO] Was there any leakage from samples?

29) YES [✓ NO] Were any of the lids cracked or broken?

30) [✓ YES] NO Were correct containers used for the tests indicated?

31) [✓ YES] NO Was a sufficient amount of sample sent for tests indicated?

32) [✓ YES] NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubble

Larger than a pea:

Smaller than a pea: AY35295 W01-W02

Preservation & Hold time:

33) [✓ YES] NO NA Was a sufficient amount of holding time remaining to analyze the samples?

34) YES NO [✓ NA] Do the sample containers contain the same preservative as what is stated on the COC?

35) YES NO [✓ NA] Was the pH taken of all non-VOA preserved samples and written on the sample container?

36) YES NO [✓ NA] Was the pH of acid preserved non-VOA samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

CUSTODY SEAL
APPL, Inc. (559) 275-2175
Initials AL Date 4-7-11

EPA METHOD 8260B
Volatile Organic Compounds
AFCEE Forms

APPL, INC.

AFCEE
ORGANIC ANALYSES DATA PACKAGE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Base/Command: CSSA

AAB #: 110413AC-154245
Contract #: 2010*1286022*000
Prime Contractor: Parsons

Field Sample ID	Lab Sample ID
TB-1	AY35295

Comments: ARF: 64352

I certify this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: for DA Name: Diane Anderson

Date: 5/6/11 Title: Project Manager

AFCEE FORM O-1

AFCEE
ORGANIC ANALYSES DATA PACKAGE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Base/Command: CSSA

AAB #: 110411AN-154242
Contract #: 2010*1286022*000
Prime Contractor: Parsons

Field Sample ID	Lab Sample ID
ACC65-SIW-01(0-0.6)	AY35296
ACC65-SIW-01(0-0.6) FD	AY35297
ACC65-SIW-01(0.6-0.8)	AY35298
ACC65-SIW-01(8-8.5)	AY35299
ACC65-SIW-01(23.5-24)	AY35300

Comments: ARF: 64352

I certify this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Name: Diane Anderson
Date: 5/6/11 Title: Project Manager

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AC-154245

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: TB-1 Lab Sample ID: AY35295 Matrix: Water

% Solids: NA Initial Calibration ID: C110412

Date Received: 08-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.06	1		U
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments:

ARF: 64352

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AC-154245

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: TB-1 Lab Sample ID: AY35295 Matrix: Water

% Solids: NA Initial Calibration ID: C110412

Date Received: 08-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.07	1		U
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	0.05	1		U
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	0.06	1		U
TOLUENE	0.06	1.1	0.06	1		U
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	111	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	86.3	75-125	
SURROGATE: DIBROMOFLUOROMETH	104	75-125	
SURROGATE: TOLUENE-D8 (S)	93.9	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64352

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110411AN-154242

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: ACC65-SIW-01(0-0.6) Lab Sample ID: AY35296 Matrix: Soil

% Solids: 79.6 Initial Calibration ID: N110407B

Date Received: 08-Apr-11 Date Prepared: 11-Apr-11 Date Analyzed: 11-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		U
1,1,1-TCA	0.0009	0.004	0.0009	1		U
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		U
1,1,2-TCA	0.0009	0.005	0.0009	1		U
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		U
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		U
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		U
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		U
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		U
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		U
1,3-DCB	0.0011	0.006	0.0011	1		U
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,4-DCB	0.0008	0.002	0.0008	1		U
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		U
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		U
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		U
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		U
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		U
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		U
BROMOFORM	0.0011	0.006	0.0011	1		U
BROMOMETHANE	0.0007	0.005	0.0007	1		U
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		U
CHLOROBENZENE	0.0007	0.002	0.0007	1		U
CHLOROETHANE	0.0015	0.005	0.0015	1		U
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		U

Comments:

ARF: 64352

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B   Preparatory Method: 5035   AAB #: 110411AN-154242
Lab Name: APPL, Inc   Contract #: 2010*1286022*000
Field Sample ID: ACC65-SIW-01(0-0.6)   Lab Sample ID: AY35296   Matrix: Soil
% Solids: 79.6   Initial Calibration ID: N110407B
Date Received: 08-Apr-11   Date Prepared: 11-Apr-11   Date Analyzed: 11-Apr-11
Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		U
DIBROMOMETHANE	0.001	0.010	0.001	1		U
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		U
ETHYLBENZENE	0.0010	0.003	0.0010	1		U
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		U
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		U
M&P-XYLENE	0.0018	0.007	0.0018	1		U
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		U
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		U
NAPHTHALENE	0.0010	0.020	0.0010	1		U
O-XYLENE	0.0007	0.005	0.0007	1		U
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		U
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		U
STYRENE	0.0009	0.002	0.0009	1		U
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		U
TETRACHLOROETHENE	0.0008	0.007	0.0151	1		
TOLUENE	0.0010	0.005	0.0021	1		F
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		U
VINYL CHLORIDE	0.0013	0.009	0.0013	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	118	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	91.1	65-135	
SURROGATE: DIBROMOFLUOROMETH	116	65-135	
SURROGATE: TOLUENE-D8 (S)	104	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64352

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B   Preparatory Method: 5035   AAB #: 110411AN-154242

Lab Name: APPL, Inc   Contract #: 2010*1286022*000

Field Sample ID: ACC65-SIW-01(0-0.6) FD   Lab Sample ID: AY35297   Matrix: Soil

% Solids: 75.4   Initial Calibration ID: N110407B

Date Received: 08-Apr-11   Date Prepared: 11-Apr-11   Date Analyzed: 11-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		U
1,1,1-TCA	0.0009	0.004	0.0009	1		U
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		U
1,1,2-TCA	0.0009	0.005	0.0009	1		U
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		U
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		U
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		U
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		U
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		U
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		U
1,3-DCB	0.0011	0.006	0.0011	1		U
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,4-DCB	0.0008	0.002	0.0008	1		U
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		U
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		U
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		U
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		U
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		U
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		U
BROMOFORM	0.0011	0.006	0.0011	1		U
BROMOMETHANE	0.0007	0.005	0.0007	1		U
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		U
CHLOROBENZENE	0.0007	0.002	0.0007	1		U
CHLOROETHANE	0.0015	0.005	0.0015	1		U
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		U

Comments:

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AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B	Preparatory Method: 5035	AAB #: 110411AN-154242

Lab Name: APPL, Inc	Contract #: 2010*1286022*000

Field Sample ID: ACC65-SIW-01(0-0.6) FD	Lab Sample ID: AY35297	Matrix: Soil

% Solids: 75.4	Initial Calibration ID: N110407B

Date Received: 08-Apr-11	Date Prepared: 11-Apr-11	Date Analyzed: 11-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		U
DIBROMOMETHANE	0.001	0.010	0.001	1		U
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		U
ETHYLBENZENE	0.0010	0.003	0.0010	1		U
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		U
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		U
M&P-XYLENE	0.0018	0.007	0.0018	1		U
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		U
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		U
NAPHTHALENE	0.0010	0.020	0.0010	1		U
O-XYLENE	0.0007	0.005	0.0007	1		U
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		U
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		U
STYRENE	0.0009	0.002	0.0009	1		U
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		U
TETRACHLOROETHENE	0.0008	0.007	0.0131	1		
TOLUENE	0.0010	0.005	0.0010	1		U
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		U
VINYL CHLORIDE	0.0013	0.009	0.0013	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	115	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	95.9	65-135	
SURROGATE: DIBROMOFLUOROMETH	114	65-135	
SURROGATE: TOLUENE-D8 (S)	97.6	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64352

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110411AN-154242
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: ACC65-SIW-01(0.6-0.8) Lab Sample ID: AY35298 Matrix: Soil
% Solids: 77.1 Initial Calibration ID: N110407B
Date Received: 08-Apr-11 Date Prepared: 11-Apr-11 Date Analyzed: 11-Apr-11
Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		M
1,1,1-TCA	0.0009	0.004	0.0009	1		M
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		M
1,1,2-TCA	0.0009	0.005	0.0009	1		M
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		M
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		M
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		M
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		M
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		M
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		M
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		M
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		M
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		M
1,3-DCB	0.0011	0.006	0.0011	1		M
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		M
1,4-DCB	0.0008	0.002	0.0008	1		M
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		M
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		M
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		M
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		M
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		M
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		M
BROMOFORM	0.0011	0.006	0.0011	1		M
BROMOMETHANE	0.0007	0.005	0.0007	1		M
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		M
CHLOROBENZENE	0.0007	0.002	0.0007	1		M
CHLOROETHANE	0.0015	0.005	0.0015	1		M
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		M

Comments: M = Matrix effect.

ARF: 64352

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110411AN-154242
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: ACC65-SIW-01(0.6-0.8) Lab Sample ID: AY35298 Matrix: Soil
% Solids: 77.1 Initial Calibration ID: N110407B
Date Received: 08-Apr-11 Date Prepared: 11-Apr-11 Date Analyzed: 11-Apr-11
Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		M
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		M
DIBROMOMETHANE	0.001	0.010	0.001	1		M
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		M
ETHYLBENZENE	0.0010	0.003	0.0010	1		M
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		M
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		M
M&P-XYLENE	0.0018	0.007	0.0018	1		M
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		M
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		M
NAPHTHALENE	0.0010	0.020	0.0010	1		M
O-XYLENE	0.0007	0.005	0.0007	1		M
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		M
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		M
STYRENE	0.0009	0.002	0.0009	1		M
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		M
TETRACHLOROETHENE	0.0008	0.007	0.0107	1		M
TOLUENE	0.0010	0.005	0.0013	1		M
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		M
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		M
VINYL CHLORIDE	0.0013	0.009	0.0013	1		M

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	124	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	91.1	65-135	
SURROGATE: DIBROMOFLUOROMETH	122	65-135	
SURROGATE: TOLUENE-D8 (S)	106	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: M = Matrix effect.

ARF: 64352

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110411AN-154242

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: ACC65-SIW-01(8-8.5) Lab Sample ID: AY35299 Matrix: Soil

% Solids: 95.8 Initial Calibration ID: N110407B

Date Received: 08-Apr-11 Date Prepared: 11-Apr-11 Date Analyzed: 11-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		U
1,1,1-TCA	0.0009	0.004	0.0009	1		U
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		U
1,1,2-TCA	0.0009	0.005	0.0009	1		U
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		U
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		U
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		U
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		U
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		U
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		U
1,3-DCB	0.0011	0.006	0.0011	1		U
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,4-DCB	0.0008	0.002	0.0008	1		U
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		U
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		U
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		U
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		U
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		U
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		U
BROMOFORM	0.0011	0.006	0.0011	1		U
BROMOMETHANE	0.0007	0.005	0.0007	1		U
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		U
CHLOROBENZENE	0.0007	0.002	0.0007	1		U
CHLOROETHANE	0.0015	0.005	0.0015	1		U
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		U

Comments:

ARF: 64352

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110411AN-154242

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: ACC65-SIW-01(8-8.5) Lab Sample ID: AY35299 Matrix: Soil

% Solids: 95.8 Initial Calibration ID: N110407B

Date Received: 08-Apr-11 Date Prepared: 11-Apr-11 Date Analyzed: 11-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		U
DIBROMOMETHANE	0.001	0.010	0.001	1		U
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		U
ETHYLBENZENE	0.0010	0.003	0.0010	1		U
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		U
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		U
M&P-XYLENE	0.0018	0.007	0.0018	1		U
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		U
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		U
NAPHTHALENE	0.0010	0.020	0.0010	1		U
O-XYLENE	0.0007	0.005	0.0007	1		U
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		U
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		U
STYRENE	0.0009	0.002	0.0009	1		U
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		U
TETRACHLOROETHENE	0.0008	0.007	0.0008	1		U
TOLUENE	0.0010	0.005	0.0010	1		U
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		U
VINYL CHLORIDE	0.0013	0.009	0.0013	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	124	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	95.9	65-135	
SURROGATE: DIBROMOFLUOROMETH	116	65-135	
SURROGATE: TOLUENE-D8 (S)	95.4	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64352

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110411AN-154242

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: ACC65-SIW-01(23.5-24) Lab Sample ID: AY35300 Matrix: Soil

% Solids: 92.7 Initial Calibration ID: N110407B

Date Received: 08-Apr-11 Date Prepared: 11-Apr-11 Date Analyzed: 11-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		U
1,1,1-TCA	0.0009	0.004	0.0009	1		U
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		U
1,1,2-TCA	0.0009	0.005	0.0009	1		U
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		U
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		U
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		U
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		U
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		U
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		U
1,3-DCB	0.0011	0.006	0.0011	1		U
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,4-DCB	0.0008	0.002	0.0008	1		U
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		U
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		U
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		U
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		U
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		U
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		U
BROMOFORM	0.0011	0.006	0.0011	1		U
BROMOMETHANE	0.0007	0.005	0.0007	1		U
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		U
CHLOROBENZENE	0.0007	0.002	0.0007	1		U
CHLOROETHANE	0.0015	0.005	0.0015	1		U
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		U

Comments:

ARF: 64352

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110411AN-154242

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: ACC65-SIW-01(23.5-24) Lab Sample ID: AY35300 Matrix: Soil

% Solids: 92.7 Initial Calibration ID: N110407B

Date Received: 08-Apr-11 Date Prepared: 11-Apr-11 Date Analyzed: 11-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		U
DIBROMOMETHANE	0.001	0.010	0.001	1		U
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		U
ETHYLBENZENE	0.0010	0.003	0.0010	1		U
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		U
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		U
M&P-XYLENE	0.0018	0.007	0.0018	1		U
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		U
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		U
NAPHTHALENE	0.0010	0.020	0.0010	1		U
O-XYLENE	0.0007	0.005	0.0007	1		U
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		U
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		U
STYRENE	0.0009	0.002	0.0009	1		U
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		U
TETRACHLOROETHENE	0.0008	0.007	0.0008	1		U
TOLUENE	0.0010	0.005	0.0010	1		U
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		U
VINYL CHLORIDE	0.0013	0.009	0.0013	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	122	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	91.1	65-135	
SURROGATE: DIBROMOFLUOROMETH	120	65-135	
SURROGATE: TOLUENE-D8 (S)	97.6	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64352

AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Date of Initial Calibration: 12-Apr-11

Initial Calibration ID: C110412

Concentration Units (ug/L or mg/kg): ug/L

Analyte	Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5	Std 6	RF 6	Std 7	RF 7	Std 8	RF 8	Std 9	RF 9
Chloromethane *	5.0	0.142	0.5	0.191	1.0	0.196	2.0	0.146	10.0	0.130	100.0	0.128	20.0	0.135	40.0	0.132	0.3	
Vinyl chloride #	5.0	0.308	0.5	0.395	1.0	0.306	2.0	0.322	10.0	0.299	100.0		20.0	0.27	40.0		0.3	0.344
1,1-DCE #	5.0	0.958	0.5	1.104	1.0	0.976	2.0	1.122	10.0	1.103	100.0	0.881	20.0	1.018	40.0	0.958	0.3	1.067
1,1-DCA *	5.0	1.228	0.5	1.270	1.0	1.298	2.0	1.227	10.0	1.310	100.0	1.032	20.0	1.187	40.0	1.102	0.3	1.150
Chloroform #	5.0	1.316	0.5	1.383	1.0	1.367	2.0	1.351	10.0	1.422	100.0	1.147	20.0	1.307	40.0	1.206	0.3	1.508
1,2-Dichloropropane #	5.0	0.557	0.5	0.579	1.0	0.487	2.0	0.580	10.0	0.588	100.0	0.517	20.0	0.565	40.0	0.529	0.3	0.516
Toluene #	5.0	2.708	0.5	2.894	1.0	2.823	2.0	2.834	10.0	2.935	100.0	2.557	20.0	2.787	40.0	2.662	0.3	3.198
Chlorobenzene *	5.0	2.866	0.5	2.840	1.0	2.809	2.0	2.710	10.0	3.075	100.0	2.682	20.0	2.745	40.0	2.758	0.3	2.923
Ethylbenzene #	5.0	4.825	0.5	4.741	1.0	4.671	2.0	4.823	10.0	5.269	100.0	4.497	20.0	4.639	40.0	4.656	0.3	5.265
Bromoform *	5.0	0.172	0.5	0.114	1.0	0.149	2.0	0.137	10.0	0.179	100.0	0.167	20.0	0.151	40.0	0.163	0.3	0.154
1,1,2,2-Tetrachloroethane *	5.0	0.703	0.5	0.612	1.0	0.810	2.0	0.685	10.0	0.761	100.0	0.762	20.0	0.746	40.0	0.72	0.3	0.887

* SPCCs # CCCs

Comments:

AFCEE FORM O-3A Page ____ of ____

AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B
AAB #: 110411AN-154242
Lab Name: APPL, Inc.
Contract #: 2010*1286022*000
Instrument ID: Neo
Date of Initial Calibration: 8 Apr 11
Initial Calibration ID: N110407B
Concentration Units (ug/L or mg/kg): mg/kg

Analyte	Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5	Std 6	RF 6	Std 7	RF 7
Chloromethane *	0.002	0.918	0.050	0.739	0.010	0.786	0.005	0.887	0.020	0.725	0.200	0.874		
Vinyl chloride #	0.002	0.107	0.050	0.129	0.010	0.122	0.005	0.134	0.020	0.130	0.200	0.156		
1,1-DCE #	0.002	0.485	0.050	0.521	0.010	0.479	0.005	0.510	0.020	0.451	0.200	0.564		
1,1-DCA *	0.002	0.650	0.050	0.651	0.010	0.615	0.005	0.596	0.020	0.575	0.200	0.664		
Chloroform #	0.002	0.577	0.050	0.559	0.010	0.551	0.005	0.585	0.020	0.520	0.200	0.587		
1,2-Dichloropropane #	0.002		0.050	0.266	0.010	0.253	0.005	0.253	0.020	0.246	0.200	0.289		
Toluene #	0.002	0.693	0.050	0.680	0.010	0.672	0.005	0.711	0.020	0.592	0.200	0.694		
Chlorobenzene *	0.002	1.316	0.050	1.067	0.010	1.100	0.005	1.100	0.020	1.038	0.200	1.153		
Ethylbenzene #	0.002	2.316	0.050	1.983	0.010	1.921	0.005	2.092	0.020	1.805	0.200	2.091		
Bromoform *	0.002	0.323	0.050	0.314	0.010	0.302	0.005	0.287	0.020	0.323	0.200	0.325		
1,1,2,2-Tetrachloroethane *	0.002	1.128	0.050	1.119	0.010	1.071	0.005	1.083	0.020	1.110	0.200	1.174		

* SPCCs # CCCs

Comments: ____________________

AFCEE FORM O-3A Page ___ of ___

AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Date of Initial Calibration: 12-Apr-11

Initial Calibration ID: C110412

Concentration Units (ug/L or mg/kg): ug/L

Analyte	% RSD	mean %RSD	r	COD	Q
Chloromethane *	18.4		1.0000		
1,1-DCA *	7.7				
Bromoform *	12.8				
Chlorobenzene *	4.3				
1,1,2,2-TCA *	10.5				
1,1-DCE #	8.2				
Chloroform #	8.1				
1,2-DCP #	6.5				
Toluene #	6.5				
Ethylbenzene #	5.6				
Vinyl chloride #	12.5				

* SPCCs # CCCs

Comments: ___

AFCEE FORM O-3A Page ___ of ___

AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Instrument ID: Neo

Initial Calibration ID: N110407B

AAB #: 110411AN-154242

Contract #: 2010*1286022*000

Date of Initial Calibration: 8 Apr 11

Concentration Units (ug/L or mg/kg): mg/kg

Analyte	% RSD	mean %RSD	r	COD	Q
Chloromethane *	10.0				
1,1-DCA *	5.7				
Bromoform *	4.8				
Chlorobenzene *	8.8				
1,1,2,2-TCA *	3.3				
1,1-DCE #	7.9				
Chloroform #	4.6				
1,2-DCP #	6.6				
Toluene #	6.3				
Ethylbenzene #	8.6				
Vinyl chloride #	12.3				

* SPCCs # CCCs

Comments: ____

AFCEE FORM O-3A Page ____ of ____

AFCEE
ORGANIC ANALYSES DATA SHEET 3
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Date of Initial Calibration: 12-Apr-11

Initial Calibration ID: C110412

Concentration Units (ug/L or mg/kg): ug/L

Analyte	Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5	Std 6	RF 6	Std 7	RF 7	Std 8	RF 8	Std 9	RF 9
1,1,1,2-Tetrachloroethane	5.0	1.031	0.5	1.034	1.0	1.000	2.0	1.005	10.0	1.142	100.0	0.992	20.0	1.028	40.0	1.030	0.3	1.003
1,1,1-TCA	5.0	1.334	0.5	1.414	1.0	1.297	2.0	1.405	10.0	1.456	100.0	1.132	20.0	1.325	40.0	1.235	0.3	1.266
1,1,2-TCA	5.0	0.264	0.5	0.269	1.0	0.283	2.0	0.277	10.0	0.300	100.0	0.270	20.0	0.285	40.0	0.272	0.3	0.241
1,1-Dichloropropene	5.0	0.895	0.5	1.032	1.0	0.951	2.0	0.929	10.0	1.021	100.0	0.819	20.0	0.918	40.0	0.866	0.3	1.049
1,2,3-Trichlorobenzene	5.0	2.507	0.5	3.022	1.0	2.771	2.0	2.638	10.0	2.771	100.0	2.505	20.0	2.549	40.0	2.533	0.3	4.076
1,2,3-Trichloropropane	5.0	0.080	0.5	0.121	1.0	0.126	2.0	0.109	10.0	0.101	100.0		20.0	0.087	40.0	0.085	0.3	
1,2,4-Trichlorobenzene	5.0	3.115	0.5	3.726	1.0	3.419	2.0	3.099	10.0	3.284	100.0	3.043	20.0	3.229	40.0	3.095	0.3	4.658
1,2,4-Trimethylbenzene	5.0	7.684	0.5	7.392	1.0	7.096	2.0	7.662	10.0	8.341	100.0	6.969	20.0	7.337	40.0	7.053	0.3	9.273
1,2-DCA	5.0	0.640	0.5	0.574	1.0	0.579	2.0	0.623	10.0	0.658	100.0	0.542	20.0	0.589	40.0	0.574	0.3	0.536
1,2-DCB	5.0	3.596	0.5	3.466	1.0	3.358	2.0	3.436	10.0	3.940	100.0	3.440	20.0	3.605	40.0	3.504	0.3	3.792
1,2-Dibromo-3-chloropropane	5.0	0.138	0.5		1.0	0.083	2.0	0.162	10.0	0.173	100.0	0.166	20.0	0.150	40.0	0.157	0.3	
1,2-EDB	5.0	0.535	0.5	0.485	1.0	0.517	2.0	0.520	10.0	0.572	100.0	0.534	20.0	0.528	40.0	0.535	0.3	0.436
1,3,5-Trimethylbenzene	5.0	7.595	0.5	7.809	1.0	7.104	2.0	7.657	10.0	8.166	100.0	6.944	20.0	7.309	40.0	6.853	0.3	8.433
1,3-DCB	5.0	4.296	0.5	4.513	1.0	4.327	2.0	4.324	10.0	4.713	100.0	4.084	20.0	4.284	40.0	4.137	0.3	5.022
1,3-Dichloropropane	5.0	0.830	0.5	0.774	1.0	0.867	2.0	0.778	10.0	0.920	100.0	0.825	20.0	0.819	40.0	0.813	0.3	0.881
1,4-DCB	5.0	4.093	0.5	4.256	1.0	3.965	2.0	4.125	10.0	4.410	100.0	3.973	20.0	4.043	40.0	3.948	0.3	4.553
1-Chlorohexane	5.0	1.229	0.5	1.321	1.0	1.178	2.0	1.278	10.0	1.329	100.0	1.226	20.0	1.240	40.0	1.279	0.3	1.258
2,2-Dichloropropane	5.0	1.110	0.5	1.264	1.0	1.167	2.0	1.227	10.0	1.219	100.0	0.922	20.0	1.104	40.0	1.026	0.3	1.506
2-Chlorotoluene	5.0	7.040	0.5	7.277	1.0	6.686	2.0	6.690	10.0	7.429	100.0	6.216	20.0	6.663	40.0	6.365	0.3	8.025
Benzene	5.0	2.545	0.5	2.976	1.0	2.611	2.0	2.527	10.0	2.648	100.0	2.340	20.0	2.496	40.0	2.381	0.3	3.215
Bromobenzene	5.0	2.071	0.5	2.144	1.0	2.055	2.0	2.062	10.0	2.272	100.0	1.960	20.0	2.027	40.0	1.993	0.3	2.457
Bromochloromethane	5.0	0.281	0.5	0.337	1.0	0.266	2.0	0.304	10.0	0.311	100.0	0.273	20.0	0.302	40.0	0.276	0.3	0.233
Bromodichloromethane	5.0	0.279	0.5	0.287	1.0	0.262	2.0	0.294	10.0	0.304	100.0	0.263	20.0	0.280	40.0	0.260	0.3	0.319
Bromomethane	5.0	0.100	0.5	0.080	1.0	0.074	2.0	0.091	10.0	0.090	100.0	0.096	20.0	0.097	40.0	0.102	0.3	0.123
Carbon Tetrachloride	5.0	1.189	0.5	1.189	1.0	1.108	2.0	1.288	10.0	1.327	100.0	1.041	20.0	1.206	40.0	1.131	0.3	1.084
Chloroethane	5.0	0.102	0.5	0.143	1.0	0.096	2.0	0.093	10.0	0.083	100.0	0.085	20.0	0.093	40.0	0.090	0.3	
Cis-1,2-DCE	5.0	0.868	0.5	0.977	1.0	0.834	2.0	0.887	10.0	0.921	100.0	0.745	20.0	0.849	40.0	0.778	0.3	1.097
Cis-1,3-Dichloropropene	5.0	0.815	0.5	0.887	1.0	0.777	2.0	0.773	10.0	0.913	100.0	0.786	20.0	0.856	40.0	0.811	0.3	0.786
Dibromochloromethane	5.0	0.838	0.5	0.760	1.0	0.744	2.0	0.762	10.0	0.881	100.0	0.804	20.0	0.821	40.0	0.814	0.3	0.860
Dibromomethane	5.0	0.294	0.5	0.317	1.0	0.296	2.0	0.307	10.0	0.314	100.0	0.281	20.0	0.304	40.0	0.290	0.3	0.319
Dichlorodifluoromethane	5.0	0.419	0.5	0.502	1.0	0.492	2.0	0.521	10.0	0.459	100.0	0.432	20.0	0.479	40.0	0.463	0.3	0.442
Hexachlorobutadiene	5.0	0.673	0.5		1.0	0.695	2.0	0.563	10.0	0.606	100.0	0.535	20.0	0.591	40.0	0.562	0.3	
Isopropylbenzene	5.0	9.373	0.5	9.583	1.0	8.896	2.0	9.166	10.0	10.202	100.0	8.545	20.0	9.059	40.0	8.624	0.3	9.550
m&p-Xylene	5.0	1.990	0.5	2.028	1.0	1.788	2.0	1.957	10.0	2.099	100.0	1.840	20.0	1.923	40.0	1.886	0.3	2.092
Methylene chloride	5.0	0.586	0.5	1.010	1.0	0.795	2.0	0.657	10.0	0.630	100.0	0.514	20.0	0.591	40.0	0.548	0.3	
n-Butylbenzene	5.0	6.785	0.5	7.851	1.0	7.377	2.0	6.957	10.0	7.867	100.0	6.642	20.0	6.928	40.0	6.757	0.3	9.156
n-Propylbenzene	5.0	10.331	0.5	11.031	1.0	9.642	2.0	10.283	10.0	11.583	100.0	9.543	20.0	10.141	40.0	9.991	0.3	11.211
Naphthalene	5.0	1.378	0.5	1.512	1.0	1.544	2.0	1.284	10.0	1.422	100.0		20.0	1.390	40.0	1.330	0.3	2.078
o-Xylene	5.0	1.952	0.5	1.840	1.0	1.798	2.0	1.863	10.0	2.108	100.0	1.849	20.0	1.867	40.0	1.883	0.3	2.029
p-Isopropyltoluene	5.0	8.338	0.5	8.602	1.0	8.015	2.0	8.528	10.0	9.057	100.0	8.108	20.0	8.330	40.0	8.200	0.3	9.599
Sec-Butylbenzene	5.0	9.831	0.5	9.985	1.0	9.771	2.0	9.839	10.0	11.224	100.0	9.555	20.0	9.977	40.0	9.630	0.3	11.040
Styrene	5.0	2.946	0.5	2.718	1.0	2.731	2.0	2.730	10.0	3.155	100.0	2.813	20.0	2.902	40.0	2.906	0.3	2.615
TCE	5.0	0.811	0.5	0.937	1.0	0.834	2.0	0.877	10.0	0.922	100.0	0.750	20.0	0.851	40.0	0.809	0.3	0.680
Tert-Butylbenzene	5.0	7.912	0.5	7.826	1.0	7.801	2.0	7.585	10.0	8.730	100.0	7.408	20.0	7.914	40.0	7.607	0.3	8.142
Tetrachloroethene	5.0	1.102	0.5	1.008	1.0	1.077	2.0	1.074	10.0	1.189	100.0	1.020	20.0	1.064	40.0	1.061	0.3	1.165
Trans-1,2-DCE	5.0	0.772	0.5	0.998	1.0	0.765	2.0	0.787	10.0	0.836	100.0	0.687	20.0	0.794	40.0	0.723	0.3	0.872
Trans-1,3-Dichloropropene	5.0	0.595	0.5	0.737	1.0	0.571	2.0	0.659	10.0	0.655	100.0	0.589	20.0	0.620	40.0	0.614	0.3	0.568
Trichlorofluoromethane	5.0	0.881	0.5	0.901	1.0	0.892	2.0	0.893	10.0	0.857	100.0	0.776	20.0	0.871	40.0	0.847	0.3	0.919
1,2-DCA-D4(S)	5.0	0.536	0.5	0.567	1.0	0.552	2.0	0.562	10.0	0.529	100.0	0.479	20.0	0.523	40.0	0.512	0.3	0.616
4-Bromofluorobenzene(S)	5.0	1.217	0.5	1.378	1.0	1.247	2.0	1.256	10.0	1.213	100.0	1.197	20.0	1.200	40.0	1.231	0.3	1.654
Dibromofluoromethane(S)	5.0	0.738	0.5	0.791	1.0	0.791	2.0	0.782	10.0	0.733	100.0	0.703	20.0	0.738	40.0	0.726	0.3	0.926
Toluene-D8(S)	5.0	3.599	0.5	3.634	1.0	3.579	2.0	3.645	10.0	3.532	100.0	3.489	20.0	3.466	40.0	3.491	0.3	3.821

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 3
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Date of Initial Calibration: 8 Apr 11

Initial Calibration ID: N110407B

Concentration Units (ug/L or mg/kg): mg/kg

Analyte	Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5	Std 6	RF 6	Std 7	RF 7
1,1,1,2-Tetrachloroethane	0.002	0.488	0.050	0.399	0.010	0.403	0.005	0.452	0.020	0.394	0.200	0.427		
1,1,1-TCA	0.002	0.488	0.050	0.409	0.010	0.423	0.005	0.432	0.020	0.402	0.200	0.473		
1,1,2-TCA	0.002	0.222	0.050	0.223	0.010	0.232	0.005	0.228	0.020	0.199	0.200	0.221		
1,1-Dichloropropene	0.002	0.464	0.050	0.398	0.010	0.400	0.005	0.452	0.020	0.404	0.200	0.464		
1,2,3-Trichlorobenzene	0.002	1.082	0.050	0.824	0.010	0.839	0.005	0.844	0.020	0.839	0.200	0.901		
1,2,3-Trichloropropane	0.002	0.170	0.050	0.247	0.010	0.233	0.005	0.262	0.020	0.283	0.200			
1,2,4-Trichlorobenzene	0.002	1.407	0.050	0.895	0.010	0.903	0.005	1.019	0.020	0.969	0.200	0.997		
1,2,4-Trimethylbenzene	0.002	3.350	0.050	2.916	0.010	2.767	0.005	3.211	0.020	2.886	0.200	3.394		
1,2-DCA	0.002	0.474	0.050	0.437	0.010	0.413	0.005	0.409	0.020	0.419	0.200	0.448		
1,2-DCB	0.002	1.821	0.050	1.570	0.010	1.546	0.005	1.638	0.020	1.581	0.200	1.647		
1,2-Dibromo-3-chloropropane	0.002	0.248	0.050	0.219	0.010	0.198	0.005	0.214	0.020	0.216	0.200	0.214		
1,2-EDB	0.002	0.458	0.050	0.409	0.010	0.398	0.005	0.380	0.020	0.386	0.200	0.393		
1,3,5-Trimethylbenzene	0.002	3.175	0.050	2.789	0.010	2.880	0.005	3.304	0.020	2.701	0.200	3.250		
1,3-DCB	0.002	2.063	0.050	1.643	0.010	1.732	0.005	1.779	0.020	1.660	0.200	1.766		
1,3-Dichloropropane	0.002	0.713	0.050	0.654	0.010	0.642	0.005	0.697	0.020	0.665	0.200	0.709		
1,4-DCB	0.002	2.073	0.050	1.690	0.010	1.546	0.005	1.784	0.020	1.598	0.200	1.789		
1-Chlorohexane	0.002	0.674	0.050	0.565	0.010	0.604	0.005	0.655	0.020	0.558	0.200	0.677		
2,2-Dichloropropane	0.002	0.096	0.050	0.097	0.010	0.095	0.005	0.127	0.020	0.096	0.200	0.132		
2-Chlorotoluene	0.002	3.838	0.050	3.137	0.010	3.170	0.005	3.641	0.020	3.048	0.200	3.583		
4-Chlorotoluene	0.002	3.211	0.050	2.711	0.010	2.784	0.005	2.952	0.020	2.666	0.200	3.129		
Acetone	0.002	0.127	0.050	0.157	0.010	0.161	0.005	0.257	0.020	0.145	0.200	0.129		
Benzene	0.002	1.129	0.050	1.152	0.010	1.103	0.005	1.183	0.020	1.049	0.200	1.290		
Bromobenzene	0.002	1.080	0.050	0.977	0.010	0.919	0.005	1.053	0.020	0.947	0.200	1.006		
Bromochloromethane	0.002	0.035	0.050	0.028	0.010	0.030	0.005	0.027	0.020	0.026	0.200	0.030		
Bromodichloromethane	0.002	0.454	0.050	0.434	0.010	0.410	0.005	0.413	0.020	0.396	0.200	0.477		
Bromomethane	0.002		0.050	0.025	0.010	0.019	0.005	0.021	0.020	0.023	0.200	0.030		
Carbon tetrachloride	0.002		0.050	0.323	0.010	0.295	0.005	0.252	0.020	0.307	0.200	0.396		
Chloroethane	0.002	0.261	0.050	0.235	0.010	0.223	0.005	0.215	0.020	0.210	0.200	0.237		
Cis-1,2-DCE	0.002	0.370	0.050	0.336	0.010	0.336	0.005	0.337	0.020	0.310	0.200	0.352		
Cis-1,3-Dichloropropene	0.002	0.527	0.050	0.516	0.010	0.502	0.005	0.503	0.020	0.485	0.200	0.558		
Dibromochloromethane	0.002	0.497	0.050	0.472	0.010	0.487	0.005	0.445	0.020	0.446	0.200	0.486		
Dibromomethane	0.002	0.191	0.050	0.195	0.010	0.206	0.005	0.187	0.020	0.173	0.200	0.193		
Dichlorodifluoromethane	0.002	0.336	0.050	0.289	0.010	0.301	0.005	0.314	0.020	0.293	0.200	0.331		
Hexachlorobutadiene	0.002	0.894	0.050	0.743	0.010	0.748	0.005	0.419	0.020	0.717	0.200	0.849		
Isopropylbenzene	0.002	4.045	0.050	3.450	0.010	3.416	0.005	3.813	0.020	3.460	0.200	4.438		
m&p-Xylene	0.002	0.809	0.050	0.659	0.010	0.688	0.005	0.744	0.020	0.645	0.200	0.754		
Methylene chloride	0.002	0.489	0.050	0.332	0.010	0.353	0.005	0.434	0.020	0.334	0.200			
Methyl t-butyl ether (MTBE)	0.002	0.736	0.050	0.847	0.010	0.774	0.005	0.696	0.020	0.755	0.200	0.798		
MEK (2-Butanone)	0.002	0.393	0.050	0.347	0.010	0.289	0.005	0.329	0.020	0.297	0.200	0.321		
MIBK (methyl isobutyl ketone)	0.002	1.187	0.050	1.379	0.010	0.966	0.005	1.145	0.020	0.988	0.200			
n-Butylbenzene	0.002	3.603	0.050	2.906	0.010	3.022	0.005	3.573	0.020	2.880	0.200	3.573		
n-Propylbenzene	0.002	5.208	0.050	4.763	0.010	4.667	0.005	5.288	0.020	4.621	0.200	5.542		
Naphthalene	0.002	1.638	0.050	1.452	0.010	1.427	0.005	1.372	0.020	1.520	0.200	1.594		
o-Xylene	0.002	0.781	0.050	0.659	0.010	0.689	0.005	0.705	0.020	0.649	0.200	0.721		
p-Isopropyltoluene	0.002	3.785	0.050	2.904	0.010	3.017	0.005	3.564	0.020	2.876	0.200	3.380		
Sec-Butylbenzene	0.002	4.411	0.050	3.922	0.010	3.804	0.005	4.468	0.020	3.812	0.200	4.607		
Styrene	0.002	0.190	0.050	0.198	0.010	0.196	0.005	0.198	0.020	0.192	0.200	0.220		
TCE	0.002	0.279	0.050	0.266	0.010	0.292	0.005	0.268	0.020	0.263	0.200	0.326		
Tert-Butylbenzene	0.002	3.173	0.050	2.695	0.010	2.710	0.005	3.108	0.020	2.714	0.200	3.114		
Tetrachloroethene	0.002	0.333	0.050	0.298	0.010	0.318	0.005	0.343	0.020	0.288	0.200	0.363		
Trans-1,2-DCE	0.002	0.351	0.050	0.293	0.010	0.272	0.005	0.312	0.020	0.272	0.200	0.307		
Trans-1,3-Dichloropropene	0.002	0.478	0.050	0.468	0.010	0.483	0.005	0.436	0.020	0.401	0.200	0.468		
Trichlorofluoromethane	0.002	0.075	0.050	0.061	0.010	0.057	0.005	0.065	0.020	0.060	0.200	0.068		
1,2-DCA-D4(S)	0.002	0.375	0.050	0.384	0.010	0.366	0.005	0.352	0.020	0.371	0.200	0.377		
4-Bromofluorobenzene(S)	0.002	0.743	0.050	0.553	0.010	0.583	0.005	0.633	0.020	0.572	0.200	0.557		
Dibromofluoromethane(S)	0.002	0.362	0.050	0.352	0.010	0.336	0.005	0.336	0.020	0.323	0.200	0.335		
Toluene-D8(S)	0.002	1.572	0.050	1.472	0.010	1.437	0.005	1.487	0.020	1.353	0.200	1.579		

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 3
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Date of Initial Calibration: 12-Apr-11

Initial Calibration ID: C110412

Concentration Units (ug/L or mg/kg): ug/L

Analyte	% RSD	mean %RSD	r	COD	Q
1,1,1,2-Tetrachloroethane	4.4				
1,1,1-TCA	7.6				
1,1,2-TCA	6.0				
1,1-Dichloropropene	8.4				
1,2,3-Trichlorobenzene	18		1.0000		
1,2,3-Trichloropropane	18		0.9980		
1,2,4-Trichlorobenzene	15				
1,2,4-Trimethylbenzene	9.7				
1,2-DCA	7.1				
1,2-DCB	5.3				
1,2-Dibromo-3-chloropropane	21		0.9990		
1,2-EDB	7.4				
1,3,5-Trimethylbenzene	7.2				
1,3-DCB	6.7				
1,3-Dichloropropane	5.7				
1,4-DCB	5.1				
1-Chlorohexane	3.8				
2,2-Dichloropropane	14				
2-Chlorotoluene	8.2				
Benzene	11				
Bromobenzene	7.4				
Bromochloromethane	11				
Bromodichloromethane	7.1				
Bromomethane	15				
Carbon Tetrachloride	8.0				
Chloroethane	19		0.9990		
Cis-1,2-DCE	12				
Cis-1,3-Dichloropropene	6.2				
Dibromochloromethane	5.8				
Dibromomethane	4.3				
Dichlorodifluoromethane	7.3				
Hexachlorobutadiene	9.9				
Isopropylbenzene	5.7				
m&p-Xylene	5.5				
Methylene chloride	24		0.9990		
n-Butylbenzene	11				
n-Propylbenzene	6.8				
Naphthalene	17		0.9990		
o-Xylene	5.3				
p-Isopropyltoluene	5.9				
Sec-Butylbenzene	6.0				
Styrene	5.7				
TCE	9.7				
Tert-Butylbenzene	4.9				
Tetrachloroethene	5.5				
Trans-1,2-DCE	11				
Trans-1,3-Dichloropropene	8.7				
Trichlorofluoromethane	4.8				
1,2-DCA-D4(S)	7.2				
4-Bromofluorobenzene(S)	11				
Dibromofluoromethane(S)	8.6				
Toluene-D8(S)	3.1				

AFCEE
ORGANIC ANALYSES DATA SHEET 3
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Date of Initial Calibration: 8 Apr 11

Initial Calibration ID: N110407B

Concentration Units (ug/L or mg/kg): mg/kg

Analyte	% RSD	mean %RSD	r	COD	Q
1,1,1,2-Tetrachloroethane	8.6				
1,1,1-TCA	8.0				
1,1,2-TCA	5.2				
1,1-Dichloropropene	7.7				
1,2,3-Trichlorobenzene	11				
1,2,3-Trichloropropane	18		0.9950		
1,2,4-Trichlorobenzene	18				
1,2,4-Trimethylbenzene	8.6				
1,2-DCA	5.8				
1,2-DCB	6.1				
1,2-Dibromo-3-chloropropane	7.5				
1,2-EDB	7.0				
1,3,5-Trimethylbenzene	8.6				
1,3-DCB	8.6				
1,3-Dichloropropane	4.5				
1,4-DCB	11				
1-Chlorohexane	8.7				
2,2-Dichloropropane	16		0.9960		
2-Chlorotoluene	9.6				
4-Chlorotoluene	7.8				
Acetone	30		0.9970		
Benzene	7.1				
Bromobenzene	6.2				
Bromochloromethane	11				
Bromodichloromethane	7.1				
Bromomethane	18		0.9980		
Carbon tetrachloride	17		0.9980		
Chloroethane	8.1				
Cis-1,2-DCE	5.8				
Cis-1,3-Dichloropropene	5.0				
Dibromochloromethane	4.7				
Dibromomethane	5.7				
Dichlorodifluoromethane	6.3				
Hexachlorobutadiene	23		0.9990		
Isopropylbenzene	11				
m&p-Xylene	8.8				
Methylene chloride	18		1.0000		
Methyl t-butyl ether (MTBE)	6.8				
MEK (2-Butanone)	11				
MIBK (methyl isobutyl ketone)	15				
n-Butylbenzene	11				
n-Propylbenzene	7.6				
Naphthalene	6.8				
o-Xylene	6.8				
p-Isopropyltoluene	12				
Sec-Butylbenzene	8.7				
Styrene	5.4				
TCE	8.4				
Tert-Butylbenzene	8.0				
Tetrachloroethene	8.7				
Trans-1,2-DCE	9.8				
Trans-1,3-Dichloropropene	6.8				
Trichlorofluoromethane	10				
1,2-DCA-D4(S)	3.0				
4-Bromofluorobenzene(S)	12				

AFCEE
ORGANIC ANALYSES DATA SHEET 3
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Date of Initial Calibration: 8 Apr 11

Initial Calibration ID: N110407B

Concentration Units (ug/L or mg/kg): mg/kg

Analyte	% RSD	mean %RSD	r	COD	Q
Dibromofluoromethane(S)	4.1				
Toluene-D8(S)	5.7				

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 4
SECOND SOURCE CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Instrument ID: Chico

2nd Source ID: 110412A LCS-1WC (SS)

AAB #: 110413AC-154245

Contract #: 2010*1286022*000

Initial Calibration ID: C110412

Concentration Units (ug/L or mg/kg): ug/L

Analyte	Expected	Found	%D	Q
1,1,1,2-Tetrachloroethane	10.00	10.10	1.3	
1,1,1-TCA	10.00	10.20	2.3	
1,1,2,2-Tetrachloroethane	10.00	8.98	10	
1,1,2-TCA	10.00	10.60	5.6	
1,1-DCA	10.00	10.50	4.7	
1,1-DCE	10.00	10.20	2.2	
1,1-Dichloropropene	10.00	10.20	2.4	
1,2,3-Trichlorobenzene	10.00	10.20	2.5	
1,2,3-Trichloropropane	10.00	10.90	8.7	
1,2,4-Trichlorobenzene	10.00	9.79	2.1	
1,2,4-Trimethylbenzene	10.00	9.97	0.3	
1,2-DCA	10.00	11.00	10	
1,2-DCB	10.00	10.30	3.2	
1,2-Dibromo-3-chloropropane	10.00	9.22	7.8	
1,2-Dichloropropane	10.00	10.20	2.1	
1,2-EDB	10.00	10.40	3.8	
1,3,5-Trimethylbenzene	10.00	9.80	2.0	
1,3-DCB	10.00	9.97	0.3	
1,3-Dichloropropane	10.00	9.93	0.7	
1,4-DCB	10.00	10.10	0.5	
1-Chlorohexane	10.00	10.40	3.7	
2,2-Dichloropropane	10.00	9.03	9.7	
2-Chlorotoluene	10.00	10.10	1.1	
Benzene	10.00	9.60	4.0	
Bromobenzene	10.00	10.00	0.3	
Bromochloromethane	10.00	10.80	8.2	
Bromodichloromethane	10.00	10.60	6.1	
Bromoform	10.00	10.40	3.7	
Bromomethane	10.00	9.60	4.0	
Carbon Tetrachloride	10.00	10.50	4.8	
Chlorobenzene	10.00	10.30	2.8	
Chloroethane	10.00	11.50	15	
Chloroform	10.00	10.00	0.4	
Chloromethane	10.00	10.70	6.8	
Cis-1,2-DCE	10.00	9.92	0.8	
Cis-1,3-Dichloropropene	10.00	10.10	1.4	
Dibromochloromethane	10.00	10.50	4.6	
Dibromomethane	10.00	10.30	2.8	
Dichlorodifluoromethane	10.00	10.60	5.8	
Ethylbenzene	10.00	10.40	3.9	
Hexachlorobutadiene	10.00	10.20	2.0	
Isopropylbenzene	10.00	10.20	2.0	
m&p-Xylene	20.00	20.20	1.2	
Methylene chloride	10.00	10.70	6.5	
n-Butylbenzene	10.00	9.96	0.4	
n-Propylbenzene	10.00	10.00	0.5	
Naphthalene	10.00	10.00	0.0	

AFCEE
ORGANIC ANALYSES DATA SHEET 4
SECOND SOURCE CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Initial Calibration ID: C110412

2nd Source ID: 110412A LCS-1WC (SS)

Concentration Units (ug/L or mg/kg): ug/L

Analyte	Expected	Found	%D	Q
o-Xylene	10.00	10.00	0.4	
p-Isopropyltoluene	10.00	10.40	3.9	
Sec-Butylbenzene	10.00	10.30	3.0	
Styrene	10.00	10.70	6.5	
TCE	10.00	11.30	13	
Tert-Butylbenzene	10.00	10.20	2.3	
Tetrachloroethene	10.00	10.60	5.8	
Toluene	10.00	10.10	1.2	
Trans-1,2-DCE	10.00	9.86	1.4	
Trans-1,3-Dichloropropene	10.00	9.85	1.5	
Trichlorofluoromethane	10.00	10.70	7.5	
Vinyl chloride	10.00	10.50	4.7	

Comments:

AFCEE FORM O-4 Page ___ of ____

AFCEE
ORGANIC ANALYSES DATA SHEET 4
SECOND SOURCE CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Initial Calibration ID: N110407B

2nd Source ID: 110411A LCS-1SN (SS)

Concentration Units (ug/L or mg/kg): mg/kg

Analyte	Expected	Found	%D	Q
1,1,1,2-Tetrachloroethane	0.050	0.04	15	
1,1,1-TCA	0.050	0.06	14	
1,1,2,2-Tetrachloroethane	0.050	0.04	13	
1,1,2-TCA	0.050	0.06	17	
1,1-DCA	0.050	0.06	17	
1,1-DCE	0.050	0.06	11	
1,1-Dichloropropene	0.050	0.05	9.4	
1,2,3-Trichlorobenzene	0.050	0.05	6.6	
1,2,3-Trichloropropane	0.050	0.05	8.0	
1,2,4-Trichlorobenzene	0.050	0.05	6.4	
1,2,4-Trimethylbenzene	0.050	0.04	13	
1,2-DCA	0.050	0.06	13	
1,2-DCB	0.050	0.04	14	
1,2-Dibromo-3-chloropropane	0.050	0.04	11	
1,2-Dichloropropane	0.050	0.06	20	
1,2-EDB	0.050	0.04	12	
1,3,5-Trimethylbenzene	0.050	0.04	14	
1,3-DCB	0.050	0.04	15	
1,3-Dichloropropane	0.050	0.04	13	
1,4-DCB	0.050	0.04	14	
1-Chlorohexane	0.050	0.04	12	
2,2-Dichloropropane	0.050	0.05	1.3	
2-Chlorotoluene	0.050	0.04	16	
4-Chlorotoluene	0.050	0.04	17	
Acetone	0.050	0.06	19	
Benzene	0.050	0.06	16	
Bromobenzene	0.050	0.04	19	
Bromochloromethane	0.050	0.06	20	
Bromodichloromethane	0.050	0.06	18	
Bromoform	0.050	0.04	11	
Bromomethane	0.050	0.06	19	
Carbon tetrachloride	0.050	0.05	4.2	
Chlorobenzene	0.050	0.04	13	
Chloroethane	0.050	0.05	2.6	
Chloroform	0.050	0.06	11	
Chloromethane	0.050	0.06	16	
Cis-1,2-DCE	0.050	0.06	13	
Cis-1,3-Dichloropropene	0.050	0.06	19	
Dibromochloromethane	0.050	0.04	12	
Dibromomethane	0.050	0.06	18	
Dichlorodifluoromethane	0.050	0.05	1.4	
Ethylbenzene	0.050	0.04	12	
Hexachlorobutadiene	0.050	0.04	15	
Isopropylbenzene	0.050	0.04	13	
m&p-Xylene	0.100	0.08	16	
Methylene chloride	0.050	0.06	15	
Methyl t-butyl ether (MTBE)	0.050	0.06	18	

AFCEE
ORGANIC ANALYSES DATA SHEET 4
SECOND SOURCE CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Initial Calibration ID: N110407B

2nd Source ID: 110411A LCS-1SN (SS)

Concentration Units (ug/L or mg/kg): mg/kg

Analyte	Expected	Found	%D	Q
MEK (2-Butanone)	0.050	0.06	15	
MIBK (methyl isobutyl ketone)	0.050	0.05	2.5	
n-Butylbenzene	0.050	0.05	7.2	
n-Propylbenzene	0.050	0.04	12	
Naphthalene	0.050	0.05	2.2	
o-Xylene	0.050	0.04	13	
p-Isopropyltoluene	0.050	0.04	14	
Sec-Butylbenzene	0.050	0.04	17	
Styrene	0.050	0.05	5.2	
TCE	0.050	0.06	12	
Tert-Butylbenzene	0.050	0.04	18	
Tetrachloroethene	0.050	0.04	17	
Toluene	0.050	0.06	11	
Trans-1,2-DCE	0.050	0.05	7.3	
Trans-1,3-Dichloropropene	0.050	0.06	18	
Trichlorofluoromethane	0.050	0.05	7.1	
Vinyl chloride	0.050	0.06	17	

Comments:

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AFCEE
ORGANIC ANALYSES DATA SHEET 5
CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Initial Calibration ID: C110412

ICV ID: 110413A LCS-1WC

CCV #1 ID: ____

CCV #2 ID: ____

Analyte	ICV %D or % drift	CCV#1 %D or % drift	CCV#2 %D or % drift	Q
1,1,1,2-Tetrachloroethane	7.2			
1,1,1-TCA	3.0			
1,1,2-TCA	3.4			
1,1-Dichloropropene	2.1			
1,2,3-Trichlorobenzene	11			
1,2,3-Trichloropropane	7.5			
1,2,4-Trichlorobenzene	15			
1,2,4-Trimethylbenzene	3.7			
1,2-DCA	4.8			
1,2-DCB	7.6			
1,2-Dibromo-3-chloropropane	16			
1,2-EDB	12			
1,3,5-Trimethylbenzene	2.2			
1,3-DCB	6.9			
1,3-Dichloropropane	10			
1,4-DCB	5.1			
1-Chlorohexane	2.3			
2,2-Dichloropropane	6.9			
2-Chlorotoluene	3.3			
Benzene	9.3			
Bromobenzene	8.3			
Bromochloromethane	11			
Bromodichloromethane	3.1			
Bromomethane	15			
Carbon Tetrachloride	1.5			
Chloroethane	1.1			
Cis-1,2-DCE	8.8			
Cis-1,3-Dichloropropene	6.5			
Dibromochloromethane	11			
Dibromomethane	10			
Dichlorodifluoromethane	0.9			
Hexachlorobutadiene	4.3			
Isopropylbenzene	1.0			
m&p-Xylene	6.5			
Methylene chloride	15			
n-Butylbenzene	2.2			
n-Propylbenzene	2.0			
Naphthalene	13			

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AFCEE
ORGANIC ANALYSES DATA SHEET 5
CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Initial Calibration ID: C110412

ICV ID: 110413A LCS-1WC

CCV #1 ID:

CCV #2 ID:

Analyte	ICV %D or % drift	CCV#1 %D or % drift	CCV#2 %D or % drift	Q
o-Xylene	6.1			
p-Isopropyltoluene	0.2			
Sec-Butylbenzene	2.8			
Styrene	3.1			
TCE	2.7			
Tert-Butylbenzene	1.8			
Tetrachloroethene	5.2			
Trans-1,2-DCE	7.8			
Trans-1,3-Dichloropropene	14			
Trichlorofluoromethane	2.7			

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 5
CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Initial Calibration ID: N110407B

ICV ID: 110411A LCS-1SN

CCV #1 ID: ______

CCV #2 ID: ______

Analyte	ICV %D or % drift	CCV#1 %D or % drift	CCV#2 %D or % drift	Q
1,1,1,2-Tetrachloroethane	15			
1,1,1-TCA	14			
1,1,2-TCA	17			
1,1-Dichloropropene	9.4			
1,2,3-Trichlorobenzene	6.6			
1,2,3-Trichloropropane	8.0			
1,2,4-Trichlorobenzene	6.4			
1,2,4-Trimethylbenzene	13			
1,2-DCA	13			
1,2-DCB	14			
1,2-Dibromo-3-chloropropane	11			
1,2-EDB	12			
1,3,5-Trimethylbenzene	14			
1,3-DCB	15			
1,3-Dichloropropane	13			
1,4-DCB	14			
1-Chlorohexane	12			
2,2-Dichloropropane	1.3			
2-Chlorotoluene	16			
4-Chlorotoluene	17			
Acetone	0.1			
Benzene	16			
Bromobenzene	19			
Bromochloromethane	20			
Bromodichloromethane	18			
Bromomethane	19			
Carbon tetrachloride	4.2			
Chloroethane	2.6			
Cis-1,2-DCE	13			
Cis-1,3-Dichloropropene	19			
Dibromochloromethane	12			
Dibromomethane	18			
Dichlorodifluoromethane	1.4			
Hexachlorobutadiene	15			
Isopropylbenzene	13			
m&p-Xylene	16			
Methylene chloride	15			
Methyl t-butyl ether (MTBE)	18			
MEK (2-Butanone)	15			
MIBK (methyl isobutyl ketone)	2.5			
n-Butylbenzene	7.2			
n-Propylbenzene	12			
Naphthalene	2.2			

AFCEE
ORGANIC ANALYSES DATA SHEET 5
CALIBRATION VERIFICATION

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Initial Calibration ID: N110407B

ICV ID: 110411A LCS-1SN

CCV #1 ID: ________

CCV #2 ID: ________

Analyte	ICV %D or % drift	CCV#1 %D or % drift	CCV#2 %D or % drift	Q
o-Xylene	13			
p-Isopropyltoluene	14			
Sec-Butylbenzene	17			
Styrene	5.2			
TCE	12			
Tert-Butylbenzene	18			
Tetrachloroethene	17			
Trans-1,2-DCE	7.3			
Trans-1,3-Dichloropropene	18			
Trichlorofluoromethane	7.1			

Comments: ________

AFCEE
ORGANIC ANALYSES DATA SHEET 5A
CALIBRATION VERIFICATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110413AC-154245

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Initial Calibration ID: C110412

ICV ID: 110413A LCS-1WC

CCV #1 ID:

CCV #2 ID:

Analyte	ICV		CCV #1		CCV #2		
	RF	% D	RF	% D	RF	% D	Q
Chloromethane *	0.115021	15.6024					
1,1-DCA *	1.14414	4.68645					
Bromoform *	0.13889	9.81335					
Chlorobenzene *	2.66877	5.46677					
1,1,2,2-Tetrachloroethane *	0.719003	3.20963					
1,1-DCE #	0.980145	3.98553					
Chloroform #	1.22087	8.49419					
1,2-Dichloropropane #	0.51755	5.28435					
Toluene #	2.77179	1.78064					
Ethylbenzene #	4.68563	2.80066					
Vinyl chloride #	0.30584	4.53374					

* SPCCs # CCCs

Comments:

AFCEE FORM O-5A Page ___ of _____

AFCEE
ORGANIC ANALYSES DATA SHEET 5A
CALIBRATION VERIFICATION-GC/MS ANALYSIS

Analytical Method: METHOD 8260B

AAB #: 110411AN-154242

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Initial Calibration ID: N110407B

ICV ID: 110411A LCS-1SN

CCV #1 ID:

CCV #2 ID:

	ICV		CCV #1		CCV #2		
Analyte	RF	% D	RF	% D	RF	% D	Q
Chloromethane *	0.949628	15.6088					
1,1-DCA *	0.732879	17.201					
Bromoform *	0.278357	10.9094					
Chlorobenzene *	0.981646	13.0499					
1,1,2,2-Tetrachloroethane *	0.972346	12.7349					
1,1-DCE #	0.557503	11.1173					
Chloroform #	0.623549	10.7201					
1,2-Dichloropropane #	0.314671	20.362					
Toluene #	0.746912	10.8813					
Ethylbenzene #	1.78067	12.4813					
Vinyl chloride #	0.1513	16.6826					

* SPCCs # CCCs

Comments:

AFCEE FORM O-5A Page ___ of ____

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: C110412

AAB #: 110413AC-154245
Contract #: 2010*1286022*000
Method Blank ID: 110413A~~C~~-BLK -1WC
hp 5-6-11

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64352, Sample: AY35295

AFCEE FORM O-6

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

Concentration Units: ug/L

Initial Calibration ID: C110412

AAB #: 110413AC-154245

Contract #: 2010*1286022*000

Method Blank ID: 110413A~~C~~-BLK-1WC

np 5-6-11

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	103	69-139	
SURROGATE: 4-BROMOFLUOROBE	84.2	75-125	
SURROGATE: DIBROMOFLUOROME	98.8	75-125	
SURROGATE: TOLUENE-D8 (S)	90.2	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64352, Sample: AY35295

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: N110407B

AAB #: 110411AN-154242
Contract #: 2010*1286022*000
Method Blank ID: 110411A~~N~~-BLK-1SN
hp 5-6-11

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.003	U
1,1,1-TCA	< RL	0.004	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.002	U
1,1,2-TCA	< RL	0.005	U
1,1-DCA	< RL	0.002	U
1,1-DCE	< RL	0.006	U
1,1-DICHLOROPROPENE	< RL	0.005	U
1,2,3-TRICHLOROBENZENE	< RL	0.004	U
1,2,3-TRICHLOROPROPANE	< RL	0.020	U
1,2,4-TRICHLOROBENZENE	< RL	0.004	U
1,2,4-TRIMETHYLBENZENE	< RL	0.007	U
1,2-DCA	< RL	0.003	U
1,2-DCB	< RL	0.002	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	0.010	U
1,2-DICHLOROPROPANE	< RL	0.002	U
1,2-EDB	< RL	0.003	U
1,3,5-TRIMETHYLBENZENE	< RL	0.003	U
1,3-DCB	< RL	0.006	U
1,3-DICHLOROPROPANE	< RL	0.002	U
1,4-DCB	< RL	0.002	U
1-CHLOROHEXANE	< RL	0.003	U
2,2-DICHLOROPROPANE	< RL	0.020	U
2-CHLOROTOLUENE	< RL	0.002	U
4-CHLOROTOLUENE	< RL	0.003	U
BENZENE	< RL	0.002	U
BROMOBENZENE	< RL	0.002	U
BROMOCHLOROMETHANE	< RL	0.002	U
BROMODICHLOROMETHANE	< RL	0.004	U
BROMOFORM	< RL	0.006	U
BROMOMETHANE	< RL	0.005	U
CARBON TETRACHLORIDE	< RL	0.010	U
CHLOROBENZENE	< RL	0.002	U
CHLOROETHANE	< RL	0.005	U
CHLOROFORM	< RL	0.002	U
CHLOROMETHANE	< RL	0.007	U
CIS-1,2-DCE	< RL	0.006	U
CIS-1,3-DICHLOROPROPENE	< RL	0.005	U
DIBROMOCHLOROMETHANE	< RL	0.003	U
DIBROMOMETHANE	< RL	0.010	U
DICHLORODIFLUOROMETHANE	< RL	0.005	U
ETHYLBENZENE	< RL	0.003	U

Comments: ARF: 64352, Sample: AY35298

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

Concentration Units: mg/kg

Initial Calibration ID: N110407B

AAB #: 110411AN-154242

Contract #: 2010*1286022*000

Method Blank ID: 110411A~~N~~-BLK-15N

rp 5-6-11

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	0.005	U
ISOPROPYLBENZENE	< RL	0.008	U
M&P-XYLENE	< RL	0.007	U
METHYLENE CHLORIDE	< RL	0.005	U
N-BUTYLBENZENE	< RL	0.005	U
N-PROPYLBENZENE	< RL	0.002	U
NAPHTHALENE	< RL	0.020	U
O-XYLENE	< RL	0.005	U
P-ISOPROPYLTOLUENE	< RL	0.006	U
SEC-BUTYLBENZENE	< RL	0.007	U
STYRENE	< RL	0.002	U
TCE	< RL	0.010	U
TERT-BUTYLBENZENE	< RL	0.007	U
TETRACHLOROETHENE	< RL	0.007	U
TOLUENE	< RL	0.005	U
TRANS-1,2-DCE	< RL	0.003	U
TRANS-1,3-DICHLOROPROPENE	< RL	0.005	U
TRICHLOROFLUOROMETHANE	< RL	0.004	U
VINYL CHLORIDE	< RL	0.009	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	118	52-149	
SURROGATE: 4-BROMOFLUOROBE	93.5	65-135	
SURROGATE: DIBROMOFLUOROME	110	65-135	
SURROGATE: TOLUENE-D8 (S)	102	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64352, Sample: AY35298

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110411A~~N~~LCS-15N
rp 5-6-11
Concentration Units: mg/kg

AAB #: 110411AN-154242
Contract #: 2010*1286022*000
Initial Calibration ID: N110407B

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	0.0500	0.0424	84.8	62-125	
1,1,1-TCA	0.0500	0.0569	114	65-135	
1,1,2,2-TETRACHLOROETHANE	0.0500	0.0436	87.2	64-135	
1,1,2-TCA	0.0500	0.0587	117	65-135	
1,1-DCA	0.0500	0.0586	117	62-135	
1,1-DCE	0.0500	0.0556	111	65-135	
1,1-DICHLOROPROPENE	0.0500	0.0547	109	65-135	
1,2,3-TRICHLOROBENZENE	0.0500	0.0467	93.4	65-147	
1,2,3-TRICHLOROPROPANE	0.050	0.046	92.0	65-135	
1,2,4-TRICHLOROBENZENE	0.0500	0.0494	98.8	65-145	
1,2,4-TRIMETHYLBENZENE	0.0500	0.0434	86.8	65-135	
1,2-DCA	0.0500	0.0567	113	58-137	
1,2-DCB	0.0500	0.0428	85.6	65-135	
1,2-DIBROMO-3-CHLOROPROPANE	0.050	0.045	90.0	49-135	
1,2-DICHLOROPROPANE	0.0500	0.0602	120	60-135	
1,2-EDB	0.0500	0.0442	88.4	65-135	
1,3,5-TRIMETHYLBENZENE	0.0500	0.0429	85.8	62-135	
1,3-DCB	0.0500	0.0427	85.4	65-135	
1,3-DICHLOROPROPANE	0.0500	0.0436	87.2	65-135	
1,4-DCB	0.0500	0.0428	85.6	65-135	
1-CHLOROHEXANE	0.0500	0.0442	88.4	65-135	
2,2-DICHLOROPROPANE	0.050	0.051	102	65-135	
2-CHLOROTOLUENE	0.0500	0.0421	84.2	63-135	
4-CHLOROTOLUENE	0.0500	0.0417	83.4	64-135	
BENZENE	0.0500	0.0582	116	65-135	
BROMOBENZENE	0.0500	0.0405	81.0	65-135	
BROMOCHLOROMETHANE	0.0500	0.0600	120	63-135	
BROMODICHLOROMETHANE	0.0500	0.0588	118	65-135	
BROMOFORM	0.0500	0.0445	89.0	65-135	
BROMOMETHANE	0.0500	0.0594	119	62-135	
CARBON TETRACHLORIDE	0.050	0.052	104	52-135	
CHLOROBENZENE	0.0500	0.0435	87.0	65-135	
CHLOROETHANE	0.0500	0.0487	97.4	55-135	
CHLOROFORM	0.0500	0.0554	111	64-135	
CHLOROMETHANE	0.0500	0.0578	116	65-135	
CIS-1,2-DCE	0.0500	0.0566	113	65-135	
CIS-1,3-DICHLOROPROPENE	0.0500	0.0593	119	64-135	
DIBROMOCHLOROMETHANE	0.0500	0.0442	88.4	63-135	
DIBROMOMETHANE	0.050	0.059	118	59-137	
DICHLORODIFLUOROMETHANE	0.0500	0.0507	101	65-135	

Comments: ARF: 64352, QC Sample ID: AY35298

AFCEE FORM O-7

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110411A~~N~~ LCS -1SN
np 5-16-11

Concentration Units: mg/kg

AAB #: 110411AN-154242

Contract #: 2010*1286022*000

Initial Calibration ID: N110407B

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	0.0500	0.0438	87.6	65-135	
HEXACHLOROBUTADIENE	0.0500	0.0427	85.4	65-135	
ISOPROPYLBENZENE	0.0500	0.0437	87.4	65-135	
M&P-XYLENE	0.1000	0.0843	84.3	65-135	
METHYLENE CHLORIDE	0.0500	0.0575	115	65-135	
N-BUTYLBENZENE	0.0500	0.0464	92.8	65-135	
N-PROPYLBENZENE	0.0500	0.0438	87.6	65-135	
NAPHTHALENE	0.0500	0.0511	102	65-135	
O-XYLENE	0.0500	0.0433	86.6	65-135	
P-ISOPROPYLTOLUENE	0.0500	0.0431	86.2	65-135	
SEC-BUTYLBENZENE	0.0500	0.0413	82.6	65-135	
STYRENE	0.0500	0.0474	94.8	65-135	
TCE	0.0500	0.0562	112	61-135	
TERT-BUTYLBENZENE	0.0500	0.0412	82.4	65-135	
TETRACHLOROETHENE	0.0500	0.0415	83.0	61-135	
TOLUENE	0.0500	0.0554	111	64-135	
TRANS-1,2-DCE	0.0500	0.0537	107	65-135	
TRANS-1,3-DICHLOROPROPENE	0.0500	0.0591	118	56-135	
TRICHLOROFLUOROMETHANE	0.0500	0.0536	107	57-135	
VINYL CHLORIDE	0.0500	0.0583	117	36-144	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	120	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	92.9	65-135	
SURROGATE: DIBROMOFLUOROMETH	117	65-135	
SURROGATE: TOLUENE-D8 (S)	97.8	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64352, QC Sample ID: AY35298

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110413A~~C~~LCS-1WC
np 5-16-11

Concentration Units: ug/L

AAB #: 110413AC-154245

Contract #: 2010*1286022*000

Initial Calibration ID: C110412

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	9.28	92.8	72-125	
1,1,1-TCA	10.00	9.70	97.0	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	9.68	96.8	74-125	
1,1,2-TCA	10.00	9.66	96.6	75-127	
1,1-DCA	10.00	9.53	95.3	75-125	
1,1-DCE	10.00	9.60	96.0	75-125	
1,1-DICHLOROPROPENE	10.00	9.79	97.9	75-125	
1,2,3-TRICHLOROBENZENE	10.00	8.93	89.3	75-137	
1,2,3-TRICHLOROPROPANE	10.00	10.75	108	75-125	
1,2,4-TRICHLOROBENZENE	10.00	8.54	85.4	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	9.63	96.3	75-125	
1,2-DCA	10.00	9.52	95.2	68-127	
1,2-DCB	10.00	9.24	92.4	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	8.36	83.6	59-125	
1,2-DICHLOROPROPANE	10.00	9.47	94.7	70-125	
1,2-EDB	10.00	8.83	88.3	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	9.78	97.8	72-125	
1,3-DCB	10.00	9.31	93.1	75-125	
1,3-DICHLOROPROPANE	10.00	9.00	90.0	75-125	
1,4-DCB	10.00	9.49	94.9	75-125	
1-CHLOROHEXANE	10.00	9.77	97.7	75-125	
2,2-DICHLOROPROPANE	10.00	9.31	93.1	75-125	
2-CHLOROTOLUENE	10.00	9.67	96.7	73-125	
4-CHLOROTOLUENE	10.00	9.94	99.4	74-125	
BENZENE	10.00	9.07	90.7	75-125	
BROMOBENZENE	10.00	9.17	91.7	75-125	
BROMOCHLOROMETHANE	10.00	8.88	88.8	73-125	
BROMODICHLOROMETHANE	10.00	9.69	96.9	75-125	
BROMOFORM	10.00	9.02	90.2	75-125	
BROMOMETHANE	10.00	8.53	85.3	72-125	
CARBON TETRACHLORIDE	10.00	10.15	102	62-125	
CHLOROBENZENE	10.00	9.45	94.5	75-125	
CHLOROETHANE	10.00	10.11	101	65-125	
CHLOROFORM	10.00	9.15	91.5	74-125	
CHLOROMETHANE	10.00	8.44	84.4	75-125	
CIS-1,2-DCE	10.00	9.12	91.2	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	9.35	93.5	74-125	
DIBROMOCHLOROMETHANE	10.00	8.86	88.6	73-125	
DIBROMOMETHANE	10.00	8.95	89.5	69-127	
DICHLORODIFLUOROMETHANE	10.00	9.91	99.1	72-125	

Comments: ARF: 64352, QC Sample ID: AY35295

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110413A~~C~~LCS -1WC
np 5-6-11
Concentration Units: ug/L

AAB #: 110413AC-154245
Contract #: 2010*1286022*000
Initial Calibration ID: C110412

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	9.72	97.2	75-125	
HEXACHLOROBUTADIENE	10.00	9.57	95.7	75-125	
ISOPROPYLBENZENE	10.00	10.10	101	75-125	
M&P-XYLENE	20.00	18.69	93.5	75-125	
METHYLENE CHLORIDE	10.00	8.47	84.7	75-125	
N-BUTYLBENZENE	10.00	9.78	97.8	75-125	
N-PROPYLBENZENE	10.00	10.20	102	75-125	
NAPHTHALENE	10.00	8.72	87.2	75-125	
O-XYLENE	10.00	9.39	93.9	75-125	
P-ISOPROPYLTOLUENE	10.00	10.02	100	75-125	
SEC-BUTYLBENZENE	10.00	10.28	103	75-125	
STYRENE	10.00	9.69	96.9	75-125	
TCE	10.00	9.73	97.3	71-125	
TERT-BUTYLBENZENE	10.00	10.18	102	75-125	
TETRACHLOROETHENE	10.00	9.48	94.8	71-125	
TOLUENE	10.00	9.82	98.2	74-125	
TRANS-1,2-DCE	10.00	9.22	92.2	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	8.62	86.2	66-125	
TRICHLOROFLUOROMETHANE	10.00	10.27	103	67-125	
VINYL CHLORIDE	10.00	9.55	95.5	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	104	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	86.7	75-125	
SURROGATE: DIBROMOFLUOROMETH	102	75-125	
SURROGATE: TOLUENE-D8 (S)	94.2	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64352, QC Sample ID: AY35295

AFCEE
ORGANIC ANALYSES DATA SHEET 8
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Analytical Method: EPA 8260B

Initial Calibration ID: N110407B

Lab Name: APPL, Inc

Contract #: 2010*1286022*000

Concentration Units: mg/kg

% Solids: 77.1

Parent Field Sample ID: ACC65-SIW-01(0.6-0.8)

MS ID: 110411 A-AY 35298S 01 MS-1NS rp 5-6-11

MSD ID: 110411 A-AY 35298S 01 MSD-1NS rp 5-6-11

Analyte	Parent Sample Result	Spike Added	Spiked Sample Result	% R	Duplicate Spiked Sample Result	% R	%RPD	Control Limits % R	Control Limits % RPD	Q
1,1,1,2-TETRACHLOROETHANE		0.0642	0.0307	47.8	0.0273	42.5	11.7	62-125	30	M
1,1,1-TCA		0.0642	0.0522	81.3	0.0372	57.9	33.6	65-135	30	M
1,1,2,2-TETRACHLOROETHANE		0.0642	0.0323	50.3	0.0330	51.4	2.1	64-135	30	M
1,1,2-TCA		0.0642	0.0476	74.1	0.0400	62.3	17.4	65-135	30	M
1,1-DCA		0.0642	0.0536	83.5	0.0506	78.8	5.8	62-135	30	
1,1-DCE		0.0642	0.0583	90.8	0.0536	83.5	8.4	65-135	30	
1,1-DICHLOROPROPENE		0.0642	0.0487	75.9	0.0394	61.4	21.1	65-135	30	M
1,2,3-TRICHLOROBENZENE		0.0642	0.0129	20.1	0.0001	0.2	196.9	65-147	30	M
1,2,3-TRICHLOROPROPANE		0.065	0.031	47.7	0.036	55.4	14.9	65-135	30	M
1,2,4-TRICHLOROBENZENE		0.0642	0.0144	22.4	0.0042	6.5	109.7	65-145	30	M
1,2,4-TRIMETHYLBENZENE		0.0642	0.0219	34.1	0.0107	16.7	68.7	65-135	30	M
1,2-DCA		0.0642	0.0556	86.6	0.0568	88.5	2.1	58-137	30	
1,2-DCB		0.0642	0.0189	29.4	0.0091	14.2	70.0	65-135	30	M
1,2-DIBROMO-3-CHLOROPROPAN		0.065	0.032	49.2	0.027	41.5	16.9	49-135	30	M
1,2-DICHLOROPROPANE		0.0642	0.0542	84.4	0.0493	76.8	9.5	60-135	30	
1,2-EDB		0.0642	0.0378	58.9	0.0016	2.5	183.8	65-135	30	M
1,3,5-TRIMETHYLBENZENE		0.0642	0.0226	35.2	0.0108	16.8	70.7	62-135	30	M
1,3-DCB		0.0642	0.0186	29.0	0.0100	15.6	60.1	65-135	30	M
1,3-DICHLOROPROPANE		0.0642	0.0376	58.6	0.0215	33.5	54.5	65-135	30	M
1,4-DCB		0.0642	0.0198	30.8	0.0104	16.2	62.3	65-135	30	M
1-CHLOROHEXANE		0.0642	0.0260	40.5	0.0100	15.6	88.9	65-135	30	M
2,2-DICHLOROPROPANE		0.065	0.042	64.6	0.011	16.9	117.0	65-135	30	M
2-CHLOROTOLUENE		0.0642	0.0209	32.6	0.0119	18.5	54.9	63-135	30	M
4-CHLOROTOLUENE		0.0642	0.0223	34.7	0.0139	21.7	46.4	64-135	30	M
BENZENE		0.0642	0.0539	84.0	0.0438	68.2	20.7	65-135	30	
BROMOBENZENE		0.0642	0.0229	35.7	0.0180	28.0	24.0	65-135	30	M
BROMOCHLOROMETHANE		0.0642	0.0547	85.2	0.0421	65.6	26.0	63-135	30	
BROMODICHLOROMETHANE		0.0642	0.0526	81.9	0.0315	49.1	50.2	65-135	30	M
BROMOFORM		0.0642	0.0336	52.3	0.0222	34.6	40.9	65-135	30	M
BROMOMETHANE		0.0642	0.0507	79.0	0.0144	22.4	111.5	62-135	30	M
CARBON TETRACHLORIDE		0.065	0.044	67.7	0.012	18.5	114.3	52-135	30	M
CHLOROBENZENE		0.0642	0.0287	44.7	0.0235	36.6	19.9	65-135	30	M
CHLOROETHANE		0.0642	0.0590	91.9	0.0363	56.5	47.6	55-135	30	M
CHLOROFORM		0.0642	0.0497	77.4	0.0469	73.1	5.8	64-135	30	
CHLOROMETHANE		0.0642	0.0514	80.1	0.0198	30.8	88.8	65-135	30	M
CIS-1,2-DCE		0.0642	0.0558	86.9	0.0492	76.6	12.6	65-135	30	
CIS-1,3-DICHLOROPROPENE		0.0642	0.0500	77.9	0.0074	11.5	148.4	64-135	30	M

Comments:

AFCEE FORM O-8

AFCEE
ORGANIC ANALYSES DATA SHEET 8
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Analytical Method: EPA 8260B

Initial Calibration ID: N110407B

Lab Name: APPL, Inc

Contract #: 2010*1286022*000

Concentration Units: mg/kg

% Solids: 77.1

Parent Field Sample ID: ACC65-SIW-01(0.6-0.8)

MS ID: 110411A-AY-35298S01MS-1NS rp 5-6-11

MSD ID: 110411A-AY35298S01MSD-1NS rp 5-6-11

Analyte	Parent Sample Result	Spike Added	Spiked Sample Result	% R	Duplicate Spiked Sample Result	% R	%RPD	Control Limits % R	Control Limits % RPD	Q
DIBROMOCHLOROMETHANE		0.0642	0.0359	55.9	0.0167	26.0	73.0	63-135	30	M
DIBROMOMETHANE		0.065	0.055	84.6	0.030	46.2	58.8	59-137	30	M
DICHLORODIFLUOROMETHANE		0.0642	0.0647	101	0.0183	28.5	111.8	65-135	30	M
ETHYLBENZENE		0.0642	0.0313	48.8	0.0219	34.1	35.3	65-135	30	M
HEXACHLOROBUTADIENE		0.0642	0.0150	23.4	0.0063	9.8	81.7	65-135	30	M
ISOPROPYLBENZENE		0.0642	0.0244	38.0	0.0130	20.2	61.0	65-135	30	M
M&P-XYLENE		0.0642	0.0550	85.7	0.0397	61.8	32.3	65-135	30	M
METHYLENE CHLORIDE		0.0642	0.0530	82.6	0.0520	81.0	1.9	65-135	30	
N-BUTYLBENZENE		0.0642	0.0179	27.9	0.0058	9.0	102.1	65-135	30	M
N-PROPYLBENZENE		0.0642	0.0220	34.3	0.0105	16.4	70.8	65-135	30	M
NAPHTHALENE		0.0642	0.0193	30.1	0.0098	15.3	65.3	65-135	30	M
O-XYLENE		0.0642	0.0281	43.8	0.0208	32.4	29.9	65-135	30	M
P-ISOPROPYLTOLUENE		0.0642	0.0186	29.0	0.0061	9.5	101.2	65-135	30	M
SEC-BUTYLBENZENE		0.0642	0.0193	30.1	0.0064	10.0	100.4	65-135	30	M
STYRENE		0.0642	0.0317	49.4	0.0247	38.5	24.8	65-135	30	M
TCE		0.0642	0.0508	79.1	0.0425	66.2	17.8	61-135	30	
TERT-BUTYLBENZENE		0.0642	0.0207	32.2	0.0080	12.5	88.5	65-135	30	M
TETRACHLOROETHENE	0.0107	0.0642	0.0339	36.1	0.0209	15.9	47.4	61-135	30	M
TOLUENE	0.0013	0.0642	0.0436	65.9	0.0396	59.7	9.6	64-135	30	M
TRANS-1,2-DCE		0.0642	0.0505	78.7	0.0465	72.4	8.2	65-135	30	
TRANS-1,3-DICHLOROPROPENE		0.0642	0.0502	78.2	0.0055	8.6	160.5	56-135	30	M
TRICHLOROFLUOROMETHANE		0.0642	0.0647	101	0.0186	29.0	110.7	57-135	30	M
VINYL CHLORIDE		0.0642	0.0723	113	0.0218	34.0	107.3	36-144	30	M

Analyte	Parent Sample Result	Spike Added	Spiked Sample Result	% R	Duplicate Spiked Sample Result	% R	%RPD	Control Limits % R	Control Limits % RPD	Q
SURROGATE: 1,2-DICHLOROETHA		0.046	0.058	126	0.052	113		52-149		
SURROGATE: 4-BROMOFLUOROB		0.042	0.040	95.2	0.041	97.6		65-135		
SURROGATE: DIBROMOFLUORO		0.047	0.059	126	0.051	109		65-135		
SURROGATE: TOLUENE-D8 (S)		0.045	0.046	102	0.046	102		65-135		

Comments:

AFCEE FORM O-8

AFCEE
ORGANIC ANALYSES DATA SHEET 9
HOLDING TIMES

Analytical Method: EPA 8260B

AAB#: 110411AN-154242

Lab Name: APPL, Inc

Contract #: 2010*1286022*000

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time Ext	Time Held Ext	Date Analyzed	Max. Holding Time A	Time Held Anal.	Q
ACC65-SIW-01(0-0.6)	06-Apr-11	08-Apr-11	11-Apr-11			11-Apr-11	14	5	
ACC65-SIW-01(0-0.6) F	06-Apr-11	08-Apr-11	11-Apr-11			11-Apr-11	14	5	
ACC65-SIW-01(0.6-0.8)	06-Apr-11	08-Apr-11	11-Apr-11			11-Apr-11	14	5	
ACC65-SIW-01(23.5-24	06-Apr-11	08-Apr-11	11-Apr-11			11-Apr-11	14	5	
ACC65-SIW-01(8-8.5)	06-Apr-11	08-Apr-11	11-Apr-11			11-Apr-11	14	5	

Comments: ARF: 64352

AFCEE
ORGANIC ANALYSES DATA SHEET 9
HOLDING TIMES

Analytical Method: EPA 8260B

AAB#: 110413AC-154245

Lab Name: APPL, Inc

Contract #: 2010*1286022*000

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time Ext	Time Held Ext	Date Analyzed	Max. Holding Time A	Time Held Anal.	Q
TB-1	06-Apr-11	08-Apr-11	13-Apr-11			13-Apr-11	14	7	

Comments: ARF: 64352

AFCEE FORM O-9

AFCEE
ORGANIC ANALYSES DATA SHEET 10
INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID #: Chico

ICAL ID: C110412

Field Sample ID/Std ID/ Blank ID/QC Sample ID	Date Analysis Started	Time Analysis Started	Date Analysis Completed	Time Analysis Completed
20ug/ml BFB STD 03-11-11A	12-Apr-11	10:41	12-Apr-11	10:53
Vol Std 04-12-11@0.3ug/L	12-Apr-11	13:00	12-Apr-11	13:28
Vol Std 04-12-11@0.5ug/L	12-Apr-11	13:35	12-Apr-11	14:04
Vol Std 04-12-11@1.0ug/L	12-Apr-11	14:10	12-Apr-11	14:39
Vol Std 04-1211@2.0ug/L	12-Apr-11	14:46	12-Apr-11	15:14
Vol Std 04-12-11@5.0ug/L	12-Apr-11	15:21	12-Apr-11	15:49
Vol Std 04-12-11@10ug/L	12-Apr-11	15:56	12-Apr-11	16:24
Vol Std 04-12-11@20ug/L	12-Apr-11	16:31	12-Apr-11	16:59
Vol Std 04-12-11@40ug/L	12-Apr-11	17:06	12-Apr-11	17:35
Vol Std 04-1211@100ug/L	12-Apr-11	17:42	12-Apr-11	18:10
20ug/ml BFB STD 03-11-11A	12-Apr-11	19:27	12-Apr-11	19:55
110412A LCS-1WC(SS)	12-Apr-11	20:38	12-Apr-11	21:07
20ug/ml BFB STD 03-11-11A	13-Apr-11	10:59	13-Apr-11	11:27
110413A LCS-1WC	13-Apr-11	13:55	13-Apr-11	14:23
110413A BLK-1WC	13-Apr-11	15:40	13-Apr-11	16:08
AY35295W01	13-Apr-11	16:14	13-Apr-11	16:43

Comments:

AFCEE FORM O-10 Page ___ of _____

Injection Log

Directory: M:\CHICO\DATA\C110412\

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0412C00T.D	1	20ug/ml BFB STD 03-11-11A	2uL	12 Apr 11 10:41
2	1	0412C04W.D	1	Vol Std 04-12-11@0.3ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 13:00
3	1	0412C05W.D	1	Vol Std 04-12-11@0.5ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 13:35
4	1	0412C06W.D	1	Vol Std 04-12-11@1.0ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 14:10
5	1	0412C07W.D	1	Vol Std 04-1211@2.0ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 14:46
6	1	0412C08W.D	1	Vol Std 04-12-11@5.0ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 15:21
7	1	0412C09W.D	1	Vol Std 04-12-11@10ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 15:56
8	1	0412C10W.D	1	Vol Std 04-12-11@20ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 16:31
9	1	0412C11W.D	1	Vol Std 04-12-11@40ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 17:06
10	1	0412C12W.D	1	Vol Std 04-1211@100ug/L	Water 10ml w/IS: 04-12-11	12 Apr 11 17:42
11	1	0412C15W.D	1	20ug/ml BFB STD 03-11-11A	Water 10ml w/IS&S: 04-12-11	12 Apr 11 19:27
12	1	0412C17W.D	1	110412A LCS-1WC(SS)	Water 10ml w/IS&S: 04-12-11	12 Apr 11 20:38
13	1	0413C00T.D	1	20ug/ml BFB STD 03-11-11A	2uL	13 Apr 11 10:59
14	1	0413C05W.D	1	110413A LCS-1WC	Water 10ml w/IS&S: 04-12-11	13 Apr 11 13:55
15	1	0413C07W.D	1	110413A BLK-1WC	Water 10ml w/IS&S: 04-12-11	13 Apr 11 15:40
16	1	0413C08W.D	1	AY35295W01	Water 10ml w/IS&S: 04-12-11	13 Apr 11 16:14

AFCEE
ORGANIC ANALYSES DATA SHEET 10
INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID #: Neo

ICAL ID: N110407B

Field Sample ID/Std ID/ Blank ID/QC Sample ID	Date Analysis Started	Time Analysis Started	Date Analysis Completed	Time Analysis Completed
20ug/ml BFB Std 03-21-11A	7-Apr-11	22:38	7-Apr-11	22:49
Vol Std 04-07-11@2.0ug/kg	8-Apr-11	00:52	8-Apr-11	1:24
Vol Std 04-07-11@5.0ug/kg	8-Apr-11	1:30	8-Apr-11	2:02
Vol Std 04-07-11@10ug/kg	8-Apr-11	2:08	8-Apr-11	2:40
Vol Std 04-07-11@20ug/kg	8-Apr-11	2:47	8-Apr-11	3:18
Vol Std 04-07-11@50ug/kg	8-Apr-11	3:25	8-Apr-11	3:56
Vol Std 04-07-11@200ug/kg	8-Apr-11	4:41	8-Apr-11	5:13
20ug/ml BFB Std 03-21-11A	11-Apr-11	10:08	11-Apr-11	10:18
110411A LCS-1SN (SS)	11-Apr-11	12:23	11-Apr-11	12:55
110411A BLK-1SN	11-Apr-11	13:38	11-Apr-11	14:10
AY35296S01 5.050	11-Apr-11	15:31	11-Apr-11	16:03
AY35298S01 5.032	11-Apr-11	16:47	11-Apr-11	17:19
AY35299S01 5.018	11-Apr-11	17:25	11-Apr-11	17:57
AY35300S01 5.031	11-Apr-11	18:03	11-Apr-11	18:34
AY35298S01 MS-1NS	11-Apr-11	18:41	11-Apr-11	19:12
AY35298S01 MSD-1NS	11-Apr-11	19:18	11-Apr-11	19:50
AY35297S01 5.038	11-Apr-11	21:51	11-Apr-11	22:22

Comments:

AFCEE FORM O-10 Page ___ of _____

Injection Log

Directory: M:\NEO\DATA\N110407B\

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0407N00T.D	1	20ug/ml BFB Std 03-21-11A	2ul	7 Apr 11 22:38
2	1	0407N04S.D	1	Vol Std 04-07-11@2.0ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 00:52
3	1	0407N05S.D	1	Vol Std 04-07-11@5.0ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 1:30
4	1	0407N06S.D	1	Vol Std 04-07-11@10ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 2:08
5	1	0407N07S.D	1	Vol Std 04-07-11@20ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 2:47
6	1	0407N08S.D	1	Vol Std 04-07-11@50ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 3:25
7	1	0407N10S.D	1	Vol Std 04-07-11@200ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 4:41
8	1	0411N00T.D	1	20ug/ml BFB Std 03-21-11A	2ul	11 Apr 11 10:08
9	1	0411N04S.D	1	110411A LCS-1SN (SS)	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 12:23
10	1	0411N05S.D	1	110411A BLK-1SN	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 13:38
11	1	0411N07S.D	0.990099	AY35296S01 5.050	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 15:31
12	1	0411N09S.D	0.993641	AY35298S01 5.032	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 16:47
13	1	0411N10S.D	0.996413	AY35299S01 5.018	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 17:25
14	1	0411N11S.D	0.993838	AY35300S01 5.031	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 18:03
15	1	0411N12S.D	0.99226	AY35298S01 MS-1NS	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 18:41
16	1	0411N13S.D	0.993641	AY35298S01 MSD-1NS	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 19:18
17	1	0411N17S.D	0.992457	AY35297S01 5.038	Soil 5mL w/IS&S: 04-07-11	11 Apr 11 21:51

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK
(BFB or DFTPP)

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Compound: BFB

Injection Date/Time: 12-Apr-11 10:41

Initial Calibration ID: C110412

Mass	Ion Abundance Criteria	% Relative Abundance	Q
50	14.9 - 40% of mass 95	18.2	PASS
75	30 - 60% of mass 95	46.8	PASS
95	100 - 100% of mass 95	100.0	PASS
96	5 - 9% of mass 95	7.3	PASS
173	0 - 2% of mass 174	0.0	PASS
174	50 - 100% of mass 95	98.4	PASS
175	5 - 9% of mass 174	7.5	PASS
176	95 - 101% of mass 174	98.7	PASS
177	5 - 9% of mass 176	7.1	PASS

AFCEE FORM O-11 Page ___ of _____

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK
(BFB or DFTPP)

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Compound: BFB

Injection Date/Time: 12-Apr-11 19:27

Initial Calibration ID: C110412

Mass	Ion Abundance Criteria	% Relative Abundance	Q
50	14.9 - 40% of mass 95	17.0	PASS
75	30 - 60% of mass 95	44.0	PASS
95	100 - 100% of mass 95	100.0	PASS
96	5 - 9% of mass 95	6.7	PASS
173	0 - 2% of mass 174	0.3	PASS
174	50 - 100% of mass 95	97.7	PASS
175	5 - 9% of mass 174	7.0	PASS
176	95 - 101% of mass 174	98.4	PASS
177	5 - 9% of mass 176	6.6	PASS

AFCEE FORM O-11 Page __ of ____

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK
(BFB or DFTPP)

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Chico

Compound: BFB

Injection Date/Time: 13-Apr-11 10:59

Initial Calibration ID: C110412

Mass	Ion Abundance Criteria	% Relative Abundance	Q
50	14.9 - 40% of mass 95	17.1	PASS
75	30 - 60% of mass 95	42.5	PASS
95	100 - 100% of mass 95	100.0	PASS
96	5 - 9% of mass 95	6.8	PASS
173	0 - 2% of mass 174	0.2	PASS
174	50 - 100% of mass 95	96.9	PASS
175	5 - 9% of mass 174	6.8	PASS
176	95 - 101% of mass 174	98.5	PASS
177	5 - 9% of mass 176	7.1	PASS

AFCEE FORM O-11 Page ___ of ____

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK
(BFB or DFTPP)

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc.

Contract #: 2010*1286022*000

Instrument ID: Neo

Compound: BFB

Injection Date/Time: 7 Apr 11 22:38

Initial Calibration ID: N110407B

Mass	Ion Abundance Criteria	% Relative Abundance	Q
50	15 - 40% of mass 95	23.9	PASS
75	30 - 60% of mass 95	47.8	PASS
95	100 - 100% of mass 95	100.0	PASS
96	5 - 9% of mass 95	7.0	PASS
173	0 - 2% of mass 174	0.3	PASS
174	50 - 100% of mass 95	84.5	PASS
175	5 - 9% of mass 174	7.1	PASS
176	95 - 101% of mass 174	96.1	PASS
177	5 - 9% of mass 176	6.5	PASS

AFCEE FORM O-11 Page ___ of ____

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK
(BFB or DFTPP)

Analytical Method: METHOD 8260B

Lab Name: APPL, Inc. Contract #: 2010*1286022*000

Instrument ID: Neo Compound: BFB Injection Date/Time: 11-Apr-11 10:08

Initial Calibration ID: N110407B

Mass	Ion Abundance Criteria	% Relative Abundance	Q
50	15 - 40% of mass 95	23.5	PASS
75	30 - 60% of mass 95	46.3	PASS
95	100 - 100% of mass 95	100.0	PASS
96	5 - 9% of mass 95	5.4	PASS
173	0 - 2% of mass 174	0.6	PASS
174	50 - 100% of mass 95	75.7	PASS
175	5 - 9% of mass 174	6.9	PASS
176	95 - 101% of mass 174	98.9	PASS
177	5 - 9% of mass 176	6.5	PASS

AFCEE FORM O-11 Page ___ of ____

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 64352
Matrix: Water
ID: 20ug/ml BFB STD 03-11-11A

SDG No: 64352
Date Analyzed: 4/13/11
Instrument: Chico
Time Analyzed: 10:59

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1	Lab Control Spike	110413A LCS-1WC	0413C05W.D	4/13/11 13:55
2	Blank	110413A BLK-1WC	0413C07W.D	4/13/11 15:40
3	TB-1	AY35295W01	0413C08W.D	4/13/11 16:14
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	14.9 - 40% of mass 95	17.1
75	30 - 60% of mass 95	42.5
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	6.8
173	0 - 2% of mass 174	0.2
174	50 - 100% of mass 95	96.9
175	5 - 9% of mass 174	6.8
176	95 - 101% of mass 174	98.5
177	5 - 9% of mass 176	7.1

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 64352
Matrix: Soil
ID: 20ug/ml BFB Std 03-21-11A

SDG No: 64352
Date Analyzed: 4/11/11
Instrument: Neo
Time Analyzed: 10:08

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1	Lab Control Spike	110411A LCS-1SN (SS)	0411N04S.D	4/11/11 12:23
2	Blank	110411A BLK-1SN	0411N05S.D	4/11/11 13:38
3	ACC65-SIW-01(0-0.6)	AY35296S01 5.050	0411N07S.D	4/11/11 15:31
4	ACC65-SIW-01(0.6-0.8)	AY35298S01 5.032	0411N09S.D	4/11/11 16:47
5	ACC65-SIW-01(8-8.5)	AY35299S01 5.018	0411N10S.D	4/11/11 17:25
6	ACC65-SIW-01(23.5-24)	AY35300S01 5.031	0411N11S.D	4/11/11 18:03
7		AY35298S01 MS-1NS	0411N12S.D	4/11/11 18:41
8		AY35298S01 MSD-1NS	0411N13S.D	4/11/11 19:18
9	ACC65-SIW-01(0-0.6) FD	AY35297S01 5.038	0411N17S.D	4/11/11 21:51
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	23.5
75	30 - 60% of mass 95	46.3
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	5.4
173	0 - 2% of mass 174	0.6
174	50 - 100% of mass 95	75.7
175	5 - 9% of mass 174	6.9
176	95 - 101% of mass 174	98.9
177	5 - 9% of mass 176	6.5

8A
INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.
Contract: Review
Lab Code:
SDG No.: 64352
Lab File ID (Standard): 0412C09W.D
Date Analyzed: 04/12/11
Instrument ID: Chico
Time Analyzed: 15:56
GC Column:
ID:
Heated Purge: (Y/N)

		Fluorobenzene (IS)		Chlorobenzene-D5 (IS)		1,4-Dichlorobenzene-D (IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	390464	12.90	263424	18.09	147840	22.28
	UPPER LIMIT	780928	13.40	526848	18.59	295680	22.78
	LOWER LIMIT	195232	12.40	131712	17.59	73920	21.78
	SAMPLE NO.						
01	110413A LCS-1WC	406144	12.87	288448	18.06	156032	22.26
02	110413A BLK-1WC	417472	12.87	291328	18.06	147200	22.26
03	AY35295W01	381696	12.87	265984	18.06	145408	22.26
04							
05							
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A
INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.

Contract: Review

Lab Code:

SDG No.: 64352

Lab File ID (Standard): 0407N08S.D

Date Analyzed: 8 Apr 11 3:25

Instrument ID: Neo

Time Analyzed: 8 Apr 11 3:25

GC Column:

ID:

Heated Purge: (Y/N)

		Fluorobenzene(IS)		Chlorobenzene-D5(IS)		1,4-Dichlorobenzene-D(IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	500830	13.32	341280	18.49	161414	22.69
	UPPER LIMIT	1001660	13.82	682560	18.99	322828	23.19
	LOWER LIMIT	250415	12.82	170640	17.99	80707	22.19
	SAMPLE NO.						
01	110411A LCS-1SN (SS)	365261	13.25	320197	18.44	154047	22.64
02	110411A BLK-1SN	373094	13.27	294746	18.44	134677	22.65
03	AY35296S01 5.050	316320	13.28	239562	18.45	98523	22.65
04	AY35298S01 5.032	289545	13.27	209586	18.46	82230	22.66
05	AY35299S01 5.018	357031	13.28	292145	18.45	141793	22.64
06	AY35300S01 5.031	340501	13.28	278384	18.46	130943	22.65
07	AY35298S01 MS-1NS	350511	13.28	297644	18.45	148371	22.65
08	AY35298S01 MSD-1NS	351894	13.31	304091	18.46	143781	22.65
09	AY35297S01 5.038	461783	13.27	383116	18.46	160378	22.66
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

Rec'd
5/11/11

Laboratory Report

#33

Parsons

CSSA

Project #: 747781.04000 CSSA

ARF: 64353

RECEIVED
5/11/11

Sample collected: April 7, 2011

APPL, Inc.

EPA METHOD 8260B
Volatile Organic Compounds

Data Validation Package
for

EPA METHOD 8260B
Volatile Organic Compounds

TABLE OF CONTENTS

LABORATORY NAME: *APPL, Inc.*

EPA METHOD 8260B
Volatile Organic Compounds
Case Narrative

908 North Temperance Ave. ∇ Clovis, CA 93611 ∇ Phone 559-275-2175 ∇ Fax 559-275-4422

Volatile Organic Compounds
EPA Method 8260B

Case Narrative

ARF: 64353

Project: 747781.04000 CSSA

California State Certification Number: CA1312 (DW & WW)

NELAP Certification number: 05233CA (HW)

Texas Certificate Number: T104704242-10-3

Results in this report apply to the sample analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Sample Receipt Information:

The sample was received April 8, 2011, at 3.0°C. The sample was assigned Analytical Request Form (ARF) number 64353. The sample numbers and requested analysis were compared to the chain of custody. No exception was noted.

Sample Table

CLIENT ID	APPL ID	Matrix	Date Sampled	Date Received
MW36-WC-02	AY35294	SOIL	04/07/11	04/08/11

Sample Preparation:

The sample was purged according to EPA method 5035. All holding times were met.

Sample Analysis Information:

The sample was analyzed according to EPA method 8260B using a Hewlett Packard Gas Chromatograph with a mass spectrometer detector. All holding times were met.

Quality Control/Assurance

Spike Recovery

A Laboratory Control Spike (LCS) was used for quality assurance. A second-source standard was used for the LCS. All LCS criteria were met.

No sample was designated by the client for MS/MSD analysis.

Surrogates

Surrogate recoveries are summarized on the form 2 & 8. All surrogate recoveries met acceptance criteria.

Method blanks

No target analyte were detected above the reporting limits in the method blank.

Calibration

Initial and continuing calibrations were analyzed according to the method. All calibration criteria were met.

Tuning:

The instrument was tuned using BFB. All method criteria were met.

Internal Standards

The internal standard area counts were compared to the mid-point of the initial calibration according to method 8260. All acceptance criteria were met.

Summary:

No analytical exception is noted. All data are acceptable.

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. These test results meet all requirements of NELAC. Release of the hard copy has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

5/10/11

Leonard Fong, Ph.D., Laboratory Director / Date

EPA METHOD 8260B
Volatile Organic Compounds
Chain of Custody and ARF

APPL - Analysis Request Form

64353

Client: **Parsons**
Address: **8000 Centre Park Drive Ste 200**
Austin, TX 78754
Attn: **Tammy Chang**
Phone: **512-719-6092** Fax: **512-719-6099**
Job: **747781.04000 CSSA**
PO #: **747780.30002**
Chain of Custody (Y/N): **Y** # **040711APPFB**
RAD Screen (Y/N): **Y** pH (Y/N): **N**
Turn Around Type: **3 DAYS**

Received by: **TBV**
Date Received: **04/08/11** Time: **10:10**
Delivered by: **FED EX**
Shuttle Custody Seals (Y/N): **Y**
Chest Temp(s): **3.0°C**
Color: **VOA**
Samples Chilled until Placed in Refrig/Freezer: **Y**
Project Manager: **Diane Anderson** DA
QC Report Type: **DVP3/AFCEE/ERPIMS/TX** ✓
Due Date: **04/11/11**

Comments:
pdf ARF to Tammy & Pam; send 2 DVP3 to Tammy
Data screening project: analyze samples ONCE; report deficiencies; do NOT re-analyze.
Case Narrative. CSSA + AFCEE 3.1 QAPP. Only report MS/MSD when requested. ✓
Use AFCEE forms with AFCEE flagging to report sample & QC data only. ✓
APPL forms for everything else and APPL DVP3. ✓
EDD: ERPIMS 4 Lab PC4 checked TXF to Pam.Ford@parsons.com

4-11 Sent ARF

Sample Distribution:
VOA: 1-$826AW

Charges:

Invoice To:

8000 Centre Park Drive Ste 200
Austin, TX 78754-5140
Attn: Ellen Felfe

Client ID		APPL ID	Sampled	Analyses Requested
1. MW36-WC-02	S 4/8	AY35294S	04/07/11 07:25	$826AW

Initials _____ Date _________

APPL Sample Receipt Form

ARF# **64353**

Sample	Container Type	Count	pH	Sample	Container Type	Count	pH
AY35294	21 8oz Jar	1	NA				

643

Camp Stanley Storage Activity Chain Of Custody

COC ID: **040711APPFB**
Project Location: **CSSA**
Job Number: **747781.04000**
Creation Date: **4/7/2011**
Task Manager **Scott Pearson**

Relinquish_Date: **4/7/2011**
Relinquished_By: **JDB**
Relinquish_Time: **5:00 PM**
Collection Team: **AL**
Sample Data Type See comments

Cooler ID: **B**
LabCode: **APPF**
Carrier: **FedEx**
Airbill Carrier: **873526388199**
TAT: See comments

Sampler(s): Julie Burch Adrien Lindley
J.B A Lindley

LOCID: **MW36-WC-02** LOGDATE: **4/7/2011** MATRIX: **SD** TBLOT:
SBD: **0** LOGTIME: **7:25** SACODE: **N** SMCODE: **CS** ABLOT:
SED: **0** FLDSAMPID **MW36-WC-02_040711_N0725** EBLOT: Containers: **1**
Remarks:

Analysis Required:

SW8260B	VOC Full List

screening data
3 day TAT

Relinquished by: J.B Date 4-7-11 Time 1700
Recieved by: Date 4/8/11 Time 1010

Relinquished by:____ Date____ Time____
Recieved by:____ Date____ Time____

Relinquished by:____ Date____ Time____
Recieved by:____ Date____ Time____

COOLER RECEIPT FORM

1) Project: 747781.04000 CSSA Date Received: 4/8/11

2) Coolers: Number of Coolers: 1

3) [✓ YES] NO Were coolers and samples screened for radioactivity?

4) [✓ YES] NO Were custody seals on outside of cooler? How many? 1 Date on seal? 4/7/11

5) Name on seal? See Label

6) [✓ YES] NO NA Were custody seals unbroken and intact at the time of arrival?

7) [✓ YES] NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed Ex

8) Shipping slip numbers: 1) 8735 2638 8203 2) 3)

9) [✓ YES] NO NA Was the shipping slip scanned into the database?

10) YES [✓ NO] NA If cooler belongs to APPL, has it been logged into the ice chest database?

11) Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): bubble bag in wet ice

12) YES NO [✓ NA] For hand delivered samples was sufficient ice present to start the cooling process?

13) [✓ YES] NO Was a temperature blank included in the cooler?

14) Serial number of certified NIST thermometer used: A39267 Correction factor: 0

15) Cooler temp(s): 1) 3.0°C 2) 3) 4) 5) 6) 7) 8)

Chain of custody:

16) [✓ YES] NO Was a chain of custody received?

17) [✓ YES] NO Were the custody papers signed in the appropriate places?

18) [✓ YES] NO Was the project identifiable from custody papers?

19) [✓ YES] NO Did the chain of custody include date and time of sampling?

20) [✓ YES] NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

21) [✓ YES] NO Were container labels in good condition?

22) [✓ YES] NO Was the client ID on the label?

23) [✓ YES] NO Was the date of sampling on the label?

24) [✓ YES] NO Was the time of sampling on the label?

25) [✓ YES] NO Did all container labels agree with custody papers?

Sample Containers:

26) [✓ YES] NO Were all containers sealed in separate bags?

27) [✓ YES] NO Did all containers arrive unbroken?

28) YES [✓ NO] Was there any leakage from samples?

29) YES [✓ NO] Were any of the lids cracked or broken?

30) [✓ YES] NO Were correct containers used for the tests indicated?

31) [✓ YES] NO Was a sufficient amount of sample sent for tests indicated?

32) YES NO [✓ NA] Were bubbles present in volatile samples? If yes, the following were received with air bubble

Larger than a pea:

Smaller than a pea:

Preservation & Hold time:

33) [✓ YES] NO NA Was a sufficient amount of holding time remaining to analyze the samples?

34) YES NO [✓ NA] Do the sample containers contain the same preservative as what is stated on the COC?

35) YES NO [✓ NA] Was the pH taken of all non-VOA preserved samples and written on the sample container?

36) YES NO [✓ NA] Was the pH of acid preserved non-VOA samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate:

Deficiencies:

Signature of personnel receiving samples: Second reviewer:

Signature of project manager notified: Date and Time of notification:

Name of client notified: Date and Time of notification:

Information given to client:

by whom (Initials):

CUSTODY SEAL

APPL, Inc. (559) 275-2175

Initials AL Date 4-7-11

EPA METHOD 8260B
Volatile Organic Compounds
QC Summary

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: S110407

AAB #: 110408AS-153977
Contract #: 2010*1286022*000
Method Blank ID: 110408AS-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.003	U
1,1,1-TCA	< RL	0.004	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.002	U
1,1,2-TCA	< RL	0.005	U
1,1-DCA	< RL	0.002	U
1,1-DCE	< RL	0.006	U
1,1-DICHLOROPROPENE	< RL	0.005	U
1,2,3-TRICHLOROBENZENE	< RL	0.004	U
1,2,3-TRICHLOROPROPANE	< RL	0.020	U
1,2,4-TRICHLOROBENZENE	< RL	0.004	U
1,2,4-TRIMETHYLBENZENE	< RL	0.007	U
1,2-DCA	< RL	0.003	U
1,2-DCB	< RL	0.002	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	0.010	U
1,2-DICHLOROPROPANE	< RL	0.002	U
1,2-EDB	< RL	0.003	U
1,3,5-TRIMETHYLBENZENE	< RL	0.003	U
1,3-DCB	< RL	0.006	U
1,3-DICHLOROPROPANE	< RL	0.002	U
1,4-DCB	< RL	0.002	U
1-CHLOROHEXANE	< RL	0.003	U
2,2-DICHLOROPROPANE	< RL	0.020	U
2-CHLOROTOLUENE	< RL	0.002	U
4-CHLOROTOLUENE	< RL	0.003	U
BENZENE	< RL	0.002	U
BROMOBENZENE	< RL	0.002	U
BROMOCHLOROMETHANE	< RL	0.002	U
BROMODICHLOROMETHANE	< RL	0.004	U
BROMOFORM	< RL	0.006	U
BROMOMETHANE	< RL	0.005	U
CARBON TETRACHLORIDE	< RL	0.010	U
CHLOROBENZENE	< RL	0.002	U
CHLOROETHANE	< RL	0.005	U
CHLOROFORM	< RL	0.002	U
CHLOROMETHANE	< RL	0.007	U
CIS-1,2-DCE	< RL	0.006	U
CIS-1,3-DICHLOROPROPENE	< RL	0.005	U
DIBROMOCHLOROMETHANE	< RL	0.003	U
DIBROMOMETHANE	< RL	0.010	U
DICHLORODIFLUOROMETHANE	< RL	0.005	U
ETHYLBENZENE	< RL	0.003	U

Comments: ARF: 64353, Sample: AY35294

AFCEE FORM O-6

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: S110407

AAB #: 110408AS-153977
Contract #: 2010*1286022*000
Method Blank ID: 110408AS-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	0.005	U
ISOPROPYLBENZENE	< RL	0.008	U
M&P-XYLENE	< RL	0.007	U
METHYLENE CHLORIDE	< RL	0.005	U
N-BUTYLBENZENE	< RL	0.005	U
N-PROPYLBENZENE	< RL	0.002	U
NAPHTHALENE	< RL	0.020	U
O-XYLENE	< RL	0.005	U
P-ISOPROPYLTOLUENE	< RL	0.006	U
SEC-BUTYLBENZENE	< RL	0.007	U
STYRENE	< RL	0.002	U
TCE	< RL	0.010	U
TERT-BUTYLBENZENE	< RL	0.007	U
TETRACHLOROETHENE	< RL	0.007	U
TOLUENE	< RL	0.005	U
TRANS-1,2-DCE	< RL	0.003	U
TRANS-1,3-DICHLOROPROPENE	< RL	0.005	U
TRICHLOROFLUOROMETHANE	< RL	0.004	U
VINYL CHLORIDE	< RL	0.009	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	100	52-149	
SURROGATE: 4-BROMOFLUOROBE	103	65-135	
SURROGATE: DIBROMOFLUOROME	102	65-135	
SURROGATE: TOLUENE-D8 (S)	103	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64353, Sample: AY35294

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64353
Matrix: SOIL

SDG No: 64353
Date Analyzed: 4/8/11
Instrument: Sweetpea

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110408AS-LCS	Lab Control Spike	103	100
110408AS-BLK	Blank	100	103
AY35294	MW36-WC-02	103	103

Comments: Batch: #826AF-110408AS

Printed: 5/9/11 3:10:04 PM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.

Case No: 64353

Matrix: SOIL

SDG No: 64353

Date Analyzed: 4/8/11

Instrument: Sweetpea

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110408AS-LCS	Lab Control Spike	102	97.9
110408AS-BLK	Blank	102	103
AY35294	MW36-WC-02	99.9	100

Comments: Batch: #826AF-110408AS

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110408AS LCS
Concentration Units: mg/kg

AAB #: 110408AS-153977
Contract #: 2010*1286022*000
Initial Calibration ID: S110407

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	0.0500	0.0469	93.8	62-125	
1,1,1-TCA	0.0500	0.0463	92.6	65-135	
1,1,2,2-TETRACHLOROETHANE	0.0500	0.0523	105	64-135	
1,1,2-TCA	0.0500	0.0472	94.4	65-135	
1,1-DCA	0.0500	0.0458	91.6	62-135	
1,1-DCE	0.0500	0.0459	91.8	65-135	
1,1-DICHLOROPROPENE	0.0500	0.0467	93.4	65-135	
1,2,3-TRICHLOROBENZENE	0.0500	0.0493	98.6	65-147	
1,2,3-TRICHLOROPROPANE	0.050	0.055	110	65-135	
1,2,4-TRICHLOROBENZENE	0.0500	0.0502	100	65-145	
1,2,4-TRIMETHYLBENZENE	0.0500	0.0476	95.2	65-135	
1,2-DCA	0.0500	0.0501	100	58-137	
1,2-DCB	0.0500	0.0474	94.8	65-135	
1,2-DIBROMO-3-CHLOROPROPANE	0.050	0.053	106	49-135	
1,2-DICHLOROPROPANE	0.0500	0.0481	96.2	60-135	
1,2-EDB	0.0500	0.0496	99.2	65-135	
1,3,5-TRIMETHYLBENZENE	0.0500	0.0465	93.0	62-135	
1,3-DCB	0.0500	0.0473	94.6	65-135	
1,3-DICHLOROPROPANE	0.0500	0.0483	96.6	65-135	
1,4-DCB	0.0500	0.0496	99.2	65-135	
1-CHLOROHEXANE	0.0500	0.0501	100	65-135	
2,2-DICHLOROPROPANE	0.050	0.047	94.0	65-135	
2-CHLOROTOLUENE	0.0500	0.0473	94.6	63-135	
4-CHLOROTOLUENE	0.0500	0.0478	95.6	64-135	
BENZENE	0.0500	0.0467	93.4	65-135	
BROMOBENZENE	0.0500	0.0488	97.6	65-135	
BROMOCHLOROMETHANE	0.0500	0.0516	103	63-135	
BROMODICHLOROMETHANE	0.0500	0.0479	95.8	65-135	
BROMOFORM	0.0500	0.0502	100	65-135	
BROMOMETHANE	0.0500	0.0414	82.8	62-135	
CARBON TETRACHLORIDE	0.050	0.045	90.0	52-135	
CHLOROBENZENE	0.0500	0.0470	94.0	65-135	
CHLOROETHANE	0.0500	0.0473	94.6	55-135	
CHLOROFORM	0.0500	0.0457	91.4	64-135	
CHLOROMETHANE	0.0500	0.0447	89.4	65-135	
CIS-1,2-DCE	0.0500	0.0462	92.4	65-135	
CIS-1,3-DICHLOROPROPENE	0.0500	0.0461	92.2	64-135	
DIBROMOCHLOROMETHANE	0.0500	0.0494	98.8	63-135	
DIBROMOMETHANE	0.050	0.050	100	59-137	
DICHLORODIFLUOROMETHANE	0.0500	0.0478	95.6	65-135	

Comments: ARF: 64353, QC Sample ID: AY34954

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110408AS LCS
Concentration Units: mg/kg

AAB #: 110408AS-153977
Contract #: 2010*1286022*000
Initial Calibration ID: S110407

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	0.0500	0.0451	90.2	65-135	
HEXACHLOROBUTADIENE	0.0500	0.0460	92.0	65-135	
ISOPROPYLBENZENE	0.0500	0.0463	92.6	65-135	
M&P-XYLENE	0.1000	0.0945	94.5	65-135	
METHYLENE CHLORIDE	0.0500	0.0470	94.0	65-135	
N-BUTYLBENZENE	0.0500	0.0481	96.2	65-135	
N-PROPYLBENZENE	0.0500	0.0475	95.0	65-135	
NAPHTHALENE	0.0500	0.0482	96.4	65-135	
O-XYLENE	0.0500	0.0451	90.2	65-135	
P-ISOPROPYLTOLUENE	0.0500	0.0467	93.4	65-135	
SEC-BUTYLBENZENE	0.0500	0.0458	91.6	65-135	
STYRENE	0.0500	0.0471	94.2	65-135	
TCE	0.0500	0.0461	92.2	61-135	
TERT-BUTYLBENZENE	0.0500	0.0464	92.8	65-135	
TETRACHLOROETHENE	0.0500	0.0486	97.2	61-135	
TOLUENE	0.0500	0.0450	90.0	64-135	
TRANS-1,2-DCE	0.0500	0.0454	90.8	65-135	
TRANS-1,3-DICHLOROPROPENE	0.0500	0.0477	95.4	56-135	
TRICHLOROFLUOROMETHANE	0.0500	0.0486	97.2	57-135	
VINYL CHLORIDE	0.0500	0.0402	80.4	36-144	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	103	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	100	65-135	
SURROGATE: DIBROMOFLUOROMETH	103	65-135	
SURROGATE: TOLUENE-D8 (S)	97.7	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64353, QC Sample ID: AY34954

EPA 8260B

Form 4

Blank Summary

Lab Name: APPL, Inc.

Case No: 64353

Matrix: SOIL

Blank ID: 110408AS-BLK

SDG No: 64353

Date Analyzed: 4/8/11

Instrument: Sweetpea

Time Analyzed: 0957

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110408AS-LCS	Lab Control Spike	0408S01	4/8/11 0702
110408AS-BLK	Blank	0408S04	4/8/11 0957
AY35294	MW36-WC-02	0408S15	4/8/11 1622

Comments: Batch: #826AF-110408AS

Printed: 5/9/11 3:09:59 PM
Form 4, Blank Summary

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 64353
Matrix: Soil
ID: 20uL/mL BFB Std 03-11-11A

SDG No: 64353
Date Analyzed: 4/8/11
Instrument: Sweetpea
Time Analyzed: 6:43

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1	Lab Control Spike	110408A LCS-1SS (SS)	0408S01S.D	4/8/11 7:02
2	Blank	110408A BLK-1SS	0408S04S.D	4/8/11 9:57
3	MW36-WC-02	AY35294S01 5.026	0408S15S.D	4/8/11 16:22
4				
5				
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17				
18				
19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	18.7
75	30 - 60% of mass 95	43.7
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	6.7
173	0 - 2% of mass 174	0.2
174	50 - 100% of mass 95	88.4
175	5 - 9% of mass 174	7.2
176	95 - 101% of mass 174	97.0
177	5 - 9% of mass 176	6.6

8A
INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.

Contract: Review

Lab Code:

SDG No.: 64353

Lab File ID (Standard): 0407S07S.D

Date Analyzed: 8 Apr 11 2:29

Instrument ID: Sweetpea

Time Analyzed: 8 Apr 11 2:29

GC Column:

ID:

Heated Purge: (Y/N)

		Fluorobenzene(IS)				Chlorobenzene-D5(IS)				1,4-Dichlorobenzene-D(IS)			
		AREA	#	RT	#	AREA	#	RT	#	AREA	#	RT	#
	12 HOUR STD	540360		9.81		290429		14.84		136723		18.94	
	UPPER LIMIT	1080720		10.31		580858		15.34		273446		19.44	
	LOWER LIMIT	270180		9.31		145215		14.34		68362		18.44	
	SAMPLE NO.												
01	110408A LCS-1SS (SS)	545218		9.81		291569		14.84		129064		18.93	
02	110408A BLK-1SS	496426		9.80		259923		14.84		113067		18.94	
03	AY35294S01 5.026	523444		9.81		275899		14.84		121949		18.93	
04													
05													
06													
07													
08													
09													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

EPA METHOD 8260B
Volatile Organic Compounds
Sample Data

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B   Preparatory Method: 5035   AAB #: 110408AS-153977

Lab Name: APPL, Inc   Contract #: 2010*1286022*000

Field Sample ID: MW36-WC-02   Lab Sample ID: AY35294   Matrix: Soil

% Solids: 87.8   Initial Calibration ID: S110407

Date Received: 08-Apr-11   Date Prepared: 08-Apr-11   Date Analyzed: 08-Apr-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		U
1,1,1-TCA	0.0009	0.004	0.0009	1		U
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		U
1,1,2-TCA	0.0009	0.005	0.0009	1		U
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		U
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		U
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		U
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		U
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		U
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		U
1,3-DCB	0.0011	0.006	0.0011	1		U
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,4-DCB	0.0008	0.002	0.0008	1		U
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		U
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		U
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		U
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		U
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		U
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		U
BROMOFORM	0.0011	0.006	0.0011	1		U
BROMOMETHANE	0.0007	0.005	0.0007	1		U
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		U
CHLOROBENZENE	0.0007	0.002	0.0007	1		U
CHLOROETHANE	0.0015	0.005	0.0015	1		U
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		U

Comments:

ARF: 64353

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110408AS-153977
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: MW36-WC-02 Lab Sample ID: AY35294 Matrix: Soil
% Solids: 87.8 Initial Calibration ID: S110407
Date Received: 08-Apr-11 Date Prepared: 08-Apr-11 Date Analyzed: 08-Apr-11
Concentration Units: mg/kg

Analyte	**MDL**	**RL**	**Concentration**	**Dilution**	**Confirm**	**Qualifier**
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		U
DIBROMOMETHANE	0.001	0.010	0.001	1		U
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		U
ETHYLBENZENE	0.0010	0.003	0.0010	1		U
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		U
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		U
M&P-XYLENE	0.0018	0.007	0.0018	1		U
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		U
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		U
NAPHTHALENE	0.0010	0.020	0.0010	1		U
O-XYLENE	0.0007	0.005	0.0007	1		U
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		U
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		U
STYRENE	0.0009	0.002	0.0009	1		U
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		U
TETRACHLOROETHENE	0.0008	0.007	0.0008	1		U
TOLUENE	0.0010	0.005	0.0010	1		U
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		U
VINYL CHLORIDE	0.0013	0.009	0.0013	1		U

Surrogate	**Recovery**	**Control Limits**	**Qualifier**
SURROGATE: 1,2-DICHLOROETHANE-	103	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	103	65-135	
SURROGATE: DIBROMOFLUOROMETH	99.9	65-135	
SURROGATE: TOLUENE-D8 (S)	100	65-135	

Internal Std	**Qualifier**
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64353

AFCEE FORM O-2

EPA METHOD 8260B
Volatile Organic Compounds
Calibration Data

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64353
Initial Cal. Date: 4/7/11
Instrument: Sweetpea

Initials:

			0407S03S.D	0407S04S.D	0407S05S.D	0407S06S.D	0407S07S.D	0407S08S.D	0407S09S.D							
		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
1	I	Fluorobenzene(IS)														
2	TM	Dichlorodifluoromethane	0.3155	0.2816	0.2836	0.2777	0.2863	0.2971	0.2887				0.29	4.4	TM	
3	TM**	Chloromethane	0.4355	0.4314	0.4153	0.4155	0.4423	0.4550	0.4114				0.43	3.8	TM**	
4	TM*	Vinyl chloride	0.1095	0.0949	0.1157	0.1307	0.1199						0.11	12	TM*	
5	TM	Bromomethane	0.0632	0.0513	0.0601	0.0540	0.0697	0.0711	0.0677				0.06	12	TM	
6	TM	Chloroethane	0.2154	0.1922	0.2066	0.2279	0.2344	0.2426	0.2306				0.22	7.9	TM	
7	TM	Trichlorofluoromethane	0.0963	0.1073	0.0988	0.1026	0.1157	0.1228	0.1027				0.11	8.9	TM	
8	tmL	Acetone	0.0509	0.0418	0.0289	0.0259	0.0255	0.0254	0.0228				0.03	33	tmL	0.997
9	TM*	1,1-DCE	0.4428	0.4923	0.4452	0.4635	0.4850	0.4962	0.4977				0.47	5.0	TM*	
10	TM	Freon-113	0.2424	0.2540	0.2709	0.2738	0.2741	0.2814	0.2914				0.27	6.1	TM	
11	TML	Methylene chloride	0.3949	0.2878	0.2635	0.2396	0.2274	0.2301					0.27	23	TML	1.000
12	TM	Methyl t-butyl ether (MTBE)	0.3173	0.2896	0.3032	0.3119	0.3271	0.3417	0.3377				0.32	5.9	TM	
13	TM	Trans-1,2-DCE	0.3123	0.2840	0.2947	0.2836	0.3015	0.3142	0.3182				0.30	4.7	TM	
14	TM**	1,1-DCA	0.5063	0.5201	0.4842	0.5140	0.5165	0.5495	0.5496				0.52	4.5	TM**	
15	TM	MEK (2-Butanone)	0.1171	0.0997	0.0781	0.0809	0.0866	0.0867	0.0854				0.09	15	TM	
16	TM	Cis-1,2-DCE	0.3070	0.2977	0.2960	0.2766	0.2926	0.2999	0.3011				0.30	3.2	TM	
17	TM	2,2-Dichloropropane	0.4192	0.4349	0.4307	0.4170	0.4330	0.4469	0.4564				0.43	3.2	TM	
18	TM*	Chloroform	0.4324	0.4351	0.4224	0.4271	0.4348	0.4392	0.4421				0.43	1.6	TM*	
19	TM	Bromochloromethane	0.0853	0.0764	0.0758	0.0851	0.0896	0.0923	0.0864				0.08	7.4	TM	
20	S	Dibromofluoromethane(S)	0.2879	0.2507	0.2386	0.2287	0.2389	0.2534	0.2471				0.25	7.6	S	
21	TM	1,1,1-TCA	0.3452	0.3999	0.3823	0.3975	0.4130	0.4165	0.4201				0.40	6.6	TM	
22	TM	1,1-Dichloropropene	0.4178	0.3954	0.4157	0.4116	0.4382	0.4440	0.4482				0.42	4.6	TM	
23	S	1,2-DCA-D4(S)	0.1987	0.1730	0.1518	0.1569	0.1721	0.1680	0.1618				0.17	9.1	S	
24	TM	Carbon tetrachloride	0.3222	0.3517	0.3319	0.3511	0.3633	0.3605	0.3708				0.35	5.0	TM	
25	TM	1,2-DCA	0.1825	0.1800	0.1990	0.1844	0.1862	0.1937	0.2009				0.19	4.4	TM	
26	TM	Benzene	1.117	1.097	1.089	1.112	1.142	1.184	1.176				1.1	3.3	TM	
27	TM	TCE	0.2933	0.2827	0.2690	0.2684	0.2861	0.2974	0.2926				0.28	4.1	TM	
28	TM*	1,2-Dichloropropane	0.2612	0.2481	0.2264	0.2527	0.2493	0.2556	0.2550				0.25	4.5	TM*	
29	TM	Bromodichloromethane	0.2583	0.2590	0.2535	0.2574	0.2650	0.2838	0.2798				0.27	4.5	TM	
30	TM	Dibromomethane	0.0989	0.0953	0.0865	0.0969	0.0952	0.0973	0.0979				0.10	4.4	TM	
31	TM	Cis-1,3-Dichloropropene	0.3323	0.3183	0.3065	0.3231	0.3368	0.3393	0.3380				0.33	3.7	TM	
32	TM*	Toluene	0.6581	0.6886	0.6263	0.6591	0.6508	0.6867	0.6772				0.66	3.3	TM*	
33	TM	Trans-1,3-Dichloropropene	0.2428	0.2076	0.2121	0.2295	0.2209	0.2391	0.2309				0.23	5.8	TM	
34	TM	1,1,2-TCA	0.1258	0.1063	0.0862	0.1007	0.1021	0.1101	0.1092				0.11	11	TM	
35	I	Chlorobenzene-D5(IS)														

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64353
Initial Cal. Date: 4/7/11
Instrument: Sweetpea

Initials:

		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
36	S	Toluene-D8(S)	1.685	1.514	1.577	1.606	1.721	1.706	1.647				1.6	4.6	S	
37	TM	1,2-EDB	0.2044	0.1765	0.1909	0.1993	0.2020	0.2168	0.2129				0.20	6.8	TM	
38	TM	Tetrachloroethene	0.4084	0.4326	0.3980	0.4373	0.4516	0.4632	0.4461				0.43	5.4	TM	
39	TM	1-Chlorohexane	0.7925	0.7369	0.7706	0.7725	0.8053	0.8413	0.8262				0.79	4.5	TM	
40	TM	1,1,1,2-Tetrachloroethane	0.4001	0.3605	0.3693	0.3916	0.3885	0.4148	0.4118				0.39	5.2	TM	
41	TM	m&p-Xylene	0.8619	0.7908	0.8365	0.8112	0.8200	0.8538	0.8152				0.83	3.0	TM	
42	TM	o-Xylene	0.7935	0.7473	0.7209	0.7464	0.7595	0.7638	0.7694				0.76	3.0	TM	
43	TM	Styrene	0.1774	0.1368	0.1604	0.1565	0.1601	0.1587	0.1620				0.16	7.5	TM	
44	S	4-Bromofluorobenzene(S)	0.5812	0.4364	0.4281	0.4408	0.4778	0.4858	0.4575				0.47	11	S	
45	TM	1,3-Dichloropropane	0.4141	0.3648	0.3813	0.3876	0.3903	0.4043	0.3939				0.39	4.1	TM	
46	TM	Dibromochloromethane	0.2866	0.2986	0.2578	0.3011	0.3081	0.3290	0.3152				0.30	7.6	TM	
47	TM**	Chlorobenzene	1.136	1.110	1.131	1.154	1.116	1.192	1.150				1.1	2.4	TM**	
48	TM*	Ethylbenzene	2.324	2.255	2.211	2.241	2.196	2.312	2.311				2.3	2.3	TM*	
49	TM**	Bromoform	0.1478	0.1279	0.1540	0.1424	0.1521	0.1643	0.1556				0.15	7.8	TM**	
50	I	1,4-Dichlorobenzene-D(IS)														
51	TM	MIBK (methyl isobutyl ketone)	0.2583	0.2748	0.2559	0.2678	0.3034	0.3211	0.3176				0.29	9.8	TM	
52	TM	Isopropylbenzene	4.924	4.751	4.723	4.943	4.537	4.764	4.609				4.8	3.1	TM	
53	TM**	1,1,2,2-Tetrachloroethane	0.4457	0.4681	0.3930	0.5000	0.4533	0.4787	0.4845				0.46	7.6	TM**	
54	TM	1,2,3-Trichloropropane	0.1023	0.0822	0.0943	0.0965	0.1006	0.1023	0.1013				0.10	7.5	TM	
55	TM	Bromobenzene	0.9470	0.9069	1.009	0.9691	0.8840	0.9466	0.9207				0.94	4.4	TM	
56	TM	n-Propylbenzene	6.408	5.856	6.084	6.137	5.571	6.019	5.962				6.0	4.3	TM	
57	TM	2-Chlorotoluene	3.846	3.699	3.986	3.928	3.640	3.711	3.647				3.8	3.7	TM	
58	TM	1,3,5-Trimethylbenzene	3.711	3.559	3.624	3.668	3.489	3.582	3.538				3.6	2.1	TM	
59	TM	4-Chlorotoluene	3.293	3.270	2.922	3.026	2.739	2.879	2.845				3.0	7.1	TM	
60	TM	Tert-Butylbenzene	3.782	3.668	3.731	3.796	3.659	3.687	3.814				3.7	1.7	TM	
61	TM	1,2,4-Trimethylbenzene	3.455	3.262	3.352	3.436	3.156	3.294	3.290				3.3	3.1	TM	
62	TM	Sec-Butylbenzene	5.433	5.137	5.309	5.467	5.073	5.318	5.279				5.3	2.7	TM	
63	TM	p-Isopropyltoluene	4.175	4.118	4.246	4.245	4.106	4.226	4.288				4.2	1.6	TM	
64	TM	1,3-DCB	2.042	1.938	1.807	1.817	1.716	1.847	1.811				1.9	5.7	TM	
65	TM	1,4-DCB	2.042	1.776	1.693	1.763	1.681	1.749	1.665				1.8	7.3	TM	
66	TM	n-Butylbenzene	4.037	3.819	3.895	3.921	3.709	3.981	3.948				3.9	2.8	TM	
67	TM	1,2-DCB	1.500	1.434	1.455	1.429	1.378	1.422	1.427				1.4	2.6	TM	
68	TM	1,2-Dibromo-3-chloropropane		0.0501	0.0644	0.0580	0.0502	0.0598	0.0587				0.06	10.0	TM	
69	TM	1,2,4-Trichlorobenzene	1.025	0.8501	0.8761	0.8000	0.7722	0.8643	0.8738				0.87	9.3	TM	
70	TM	Hexachlorobutadiene	0.9047	0.8071	0.8161	0.7947	0.7697	0.8490	0.8674				0.83	5.6	TM	

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64353
Initial Cal. Date: 4/7/11
Instrument: Sweetpea

Initials:

		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
71	TM	Naphthalene	0.6811	0.6786	0.6587	0.6897	0.7464	0.8677	0.9426				0.75	15	TM	
72	TM	1,2,3-Trichlorobenzene	0.6486	0.7380	0.6135	0.6599	0.6432	0.7005	0.7241				0.68	6.8	TM	
73																
74																
75																
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VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration/CCV

Lab Name: APPL, Inc.

Case No:

Matrix:

SDG No: 64353

Date Analyzed: 8 Apr 11 7:02

Instrument: Sweetpea

Initial Cal. Date: 4/7/11

Data File: 0408S01S.D

		Compound	MEAN	CCRF	%D	%Drift	
1	I	Fluorobenzene(IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.2901	0.2772	4.5	TM	
3	TM**	Chloromethane	0.4295	0.3843	11	TM**	
4	TM*	Vinyl chloride	0.1141	0.0917	20	TM*	
5	TM	Bromomethane	0.0624	0.0517	17	TM	
6	TM	Chloroethane	0.2214	0.2093	5.5	TM	
7	TM	Trichlorofluoromethane	0.1066	0.1036	2.8	TM	
8	tmL	Acetone	0.0316	0.0250	21	tmL	1.5
9	TM*	1,1-DCE	0.4747	0.4354	8.3	TM*	
10	TM	Freon-113	0.2697	0.2558	5.2	TM	
11	TML	Methylene chloride	0.2739	0.2182	20	TML	6.1
12	TM	Methyl t-butyl ether (MTBE)	0.3184	0.3191	0.22	TM	
13	TM	Trans-1,2-DCE	0.3012	0.2735	9.2	TM	
14	TM**	1,1-DCA	0.5200	0.4766	8.3	TM**	
15	TM	MEK (2-Butanone)	0.0907	0.0825	9.0	TM	
16	TM	Cis-1,2-DCE	0.2958	0.2733	7.6	TM	
17	TM	2,2-Dichloropropane	0.4340	0.4098	5.6	TM	
18	TM*	Chloroform	0.4333	0.3957	8.7	TM*	
19	TM	Bromochloromethane	0.0844	0.0871	3.1	TM	
20	S	Dibromofluoromethane(S)	0.2493	0.2543	2.0	S	
21	TM	1,1,1-TCA	0.3964	0.3670	7.4	TM	
22	TM	1,1-Dichloropropene	0.4244	0.3961	6.7	TM	
23	S	1,2-DCA-D4(S)	0.1689	0.1726	2.2	S	
24	TM	Carbon tetrachloride	0.3502	0.3149	10	TM	
25	TM	1,2-DCA	0.1895	0.1899	0.17	TM	
26	TM	Benzene	1.131	1.057	6.5	TM	
27	TM	TCE	0.2842	0.2620	7.8	TM	
28	TM*	1,2-Dichloropropane	0.2498	0.2404	3.8	TM*	
29	TM	Bromodichloromethane	0.2652	0.2540	4.2	TM	
30	TM	Dibromomethane	0.0954	0.0953	0.20	TM	
31	TM	Cis-1,3-Dichloropropene	0.3278	0.3021	7.8	TM	
32	TM*	Toluene	0.6638	0.5974	10	TM*	
33	TM	Trans-1,3-Dichloropropene	0.2261	0.2158	4.6	TM	
34	TM	1,1,2-TCA	0.1058	0.0998	5.6	TM	
35	I	Chlorobenzene-D5(IS)	ISTD			I	
36	S	Toluene-D8(S)	1.637	1.596	2.5	S	
37	TM	1,2-EDB	0.2004	0.1987	0.84	TM	
38	TM	Tetrachloroethene	0.4339	0.4214	2.9	TM	
39	TM	1-Chlorohexane	0.7922	0.7946	0.30	TM	
40	TM	1,1,1,2-Tetrachloroethane	0.3909	0.3664	6.3	TM	
		Average			6.8		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration/CCV

Lab Name: APPL, Inc.
Case No:
Matrix: 0

SDG No: 64353
Date Analyzed: 8 Apr 11 7:02
Instrument: Sweetpea
Cal. Date: 4/7/11
Data File: 0408S01S.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	m&p-Xylene	0.8270	0.7816	5.5	TM	
42	TM	o-Xylene	0.7573	0.6834	9.8	TM	
43	TM	Styrene	0.1588	0.1497	5.7	TM	
44	S	4-Bromofluorobenzene(S)	0.4725	0.4690	0.74	S	
45	TM	1,3-Dichloropropane	0.3909	0.3772	3.5	TM	
46	TM	Dibromochloromethane	0.2995	0.2957	1.3	TM	
47	TM**	Chlorobenzene	1.141	1.074	5.9	TM**	
48	TM*	Ethylbenzene	2.264	2.042	9.8	TM*	
49	TM**	Bromoform	0.1492	0.1497	0.38	TM**	
50	I	1,4-Dichlorobenzene-D(IS)	ISTD			I	
51	TM	MIBK (methyl isobutyl ketone)	0.2856	0.3162	11	TM	
52	TM	Isopropylbenzene	4.750	4.396	7.4	TM	
53	TM**	1,1,2,2-Tetrachloroethane	0.4605	0.4819	4.6	TM**	
54	TM	1,2,3-Trichloropropane	0.0971	0.1063	9.5	TM	
55	TM	Bromobenzene	0.9404	0.9184	2.3	TM	
56	TM	n-Propylbenzene	6.005	5.702	5.0	TM	
57	TM	2-Chlorotoluene	3.780	3.572	5.5	TM	
58	TM	1,3,5-Trimethylbenzene	3.596	3.345	7.0	TM	
59	TM	4-Chlorotoluene	2.996	2.862	4.5	TM	
60	TM	Tert-Butylbenzene	3.734	3.462	7.3	TM	
61	TM	1,2,4-Trimethylbenzene	3.321	3.159	4.9	TM	
62	TM	Sec-Butylbenzene	5.288	4.840	8.5	TM	
63	TM	p-Isopropyltoluene	4.200	3.920	6.7	TM	
64	TM	1,3-DCB	1.854	1.752	5.5	TM	
65	TM	1,4-DCB	1.767	1.752	0.84	TM	
66	TM	n-Butylbenzene	3.902	3.756	3.7	TM	
67	TM	1,2-DCB	1.435	1.361	5.2	TM	
68	TM	1,2-Dibromo-3-chloropropane	0.0569	0.0607	6.8	TM	
69	TM	1,2,4-Trichlorobenzene	0.8659	0.8693	0.39	TM	
70	TM	Hexachlorobutadiene	0.8298	0.7630	8.0	TM	
71	TM	Naphthalene	0.7521	0.7249	3.6	TM	
72	TM	1,2,3-Trichlorobenzene	0.6754	0.6653	1.5	TM	
73							
74							
75							
76							
77							
78							
79							
80							
		Average			5.2		

EPA METHOD 8260B
Volatile Organic Compounds
Raw Data

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: S110407

AAB #: 110408AS-153977
Contract #: 2010*1286022*000
Method Blank ID: 110408AS-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.003	U
1,1,1-TCA	< RL	0.004	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.002	U
1,1,2-TCA	< RL	0.005	U
1,1-DCA	< RL	0.002	U
1,1-DCE	< RL	0.006	U
1,1-DICHLOROPROPENE	< RL	0.005	U
1,2,3-TRICHLOROBENZENE	< RL	0.004	U
1,2,3-TRICHLOROPROPANE	< RL	0.020	U
1,2,4-TRICHLOROBENZENE	< RL	0.004	U
1,2,4-TRIMETHYLBENZENE	< RL	0.007	U
1,2-DCA	< RL	0.003	U
1,2-DCB	< RL	0.002	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	0.010	U
1,2-DICHLOROPROPANE	< RL	0.002	U
1,2-EDB	< RL	0.003	U
1,3,5-TRIMETHYLBENZENE	< RL	0.003	U
1,3-DCB	< RL	0.006	U
1,3-DICHLOROPROPANE	< RL	0.002	U
1,4-DCB	< RL	0.002	U
1-CHLOROHEXANE	< RL	0.003	U
2,2-DICHLOROPROPANE	< RL	0.020	U
2-CHLOROTOLUENE	< RL	0.002	U
4-CHLOROTOLUENE	< RL	0.003	U
BENZENE	< RL	0.002	U
BROMOBENZENE	< RL	0.002	U
BROMOCHLOROMETHANE	< RL	0.002	U
BROMODICHLOROMETHANE	< RL	0.004	U
BROMOFORM	< RL	0.006	U
BROMOMETHANE	< RL	0.005	U
CARBON TETRACHLORIDE	< RL	0.010	U
CHLOROBENZENE	< RL	0.002	U
CHLOROETHANE	< RL	0.005	U
CHLOROFORM	< RL	0.002	U
CHLOROMETHANE	< RL	0.007	U
CIS-1,2-DCE	< RL	0.006	U
CIS-1,3-DICHLOROPROPENE	< RL	0.005	U
DIBROMOCHLOROMETHANE	< RL	0.003	U
DIBROMOMETHANE	< RL	0.010	U
DICHLORODIFLUOROMETHANE	< RL	0.005	U
ETHYLBENZENE	< RL	0.003	U

Comments: ARF: 64353, Sample: AY35294

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: S110407

AAB #: 110408AS-153977
Contract #: 2010*1286022*000
Method Blank ID: 110408AS-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	0.005	U
ISOPROPYLBENZENE	< RL	0.008	U
M&P-XYLENE	< RL	0.007	U
METHYLENE CHLORIDE	< RL	0.005	U
N-BUTYLBENZENE	< RL	0.005	U
N-PROPYLBENZENE	< RL	0.002	U
NAPHTHALENE	< RL	0.020	U
O-XYLENE	< RL	0.005	U
P-ISOPROPYLTOLUENE	< RL	0.006	U
SEC-BUTYLBENZENE	< RL	0.007	U
STYRENE	< RL	0.002	U
TCE	< RL	0.010	U
TERT-BUTYLBENZENE	< RL	0.007	U
TETRACHLOROETHENE	< RL	0.007	U
TOLUENE	< RL	0.005	U
TRANS-1,2-DCE	< RL	0.003	U
TRANS-1,3-DICHLOROPROPENE	< RL	0.005	U
TRICHLOROFLUOROMETHANE	< RL	0.004	U
VINYL CHLORIDE	< RL	0.009	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	100	52-149	
SURROGATE: 4-BROMOFLUOROBE	103	65-135	
SURROGATE: DIBROMOFLUOROME	102	65-135	
SURROGATE: TOLUENE-D8 (S)	103	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64353, Sample: AY35294

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110408AS LCS

Concentration Units: mg/kg

AAB #: 110408AS-153977

Contract #: 2010*1286022*000

Initial Calibration ID: S110407

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	0.0500	0.0469	93.8	62-125	
1,1,1-TCA	0.0500	0.0463	92.6	65-135	
1,1,2,2-TETRACHLOROETHANE	0.0500	0.0523	105	64-135	
1,1,2-TCA	0.0500	0.0472	94.4	65-135	
1,1-DCA	0.0500	0.0458	91.6	62-135	
1,1-DCE	0.0500	0.0459	91.8	65-135	
1,1-DICHLOROPROPENE	0.0500	0.0467	93.4	65-135	
1,2,3-TRICHLOROBENZENE	0.0500	0.0493	98.6	65-147	
1,2,3-TRICHLOROPROPANE	0.050	0.055	110	65-135	
1,2,4-TRICHLOROBENZENE	0.0500	0.0502	100	65-145	
1,2,4-TRIMETHYLBENZENE	0.0500	0.0476	95.2	65-135	
1,2-DCA	0.0500	0.0501	100	58-137	
1,2-DCB	0.0500	0.0474	94.8	65-135	
1,2-DIBROMO-3-CHLOROPROPANE	0.050	0.053	106	49-135	
1,2-DICHLOROPROPANE	0.0500	0.0481	96.2	60-135	
1,2-EDB	0.0500	0.0496	99.2	65-135	
1,3,5-TRIMETHYLBENZENE	0.0500	0.0465	93.0	62-135	
1,3-DCB	0.0500	0.0473	94.6	65-135	
1,3-DICHLOROPROPANE	0.0500	0.0483	96.6	65-135	
1,4-DCB	0.0500	0.0496	99.2	65-135	
1-CHLOROHEXANE	0.0500	0.0501	100	65-135	
2,2-DICHLOROPROPANE	0.050	0.047	94.0	65-135	
2-CHLOROTOLUENE	0.0500	0.0473	94.6	63-135	
4-CHLOROTOLUENE	0.0500	0.0478	95.6	64-135	
BENZENE	0.0500	0.0467	93.4	65-135	
BROMOBENZENE	0.0500	0.0488	97.6	65-135	
BROMOCHLOROMETHANE	0.0500	0.0516	103	63-135	
BROMODICHLOROMETHANE	0.0500	0.0479	95.8	65-135	
BROMOFORM	0.0500	0.0502	100	65-135	
BROMOMETHANE	0.0500	0.0414	82.8	62-135	
CARBON TETRACHLORIDE	0.050	0.045	90.0	52-135	
CHLOROBENZENE	0.0500	0.0470	94.0	65-135	
CHLOROETHANE	0.0500	0.0473	94.6	55-135	
CHLOROFORM	0.0500	0.0457	91.4	64-135	
CHLOROMETHANE	0.0500	0.0447	89.4	65-135	
CIS-1,2-DCE	0.0500	0.0462	92.4	65-135	
CIS-1,3-DICHLOROPROPENE	0.0500	0.0461	92.2	64-135	
DIBROMOCHLOROMETHANE	0.0500	0.0494	98.8	63-135	
DIBROMOMETHANE	0.050	0.050	100	59-137	
DICHLORODIFLUOROMETHANE	0.0500	0.0478	95.6	65-135	

Comments: ARF: 64353, QC Sample ID: AY34954

AFCEE FORM O-7

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110408AS LCS
Concentration Units: mg/kg

AAB #: 110408AS-153977
Contract #: 2010*1286022*000
Initial Calibration ID: S110407

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	0.0500	0.0451	90.2	65-135	
HEXACHLOROBUTADIENE	0.0500	0.0460	92.0	65-135	
ISOPROPYLBENZENE	0.0500	0.0463	92.6	65-135	
M&P-XYLENE	0.1000	0.0945	94.5	65-135	
METHYLENE CHLORIDE	0.0500	0.0470	94.0	65-135	
N-BUTYLBENZENE	0.0500	0.0481	96.2	65-135	
N-PROPYLBENZENE	0.0500	0.0475	95.0	65-135	
NAPHTHALENE	0.0500	0.0482	96.4	65-135	
O-XYLENE	0.0500	0.0451	90.2	65-135	
P-ISOPROPYLTOLUENE	0.0500	0.0467	93.4	65-135	
SEC-BUTYLBENZENE	0.0500	0.0458	91.6	65-135	
STYRENE	0.0500	0.0471	94.2	65-135	
TCE	0.0500	0.0461	92.2	61-135	
TERT-BUTYLBENZENE	0.0500	0.0464	92.8	65-135	
TETRACHLOROETHENE	0.0500	0.0486	97.2	61-135	
TOLUENE	0.0500	0.0450	90.0	64-135	
TRANS-1,2-DCE	0.0500	0.0454	90.8	65-135	
TRANS-1,3-DICHLOROPROPENE	0.0500	0.0477	95.4	56-135	
TRICHLOROFLUOROMETHANE	0.0500	0.0486	97.2	57-135	
VINYL CHLORIDE	0.0500	0.0402	80.4	36-144	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	103	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	100	65-135	
SURROGATE: DIBROMOFLUOROMETH	103	65-135	
SURROGATE: TOLUENE-D8 (S)	97.7	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

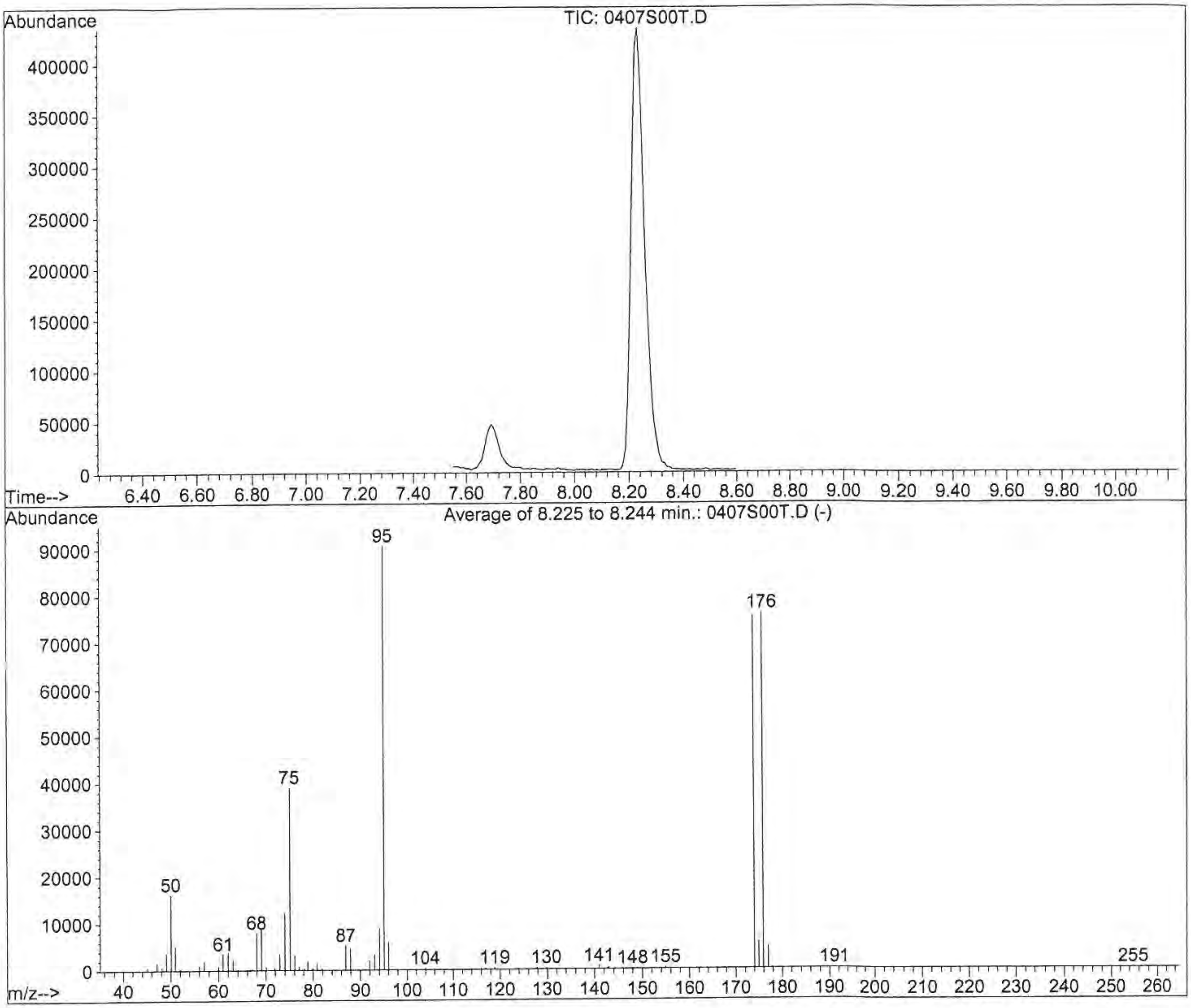
Comments: ARF: 64353, QC Sample ID: AY34954

BFB

Data File : M:\SWEETPEA\DATA\S110407\0407S00T.D
Acq On : 7 Apr 11 22:42
Sample : 20uL/mL BFB Std 03-11-11A
Misc : 2uL

Vial: 1
Operator: RS
Inst : Sweetpea
Multiplr: 1.00

Method : M:\SWEETPEA\DATA\S110407\S826AFS.M (RTE Integrator)
Title : METHOD 8260B



Spectrum Information: Average of 8.225 to 8.244 min.

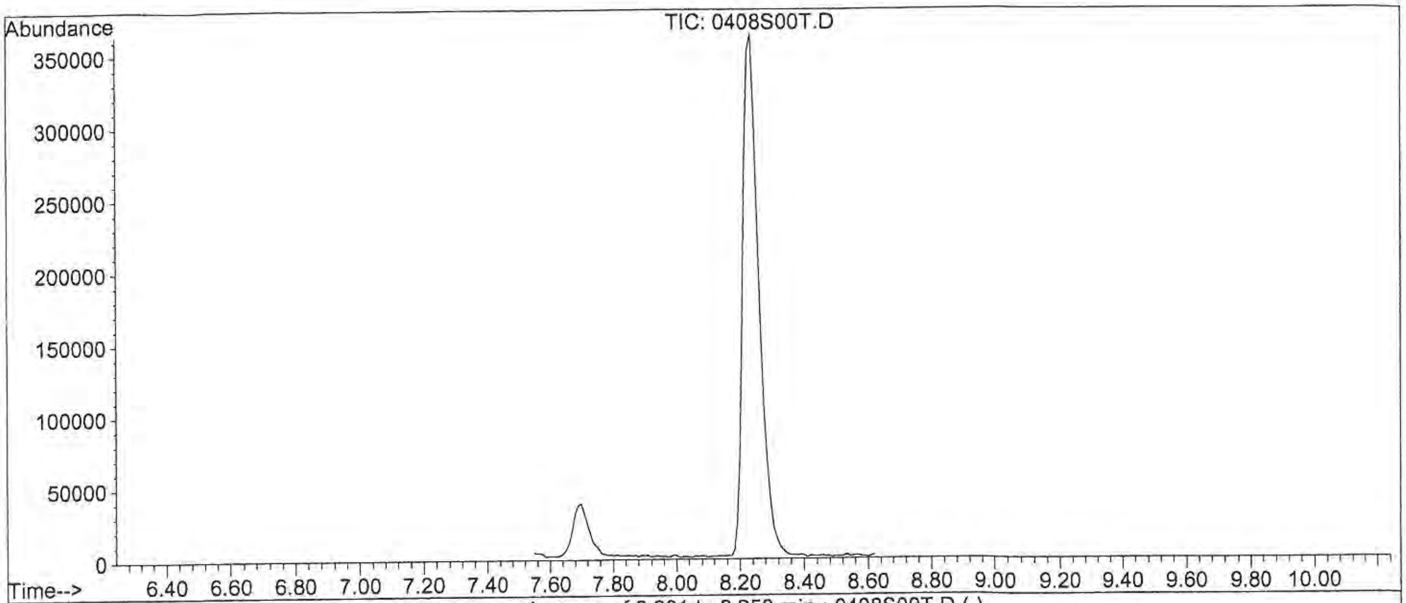
Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	17.8	16123	PASS
75	95	30	60	42.9	38904	PASS
95	95	100	100	100.0	90605	PASS
96	95	5	9	6.6	5968	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	100	83.1	75296	PASS
175	174	5	9	7.5	5623	PASS
176	174	95	101	101.0	76027	PASS
177	176	5	9	6.1	4649	PASS

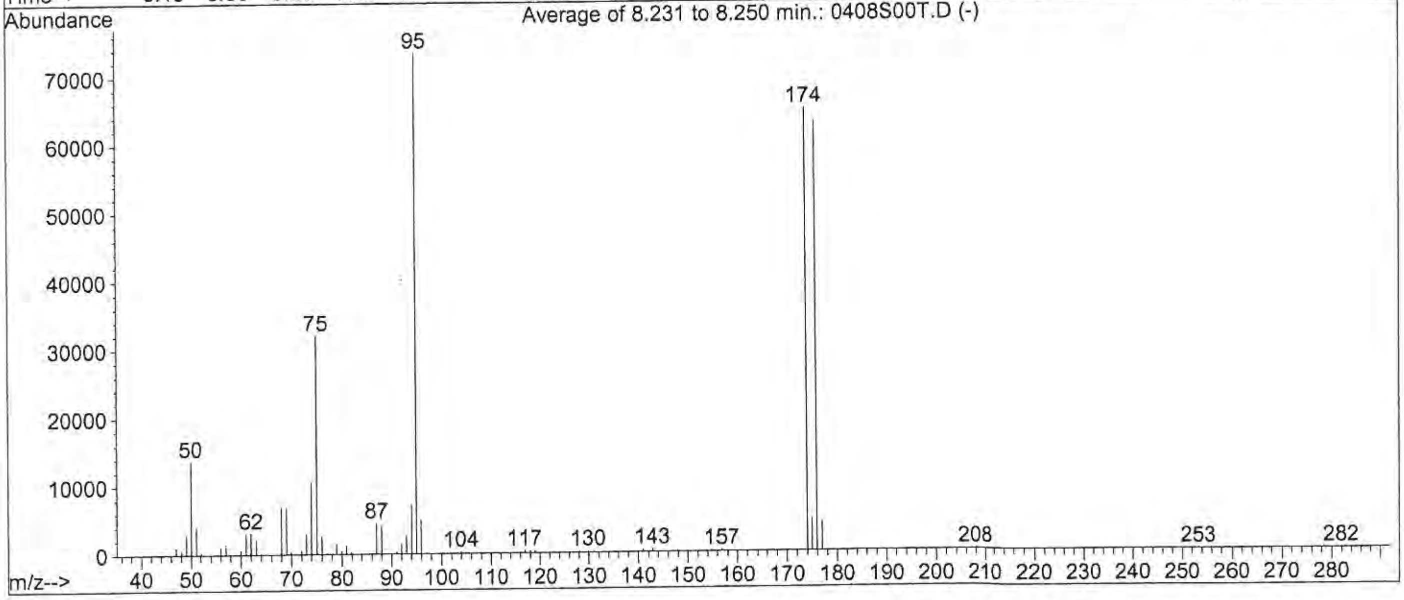
BFB

Data File : M:\SWEETPEA\DATA\S110407\0408S00T.D
Acq On : 8 Apr 11 6:43
Sample : 20uL/mL BFB Std 03-11-11A
Misc : 2uL

Vial: 1
Operator: RS
Inst : Sweetpea
Multiplr: 1.00

Method : M:\SWEETPEA\DATA\S110407\S826AFS.M (RTE Integrator)
Title : METHOD 8260B





Spectrum Information: Average of 8.231 to 8.250 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	18.7	13746	PASS
75	95	30	60	43.7	32075	PASS
95	95	100	100	100.0	73472	PASS
96	95	5	9	6.7	4933	PASS
173	174	0.00	2	0.2	135	PASS
174	95	50	100	88.4	64947	PASS
175	174	5	9	7.2	4662	PASS
176	174	95	101	97.0	63005	PASS
177	176	5	9	6.6	4184	PASS

Injection Log

Directory: M:\SWEETPEA\DATA\S110407\

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0407S00T.D	1	20uL/mL BFB Std 03-11-11A	2uL	7 Apr 11 22:42
2	3	0407S03S.D	1	Vol Std 04-07-11@2.0ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 00:10
3	4	0407S04S.D	1	Vol Std 04-07-11@5.0ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 00:44
4	5	0407S05S.D	1	Vol Std 04-07-11@10ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 1:19
5	6	0407S06S.D	1	Vol Std 04-07-11@20ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 1:54
6	7	0407S07S.D	1	Vol Std 04-07-11@50ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 2:29
7	8	0407S08S.D	1	Vol Std 04-07-11@100ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 3:04
8	9	0407S09S.D	1	Vol Std 04-07-11@200ug/kg	Soil 5mL w/IS: 04-07-11	8 Apr 11 3:39
9	1	0408S00T.D	1	20uL/mL BFB Std 03-11-11A	2uL	8 Apr 11 6:43
10	1	0408S01S.D	1	110408A LCS-1SS (SS)	Soil 5mL w/IS&S: 04-07-11	8 Apr 11 7:02
11	4	0408S04S.D	1	110408A BLK-1SS	Soil 5mL w/IS&S: 04-07-11	8 Apr 11 9:57
12	15	0408S15S.D	0.994827	AY35294S01 5.026	Soil 5mL w/IS&S: 04-07-11	8 Apr 11 16:22

Wetlab Results

ARF: 64353

APPL Inc.
908 North Temperance Avenue
Clovis, CA 93611

Parsons
8000 Centre Park Drive Ste 200
Austin, TX 78754

Attn: Tammy Chang

APPL ID: AY35294 -Client Sample ID: MW36-WC-02 -Sample Collection Date: 04/07/11 Project: 747781.04000 CSSA

Method	Analyte	Result	PQL	Units	Prep Date	Analysis Date
CLP MOIST	MOISTURE	12.2	2.0	%	04/13/11	04/14/11

Printed: 04/14/11 10:29:56 AM

% Moisture

Batch: QCG 110413-M002923

Method: CLP 4.0

Date: 04/13/11 10:46

Sample	Container	Pan (g)	Pan+Wet (g)	Pan+Dry 1 (g)	Pan+Dry 2 (g)	Moisture (%)	Comments
AY35294D	S01	0.8265 04/13/11 10:46	9.6844 04/13/11 10:47	8.5189 04/14/11 09:04	8.5189 04/14/11 09:04	13.158	ay35294s01
AY35294	S01	0.8165 04/13/11 10:46	9.6585 04/13/11 10:49	8.5817 04/14/11 09:03	8.5816 04/14/11 09:03	12.179	ay35294s01

Date/Time InOven@104°C	Date/Time OutOven@104°C	Date/Time InOven@104°C	Date/Time OutOven@104°C
04/13/11 10:50:00 AM			04/14/11 9:02:00 AM

Laboratory Report

Parsons

CSSA

#34

Project #: 747781.04000 CSSA

ARF: 64378

Samples collected: April 8 and 11, 2011

APPL, Inc.

EPA METHOD 8260B
Volatile Organic Compounds

Data Validation Package
for

EPA METHOD 8260B
Volatile Organic Compounds

TABLE OF CONTENTS

LABORATORY NAME: *APPL, Inc.*

EPA METHOD 8260B
Volatile Organic Compounds
Case Narrative

908 North Temperance Ave. ∇ Clovis, CA 93611 ∇ Phone 559-275-2175 ∇ Fax 559-275-4422

Volatile Organic Compounds
EPA Method 8260B

Case Narrative

ARF: 64378

Project: 747781.04000 CSSA

California State Certification Number: CA1312 (DW & WW)

NELAP Certification number: 05233CA (HW)

Texas Certificate Number: T104704242-10-3

Results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Sample Receipt Information:

The samples were received April 13, 2011, at 3.0°C. The sample was assigned Analytical Request Form (ARF) number 64378. The sample numbers and requested analysis were compared to the chains of custody. No exception was noted.

Sample Table

CLIENT ID	APPL ID	Matrix	Date Sampled	Date Received
CS-MW36-LGR(320-332)	AY35518	WATER	04/08/11	04/13/11
AOC65-SIW-01	AY35519	WATER	04/11/11	04/13/11
CS-MW36-LGR(0-142)	AY35520	WATER	04/11/11	04/13/11

Sample Preparation:

The samples were purged according to EPA method 5030B. All holding times were met.

Sample Analysis Information:

The sampleswere analyzed according to EPA method 8260B using a Hewlett Packard Gas Chromatograph with a mass spectrometer detector. The pH of the sample was measured after analysis. The vials used for analysis had a pH of 2. All holding times were met.

Quality Control/Assurance

Spike Recovery

Laboratory Control Spikes (LCS) were used for quality assurance. A second-source standard was used for the LCS. All LCS criteria were met.

No sample were designated by the client for MS/MSD analysis.

Surrogates

Surrogate recoveries are summarized on the form 2 & 8. All surrogate recoveries met acceptance criteria.

Method blanks

No target analyte were detected above the reporting limits in the method blanks.

Calibration

Initial and continuing calibrations were analyzed according to the method. All calibration criteria were met.

Tuning:

The instrument was tuned using BFB. All method criteria were met.

Internal Standards

The internal standard area counts were compared to the mid-point of the initial calibration according to method 8260. All acceptance criteria were met.

Summary:

No analytical exception is noted. All data are acceptable.

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. These test results meet all requirements of NELAC. Release of the hard copy has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

5/4/11

Leonard Fong, Ph.D, Laboratory Director / Date

EPA METHOD 8260B
Volatile Organic Compounds
Chain of Custody and ARF

APPL - Analysis Request Form

64378

Client: **Parsons**

Address: **8000 Centre Park Drive Ste 200**

Austin, TX 78754

Attn: **Tammy Chang**

Phone: **512-719-6092** Fax: **512-719-6099**

Job: **747781.04000 CSSA**

PO #: **747780.30002**

Chain of Custody (Y/N): **Y** # **041111APPFA**

RAD Screen (Y/N): **Y** pH (Y/N): **N**

Turn Around Type: **STD**

Received by: **TBV**

Date Received: **04/13/11** Time: **10:20**

Delivered by: **FED EX**

Shuttle Custody Seals (Y/N): **Y**

Chest Temp(s): **3.0°C**

Color: **VOA**

Samples Chilled until Placed in Refrig/Freezer: **Y**

Project Manager: **Diane Anderson** DA

QC Report Type: **DVP3/AFCEE/ERPIMS/TX**

Due Date: **05/04/11**

w

Comments:

pdf ARF to Tammy & Pam; send 2 DVP3 to Tammy

Data screening project: analyze samples ONCE; report deficiencies; do NOT re-analyze.

Case Narrative. CSSA + AFCEE 3.1 QAPP. Only report MS/MSD when requested.

Use AFCEE forms with AFCEE flagging to report sample & QC data only.

APPL forms for everything else and APPL DVP3.

EDD: ERPIMS 4 Lab PC4 checked TXF to Pam.Ford@parsons.com

4-14 Sent ARF

Sample Distribution:

VOA: 3-$826AW

Charges:

Invoice To:

8000 Centre Park Drive Ste 200
Austin, TX 78754-5140
Attn: Ellen Felfe

	Client ID	APPL ID	Sampled		Analyses Requested
1.	CS-MW36-LGR(320-332)	AY35518W	04/08/11	09:44	$826AW
2.	AOC65-SIW-01	AY35519W	04/11/11	10:45	$826AW
3.	CS-MW36-LGR(0-142)	AY35520W	04/11/11	11:06	$826AW

Initials ______ Date ________

APPL Sample Receipt Form

ARF# **64378**

Sample	Container Type	Count	pH	Sample	Container Type	Count	pH
AY35518	13 VOAs - HCL	3	NA				
AY35519	13 VOAs - HCL	3	NA				
AY35520	13 VOAs - HCL	3	NA				

Printed 04/14/11 8:19:38 AM

64378
3.0

Camp Stanley Storage Activity Chain Of Custody

COC ID: **041111APPFA**
Project Location: **CSSA**
Job Number: **747781.04000**
Creation Date: **4/11/2011**
Task Manager **Scott Pearson**

Relinquish_Date: **4/11/2011**
Relinquished_By: **JDB**
Relinquish_Time: **5:00 PM**
Collection Team: **JB-AL**
Sample Data Type **Screening**

Cooler ID: **A**
LabCode: **APPF**
Carrier: **FedEx**
Airbill Carrier: **873526388188**
TAT: **Standard TAT**

Sampler(s): Julie Bunch A Lindley

LOCID: **CS-MW36-LGR** LOGDATE: **4/8/2011** MATRIX: **WG** TBLOT:
SBD: **320** LOGTIME: **9:44** SACODE: **N** SMCODE: **G** ABLOT:
SED: **332** FLDSAMPID **CS-MW36-LGR_040811_N0944** EBLOT: Containers: 3
Remarks:

Analysis Required:
SW8260B VOC Full List

LOCID: **AOC65-SIW-01** LOGDATE: **4/11/2011** MATRIX: **WG** TBLOT:
SBD: **0** LOGTIME: **10:45** SACODE: **N** SMCODE: **G** ABLOT:
SED: **0** FLDSAMPID **AOC65-SIW-01_041111_N1045** EBLOT: Containers: 3
Remarks:

Analysis Required:
SW8260B VOC Full List

LOCID: **CS-MW36-LGR** LOGDATE: **4/11/2011** MATRIX: **WG** TBLOT:
SBD: **0** LOGTIME: **11:06** SACODE: **N** SMCODE: **G** ABLOT:
SED: **142** FLDSAMPID **CS-MW36-LGR_041111_N1106** EBLOT: Containers: 3
Remarks:

Analysis Required:
SW8260B VOC Full List

Relinquished by: Date 4·11·11 Time 1700
Recieved by: Date Time

Relinquished by: Date Time
Recieved by: Date 4/13/11 Time 1020

Relinquished by: Date Time
Recieved by: Date Time

Page 1 of 1

COOLER RECEIPT FORM

1) Project: 747781.0400 CSSA Date Received: 4/13/11

2) Coolers: Number of Coolers: 1

3) [✓ YES] NO Were coolers and samples screened for radioactivity?

4) [✓ YES] ~~NO~~ to 4/13/11 Were custody seals on outside of cooler? How many? 1 Date on seal? 4/11/11

5) Name on seal? See below - saved only half.

6) [✓ YES] NO [✓ NA] Were custody seals unbroken and intact at the time of arrival?

7) [✓ YES] [✓ NO] Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fed EX

8) Shipping slip numbers:1) ~~873526388188~~ 2) 8735-2638-~~8199~~ 3) 8188 to 4/13/11 to 4/13/11

9) [✓ YES] NO NA Was the shipping slip scanned into the database? to 4/13/11

10) YES NO [✓ NA] If cooler belongs to APPL, has it been logged into the ice chest database?

11) Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): Bubble wrap, wet Ice.

12) YES NO [✓ NA] For hand delivered samples was sufficient ice present to start the cooling process?

13) [✓ YES] NO Was a temperature blank included in the cooler?

14) Serial number of certified NIST thermometer used: A34267 Correction factor: 0

15) Cooler temp(s): 1) 3.0°C 2)____ 3)____ 4)____ 5)____ 6)____ 7)____ 8)____

Chain of custody:

16) [✓ YES] NO Was a chain of custody received?

17) [✓ YES] NO Were the custody papers signed in the appropriate places?

18) [✓ YES] NO Was the project identifiable from custody papers?

19) [✓ YES] NO Did the chain of custody include date and time of sampling?

20) [✓ YES] NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

21) [✓ YES] NO Were container labels in good condition?

22) [✓ YES] NO Was the client ID on the label?

23) [✓ YES] NO Was the date of sampling on the label?

24) [✓ YES] NO Was the time of sampling on the label?

25) [✓ YES] NO Did all container labels agree with custody papers?

Sample Containers:

26) [✓ YES] NO Were all containers sealed in separate bags?

27) [✓ YES] NO Did all containers arrive unbroken?

28) YES [✓ NO] Was there any leakage from samples?

29) YES [✓ NO] Were any of the lids cracked or broken?

30) [✓ YES] NO Were correct containers used for the tests indicated?

31) [✓ YES] NO Was a sufficient amount of sample sent for tests indicated?

32) [✓ YES] NO NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea: ____

Smaller than a pea: A9C35518 W02-W03, A9C35519 W3

Preservation & Hold time:

33) [✓ YES] NO NA Was a sufficient amount of holding time remaining to analyze the samples?

34) YES NO [✓ NA] Do the sample containers contain the same preservative as what is stated on the COC?

35) YES NO [✓ NA] Was the pH taken of all non-VOA preserved samples and written on the sample container?

36) YES NO [✓ NA] Was the pH of acid preserved non-VOA samples < 2 & sodium hydroxide preserved samples > 10?

Lab notified if pH was not adequate: ____

Deficiencies: Could only saved all of the Custody Seal - too much tape over it and it got wet.

Signature of personnel receiving samples: ____ Second reviewer: ____

Signature of project manager notified: ____ Date and Time of notification: ____

Name of client notified: ____ Date and Time of notification: ____

Information given to client: ____

by whom (Initials): ____

EPA METHOD 8260B
Volatile Organic Compounds
QC Summary

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110412

AAB #: 110413AT-154412
Contract #: 2010*1286022*000
Method Blank ID: 110413AT-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64378, Sample: AY35518

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110412

AAB #: 110413AT-154412
Contract #: 2010*1286022*000
Method Blank ID: 110413AT-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	101	69-139	
SURROGATE: 4-BROMOFLUOROBE	86.8	75-125	
SURROGATE: DIBROMOFLUOROME	93.6	75-125	
SURROGATE: TOLUENE-D8 (S)	94.1	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, Sample: AY35518

AFCEE FORM O-6

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B	AAB #: 110414AT-154413
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
Concentration Units: ug/L	Method Blank ID: 110414AT-BLK
Initial Calibration ID: T110412	

Analyte	Method Blank	RL	Q
TETRACHLOROETHENE	< RL	1.4	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	97.7	69-139	
SURROGATE: 4-BROMOFLUOROBE	85.7	75-125	
SURROGATE: DIBROMOFLUOROME	95.3	75-125	
SURROGATE: TOLUENE-D8 (S)	91.4	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, Sample: AY35519

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.

Case No: 64378

Matrix: WATER

SDG No: 64378

Date Analyzed: 04/13/11

Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110413AT-LCS	Lab Control Spike	94.8	97.2
110413AT-BLK	Blank	101	86.8
AY35518	CS-MW36-LGR(320-332)	103	83.1
AY35519	AOC65-SIW-01	98.2	86.6
AY35520	CS-MW36-LGR(0-142)	102	87.2

Comments: Batch: #826AW-110413AT

Printed: 05/04/11 3:33:18 PM

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64378
Matrix: WATER

SDG No: 64378
Date Analyzed: 04/13/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110413AT-LCS	Lab Control Spike	101	106
110413AT-BLK	Blank	93.6	94.1
AY35518	CS-MW36-LGR(320-332)	100	88.1
AY35519	AOC65-SIW-01	98.4	91.9
AY35520	CS-MW36-LGR(0-142)	97.0	92.8

Comments: Batch: #826AW-110413AT

Printed: 05/04/11 3:33:18 PM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64378
Matrix: WATER

SDG No: 64378
Date Analyzed: 04/14/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110414AT-LCS	Lab Control Spike	96.8	103
110414AT-BLK	Blank	97.7	85.7
AY35519	AOC65-SIW-01	98.3	87.1

Comments: Batch: #826AW-110414AT

Printed: 05/04/11 3:33:18 PM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64378
Matrix: WATER

SDG No: 64378
Date Analyzed: 04/14/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110414AT-LCS	Lab Control Spike	111	112
110414AT-BLK	Blank	95.3	91.4
AY35519	AOC65-SIW-01	97.1	92.9

Comments: Batch: #826AW-110414AT

Printed: 05/04/11 3:33:18 PM

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110413AT LCS
Concentration Units: ug/L

AAB #: 110413AT-154412
Contract #: 2010*1286022*000
Initial Calibration ID: T110412

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	9.65	96.5	72-125	
1,1,1-TCA	10.00	10.22	102	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	10.18	102	74-125	
1,1,2-TCA	10.00	9.59	95.9	75-127	
1,1-DCA	10.00	9.67	96.7	75-125	
1,1-DCE	10.00	9.57	95.7	75-125	
1,1-DICHLOROPROPENE	10.00	9.78	97.8	75-125	
1,2,3-TRICHLOROBENZENE	10.00	10.13	101	75-137	
1,2,3-TRICHLOROPROPANE	10.00	10.47	105	75-125	
1,2,4-TRICHLOROBENZENE	10.00	9.41	94.1	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	10.40	104	75-125	
1,2-DCA	10.00	9.95	99.5	68-127	
1,2-DCB	10.00	10.68	107	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	9.02	90.2	59-125	
1,2-DICHLOROPROPANE	10.00	9.90	99.0	70-125	
1,2-EDB	10.00	9.04	90.4	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	10.57	106	72-125	
1,3-DCB	10.00	10.38	104	75-125	
1,3-DICHLOROPROPANE	10.00	9.27	92.7	75-125	
1,4-DCB	10.00	10.10	101	75-125	
1-CHLOROHEXANE	10.00	9.39	93.9	75-125	
2,2-DICHLOROPROPANE	10.00	10.11	101	75-125	
2-CHLOROTOLUENE	10.00	11.01	110	73-125	
4-CHLOROTOLUENE	10.00	10.57	106	74-125	
BENZENE	10.00	9.98	99.8	75-125	
BROMOBENZENE	10.00	10.45	105	75-125	
BROMOCHLOROMETHANE	10.00	9.69	96.9	73-125	
BROMODICHLOROMETHANE	10.00	9.73	97.3	75-125	
BROMOFORM	10.00	8.66	86.6	75-125	
BROMOMETHANE	10.00	11.25	113	72-125	
CARBON TETRACHLORIDE	10.00	10.09	101	62-125	
CHLOROBENZENE	10.00	9.65	96.5	75-125	
CHLOROETHANE	10.00	9.30	93.0	65-125	
CHLOROFORM	10.00	9.67	96.7	74-125	
CHLOROMETHANE	10.00	8.28	82.8	75-125	
CIS-1,2-DCE	10.00	9.98	99.8	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	9.08	90.8	74-125	
DIBROMOCHLOROMETHANE	10.00	8.78	87.8	73-125	
DIBROMOMETHANE	10.00	9.89	98.9	69-127	
DICHLORODIFLUOROMETHANE	10.00	9.45	94.5	72-125	

Comments: ARF: 64378, QC Sample ID: AY35518

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110413AT LCS

Concentration Units: ug/L

AAB #: 110413AT-154412

Contract #: 2010*1286022*000

Initial Calibration ID: T110412

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	10.62	106	75-125	
HEXACHLOROBUTADIENE	10.00	10.88	109	75-125	
ISOPROPYLBENZENE	10.00	10.35	104	75-125	
M&P-XYLENE	20.00	18.84	94.2	75-125	
METHYLENE CHLORIDE	10.00	9.15	91.5	75-125	
N-BUTYLBENZENE	10.00	10.01	100	75-125	
N-PROPYLBENZENE	10.00	10.83	108	75-125	
NAPHTHALENE	10.00	9.51	95.1	75-125	
O-XYLENE	10.00	9.27	92.7	75-125	
P-ISOPROPYLTOLUENE	10.00	10.49	105	75-125	
SEC-BUTYLBENZENE	10.00	10.30	103	75-125	
STYRENE	10.00	9.04	90.4	75-125	
TCE	10.00	9.44	94.4	71-125	
TERT-BUTYLBENZENE	10.00	10.36	104	75-125	
TETRACHLOROETHENE	10.00	9.98	99.8	71-125	
TOLUENE	10.00	11.21	112	74-125	
TRANS-1,2-DCE	10.00	9.45	94.5	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	8.86	88.6	66-125	
TRICHLOROFLUOROMETHANE	10.00	8.92	89.2	67-125	
VINYL CHLORIDE	10.00	9.09	90.9	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	94.8	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	97.2	75-125	
SURROGATE: DIBROMOFLUOROMETH	101	75-125	
SURROGATE: TOLUENE-D8 (S)	106	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, QC Sample ID: AY35518

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110414AT LCS

Concentration Units: ug/L

AAB #: 110414AT-154413

Contract #: 2010*1286022*000

Initial Calibration ID: T110412

Analyte	**Expected**	**Found**	**% R**	**Control Limits**	**Q**
TETRACHLOROETHENE	10.00	10.44	104	71-125	

Surrogate	**Recovery**	**Control Limits**	**Qualifier**
SURROGATE: 1,2-DICHLOROETHANE-	96.8	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	103	75-125	
SURROGATE: DIBROMOFLUOROMETH	111	75-125	
SURROGATE: TOLUENE-D8 (S)	112	75-125	

Internal Std	**Qualifier**
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, QC Sample ID: AY35519

EPA 8260B

Form 4

Blank Summary

Lab Name: APPL, Inc.
SDG No: 64378
Case No: 64378
Date Analyzed: 04/13/11
Matrix: WATER
Instrument: Thor
Blank ID: 110413AT-BLK
Time Analyzed: 1340

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110413AT-LCS	Lab Control Spike	0413T04	04/13/11 1131
110413AT-BLK	Blank	0413T07	04/13/11 1340
AY35518	CS-MW36-LGR(320-332)	0413T15	04/13/11 1708
AY35519	AOC65-SIW-01	0413T16	04/13/11 1733
AY35520	CS-MW36-LGR(0-142)	0413T17	04/13/11 1759

Comments: Batch: #826AW-110413AT

EPA 8260B

Form 4

Blank Summary

Lab Name:	APPL, Inc.	SDG No:	64378
Case No:	64378	Date Analyzed:	04/14/11
Matrix:	WATER	Instrument:	Thor
Blank ID:	110414AT-BLK	Time Analyzed:	1153

APPL ID.	**Client Sample No.**	**File ID.**	**Date Analyzed**
110414AT-LCS	Lab Control Spike	0414T04	04/14/11 1010
110414AT-BLK	Blank	0414T06	04/14/11 1153
AY35519	AOC65-SIW-01	0414T07	04/14/11 1219

Comments: Batch: #826AW-110414AT

8A
INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.

Contract: Review

Lab Code:

SDG No.: 64378

Lab File ID (Standard): 0412T08W.D

Date Analyzed: 04/12/11

Instrument ID: Thor

Time Analyzed: 14:03

GC Column:

ID:

Heated Purge: (Y/N)

		Fluorobenzene (IS)		Chlorobenzene-D5 (IS)		1,4-Dichlorobenzene-D (IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	1748480	6.79	1245180	10.67	840896	12.48
	UPPER LIMIT	3496960	7.29	2490360	11.17	1681792	12.98
	LOWER LIMIT	874240	6.29	622590	10.17	420448	11.98
	SAMPLE NO.						
01	110413A LCS-1WT	1676290	6.79	1236990	10.67	812032	12.48
02	110413A BLK-1WT	1643010	6.79	1134080	10.67	677952	12.48
03	AY35518W01	1506300	6.79	1122300	10.67	649472	12.48
04	AY35519W01	1597440	6.79	1123840	10.67	667520	12.48
05	AY35520W01	1574910	6.79	1080830	10.67	687616	12.48
06							
07							
08							
09							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

\# Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A
INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.
Contract: Review
Lab Code:
SDG No.: 64378
Lab File ID (Standard): 0412T08W.D
Date Analyzed: 04/12/11
Instrument ID: Thor
Time Analyzed: 14:03
GC Column:
ID:
Heated Purge: (Y/N)

		Fluorobenzene (IS)				Chlorobenzene-D5 (IS)				1,4-Dichlorobenzene-D (IS)			
		AREA	#	RT	#	AREA	#	RT	#	AREA	#	RT	#
	12 HOUR STD	1748480		6.79		1245180		10.67		840896		12.48	
	UPPER LIMIT	3496960		7.29		2490360		11.17		1681792		12.98	
	LOWER LIMIT	874240		6.29		622590		10.17		420448		11.98	
	SAMPLE NO.												
01	110414A LCS-1WT	1997310		6.79		1458690		10.67		983232		12.48	
02	110414A BLK-1WT	1746430		6.79		1218560		10.67		728064		12.48	
03	AY35519W02 DF5	1724420		6.79		1195010		10.67		700224		12.48	
04													
05													
06													
07													
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22													

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

EPA METHOD 8260B
Volatile Organic Compounds
Sample Data

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AT-154412

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: CS-MW36-LGR(320-332) Lab Sample ID: AY35518 Matrix: Water

% Solids: NA Initial Calibration ID: T110412

Date Received: 13-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.11	1		F
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments:

ARF: 64378

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AT-154412

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: CS-MW36-LGR(320-332) Lab Sample ID: AY35518 Matrix: Water

% Solids: NA Initial Calibration ID: T110412

Date Received: 13-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.34	1		F
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	15.45	1		
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	22.91	1		
TOLUENE	0.06	1.1	0.06	1		U
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	103	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	83.1	75-125	
SURROGATE: DIBROMOFLUOROMETH	100	75-125	
SURROGATE: TOLUENE-D8 (S)	88.1	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64378

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AT-154412

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: AOC65-SIW-01 Lab Sample ID: AY35519 Matrix: Water

% Solids: NA Initial Calibration ID: T110412

Date Received: 13-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.37	1		
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments: J = Estimated value.

ARF: 64378

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AT-154412

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: AOC65-SIW-01 Lab Sample ID: AY35519 Matrix: Water

% Solids: NA Initial Calibration ID: T110412

Date Received: 13-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.64	1		F
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	0.35	1		F
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	272.71	1		J
TOLUENE	0.06	1.1	0.06	1		U
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	98.2	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	86.6	75-125	
SURROGATE: DIBROMOFLUOROMETH	98.4	75-125	
SURROGATE: TOLUENE-D8 (S)	91.9	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: J = Estimated value.

ARF: 64378

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110414AT-154413

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: AOC65-SIW-01 Lab Sample ID: AY35519 Matrix: Water

% Solids: NA Initial Calibration ID: T110412

Date Received: 13-Apr-11 Date Prepared: 14-Apr-11 Date Analyzed: 14-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
TETRACHLOROETHENE	0.30	7.0	289.28	5		

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	98.3	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	87.1	75-125	
SURROGATE: DIBROMOFLUOROMETH	97.1	75-125	
SURROGATE: TOLUENE-D8 (S)	92.9	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64378

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AT-154412

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: CS-MW36-LGR(0-142) Lab Sample ID: AY35520 Matrix: Water

% Solids: NA Initial Calibration ID: T110412

Date Received: 13-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.06	1		U
CHLOROMETHANE	0.16	1.3	0.44	1		F

Comments:

ARF: 64378

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110413AT-154412

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: CS-MW36-LGR(0-142) Lab Sample ID: AY35520 Matrix: Water

% Solids: NA Initial Calibration ID: T110412

Date Received: 13-Apr-11 Date Prepared: 13-Apr-11 Date Analyzed: 13-Apr-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	0.32	1		F
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	12.64	1		
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	24.93	1		
TOLUENE	0.06	1.1	0.06	1		U
TRANS-1,2-DCE	0.08	0.6	0.08	1		U
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	102	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	87.2	75-125	
SURROGATE: DIBROMOFLUOROMETH	97.0	75-125	
SURROGATE: TOLUENE-D8 (S)	92.8	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64378

AFCEE FORM O-2

EPA METHOD 8260B
Volatile Organic Compounds
Calibration Data

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64378
Initial Cal. Date: 04/12/11
Instrument: Thor

Initials:

			0412T03W.D	0412T04W.D	0412T05W.D	0412T06W.D	0412T07W.D	0412T08W.D	0412T09W.D	0412T10W.D	0412T11W.D					
		Compound	0.3	0.5	1	2	5	10	20	40	100		Avg	%RSD		
1	I	Fluorobenzene (IS)	ISTD													
2	TM	Dichlorodifluoromethane	0.1688	0.1385	0.1588	0.1537	0.1311	0.1367	0.1448	0.1462	0.1365		0.15	8.4	TM	
3	TM**	Chloromethane	0.3121	0.3316	0.2852	0.2798	0.2743	0.2319	0.2352	0.2294	0.2351		0.27	14	TM**	
4	TM*	Vinyl chloride	0.2969	0.2302	0.2033	0.2311	0.2290	0.2171	0.2306	0.2271	0.2282		0.23	11	TM*	
5	TML	Bromomethane		0.0077	0.2949	0.2577	0.2036	0.1701	0.1493	0.1381	0.1317		0.17	52	TML	0.999
6	TM	Chloroethane		0.1920	0.1796	0.1952	0.1940	0.1703	0.1752				0.18	5.8	TM	
7	TM	Trichlorofluoromethane	0.3913	0.4191	0.4028	0.4200	0.3848	0.3954	0.4045	0.4171	0.4462		0.41	4.6	TM	
8	TM*	1,1-DCE	0.4118	0.3025	0.3329	0.3355	0.3107	0.3424	0.3287	0.3193	0.3486		0.34	9.4	TM*	
9	TML	Methylene chloride		0.7462	0.5276	0.5090	0.4695	0.5017	0.4603				0.54	20	TML	0.998
10	TM	Trans-1,2-DCE	0.4409	0.3888	0.4130	0.3777	0.3728	0.4108	0.3802	0.3590	0.3898		0.39	6.4	TM	
11	TM**	1,1-DCA	0.7965	0.7963	0.7717	0.7597	0.7913	0.8467	0.7653	0.7342	0.7930		0.78	4.0	TM**	
12	TM	Cis-1,2-DCE	0.3860	0.4175	0.3928	0.4286	0.4516	0.4966	0.4640	0.4517	0.4948		0.44	9.0	TM	
13	TM	2,2-Dichloropropane	0.3907	0.4381	0.3730	0.4205	0.4170	0.4741	0.4382	0.4323	0.4920		0.43	8.6	TM	
14	TM*	Chloroform	0.7762	0.7497	0.6843	0.6988	0.7396	0.8084	0.7417	0.7164	0.7843		0.74	5.5	TM*	
15	TM	Bromochloromethane	0.1575	0.1646	0.1366	0.1482	0.1574	0.1680	0.1571	0.1527	0.1634		0.16	6.1	TM	
16	S	Dibromofluoromethane(S)	0.3993	0.3490	0.3091	0.3332	0.3362	0.3330	0.3424	0.3488	0.3816		0.35	7.8	S	
17	TM	1,1,1-TCA	0.4316	0.3818	0.4067	0.4471	0.4467	0.5297	0.4941	0.4928	0.5449		0.46	12	TM	
18	TM	1,1-Dichloropropene	0.4266	0.4790	0.4294	0.4421	0.4423	0.5113	0.4805	0.4763	0.5182		0.47	7.3	TM	
19	S	1,2-DCA-D4(S)	0.5645	0.5251	0.4796	0.4870	0.4647	0.4608	0.4616	0.4551	0.4727		0.49	7.5	S	
20	TM	Carbon Tetrachloride	0.2919	0.3021	0.2877	0.2885	0.3066	0.3537	0.3365	0.3401	0.3759		0.32	10	TM	
21	TM	1,2-DCA	0.5488	0.5514	0.5275	0.5768	0.6006	0.6426	0.5728	0.5461	0.5822		0.57	6.0	TM	
22	TM	Benzene	1.604	1.514	1.462	1.563	1.694	1.860	1.727	1.665	1.868		1.7	8.6	TM	
23	TM	TCE	0.4733	0.3768	0.3635	0.3634	0.3774	0.4377	0.4066	0.4005	0.4447		0.40	9.7	TM	
24	TM*	1,2-Dichloropropane	0.5204	0.4490	0.4605	0.4832	0.5045	0.5360	0.4929	0.4808	0.5198		0.49	5.9	TM*	
25	TM	Bromodichloromethane	0.4659	0.4588	0.4253	0.4573	0.4953	0.5564	0.5271	0.5251	0.5932		0.50	11	TM	
26	TM	Dibromomethane	0.2138	0.2011	0.2135	0.2229	0.2297	0.2549	0.2285	0.2199	0.2386		0.22	7.0	TM	
27	TML	Cis-1,3-Dichloropropene		0.3519	0.3540	0.3876	0.4745	0.5994	0.5920	0.6090	0.7036		0.51	27	TML	0.997
28	TM*	Toluene		1.019	1.109	1.368	1.674	1.894	1.763	1.732			1.5	23	TM*	
29	TML	Trans-1,3-Dichloropropene		0.2779	0.3242	0.3063	0.3922	0.4714	0.4708	0.5021	0.5949		0.42	26	TML	0.996
30	TM	1,1,2-TCA	0.2766	0.2716	0.2602	0.2977	0.3158	0.3470	0.3163	0.3062	0.3346		0.30	9.6	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD													
32	SL	Toluene-D8(S)	1.336	1.308	1.370	1.501	1.707	1.923	1.829	1.969			1.6	17	SL	0.999
33	TML	1,2-EDB		0.2695	0.2905	0.3060	0.3782	0.4360	0.3965	0.4082	0.4371		0.37	18	TML	0.999
34	TM	Tetrachloroethene	0.2148	0.2426	0.3003	0.2468	0.2715	0.3104	0.2749	0.2833	0.2941		0.27	11	TM	
35	TM	1-Chlorohexane		0.5953	0.5204	0.4338	0.4896	0.6022	0.5379	0.5813	0.6397		0.55	12	TM	

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64378
Initial Cal. Date: 04/12/11
Instrument: Thor

Initials:

		Compound	0.3	0.5	1	2	5	10	20	40	100		Avg	%RSD		
36	TM	1,1,1,2-Tetrachloroethane	0.3239	0.3698	0.3852	0.3509	0.4002	0.4677	0.4107	0.4381	0.4844		0.40	13	TM	
37	TML	m&p-Xylene		0.5897	0.6320	0.7873	0.9085	1.072	0.9395	0.9983			0.85	22	TML	0.998
38	TML	o-Xylene		0.5431	0.5072	0.6498	0.8375	1.024	0.9214	0.9726	1.096		0.82	27	TML	0.998
39	TML	Styrene	0.6137	0.7521	0.8675	1.187	1.516	1.883	1.685	1.801	1.867		1.4	37	TML	1.000
40	SL	4-Bromofluorobenzene(S)	0.5142	0.5050	0.5344	0.6080	0.6613	0.7294	0.7021	0.7744	0.8369		0.65	18	SL	0.996
41	TML	1,3-Dichloropropane	0.5808	0.6564	0.7584	0.7380	0.8325	0.9825	0.8511	0.8806	0.9478		0.80	16	TML	0.999
42	TML	Dibromochloromethane		0.2393	0.2817	0.2625	0.3346	0.4047	0.3582	0.3933	0.4418		0.34	21	TML	0.998
43	TM**	Chlorobenzene	1.509	1.436	1.362	1.364	1.481	1.623	1.419	1.455	1.594		1.5	6.2	TM**	
44	TM*	Ethylbenzene		1.805	1.929	2.178	2.456	3.026	2.680	2.816	2.338		2.4	18	TM*	
45	TM**L	Bromoform		0.1351	0.1147	0.1382	0.1354	0.1854	0.1652	0.1872	0.2278		0.16	23	TM**L	0.994
46	I	1,4-Dichlorobenzene-D (IS)	ISTD													
47	TML	Isopropylbenzene		1.652	1.795	2.205	2.893	3.645	3.353	3.594	2.900		2.8	29	TML	0.991
48	TM**	1,1,2,2-Tetrachloroethane	0.7672	0.7847	0.7783	0.7111	0.8426	0.8659	0.7376	0.7732	0.8522		0.79	6.7	TM**	
49	TM	1,2,3-Trichloropropane	0.2163	0.2145	0.2106	0.2387	0.2300	0.2626	0.2229	0.2353	0.2425		0.23	7.2	TM	
50	TML	Bromobenzene	0.4667	0.5958	0.5631	0.6442	0.7454	0.8319	0.7020	0.7360	0.7822		0.67	17	TML	0.999
51	TML	n-Propylbenzene	2.003	2.190	2.668	3.124	3.501	3.914	3.387	3.633	2.912		3.0	21	TML	0.991
52	TML	2-Chlorotoluene	1.849	1.898	2.507	2.806	3.289	3.642	3.162	3.335	3.048		2.8	22	TML	0.998
53	TML	1,3,5-Trimethylbenzene		1.427	1.850	2.537	3.058	3.483	3.061	3.290	2.690		2.7	27	TML	0.992
54	TML	4-Chlorotoluene		2.153	2.668	3.124	3.501	3.914	3.387	3.633	2.912		3.2	18	TML	0.990
55	TML	Tert-Butylbenzene		1.379	1.588	1.809	2.240	2.823	2.514	2.742	2.717		2.2	25	TML	1.000
56	TML	1,2,4-Trimethylbenzene		1.285	1.683	2.434	2.992	3.508	3.162	3.392			2.6	33	TML	0.999
57	TML	Sec-Butylbenzene		1.858	2.341	2.906	3.448	4.196	3.771	4.130			3.2	28	TML	0.998
58	TML	p-Isopropyltoluene	1.310	1.596	1.895	2.230	2.713	3.261	2.886	3.188	2.613		2.4	29	TML	0.993
59	TM	1,3-DCB	1.145	1.818	1.645	1.434	1.584	1.753	1.515	1.602	1.753		1.6	13	TM	
60	TM	1,4-DCB	1.925	1.818	1.645	1.615	1.643	1.830	1.551	1.664	1.807		1.7	7.3	TM	
61	TML	n-Butylbenzene		1.793	2.081	2.357	2.936	3.632	3.319	3.742			2.8	27	TML	0.997
62	TM	1,2-DCB	1.274	1.237	1.340	1.449	1.596	1.717	1.486	1.547	1.709		1.5	12	TM	
63	TML	1,2-Dibromo-3-chloropropane			0.0801	0.0657	0.0805	0.0922	0.0896	0.1050	0.1196		0.09	20	TML	0.997
64	TML	1,2,4-Trichlorobenzene	0.6510	0.5666	0.6100	0.6028	0.7452	0.9102	0.8435	0.9555	1.069		0.77	23	TML	0.997
65	TM	Hexachlorobutadiene	0.3308	0.2766	0.2835	0.3255	0.3279	0.3758	0.3289	0.3618	0.3919		0.33	12	TM	
66	TML	Naphthalene	0.9574	0.9613	0.9361	1.136	1.828	2.382	2.209	2.493	2.398		1.7	41	TML	0.999
67	TML	1,2,3-Trichlorobenzene	0.6499	0.5095	0.5933	0.6121	0.8096	0.9363	0.8254	0.8926	0.9703		0.76	22	TML	0.999
68																
69																
70																

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix:

SDG No: 64378
Date Analyzed: 04/12/11
Instrument: Thor
Initial Cal. Date: 04/12/11
Data File: 0412T16W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.1461	0.1451	0.71	TM	
3	TM**	Chloromethane	0.2683	0.2291	15	TM**	
4	TM*	Vinyl chloride	0.2326	0.2127	8.6	TM*	
5	TML	Bromomethane	0.1691	0.1681	0.59	TML	10.0
6	TM	Chloroethane	0.1844	0.1700	7.8	TM	
7	TM	Trichlorofluoromethane	0.4090	0.3791	7.3	TM	
8	TM*	1,1-DCE	0.3369	0.3002	11	TM*	
9	TML	Methylene chloride	0.5357	0.4263	20	TML	10
10	TM	Trans-1,2-DCE	0.3926	0.3529	10	TM	
11	TM**	1,1-DCA	0.7839	0.7168	8.6	TM**	
12	TM	Cis-1,2-DCE	0.4426	0.4307	2.7	TM	
13	TM	2,2-Dichloropropane	0.4307	0.3495	19	TM	
14	TM*	Chloroform	0.7444	0.6737	9.5	TM*	
15	TM	Bromochloromethane	0.1562	0.1424	8.8	TM	
16	S	Dibromofluoromethane(S)	0.3480	0.3528	1.4	S	
17	TM	1,1,1-TCA	0.4639	0.4457	3.9	TM	
18	TM	1,1-Dichloropropene	0.4673	0.4276	8.5	TM	
19	S	1,2-DCA-D4(S)	0.4857	0.4659	4.1	S	
20	TM	Carbon Tetrachloride	0.3203	0.2957	7.7	TM	
21	TM	1,2-DCA	0.5721	0.5286	7.6	TM	
22	TM	Benzene	1.662	1.572	5.4	TM	
23	TM	TCE	0.4049	0.3874	4.3	TM	
24	TM*	1,2-Dichloropropane	0.4941	0.4654	5.8	TM*	
25	TM	Bromodichloromethane	0.5005	0.4777	4.6	TM	
26	TM	Dibromomethane	0.2248	0.2118	5.8	TM	
27	TML	Cis-1,3-Dichloropropene	0.5090	0.4969	2.4	TML	13
28	TM*	Toluene	1.508	1.619	7.3	TM*	
29	TML	Trans-1,3-Dichloropropene	0.4175	0.3854	7.7	TML	16
30	TM	1,1,2-TCA	0.3029	0.2928	3.3	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	SL	Toluene-D8(S)	1.618	2.095	29	SL	9.9
33	TML	1,2-EDB	0.3653	0.3832	4.9	TML	4.5
34	TM	Tetrachloroethene	0.2710	0.2628	3.0	TM	
35	TM	1-Chlorohexane	0.5500	0.4872	11	TM	
36	TM	1,1,1,2-Tetrachloroethane	0.4034	0.3982	1.3	TM	
37	TML	m&p-Xylene	0.8468	0.8997	6.2	TML	7.2
38	TML	o-Xylene	0.8189	0.8477	3.5	TML	8.9
39	TML	Styrene	1.353	1.583	17	TML	8.4
40	SL	4-Bromofluorobenzene(S)	0.6517	0.7664	18	SL	0.16
		Average			8.0		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: 0

SDG No: 64378
Date Analyzed: 04/12/11
Instrument: Thor
Cal. Date: 04/12/11
Data File: 0412T16W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TML	1,3-Dichloropropane	0.8031	0.8319	3.6	TML	6.0
42	TML	Dibromochloromethane	0.3395	0.3373	0.64	TML	9.2
43	TM**	Chlorobenzene	1.471	1.411	4.1	TM**	
44	TM*	Ethylbenzene	2.403	2.498	3.9	TM*	
45	TM**L	Bromoform	0.1611	0.1491	7.5	TM**L	12
46	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
47	TML	Isopropylbenzene	2.755	3.152	14	TML	6.6
48	TM**	1,1,2,2-Tetrachloroethane	0.7903	0.7206	8.8	TM**	
49	TM	1,2,3-Trichloropropane	0.2304	0.2378	3.2	TM	
50	TML	Bromobenzene	0.6741	0.7260	7.7	TML	2.2
51	TML	n-Propylbenzene	3.037	3.383	11	TML	1.4
52	TML	2-Chlorotoluene	2.837	3.196	13	TML	1.3
53	TML	1,3,5-Trimethylbenzene	2.675	2.982	11	TML	5.6
54	TML	4-Chlorotoluene	3.161	3.383	7.0	TML	4.0
55	TML	Tert-Butylbenzene	2.227	2.404	8.0	TML	7.1
56	TML	1,2,4-Trimethylbenzene	2.637	3.055	16	TML	5.6
57	TML	Sec-Butylbenzene	3.236	3.594	11	TML	7.7
58	TML	p-Isopropyltoluene	2.410	2.807	16	TML	4.6
59	TM	1,3-DCB	1.583	1.519	4.1	TM	
60	TM	1,4-DCB	1.722	1.590	7.7	TM	
61	TML	n-Butylbenzene	2.837	3.055	7.7	TML	11
62	TM	1,2-DCB	1.484	1.472	0.80	TM	
63	TML	1,2-Dibromo-3-chloropropane	0.0904	0.0856	5.2	TML	5.7
64	TML	1,2,4-Trichlorobenzene	0.7726	0.7811	1.1	TML	13
65	TM	Hexachlorobutadiene	0.3336	0.3286	1.5	TM	
66	TML	Naphthalene	1.700	2.060	21	TML	9.2
67	TML	1,2,3-Trichlorobenzene	0.7554	0.8078	6.9	TML	7.2
68							
69							
70							
71							
72							
73							
74							
75							
76							
77							
78							
79							
80							
		Average			7.8		

EPA METHOD 8260B
Volatile Organic Compounds
Raw Data

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110412

AAB #: 110413AT-154412
Contract #: 2010*1286022*000
Method Blank ID: 110413AT-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64378, Sample: AY35518

AFCEE FORM O-6

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110412

AAB #: 110413AT-154412
Contract #: 2010*1286022*000
Method Blank ID: 110413AT-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	101	69-139	
SURROGATE: 4-BROMOFLUOROBE	86.8	75-125	
SURROGATE: DIBROMOFLUOROME	93.6	75-125	
SURROGATE: TOLUENE-D8 (S)	94.1	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, Sample: AY35518

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

Concentration Units: ug/L

Initial Calibration ID: T110412

AAB #: 110414AT-154413

Contract #: 2010*1286022*000

Method Blank ID: 110414AT-BLK

Analyte	Method Blank	RL	Q
TETRACHLOROETHENE	< RL	1.4	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	97.7	69-139	
SURROGATE: 4-BROMOFLUOROBE	85.7	75-125	
SURROGATE: DIBROMOFLUOROME	95.3	75-125	
SURROGATE: TOLUENE-D8 (S)	91.4	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, Sample: AY35519

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110413AT LCS

Concentration Units: ug/L

AAB #: 110413AT-154412

Contract #: 2010*1286022*000

Initial Calibration ID: T110412

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	9.65	96.5	72-125	
1,1,1-TCA	10.00	10.22	102	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	10.18	102	74-125	
1,1,2-TCA	10.00	9.59	95.9	75-127	
1,1-DCA	10.00	9.67	96.7	75-125	
1,1-DCE	10.00	9.57	95.7	75-125	
1,1-DICHLOROPROPENE	10.00	9.78	97.8	75-125	
1,2,3-TRICHLOROBENZENE	10.00	10.13	101	75-137	
1,2,3-TRICHLOROPROPANE	10.00	10.47	105	75-125	
1,2,4-TRICHLOROBENZENE	10.00	9.41	94.1	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	10.40	104	75-125	
1,2-DCA	10.00	9.95	99.5	68-127	
1,2-DCB	10.00	10.68	107	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	9.02	90.2	59-125	
1,2-DICHLOROPROPANE	10.00	9.90	99.0	70-125	
1,2-EDB	10.00	9.04	90.4	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	10.57	106	72-125	
1,3-DCB	10.00	10.38	104	75-125	
1,3-DICHLOROPROPANE	10.00	9.27	92.7	75-125	
1,4-DCB	10.00	10.10	101	75-125	
1-CHLOROHEXANE	10.00	9.39	93.9	75-125	
2,2-DICHLOROPROPANE	10.00	10.11	101	75-125	
2-CHLOROTOLUENE	10.00	11.01	110	73-125	
4-CHLOROTOLUENE	10.00	10.57	106	74-125	
BENZENE	10.00	9.98	99.8	75-125	
BROMOBENZENE	10.00	10.45	105	75-125	
BROMOCHLOROMETHANE	10.00	9.69	96.9	73-125	
BROMODICHLOROMETHANE	10.00	9.73	97.3	75-125	
BROMOFORM	10.00	8.66	86.6	75-125	
BROMOMETHANE	10.00	11.25	113	72-125	
CARBON TETRACHLORIDE	10.00	10.09	101	62-125	
CHLOROBENZENE	10.00	9.65	96.5	75-125	
CHLOROETHANE	10.00	9.30	93.0	65-125	
CHLOROFORM	10.00	9.67	96.7	74-125	
CHLOROMETHANE	10.00	8.28	82.8	75-125	
CIS-1,2-DCE	10.00	9.98	99.8	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	9.08	90.8	74-125	
DIBROMOCHLOROMETHANE	10.00	8.78	87.8	73-125	
DIBROMOMETHANE	10.00	9.89	98.9	69-127	
DICHLORODIFLUOROMETHANE	10.00	9.45	94.5	72-125	

Comments: ARF: 64378, QC Sample ID: AY35518

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110413AT LCS

Concentration Units: ug/L

AAB #: 110413AT-154412

Contract #: 2010*1286022*000

Initial Calibration ID: T110412

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	10.62	106	75-125	
HEXACHLOROBUTADIENE	10.00	10.88	109	75-125	
ISOPROPYLBENZENE	10.00	10.35	104	75-125	
M&P-XYLENE	20.00	18.84	94.2	75-125	
METHYLENE CHLORIDE	10.00	9.15	91.5	75-125	
N-BUTYLBENZENE	10.00	10.01	100	75-125	
N-PROPYLBENZENE	10.00	10.83	108	75-125	
NAPHTHALENE	10.00	9.51	95.1	75-125	
O-XYLENE	10.00	9.27	92.7	75-125	
P-ISOPROPYLTOLUENE	10.00	10.49	105	75-125	
SEC-BUTYLBENZENE	10.00	10.30	103	75-125	
STYRENE	10.00	9.04	90.4	75-125	
TCE	10.00	9.44	94.4	71-125	
TERT-BUTYLBENZENE	10.00	10.36	104	75-125	
TETRACHLOROETHENE	10.00	9.98	99.8	71-125	
TOLUENE	10.00	11.21	112	74-125	
TRANS-1,2-DCE	10.00	9.45	94.5	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	8.86	88.6	66-125	
TRICHLOROFLUOROMETHANE	10.00	8.92	89.2	67-125	
VINYL CHLORIDE	10.00	9.09	90.9	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	94.8	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	97.2	75-125	
SURROGATE: DIBROMOFLUOROMETH	101	75-125	
SURROGATE: TOLUENE-D8 (S)	106	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, QC Sample ID: AY35518

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110414AT LCS

Concentration Units: ug/L

AAB #: 110414AT-154413

Contract #: 2010*1286022*000

Initial Calibration ID: T110412

Analyte	**Expected**	**Found**	**% R**	**Control Limits**	**Q**
TETRACHLOROETHENE	10.00	10.44	104	71-125	

Surrogate	**Recovery**	**Control Limits**	**Qualifier**
SURROGATE: 1,2-DICHLOROETHANE-	96.8	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	103	75-125	
SURROGATE: DIBROMOFLUOROMETH	111	75-125	
SURROGATE: TOLUENE-D8 (S)	112	75-125	

Internal Std	**Qualifier**
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64378, QC Sample ID: AY35519

Injection Log

Directory: M:\THOR\DATA\T110412\

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0412T00T.D	1	20ug/mL BFB Std 03-23-11A	2uL	12 Apr 11 10:41
2	3	0412T03W.D	1	Vol Std 04-12-11@0.3ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 11:54
3	4	0412T04W.D	1	Vol Std 04-12-11@0.5ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 12:19
4	5	0412T05W.D	1	Vol Std 04-12-11@1.0ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 12:45
5	6	0412T06W.D	1	Vol Std 04-12-11@2.0ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 13:11
6	7	0412T07W.D	1	Vol Std 04-12-11@5.0ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 13:37
7	8	0412T08W.D	1	Vol Std 04-12-11@10ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 14:03
8	9	0412T09W.D	1	Vol Std 04-12-11@20ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 14:29
9	10	0412T10W.D	1	Vol Std 04-12-11@40ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 14:55
10	11	0412T11W.D	1	Vol Std 04-12-11@100ug/L	10ml w/5ul of IS: 03-02-11C	12 Apr 11 15:21
11	15	0412T15W.D	1	20ug/mL BFB Std 03-23-11A	2ul	12 Apr 11 17:56
12	16	0412T16W.D	1	110412A LCS-1WT(SS)	10ml w/5ul of IS&S: 03-02-1	12 Apr 11 18:22
13	1	0413T00T.D	1	20ug/mL BFB Std 03-23-11A	2uL	13 Apr 11 9:50
14	4	0413T04W.D	1	110413A LCS-1WT	10ml w/5ul of IS&S: 03-02-1	13 Apr 11 11:31
15	7	0413T07W.D	1	110413A BLK-1WT	10ml w/5ul of IS&S: 03-02-1	13 Apr 11 13:40
16	15	0413T15W.D	1	AY35518W01	10ml w/5ul of IS&S: 03-02-1	13 Apr 11 17:08
17	16	0413T16W.D	1	AY35519W01	10ml w/5ul of IS&S: 03-02-1	13 Apr 11 17:33
18	17	0413T17W.D	1	AY35520W01	10ml w/5ul of IS&S: 03-02-1	13 Apr 11 17:59
19	1	0414T00T.D	1	20ug/mL BFB Std 03-23-11A	2uL	14 Apr 11 8:31
20	4	0414T04W.D	1	110414A LCS-1WT	10ml w/5ul of IS&S: 03-02-1	14 Apr 11 10:10
21	6	0414T06W.D	1	110414A BLK-1WT	10ml w/5ul of IS&S: 03-02-1	14 Apr 11 11:53
22	7	0414T07W.D	5	AY35519W02 DF5	10ml w/5ul of IS&S: 03-02-1	14 Apr 11 12:19

Laboratory Report

Parsons

rec. 7/8/2011

CSSA

#63

Project #: 747781.04000 CSSA

ARF: 64923

Samples collected: June 15, 2011

APPL, Inc.

EPA METHOD 8260B
Volatile Organic Compounds

APPL, INC.

Data Validation Package
for

EPA METHOD 8260B
Volatile Organic Compounds

TABLE OF CONTENTS

LABORATORY NAME: *APPL, Inc.*

APPL, INC.

EPA METHOD 8260B
Volatile Organic Compounds
Case Narrative

APPL, INC.

908 North Temperance Ave. ∇ Clovis, CA 93611 ∇ Phone 559-275-2175 ∇ Fax 559-275-4422

Volatile Organic Compounds
EPA Method 8260B
Case Narrative

ARF: 64923

Project: 747781.04000 CSSA

California State Certification Number: CA1312 (DW & WW)

NELAP Certification number: 05233CA (HW)

Texas Certificate Number: T104704242-10-3

Results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Sample Receipt Information:

The samples were received June 17, 2011, at 3.0°C. The samples were assigned Analytical Request Form (ARF) number 64923. The sample numbers and requested analysis were compared to the chain of custody. No exception was noted.

Sample Table

CLIENT ID	APPL ID	Matrix	Date Sampled	Date Received
B3-EXW03-WC02	AY39993	WATER	06/15/11	06/17/11
B3-EXW03-WC01	AY39994	SOIL	06/15/11	06/17/11

Percent moisture was determined using CLP 4.0.

Sample Preparation:

The water sample was purged according to EPA method 5030B and the soil sample was purged according to EPA method 5035. All holding times were met.

Sample Analysis Information:

The samples were analyzed according to EPA method 8260B using a Hewlett Packard Gas Chromatograph with a mass spectrometer detector. All holding times were met.

Quality Control/Assurance

Spike Recovery

Laboratory Control Spikes (LCS) were used for quality assurance. A second-source standard was used for the LCSs. All recoveries were acceptable.

No sample was designated by the client for MS/MSD analysis.

Surrogates

All surrogate recoveries met acceptance criteria.

Method blanks

No target compound was detected above the reporting limit in the method blanks.

Calibration

Initial and continuing calibrations were analyzed according to the method. All acceptance criteria were met.

Tuning:

The instrument was tuned using BFB. All method criteria were met.

Internal Standards

The internal standard area counts were compared to the mid-point of the initial calibration according to method 8260. All acceptance criteria were met.

Summary:

No analytical exception is noted. All data are acceptable.

CERTIFICATION

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. These test results meet all requirements of NELAC. Release of the hard copy has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

7/7/11

Leonard Fong, Ph.D, Laboratory Director / Date

EPA METHOD 8260B
Volatile Organic Compounds
Chain of Custody and ARF

APPL, INC.

APPL - Analysis Request Form 64923

Client: **Parsons**

Address: **8000 Centre Park Drive Ste 200**

Austin, TX 78754

Attn: **Tammy Chang**

Phone: **512-719-6092** Fax: **512-719-6099**

Job: **747781.04000 CSSA**

PO #: **747780.30002**

Chain of Custody (Y/N): **Y** # **061611APPFB**

RAD Screen (Y/N): **Y** pH (Y/N): **N**

Turn Around Type: **3 DAYS** ✓

Received by: **TBV**

Date Received: **06/17/11** Time: **10:25**

Delivered by: **FED EX**

Shuttle Custody Seals (Y/N): **Y**

Chest Temp(s): **3.0°C**

Color: **VOA**

Samples Chilled until Placed in Refrig/Freezer: **Y**

Project Manager: **Diane Anderson** DA

QC Report Type: **DVP3/AFCEE/ERPIMS/TX** ✓

Due Date: **06/20/11** ✓

Comments:

pdf ARF to Tammy & Pam; send 2 DVP3 to Tammy ✓

Data screening project: analyze samples ONCE; report deficiencies; do NOT re-analyze ✓

Case Narrative. CSSA + AFCEE 3.1 QAPP. Only report MS/MSD when requested. ✓

Use AFCEE forms with AFCEE flagging to report sample & QC data only. ✓

APPL forms for everything else and APPL DVP3. ✓

EDD: ERPIMS 4 Lab PC4 checked TXF to Pam.Ford@parsons.com ✓

6-17 Sent ARF

Sample Distribution:

VOA: 1-$826AW, 1-$826AF

Wetlab: 1-MOIST

Charges:

Invoice To:

8000 Centre Park Drive Ste 200
Austin, TX 78754-5140
Attn: Ellen Felfe

	Client ID	APPL ID	Sampled		Analyses Requested
1.	B3-EXW03-WC02	AY39993W	06/15/11	14:40	$826AW
2.	B3-EXW03-WC01	AY39994S	06/15/11	14:45	$826AF, MOIST

APPL Sample Receipt Form

ARF# **64923**

Sample	Container Type	Count	pH	Sample	Container Type	Count	pH
AY39993	13 VOAs - HCL	3	NA				
AY39994	21 8oz Jar	1	NA				

9

Receiving

From: "Renee Patterson" <rpatterson@applinc.com>
To: <receiving@applinc.com>
Cc: "'Chue Moua'" <cmoua@applinc.com>
Sent: Friday, June 17, 2011 9:34 AM
Attach: 061611APPFB_SAMPLES.TXT; 061611_APPL.pdf; 061611.pdf; 061611APPFB_SAMPLES.TXT
Subject: FW: Cooler

Tom,

note change in TAT for two samples.

Thank you, Renée

From: Chang, Tammy [mailto:Tammy.Chang@parsons.com]
Sent: Friday, June 17, 2011 9:24 AM
To: Ford, Pamela
Cc: Jeremy Hale; Robert Wise; Renee Patterson
Subject: FW: Cooler

Pam:
Can you help Jeremy on this one?

Jeremy and Renee:
Also, on the COC with only three samples, the first one has normal TAT and the other two (WC samples) require 3 days TAT.

Tammy

From: Jeremy Hale [mailto:jeremy@applinc.com]
Sent: Friday, June 17, 2011 11:19 AM
To: Chang, Tammy
Cc: 'rwise'
Subject: FW: Cooler

Hi Tammy,

We noticed that these two files had the same name which stood out as a bit odd. Is one supposed to be "A" or maybe they 17th by chance?

Thanks,
-Jeremy

From: Chang, Tammy [mailto:Tammy.Chang@parsons.com]
Sent: Thursday, June 16, 2011 1:21 PM
To: Renee Patterson; Diane Anderson; Robert Wise; Jeremy Hale
Subject: FW: Cooler

From: Bouch, Julie

64923
3.C

Camp Stanley Storage Activity Chain Of Custody

COC ID: **061611APPFB**
Project Location: **CSSA**
Job Number: **747781.04000**
Creation Date: **6/16/2011**
Task Manager **Scott Pearson**

Relinquish_Date: **6/16/2011**
Relinquished_By: **JDB**
Relinquish_Time: **5:00 PM**
Collection Team: **SP-BM**
Sample Data Type **Screening**

Cooler ID: **B**
LabCode: **APPF**
Carrier: **FedEx**
Airbill Carrier: **875893858772**
TAT:

Sampler(s):
WB MARTIN
WB

LOCID: **B3-EXW04** LOGDATE: **6/15/2011** MATRIX: **WG** TBLOT: normal
SBD: **21** LOGTIME: **14:15** SACODE: **N** SMCODE: **G** ABLOT:
SED: **21** FLDSAMPID **B3-EXW04_061511_N1415** EBLOT: Containers: **3**
Remarks:

Analysis Required:
SW8260B VOC Full List

LOCID: **B3-EXW03-WC02** LOGDATE: **6/15/2011** MATRIX: **LD** TBLOT: 3days
SBD: **0** LOGTIME: **14:40** SACODE: **N** SMCODE: **G** ABLOT:
SED: **0** FLDSAMPID **B3-EXW03-WC02_061511_N1440** EBLOT: Containers: **3**
Remarks:

Analysis Required:
SW8260B VOC Full List

LOCID: **B3-EXW03-WC01** LOGDATE: **6/15/2011** MATRIX: **SD** TBLOT: 3 days
SBD: **0** LOGTIME: **14:45** SACODE: **N** SMCODE: **CS** ABLOT:
SED: **0** FLDSAMPID **B3-EXW03-WC01_061511_N1445** EBLOT: Containers: **1**
Remarks:

Analysis Required:
SW8260B VOC Full List

Relinquished by: WB Date 6/16/2011 Time 1700
Recieved by: Date 6/17/11 Time 1025

Relinquished by:______ Date____ Time____
Recieved by:______ Date____ Time____

Relinquished by:______ Date____ Time____
Recieved by:______ Date____ Time____

COOLER RECEIPT FORM

1) Project: 747781.04000 CSSA Date Received: 6/17/11

2) Coolers: Number of Coolers: 1

3) [✓ YES] NO Were coolers and samples screened for radioactivity?

4) [✓ YES] NO Were custody seals on outside of cooler? How many? 1 Date on seal? 6/16/11

5) Name on seal? Ice label

6) [✓ YES] NO NA Were custody seals unbroken and intact at the time of arrival?

7) [✓ YES] NO Did the cooler come with a shipping slip (air bill, etc.)? Carrier name: Fd EX ~~8758~~ L. 6/17/11

8) Shipping slip numbers:1) 8758 9385 8772 2)____ 3)____

9) YES NO [✓ NA] Was the shipping slip scanned into the database?

10) YES NO [✓ NA] If cooler belongs to APPL, has it been logged into the ice chest database?

11) Describe type of packing in cooler (bubble wrap, popcorn, type of ice, etc.): Bubble wrap, wet ice.

12) [✓ YES] NO NA For hand delivered samples was sufficient ice present to start the cooling process?

13) [✓ YES] NO Was a temperature blank included in the cooler?

14) Serial number of certified NIST thermometer used: A39267 Correction factor: 0

15) Cooler temp(s): 1) 3.0°C 2)____ 3)____ 4)____ 5)____ 6)____ 7)____ 8)____

Chain of custody:

16) [✓ YES] NO Was a chain of custody received?

17) [✓ YES] NO Were the custody papers signed in the appropriate places?

18) [✓ YES] NO Was the project identifiable from custody papers?

19) [✓ YES] NO Did the chain of custody include date and time of sampling?

20) [✓ YES] NO Is location where sample was taken listed on the chain of custody?

Sample Labels:

21) [✓ YES] NO Were container labels in good condition?

22) [✓ YES] NO Was the client ID on the label?

23) [✓ YES] NO Was the date of sampling on the label?

24) [✓ YES] NO Was the time of sampling on the label?

25) [✓ YES] NO Did all container labels agree with custody papers?

Sample Containers:

26) [✓ YES] NO Were all containers sealed in separate bags?

27) [✓ YES] NO Did all containers arrive unbroken?

28) YES [✓ NO] Was there any leakage from samples?

29) YES [✓ NO] Were any of the lids cracked or broken?

30) [✓ YES] NO Were correct containers used for the tests indicated?

31) [✓ YES] NO Was a sufficient amount of sample sent for tests indicated?

32) YES [✓ NO] NA Were bubbles present in volatile samples? If yes, the following were received with air bubbles:

Larger than a pea:____

Smaller than a pea:____

Preservation & Hold time:

33) [✓ YES] NO NA Was a sufficient amount of holding time remaining to analyze the samples?

34) YES NO [✓ NA] Do the sample containers contain the same preservative as what is stated on the COC?

35) YES NO [✓ NA] Was the pH taken of all non-VOA preserved samples and written on the sample container?

36) YES NO [✓ NA] Was the pH of acid preserved non-VOA samples < 2 & sodium hydroxide preserved samples > 10?

37) YES [✓ NO] NA Unpreserved VOA Vials received?____

38) YES [✓ NO] NA Are unpreserved VOA vials noted in the ADD TEST FIELD on the ARF?____

CUS

Person Collecting Sample

Date Collected 6/16/2011

Lab notified if pH was not adequate:____

Deficiencies:____

Signature of personnel receiving samples:____ Second reviewer:____

Signature of project manager notified:____ Date and Time of notification:____

Name of client notified:____ Date and Time of notification:____

Information given to client:____

____ by whom (Initials):____

My documents/Forms/Worksheet - CoolerReceipt.doc

Revision 17, April 22, 2011

EPA METHOD 8260B
Volatile Organic Compounds
QC Summary

APPL, INC.

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110617

AAB #: 110617AT-156223
Contract #: 2010*1286022*000
Method Blank ID: 110617AT-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64923, Sample: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110617

AAB #: 110617AT-156223
Contract #: 2010*1286022*000
Method Blank ID: 110617AT-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	105	69-139	
SURROGATE: 4-BROMOFLUOROBE	96.5	75-125	
SURROGATE: DIBROMOFLUOROME	103	75-125	
SURROGATE: TOLUENE-D8 (S)	99.6	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, Sample: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110617

AAB #: 110619AT-156278
Contract #: 2010*1286022*000
Method Blank ID: 110619AT-BLK

Analyte	**Method Blank**	**RL**	**Q**
CIS-1,2-DCE	< RL	1.2	U
TCE	< RL	1.0	U
TETRACHLOROETHENE	< RL	1.4	U

Surrogate	**Recovery**	**Control Limits**	**Qualifier**
SURROGATE: 1,2-DICHLOROETHAN	110	69-139	
SURROGATE: 4-BROMOFLUOROBE	95.6	75-125	
SURROGATE: DIBROMOFLUOROME	104	75-125	
SURROGATE: TOLUENE-D8 (S)	99.1	75-125	

Internal Std	**Qualifier**
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, Sample: AY39993

AFCEE FORM O-6

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

Concentration Units: mg/kg

Initial Calibration ID: S110620

AAB #: 110620AS-156276

Contract #: 2010*1286022*000

Method Blank ID: 110620AS-BLK

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.003	U
1,1,1-TCA	< RL	0.004	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.002	U
1,1,2-TCA	< RL	0.005	U
1,1-DCA	< RL	0.002	U
1,1-DCE	< RL	0.006	U
1,1-DICHLOROPROPENE	< RL	0.005	U
1,2,3-TRICHLOROBENZENE	< RL	0.004	U
1,2,3-TRICHLOROPROPANE	< RL	0.020	U
1,2,4-TRICHLOROBENZENE	< RL	0.004	U
1,2,4-TRIMETHYLBENZENE	< RL	0.007	U
1,2-DCA	< RL	0.003	U
1,2-DCB	< RL	0.002	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	0.010	U
1,2-DICHLOROPROPANE	< RL	0.002	U
1,2-EDB	< RL	0.003	U
1,3,5-TRIMETHYLBENZENE	< RL	0.003	U
1,3-DCB	< RL	0.006	U
1,3-DICHLOROPROPANE	< RL	0.002	U
1,4-DCB	< RL	0.002	U
1-CHLOROHEXANE	< RL	0.003	U
2,2-DICHLOROPROPANE	< RL	0.020	U
2-CHLOROTOLUENE	< RL	0.002	U
4-CHLOROTOLUENE	< RL	0.003	U
BENZENE	< RL	0.002	U
BROMOBENZENE	< RL	0.002	U
BROMOCHLOROMETHANE	< RL	0.002	U
BROMODICHLOROMETHANE	< RL	0.004	U
BROMOFORM	< RL	0.006	U
BROMOMETHANE	< RL	0.005	U
CARBON TETRACHLORIDE	< RL	0.010	U
CHLOROBENZENE	< RL	0.002	U
CHLOROETHANE	< RL	0.005	U
CHLOROFORM	< RL	0.002	U
CHLOROMETHANE	< RL	0.007	U
CIS-1,2-DCE	< RL	0.006	U
CIS-1,3-DICHLOROPROPENE	< RL	0.005	U
DIBROMOCHLOROMETHANE	< RL	0.003	U
DIBROMOMETHANE	< RL	0.010	U
DICHLORODIFLUOROMETHANE	< RL	0.005	U
ETHYLBENZENE	< RL	0.003	U

Comments: ARF: 64923, Sample: AY39994

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B	AAB #: 110620AS-156276
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
Concentration Units: mg/kg	Method Blank ID: 110620AS-BLK
Initial Calibration ID: S110620	

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	0.005	U
ISOPROPYLBENZENE	< RL	0.008	U
M&P-XYLENE	< RL	0.007	U
METHYLENE CHLORIDE	< RL	0.005	U
N-BUTYLBENZENE	< RL	0.005	U
N-PROPYLBENZENE	< RL	0.002	U
NAPHTHALENE	< RL	0.020	U
O-XYLENE	< RL	0.005	U
P-ISOPROPYLTOLUENE	< RL	0.006	U
SEC-BUTYLBENZENE	< RL	0.007	U
STYRENE	< RL	0.002	U
TCE	< RL	0.010	U
TERT-BUTYLBENZENE	< RL	0.007	U
TETRACHLOROETHENE	< RL	0.007	U
TOLUENE	< RL	0.005	U
TRANS-1,2-DCE	< RL	0.003	U
TRANS-1,3-DICHLOROPROPENE	< RL	0.005	U
TRICHLOROFLUOROMETHANE	< RL	0.004	U
VINYL CHLORIDE	< RL	0.009	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	97.9	52-149	
SURROGATE: 4-BROMOFLUOROBE	92.9	65-135	
SURROGATE: DIBROMOFLUOROME	97.3	65-135	
SURROGATE: TOLUENE-D8 (S)	101	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, Sample: AY39994

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64923
Matrix: SOIL

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Sweetpea

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110620AS-LCS	Lab Control Spike	101	99.1
110620AS-BLK	Blank	97.9	92.9
AY39994	B3-EXW03-WC01	95.6	95.2

Comments: Batch: #826AF-110620AS

Printed: 07/07/11 11:12:12 AM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.

SDG No: 64923

Case No: 64923

Date Analyzed: 06/20/11

Matrix: SOIL

Instrument: Sweetpea

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110620AS-LCS	Lab Control Spike	101	104
110620AS-BLK	Blank	97.3	101
AY39994	B3-EXW03-WC01	97.3	101

Comments: Batch: #826AF-110620AS

Printed: 07/07/11 11:12:12 AM

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.

Case No: 64923

Matrix: WATER

SDG No: 64923

Date Analyzed: 06/17/11

Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110617AT-LCS	Lab Control Spike	91.2	110
110617AT-BLK	Blank	105	96.5
AY39993	B3-EXW03-WC02	104	94.7

Comments: Batch: #826AW-110617AT

Printed: 07/07/11 11:12:12 AM

Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64923
Matrix: WATER

SDG No: 64923
Date Analyzed: 06/17/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110617AT-LCS	Lab Control Spike	94.5	103
110617AT-BLK	Blank	103	99.6
AY39993	B3-EXW03-WC02	100	97.7

Comments: Batch: #826AW-110617AT

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64923
Matrix: WATER

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: 1,2-DICHLOROETHANE-D4 (S)	SURROGATE: 4-BROMOFLUOROBENZENE (S)
110619AT-LCS	Lab Control Spike	100	116
110619AT-BLK	Blank	110	95.6
AY39993	B3-EXW03-WC02	108	95.9

Comments: Batch: #826AW-110619AT

Printed: 07/07/11 11:12:12 AM
Form 2 & 8, Surrogate Recovery Summary

Form 2 & 8

Surrogate Recovery

Lab Name: APPL, Inc.
Case No: 64923
Matrix: WATER

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Thor

APPL ID.	Client Sample No.	SURROGATE: DIBROMOFLUOROMETHANE (S)	SURROGATE: TOLUENE-D8 (S)
110619AT-LCS	Lab Control Spike	101	105
110619AT-BLK	Blank	104	99.1
AY39993	B3-EXW03-WC02	108	97.5

Comments: Batch: #826AW-110619AT

Printed: 07/07/11 11:12:12 AM
Form 2 & 8, Surrogate Recovery Summary

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B	AAB #: 110617AT-156223
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
LCS ID: 110617AT LCS	Initial Calibration ID: T110617
Concentration Units: ug/L	

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	10.27	103	72-125	
1,1,1-TCA	10.00	10.21	102	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	9.40	94.0	74-125	
1,1,2-TCA	10.00	9.42	94.2	75-127	
1,1-DCA	10.00	10.74	107	75-125	
1,1-DCE	10.00	9.54	95.4	75-125	
1,1-DICHLOROPROPENE	10.00	9.56	95.6	75-125	
1,2,3-TRICHLOROBENZENE	10.00	9.67	96.7	75-137	
1,2,3-TRICHLOROPROPANE	10.00	9.87	98.7	75-125	
1,2,4-TRICHLOROBENZENE	10.00	10.25	103	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	10.02	100	75-125	
1,2-DCA	10.00	9.36	93.6	68-127	
1,2-DCB	10.00	10.72	107	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	9.61	96.1	59-125	
1,2-DICHLOROPROPANE	10.00	9.49	94.9	70-125	
1,2-EDB	10.00	10.35	104	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	10.35	104	72-125	
1,3-DCB	10.00	10.62	106	75-125	
1,3-DICHLOROPROPANE	10.00	10.51	105	75-125	
1,4-DCB	10.00	9.46	94.6	75-125	
1-CHLOROHEXANE	10.00	9.83	98.3	75-125	
2,2-DICHLOROPROPANE	10.00	9.41	94.1	75-125	
2-CHLOROTOLUENE	10.00	10.15	102	73-125	
4-CHLOROTOLUENE	10.00	10.13	101	74-125	
BENZENE	10.00	10.57	106	75-125	
BROMOBENZENE	10.00	10.02	100	75-125	
BROMOCHLOROMETHANE	10.00	9.75	97.5	73-125	
BROMODICHLOROMETHANE	10.00	9.48	94.8	75-125	
BROMOFORM	10.00	9.80	98.0	75-125	
BROMOMETHANE	10.00	9.79	97.9	72-125	
CARBON TETRACHLORIDE	10.00	10.06	101	62-125	
CHLOROBENZENE	10.00	10.10	101	75-125	
CHLOROETHANE	10.00	10.58	106	65-125	
CHLOROFORM	10.00	9.67	96.7	74-125	
CHLOROMETHANE	10.00	9.29	92.9	75-125	
CIS-1,2-DCE	10.00	10.05	101	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	9.11	91.1	74-125	
DIBROMOCHLOROMETHANE	10.00	9.80	98.0	73-125	
DIBROMOMETHANE	10.00	9.37	93.7	69-127	
DICHLORODIFLUOROMETHANE	10.00	9.83	98.3	72-125	

Comments: ARF: 64923, QC Sample ID: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B	AAB #: 110617AT-156223
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
LCS ID: 110617AT LCS	Initial Calibration ID: T110617
Concentration Units: ug/L	

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	11.42	114	75-125	
HEXACHLOROBUTADIENE	10.00	10.26	103	75-125	
ISOPROPYLBENZENE	10.00	9.78	97.8	75-125	
M&P-XYLENE	20.00	21.15	106	75-125	
METHYLENE CHLORIDE	10.00	9.24	92.4	75-125	
N-BUTYLBENZENE	10.00	9.79	97.9	75-125	
N-PROPYLBENZENE	10.00	10.04	100	75-125	
NAPHTHALENE	10.00	8.26	82.6	75-125	
O-XYLENE	10.00	9.82	98.2	75-125	
P-ISOPROPYLTOLUENE	10.00	9.92	99.2	75-125	
SEC-BUTYLBENZENE	10.00	10.12	101	75-125	
STYRENE	10.00	10.04	100	75-125	
TCE	10.00	10.06	101	71-125	
TERT-BUTYLBENZENE	10.00	10.96	110	75-125	
TETRACHLOROETHENE	10.00	10.90	109	71-125	
TOLUENE	10.00	10.88	109	74-125	
TRANS-1,2-DCE	10.00	9.86	98.6	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	8.82	88.2	66-125	
TRICHLOROFLUOROMETHANE	10.00	9.00	90.0	67-125	
VINYL CHLORIDE	10.00	10.21	102	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	91.1	69-139	
SURROGATE: 4-BROMOFLUOROBENZE	111	75-125	
SURROGATE: DIBROMOFLUOROMETH	94.6	75-125	
SURROGATE: TOLUENE-D8 (S)	103	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, QC Sample ID: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B	AAB #: 110619AT-156278
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
LCS ID: 110619AT LCS	Initial Calibration ID: T110617
Concentration Units: ug/L	

Analyte	Expected	Found	% R	Control Limits	Q
CIS-1,2-DCE	10.00	10.66	107	75-125	
TCE	10.00	10.15	102	71-125	
TETRACHLOROETHENE	10.00	11.39	114	71-125	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	100	69-139	
SURROGATE: 4-BROMOFLUOROBENZE	116	75-125	
SURROGATE: DIBROMOFLUOROMETH	101	75-125	
SURROGATE: TOLUENE-D8 (S)	105	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, QC Sample ID: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110620AS LCS
Concentration Units: mg/kg

AAB #: 110620AS-156276
Contract #: 2010*1286022*000
Initial Calibration ID: S110620

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	0.0500	0.0487	97.4	62-125	
1,1,1-TCA	0.0500	0.0470	94.0	65-135	
1,1,2,2-TETRACHLOROETHANE	0.0500	0.0494	98.8	64-135	
1,1,2-TCA	0.0500	0.0539	108	65-135	
1,1-DCA	0.0500	0.0506	101	62-135	
1,1-DCE	0.0500	0.0457	91.4	65-135	
1,1-DICHLOROPROPENE	0.0500	0.0460	92.0	65-135	
1,2,3-TRICHLOROBENZENE	0.0500	0.0445	89.0	65-147	
1,2,3-TRICHLOROPROPANE	0.050	0.049	98.0	65-135	
1,2,4-TRICHLOROBENZENE	0.0500	0.0445	89.0	65-145	
1,2,4-TRIMETHYLBENZENE	0.0500	0.0452	90.4	65-135	
1,2-DCA	0.0500	0.0514	103	58-137	
1,2-DCB	0.0500	0.0454	90.8	65-135	
1,2-DIBROMO-3-CHLOROPROPANE	0.050	0.048	96.0	49-135	
1,2-DICHLOROPROPANE	0.0500	0.0527	105	60-135	
1,2-EDB	0.0500	0.0505	101	65-135	
1,3,5-TRIMETHYLBENZENE	0.0500	0.0444	88.8	62-135	
1,3-DCB	0.0500	0.0433	86.6	65-135	
1,3-DICHLOROPROPANE	0.0500	0.0507	101	65-135	
1,4-DCB	0.0500	0.0455	91.0	65-135	
1-CHLOROHEXANE	0.0500	0.0415	83.0	65-135	
2,2-DICHLOROPROPANE	0.050	0.048	96.0	65-135	
2-CHLOROTOLUENE	0.0500	0.0454	90.8	63-135	
4-CHLOROTOLUENE	0.0500	0.0441	88.2	64-135	
BENZENE	0.0500	0.0484	96.8	65-135	
BROMOBENZENE	0.0500	0.0470	94.0	65-135	
BROMOCHLOROMETHANE	0.0500	0.0544	109	63-135	
BROMODICHLOROMETHANE	0.0500	0.0536	107	65-135	
BROMOFORM	0.0500	0.0477	95.4	65-135	
BROMOMETHANE	0.0500	0.0472	94.4	62-135	
CARBON TETRACHLORIDE	0.050	0.047	94.0	52-135	
CHLOROBENZENE	0.0500	0.0466	93.2	65-135	
CHLOROETHANE	0.0500	0.0470	94.0	55-135	
CHLOROFORM	0.0500	0.0498	99.6	64-135	
CHLOROMETHANE	0.0500	0.0496	99.2	65-135	
CIS-1,2-DCE	0.0500	0.0503	101	65-135	
CIS-1,3-DICHLOROPROPENE	0.0500	0.0534	107	64-135	
DIBROMOCHLOROMETHANE	0.0500	0.0501	100	63-135	
DIBROMOMETHANE	0.050	0.056	112	59-137	
DICHLORODIFLUOROMETHANE	0.0500	0.0426	85.2	65-135	

Comments: ARF: 64923, QC Sample ID: AY39994

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110620AS LCS

Concentration Units: mg/kg

AAB #: 110620AS-156276

Contract #: 2010*1286022*000

Initial Calibration ID: S110620

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	0.0500	0.0456	91.2	65-135	
HEXACHLOROBUTADIENE	0.0500	0.0421	84.2	65-135	
ISOPROPYLBENZENE	0.0500	0.0423	84.6	65-135	
M&P-XYLENE	0.1000	0.0926	92.6	65-135	
METHYLENE CHLORIDE	0.0500	0.0559	112	65-135	
N-BUTYLBENZENE	0.0500	0.0409	81.8	65-135	
N-PROPYLBENZENE	0.0500	0.0425	85.0	65-135	
NAPHTHALENE	0.0500	0.0508	102	65-135	
O-XYLENE	0.0500	0.0473	94.6	65-135	
P-ISOPROPYLTOLUENE	0.0500	0.0429	85.8	65-135	
SEC-BUTYLBENZENE	0.0500	0.0423	84.6	65-135	
STYRENE	0.0500	0.0502	100	65-135	
TCE	0.0500	0.0476	95.2	61-135	
TERT-BUTYLBENZENE	0.0500	0.0434	86.8	65-135	
TETRACHLOROETHENE	0.0500	0.0422	84.4	61-135	
TOLUENE	0.0500	0.0501	100	64-135	
TRANS-1,2-DCE	0.0500	0.0478	95.6	65-135	
TRANS-1,3-DICHLOROPROPENE	0.0500	0.0535	107	56-135	
TRICHLOROFLUOROMETHANE	0.0500	0.0477	95.4	57-135	
VINYL CHLORIDE	0.0500	0.0557	111	36-144	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	100	52-149	
SURROGATE: 4-BROMOFLUOROBENZE	100	65-135	
SURROGATE: DIBROMOFLUOROMETH	100	65-135	
SURROGATE: TOLUENE-D8 (S)	103	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, QC Sample ID: AY39994

EPA 8260B

Form 4

Blank Summary

Lab Name: APPL, Inc.
Case No: 64923
Matrix: SOIL
Blank ID: 110620AS-BLK
SDG No: 64923
Date Analyzed: 06/21/11
Instrument: Sweetpea
Time Analyzed: 0014

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110620AS-LCS	Lab Control Spike	0620S17	06/20/11 2043
110620AS-BLK	Blank	0620S21	06/21/11 0014
AY39994	B3-EXW03-WC01	0620S29	06/21/11 0455

Comments: Batch: #826AF-110620AS

Printed: 07/07/11 11:12:10 AM
Form 4, Blank Summary

EPA 8260B

Form 4

Blank Summary

Lab Name: APPL, Inc.

SDG No: 64923

Case No: 64923

Date Analyzed: 06/18/11

Matrix: WATER

Instrument: Thor

Blank ID: 110617AT-BLK

Time Analyzed: 0528

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110617AT-LCS	Lab Control Spike	0617T17	06/17/11 1931
110617AT-BLK	Blank	0617T38	06/18/11 0528
AY39993	B3-EXW03-WC02	0617T39	06/18/11 0554

Comments: Batch: #826AW-110617AT

Printed: 07/07/11 11:12:10 AM
Form 4, Blank Summary

EPA 8260B

Form 4

Blank Summary

Lab Name: APPL, Inc.
Case No: 64923
Matrix: WATER
Blank ID: 110619AT-BLK

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Thor
Time Analyzed: 1659

APPL ID.	Client Sample No.	File ID.	Date Analyzed
110619AT-LCS	Lab Control Spike	0619T02	06/20/11 1515
110619AT-BLK	Blank	0619T04	06/20/11 1659
AY39993	B3-EXW03-WC02	0619T16	06/20/11 2210

Comments: Batch: #826AW-110619AT

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 0617T00T.D
Matrix: Water
ID: 20ug/ml BFB Std 05-25-11A

SDG No: 64923
Date Analyzed: 06/17/11
Instrument: Thor
Time Analyzed: 12:19

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1		Vol Std 06-17-11@0.3	0617T04W.D	06/17/11 13:54
2		Vol Std 06-17-11@0.5	0617T05W.D	06/17/11 14:20
3		Vol Std 06-17-11@1.0	0617T06W.D	06/17/11 14:46
4		Vol Std 06-17-11@2.0	0617T07W.D	06/17/11 15:12
5		Vol Std 06-17-11@5.0	0617T08W.D	06/17/11 15:38
6		Vol Std 06-17-11@10u	0617T09W.D	06/17/11 16:04
7		Vol Std 06-17-11@20u	0617T10W.D	06/17/11 16:30
8		Vol Std 06-17-11@40u	0617T11W.D	06/17/11 16:56
9		Vol Std 06-17-11@100	0617T12W.D	06/17/11 17:22
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	38.5
75	30 - 60% of mass 95	58.5
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	6.1
173	0 - 2% of mass 174	1.0
174	50 - 100% of mass 95	51.4
175	5 - 9% of mass 174	7.0
176	95 - 101% of mass 174	95.7
177	5 - 9% of mass 176	6.2

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 0617T15W.D
Matrix: Water
ID: 20ug/ml BFB Std 05-25-11A

SDG No: 64923
Date Analyzed: 06/17/11
Instrument: Thor
Time Analyzed: 18:40

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1		Vol Std 06-17-11@10u	0617T16W.D	06/17/11 19:05
2	Lab Control Spike	110617A LCS-1WT	0617T17W.D	06/17/11 19:31
3	Blank	110617A BLK-1WT	0617T38W.D	06/18/11 5:28
4	B3-EXW03-WC02	AY39993W01	0617T39W.D	06/18/11 5:54
5				
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9				
10				
11				
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13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	38.5
75	30 - 60% of mass 95	57.9
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	6.2
173	0 - 2% of mass 174	0.8
174	50 - 100% of mass 95	53.3
175	5 - 9% of mass 174	7.2
176	95 - 101% of mass 174	95.8
177	5 - 9% of mass 176	6.6

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 0619T00T.D
Matrix: Water
ID: 20ug/ml BFB Std 05-25-11A

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Thor
Time Analyzed: 14:08

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1		Vol Std 06-19-11@10u	0619T01W.D	06/20/11 14:50
2	Lab Control Spike	110619A LCS-1WT	0619T02W.D	06/20/11 15:15
3	Blank	110619A BLK-1WT	0619T04W.D	06/20/11 16:59
4	B3-EXW03-WC02	AY39993W02 DF5	0619T16W.D	06/20/11 22:10
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	38.1
75	30 - 60% of mass 95	56.9
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	6.5
173	0 - 2% of mass 174	0.8
174	50 - 100% of mass 95	51.9
175	5 - 9% of mass 174	6.9
176	95 - 101% of mass 174	96.5
177	5 - 9% of mass 176	6.3

Form 5
Tune Summary

Lab Name: APPL Inc.

Case No: 0620S00T.D

Matrix: Soil

ID: 20ug/L BFB Std 05-25-11A

SDG No: 64923

Date Analyzed: 06/20/11

Instrument: Sweetpea

Time Analyzed: 10:48

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1		Vol Std 06-20-11@2.0	0620S04S.D	06/20/11 12:55
2		Vol Std 06-20-11@5.0	0620S05S.D	06/20/11 13:30
3		Vol Std 06-20-11@10u	0620S06S.D	06/20/11 14:05
4		Vol Std 06-20-11@20u	0620S07S.D	06/20/11 14:40
5		Vol Std 06-20-11@50u	0620S08S.D	06/20/11 15:16
6		Vol Std 06-20-11@100	0620S09S.D	06/20/11 15:51
7		Vol Std 06-20-11@200	0620S10S.D	06/20/11 16:26
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	18.1
75	30 - 60% of mass 95	44.4
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	6.7
173	0 - 2% of mass 174	0.0
174	50 - 100% of mass 95	80.6
175	5 - 9% of mass 174	7.3
176	95 - 101% of mass 174	97.1
177	5 - 9% of mass 176	7.0

Form 5
Tune Summary

Lab Name: APPL Inc.
Case No: 0620S15S.D
Matrix: Soil
ID: 20ug/L BFB Std 05-25-11A

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Sweetpea
Time Analyzed: 19:33

	Client Sample No.	APPL ID.	File ID.	Date Analyzed
1		Vol Std 06-20-11@50u	0620S16S.D	06/20/11 20:08
2	Lab Control Spike	110620A LCS-1SS	0620S17S.D	06/20/11 20:43
3	Blank	110620A BLK-1SS	0620S21S.D	06/21/11 0:14
4	B3-EXW03-WC01	AY39994S01 5.020	0620S29S.D	06/21/11 4:55
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				

m/e		
50	15 - 40% of mass 95	17.6
75	30 - 60% of mass 95	42.6
95	100 - 100% of mass 95	100.0
96	5 - 9% of mass 95	5.9
173	0 - 2% of mass 174	0.0
174	50 - 100% of mass 95	91.0
175	5 - 9% of mass 174	6.9
176	95 - 101% of mass 174	95.2
177	5 - 9% of mass 176	7.2

8A

INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.
Contract: Review
Lab Code:
SDG No.: 64923
Lab File ID (Standard): 0617T09W.D
Date Analyzed: 06/17/11
Instrument ID: Thor
Time Analyzed: 16:04
GC Column:
ID:
Heated Purge: (Y/N)

		Fluorobenzene (IS)		Chlorobenzene-D5 (IS)		1,4-Dichlorobenzene-D (IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	500672	6.73	397632	10.61	264000	12.43
	UPPER LIMIT	1001344	7.23	795264	11.11	528000	12.93
	LOWER LIMIT	250336	6.23	198816	10.11	132000	11.93
	SAMPLE NO.						
01	Vol Std 06-17-11@0.3ug	444544	6.73	322560	10.61	190080	12.43
02	Vol Std 06-17-11@0.5ug	422720	6.73	315776	10.61	196160	12.43
03	Vol Std 06-17-11@1.0ug	433216	6.73	306496	10.61	201600	12.43
04	Vol Std 06-17-11@2.0ug	452352	6.73	341824	10.61	223872	12.43
05	Vol Std 06-17-11@5.0ug	460352	6.73	349056	10.61	224320	12.43
06	Vol Std 06-17-11@10ug	500672	6.73	397632	10.61	264000	12.43
07	Vol Std 06-17-11@20ug	544512	6.72	416640	10.61	297728	12.43
08	Vol Std 06-17-11@40ug	542976	6.73	411776	10.61	299776	12.43
09	Vol Std 06-17-11@100u	570496	6.72	485312	10.61	323072	12.43
10	Vol Std 06-17-11@10ug	508224	6.72	376448	10.61	252224	12.43
11	110617A LCS-1WT	555136	6.72	401600	10.61	277312	12.43
12	110617A BLK-1WT	435456	6.73	336448	10.61	193792	12.43
13	AY39993W01	446336	6.73	337344	10.61	195392	12.43
14	Vol Std 06-19-11@10ug	461248	6.73	364992	10.61	247296	12.43
15	110619A LCS-1WT	450752	6.73	330368	10.61	222144	12.43
16	110619A BLK-1WT	404864	6.73	298304	10.61	163968	12.43
17	AY39993W02 DF5	395776	6.73	306560	10.61	179008	12.43
18							
19							
20							
21							
22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

8A
INTERNAL STANDARD AREA AND RT SUMMARY

Lab Name: APPL Inc.
Contract: Review
Lab Code:
SDG No.: 64923
Lab File ID (Standard): 0620S08S.D
Date Analyzed: 06/20/11
Instrument ID: Sweetpea
Time Analyzed: 15:16
GC Column:
ID:
Heated Purge: (Y/N)

		Fluorobenzene(IS)		Chlorobenzene-D5(IS)		1,4-Dichlorobenzene-D(IS)	
		AREA #	RT #	AREA #	RT #	AREA #	RT #
	12 HOUR STD	360669	9.81	209235	14.85	100176	18.93
	UPPER LIMIT	721338	10.31	418470	15.35	200352	19.43
	LOWER LIMIT	180335	9.31	104618	14.35	50088	18.43
	SAMPLE NO.						
01	Vol Std 06-20-11@2.0u	365969	9.81	207161	14.84	93796	18.93
02	Vol Std 06-20-11@5.0u	379237	9.81	211916	14.85	98712	18.93
03	Vol Std 06-20-11@10ug	366923	9.81	203301	14.85	93712	18.94
04	Vol Std 06-20-11@20ug	369379	9.81	211100	14.84	97277	18.93
05	Vol Std 06-20-11@50ug	360669	9.81	209235	14.85	100176	18.93
06	Vol Std 06-20-11@100u	363559	9.82	207210	14.85	96346	18.94
07	Vol Std 06-20-11@200u	369810	9.82	207847	14.85	94438	18.94
08	Vol Std 06-20-11@50ug	340160	9.82	207896	14.85	98977	18.93
09	110620A LCS-1SS	333450	9.82	202853	14.85	99354	18.93
10	110620A BLK-1SS	316884	9.82	192311	14.85	88970	18.94
11	AY39994S01 5.020	382482	9.81	231974	14.84	112268	18.93
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							

AREA UPPER LIMIT = +100% of internal standard area.
AREA LOWER LIMIT = -50% of internal standard area.
RT UPPER LIMIT = +0.50 minutes of internal standard RT
RT LOWER LIMIT = -0.50 minutes of internal standard RT

Column used to flag values outside QC limits with an asterisk.
* Values outside of QC limits.

EPA METHOD 8260B
Volatile Organic Compounds
Sample Data

APPL, INC.

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B
Preparatory Method: 5030B
AAB #: 110617AT-156223
Lab Name: APPL, Inc
Contract #: 2010*1286022*000
Field Sample ID: B3-EXW03-WC02
Lab Sample ID: AY39993
Matrix: Water
% Solids: NA
Initial Calibration ID: T110617
Date Received: 17-Jun-11
Date Prepared: 18-Jun-11
Date Analyzed: 18-Jun-11
Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.09	0.5	0.09	1		U
1,1,1-TCA	0.03	0.8	0.03	1		U
1,1,2,2-TETRACHLOROETHANE	0.07	0.4	0.07	1		U
1,1,2-TCA	0.06	1.0	0.06	1		U
1,1-DCA	0.07	0.4	0.07	1		U
1,1-DCE	0.12	1.2	0.12	1		U
1,1-DICHLOROPROPENE	0.10	1.0	0.10	1		U
1,2,3-TRICHLOROBENZENE	0.24	0.3	0.24	1		U
1,2,3-TRICHLOROPROPANE	0.17	3.2	0.17	1		U
1,2,4-TRICHLOROBENZENE	0.16	0.4	0.16	1		U
1,2,4-TRIMETHYLBENZENE	0.04	1.3	0.04	1		U
1,2-DCA	0.05	0.6	0.05	1		U
1,2-DCB	0.02	0.3	0.02	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.76	2.6	0.76	1		U
1,2-DICHLOROPROPANE	0.06	0.4	0.06	1		U
1,2-EDB	0.06	0.6	0.06	1		U
1,3,5-TRIMETHYLBENZENE	0.04	0.5	0.04	1		U
1,3-DCB	0.03	1.2	0.03	1		U
1,3-DICHLOROPROPANE	0.05	0.4	0.05	1		U
1,4-DCB	0.07	0.3	0.07	1		U
1-CHLOROHEXANE	0.04	0.5	0.04	1		U
2,2-DICHLOROPROPANE	0.10	3.5	0.10	1		U
2-CHLOROTOLUENE	0.04	0.4	0.04	1		U
4-CHLOROTOLUENE	0.04	0.6	0.04	1		U
BENZENE	0.07	0.4	0.07	1		U
BROMOBENZENE	0.06	0.3	0.06	1		U
BROMOCHLOROMETHANE	0.11	0.4	0.11	1		U
BROMODICHLOROMETHANE	0.06	0.8	0.06	1		U
BROMOFORM	0.13	1.2	0.13	1		U
BROMOMETHANE	0.08	1.1	0.08	1		U
CARBON TETRACHLORIDE	0.06	2.1	0.06	1		U
CHLOROBENZENE	0.04	0.4	0.04	1		U
CHLOROETHANE	0.07	1.0	0.07	1		U
CHLOROFORM	0.06	0.3	0.13	1		F
CHLOROMETHANE	0.16	1.3	0.16	1		U

Comments: J = Estimated value.

ARF: 64923

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110617AT-156223
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: B3-EXW03-WC02 Lab Sample ID: AY39993 Matrix: Water
% Solids: NA Initial Calibration ID: T110617
Date Received: 17-Jun-11 Date Prepared: 18-Jun-11 Date Analyzed: 18-Jun-11
Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.07	1.2	198.15	1		J
CIS-1,3-DICHLOROPROPENE	0.03	1.0	0.03	1		U
DIBROMOCHLOROMETHANE	0.06	0.5	0.06	1		U
DIBROMOMETHANE	0.06	2.4	0.06	1		U
DICHLORODIFLUOROMETHANE	0.11	1.0	0.11	1		U
ETHYLBENZENE	0.05	0.6	0.05	1		U
HEXACHLOROBUTADIENE	0.17	1.1	0.17	1		U
ISOPROPYLBENZENE	0.04	0.5	0.04	1		U
M&P-XYLENE	0.07	0.5	0.07	1		U
METHYLENE CHLORIDE	0.35	1.0	0.35	1		U
N-BUTYLBENZENE	0.17	1.1	0.17	1		U
N-PROPYLBENZENE	0.03	0.4	0.03	1		U
NAPHTHALENE	0.07	0.4	0.07	1		U
O-XYLENE	0.06	1.1	0.06	1		U
P-ISOPROPYLTOLUENE	0.05	1.2	0.05	1		U
SEC-BUTYLBENZENE	0.05	1.3	0.05	1		U
STYRENE	0.08	0.4	0.08	1		U
TCE	0.05	1.0	190.18	1		J
TERT-BUTYLBENZENE	0.04	1.4	0.04	1		U
TETRACHLOROETHENE	0.06	1.4	175.46	1		J
TOLUENE	0.06	1.1	1.14	1		
TRANS-1,2-DCE	0.08	0.6	1.52	1		
TRANS-1,3-DICHLOROPROPENE	0.04	1.0	0.04	1		U
TRICHLOROFLUOROMETHANE	0.07	0.8	0.07	1		U
VINYL CHLORIDE	0.08	1.1	0.08	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	104	69-139	
SURROGATE: 4-BROMOFLUOROBENZE	94.7	75-125	
SURROGATE: DIBROMOFLUOROMETH	100	75-125	
SURROGATE: TOLUENE-D8 (S)	97.7	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: J = Estimated value.

ARF: 64923

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5030B AAB #: 110619AT-156278

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: B3-EXW03-WC02 Lab Sample ID: AY39993 Matrix: Water

% Solids: NA Initial Calibration ID: T110617

Date Received: 17-Jun-11 Date Prepared: 20-Jun-11 Date Analyzed: 20-Jun-11

Concentration Units: ug/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.35	6.0	183.18	5		
TCE	0.25	5.0	180.88	5		
TETRACHLOROETHENE	0.30	7.0	153.75	5		

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	108	69-139	
SURROGATE: 4-BROMOFLUOROBENZE	95.9	75-125	
SURROGATE: DIBROMOFLUOROMETH	108	75-125	
SURROGATE: TOLUENE-D8 (S)	97.5	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64923

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110620AS-156276
Lab Name: APPL, Inc Contract #: 2010*1286022*000
Field Sample ID: B3-EXW03-WC01 Lab Sample ID: AY39994 Matrix: Soil
% Solids: 100 Initial Calibration ID: S110620
Date Received: 17-Jun-11 Date Prepared: 21-Jun-11 Date Analyzed: 21-Jun-11
Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
1,1,1,2-TETRACHLOROETHANE	0.0008	0.003	0.0008	1		U
1,1,1-TCA	0.0009	0.004	0.0009	1		U
1,1,2,2-TETRACHLOROETHANE	0.0009	0.002	0.0009	1		U
1,1,2-TCA	0.0009	0.005	0.0009	1		U
1,1-DCA	0.0010	0.002	0.0010	1		U
1,1-DCE	0.0011	0.006	0.0011	1		U
1,1-DICHLOROPROPENE	0.0012	0.005	0.0012	1		U
1,2,3-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,3-TRICHLOROPROPANE	0.001	0.020	0.001	1		U
1,2,4-TRICHLOROBENZENE	0.0010	0.004	0.0010	1		U
1,2,4-TRIMETHYLBENZENE	0.0011	0.007	0.0011	1		U
1,2-DCA	0.0010	0.003	0.0010	1		U
1,2-DCB	0.0010	0.002	0.0010	1		U
1,2-DIBROMO-3-CHLOROPROPANE	0.002	0.010	0.002	1		U
1,2-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,2-EDB	0.0013	0.003	0.0013	1		U
1,3,5-TRIMETHYLBENZENE	0.0011	0.003	0.0011	1		U
1,3-DCB	0.0011	0.006	0.0011	1		U
1,3-DICHLOROPROPANE	0.0007	0.002	0.0007	1		U
1,4-DCB	0.0008	0.002	0.0008	1		U
1-CHLOROHEXANE	0.0009	0.003	0.0009	1		U
2,2-DICHLOROPROPANE	0.001	0.020	0.001	1		U
2-CHLOROTOLUENE	0.0013	0.002	0.0013	1		U
4-CHLOROTOLUENE	0.0011	0.003	0.0011	1		U
BENZENE	0.0009	0.002	0.0009	1		U
BROMOBENZENE	0.0009	0.002	0.0009	1		U
BROMOCHLOROMETHANE	0.0008	0.002	0.0008	1		U
BROMODICHLOROMETHANE	0.0009	0.004	0.0009	1		U
BROMOFORM	0.0011	0.006	0.0011	1		U
BROMOMETHANE	0.0007	0.005	0.0007	1		U
CARBON TETRACHLORIDE	0.001	0.010	0.001	1		U
CHLOROBENZENE	0.0007	0.002	0.0007	1		U
CHLOROETHANE	0.0015	0.005	0.0015	1		U
CHLOROFORM	0.0007	0.002	0.0007	1		U
CHLOROMETHANE	0.0015	0.007	0.0015	1		U

Comments:

ARF: 64923

AFCEE FORM O-2

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: EPA 8260B Preparatory Method: 5035 AAB #: 110620AS-156276

Lab Name: APPL, Inc Contract #: 2010*1286022*000

Field Sample ID: B3-EXW03-WC01 Lab Sample ID: AY39994 Matrix: Soil

% Solids: 100 Initial Calibration ID: S110620

Date Received: 17-Jun-11 Date Prepared: 21-Jun-11 Date Analyzed: 21-Jun-11

Concentration Units: mg/kg

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
CIS-1,2-DCE	0.0008	0.006	0.0008	1		U
CIS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
DIBROMOCHLOROMETHANE	0.0009	0.003	0.0009	1		U
DIBROMOMETHANE	0.001	0.010	0.001	1		U
DICHLORODIFLUOROMETHANE	0.0018	0.005	0.0018	1		U
ETHYLBENZENE	0.0010	0.003	0.0010	1		U
HEXACHLOROBUTADIENE	0.0011	0.005	0.0011	1		U
ISOPROPYLBENZENE	0.0010	0.008	0.0010	1		U
M&P-XYLENE	0.0018	0.007	0.0018	1		U
METHYLENE CHLORIDE	0.0013	0.005	0.0013	1		U
N-BUTYLBENZENE	0.0010	0.005	0.0010	1		U
N-PROPYLBENZENE	0.0012	0.002	0.0012	1		U
NAPHTHALENE	0.0010	0.020	0.0010	1		U
O-XYLENE	0.0007	0.005	0.0007	1		U
P-ISOPROPYLTOLUENE	0.0012	0.006	0.0012	1		U
SEC-BUTYLBENZENE	0.0011	0.007	0.0011	1		U
STYRENE	0.0009	0.002	0.0009	1		U
TCE	0.0012	0.010	0.0012	1		U
TERT-BUTYLBENZENE	0.0012	0.007	0.0012	1		U
TETRACHLOROETHENE	0.0008	0.007	0.0008	1		U
TOLUENE	0.0010	0.005	0.0010	1		U
TRANS-1,2-DCE	0.0008	0.003	0.0008	1		U
TRANS-1,3-DICHLOROPROPENE	0.0009	0.005	0.0009	1		U
TRICHLOROFLUOROMETHANE	0.0013	0.004	0.0013	1		U
VINYL CHLORIDE	0.0013	0.009	0.0013	1		U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	95.6	52-149	
SURROGATE: 4-BROMOFLUOROBENZE	95.2	65-135	
SURROGATE: DIBROMOFLUOROMETH	97.3	65-135	
SURROGATE: TOLUENE-D8 (S)	101	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments:

ARF: 64923

AFCEE FORM O-2

EPA METHOD 8260B
Volatile Organic Compounds
Calibration Data

APPL, INC.

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Water

SDG No: 64923
Initial Cal. Date: 06/17/11
Instrument: Thor

Initials: ______

			0617T04W.D	0617T05W.D	0617T06W.D	0617T07W.D	0617T08W.D	0617T09W.D	0617T10W.D	0617T11W.D	0617T12W.D					
		Compound	0.3	0.5	1	2	5	10	20	40	100		Avg	%RSD		
1	I	Fluorobenzene (IS)	ISTD													
2	TM	Dichlorodifluoromethane		0.5012	0.4890	0.4809	0.3777	0.4804	0.4760	0.5005	0.5301		0.48	9.3	TM	
3	TM**L	Chloromethane		2.868	2.423	2.197	1.904	1.848	1.880	2.028	1.934		2.1	17	TM**L	1.000
4	TM*	Vinyl chloride		0.5695	0.5381	0.6022	0.5840	0.6124	0.6273	0.6839	0.7285		0.62	10	TM*	
5	TML	Bromomethane		0.3563	0.3671	0.3264	0.2520	0.2635	0.2378	0.2341	0.1970		0.28	22	TML	0.995
6	TM	Chloroethane		0.3090	0.2754	0.3225	0.3635	0.3635	0.3476	0.3675	0.3317		0.34	9.6	TM	
7	TM	Trichlorofluoromethane		0.8873	0.7725	0.8073	0.7682	0.7953	0.7502	0.8027	0.8740		0.81	6.1	TM	
8	TM*	1,1-DCE		0.6096	0.6579	0.6595	0.6526	0.6147	0.6075	0.6335	0.6712		0.64	4.0	TM*	
9	TML	Methylene chloride'		0.5433	0.3846	0.4068	0.3879	0.3496	0.2815	0.2839	0.2894		0.37	24	TML	0.999
10	TM	Trans-1,2-DCE		0.5448	0.6014	0.5576	0.6075	0.5701	0.5523	0.5708	0.5754		0.57	3.9	TM	
11	TM**	1,1-DCA	0.6625	0.6696	0.8365	0.8274	0.9180	0.8528	0.8249	0.8476	0.8444		0.81	11	TM**	
12	TM	Cis-1,2-DCE		0.9161	0.8033	0.8205	0.9080	0.8938	0.8716	0.9602	0.9610		0.89	6.5	TM	
13	TM	2,2-Dichloropropane		0.7712	0.6819	0.6557	0.6775	0.6706	0.6617	0.6935	0.7083		0.69	5.3	TM	
14	TM*	Chloroform	0.7348	0.9652	0.8911	0.8043	0.8733	0.8457	0.8144	0.8440	0.8425		0.85	7.5	TM*	
15	TM	Bromochloromethane	0.8136	0.4789	0.7052	0.6807	0.7079	0.6597	0.6365	0.6710	0.6543		0.67	13	TM	
16	S	Dibromofluoromethane(S)		0.5111	0.4544	0.4298	0.4122	0.4119	0.4024	0.4132	0.4106		0.43	8.4	S	
17	TM	1,1,1-TCA		0.6198	0.5737	0.5589	0.6429	0.5937	0.5879	0.6262	0.6228		0.60	4.8	TM	
18	TM	1,1-Dichloropropene		0.4505	0.3491	0.3408	0.3700	0.3557	0.3714	0.4033	0.4257		0.38	10	TM	
19	S	1,2-DCA-D4(S)		1.208	1.110	1.026	0.9659	0.9276	0.8830	0.9183	0.9006		0.99	12	S	
20	TM	Carbon Tetrachloride		0.3511	0.3858	0.3829	0.3735	0.3819	0.3784	0.3990	0.4025		0.38	4.2	TM	
21	TM	1,2-DCA		1.076	1.093	1.042	1.043	1.019	0.9453	0.9831	0.9732		1.0	5.0	TM	
22	TM	Benzene	1.063	1.132	1.086	1.043	1.218	1.205	1.200	1.311	1.312		1.2	8.5	TM	
23	TML	TCE		0.1486	0.3256	0.3011	0.3298	0.3146	0.3198	0.3520	0.3704		0.31	22	TML	0.999
24	TM*	1,2-Dichloropropane	0.5588	0.6423	0.5658	0.5503	0.5920	0.5397	0.5218	0.5495	0.5376		0.56	6.4	TM*	
25	TM	Bromodichloromethane		0.7724	0.6507	0.6644	0.6810	0.6352	0.6304	0.6792	0.7063		0.68	6.8	TM	
26	TM	Dibromomethane		0.2477	0.2540	0.2379	0.2359	0.2220	0.2168	0.2273	0.2299		0.23	5.4	TM	
27	TML	Cis-1,3-Dichloropropene		0.2836	0.3008	0.4023	0.4736	0.4989	0.5584	0.6562	0.7112		0.49	32	TML	0.998
28	TM*	Toluene		0.9045	0.9422	0.9902	1.339	1.363	1.411	1.557	1.596		1.3	22	TM*	
29	TML	Trans-1,3-Dichloropropene		0.4670	0.4512	0.4267	0.4889	0.5131	0.5422	0.6411	0.7123		0.53	19	TML	0.997
30	TM	1,1,2-TCA		0.2674	0.2772	0.2986	0.2998	0.2781	0.2907	0.3138	0.3207		0.29	6.3	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD													
32	S	Toluene-D8(S)		1.504	1.519	1.482	1.674	1.759	1.865	2.003	1.836		1.7	11	S	
33	TM	1,2-EDB		0.3005	0.3231	0.2969	0.3349	0.3342	0.3419	0.3790	0.3673		0.33	8.6	TM	
34	TML	Tetrachloroethene		0.1708	0.0713	0.1882	0.1835	0.1712	0.1923	0.2048	0.1923		0.17	25	TML	0.999
35	TML	1-Chlorohexane		0.4761	0.5903	0.4515	0.6155	0.6249	0.6839	0.7481	0.6883		0.61	17	TML	0.999

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Water

SDG No: 64923
Initial Cal. Date: 06/17/11
Instrument: Thor

Initials: ______

		Compound	0.3	0.5	1	2	5	10	20	40	100		Avg	%RSD		
36	TM	1,1,1,2-Tetrachloroethane		0.4076	0.4307	0.4090	0.4337	0.4078	0.4201	0.4428	0.4237		0.42	3.1	TM	
37	TML	m&p-Xylene		0.4935	0.5218	0.5959	0.7579	0.7614	0.8094	0.8684	0.7578		0.70	20	TML	0.997
38	TML	o-Xylene		0.4061	0.4435	0.5252	0.6772	0.7202	0.7878	0.8846	0.8036		0.66	27	TML	0.998
39	TML	Styrene	0.8476	0.8862	0.9332	0.9117	1.487	1.471	1.576	1.724	1.564		1.3	28	TML	0.998
40	S	4-Bromofluorobenzene(S)			0.6981	0.7285	0.8289	0.8714	0.9210	1.016	0.9571		0.86	14	S	
41	TM	1,3-Dichloropropane	0.5648	0.7342	0.7135	0.6979	0.7839	0.7520	0.8271	0.8896	0.8279		0.75	12	TM	
42	TM	Dibromochloromethane		0.3979	0.3979	0.2973	0.3683	0.3322	0.3637	0.4046	0.3873		0.37	10	TM	
43	TM**	Chlorobenzene	1.309	1.360	1.371	1.175	1.313	1.242	1.231	1.315	1.175		1.3	5.8	TM**	
44	TM*	Ethylbenzene		1.755	1.786	1.835	2.277	2.315	2.499	2.802	2.582		2.2	18	TM*	
45	TM**	Bromoform		0.1112	0.1688	0.1512	0.1739	0.1632	0.1616	0.1848	0.1912		0.16	15	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD													
47	TML	Isopropylbenzene		1.592	1.729	1.859	2.596	2.722	2.975	3.338	3.475		2.5	29	TML	0.999
48	TM**	1,1,2,2-Tetrachloroethane	1.107	0.9097	0.9551	0.9531	1.020	0.8736	0.8031	0.8822	0.8623		0.93	9.9	TM**	
49	TM	1,2,3-Trichloropropane		0.2215	0.2607	0.2597	0.2995	0.2610	0.2516	0.2502	0.2589		0.26	8.3	TM	
50	TML	Bromobenzene	0.4621	0.3209	0.5463	0.5074	0.6472	0.5872	0.5817	0.6215	0.6224		0.54	19	TML	1.000
51	TML	n-Propylbenzene	2.549	2.634	2.836	3.044	4.675	4.642	4.649	5.085	5.175		3.9	29	TML	1.000
52	TML	2-Chlorotoluene	1.558	2.024	2.760	2.786	3.853	3.631	3.546	3.855	3.942		3.1	28	TML	1.000
53	TML	1,3,5-Trimethylbenzene		1.541	2.049	2.441	3.320	3.044	3.063	3.225	3.212		2.7	24	TML	1.000
54	TML	4-Chlorotoluene		2.302	2.122	3.321	4.206	3.802	3.727	3.957	3.959		3.4	23	TML	1.000
55	TML	Tert-Butylbenzene		1.012	1.247	1.393	1.859	1.918	2.148	2.393	2.464		1.8	30	TML	0.999
56	TML	1,2,4-Trimethylbenzene		1.608	1.717	2.169	3.302	3.229	3.259	3.502	3.589		2.8	29	TML	1.000
57	TML	Sec-Butylbenzene		1.782	2.099	2.283	3.377	3.422	3.581	3.867	4.061		3.1	28	TML	0.999
58	TML	p-Isopropyltoluene		1.557	1.627	1.950	2.721	2.773	2.835	3.093	3.180		2.5	27	TML	1.000
59	TM	1,3-DCB		1.176	1.289	1.154	1.446	1.356	1.322	1.428	1.411		1.3	8.4	TM	
60	TM	1,4-DCB	1.821	1.764	1.557	1.426	1.607	1.437	1.380	1.455	1.452		1.5	10	TM	
61	TML	n-Butylbenzene		2.248	2.191	2.212	3.152	3.273	3.424	3.774	3.765		3.0	23	TML	1.000
62	TM	1,2-DCB	1.184	1.170	1.321	1.239	1.453	1.336	1.265	1.355	1.273		1.3	6.9	TM	
63	TML	1,2-Dibromo-3-chloropropane			0.0663	0.0635	0.0949	0.0904	0.0855	0.0964	0.1130		0.09	20	TML	0.996
64	TM	1,2,4-Trichlorobenzene	0.5980	0.6082	0.5264	0.5526	0.6630	0.6305	0.6997	0.8020	0.8031		0.65	15	TM	
65	TM	Hexachlorobutadiene		0.2786	0.2408	0.2714	0.2753	0.2652	0.2632	0.3065	0.2996		0.28	7.6	TM	
66	TML	Naphthalene	1.078	1.126	1.277	1.308	1.629	1.761	1.968	2.279	2.342		1.6	29	TML	0.993
67	TML	1,2,3-Trichlorobenzene	0.3573	0.5735	0.5556	0.5771	0.6794	0.6929	0.6994	0.7777	0.7627		0.63	21	TML	1.000
68																
69																
70																

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Soil

SDG No: 64923
Initial Cal. Date: 06/20/11
Instrument: Sweetpea

Initials:

			0620S04S.D	0620S05S.D	0620S06S.D	0620S07S.D	0620S08S.D	0620S09S.D	0620S10S.D							
		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
1	I	Fluorobenzene(IS)														
2	TM	Dichlorodifluoromethane	0.5270	0.4393	0.4426	0.4072	0.4908	0.4358	0.4343				0.45	9.0	TM	
3	TM**L	Chloromethane	0.6980	0.4688	0.4559	0.4736	0.4952	0.4815	0.4859				0.51	17	TM**L	1.000
4	TM*	Vinyl chloride		0.4398	0.3908	0.3082	0.4436	0.3238					0.38	17	TM*	
5	TM	Bromomethane	0.0950	0.0907	0.0837	0.0780	0.0887	0.0902	0.0849				0.09	6.4	TM	
6	TM	Chloroethane	0.3526	0.2581	0.2727	0.2544	0.2753	0.2763	0.2691				0.28	12	TM	
7	TM	Trichlorofluoromethane	0.1674	0.1449	0.1457	0.1362	0.1510	0.1447	0.1207				0.14	9.8	TM	
8	tmL	Acetone	0.0978	0.0701	0.0543	0.0381	0.0276	0.0260	0.0237				0.05	57	TML	0.998
9	TM*	1,1-DCE	0.3629	0.3356	0.3418	0.3327	0.3516	0.3679	0.3433				0.35	3.9	TM*	
10	TM	Freon-113	0.4261	0.3754	0.3929	0.3839	0.4189	0.4295	0.3983				0.40	5.3	TM	
11	TM	Methylene chloride		0.2218	0.1866	0.1821	0.1703	0.1815					0.19	10	TM	
12	TM	Methyl t-butyl ether (MTBE)	0.3891	0.3790	0.3647	0.3773	0.4089	0.4133	0.3870				0.39	4.5	TM	
13	TM	Trans-1,2-DCE	0.2603	0.2136	0.2055	0.2054	0.2142	0.2255	0.2119				0.22	8.8	TM	
14	TM**	1,1-DCA	0.4684	0.4443	0.4655	0.4585	0.4773	0.4945	0.4621				0.47	3.4	TM**	
15	TM	MEK (2-Butanone)	0.0920	0.0863	0.0960	0.0956	0.0997	0.1017	0.0954				0.10	5.3	TM	
16	TM	Cis-1,2-DCE	0.2653	0.2383	0.2463	0.2377	0.2590	0.2689	0.2517				0.25	4.9	TM	
17	TM	2,2-Dichloropropane	0.4470	0.4143	0.3971	0.4079	0.4283	0.4426	0.4157				0.42	4.3	TM	
18	TM*	Chloroform	0.4589	0.3784	0.4014	0.3991	0.4186	0.4253	0.4027				0.41	6.2	TM*	
19	TM	Bromochloromethane	0.0777	0.0783	0.0738	0.0747	0.0768	0.0771	0.0666				0.07	5.4	TM	
20	S	Dibromofluoromethane(S)	0.2998	0.2718	0.2644	0.2705	0.2721	0.2751	0.2632				0.27	4.5	S	
21	TM	1,1,1-TCA	0.4082	0.3649	0.3642	0.3679	0.3813	0.4046	0.3853				0.38	4.8	TM	
22	TM	1,1-Dichloropropene	0.3823	0.3504	0.3456	0.3384	0.3468	0.3558	0.3350				0.35	4.5	TM	
23	S	1,2-DCA-D4(S)	0.2144	0.1662	0.1794	0.1773	0.1807	0.1797	0.1691				0.18	8.7	S	
24	TM	Carbon tetrachloride	0.3244	0.3087	0.3148	0.3195	0.3261	0.3382	0.3173				0.32	3.0	TM	
25	TM	1,2-DCA	0.1797	0.1443	0.1752	0.1680	0.1705	0.1787	0.1688				0.17	7.1	TM	
26	TM	Benzene	1.168	0.9313	0.9524	0.9330	0.9560	0.9842	0.9250				0.98	8.8	TM	
27	TM	TCE	0.2795	0.2312	0.2458	0.2405	0.2517	0.2599	0.2490				0.25	6.1	TM	
28	TM*	1,2-Dichloropropane	0.2552	0.2248	0.2136	0.2280	0.2372	0.2467	0.2328				0.23	5.9	TM*	
29	TM	Bromodichloromethane	0.2561	0.2718	0.2719	0.2532	0.2740	0.2846	0.2655				0.27	4.1	TM	
30	TM	Dibromomethane	0.0792	0.0826	0.0776	0.0838	0.0909	0.0908	0.0854				0.08	6.2	TM	
31	TM	Cis-1,3-Dichloropropene	0.3156	0.3016	0.2821	0.2941	0.3123	0.3194	0.3056				0.30	4.3	TM	
32	TM*	Toluene	0.6384	0.5578	0.5890	0.5803	0.6127	0.6248	0.5794				0.60	4.8	TM*	
33	TM	Trans-1,3-Dichloropropene	0.1996	0.2062	0.2034	0.2077	0.2233	0.2209	0.2147				0.21	4.3	TM	
34	TM	1,1,2-TCA	0.1144	0.0940	0.1027	0.1037	0.1144	0.1158	0.1045				0.11	7.5	TM	
35	I	Chlorobenzene-D5(IS)														

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Soil

SDG No: 64923
Initial Cal. Date: 06/20/11
Instrument: Sweetpea

Initials:

		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
36	S	Toluene-D8(S)	2.109	1.769	1.780	1.751	1.727	1.787	1.708				1.8	7.6	S	
37	TM	1,2-EDB	0.1967	0.1669	0.1862	0.1728	0.1987	0.2054	0.1894				0.19	7.4	TM	
38	TM	Tetrachloroethene	0.4231	0.3614	0.4035	0.3418	0.3627	0.4005	0.3809				0.38	7.5	TM	
39	TM	1-Chlorohexane	1.121	0.9416	0.9342	0.9264	0.9726	0.9975	0.9684				0.98	6.8	TM	
40	TM	1,1,1,2-Tetrachloroethane	0.4241	0.3625	0.3656	0.3614	0.3967	0.4136	0.3855				0.39	6.6	TM	
41	TM	m&p-Xylene	0.7885	0.7424	0.7753	0.7512	0.7559	0.8073	0.7620				0.77	3.0	TM	
42	TM	o-Xylene	0.7590	0.6857	0.7066	0.6616	0.6969	0.7480	0.7087				0.71	4.8	TM	
43	TM	Styrene	0.1370	0.1203	0.1661	0.1478	0.1510	0.1598	0.1532				0.15	10	TM	
44	S	4-Bromofluorobenzene(S)	0.6220	0.5113	0.4919	0.4894	0.4627	0.4857	0.4859				0.51	10	S	
45	TM	1,3-Dichloropropane	0.3614	0.3397	0.3379	0.3375	0.3765	0.3808	0.3605				0.36	5.1	TM	
46	TM	Dibromochloromethane	0.2933	0.2911	0.3137	0.2876	0.3008	0.3238	0.2992				0.30	4.3	TM	
47	TM**	Chlorobenzene	1.232	1.063	1.046	0.9742	1.056	1.118	1.066				1.1	7.4	TM**	
48	TM*	Ethylbenzene	2.268	2.049	2.066	2.047	2.049	2.256	2.070				2.1	4.8	TM*	
49	TM**	Bromoform	0.1881	0.1449	0.1486	0.1384	0.1658	0.1723	0.1571				0.16	11	TM**	
50	I	1,4-Dichlorobenzene-D(IS)														
51	TM	MIBK (methyl isobutyl ketone)	0.3766	0.3441	0.4033	0.3618	0.3424	0.3475	0.3598				0.36	6.0	TM	
52	TM	Isopropylbenzene	5.310	4.724	4.437	4.509	4.395	4.847	4.775				4.7	6.7	TM	
53	TM**	1,1,2,2-Tetrachloroethane	0.5365	0.4453	0.4748	0.4707	0.4739	0.5057	0.4842				0.48	6.0	TM**	
54	TM	1,2,3-Trichloropropane	0.1101	0.0933	0.0915	0.1072	0.1001	0.1057	0.1041				0.10	7.0	TM	
55	TM	Bromobenzene	1.003	0.8367	0.8607	0.8126	0.8401	0.9451	0.8887				0.88	7.7	TM	
56	TM	n-Propylbenzene	6.550	5.717	5.782	5.616	5.557	6.183	6.068				5.9	6.1	TM	
57	TM	2-Chlorotoluene	4.221	3.370	3.598	3.614	3.499	3.752	3.725				3.7	7.4	TM	
58	TM	1,3,5-Trimethylbenzene	3.747	3.175	3.465	3.335	3.263	3.611	3.464				3.4	5.8	TM	
59	TM	4-Chlorotoluene	3.490	2.971	3.019	2.829	2.792	3.030	2.849				3.0	7.9	TM	
60	TM	Tert-Butylbenzene	4.674	3.622	3.762	3.625	3.675	4.029	3.843				3.9	9.6	TM	
61	TM	1,2,4-Trimethylbenzene	3.565	3.207	3.270	3.194	3.086	3.363	3.244				3.3	4.7	TM	
62	TM	Sec-Butylbenzene	6.322	5.160	5.292	5.189	5.180	5.689	5.457				5.5	7.7	TM	
63	TM	p-Isopropyltoluene	4.624	4.086	4.124	3.977	4.204	4.539	4.460				4.3	5.8	TM	
64	TM	1,3-DCB	2.180	1.874	1.857	1.704	1.703	1.904	1.819				1.9	8.6	TM	
65	TM	1,4-DCB	1.882	1.773	1.663	1.692	1.640	1.793	1.698				1.7	4.9	TM	
66	TM	n-Butylbenzene	4.728	3.763	4.052	3.958	3.856	4.174	4.151				4.1	7.7	TM	
67	TM	1,2-DCB	1.722	1.367	1.378	1.349	1.362	1.508	1.442				1.4	9.3	TM	
68	TM	1,2-Dibromo-3-chloropropane		0.0428	0.0567	0.0528	0.0605	0.0603	0.0599				0.06	12	TM	
69	TM	1,2,4-Trichlorobenzene	1.004	0.8586	0.8151	0.7642	0.7811	0.8688	0.8657				0.85	9.3	TM	
70	TM	Hexachlorobutadiene	1.041	0.8344	0.8046	0.7978	0.8271	0.8768	0.8815				0.87	9.7	TM	

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 6
Initial Calibration

Lab Name: APPL, Inc.

Case No:

Matrix: Soil

SDG No: 64923

Initial Cal. Date: 06/20/11

Instrument: Sweetpea

Initials:

		Compound	0.002	0.005	0.01	0.02	0.05	0.1	0.2				Avg	%RSD		
71	TM	Naphthalene	0.8774	0.7321	0.7834	0.7393	0.7823	0.9440	0.9604				0.83	11	TM	
72	TM	1,2,3-Trichlorobenzene	0.9052	0.6695	0.6761	0.6494	0.6517	0.7207	0.7113				0.71	13	TM	
73																
74																
75																
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VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Water

SDG No: 64923
Date Analyzed: 06/17/11
Instrument: Thor
Initial Cal. Date: 06/17/11
Data File: 0617T17W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.4795	0.4712	1.7	TM	
3	TM**L	Chloromethane	2.135	1.827	14	TM**L	7.1
4	TM*	Vinyl chloride	0.6182	0.6312	2.1	TM*	
5	TML	Bromomethane	0.2793	0.2396	14	TML	2.1
6	TM	Chloroethane	0.3351	0.3546	5.8	TM	
7	TM	Trichlorofluoromethane	0.8072	0.7262	10	TM	
8	TM*	1,1-DCE	0.6383	0.6089	4.6	TM*	
9	TML	Methylene chloride	0.3659	0.2867	22	TML	7.6
10	TM	Trans-1,2-DCE	0.5725	0.5647	1.4	TM	
11	TM**	1,1-DCA	0.8093	0.8692	7.4	TM**	
12	TM	Cis-1,2-DCE	0.8918	0.8961	0.48	TM	
13	TM	2,2-Dichloropropane	0.6901	0.6491	5.9	TM	
14	TM*	Chloroform	0.8461	0.8179	3.3	TM*	
15	TM	Bromochloromethane	0.6675	0.6507	2.5	TM	
16	S	Dibromofluoromethane(S)	0.4307	0.4063	5.7	S	
17	TM	1,1,1-TCA	0.6032	0.6161	2.1	TM	
18	TM	1,1-Dichloropropene	0.3833	0.3666	4.4	TM	
19	S	1,2-DCA-D4(S)	0.9924	0.9047	8.8	S	
20	TM	Carbon Tetrachloride	0.3819	0.3842	0.62	TM	
21	TM	1,2-DCA	1.022	0.9570	6.4	TM	
22	TM	Benzene	1.174	1.241	5.7	TM	
23	TML	TCE	0.3078	0.3368	9.4	TML	0.61
24	TM*	1,2-Dichloropropane	0.5620	0.5335	5.1	TM*	
25	TM	Bromodichloromethane	0.6775	0.6423	5.2	TM	
26	TM	Dibromomethane	0.2339	0.2192	6.3	TM	
27	TML	Cis-1,3-Dichloropropene	0.4856	0.5185	6.8	TML	8.9
28	TM*	Toluene	1.263	1.375	8.8	TM*	
29	TML	Trans-1,3-Dichloropropene	0.5303	0.4959	6.5	TML	12
30	TM	1,1,2-TCA	0.2933	0.2764	5.8	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	S	Toluene-D8(S)	1.705	1.759	3.2	S	
33	TM	1,2-EDB	0.3347	0.3464	3.5	TM	
34	TML	Tetrachloroethene	0.1718	0.2088	22	TML	9.0
35	TML	1-Chlorohexane	0.6098	0.6739	11	TML	1.7
36	TM	1,1,1,2-Tetrachloroethane	0.4219	0.4333	2.7	TM	
37	TML	m&p-Xylene	0.6958	0.8483	22	TML	5.7
38	TML	o-Xylene	0.6560	0.7780	19	TML	1.8
39	TML	Styrene	1.267	1.580	25	TML	0.40
40	S	4-Bromofluorobenzene(S)	0.8601	0.9489	10	S	
		Average			7.9		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.

Case No:

Matrix: Water

SDG No: 64923

Date Analyzed: 06/17/11

Instrument: Thor

Cal. Date: 06/17/11

Data File: 0617T17W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	1,3-Dichloropropane	0.7546	0.7934	5.1	TM	
42	TM	Dibromochloromethane	0.3687	0.3614	2.0	TM	
43	TM**	Chlorobenzene	1.277	1.290	1.0	TM**	
44	TM*	Ethylbenzene	2.231	2.547	14	TM*	
45	TM**	Bromoform	0.1632	0.1599	2.0	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
47	TML	Isopropylbenzene	2.536	2.947	16	TML	2.2
48	TM**	1,1,2,2-Tetrachloroethane	0.9296	0.8737	6.0	TM**	
49	TM	1,2,3-Trichloropropane	0.2579	0.2544	1.3	TM	
50	TML	Bromobenzene	0.5441	0.6049	11	TML	0.21
51	TML	n-Propylbenzene	3.921	4.833	23	TML	0.36
52	TML	2-Chlorotoluene	3.106	3.768	21	TML	1.5
53	TML	1,3,5-Trimethylbenzene	2.737	3.219	18	TML	3.5
54	TML	4-Chlorotoluene	3.425	3.885	13	TML	1.3
55	TML	Tert-Butylbenzene	1.804	2.405	33	TML	9.6
56	TML	1,2,4-Trimethylbenzene	2.797	3.315	19	TML	0.20
57	TML	Sec-Butylbenzene	3.059	3.664	20	TML	1.2
58	TML	p-Isopropyltoluene	2.467	2.864	16	TML	0.77
59	TM	1,3-DCB	1.323	1.405	6.2	TM	
60	TM	1,4-DCB	1.544	1.462	5.4	TM	
61	TML	n-Butylbenzene	3.005	3.400	13	TML	2.1
62	TM	1,2-DCB	1.288	1.381	7.2	TM	
63	TML	1,2-Dibromo-3-chloropropane	0.0872	0.0842	3.4	TML	3.9
64	TM	1,2,4-Trichlorobenzene	0.6537	0.6698	2.5	TM	
65	TM	Hexachlorobutadiene	0.2751	0.2821	2.6	TM	
66	TML	Naphthalene	1.641	1.782	8.6	TML	17
67	TML	1,2,3-Trichlorobenzene	0.6306	0.7044	12	TML	3.3
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		Average			10.9		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Soil

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Sweetpea
Initial Cal. Date: 06/20/11
Data File: 0620S17S.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene(IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.4538	0.3865	15	TM	
3	TM**L	Chloromethane	0.5084	0.4814	5.3	TM**L	0.83
4	TM*	Vinyl chloride	0.3812	0.4250	11	TM*	
5	TM	Bromomethane	0.0873	0.0825	5.5	TM	
6	TM	Chloroethane	0.2798	0.2627	6.1	TM	
7	TM	Trichlorofluoromethane	0.1444	0.1377	4.6	TM	
8	tmL	Acetone	0.0482	0.0313	35	tmL	16
9	TM*	1,1-DCE	0.3480	0.3181	8.6	TM*	
10	TM	Freon-113	0.4036	0.3454	14	TM	
11	TM	Methylene chloride	0.1885	0.2106	12	TM	
12	TM	Methyl t-butyl ether (MTBE)	0.3885	0.4335	12	TM	
13	TM	Trans-1,2-DCE	0.2195	0.2100	4.3	TM	
14	TM**	1,1-DCA	0.4672	0.4727	1.2	TM**	
15	TM	MEK (2-Butanone)	0.0952	0.1087	14	TM	
16	TM	Cis-1,2-DCE	0.2525	0.2539	0.57	TM	
17	TM	2,2-Dichloropropane	0.4219	0.4044	4.1	TM	
18	TM*	Chloroform	0.4121	0.4102	0.44	TM*	
19	TM	Bromochloromethane	0.0750	0.0815	8.7	TM	
20	S	Dibromofluoromethane(S)	0.2738	0.2760	0.78	S	
21	TM	1,1,1-TCA	0.3823	0.3591	6.1	TM	
22	TM	1,1-Dichloropropene	0.3506	0.3228	7.9	TM	
23	S	1,2-DCA-D4(S)	0.1809	0.1821	0.64	S	
24	TM	Carbon tetrachloride	0.3213	0.3005	6.5	TM	
25	TM	1,2-DCA	0.1693	0.1742	2.9	TM	
26	TM	Benzene	0.9786	0.9472	3.2	TM	
27	TM	TCE	0.2511	0.2390	4.8	TM	
28	TM*	1,2-Dichloropropane	0.2340	0.2467	5.4	TM*	
29	TM	Bromodichloromethane	0.2681	0.2875	7.2	TM	
30	TM	Dibromomethane	0.0843	0.0938	11	TM	
31	TM	Cis-1,3-Dichloropropene	0.3044	0.3251	6.8	TM	
32	TM*	Toluene	0.5975	0.5984	0.16	TM*	
33	TM	Trans-1,3-Dichloropropene	0.2108	0.2255	7.0	TM	
34	TM	1,1,2-TCA	0.1071	0.1154	7.8	TM	
35	I	Chlorobenzene-D5(IS)	ISTD			I	
36	S	Toluene-D8(S)	1.804	1.870	3.6	S	
37	TM	1,2-EDB	0.1880	0.1898	0.92	TM	
38	TM	Tetrachloroethene	0.3820	0.3224	16	TM	
39	TM	1-Chlorohexane	0.9803	0.8143	17	TM	
40	TM	1,1,1,2-Tetrachloroethane	0.3870	0.3767	2.7	TM	
		Average			7.4		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Second Source Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Soil

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Sweetpea
Cal. Date: 06/20/11
Data File: 0620S17S.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	m&p-Xylene	0.7689	0.7124	7.4	TM	
42	TM	o-Xylene	0.7095	0.6707	5.5	TM	
43	TM	Styrene	0.1479	0.1486	0.49	TM	
44	S	4-Bromofluorobenzene(S)	0.5070	0.5024	0.91	S	
45	TM	1,3-Dichloropropane	0.3563	0.3616	1.5	TM	
46	TM	Dibromochloromethane	0.3013	0.3021	0.25	TM	
47	TM**	Chlorobenzene	1.079	1.005	6.9	TM**	
48	TM*	Ethylbenzene	2.115	1.927	8.9	TM*	
49	TM**	Bromoform	0.1593	0.1520	4.6	TM**	
50	I	1,4-Dichlorobenzene-D(IS)	ISTD			I	
51	TM	MIBK (methyl isobutyl ketone)	0.3622	0.3543	2.2	TM	
52	TM	Isopropylbenzene	4.714	3.993	15	TM	
53	TM**	1,1,2,2-Tetrachloroethane	0.4844	0.4784	1.2	TM**	
54	TM	1,2,3-Trichloropropane	0.1017	0.1004	1.3	TM	
55	TM	Bromobenzene	0.8839	0.8312	6.0	TM	
56	TM	n-Propylbenzene	5.925	5.034	15	TM	
57	TM	2-Chlorotoluene	3.683	3.347	9.1	TM	
58	TM	1,3,5-Trimethylbenzene	3.437	3.052	11	TM	
59	TM	4-Chlorotoluene	2.997	2.641	12	TM	
60	TM	Tert-Butylbenzene	3.890	3.380	13	TM	
61	TM	1,2,4-Trimethylbenzene	3.276	2.958	9.7	TM	
62	TM	Sec-Butylbenzene	5.470	4.628	15	TM	
63	TM	p-Isopropyltoluene	4.288	3.680	14	TM	
64	TM	1,3-DCB	1.863	1.612	13	TM	
65	TM	1,4-DCB	1.734	1.580	8.9	TM	
66	TM	n-Butylbenzene	4.098	3.353	18	TM	
67	TM	1,2-DCB	1.447	1.313	9.2	TM	
68	TM	1,2-Dibromo-3-chloropropane	0.0555	0.0528	4.9	TM	
69	TM	1,2,4-Trichlorobenzene	0.8511	0.7571	11	TM	
70	TM	Hexachlorobutadiene	0.8662	0.7286	16	TM	
71	TM	Naphthalene	0.8313	0.8449	1.6	TM	
72	TM	1,2,3-Trichlorobenzene	0.7120	0.6343	11	TM	
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80							
		Average			8.2		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Water

SDG No: 64923
Date Analyzed: 06/17/11
Instrument: Thor
Initial Cal. Date: 06/17/11
Data File: 0617T16W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.4795	0.4556	5.0	TM	
3	TM**L	Chloromethane	2.135	1.708	20	TM**L	13
4	TM*	Vinyl chloride	0.6182	0.5722	7.5	TM*	
5	TML	Bromomethane	0.2793	0.2395	14	TML	2.1
6	TM	Chloroethane	0.3351	0.3417	2.0	TM	
7	TM	Trichlorofluoromethane	0.8072	0.7264	10	TM	
8	TM*	1,1-DCE	0.6383	0.6335	0.76	TM*	
9	TML	Methylene chloride	0.3659	0.2982	19	TML	3.6
10	TM	Trans-1,2-DCE	0.5725	0.6025	5.2	TM	
11	TM**	1,1-DCA	0.8093	0.9052	12	TM**	
12	TM	Cis-1,2-DCE	0.8918	0.9676	8.5	TM	
13	TM	2,2-Dichloropropane	0.6901	0.7045	2.1	TM	
14	TM*	Chloroform	0.8461	0.8810	4.1	TM*	
15	TM	Bromochloromethane	0.6675	0.7026	5.2	TM	
16	S	Dibromofluoromethane(S)	0.4307	0.4365	1.4	S	
17	TM	1,1,1-TCA	0.6032	0.6213	3.0	TM	
18	TM	1,1-Dichloropropene	0.3833	0.3862	0.76	TM	
19	S	1,2-DCA-D4(S)	0.9924	0.9579	3.5	S	
20	TM	Carbon Tetrachloride	0.3819	0.3853	0.89	TM	
21	TM	1,2-DCA	1.022	1.032	0.96	TM	
22	TM	Benzene	1.174	1.286	9.5	TM	
23	TML	TCE	0.3078	0.3424	11	TML	2.1
24	TM*	1,2-Dichloropropane	0.5620	0.5527	1.7	TM*	
25	TM	Bromodichloromethane	0.6775	0.6618	2.3	TM	
26	TM	Dibromomethane	0.2339	0.2270	3.0	TM	
27	TML	Cis-1,3-Dichloropropene	0.4856	0.5270	8.5	TML	7.7
28	TM*	Toluene	1.263	1.456	15	TM*	
29	TML	Trans-1,3-Dichloropropene	0.5303	0.5291	0.23	TML	7.1
30	TM	1,1,2-TCA	0.2933	0.3087	5.3	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	S	Toluene-D8(S)	1.705	1.821	6.8	S	
33	TM	1,2-EDB	0.3347	0.3712	11	TM	
34	TML	Tetrachloroethene	0.1718	0.1986	16	TML	3.8
35	TML	1-Chlorohexane	0.6098	0.6711	10	TML	2.1
36	TM	1,1,1,2-Tetrachloroethane	0.4219	0.4484	6.3	TM	
37	TML	m&p-Xylene	0.6958	0.8540	23	TML	6.5
38	TML	o-Xylene	0.6560	0.7837	19	TML	1.1
39	TML	Styrene	1.267	1.616	28	TML	2.6
40	S	4-Bromofluorobenzene(S)	0.8601	0.9766	14	S	
		Average			8.3		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.

Case No:

Matrix: Water

SDG No: 64923

Date Analyzed: 06/17/11

Instrument: Thor

Cal. Date: 06/17/11

Data File: 0617T16W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	1,3-Dichloropropane	0.7546	0.8464	12	TM	
42	TM	Dibromochloromethane	0.3687	0.3820	3.6	TM	
43	TM**	Chlorobenzene	1.277	1.352	5.8	TM**	
44	TM*	Ethylbenzene	2.231	2.558	15	TM*	
45	TM**	Bromoform	0.1632	0.1795	10.0	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
47	TML	Isopropylbenzene	2.536	3.076	21	TML	1.4
48	TM**	1,1,2,2-Tetrachloroethane	0.9296	0.9295	0.01	TM**	
49	TM	1,2,3-Trichloropropane	0.2579	0.2651	2.8	TM	
50	TML	Bromobenzene	0.5441	0.6746	24	TML	11
51	TML	n-Propylbenzene	3.921	5.047	29	TML	4.5
52	TML	2-Chlorotoluene	3.106	4.015	29	TML	7.7
53	TML	1,3,5-Trimethylbenzene	2.737	3.383	24	TML	8.6
54	TML	4-Chlorotoluene	3.425	4.209	23	TML	9.5
55	TML	Tert-Butylbenzene	1.804	2.234	24	TML	2.7
56	TML	1,2,4-Trimethylbenzene	2.797	3.532	26	TML	6.2
57	TML	Sec-Butylbenzene	3.059	3.684	20	TML	1.7
58	TML	p-Isopropyltoluene	2.467	2.981	21	TML	2.9
59	TM	1,3-DCB	1.323	1.464	11	TM	
60	TM	1,4-DCB	1.544	1.578	2.1	TM	
61	TML	n-Butylbenzene	3.005	3.548	18	TML	1.8
62	TM	1,2-DCB	1.288	1.479	15	TM	
63	TML	1,2-Dibromo-3-chloropropane	0.0872	0.0949	8.9	TML	5.5
64	TM	1,2,4-Trichlorobenzene	0.6537	0.7232	11	TM	
65	TM	Hexachlorobutadiene	0.2751	0.2704	1.7	TM	
66	TML	Naphthalene	1.641	1.893	15	TML	12
67	TML	1,2,3-Trichlorobenzene	0.6306	0.7119	13	TML	2.3
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80							
		Average			14.8		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Water

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Thor
Initial Cal. Date: 06/17/11
Data File: 0619T01W.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene (IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.4795	0.5670	18	TM	
3	TM**L	Chloromethane	2.135	1.777	17	TM**L	9.7
4	TM*	Vinyl chloride	0.6182	0.6244	1.0	TM*	
5	TML	Bromomethane	0.2793	0.2406	14	TML	1.6
6	TM	Chloroethane	0.3351	0.3497	4.3	TM	
7	TM	Trichlorofluoromethane	0.8072	0.8443	4.6	TM	
8	TM*	1,1-DCE	0.6383	0.6484	1.6	TM*	
9	TML	Methylene chloride	0.3659	0.2981	19	TML	3.6
10	TM	Trans-1,2-DCE	0.5725	0.5920	3.4	TM	
11	TM**	1,1-DCA	0.8093	0.8738	8.0	TM**	
12	TM	Cis-1,2-DCE	0.8918	0.9212	3.3	TM	
13	TM	2,2-Dichloropropane	0.6901	0.7589	10.0	TM	
14	TM*	Chloroform	0.8461	0.8600	1.6	TM*	
15	TM	Bromochloromethane	0.6675	0.6803	1.9	TM	
16	S	Dibromofluoromethane(S)	0.4307	0.4483	4.1	S	
17	TM	1,1,1-TCA	0.6032	0.6388	5.9	TM	
18	TM	1,1-Dichloropropene	0.3833	0.3779	1.4	TM	
19	S	1,2-DCA-D4(S)	0.9924	1.010	1.8	S	
20	TM	Carbon Tetrachloride	0.3819	0.4235	11	TM	
21	TM	1,2-DCA	1.022	0.9964	2.5	TM	
22	TM	Benzene	1.174	1.199	2.1	TM	
23	TML	TCE	0.3078	0.3256	5.8	TML	2.4
24	TM*	1,2-Dichloropropane	0.5620	0.5490	2.3	TM*	
25	TM	Bromodichloromethane	0.6775	0.6483	4.3	TM	
26	TM	Dibromomethane	0.2339	0.2248	3.9	TM	
27	TML	Cis-1,3-Dichloropropene	0.4856	0.5227	7.6	TML	8.3
28	TM*	Toluene	1.263	1.358	7.5	TM*	
29	TML	Trans-1,3-Dichloropropene	0.5303	0.5196	2.0	TML	8.5
30	TM	1,1,2-TCA	0.2933	0.2897	1.2	TM	
31	I	Chlorobenzene-D5 (IS)	ISTD			I	
32	S	Toluene-D8(S)	1.705	1.694	0.67	S	
33	TM	1,2-EDB	0.3347	0.3296	1.5	TM	
34	TML	Tetrachloroethene	0.1718	0.1882	9.5	TML	1.6
35	TML	1-Chlorohexane	0.6098	0.6507	6.7	TML	5.0
36	TM	1,1,1,2-Tetrachloroethane	0.4219	0.4207	0.28	TM	
37	TML	m&p-Xylene	0.6958	0.7625	9.6	TML	5.4
38	TML	o-Xylene	0.6560	0.7033	7.2	TML	11
39	TML	Styrene	1.267	1.445	14	TML	8.1
40	S	4-Bromofluorobenzene(S)	0.8601	0.9777	14	S	
		Average			6.2		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Water

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Thor
Cal. Date: 06/17/11
Data File: 0619T01W.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	1,3-Dichloropropane	0.7546	0.7567	0.28	TM	
42	TM	Dibromochloromethane	0.3687	0.3491	5.3	TM	
43	TM**	Chlorobenzene	1.277	1.204	5.7	TM**	
44	TM*	Ethylbenzene	2.231	2.281	2.2	TM*	
45	TM**	Bromoform	0.1632	0.1877	15	TM**	
46	I	1,4-Dichlorobenzene-D (IS)	ISTD			I	
47	TML	Isopropylbenzene	2.536	2.831	12	TML	5.5
48	TM**	1,1,2,2-Tetrachloroethane	0.9296	0.8739	6.0	TM**	
49	TM	1,2,3-Trichloropropane	0.2579	0.2542	1.4	TM	
50	TML	Bromobenzene	0.5441	0.5923	8.9	TML	1.8
51	TML	n-Propylbenzene	3.921	4.674	19	TML	2.7
52	TML	2-Chlorotoluene	3.106	3.656	18	TML	1.4
53	TML	1,3,5-Trimethylbenzene	2.737	3.125	14	TML	0.55
54	TML	4-Chlorotoluene	3.425	3.815	11	TML	0.44
55	TML	Tert-Butylbenzene	1.804	2.025	12	TML	5.7
56	TML	1,2,4-Trimethylbenzene	2.797	3.207	15	TML	2.8
57	TML	Sec-Butylbenzene	3.059	3.483	14	TML	3.2
58	TML	p-Isopropyltoluene	2.467	2.769	12	TML	3.7
59	TM	1,3-DCB	1.323	1.326	0.23	TM	
60	TM	1,4-DCB	1.544	1.407	8.9	TM	
61	TML	n-Butylbenzene	3.005	3.303	9.9	TML	4.6
62	TM	1,2-DCB	1.288	1.325	2.8	TM	
63	TML	1,2-Dibromo-3-chloropropane	0.0872	0.0904	3.7	TML	1.6
64	TM	1,2,4-Trichlorobenzene	0.6537	0.6967	6.6	TM	
65	TM	Hexachlorobutadiene	0.2751	0.2861	4.0	TM	
66	TML	Naphthalene	1.641	1.817	11	TML	16
67	TML	1,2,3-Trichlorobenzene	0.6306	0.6943	10	TML	4.6
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80							
		Average			8.8		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Soil

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Sweetpea
Initial Cal. Date: 06/20/11
Data File: 0620S16S.D

		Compound	MEAN	CCRF	%D		%Drift
1	I	Fluorobenzene(IS)	ISTD			I	
2	TM	Dichlorodifluoromethane	0.4538	0.3965	13	TM	
3	TM**L	Chloromethane	0.5084	0.5050	0.66	TM**L	4.0
4	TM*	Vinyl chloride	0.3812	0.4415	16	TM*	
5	TM	Bromomethane	0.0873	0.0849	2.8	TM	
6	TM	Chloroethane	0.2798	0.2797	0.03	TM	
7	TM	Trichlorofluoromethane	0.1444	0.1439	0.32	TM	
8	tmL	Acetone	0.0482	0.0302	37	tmL	11
9	TM*	1,1-DCE	0.3480	0.3121	10	TM*	
10	TM	Freon-113	0.4036	0.3438	15	TM	
11	TM	Methylene chloride	0.1885	0.2192	16	TM	
12	TM	Methyl t-butyl ether (MTBE)	0.3885	0.4274	10	TM	
13	TM	Trans-1,2-DCE	0.2195	0.2044	6.9	TM	
14	TM**	1,1-DCA	0.4672	0.4846	3.7	TM**	
15	TM	MEK (2-Butanone)	0.0952	0.1041	9.3	TM	
16	TM	Cis-1,2-DCE	0.2525	0.2610	3.4	TM	
17	TM	2,2-Dichloropropane	0.4219	0.4076	3.4	TM	
18	TM*	Chloroform	0.4121	0.4081	0.97	TM*	
19	TM	Bromochloromethane	0.0750	0.0846	13	TM	
20	S	Dibromofluoromethane(S)	0.2738	0.2725	0.49	S	
21	TM	1,1,1-TCA	0.3823	0.3670	4.0	TM	
22	TM	1,1-Dichloropropene	0.3506	0.3172	9.5	TM	
23	S	1,2-DCA-D4(S)	0.1809	0.1793	0.90	S	
24	TM	Carbon tetrachloride	0.3213	0.3047	5.2	TM	
25	TM	1,2-DCA	0.1693	0.1856	9.6	TM	
26	TM	Benzene	0.9786	0.9820	0.34	TM	
27	TM	TCE	0.2511	0.2418	3.7	TM	
28	TM*	1,2-Dichloropropane	0.2340	0.2491	6.5	TM*	
29	TM	Bromodichloromethane	0.2681	0.2806	4.6	TM	
30	TM	Dibromomethane	0.0843	0.0933	11	TM	
31	TM	Cis-1,3-Dichloropropene	0.3044	0.3390	11	TM	
32	TM*	Toluene	0.5975	0.6018	0.73	TM*	
33	TM	Trans-1,3-Dichloropropene	0.2108	0.2398	14	TM	
34	TM	1,1,2-TCA	0.1071	0.1196	12	TM	
35	I	Chlorobenzene-D5(IS)	ISTD			I	
36	S	Toluene-D8(S)	1.804	1.844	2.2	S	
37	TM	1,2-EDB	0.1880	0.1860	1.1	TM	
38	TM	Tetrachloroethene	0.3820	0.3407	11	TM	
39	TM	1-Chlorohexane	0.9803	0.8267	16	TM	
40	TM	1,1,1,2-Tetrachloroethane	0.3870	0.3809	1.6	TM	
		Average			7.6		

VOLATILE ORGANIC ANALYSIS BY
EPA METHOD 8260B

Form 7

Continuing Calibration

Lab Name: APPL, Inc.
Case No:
Matrix: Soil

SDG No: 64923
Date Analyzed: 06/20/11
Instrument: Sweetpea
Cal. Date: 06/20/11
Data File: 0620S16S.D

		Compound	MEAN	CCRF	%D		%Drift
41	TM	m&p-Xylene	0.7689	0.7097	7.7	TM	
42	TM	o-Xylene	0.7095	0.6938	2.2	TM	
43	TM	Styrene	0.1479	0.1503	1.6	TM	
44	S	4-Bromofluorobenzene(S)	0.5070	0.4935	2.7	S	
45	TM	1,3-Dichloropropane	0.3563	0.3647	2.4	TM	
46	TM	Dibromochloromethane	0.3013	0.2963	1.7	TM	
47	TM**	Chlorobenzene	1.079	1.046	3.1	TM**	
48	TM*	Ethylbenzene	2.115	2.004	5.2	TM*	
49	TM**	Bromoform	0.1593	0.1588	0.35	TM**	
50	I	1,4-Dichlorobenzene-D(IS)	ISTD			I	
51	TM	MIBK (methyl isobutyl ketone)	0.3622	0.3494	3.5	TM	
52	TM	Isopropylbenzene	4.714	4.173	11	TM	
53	TM**	1,1,2,2-Tetrachloroethane	0.4844	0.4898	1.1	TM**	
54	TM	1,2,3-Trichloropropane	0.1017	0.1067	4.9	TM	
55	TM	Bromobenzene	0.8839	0.8355	5.5	TM	
56	TM	n-Propylbenzene	5.925	5.120	14	TM	
57	TM	2-Chlorotoluene	3.683	3.436	6.7	TM	
58	TM	1,3,5-Trimethylbenzene	3.437	3.186	7.3	TM	
59	TM	4-Chlorotoluene	2.997	2.670	11	TM	
60	TM	Tert-Butylbenzene	3.890	3.456	11	TM	
61	TM	1,2,4-Trimethylbenzene	3.276	3.055	6.7	TM	
62	TM	Sec-Butylbenzene	5.470	4.824	12	TM	
63	TM	p-Isopropyltoluene	4.288	3.795	11	TM	
64	TM	1,3-DCB	1.863	1.686	9.5	TM	
65	TM	1,4-DCB	1.734	1.640	5.4	TM	
66	TM	n-Butylbenzene	4.098	3.513	14	TM	
67	TM	1,2-DCB	1.447	1.372	5.2	TM	
68	TM	1,2-Dibromo-3-chloropropane	0.0555	0.0503	9.4	TM	
69	TM	1,2,4-Trichlorobenzene	0.8511	0.7759	8.8	TM	
70	TM	Hexachlorobutadiene	0.8662	0.7299	16	TM	
71	TM	Naphthalene	0.8313	0.7757	6.7	TM	
72	TM	1,2,3-Trichlorobenzene	0.7120	0.6512	8.5	TM	
73							
74							
75							
76							
77							
78							
79							
80							

Average 7.0

EPA METHOD 8260B
Volatile Organic Compounds
Raw Data

APPL, INC.

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B	AAB #: 110617AT-156223
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
Concentration Units: ug/L	Method Blank ID: 110617AT-BLK
Initial Calibration ID: T110617	

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.5	U
1,1,1-TCA	< RL	0.8	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.4	U
1,1,2-TCA	< RL	1.0	U
1,1-DCA	< RL	0.4	U
1,1-DCE	< RL	1.2	U
1,1-DICHLOROPROPENE	< RL	1.0	U
1,2,3-TRICHLOROBENZENE	< RL	0.3	U
1,2,3-TRICHLOROPROPANE	< RL	3.2	U
1,2,4-TRICHLOROBENZENE	< RL	0.4	U
1,2,4-TRIMETHYLBENZENE	< RL	1.3	U
1,2-DCA	< RL	0.6	U
1,2-DCB	< RL	0.3	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	2.6	U
1,2-DICHLOROPROPANE	< RL	0.4	U
1,2-EDB	< RL	0.6	U
1,3,5-TRIMETHYLBENZENE	< RL	0.5	U
1,3-DCB	< RL	1.2	U
1,3-DICHLOROPROPANE	< RL	0.4	U
1,4-DCB	< RL	0.3	U
1-CHLOROHEXANE	< RL	0.5	U
2,2-DICHLOROPROPANE	< RL	3.5	U
2-CHLOROTOLUENE	< RL	0.4	U
4-CHLOROTOLUENE	< RL	0.6	U
BENZENE	< RL	0.4	U
BROMOBENZENE	< RL	0.3	U
BROMOCHLOROMETHANE	< RL	0.4	U
BROMODICHLOROMETHANE	< RL	0.8	U
BROMOFORM	< RL	1.2	U
BROMOMETHANE	< RL	1.1	U
CARBON TETRACHLORIDE	< RL	2.1	U
CHLOROBENZENE	< RL	0.4	U
CHLOROETHANE	< RL	1.0	U
CHLOROFORM	< RL	0.3	U
CHLOROMETHANE	< RL	1.3	U
CIS-1,2-DCE	< RL	1.2	U
CIS-1,3-DICHLOROPROPENE	< RL	1.0	U
DIBROMOCHLOROMETHANE	< RL	0.5	U
DIBROMOMETHANE	< RL	2.4	U
DICHLORODIFLUOROMETHANE	< RL	1.0	U
ETHYLBENZENE	< RL	0.6	U

Comments: ARF: 64923, Sample: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: ug/L
Initial Calibration ID: T110617

AAB #: 110617AT-156223
Contract #: 2010*1286022*000
Method Blank ID: 110617AT-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	1.1	U
ISOPROPYLBENZENE	< RL	0.5	U
M&P-XYLENE	< RL	0.5	U
METHYLENE CHLORIDE	< RL	1.0	U
N-BUTYLBENZENE	< RL	1.1	U
N-PROPYLBENZENE	< RL	0.4	U
NAPHTHALENE	< RL	0.4	U
O-XYLENE	< RL	1.1	U
P-ISOPROPYLTOLUENE	< RL	1.2	U
SEC-BUTYLBENZENE	< RL	1.3	U
STYRENE	< RL	0.4	U
TCE	< RL	1.0	U
TERT-BUTYLBENZENE	< RL	1.4	U
TETRACHLOROETHENE	< RL	1.4	U
TOLUENE	< RL	1.1	U
TRANS-1,2-DCE	< RL	0.6	U
TRANS-1,3-DICHLOROPROPENE	< RL	1.0	U
TRICHLOROFLUOROMETHANE	< RL	0.8	U
VINYL CHLORIDE	< RL	1.1	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	105	69-139	
SURROGATE: 4-BROMOFLUOROBE	96.5	75-125	
SURROGATE: DIBROMOFLUOROME	103	75-125	
SURROGATE: TOLUENE-D8 (S)	99.6	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, Sample: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B	AAB #: 110619AT-156278
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
Concentration Units: ug/L	Method Blank ID: 110619AT-BLK
Initial Calibration ID: T110617	

Analyte	Method Blank	RL	Q
CIS-1,2-DCE	< RL	1.2	U
TCE	< RL	1.0	U
TETRACHLOROETHENE	< RL	1.4	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	110	69-139	
SURROGATE: 4-BROMOFLUOROBE	95.6	75-125	
SURROGATE: DIBROMOFLUOROME	104	75-125	
SURROGATE: TOLUENE-D8 (S)	99.1	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, Sample: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B	AAB #: 110620AS-156276
Lab Name: APPL, Inc	Contract #: 2010*1286022*000
Concentration Units: mg/kg	Method Blank ID: 110620AS-BLK
Initial Calibration ID: S110620	

Analyte	Method Blank	RL	Q
1,1,1,2-TETRACHLOROETHANE	< RL	0.003	U
1,1,1-TCA	< RL	0.004	U
1,1,2,2-TETRACHLOROETHANE	< RL	0.002	U
1,1,2-TCA	< RL	0.005	U
1,1-DCA	< RL	0.002	U
1,1-DCE	< RL	0.006	U
1,1-DICHLOROPROPENE	< RL	0.005	U
1,2,3-TRICHLOROBENZENE	< RL	0.004	U
1,2,3-TRICHLOROPROPANE	< RL	0.020	U
1,2,4-TRICHLOROBENZENE	< RL	0.004	U
1,2,4-TRIMETHYLBENZENE	< RL	0.007	U
1,2-DCA	< RL	0.003	U
1,2-DCB	< RL	0.002	U
1,2-DIBROMO-3-CHLOROPROPANE	< RL	0.010	U
1,2-DICHLOROPROPANE	< RL	0.002	U
1,2-EDB	< RL	0.003	U
1,3,5-TRIMETHYLBENZENE	< RL	0.003	U
1,3-DCB	< RL	0.006	U
1,3-DICHLOROPROPANE	< RL	0.002	U
1,4-DCB	< RL	0.002	U
1-CHLOROHEXANE	< RL	0.003	U
2,2-DICHLOROPROPANE	< RL	0.020	U
2-CHLOROTOLUENE	< RL	0.002	U
4-CHLOROTOLUENE	< RL	0.003	U
BENZENE	< RL	0.002	U
BROMOBENZENE	< RL	0.002	U
BROMOCHLOROMETHANE	< RL	0.002	U
BROMODICHLOROMETHANE	< RL	0.004	U
BROMOFORM	< RL	0.006	U
BROMOMETHANE	< RL	0.005	U
CARBON TETRACHLORIDE	< RL	0.010	U
CHLOROBENZENE	< RL	0.002	U
CHLOROETHANE	< RL	0.005	U
CHLOROFORM	< RL	0.002	U
CHLOROMETHANE	< RL	0.007	U
CIS-1,2-DCE	< RL	0.006	U
CIS-1,3-DICHLOROPROPENE	< RL	0.005	U
DIBROMOCHLOROMETHANE	< RL	0.003	U
DIBROMOMETHANE	< RL	0.010	U
DICHLORODIFLUOROMETHANE	< RL	0.005	U
ETHYLBENZENE	< RL	0.003	U

Comments: ARF: 64923, Sample: AY39994

AFCEE FORM O-6

AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANK

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
Concentration Units: mg/kg
Initial Calibration ID: S110620

AAB #: 110620AS-156276
Contract #: 2010*1286022*000
Method Blank ID: 110620AS-BLK

Analyte	Method Blank	RL	Q
HEXACHLOROBUTADIENE	< RL	0.005	U
ISOPROPYLBENZENE	< RL	0.008	U
M&P-XYLENE	< RL	0.007	U
METHYLENE CHLORIDE	< RL	0.005	U
N-BUTYLBENZENE	< RL	0.005	U
N-PROPYLBENZENE	< RL	0.002	U
NAPHTHALENE	< RL	0.020	U
O-XYLENE	< RL	0.005	U
P-ISOPROPYLTOLUENE	< RL	0.006	U
SEC-BUTYLBENZENE	< RL	0.007	U
STYRENE	< RL	0.002	U
TCE	< RL	0.010	U
TERT-BUTYLBENZENE	< RL	0.007	U
TETRACHLOROETHENE	< RL	0.007	U
TOLUENE	< RL	0.005	U
TRANS-1,2-DCE	< RL	0.003	U
TRANS-1,3-DICHLOROPROPENE	< RL	0.005	U
TRICHLOROFLUOROMETHANE	< RL	0.004	U
VINYL CHLORIDE	< RL	0.009	U

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHAN	97.9	52-149	
SURROGATE: 4-BROMOFLUOROBE	92.9	65-135	
SURROGATE: DIBROMOFLUOROME	97.3	65-135	
SURROGATE: TOLUENE-D8 (S)	101	65-135	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, Sample: AY39994

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110617AT LCS

Concentration Units: ug/L

AAB #: 110617AT-156223

Contract #: 2010*1286022*000

Initial Calibration ID: T110617

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	10.00	10.27	103	72-125	
1,1,1-TCA	10.00	10.21	102	75-125	
1,1,2,2-TETRACHLOROETHANE	10.00	9.40	94.0	74-125	
1,1,2-TCA	10.00	9.42	94.2	75-127	
1,1-DCA	10.00	10.74	107	75-125	
1,1-DCE	10.00	9.54	95.4	75-125	
1,1-DICHLOROPROPENE	10.00	9.56	95.6	75-125	
1,2,3-TRICHLOROBENZENE	10.00	9.67	96.7	75-137	
1,2,3-TRICHLOROPROPANE	10.00	9.87	98.7	75-125	
1,2,4-TRICHLOROBENZENE	10.00	10.25	103	75-135	
1,2,4-TRIMETHYLBENZENE	10.00	10.02	100	75-125	
1,2-DCA	10.00	9.36	93.6	68-127	
1,2-DCB	10.00	10.72	107	75-125	
1,2-DIBROMO-3-CHLOROPROPANE	10.00	9.61	96.1	59-125	
1,2-DICHLOROPROPANE	10.00	9.49	94.9	70-125	
1,2-EDB	10.00	10.35	104	75-125	
1,3,5-TRIMETHYLBENZENE	10.00	10.35	104	72-125	
1,3-DCB	10.00	10.62	106	75-125	
1,3-DICHLOROPROPANE	10.00	10.51	105	75-125	
1,4-DCB	10.00	9.46	94.6	75-125	
1-CHLOROHEXANE	10.00	9.83	98.3	75-125	
2,2-DICHLOROPROPANE	10.00	9.41	94.1	75-125	
2-CHLOROTOLUENE	10.00	10.15	102	73-125	
4-CHLOROTOLUENE	10.00	10.13	101	74-125	
BENZENE	10.00	10.57	106	75-125	
BROMOBENZENE	10.00	10.02	100	75-125	
BROMOCHLOROMETHANE	10.00	9.75	97.5	73-125	
BROMODICHLOROMETHANE	10.00	9.48	94.8	75-125	
BROMOFORM	10.00	9.80	98.0	75-125	
BROMOMETHANE	10.00	9.79	97.9	72-125	
CARBON TETRACHLORIDE	10.00	10.06	101	62-125	
CHLOROBENZENE	10.00	10.10	101	75-125	
CHLOROETHANE	10.00	10.58	106	65-125	
CHLOROFORM	10.00	9.67	96.7	74-125	
CHLOROMETHANE	10.00	9.29	92.9	75-125	
CIS-1,2-DCE	10.00	10.05	101	75-125	
CIS-1,3-DICHLOROPROPENE	10.00	9.11	91.1	74-125	
DIBROMOCHLOROMETHANE	10.00	9.80	98.0	73-125	
DIBROMOMETHANE	10.00	9.37	93.7	69-127	
DICHLORODIFLUOROMETHANE	10.00	9.83	98.3	72-125	

Comments: ARF: 64923, QC Sample ID: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B

Lab Name: APPL, Inc

LCS ID: 110617AT LCS

Concentration Units: ug/L

AAB #: 110617AT-156223

Contract #: 2010*1286022*000

Initial Calibration ID: T110617

Analyte	Expected	Found	% R	Control Limits	Q
ETHYLBENZENE	10.00	11.42	114	75-125	
HEXACHLOROBUTADIENE	10.00	10.26	103	75-125	
ISOPROPYLBENZENE	10.00	9.78	97.8	75-125	
M&P-XYLENE	20.00	21.15	106	75-125	
METHYLENE CHLORIDE	10.00	9.24	92.4	75-125	
N-BUTYLBENZENE	10.00	9.79	97.9	75-125	
N-PROPYLBENZENE	10.00	10.04	100	75-125	
NAPHTHALENE	10.00	8.26	82.6	75-125	
O-XYLENE	10.00	9.82	98.2	75-125	
P-ISOPROPYLTOLUENE	10.00	9.92	99.2	75-125	
SEC-BUTYLBENZENE	10.00	10.12	101	75-125	
STYRENE	10.00	10.04	100	75-125	
TCE	10.00	10.06	101	71-125	
TERT-BUTYLBENZENE	10.00	10.96	110	75-125	
TETRACHLOROETHENE	10.00	10.90	109	71-125	
TOLUENE	10.00	10.88	109	74-125	
TRANS-1,2-DCE	10.00	9.86	98.6	75-125	
TRANS-1,3-DICHLOROPROPENE	10.00	8.82	88.2	66-125	
TRICHLOROFLUOROMETHANE	10.00	9.00	90.0	67-125	
VINYL CHLORIDE	10.00	10.21	102	46-134	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	91.1	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	111	75-125	
SURROGATE: DIBROMOFLUOROMETH	94.6	75-125	
SURROGATE: TOLUENE-D8 (S)	103	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, QC Sample ID: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110619AT LCS
Concentration Units: ug/L

AAB #: 110619AT-156278
Contract #: 2010*1286022*000
Initial Calibration ID: T110617

Analyte	Expected	Found	% R	Control Limits	Q
CIS-1,2-DCE	10.00	10.66	107	75-125	
TCE	10.00	10.15	102	71-125	
TETRACHLOROETHENE	10.00	11.39	114	71-125	

Surrogate	Recovery	Control Limits	Qualifier
SURROGATE: 1,2-DICHLOROETHANE-	100	69-139	
SURROGATE: 4-BROMOFLUOROBENZ	116	75-125	
SURROGATE: DIBROMOFLUOROMETH	101	75-125	
SURROGATE: TOLUENE-D8 (S)	105	75-125	

Internal Std	Qualifier
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

Comments: ARF: 64923, QC Sample ID: AY39993

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110620AS LCS
Concentration Units: mg/kg

AAB #: 110620AS-156276
Contract #: 2010*1286022*000
Initial Calibration ID: S110620

Analyte	Expected	Found	% R	Control Limits	Q
1,1,1,2-TETRACHLOROETHANE	0.0500	0.0487	97.4	62-125	
1,1,1-TCA	0.0500	0.0470	94.0	65-135	
1,1,2,2-TETRACHLOROETHANE	0.0500	0.0494	98.8	64-135	
1,1,2-TCA	0.0500	0.0539	108	65-135	
1,1-DCA	0.0500	0.0506	101	62-135	
1,1-DCE	0.0500	0.0457	91.4	65-135	
1,1-DICHLOROPROPENE	0.0500	0.0460	92.0	65-135	
1,2,3-TRICHLOROBENZENE	0.0500	0.0445	89.0	65-147	
1,2,3-TRICHLOROPROPANE	0.050	0.049	98.0	65-135	
1,2,4-TRICHLOROBENZENE	0.0500	0.0445	89.0	65-145	
1,2,4-TRIMETHYLBENZENE	0.0500	0.0452	90.4	65-135	
1,2-DCA	0.0500	0.0514	103	58-137	
1,2-DCB	0.0500	0.0454	90.8	65-135	
1,2-DIBROMO-3-CHLOROPROPANE	0.050	0.048	96.0	49-135	
1,2-DICHLOROPROPANE	0.0500	0.0527	105	60-135	
1,2-EDB	0.0500	0.0505	101	65-135	
1,3,5-TRIMETHYLBENZENE	0.0500	0.0444	88.8	62-135	
1,3-DCB	0.0500	0.0433	86.6	65-135	
1,3-DICHLOROPROPANE	0.0500	0.0507	101	65-135	
1,4-DCB	0.0500	0.0455	91.0	65-135	
1-CHLOROHEXANE	0.0500	0.0415	83.0	65-135	
2,2-DICHLOROPROPANE	0.050	0.048	96.0	65-135	
2-CHLOROTOLUENE	0.0500	0.0454	90.8	63-135	
4-CHLOROTOLUENE	0.0500	0.0441	88.2	64-135	
BENZENE	0.0500	0.0484	96.8	65-135	
BROMOBENZENE	0.0500	0.0470	94.0	65-135	
BROMOCHLOROMETHANE	0.0500	0.0544	109	63-135	
BROMODICHLOROMETHANE	0.0500	0.0536	107	65-135	
BROMOFORM	0.0500	0.0477	95.4	65-135	
BROMOMETHANE	0.0500	0.0472	94.4	62-135	
CARBON TETRACHLORIDE	0.050	0.047	94.0	52-135	
CHLOROBENZENE	0.0500	0.0466	93.2	65-135	
CHLOROETHANE	0.0500	0.0470	94.0	55-135	
CHLOROFORM	0.0500	0.0498	99.6	64-135	
CHLOROMETHANE	0.0500	0.0496	99.2	65-135	
CIS-1,2-DCE	0.0500	0.0503	101	65-135	
CIS-1,3-DICHLOROPROPENE	0.0500	0.0534	107	64-135	
DIBROMOCHLOROMETHANE	0.0500	0.0501	100	63-135	
DIBROMOMETHANE	0.050	0.056	112	59-137	
DICHLORODIFLUOROMETHANE	0.0500	0.0426	85.2	65-135	

Comments: ARF: 64923, QC Sample ID: AY39994

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: EPA 8260B
Lab Name: APPL, Inc
LCS ID: 110620AS LCS
Concentration Units: mg/kg

AAB #: 110620AS-156276
Contract #: 2010*1286022*000
Initial Calibration ID: S110620

Analyte	**Expected**	**Found**	**% R**	**Control Limits**	**Q**
ETHYLBENZENE	0.0500	0.0456	91.2	65-135	
HEXACHLOROBUTADIENE	0.0500	0.0421	84.2	65-135	
ISOPROPYLBENZENE	0.0500	0.0423	84.6	65-135	
M&P-XYLENE	0.1000	0.0926	92.6	65-135	
METHYLENE CHLORIDE	0.0500	0.0559	112	65-135	
N-BUTYLBENZENE	0.0500	0.0409	81.8	65-135	
N-PROPYLBENZENE	0.0500	0.0425	85.0	65-135	
NAPHTHALENE	0.0500	0.0508	102	65-135	
O-XYLENE	0.0500	0.0473	94.6	65-135	
P-ISOPROPYLTOLUENE	0.0500	0.0429	85.8	65-135	
SEC-BUTYLBENZENE	0.0500	0.0423	84.6	65-135	
STYRENE	0.0500	0.0502	100	65-135	
TCE	0.0500	0.0476	95.2	61-135	
TERT-BUTYLBENZENE	0.0500	0.0434	86.8	65-135	
TETRACHLOROETHENE	0.0500	0.0422	84.4	61-135	
TOLUENE	0.0500	0.0501	100	64-135	
TRANS-1,2-DCE	0.0500	0.0478	95.6	65-135	
TRANS-1,3-DICHLOROPROPENE	0.0500	0.0535	107	56-135	
TRICHLOROFLUOROMETHANE	0.0500	0.0477	95.4	57-135	
VINYL CHLORIDE	0.0500	0.0557	111	36-144	

Surrogate	**Recovery**	**Control Limits**	**Qualifier**
SURROGATE: 1,2-DICHLOROETHANE-	100	52-149	
SURROGATE: 4-BROMOFLUOROBENZ	100	65-135	
SURROGATE: DIBROMOFLUOROMETH	100	65-135	
SURROGATE: TOLUENE-D8 (S)	103	65-135	

Internal Std	**Qualifier**
1,4-DICHLOROBENZENE-D4 (IS)	
CHLOROBENZENE-D5 (IS)	
FLUOROBENZENE (IS)	

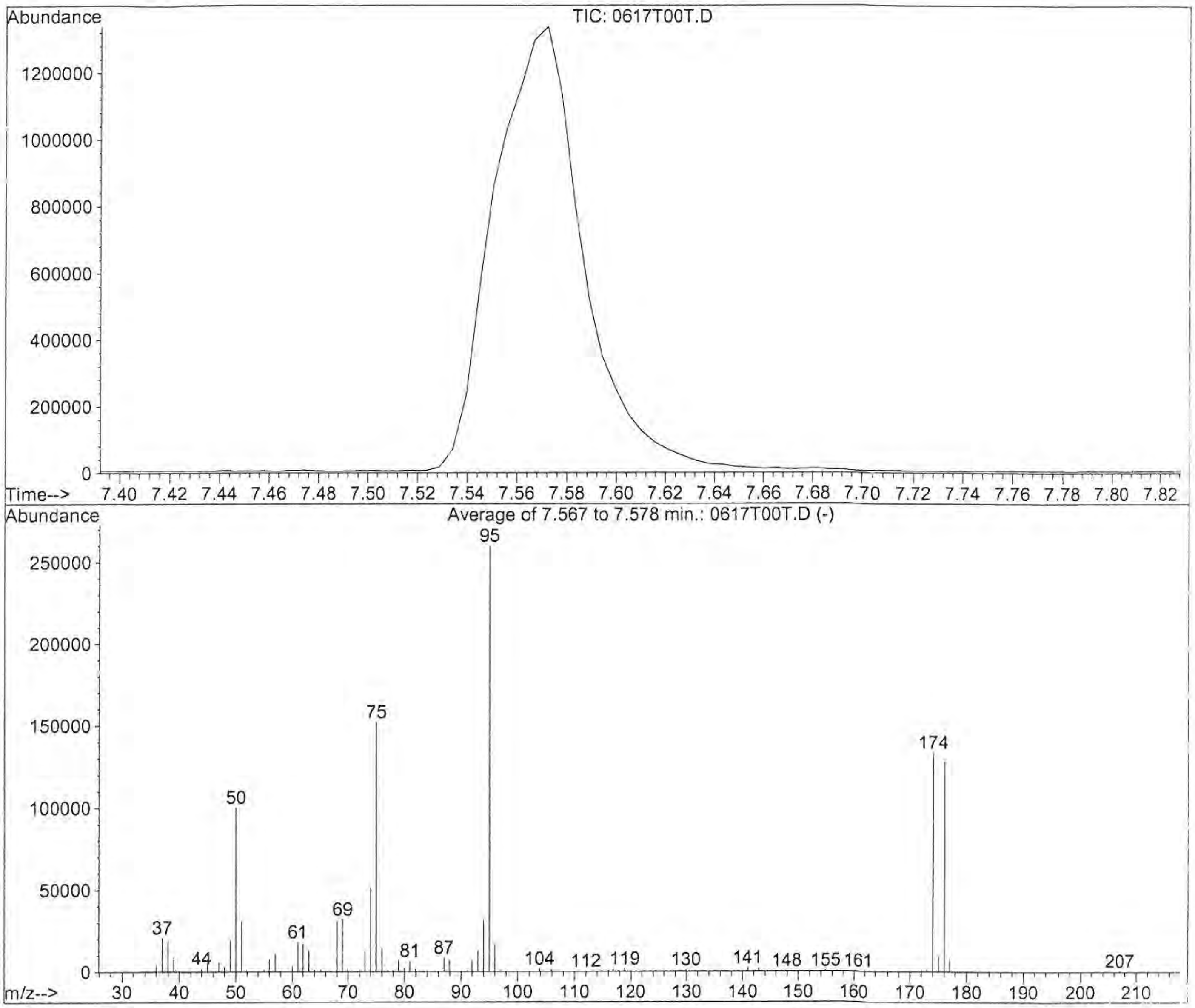
Comments: ARF: 64923, QC Sample ID: AY39994

BFB

Data File : M:\THOR\DATA\T110617\0617T00T.D
Acq On : 17 Jun 11 12:19
Sample : 20ug/ml BFB Std 05-25-11A
Misc : 2ul

Vial: 1
Operator: RP
Inst : Thor
Multiplr: 1.00

Method : M:\THOR\DATA\T110617\T826AW.M (RTE Integrator)
Title : METHOD 8260B



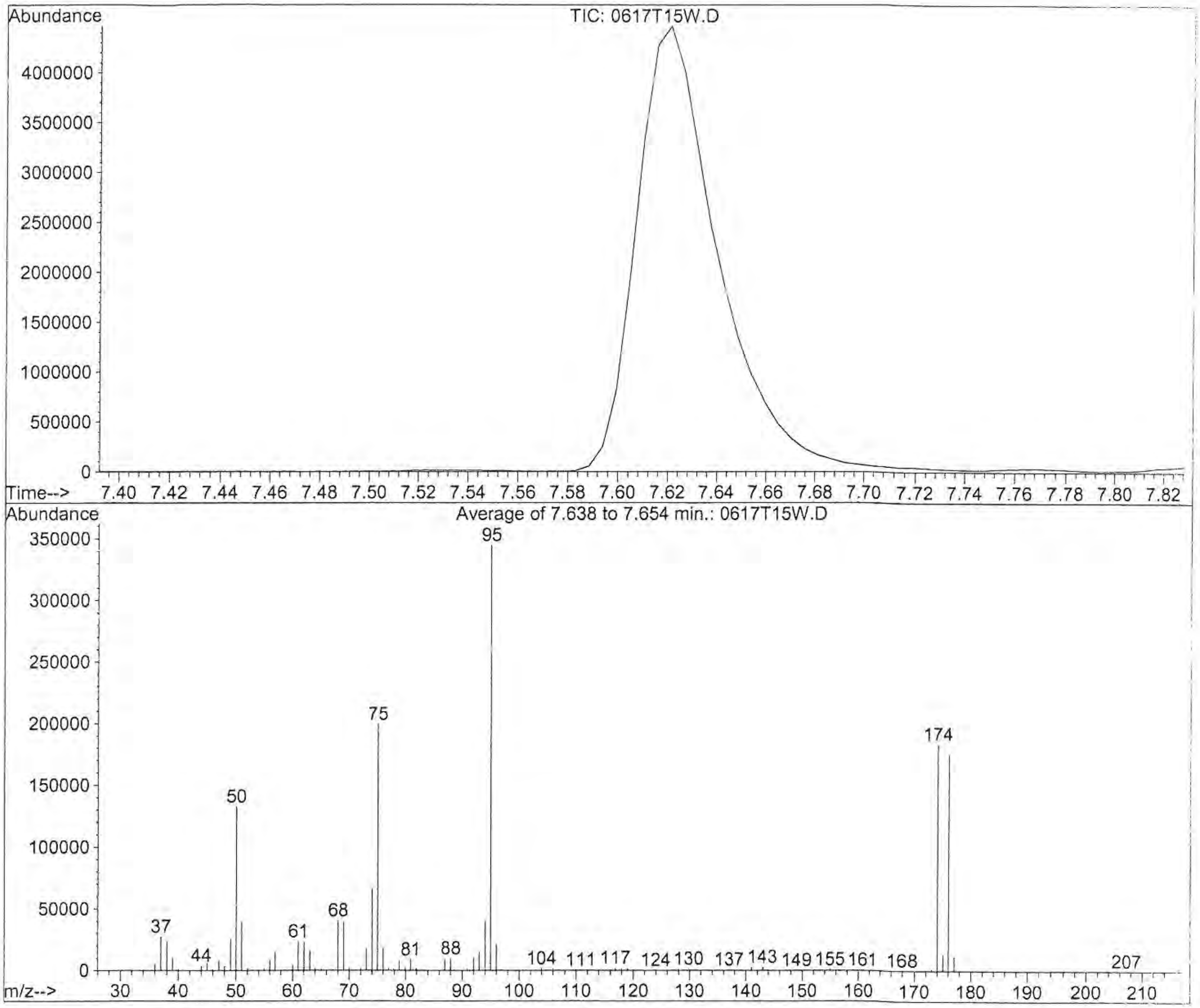
Spectrum Information: Average of 7.567 to 7.578 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	38.5	100029	PASS
75	95	30	60	58.5	151979	PASS
95	95	100	100	100.0	259669	PASS
96	95	5	9	6.1	15793	PASS
173	174	0.00	2	1.0	1379	PASS
174	95	50	100	51.4	133456	PASS
175	174	5	9	7.0	9362	PASS
176	174	95	101	95.7	127781	PASS
177	176	5	9	6.2	7965	PASS

BFB

```
Data File : M:\THOR\DATA\T110617\0617T15W.D                Vial: 15
Acq On    : 17 Jun 11  18:40                           Operator: RP
Sample    : 20ug/ml BFB Std 05-25-11A                  Inst     : Thor
Misc      : 2ul                                        Multiplr: 1.00

Method    : M:\THOR\DATA\T110617\T826AW.M (RTE Integrator)
Title     : METHOD 8260B
```



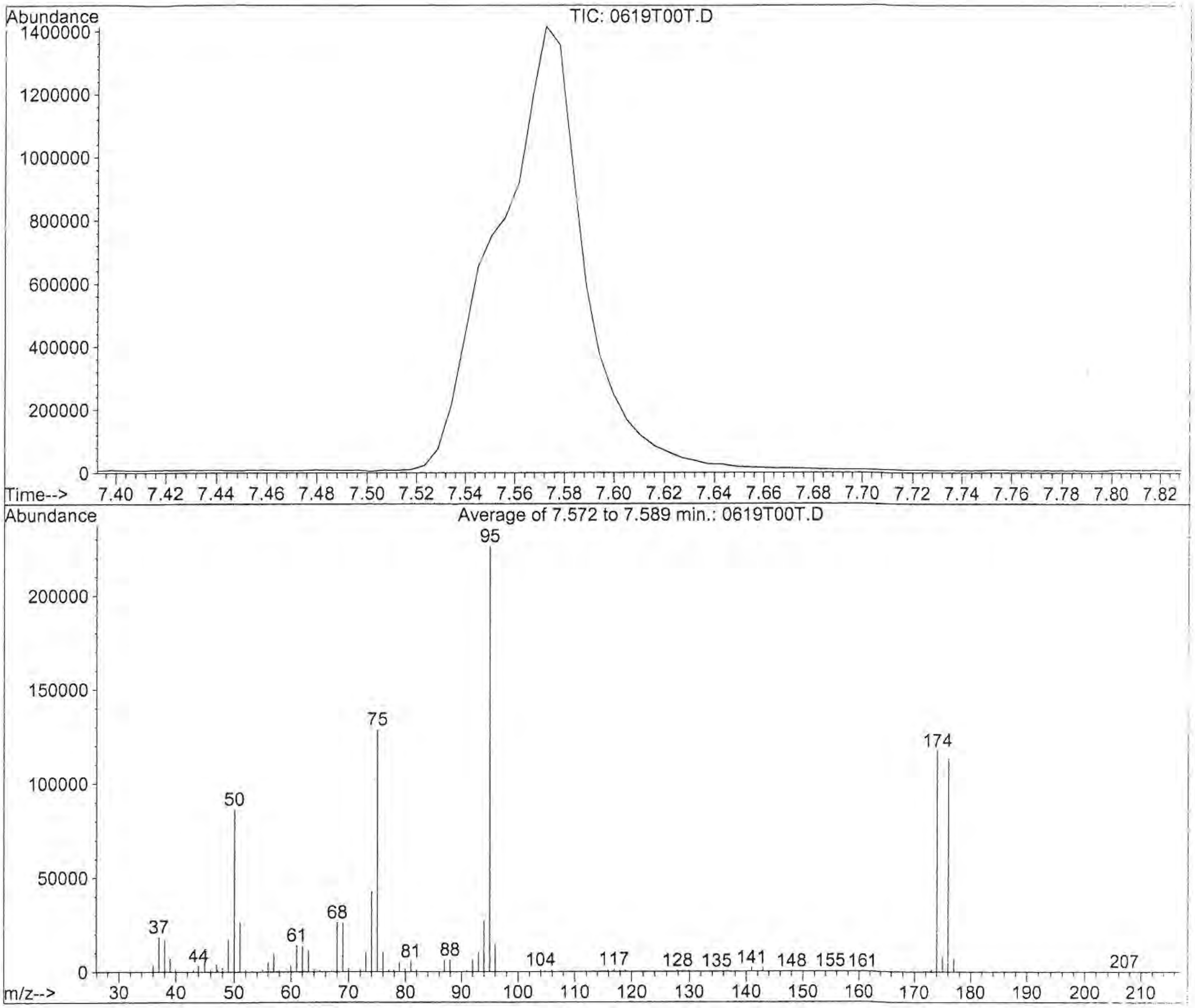
```
Spectrum Information: Average of 7.638 to 7.654 min.

| Target |  Rel. to  | Lower  | Upper  |  Rel.  |    Raw    |   Result  |
|  Mass  |   Mass    | Limit% | Limit% |  Abn%  |    Abn    | Pass/Fail |
-------------------------------------------------------------------------
|   50   |    95     |    15  |    40  |  38.5  |   132640  |   PASS    |
|   75   |    95     |    30  |    60  |  57.9  |   199406  |   PASS    |
|   95   |    95     |   100  |   100  | 100.0  |   344560  |   PASS    |
|   96   |    95     |     5  |     9  |   6.2  |    21532  |   PASS    |
|  173   |   174     |  0.00  |     2  |   0.8  |     1502  |   PASS    |
|  174   |    95     |    50  |   100  |  53.3  |   183610  |   PASS    |
|  175   |   174     |     5  |     9  |   7.2  |    13218  |   PASS    |
|  176   |   174     |    95  |   101  |  95.8  |   175916  |   PASS    |
|  177   |   176     |     5  |     9  |   6.6  |    11622  |   PASS    |
-------------------------------------------------------------------------
```

BFB

```
Data File : M:\THOR\DATA\T110617\0619T00T.D                Vial: 1
Acq On    : 20 Jun 11  14:08                           Operator: RP
Sample    : 20ug/ml BFB Std 05-25-11A                  Inst    : Thor
Misc      : 2ul                                        Multiplr: 1.00

Method    : M:\THOR\DATA\T110617\T826AW.M (RTE Integrator)
Title     : METHOD 8260B
```



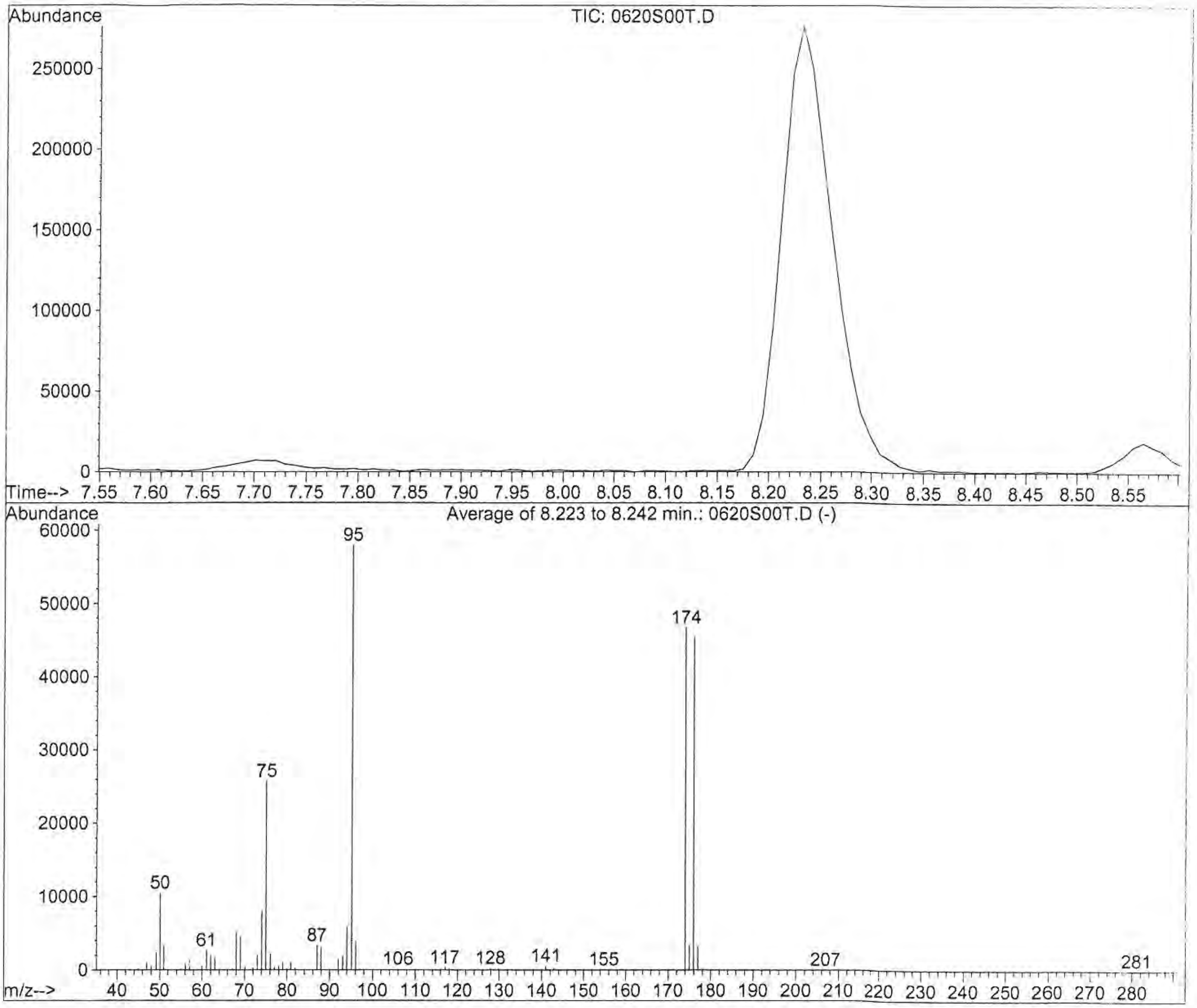
Spectrum Information: Average of 7.572 to 7.589 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	38.1	86244	PASS
75	95	30	60	56.9	128722	PASS
95	95	100	100	100.0	226124	PASS
96	95	5	9	6.5	14716	PASS
173	174	0.00	2	0.8	986	PASS
174	95	50	100	51.9	117392	PASS
175	174	5	9	6.9	8047	PASS
176	174	95	101	96.5	113336	PASS
177	176	5	9	6.3	7128	PASS

BFB

Data File : M:\SWEETPEA\DATA\S110620\0620S00T.D Vial: 1
Acq On : 20 Jun 11 10:48 Operator: DG
Sample : 20ug/L BFB Std 05-25-11A Inst : Sweetpea
Misc : 2uL Multiplr: 1.00

Method : M:\SWEETPEA\DATA\S110620\S826AFS.M (RTE Integrator)
Title : METHOD 8260B



Spectrum Information: Average of 8.223 to 8.242 min.

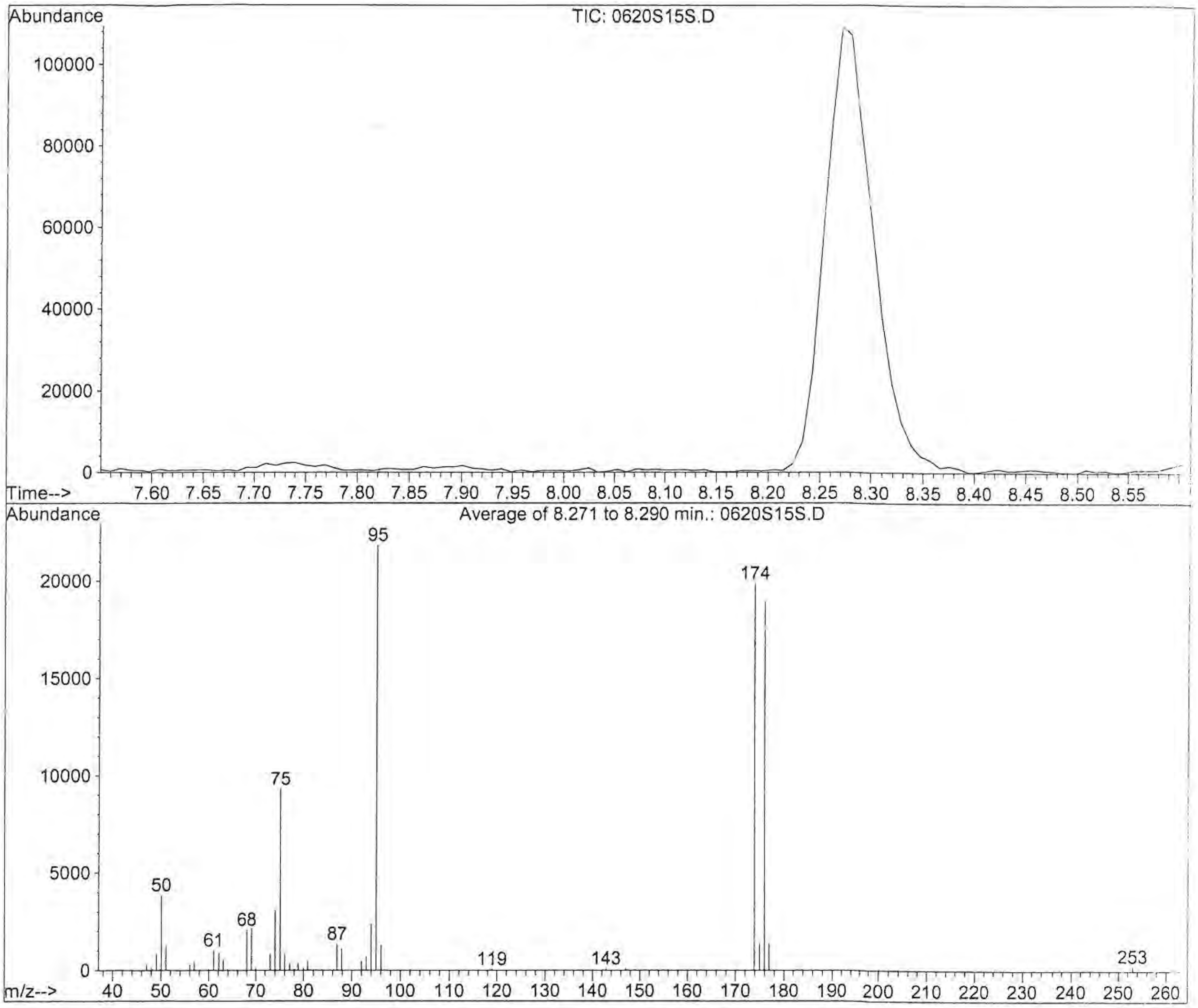
Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	18.1	10492	PASS
75	95	30	60	44.4	25733	PASS
95	95	100	100	100.0	57949	PASS
96	95	5	9	6.7	3904	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	100	80.6	46704	PASS
175	174	5	9	7.3	3425	PASS
176	174	95	101	97.1	45363	PASS
177	176	5	9	7.0	3157	PASS

BFB

Data File : M:\SWEETPEA\DATA\S110620\0620S15S.D
Acq On : 20 Jun 11 19:33
Sample : 20ug/L BFB Std 05-25-11A
Misc : 2uL

Vial: 15
Operator: DG
Inst : Sweetpea
Multiplr: 1.00

Method : M:\SWEETPEA\DATA\S110620\S826AFS.M (RTE Integrator)
Title : METHOD 8260B



Spectrum Information: Average of 8.271 to 8.290 min.

Target Mass	Rel. to Mass	Lower Limit%	Upper Limit%	Rel. Abn%	Raw Abn	Result Pass/Fail
50	95	15	40	17.6	3848	PASS
75	95	30	60	42.6	9304	PASS
95	95	100	100	100.0	21843	PASS
96	95	5	9	5.9	1282	PASS
173	174	0.00	2	0.0	0	PASS
174	95	50	100	91.0	19869	PASS
175	174	5	9	6.9	1371	PASS
176	174	95	101	95.2	18912	PASS
177	176	5	9	7.2	1358	PASS

Date:	Initial	Sample ID		Weight (g)	Volume (ml)	Method	Balance
6/17/11	ARS	AY39994	S01	5.002	5 ml of P&T H20	8260	OHAUS/PIONEER
	ARS	AY39994 DUP	S01	5.025	5 ml of P&T H20	8260	OHAUS/PIONEER

Injection Log

Directory: M:\THOR\DATA\T110617

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0617T00T.D	1	20ug/ml BFB Std 05-25-11A	2ul	06/17/2011 12:19
2	4	0617T04W.D	1	Vol Std 06-17-11@0.3ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 13:54
3	5	0617T05W.D	1	Vol Std 06-17-11@0.5ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 14:20
4	6	0617T06W.D	1	Vol Std 06-17-11@1.0ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 14:46
5	7	0617T07W.D	1	Vol Std 06-17-11@2.0ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 15:12
6	8	0617T08W.D	1	Vol Std 06-17-11@5.0ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 15:38
7	9	0617T09W.D	1	Vol Std 06-17-11@10ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 16:04
8	10	0617T10W.D	1	Vol Std 06-17-11@20ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 16:30
9	11	0617T11W.D	1	Vol Std 06-17-11@40ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 16:56
10	12	0617T12W.D	1	Vol Std 06-17-11@100ug/L	10ml w/5ul of IS: 03-28-1	06/17/2011 17:22
11	15	0617T15W.D	1	20ug/ml BFB Std 05-25-11A	2ul	06/17/2011 18:40
12	16	0617T16W.D	1	Vol Std 06-17-11@10ug/L	10ml w/5ul of IS&S: 03-2	06/17/2011 19:05
13	17	0617T17W.D	1	110617A LCS-1WT	10ml w/5ul of IS&S: 03-2	06/17/2011 19:31
14	38	0617T38W.D	1	110617A BLK-1WT	10ml w/5ul of IS&S: 03-2	06/18/2011 05:28
15	39	0617T39W.D	1	AY39993W01	10ml w/5ul of IS&S: 03-2	06/18/2011 05:54
16	1	0619T00T.D	1	20ug/ml BFB Std 05-25-11A	2ul	06/20/2011 14:08
17	1	0619T01W.D	1	Vol Std 06-19-11@10ug/L	10ml w/5ul of IS&S: 03-2	06/20/2011 14:50
18	2	0619T02W.D	1	110619A LCS-1WT	10ml w/5ul of IS&S: 03-2	06/20/2011 15:15
19	4	0619T04W.D	1	110619A BLK-1WT	10ml w/5ul of IS&S: 03-2	06/20/2011 16:59
20	16	0619T16W.D	5	AY39993W02 DF5	10ml w/5ul of IS&S: 03-2	06/20/2011 22:10

Injection Log

Directory: M:\SWEETPEA\DATA\S110620

Line	Vial	FileName	Multiplier	SampleName	Misc Info	Injected
1	1	0620S00T.D	1	20ug/L BFB Std 05-25-11A	2uL	06/20/2011 10:48
2	4	0620S04S.D	1	Vol Std 06-20-11@2.0ug/kg	Soil 10mL w/IS:06-08-11	06/20/2011 12:55
3	5	0620S05S.D	1	Vol Std 06-20-11@5.0ug/kg	Soil 10mL w/IS:06-08-11	06/20/2011 13:30
4	6	0620S06S.D	1	Vol Std 06-20-11@10ug/kg	Soil 10mL w/IS:06-08-11	06/20/2011 14:05
5	7	0620S07S.D	1	Vol Std 06-20-11@20ug/kg	Soil 10mL w/IS:06-08-11	06/20/2011 14:40
6	8	0620S08S.D	1	Vol Std 06-20-11@50ug/kg	Soil 10mL w/IS:06-08-11	06/20/2011 15:16
7	9	0620S09S.D	1	Vol Std 06-20-11@100ug/kg	Soil 10mL w/IS:06-08-11	06/20/2011 15:51
8	10	0620S10S.D	1	Vol Std 06-20-11@200ug/kg	Soil 10mL w/IS:06-08-11	06/20/2011 16:26
9	15	0620S15S.D	1	20ug/L BFB Std 05-25-11A	2uL	06/20/2011 19:33
10	16	0620S16S.D	1	Vol Std 06-20-11@50ug/kg	Soil 10mL w/IS&S:06-08	06/20/2011 20:08
11	17	0620S17S.D	1	110620A LCS-1SS	Soil 10mL w/IS&S:06-08	06/20/2011 20:43
12	21	0620S21S.D	1	110620A BLK-1SS	Soil 10mL w/IS&S:06-08	06/21/2011 00:14
13	29	0620S29S.D	0.996016	AY39994S01 5.020	Soil 10mL w/IS&S:06-08	06/21/2011 04:55

Wetlab Results

ARF: 64923

APPL Inc.
908 North Temperance Avenue
Clovis, CA 93611

Parsons
8000 Centre Park Drive Ste 200
Austin, TX 78754

Attn: Tammy Chang

Method	Analyte	Result	PQL	Units	Prep Date	Analysis Date
APPL ID: AY39994	-Client Sample ID: B3-EXW03-WC01		-Sample Collection Date: 06/15/11		Project: 747781.04000 CSSA	
CLP MOIST	MOISTURE	Not Detected	2.0	%	06/22/11	06/22/11

Printed: 06/22/11 1:25:39 PM

APPENDIX F
Equipment Information

EXW03 and EXW04
200 V, 3 Phase, 5 HP Motor
Grundfos Pump Model 40S50-15

CS-1
230 V, 3 Phase, 15 HP Motor
Franklin Pump Model 70SR15F6A-1563

Stainless Steel Submersible Pumps

70 to 475 gpm

PAGE: SP-120
DATE: Jan 14, 2010

FPS SR series

Designed for industrial and agricultural applications, the SR Series submersible pump utilizes high grade stainless steel materials for the most demanding applications.

- 6″ to 300 gpm
- 8″ to 475 gpm

Features:

- Stainless steel impellers and diffusers to resist corrosion.
- Heavy duty stainless steel shell assures permanent alignment of all components to increase longevity and enables higher pressures than strap designs.
- Teflon® floating wear ring, ceramic bearing journal and Nitrile rubber fluted bearing ensure durability against wear for long-lasting performance and reliability.
- Suited to operate in horizontal position.
- Built-in check valve to protect the pump against water hammer.
- Energy efficient hydraulic design for cost effective operation.
- Space-saving compact design.
- Easy to install and dismantle for service in the field if necessary.
- Maximum operating temperature - 180 °F

Model Number Explanation

Example: 150SR10F6A-0443

150 = Gallons per Minute
SR = Series
10 = Horsepower
F = Stainless
6 = 6″ Pump
A = Impeller Trim
04 = Number of Stages
4 = 4″ Motor
3 = 3″ Discharge

6" Stainless Steel Submersible Pumps

Ordering Information

GPM	HP	Stages	Motor Size	Model No.	Order No.	Dimensions (inches)	Weight (lbs)
70	5	5	4"	70SR5F6A-0543	96160070001	14.0	23.1
	5	5	6"	70SR5F6A-0563	96160070012	14.0	23.1
	7.5	8	4"	70SR7F6A-0843	96160070002	17.6	28.7
	7.5	8	6"	70SR7F6A-0863	96160070013	17.6	28.7
	10	11	6"	70SR10F6A-1163	96160070003	21.1	33.1
	15	13	6"	70SR15F6A-1363	96160070004	23.5	36.4
	15	15	6"	70SR15F6A-1563	96160070005	25.8	39.7
	15	17	6"	70SR15F6A-1763	96160070006	28.2	43.0
	20	19	6"	70SR20F6A-1963	96160070007	30.6	46.3
	20	22	6"	70SR20F6A-2263	96160070008	34.1	50.7
	25	24	6"	70SR25F6A-2463	96160070009	36.5	54.0
	25	26	6"	70SR25F6A-2663	96160070010	38.8	57.3
	25	28	6"	70SR25F6A-2863	96160070011	41.3	61.7
100	5	3	4"	100SR5F6A-0343	96160100001	13.3	19.8
	5	3	6"	100SR5F6A-0363	96160100013	13.3	19.8
	7.5	5	4"	100SR7F6A-0543	96160100002	16.3	24.3
	7.5	5	6"	100SR7F6A-0563	96160100014	16.3	24.3
	10	6	4"	100SR10F6A-0643	96160100003	17.7	26.5
	10	6	6"	100SR10F6A-0663	96160100015	17.7	26.5
	10	7	4"	100SR10F6A-0743	96160100004	19.2	27.6
	10	7	6"	100SR10F6A-0763	96160100016	19.2	27.6
	15	9	6"	100SR15F6A-0963	96160100005	22.1	30.9
	15	11	6"	100SR15F6A-1163	96160100006	25.1	35.3
	20	13	6"	100SR20F6A-1363	96160100007	28.0	38.6
	20	15	6"	100SR20F6A-1563	96160100008	31.0	41.9
	25	18	6"	100SR25F6A-1863	96160100009	35.4	47.4
	30	22	6"	100SR30F6A-2263	96160100010	41.3	55.1
	40	26	6"	100SR40F6A-2663	96160100011	47.2	61.7
	40	28	6"	100SR40F6A-2863	96160100012	50.1	66.1
150	7.5	3	4"	150SR7F6A-0343	96160150001	14.4	23.1
	7.5	3	6"	150SR7F6A-0363	96160150011	14.4	23.1
	10	4	4"	150SR10F6A-0443	96160150002	16.2	25.4
	10	4	6"	150SR10F6A-0463	96160150012	16.2	25.4
	15	5	6"	150SR15F6A-0563	96160150003	18.0	27.6
	15	7	6"	150SR15F6A-0763	96160150004	21.7	32.0
	20	9	6"	150SR20F6A-0963	96160150005	25.3	36.4
	25	11	6"	150SR25F6A-1163	96160150006	29.0	40.8
	30	14	6"	150SR30F6A-1463	96160150007	34.5	47.4
	40	15	6"	150SR40F6A-1563	96160150008	36.3	48.5
	40	19	6"	150SR40F6A-1963	96160150009	43.6	57.3
	50	23	6"	150SR50F6A-2363	96160150010	50.9	66.1

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6” Stainless Steel Submersible Pumps

Ordering Information

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GPM	HP	Stages	Motor Size	Model No.	Order No.	Dimensions (inches)	Weight (lbs)
240	7.5	2	4"	240SR7F6A-0243	96160240001	14.4	24.3
	7.5	2	6"	240SR7F6A-0263	96160240011	14.4	24.3
	10	3	4"	240SR10F6A-0343	96160240002	18.0	29.8
	10	3	6"	240SR10F6A-0363	96160240012	18.0	29.8
	15	4	6"	240SR15F6A-0463	96160240003	21.7	35.3
	20	5	6"	240SR20F6A-0563	96160240004	25.3	39.7
	20	6	6"	240SR20F6A-0663	96160240005	29.0	45.2
	25	7	6"	240SR25F6A-0763	96160240006	32.6	49.6
	30	9	6"	240SR30F6A-0963	96160240007	39.9	59.5
	40	10	6"	240SR40F6A-1063	96160240008	43.6	65.0
	40	12	6"	240SR40F6A-1263	96160240009	50.9	75.0
	50	15	6"	240SR50F6A-1563	96160240010	61.9	90.4
300	7.5	2	4"	300SR7F6A-0243	96160300001	14.4	25.4
	7.5	2	6"	300SR7F6A-0263	96160300013	14.4	25.4
	10	3	4"	300SR10F6A-0343	96160300002	18.0	29.8
	10	3	6"	300SR10F6A-0363	96160300014	18.0	29.8
	15	4	6"	300SR15F6A-0463	96160300003	21.7	35.3
	20	5	6"	300SR20F6A-0563	96160300004	25.3	39.7
	20	6	6"	300SR20F6A-0663	96160300005	29.0	45.2
	25	7	6"	300SR25F6A-0763	96160300006	32.6	50.7
	30	8	6"	300SR30F6A-0864	96160300007	36.3	55.1
	30	9	6"	300SR30F6A-0964	96160300008	39.9	59.5
	40	10	6"	300SR40F6A-1064	96160300009	43.6	66.1
	40	12	6"	300SR40F6A-1264	96160300010	50.9	75.0
	50	14	6"	300SR50F6A-1464	96160300011	58.2	86.0
	50	15	6"	300SR50F6A-1564	96160300012	61.9	90.4

8” Stainless Steel Submersible Pumps

Ordering Information

GPM	HP	Stages	Motor Size	Model No.	Order No.	Dimensions (inches)	Weight (lbs)
400	15	2	6”	400SR15F8A-0264	96180400001	25.3	69
	25	3	6”	400SR25F8A-0364	96180400002	30.3	81
	30	4	6”	400SR30F8A-0464	96180400003	35.2	92
	40	5	6”	400SR40F8A-0564	96180400004	40.2	103
	50	7	6”	400SR50F8A-0764	96180400006	50.1	124
	60	8	6”	400SR60F8A-0864	96180400007	55.0	135
	75	10	8”	400SR75F8A-1084	96180400009	65.1	157
	100	13	8”	400SR100F8A-1384	96180400012	80.0	192
475	30	3	6”	475SR30F8A-0366	96180475002	30.3	81
	40	4	6”	475SR40F8A-0466	96180475003	35.2	92
	50	6	6”	475SR50F8A-0666	96180475005	45.1	112
	60	7	6”	475SR60F8A-0766	96180475006	50.1	124
	75	8	8”	475SR75F8A-0886	96180475007	55.2	138
	100	10	8”	475SR100F8A-1086	96180475009	65.1	159
	125	13	8”	475SR125F8A-1386	96180475012	80.0	192

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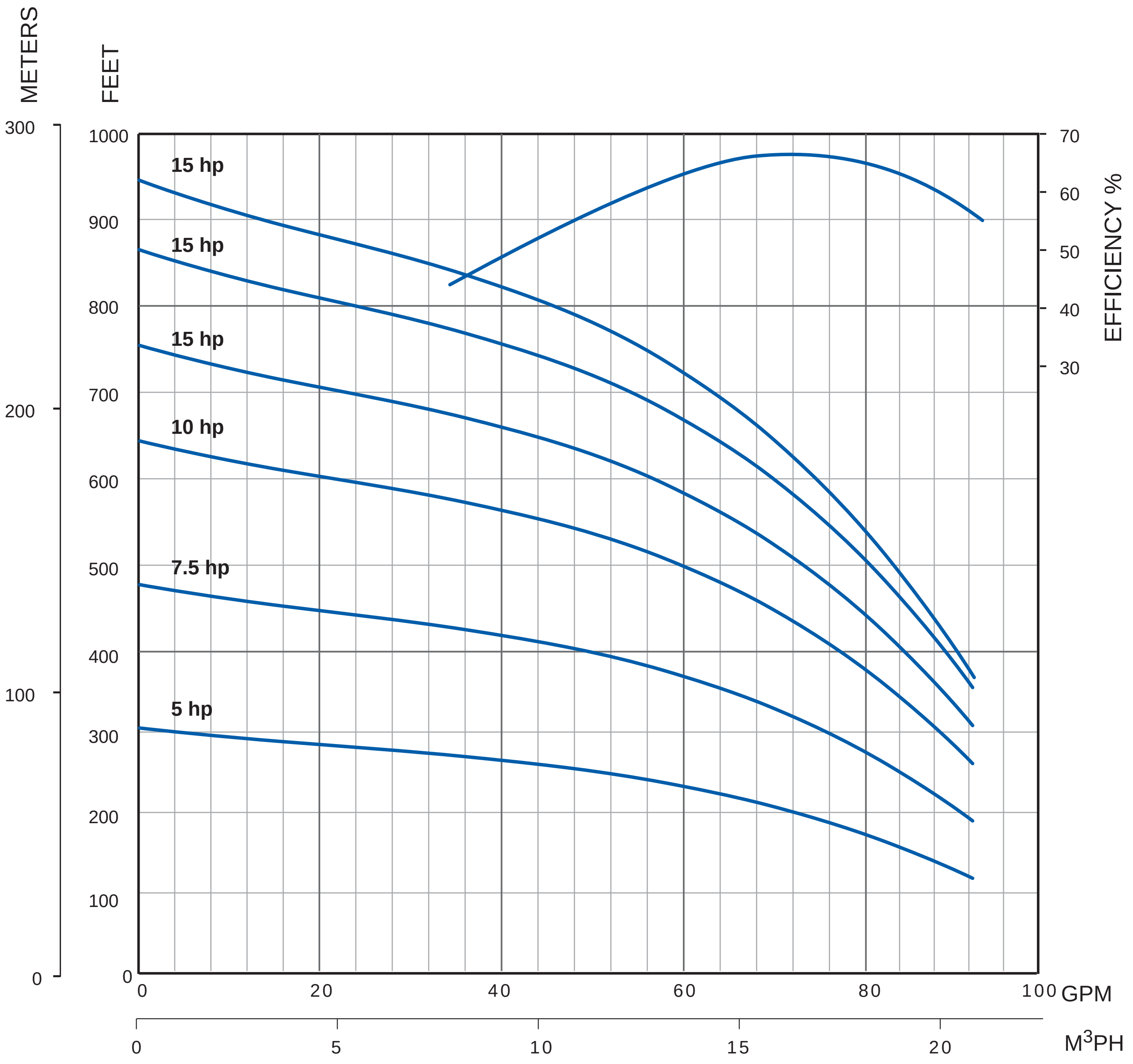
6” Stainless Steel Submersible Pumps

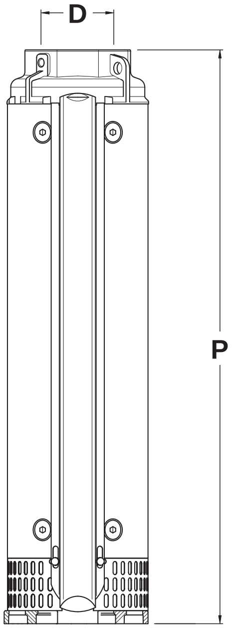
70 gpm Performance Curve

PAGE: SP-123
DATE: July 31, 2009



6" Stainless Steel Submersible Pumps

70 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
5	5	3"	4"	5.55"	14.0"	23.1
5	5	3"	6"	5.67"	14.0"	23.1
7.5	8	3"	4"	5.55"	17.6"	28.7
7.5	8	3"	6"	5.67"	17.6"	28.7
10	11	3"	6"	5.67"	21.1"	33.1
15	13	3"	6"	5.67"	23.5"	36.4
15	15	3"	6"	5.67"	25.8"	39.7
15	17	3"	6"	5.67"	28.2"	43.0

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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6” Stainless Steel Submersible Pumps

70 gpm Performance Curve

PAGE: SP-124
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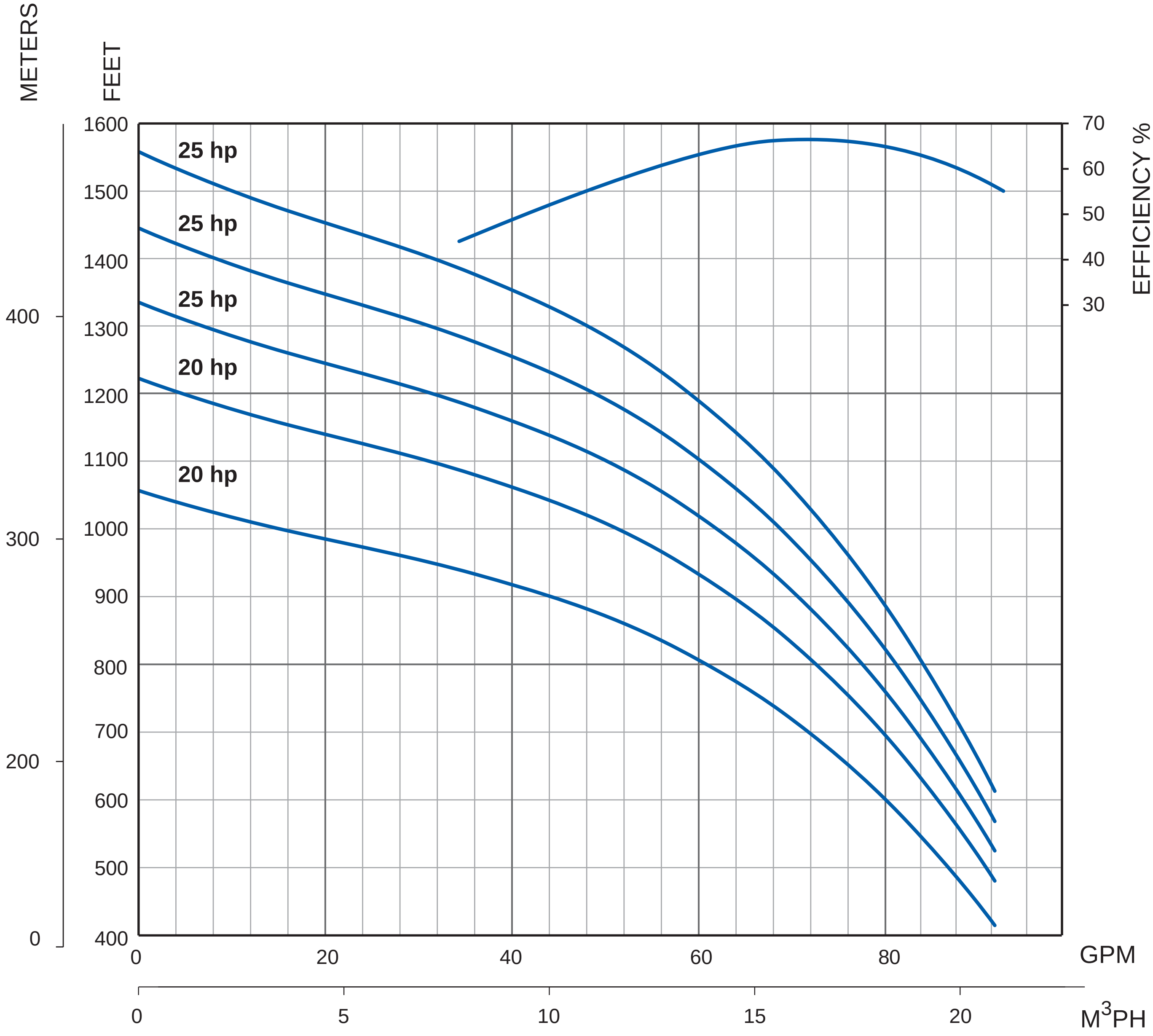
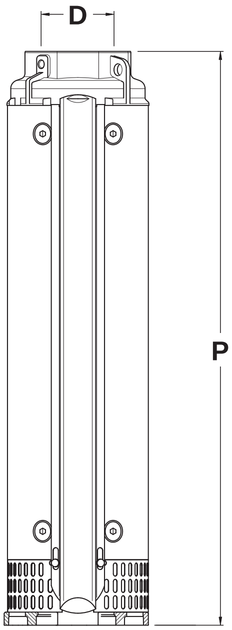


6" Stainless Steel Submersible Pumps

70 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
20	19	3"	6"	5.67"	30.6"	46.3
20	22	3"	6"	5.67"	34.1"	50.7
25	24	3"	6"	5.67"	36.5"	54.0
25	26	3"	6"	5.67"	38.8"	57.3
25	28	3"	6"	5.67"	41.3"	61.7

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

6" Stainless Steel Submersible Pumps

100 gpm Performance Curve

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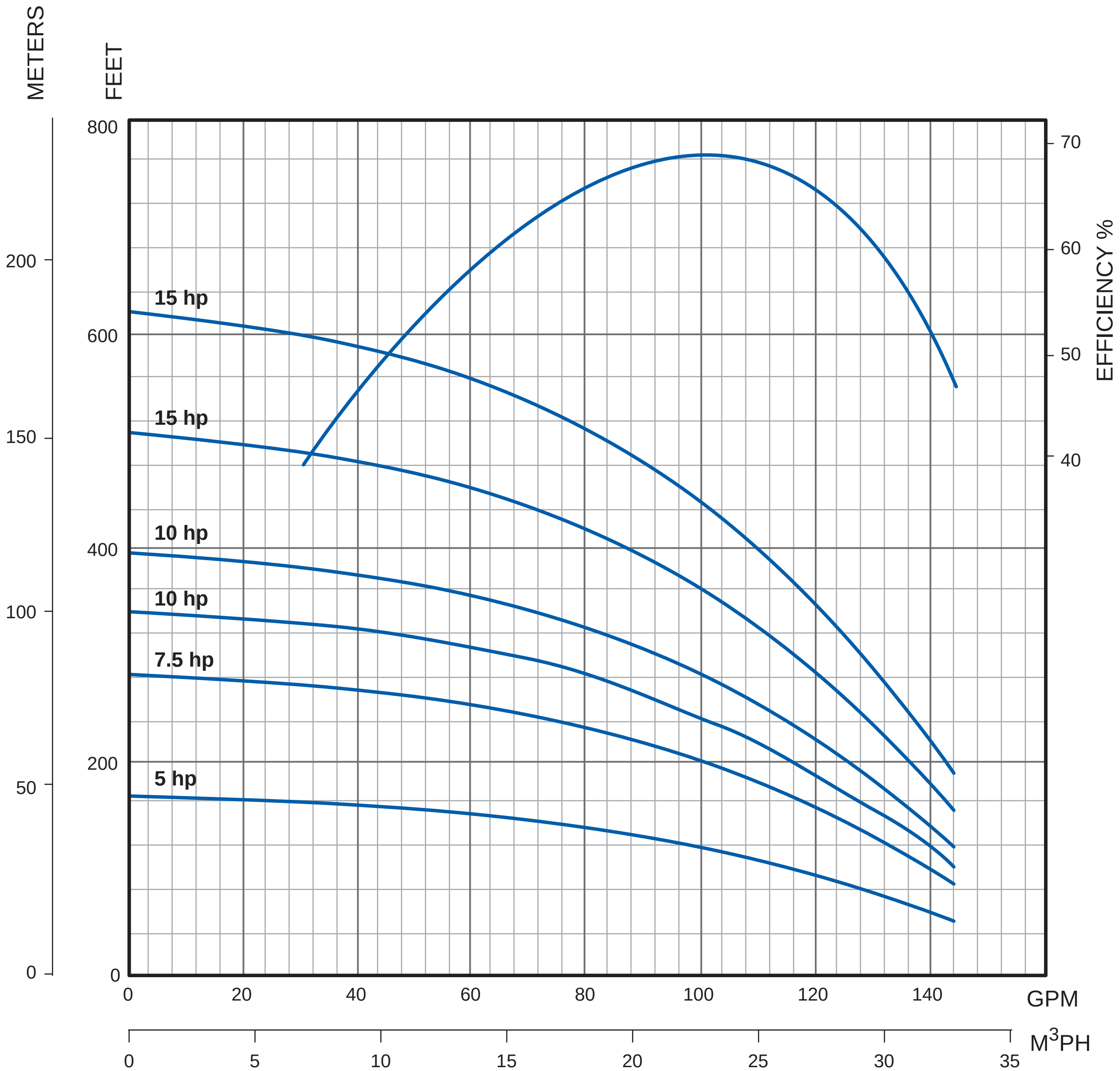
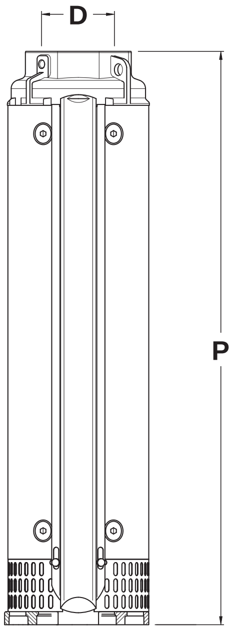


FPS SR series

6" Stainless Steel Submersible Pumps

100 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
5	3	3"	4"	5.55"	12.5"	20
5	3	3"	6"	5.67"	12.5"	20
7.5	5	3"	4"	5.55"	15.5"	24
7.5	5	3"	6"	5.67"	15.5"	24
10	6	3"	4"	5.55"	17.0"	27
10	6	3"	6"	5.67"	17.0"	27
10	7	3"	4"	5.55"	18.4"	28
10	7	3"	6"	5.67"	18.4"	28
15	9	3"	6"	5.67"	21.4"	31
15	11	3"	6"	5.67"	24.4"	35

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

6” Stainless Steel Submersible Pumps

100 gpm Performance Curve

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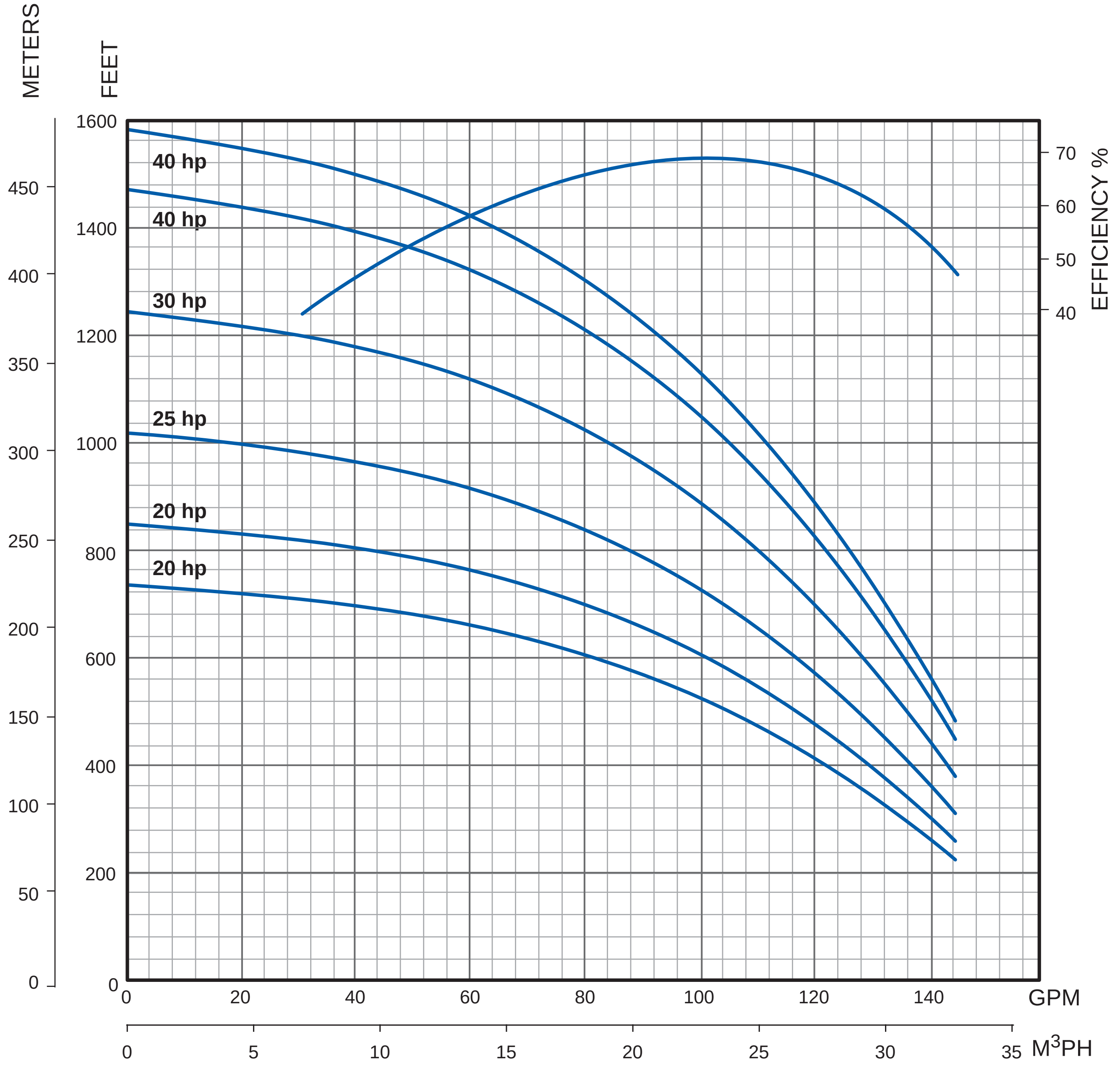
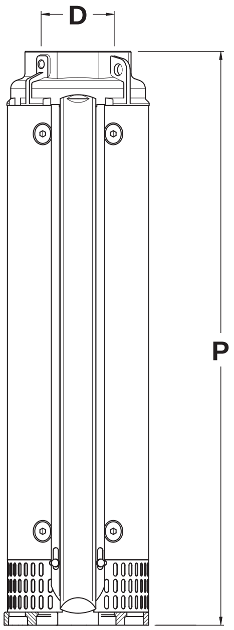


6” Stainless Steel Submersible Pumps

100 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
20	13	3”	6”	5.67”	27.3”	39
20	15	3”	6”	5.67”	30.3”	42
25	18	3”	6”	5.67”	35.2”	47
30	22	3”	6”	5.67”	40.6”	55
40	26	3”	6”	5.67”	46.5”	62
40	28	3”	6”	5.67”	49.4”	66

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

6" Stainless Steel Submersible Pumps

150 gpm Performance Curve

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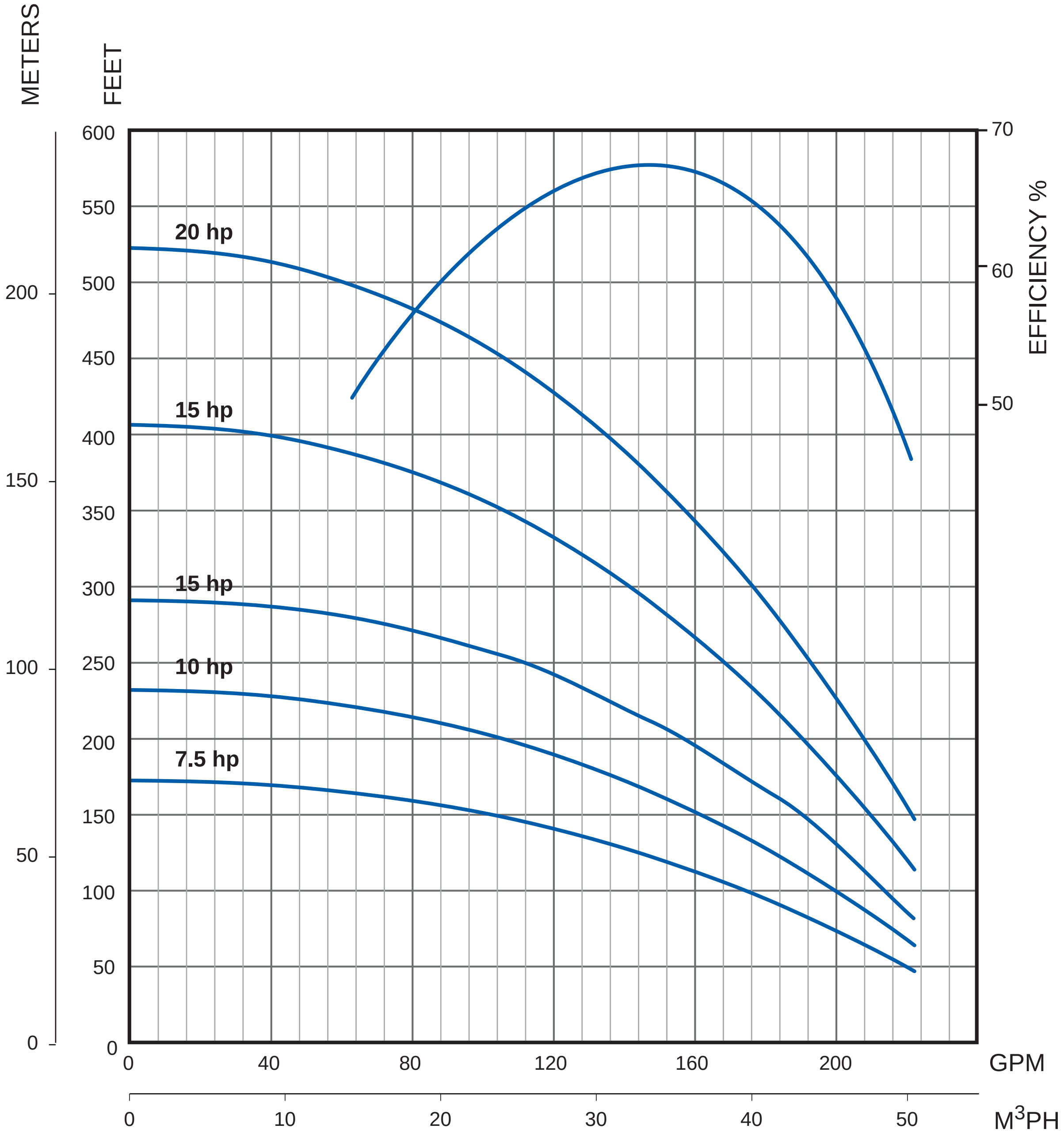
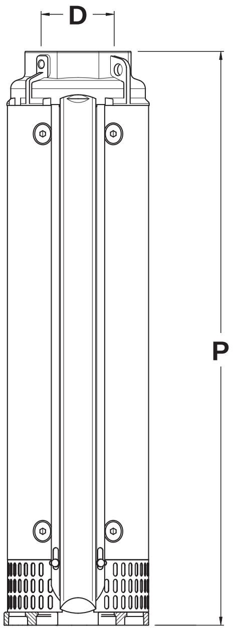


FPS SR series

6" Stainless Steel Submersible Pumps

150 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
7.5	3	3"	4"	5.55"	14.4"	23
7.5	3	3"	6"	5.67"	14.4"	23
10	4	3"	4"	5.55"	16.2"	25
10	4	3"	6"	5.67"	16.2"	25
15	5	3"	6"	5.67"	18.0"	28
15	7	3"	6"	5.67"	21.7"	32
20	9	3"	6"	5.67"	25.3"	36

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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6” Stainless Steel Submersible Pumps

150 gpm Performance Curve

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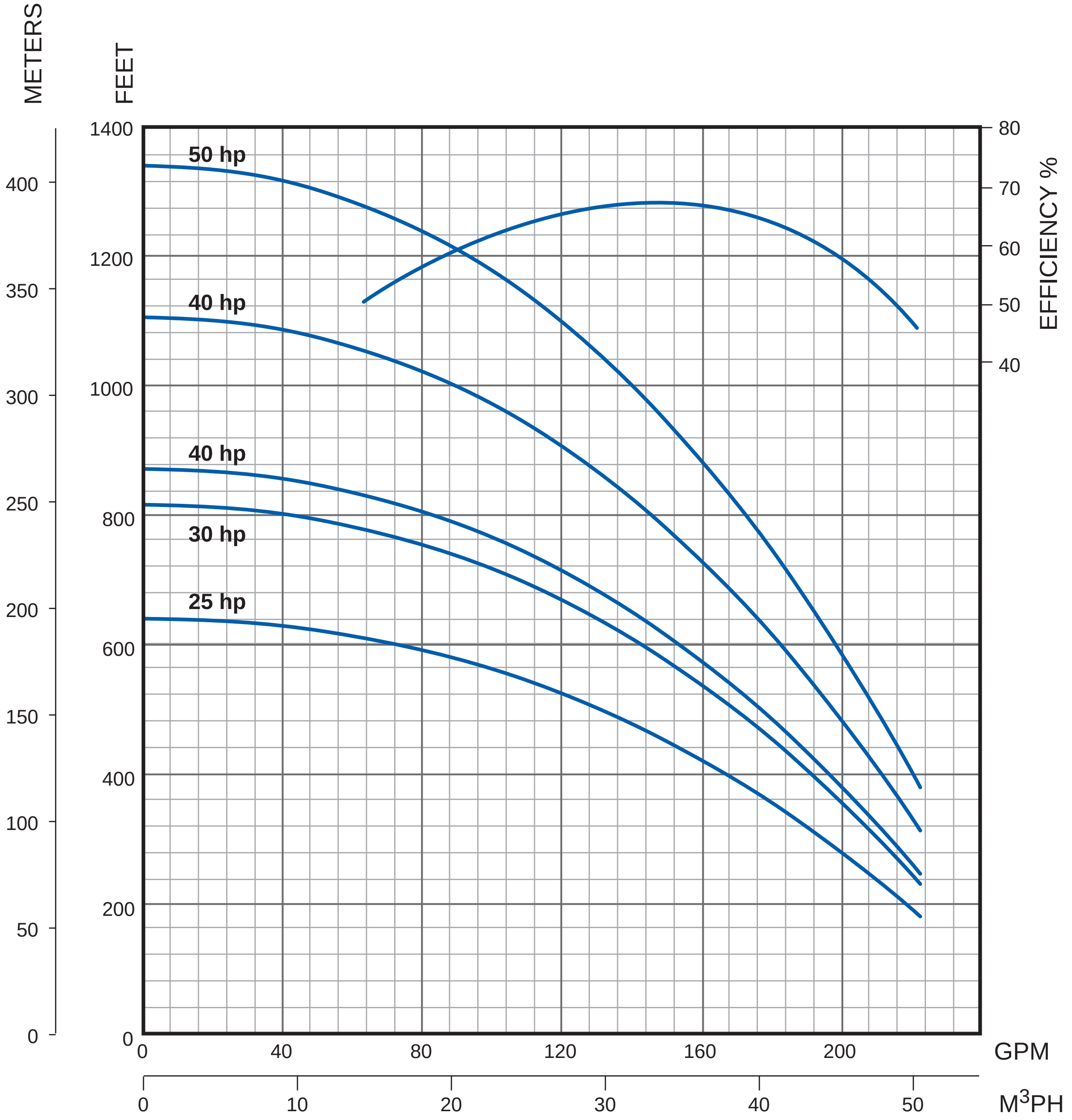
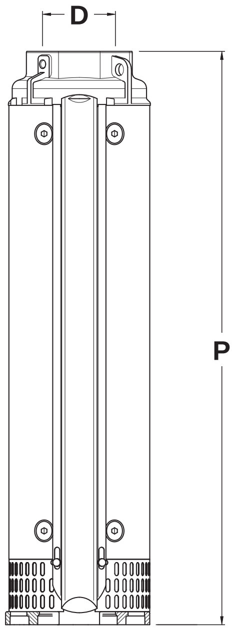


6” Stainless Steel Submersible Pumps

150 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
25	11	3”	6”	5.67”	29.0”	41
30	14	3”	6”	5.67”	34.5”	47
40	15	3”	6”	5.67”	36.8”	49
40	19	3”	6”	5.67”	43.7”	57
50	23	3”	6”	5.67”	51.0”	66

***Note:** **D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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6” Stainless Steel Submersible Pumps

240 gpm Performance Curve

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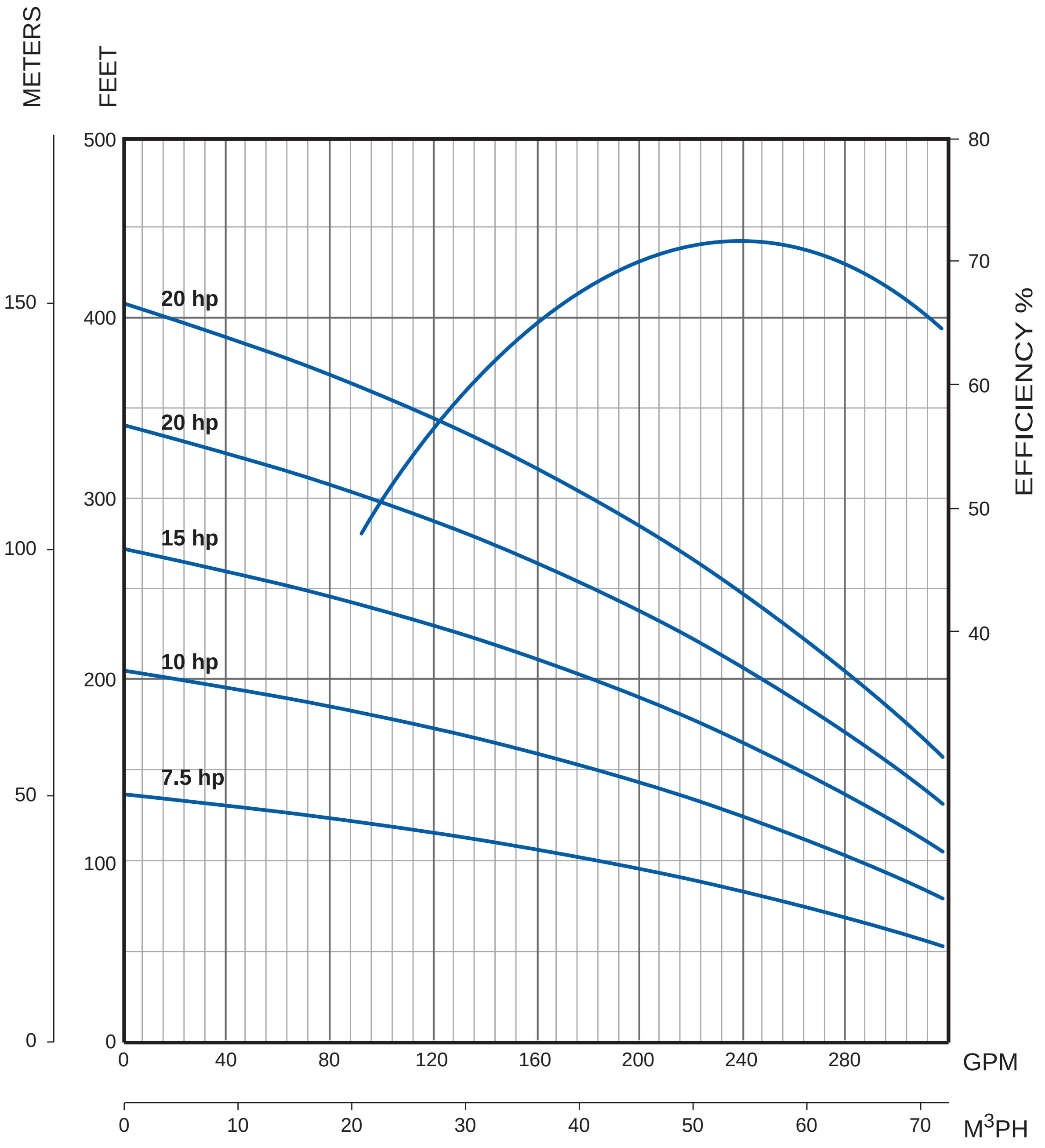
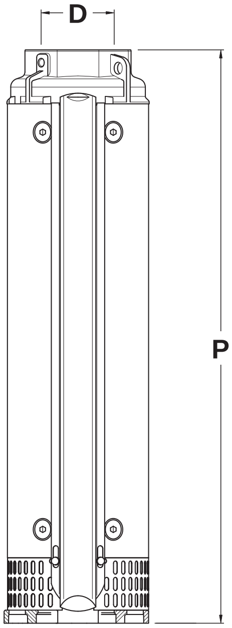


6” Stainless Steel Submersible Pumps

240 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight
						Lbs.
7.5	2	3”	4”	5.55”	14.4”	24
7.5	2	3”	6”	5.67”	14.4”	24
10	3	3”	4”	5.55”	18.1”	30
10	3	3”	6”	5.67”	18.1”	30
15	4	3”	6”	5.67”	21.7”	35
20	5	3”	6”	5.67”	25.3”	40
20	6	3”	6”	5.67”	29.0”	45

***Note:** **D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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6” Stainless Steel Submersible Pumps

240 gpm Performance Curve

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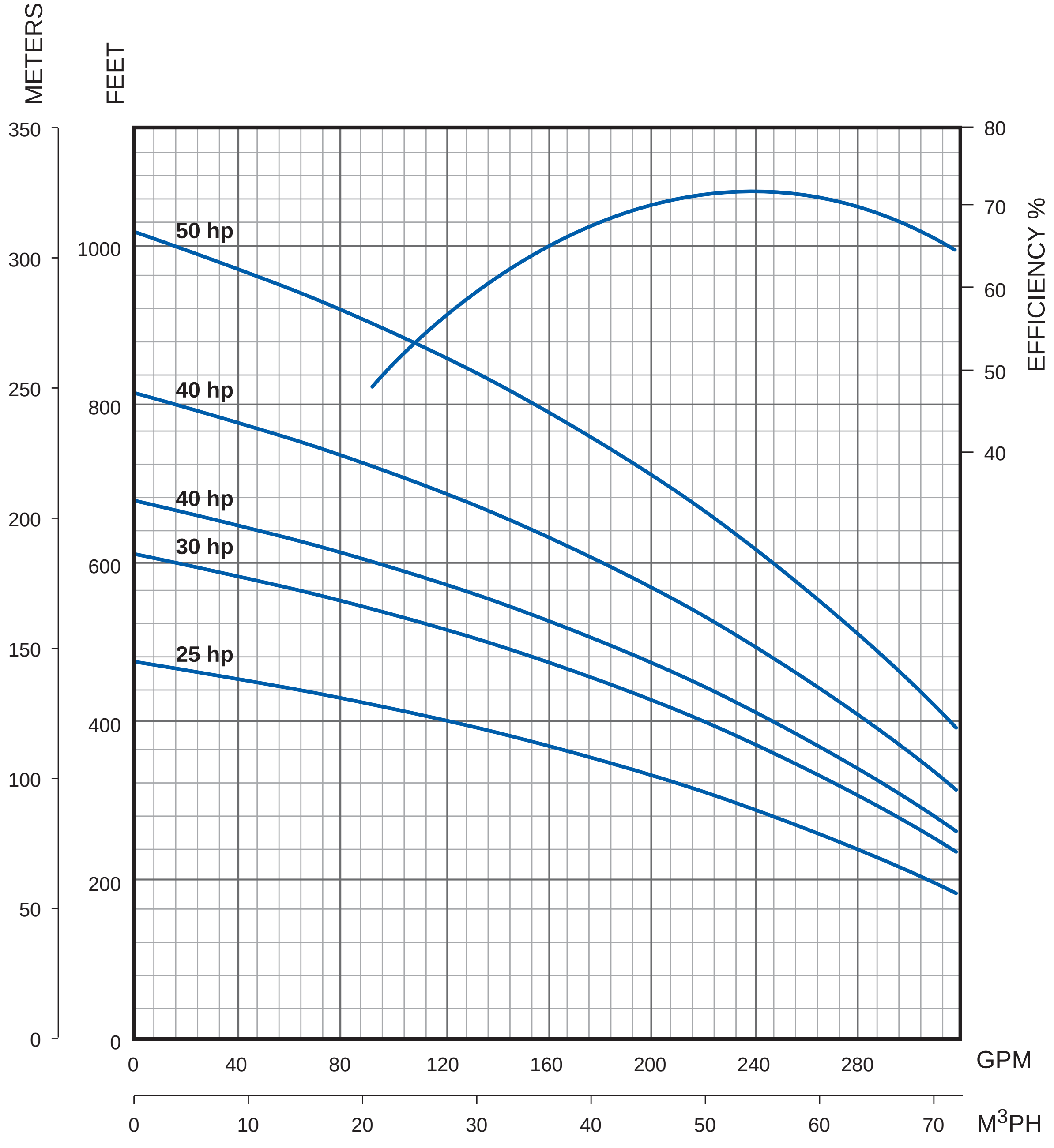
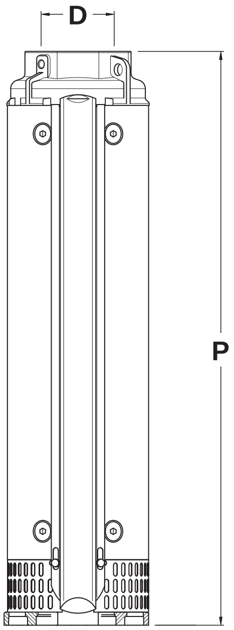
DATE: July 31, 2009



FPS SR series

6" Stainless Steel Submersible Pumps

240 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
25	7	3"	6"	5.67"	32.6"	50
30	9	3"	6"	5.67"	39.9"	60
40	10	3"	6"	5.67"	43.6"	65
40	12	3"	6"	5.67"	50.9"	75
50	15	3"	6"	5.67"	61.9"	90

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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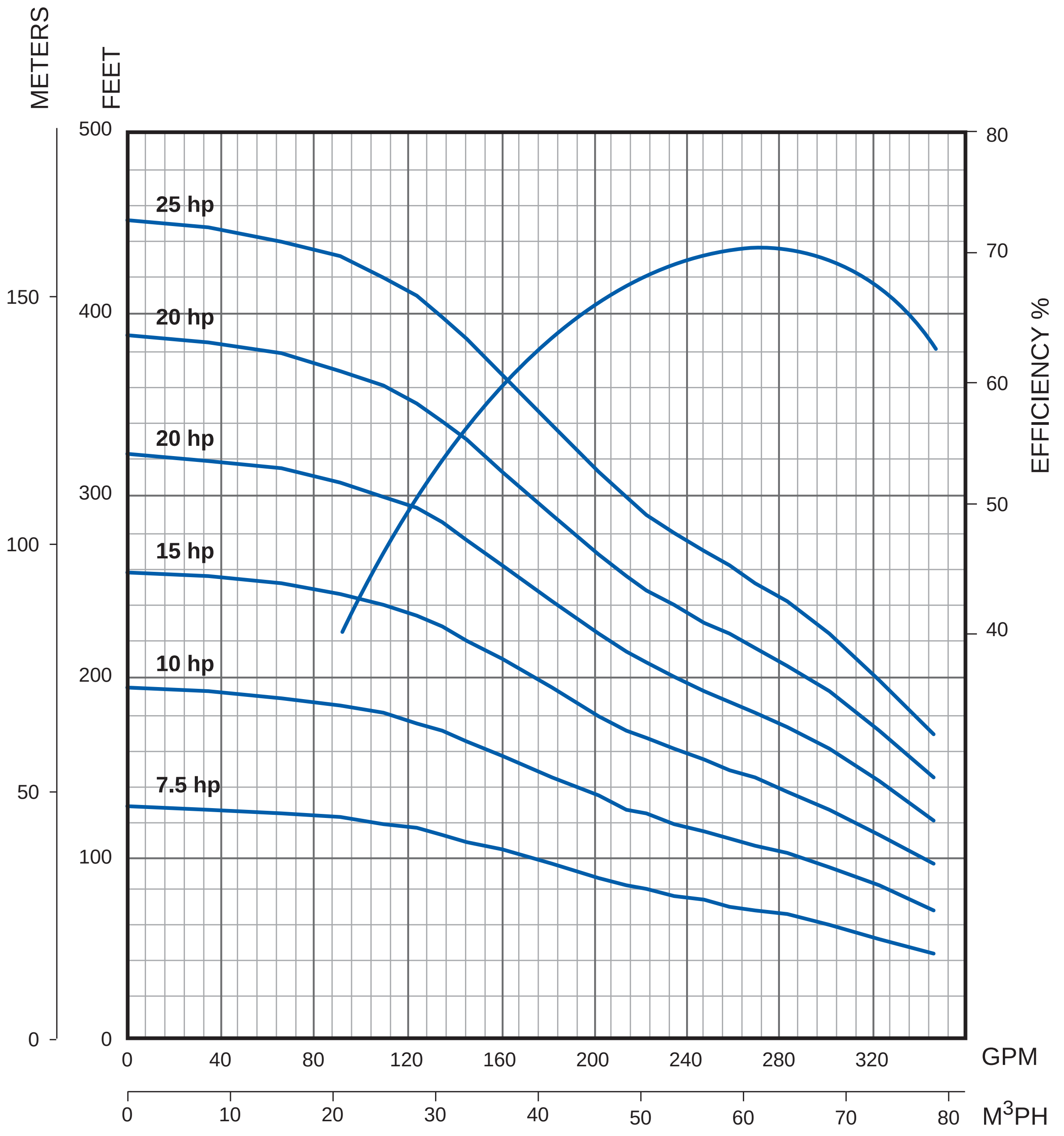
6" Stainless Steel Submersible Pumps

300 gpm Performance Curve

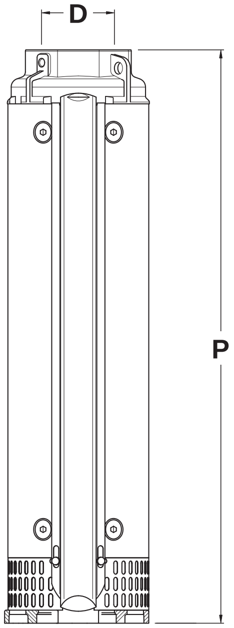
PAGE: SP-155
DATE: July 31, 2009



FPS SR series

6" Stainless Steel Submersible Pumps

300 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight
						Lbs.
7.5	2	3"	4"	5.55"	14.4"	25
7.5	2	3"	6"	5.67"	14.4"	25
10	3	3"	4"	5.55"	18.0"	30
10	3	3"	6"	5.67"	18.0"	30
15	4	3"	6"	5.67"	21.7"	35
20	5	3"	6"	5.67"	25.3"	40
20	6	3"	6"	5.67"	29.0"	45
25	7	3"	6"	5.67"	32.6"	51

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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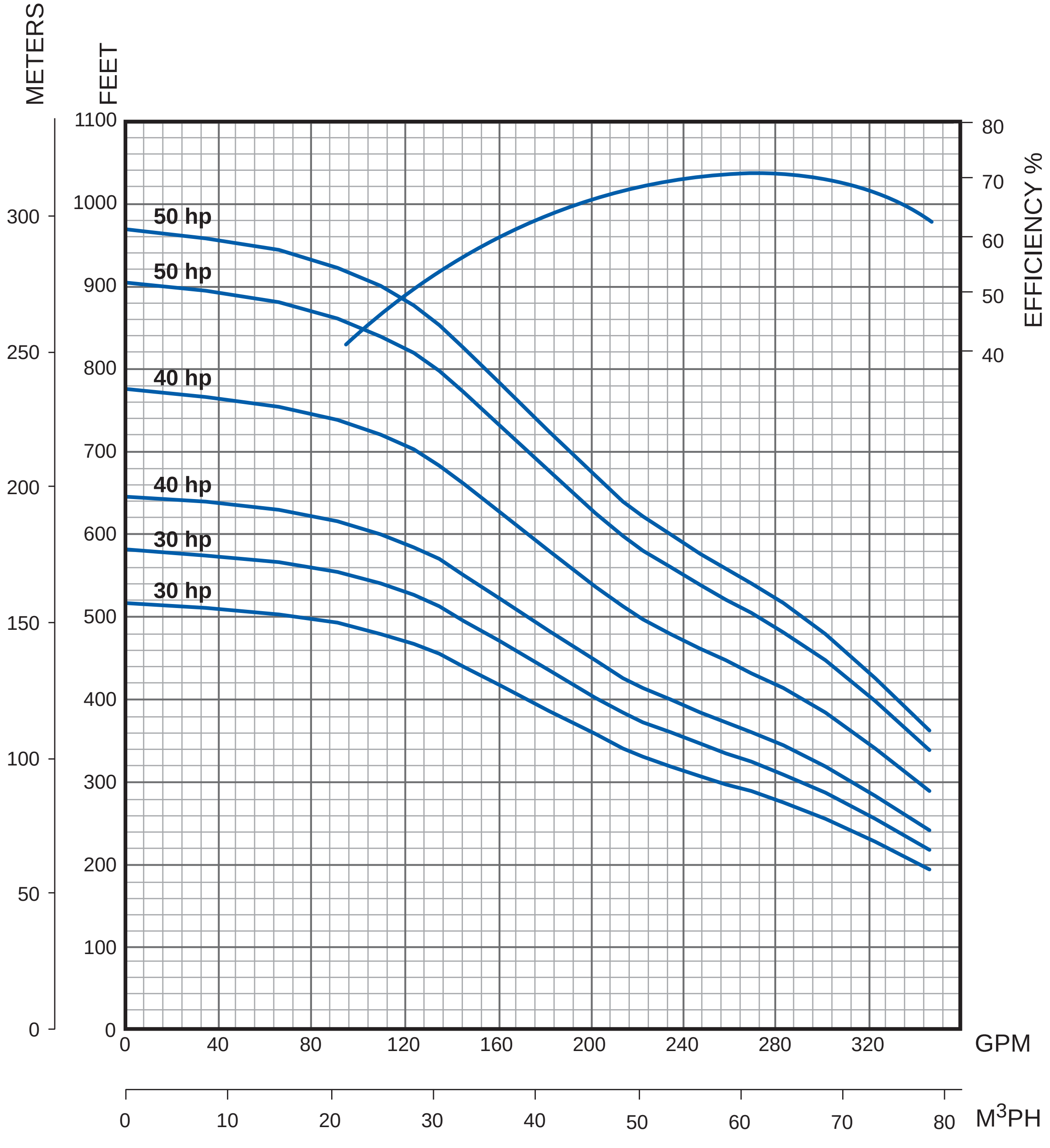
6" Stainless Steel Submersible Pumps

300 gpm Performance Curve

PAGE: SP-160
DATE: July 1, 2008



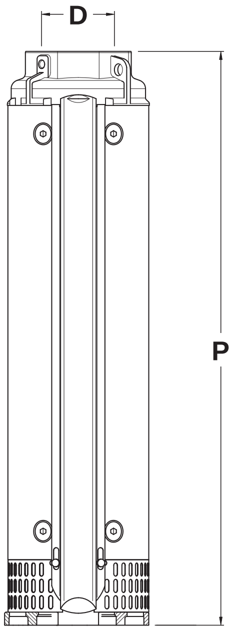
6" Stainless Steel Submersible Pumps

300 gpm Specifications

Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight
						Lbs.
30	8	4"	6"	5.67"	36.3"	55
30	9	4"	6"	5.67"	39.9"	60
40	10	4"	6"	5.67"	43.6"	66
40	12	4"	6"	5.67"	50.9"	75
50	14	4"	6"	5.67"	58.2"	86
50	15	4"	6"	5.67"	61.9"	90

***Note: D** = Discharge, **P** = Pump Length



Parts Description	Material	
	Type	AISI
Outer case with motor adapter	Stainless Steel	304
Discharge head with built-in check valve	Stainless Steel	304
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Upper bowl	Stainless Steel	304
Upper bearing bushing	Nitrile Rubber (NBR)	N/A
Upper journal sleeve	Stainless Steel w/ ceramic coating	329
Pump shaft	Stainless Steel	431
Motor coupling	Stainless Steel	431/329
Diffuser	Stainless Steel	304
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Secondary journal sleeve	Stainless Steel	304
Impeller	Stainless Steel	304
Cable guard	Stainless Steel	316
Suction strainer	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	316
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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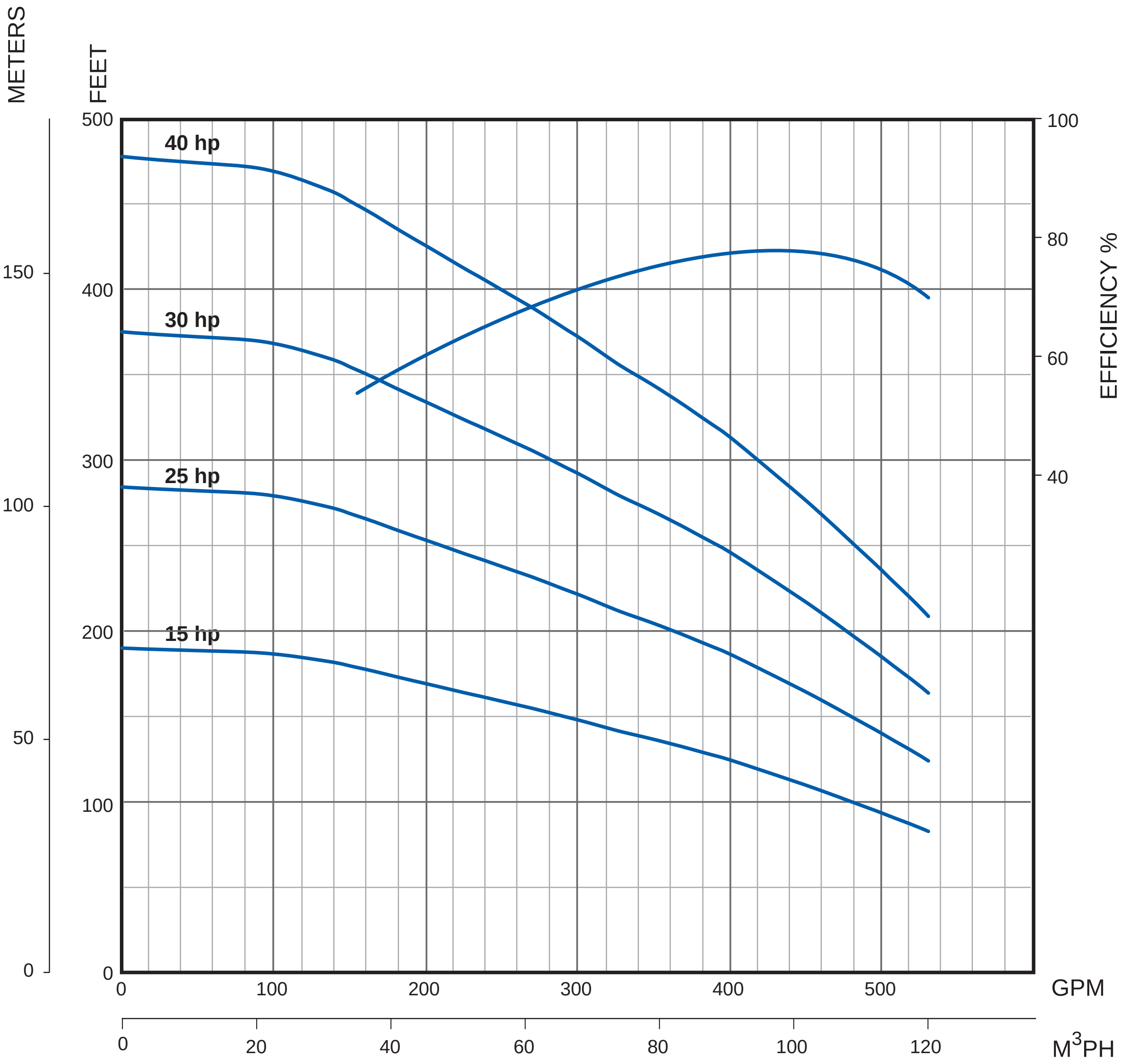
8" Stainless Steel Submersible Pumps

400 gpm Performance Curve

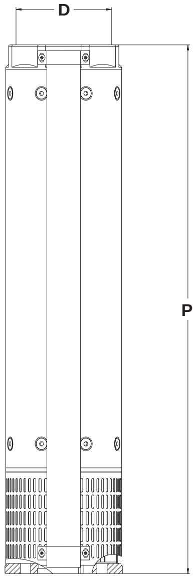
PAGE: SP-165
DATE: July 31, 2009



FPS SR series

8” Stainless Steel Submersible Pumps

400 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight Lbs.
15	2	4”	6”	7.34”	25.3”	70
25	3	4”	6”	7.34”	30.3”	81
30	4	4”	6”	7.34”	35.2”	92
40	5	4”	6”	7.34”	40.2”	103

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case	Stainless Steel	316
Motor adapter and flange	Stainless Steel	316
Suction strainer	Stainless Steel	316
Discharge head	Stainless Steel	316
Check valve assembly	Stainless Steel	316
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Stop ring	Stainless Steel	316
Spring	Stainless Steel	316
Pump shaft	Stainless Steel	329
Upper journal sleeve	Silicon Carbide (SiC)	N/A
Motor coupling	Stainless Steel	316/329
Diffuser	Stainless Steel	316
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Flange clamping neck ring	Stainless Steel	316
Impeller	Stainless Steel	316
Collet	Stainless Steel	316
Collet nut	Stainless Steel	316
Cable guard	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	329
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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8” Stainless Steel Submersible Pumps

400 gpm Performance Curve

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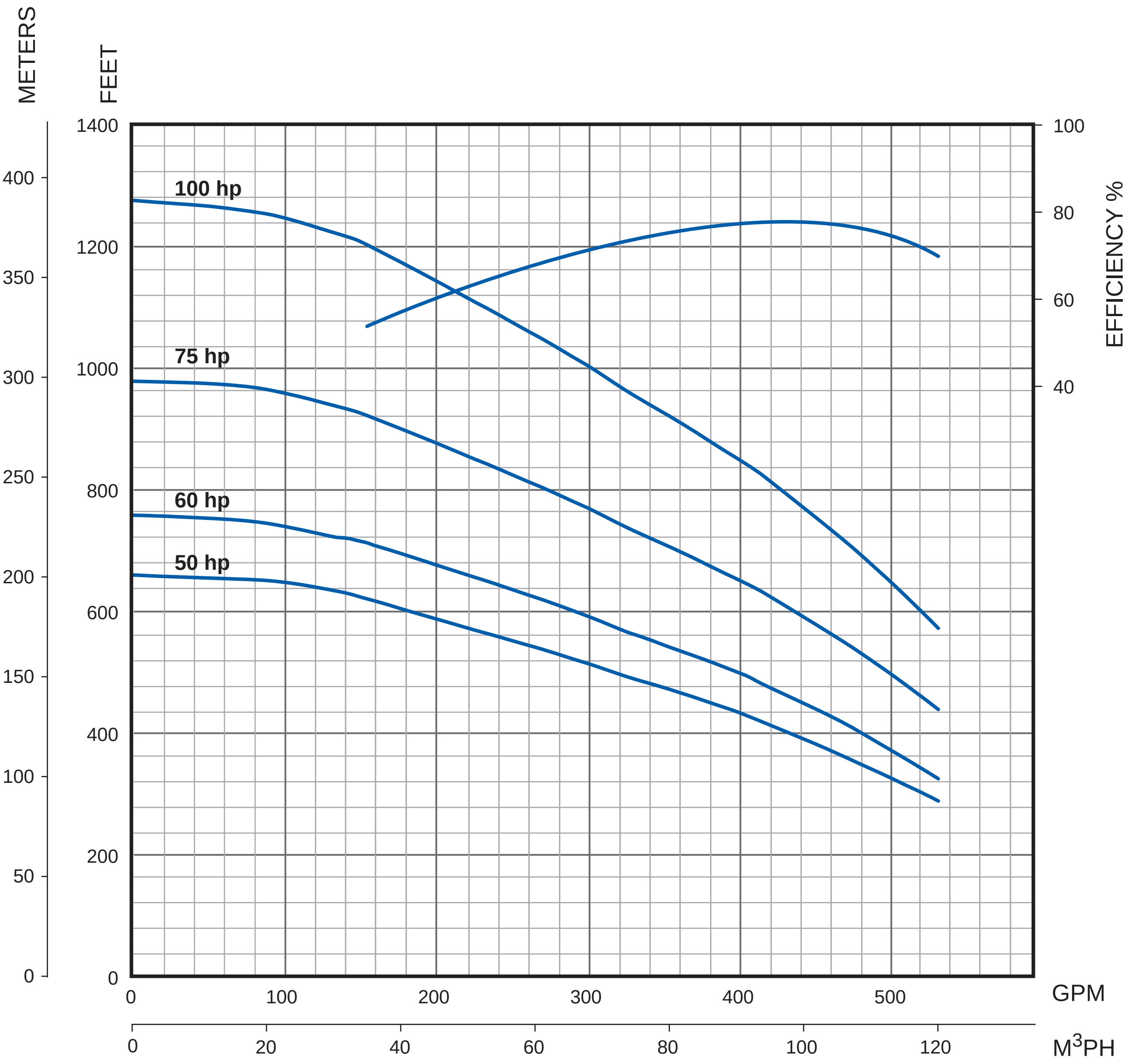
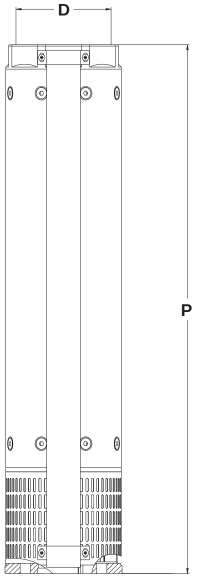


8" Stainless Steel Submersible Pumps

400 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight
						Lbs.
50	7	4"	6"	7.34"	50.1"	124
60	8	4"	8"	7.34"	55.0"	135
75	10	4"	8"	7.34"	65.1"	157
100	13	4"	8"	7.34"	80.0"	192

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case	Stainless Steel	316
Motor adapter and flange	Stainless Steel	316
Suction strainer	Stainless Steel	316
Discharge head	Stainless Steel	316
Check valve assembly	Stainless Steel	316
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Stop ring	Stainless Steel	316
Spring	Stainless Steel	316
Pump shaft	Stainless Steel	329
Upper journal sleeve	Silicon Carbide (SiC)	N/A
Motor coupling	Stainless Steel	316/329
Diffuser	Stainless Steel	316
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Flange clamping neck ring	Stainless Steel	316
Impeller	Stainless Steel	316
Collet	Stainless Steel	316
Collet nut	Stainless Steel	316
Cable guard	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	329
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

8” Stainless Steel Submersible Pumps

475 gpm Performance Curve

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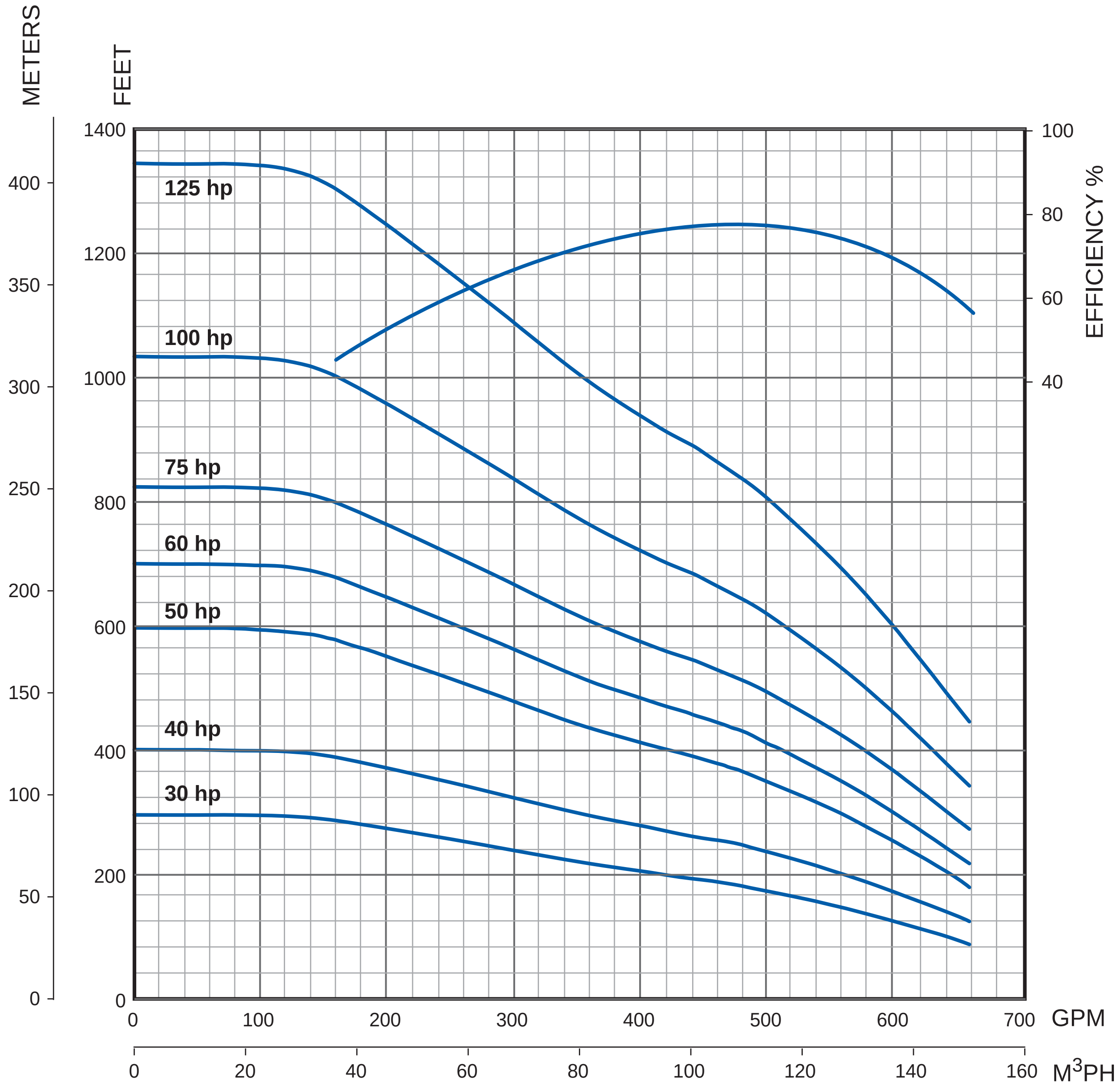
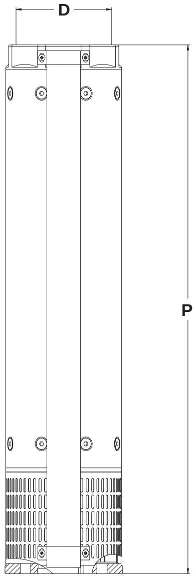
DATE: July 1, 2008



8" Stainless Steel Submersible Pumps

475 gpm Specifications



Dimension Information

HP	Stages	D*	Motor Size	Diameter w/Cable Guard	P*	Pump Weight
						Lbs.
30	3	6"	6"	7.34"	30.3"	81
40	4	6"	6"	7.34"	35.2"	92
50	6	6"	6"	7.34"	45.1"	112
60	7	6"	6"	7.34"	50.1"	124
75	8	6"	8"	7.68"	55.2"	138
100	10	6"	8"	7.68"	65.1"	159
125	13	6"	8"	7.68"	80.0"	192

***Note: D** = Discharge, **P** = Pump Length

Parts Description	Material	
	Type	AISI
Outer case	Stainless Steel	316
Motor adapter and flange	Stainless Steel	316
Suction strainer	Stainless Steel	316
Discharge head	Stainless Steel	316
Check valve assembly	Stainless Steel	316
Sealing O-ring	Nitrile Rubber (NBR)	N/A
Stop ring	Stainless Steel	316
Spring	Stainless Steel	316
Pump shaft	Stainless Steel	329
Upper journal sleeve	Silicon Carbide (SiC)	N/A
Motor coupling	Stainless Steel	316/329
Diffuser	Stainless Steel	316
Floating neck ring	Teflon (PTFE)	N/A
Secondary bearing bushing	Nitrile Rubber (NBR)	N/A
Flange clamping neck ring	Stainless Steel	316
Impeller	Stainless Steel	316
Collet	Stainless Steel	316
Collet nut	Stainless Steel	316
Cable guard	Stainless Steel	316
Insert locking outer case	Stainless Steel	316
Upthrust washer	Stainless Steel	329
Upthrust disc	Teflon (PTFE)	N/A
Screws and washers	Stainless Steel	316

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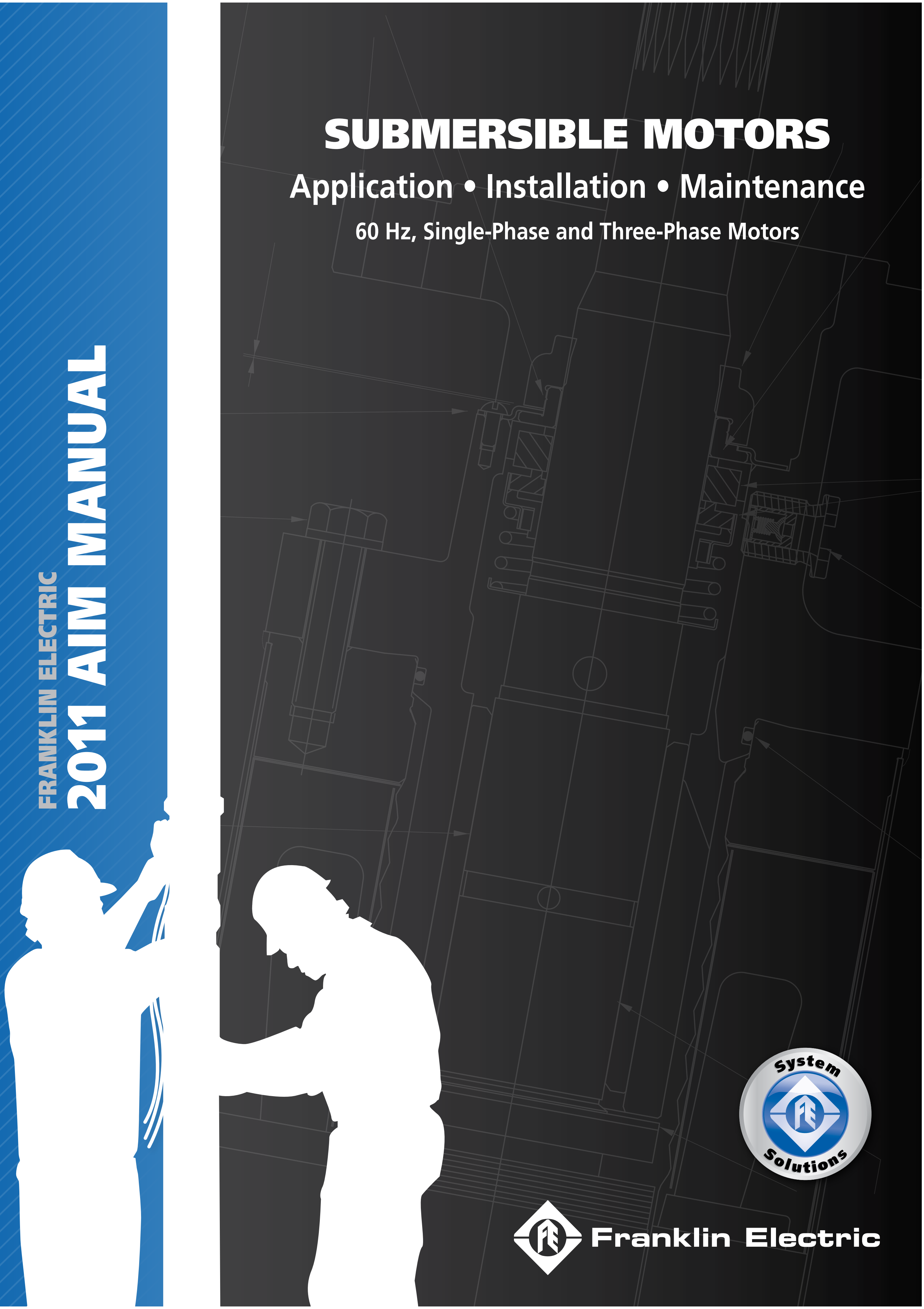
FRANKLIN ELECTRIC

2011 AIM MANUAL

SUBMERSIBLE MOTORS

Application • Installation • Maintenance

60 Hz, Single-Phase and Three-Phase Motors



System Solutions

Franklin Electric

ATTENTION!
IMPORTANT INFORMATION FOR INSTALLERS OF THIS EQUIPMENT!

THIS EQUIPMENT IS INTENDED FOR INSTALLATION BY TECHNICALLY QUALIFIED PERSONNEL. FAILURE TO INSTALL IT IN COMPLIANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES, AND WITHIN FRANKLIN ELECTRIC RECOMMENDATIONS, MAY RESULT IN ELECTRICAL SHOCK OR FIRE HAZARD, UNSATISFACTORY PERFORMANCE, AND EQUIPMENT FAILURE. FRANKLIN INSTALLATION INFORMATION IS AVAILABLE FROM PUMP MANUFACTURERS AND DISTRIBUTORS, AND DIRECTLY FROM FRANKLIN ELECTRIC. CALL FRANKLIN TOLL FREE 800-348-2420 FOR INFORMATION.

WARNING

SERIOUS OR FATAL ELECTRICAL SHOCK MAY RESULT FROM FAILURE TO CONNECT THE MOTOR, CONTROL ENCLOSURES, METAL PLUMBING, AND ALL OTHER METAL NEAR THE MOTOR OR CABLE, TO THE POWER SUPPLY GROUND TERMINAL USING WIRE NO SMALLER THAN MOTOR CABLE WIRES. TO REDUCE RISK OF ELECTRICAL SHOCK, DISCONNECT POWER BEFORE WORKING ON OR AROUND THE WATER SYSTEM. DO NOT USE MOTOR IN SWIMMING AREAS.

ATTENTION!
INFORMATIONS IMPORTANTES POUR L'INSTALLATEUR DE CET EQUIPEMENT.

CET EQUIPEMENT DOIT ETRE INTALLE PAR UN TECHNICIEN QUALIFIE. SI L'INSTALLATION N'EST PAS CONFORME AUX LOIS NATIONALES OU LOCALES AINSI QU'AUX RECOMMANDATIONS DE FRANKLIN ELECTRIC, UN CHOC ELECTRIQUE, LE FEU, UNE PERFORMANCE NON ACCEPTABLE, VOIRE MEME LE NON-FONCTIONNEMENT PEUVENT SURVENIR. UN GUIDE D'INSTALLATION DE FRANKLIN ELECTRIC EST DISPONIBLE CHEZ LES MANUFACTURIERS DE POMPES, LES DISTRIBUTEURS, OU DIRECTEMENT CHEZ FRANKLIN. POUR DE PLUS AMPLES RENSEIGNEMENTS, APPELEZ SANS FRAIS LE 800-348-2420.

AVERTISSEMENT

UN CHOC ELECTRIQUE SERIEUX OU MEME MORTEL EST POSSIBLE, SI L'ON NEGLIGE DE CONNECTER LE MOTEUR, LA PLOMBERIE METALLIQUE, BOITES DE CONTROLE ET TOUT METAL PROCHE DU MOTEUR A UN CABLE ALLANT VERS UNE ALIMENTATION D'ENERGIE AVEC BORNE DE MISE A LA TERRE UTILISANT AU MOINS LE MEME CALIBRE QUE LES FILS DU MOTEUR. POUR REDUIRE LE RISQUE DE CHOC ELECTRIQUE. COUPER LE COURANT AVANT DE TRAVAILLER PRES OU SUR LE SYSTEM D'EAU. NE PAS UTILISER CE MOTEUR DANS UNE ZONE DE BAIGNADE.

ATENCION!
INFORMACION PARA EL INSTALADOR DE ESTE EQUIPO.

PARA LA INSTALACION DE ESTE EQUIPO, SE REQUIERE DE PERSONAL TECNICO CALIFICADO. EL NO CUMPLIR CON LAS NORMAS ELECTRICAS NACIONALES Y LOCALES, ASI COMO CON LAS RECOMENDACIONES DE FRANKLIN ELECTRIC DURANTE SU INSTALACION, PUEDE OCASIONAR, UN CHOQUE ELECTRICO, PELIGRO DE UN INCENDIO, OPERACION DEFECTUOSA E INCLUSO LA DESCOMPOSTURA DEL EQUIPO. LOS MANUALES DE INSTALACION Y PUESTA EN MARCHA DE LOS EQUIPOS, ESTAN DISPONIBLES CON LOS DISTRIBUIDORES, FABRICANTES DE BOMBAS O DIRECTAMENTE CON FRANKLIN ELECTRIC. PUEDE LLAMAR GRATUITAMENTE PARA MAYOR INFORMACION AL TELEFONO 800-348-2420.

ADVERTENCIA

PUEDE OCURRIR UN CHOQUE ELECTRICO, SERIO O FATAL DEBIDO A UNA ERRONEA CONECCION DEL MOTOR, DE LOS TABLEROS ELECTRICOS, DE LA TUBERIA, DE CUALQUIER OTRA PARTE METALICA QUE ESTA CERCA DEL MOTOR O POR NO UTILIZAR UN CABLE PARA TIERRA DE CALIBRE IGUAL O MAYOR AL DE LA ALIMENTACION. PARA REDUCIR EL RIESGO DE CHOQUE ELECTRIC, DESCONECTAR LA ALIMENTACION ELECTRICA ANTES DE INICIAR A TRABAJAR EN EL SISTEMA HIDRAULICO. NO UTILIZAR ESTE MOTOR EN ALBERCAS O AREAS EN DONDE SE PRACTIQUE NATACION.

Commitment to Quality

Franklin Electric is committed to provide customers with defect free products through our program of continuous improvement. Quality shall, in every case, take precedence over quantity.

Franklin Electric

SUBMERSIBLE MOTORS
60 Hz, Single-Phase and Three-Phase

Application • Installation • Maintenance Manual

The submersible motor is a reliable, efficient and trouble-free means of powering a pump. Its needs for a long operational life are simple. They are:

1. A suitable operating environment
2. An adequate supply of electricity
3. An adequate flow of cooling water over the motor
4. An appropriate pump load

All considerations of application, installation, and maintenance of submersible motors relating to these four areas are presented in this manual. Franklin Electric's web page, www.franklin-electric.com, should be checked for the latest updates.

Contents

Application

All Motors

Single-Phase Motors

Three-Phase Motors

Installation

All Motors

Maintenance

All Motors

Single-Phase Motors and Controls

Electronic Products

Storage

Franklin Electric submersible motors are a water-lubricated design. The fill solution consists of a mixture of deionized water and Propylene Glycol (a non-toxic antifreeze). The solution will prevent damage from freezing in temperatures to -40 °F (-40 °C); motors should be stored in areas that do not go below this temperature. The solution will partially freeze below 27 °F (-3 °C), but no damage occurs. Repeated freezing and thawing should be avoided to prevent possible loss of fill solution.

There may be an interchange of fill solution with well water during operation. Care must be taken with motors removed from wells during freezing conditions to prevent damage.

When the storage temperature does not exceed 100 °F (37 °C), storage time should be limited to two years. Where temperatures reach 100° to 130 °F, storage time should be limited to one year.

Loss of a few drops of liquid will not damage the motor as an excess amount is provided, and the filter check valve will allow lost liquid to be replaced by filtered well water upon installation. If there is reason to believe there has been a considerable amount of leakage, consult the factory for checking procedures.

Frequency of Starts

The average number of starts per day over a period of months or years influences the life of a submersible pumping system. Excessive cycling affects the life of control components such as pressure switches, starters, relays and capacitors. Rapid cycling can also cause motor spline damage, bearing damage, and motor overheating. All these conditions can lead to reduced motor life.

The pump size, tank size and other controls should be selected to keep the starts per day as low as practical for longest life. The maximum number of starts per 24-hour period is shown in table 3.

Motors should run a minimum of one minute to dissipate heat build up from starting current. Six inch and larger motors should have a minimum of 15 minutes between starts or starting attempts.

Table 3 Number of Starts

MOTOR RATING		MAXIMUM STARTS PER 24 HR PERIOD	
HP	KW	SINGLE-PHASE	THREE-PHASE
Up to 0.75	Up to 0.55	300	300
1 thru 5.5	0.75 thru 4	100	300
7.5 thru 30	5.5 thru 22	50	100*
40 and over	30 and over	-	100

* Keeping starts per day within the recommended numbers provides the best system life. However, when used with a properly configured Reduced Voltage Starter (RVS) or Variable Frequency Drive (VFD), 7.5 thru 30 hp three-phase motors can be started up to 200 times per 24 hour period.

Mounting Position

Franklin submersible motors are designed primarily for operation in the vertical, shaft-up position.

During acceleration, the pump thrust increases as its output head increases. In cases where the pump head stays below its normal operating range during startup and full speed condition, the pump may create upward thrust. This creates upward thrust on the motor upthrust bearing. This is an acceptable operation for short periods at each start, but running continuously with upthrust will cause excessive wear on the upthrust bearing.

With certain additional restrictions as listed in this section and the Inline Booster Pump Systems sections of this manual, motors are also suitable for operation in positions from shaft-up to shaft-horizontal. As the mounting position becomes further from vertical and closer to horizontal, the probability of shortened thrust bearing life increases. For normal motor life expectancy with motor positions other than shaft-up, follow these recommendations:

1. Minimize the frequency of starts, preferably to fewer than **10** per 24-hour period. Six and eight inch motors should have a minimum of 20 minutes between starts or starting attempts
2. Do not use in systems which can run even for short periods at full speed without thrust toward the motor.

Transformer Capacity - Single-Phase or Three-Phase

Distribution transformers must be adequately sized to satisfy the kVA requirements of the submersible motor. When transformers are too small to supply the load, there is a reduction in voltage to the motor.

Table 4 references the motor horsepower rating, single-phase and three-phase, total effective kVA required, and the smallest transformer required for open or closed three-phase systems. Open systems require larger transformers since only two transformers are used.

Other loads would add directly to the kVA sizing requirements of the transformer bank.

Table 4 Transformer Capacity

MOTOR RATING		TOTAL EFFECTIVE KVA REQUIRED	SMALLEST KVA RATING-EACH TRANSFORMER	
HP	KW		OPEN WYE OR DELTA 2- TRANSFORMERS	CLOSED WYE OR DELTA 3- TRANSFORMERS
1.5	1.1	3	2	1
2	1.5	4	2	1.5
3	2.2	5	3	2
5	3.7	7.5	5	3
7.5	5.5	10	7.5	5
10	7.5	15	10	5
15	11	20	15	7.5
20	15	25	15	10
25	18.5	30	20	10
30	22	40	25	15
40	30	50	30	20
50	37	60	35	20
60	45	75	40	25
75	55	90	50	30
100	75	120	65	40
125	93	150	85	50
150	110	175	100	60
175	130	200	115	70
200	150	230	130	75

NOTE: Standard kVA ratings are shown. If power company experience and practice allows transformer loading higher than standard, higher loading values may be used to meet total effective kVA required, provided correct voltage and balance is maintained.

Effects of Torque

During starting of a submersible pump, the torque developed by the motor must be supported through the pump, delivery pipe or other supports. Most pumps rotate in the direction which causes unscrewing torque on right-handed threaded pipe or pump stages. All threaded joints, pumps and other parts of the pump support system must be capable of withstanding the maximum torque repeatedly without loosening or breaking. Unscrewing joints will break electrical cable and may cause loss of the pump-motor unit.

To safely withstand maximum unscrewing torques with a minimum safety factor of 1.5, tightening all threaded joints to at least 10 lb-ft per motor horsepower is recommended (table 4A). It may be necessary to tack or strap weld pipe joints on high horsepower pumps, especially at shallower settings.

Table 4A Torque Required (Examples)

MOTOR RATING		MINIMUM SAFE TORQUE-LOAD
HP	KW	
1 hp & Less	0.75 kW & Less	10 lb-ft
20 hp	15 kW	200 lb-ft
75 hp	55 kW	750 lb-ft
200 hp	150 kW	2000 lb-ft

Use of Engine Driven Generators - Single-Phase or Three-Phase

Table 5 lists minimum generator sizes based on typical 80 °C rise continuous duty generators, with 35% maximum voltage dip during starting, for Franklin's three-wire motors, single- or three-phase.

This is a general chart. The generator manufacturer should be consulted whenever possible, especially on larger sizes.

There are two types of generators available: externally and internally regulated. Most are externally regulated. They use an external voltage regulator that senses the output voltage. As the voltage dips at motor start-up, the regulator increases the output voltage of the generator.

Internally regulated (self-excited) generators have an extra winding in the generator stator. The extra winding senses the output current to automatically adjust the output voltage.

Generators must be sized to deliver at least 65% of the rated voltage during starting to ensure adequate starting torque. Besides sizing, generator frequency is important as the motor speed varies with the frequency (Hz). Due to pump affinity laws, a pump running at 1 to 2 Hz below motor nameplate frequency design will not meet its performance curve. Conversely, a pump running at 1 to 2 Hz above may trip overloads.

Generator Operation

Always start the generator before the motor is started and always stop the motor before the generator is shut down. The motor thrust bearing may be damaged if the generator is allowed to coast down with the motor running. This same condition occurs when the generator is allowed to run out of fuel.

Follow generator manufacturer's recommendations for de-rating at higher elevations or using natural gas.

Table 5 Engine Driven Generators

NOTE: This chart applies to 3-wire or 3-phase motors. For best starting of 2-wire motors, the minimum generator rating is 50% higher than shown.

MOTOR RATING		MINIMUM RATING OF GENERATOR			
		EXTERNALLY REGULATED		INTERNALLY REGULATED	
HP	KW	KW	KVA	KW	KVA
1/3	0.25	1.5	1.9	1.2	1.5
1/2	0.37	2	2.5	1.5	1.9
3/4	0.55	3	3.8	2	2.5
1	0.75	4	5.0	2.5	3.13
1.5	1.1	5	6.25	3	3.8
2	1.5	7.5	9.4	4	5
3	2.2	10	12.5	5	6.25
5	3.7	15	18.75	7.5	9.4
7.5	5.5	20	25.0	10	12.5
10	7.5	30	37.5	15	18.75
15	11	40	50	20	25
20	15	60	75	25	31
25	18.5	75	94	30	37.50
30	22	100	125	40	50
40	30	100	125	50	62.5
50	37	150	188	60	75
60	45	175	220	75	94
75	55	250	313	100	125
100	75	300	375	150	188
125	93	375	469	175	219
150	110	450	563	200	250
175	130	525	656	250	313
200	150	600	750	275	344

WARNING: To prevent accidental electrocution, automatic or manual transfer switches must be used any time a generator is used as standby or back up on power lines. Contact power company for use and approval.

Use of Check Valves

It is recommended that one or more check valves always be used in submersible pump installations. If the pump does not have a built-in check valve, a line check valve should be installed in the discharge line within 25 feet of the pump and below the draw down level of the water supply. For deeper settings, check valves should be installed per the manufacturer's recommendations. More than one check valve may be required, but more than the recommended number of check valves should not be used.

Swing type check valves are **not** acceptable and should never be used with submersible motors/pumps. Swing type check valves have a slower reaction time which can cause water hammer (see next page). Internal pump check valves or spring loaded check valves close quickly and help eliminate water hammer.

Check valves are used to hold pressure in the system when the pump stops. They also prevent backspin, water hammer and upthrust. Any of these can lead to early pump or motor failure.

NOTE: Only positive sealing check valves should be used in submersible installations. Although drilling the check valves or using drain-back check valves may prevent back spinning, they create upthrust and water hammer problems.

A. **Backspin -** With no check valve or a failed check valve, the water in the drop pipe and the water in the system can flow down the discharge pipe when the motor stops. This can cause the pump to rotate in a reverse direction. If the motor is started while it is backspinning, an excessive force is placed across the pump-motor assembly that can cause impeller damage, motor or pump shaft breakage, excessive bearing wear, etc.

B. **Upthrust -** With no check valve, a leaking check valve, or drilled check valve, the unit starts under a zero head condition. This causes an uplifting or upthrust on the impeller-shaft assembly in the pump. This upward movement carries across the pump-motor coupling and creates an upthrust condition in the motor. Repeated upthrust can cause premature failure of both the pump and the motor.

C. **Water Hammer -** If the lowest check valve is more than 30 feet above the standing (lowest static) water level, or a lower check valve leaks and the check valve above holds, a vacuum is created in the discharge piping. On the next pump start, water moving at very high velocity fills the void and strikes the closed check valve and the stationary water in the pipe above it, causing a hydraulic shock. This shock can split pipes, break joints and damage the pump and/or motor. Water hammer can often be heard or felt. When discovered, the system should be shut down and the pump installer contacted to correct the problem.

Wells – Large Diameter, Uncased, Top Feeding and Screened Sections

Franklin Electric submersible motors are designed to operate with a cooling flow of water over and around the full length of the motor.

If the pump installation does not provide the minimum flow shown in table 6, a flow inducer sleeve (flow sleeve) must be used. The conditions requiring a flow sleeve are:

- Well diameter is too large to meet table 6 flow requirements.
- Pump is in an open body of water.
- Pump is in a rock well or below the well casing.
- The well is “top-feeding” (a.k.a. cascading)
- Pump is set in or below screens or perforations.

Water Temperature and Flow

Franklin Electric’s standard submersible motors, except Hi-Temp designs (see note below), are designed to operate up to maximum service factor horsepower in water up to 86 °F (30 °C). A flow of 0.25 ft/s for 4" motors rated 3 hp and higher, and 0.5 ft/s for 6" and 8" motors is required for proper cooling. Table 6 shows minimum flow rates, in gpm, for various well diameters and motor sizes.

If a standard motor is operated in water over 86 °F (30 °C), water flow past the motor must be increased to maintain safe motor operating temperatures. See HOT WATER APPLICATIONS on page 7.

NOTE: Franklin Electric offers a line of Hi-Temp motors designed to operate in water at higher temperatures or lower flow conditions. Consult factory for details.

Table 6 Required Cooling Flow

MINIMUM GPM REQUIRED FOR MOTOR COOLING IN WATER UP TO 86 °F (30 °C).			
CASING OR SLEEVE ID INCHES (MM)	4" MOTOR (3-10 HP) 0.25 FT/S GPM (L/M)	6" MOTOR 0.50 FT/S GPM (L/M)	8" MOTOR 0.50 FT/S GPM (L/M)
4 (102)	1.2 (4.5)	-	-
5 (127)	7 (26.5)	-	-
6 (152)	13 (49)	9 (34)	-
7 (178)	20 (76)	25 (95)	-
8 (203)	30 (114)	45 (170)	10 (40)
10 (254)	50 (189)	90 (340)	55 (210)
12 (305)	80 (303)	140 (530)	110 (420)
14 (356)	110 (416)	200 (760)	170 (645)
16 (406)	150 (568)	280 (1060)	245 (930)

0.25 ft/s = 7.62 cm/sec 0.50 ft/s = 15.24 cm/sec
1 inch = 2.54 cm

Flow Inducer Sleeve

If the flow rate is less than specified, then a flow inducer sleeve must be used. A flow sleeve is always required in an open body of water. FIG. 1 shows a typical flow inducer sleeve construction.

EXAMPLE: A 6" motor and pump that delivers 60 gpm will be installed in a 10" well.

From table 6, 90 gpm would be required to maintain proper cooling. In this case adding an 8" or smaller flow sleeve provides the required cooling.

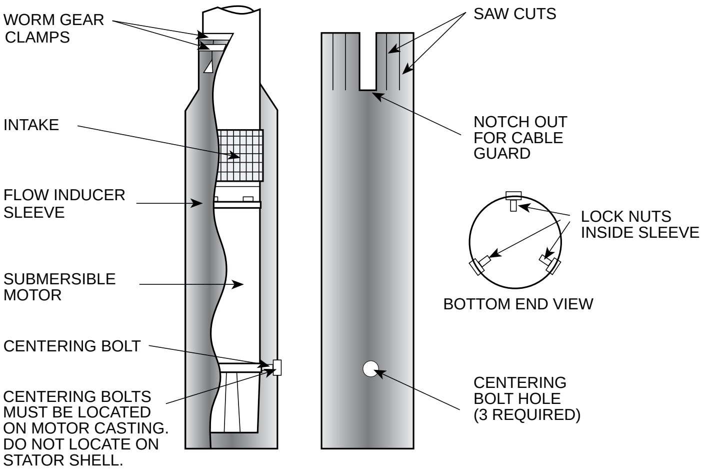


FIG. 1

Head Loss From Flow Past Motor

Table 7 lists the approximate head loss due to flow between an average length motor and smooth casing or flow inducer sleeve.

Table 7 Head Loss in Feet (Meters) at Various Flow Rates

MOTOR DIAMETER		4"	4"	4"	6"	6"	6"	8"	8"
CASING ID IN INCHES (MM)		4 (102)	5 (127)	6 (152)	6 (152)	7 (178)	8 (203)	8.1 (206)	10 (254)
Flow Rate in gpm (l/m)	25 (95)	0.3 (.09)							
	50 (189)	1.2 (.37)							
	100 (378)	4.7 (1.4)	0.3 (.09)		1.7 (.52)				
	150 (568)	10.2 (3.1)	0.6 (.18)	0.2 (.06)	3.7 (1.1)				
	200 (757)		1.1 (.34)	0.4 (.12)	6.3 (1.9)	0.5 (.15)		6.8 (2.1)	
	250 (946)		1.8 (.55)	0.7 (.21)	9.6 (2.9)	0.8 (.24)		10.4 (3.2)	
	300 (1136)		2.5 (.75)	1.0 (.30)	13.6 (4.1)	1.2 (.37)	0.2 (.06)	14.6 (4.5)	
	400 (1514)				23.7 (7.2)	2.0 (.61)	0.4 (.12)	24.6 (7.5)	
	500 (1893)					3.1 (.94)	0.7 (.21)	37.3 (11.4)	0.6 (0.2)
	600 (2271)					4.4 (1.3)	1.0 (.30)	52.2 (15.9)	0.8 (0.3)
	800 (3028)								1.5 (0.5)
	1000 (3785)								2.4 (0.7)

Hot Water Applications (Standard Motors)

Franklin Electric offers a line of Hi-Temp motors which are designed to operate in water with various temperatures up to 194 °F (90 °C) without increased flow. When a standard pump-motor operates in water hotter than 86 °F (30 °C), a flow rate of at least 3 ft/s is required. When selecting the motor to drive a pump in over 86 °F (30 °C) water, the motor horsepower must be de-rated per the following procedure.

1. Using table 7A, determine pump gpm required for different well or sleeve diameters. If necessary, add a flow sleeve to obtain at least 3 ft/s flow rate.

Table 7A Minimum gpm (l/m) Required for 3 ft/s (.91 m/sec) Flow Rate

CASING OR SLEEVE ID		4" HIGH THRUST MOTOR		6" MOTOR		8" MOTOR	
INCHES	(MM)	GPM	(L/M)	GPM	(L/M)	GPM	(L/M)
4	(102)	15	(57)				
5	(127)	80	(303)				
6	(152)	160	(606)	52	(197)		
7	(178)			150	(568)		
8	(203)			260	(984)	60	(227)
10	(254)			520	(1970)	330	(1250)
12	(305)					650	(2460)
14	(356)					1020	(3860)
16	(406)					1460	(5530)

Continued on next page

2. Determine pump horsepower required from the pump manufacturer's curve.

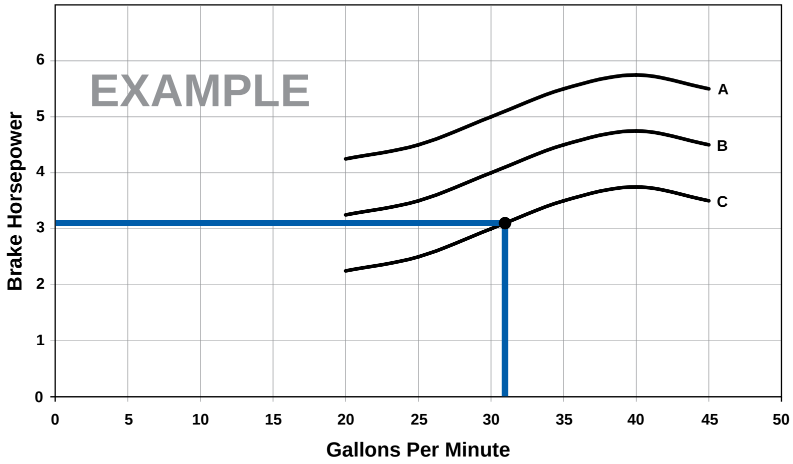


FIG. 2 MANUFACTURER'S PUMP CURVE

3. Multiply the pump horsepower required by the heat factor multiplier from table 8.

Table 8 Heat Factor Multiplier at 3 ft/s (.91 m/sec) Flow Rate

MAXIMUM WATER TEMPERATURE	1/3 - 5 HP .25 - 3.7 KW	7 1/2 - 30 HP 5.5 - 22 KW	OVER 30 HP OVER 22 KW
140 °F (60 °C)	1.25	1.62	2.00
131 °F (55 °C)	1.11	1.32	1.62
122 °F (50 °C)	1.00	1.14	1.32
113 °F (45 °C)	1.00	1.00	1.14
104 °F (40 °C)	1.00	1.00	1.00
95 °F (35 °C)	1.00	1.00	1.00

4. Select a rated hp motor on table 8A whose Service Factor Horsepower is at least the value calculated in Item 3.

Table 8A Service Factor Horsepower

HP	KW	SFHP	HP	KW	SFHP	HP	KW	SFHP	HP	KW	SFHP
1/3	0.25	0.58	3	2.2	3.45	25	18.5	28.75	100	75	115.00
1/2	0.37	0.80	5	3.7	5.75	30	22.0	34.50	125	93	143.75
3/4	0.55	1.12	7.5	5.5	8.62	40	30.0	46.00	150	110	172.50
1	0.75	1.40	10	7.5	11.50	50	37.0	57.50	175	130	201.25
1.5	1.10	1.95	15	11.0	17.25	60	45.0	69.00	200	150	230.00
2	1.50	2.50	20	15.0	23.00	75	55.0	86.25			

Hot Water Applications - Example

EXAMPLE: A 6" pump end requiring 39 hp input will pump 124 °F water in an 8" well at a delivery rate of 140 gpm. From table 7A, a 6" flow sleeve will be required to increase the flow rate to at least 3 ft/s.

Using table 8, the 1.62 heat factor multiplier is selected because the hp required is over 30 hp and water temperature is above 122 °F. Multiply 39 hp x 1.62 (multiplier), which equals 63.2 hp. This is the minimum rated service factor horsepower usable at 39 hp in 124 °F. Using table 8A, select a motor with a rated service factor horsepower above 63.2 hp. A 60 hp motor has a service factor horsepower of 69, so a 60 hp motor may be used.

Drawdown Seals

Allowable motor temperature is based on atmospheric pressure or higher surrounding the motor. “Drawdown seals,” which seal the well to the pump above its intake to maximize delivery, are not recommended, since the suction created can be lower than atmospheric pressure.

Grounding Control Boxes and Panels

The National Electrical Code requires that the control box or panel-grounding terminal always be connected to supply ground. If the circuit has no grounding conductor and no metal conduit from the box to supply panel, use a wire at least as large as line conductors and connect as required by the National Electrical Code, from the grounding terminal to the electrical supply ground.

WARNING: Failure to ground the control frame can result in a serious or fatal electrical shock hazard.

Grounding Surge Arrestors

An above ground surge arrestor must be grounded, metal to metal, all the way to the lowest draw down water strata for the surge arrestor to be effective. GROUNDING THE ARRESTOR TO THE SUPPLY GROUND OR TO A DRIVEN GROUND ROD PROVIDES LITTLE OR NO SURGE PROTECTION FOR THE MOTOR.

Control Box, Pumptec Products and Panel Environment

Franklin Electric control boxes, Pumptec products and three-phase panels meet UL requirements for NEMA Type 3R enclosures. They are suitable for indoor and outdoor applications within temperatures of +14 °F (-10 °C) to 122 °F (50 °C). Operating control boxes below +14 °F can cause reduced starting torque and loss of overload protection when overloads are located in control boxes.

Control boxes, Pumptec products and three-phase panels should never be mounted in direct sunlight or high temperature locations. This will cause shortened capacitor life (where applicable) and unnecessary tripping of overload protectors. A ventilated enclosure painted white to reflect heat is recommended for an outdoor, high temperature location.

A damp well pit, or other humid location, accelerates component failure from corrosion.

Control boxes with voltage relays are designed for vertical upright mounting only. Mounting in other positions will affect the operation of the relay.

Equipment Grounding

WARNING: Serious or fatal electrical shock may result from failure to connect the motor, control enclosures, metal plumbing and all other metal near the motor or cable to the power supply ground terminal using wire no smaller than motor cable wires.

The primary purpose of grounding the metal drop pipe and/or metal well casing in an installation is safety. It is done to limit the voltage between nonelectrical (exposed metal) parts of the system and ground, thus minimizing dangerous shock hazards. Using wire at least the size of the motor cable wires provides adequate current-carrying capability for any ground fault that might occur. It also provides a low resistance path to ground, ensuring that the current to ground will be large enough to trip any overcurrent device designed to detect faults (such as a ground fault circuit interrupter, or GFCI).

Normally, the ground wire to the motor would provide the primary path back to the power supply ground for any ground fault. There are conditions, however, where the ground wire connection could become compromised. One such example would be the case where the water in the well is abnormally corrosive or aggressive. In this example, a grounded metal drop pipe or casing would then become the primary path to ground. However, the many installations that now use plastic drop pipes and/or casings require further steps to be taken for safety purposes, so that the water column itself does not become the conductive path to ground.

When an installation has abnormally corrosive water AND the drop pipe or casing is plastic, Franklin Electric recommends the use of a GFCI with a 10 mA set-point. In this case, the motor ground wire should be routed through the current-sensing device along with the motor power leads. Wired this way, the GFCI will trip only when a ground fault has occurred AND the motor ground wire is no longer functional.

3-Wire Control Boxes

Single-phase three-wire submersible motors require the use of control boxes. Operation of motors without control boxes or with incorrect boxes can result in motor failure and voids warranty.

Control boxes contain starting capacitors, a starting relay, and, in some sizes, overload protectors, running capacitors and contactors.

Ratings through 1 hp may use either a Franklin Electric solid state QD or a potential (voltage) type starting relay, while larger ratings use potential relays.

Potential (Voltage) Relays

Potential relays have normally closed contacts. When power is applied, both start and main motor windings are energized, and the motor starts. At this instant, the voltage across the start winding is relatively low and not enough to open the contacts of the relay.

As the motor accelerates, the increasing voltage across the start winding (and the relay coil) opens the relay contacts. This opens the starting circuit and the motor continues to run on the main winding alone, or the main plus run capacitor circuit. After the motor is started the relay contacts remain open.

CAUTION: The control box and motor are two pieces of one assembly. Be certain that the control box and motor hp and voltage match. Since a motor is designed to operate with a control box from the same manufacturer, we can promise warranty coverage only when a Franklin control box is used with a Franklin motor.

2-Wire Motor Solid State Controls

BIAC Switch Operation

When power is applied the bi-metal switch contacts are closed, so the triac is conducting and energizes the start winding. As rpm increases, the voltage in the sensor coil generates heat in the bi-metal strip, causing the bi-metal strip to bend and open the switch circuit. This removes the starting winding and the motor continues to run on the main winding alone.

Approximately 5 seconds after power is removed from the motor, the bi-metal strip cools sufficiently to return to its closed position and the motor is ready for the next start cycle.

Rapid Cycling

The BIAC starting switch will reset within approximately 5 seconds after the motor is stopped. If an attempt is made to restart the motor before the starting switch has reset, the motor may not start; however, there will be current in the main winding until the overload protector interrupts the circuit. The time for the protector to reset is longer than the reset of the starting switch. Therefore, the start switch will have closed and the motor will operate.

CAUTION: Restarting the motor within 5 seconds after power is removed may cause the motor overload to trip.

A waterlogged tank will cause fast cycling. When a waterlogged condition does occur, the user will be alerted to the problem during the off time (overload reset time) since the pressure will drop drastically. When the waterlogged tank condition is detected, the condition should be corrected to prevent nuisance tripping of the overload protector.

Bound Pump (Sandlocked)

When the motor is not free to turn, as with a sandlocked pump, the BIAC switch creates a “reverse impact torque” in the motor in either direction. When the sand is dislodged, the motor will start and operate in the correct direction.

QD Relays (Solid State)

There are two elements in the relay: a reed switch and a triac. The reed switch consists of two tiny rectangular blade-type contacts, which bend under magnetic flux. It is hermetically sealed in glass and is located within a coil, which conducts line current. When power is supplied to the control box, the main winding current passing through the coil immediately closes the reed switch contacts. This turns on the triac, which supplies voltage to the start winding, thus starting the motor.

Once the motor is started, the operation of the QD relay is an interaction between the triac, the reed switch and the motor windings. The solid state switch senses motor speed through the changing phase relationship between start winding current and line current. As the motor approaches running speed, the phase angle between the start current and the line current becomes nearly in phase. At this point, the reed switch contacts open, turning off the triac. This removes voltage from the start winding and the motor continues to run on the main winding only. With the reed switch contacts open and the triac turned off, the QD relay is ready for the next starting cycle.

2- or 3-Wire Cable, 60 Hz (Service Entrance to Motor - Maximum Length In Feet)

Table 11

60 °C

MOTOR RATING			60 °C INSULATION - AWG COPPER WIRE SIZE												
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000
115	1/2	.37	100	160	250	390	620	960	1190	1460	1780	2160	2630	3140	3770
230	1/2	.37	400	650	1020	1610	2510	3880	4810	5880	7170	8720			
	3/4	.55	300	480	760	1200	1870	2890	3580	4370	5330	6470	7870		
	1	.75	250	400	630	990	1540	2380	2960	3610	4410	5360	6520		
	1.5	1.1	190	310	480	770	1200	1870	2320	2850	3500	4280	5240		
	2	1.5	150	250	390	620	970	1530	1910	2360	2930	3620	4480		
	3	2.2	**120**	190	300	470	750	1190	1490	1850	2320	2890	3610		
	5	3.7	0	0	**180**	280	450	710	890	1110	1390	1740	2170	2680	
	7.5	5.5	0	0	0	**200**	310	490	610	750	930	1140	1410	1720	
	10	7.5	0	0	0	0	**250**	390	490	600	750	930	1160	1430	1760
	15	11	0	0	0	0	**170**	**270**	340	430	530	660	820	1020	1260

Table 11A

75 °C

MOTOR RATING			75 °C INSULATION - AWG COPPER WIRE SIZE												
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000
115	1/2	.37	100	160	250	390	620	960	1190	1460	1780	2160	2630	3140	3770
230	1/2	.37	400	650	1020	1610	2510	3880	4810	5880	7170	8720			
	3/4	.55	300	480	760	1200	1870	2890	3580	4370	5330	6470	7870	9380	
	1	.75	250	400	630	990	1540	2380	2960	3610	4410	5360	6520	7780	9350
	1.5	1.1	190	310	480	770	1200	1870	2320	2850	3500	4280	5240	6300	7620
	2	1.5	150	250	390	620	970	1530	1910	2360	2930	3620	4480	5470	6700
	3	2.2	**120**	190	300	470	750	1190	1490	1850	2320	2890	3610	4470	5550
	5	3.7	0	**110**	180	280	450	710	890	1110	1390	1740	2170	2680	3330
	7.5	5.5	0	0	**120**	200	310	490	610	750	930	1140	1410	1720	2100
	10	7.5	0	0	0	**160**	250	390	490	600	750	930	1160	1430	1760
	15	11	0	0	0	0	**170**	270	340	430	530	660	820	1020	1260

1 Foot = .3048 Meter

Lengths in **BOLD** only meet the US National Electrical Code ampacity requirements for individual conductors 60 °C or 75 °C in free air or water, not in magnetic enclosures, conduit or direct buried.

Lengths NOT in bold meet the NEC ampacity requirements for either individual conductors or jacketed 60 °C or 75 °C cable and can be in conduit or direct buried. Flat molded and web/ribbon cable are considered jacketed cable.

If any other cable is used, the NEC and local codes should be observed.

Cable lengths in tables 11 & 11A allow for a 5% voltage drop running at maximum nameplate amperes. If 3% voltage drop is desired, multiply table 11 and 11A lengths by 0.6 to get maximum cable length.

The portion of the total cable length, which is between the supply and single-phase control box with a line contactor, should not exceed 25% of total maximum allowable to ensure reliable contactor operation. Single-phase control boxes without line contactors may be connected at any point in the total cable length.

Tables 11 & 11A are based on copper wire. If aluminum wire is used, it must be two sizes larger than copper wire and oxidation inhibitors must be used on connections.

EXAMPLE: If tables 11 & 11A call for #12 copper wire, #10 aluminum wire would be required.

Contact Franklin Electric for 90 °C cable lengths. See pages 15, 49, and 50 for applications using 230 V motors on 208 V power systems.

Two or More Different Cable Sizes Can Be Used

Depending on the installation, any number of combinations of cable may be used.

For example, in a replacement/upgrade installation, the well already has 160 feet of buried #10 cable between the service entrance and the wellhead. A new 3 hp, 230-volt, single-phase motor is being installed to replace a smaller motor. The question is: Since there is already 160 feet of #10 AWG installed, what size cable is required in the well with a 3 hp, 230-volt, single-phase motor setting at 310 feet?

From tables 11 & 11A, a 3 hp motor can use up to 300 feet of #10 AWG cable.

The application has 160 feet of #10 AWG copper wire installed.

Using the formula below, 160 feet (actual) ÷ 300 feet (max allowable) is equal to 0.533. This means 53.3% (0.533 x 100) of the allowable voltage drop or loss, which is allowed between the service entrance and the motor, occurs in this wire. This leaves us 46.7% (1.00 - 0.533 = 0.467) of some other wire size to use in the remaining 310 feet “down hole” wire run.

The table shows #8 AWG copper wire is good for 470 feet. Using the formula again, 310 feet (used) ÷ 470 feet (allowed) = 0.660; adding this to the 0.533 determined earlier; 0.533 + 0.660 = 1.193. This combination is greater than 1.00, so the voltage drop will not meet US National Electrical Code recommendations.

Tables 11 & 11A show #6 AWG copper wire is good for 750 feet. Using the formula, 310 ÷ 750 = 0.413, and using these numbers, 0.533 + 0.413 = 0.946, we find this is less than 1.00 and will meet the NEC recommended voltage drop.

This works for two, three or more combinations of wire and it does not matter which size wire comes first in the installation.

Formula:

$$\frac{\text{Actual Length}}{\text{Max Allowed}} + \frac{\text{Actual Length}}{\text{Max Allowed}} = 1.00$$

EXAMPLE: 3 hp, 230-Volt, Single-Phase Motor

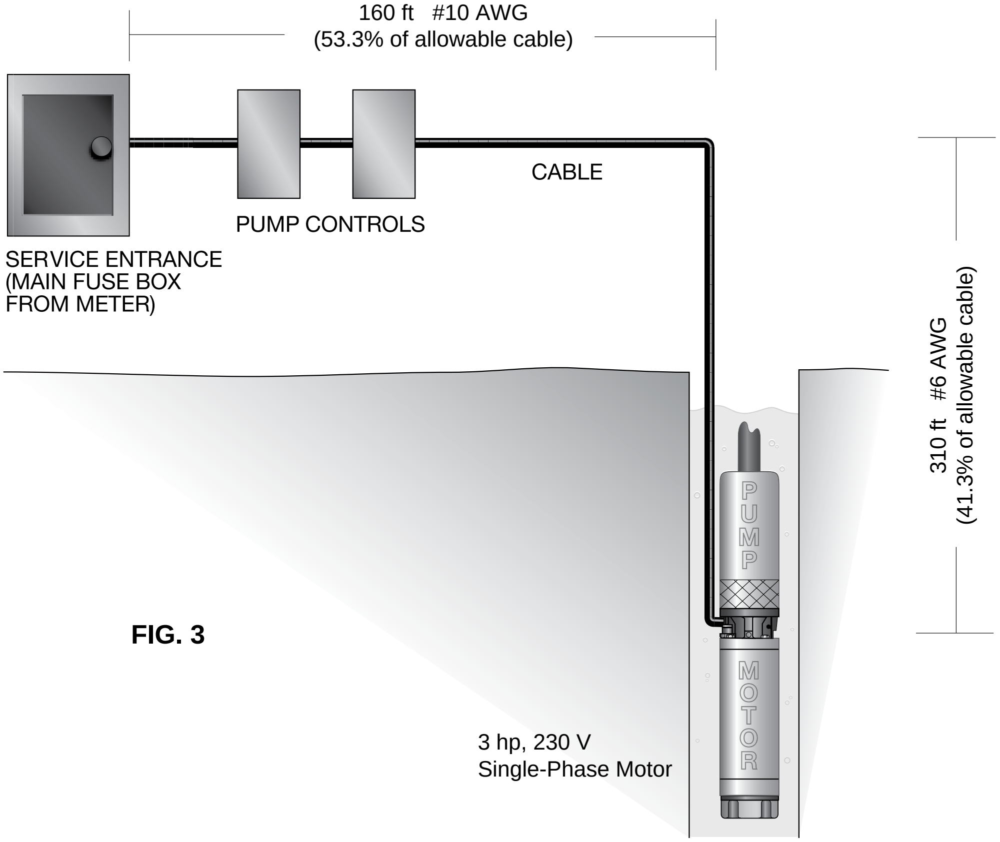


FIG. 3

Table 13 Single-Phase Motor Specifications (60 Hz) 3450 rpm

TYPE	MOTOR MODEL PREFIX	RATING					FULL LOAD		MAXIMUM LOAD		WINDING (1) RES. IN OHMS	EFFICIENCY %		POWER FACTOR %		LOCKED ROTOR AMPS	KVA CODE
		HP	KW	VOLTS	HZ	S.F.	(2) AMPS	WATTS	(2) AMPS	WATTS	M=MAIN RES. S=START RES.	S.F.	F.L.	S.F.	F.L.		
4" 2-WIRE	244504	1/2	0.37	115	60	1.6	10.0	670	12.0	960	1.0-1.3	62	56	73	58	64.4	R
	244505	1/2	0.37	230	60	1.6	5.0	670	6.0	960	4.2-5.2	62	56	73	58	32.2	R
	244507	3/4	0.55	230	60	1.5	6.8	940	8.0	1310	3.0-3.6	64	59	74	62	40.7	N
	244508	1	0.75	230	60	1.4	8.2	1210	10.4	1600	2.2-2.7	65	62	74	63	48.7	N
	244309	1.5	1.1	230	60	1.3	10.6	1770	13.1	2280	1.5-2.1	64	63	83	76	66.2	M
4" 3-WIRE	214504	1/2	0.37	115	60	1.6	Y10.0 B10.0 R0	670	Y12.0 B12.0 R0	960	M1.0-1.3 S4.1-5.1	62	56	73	58	50.5	M
	214505	1/2	0.37	230	60	1.6	Y5.0 B5.0 R0	670	Y6.0 B6.0 R0	960	M4.2-5.2 S16.7-20.5	62	56	73	58	23	M
	214507	3/4	0.55	230	60	1.5	Y6.8 B6.8 R0	940	Y8.0 B8.0 R0	1310	M3.0-3.6 S10.7-13.1	64	59	74	62	34.2	M
	214508	1	0.75	230	60	1.4	Y8.2 B8.2 R0	1210	10.4 10.4 R0	1600	M2.2-2.7 S9.9-12.1	65	62	74	63	41.8	L
4" 3-WIRE W/CRC CB	214505	1/2	0.37	230	60	1.6	Y3.6 B3.7 R2.0	655	Y4.3 B4.0 R2.0	890	M4.2-5.2 S16.7-20.5	67	57	90	81	23	M
	214507	3/4	0.55	230	60	1.5	Y4.9 B5.0 R3.2	925	Y5.7 B5.2 R3.1	1220	M3.0-3.6 S10.7-13.1	69	60	92	84	34.2	M
	214508	1	0.75	230	60	1.4	Y6.0 B5.7 R3.4	1160	Y7.1 B6.2 R3.3	1490	M2.2-2.7 S9.9-12.1	70	64	92	86	41.8	L
4" 3-WIRE	214508 W/1-1.5 CB	1	0.75	230	60	1.4	Y6.6 B6.6 R1.3	1130	Y8.0 B7.9 R1.3	1500	M2.2-2.7 S9.9-12.1	70	66	82	72	43	L
	224300	1.5	1.1	230	60	1.3	Y10.0 B9.9 R1.3	1620	Y11.5 B11.0 R1.3	2080	M1.7-2.1 S7.5-9.2	70	69	85	79	51.4	J
	224301	2	1.5	230	60	1.25	Y10.0 B9.3 R2.6	2025	Y13.2 B11.9 R2.6	2555	M1.8-2.3 S5.5-7.2	73	74	95	94	53.1	G
	224302 (3)	3	2.2	230	60	1.15	Y14.0 B11.2 R6.1	3000	Y17.0 B12.6 R6.0	3400	M1.1-1.4 S4.0-4.8	75	75	99	99	83.4	H
	224303 (4)	5	3.7	230	60	1.15	Y23.0 B15.9 R11.0	4830	Y27.5 B19.1 R10.8	5500	M.71-.82 S1.8-2.2	78	77	100	100	129	G
6"	226110 (5)	5	3.7	230	60	1.15	Y23.0 B14.3 R10.8	4910	Y27.5 B17.4 R10.5	5570	M.55-.68 S1.3-1.7	77	76	100	99	99	E
	226111	7.5	5.5	230	60	1.15	Y36.5 B34.4 R5.5	7300	Y42.1 B40.5 R5.4	8800	M.36-.50 S.88-1.1	73	74	91	90	165	F
	226112	10	7.5	230	60	1.15	Y44.0 B39.5 R9.3	9800	Y51.0 B47.5 R8.9	11300	M.27-.33 S.80-.99	76	77	96	96	204	E
	226113	15	11	230	60	1.15	Y62.0 B52.0 R17.5	13900	Y75.0 B62.5 R16.9	16200	M.17-.22 S.68-.93	79	80	97	98	303	E

(1) Main winding - yellow to black
Start winding - yellow to red

(2) Y = Yellow lead - line amps
B = Black lead - main winding amps
R = Red lead - start or auxiliary winding amps

(3) Control Boxes date coded 02C and older have **35 MFD** run capacitors. Current values should be Y14.0 @ FL and Y17.0 @ Max Load.
B12.2 B14.5
R4.7 R4.5

(4) Control Boxes date coded 01M and older have **60 MFD** run capacitors and the current values on a 4" motor will be Y23.0 @ FL - Y27.5 @ Max Load.
B19.1 B23.2
R8.0 R7.8

(5) Control Boxes date coded 01M and older have **60 MFD** run capacitors and the current values on a 6" motor will be Y23.0 @ FL -Y27.5 @ Max Load.
B18.2 B23.2
R8.0 R7.8

Performance is typical, not guaranteed, at specified voltages and specified capacitor values. Performance at voltage ratings not shown is similar, except amps vary inversely with voltage.

Table 14 Single-Phase Motor Fuse Sizing

TYPE	MOTOR MODEL PREFIX	RATING			CIRCUIT BREAKERS OR FUSE AMPS (MAXIMUM PER NEC)			CIRCUIT BREAKERS OR FUSE AMPS (TYPICAL SUBMERSIBLE)		
		HP	KW	VOLTS	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER
4" 2-WIRE	244504	1/2	0.37	115	35	20	30	30	15	30
	244505	1/2	0.37	230	20	10	15	15	8	15
	244507	3/4	0.55	230	25	15	20	20	10	20
	244508	1	0.75	230	30	20	25	25	11	25
	244309	1.5	1.1	230	35	20	30	35	15	30
4" 3-WIRE	214504	1/2	0.37	115	35	20	30	30	15	30
	214505	1/2	0.37	230	20	10	15	15	8	15
	214507	3/4	0.55	230	25	15	20	20	10	20
	214508	1	0.75	230	30	20	25	25	11	25
4" 3-WIRE W/CRC CB	214505	1/2	0.37	230	20	10	15	15	8	15
	214507	3/4	0.55	230	25	15	20	20	10	20
	214508	1	0.75	230	30	20	25	25	11	25
4" 3-WIRE	214508 W/ 1-1.5 CB	1	0.75	230	30	20	25	25	11	25
	224300	1.5	1.1	230	35	20	30	30	15	30
	224301	2	1.5	230	30	20	25	30	15	25
	224302	3	2.2	230	45	30	40	45	20	40
	224303	5	3.7	230	80	45	60	70	30	60
6"	226110	5	3.7	230	80	45	60	70	30	60
	226111	7.5	5.5	230	125	70	100	110	50	100
	226112	10	7.5	230	150	80	125	150	60	125
	226113	15	11	230	200	125	175	200	90	175

Auxiliary Running Capacitors

Added capacitors must be connected across “Red” and “Black” control box terminals, in parallel with any existing running capacitors. The additional capacitor(s) should be mounted in an auxiliary box. The values of additional running capacitors most likely to reduce noise are given below. The tabulation gives the **max.** S.F. amps normally in each lead with the added capacitor.

Although motor amps decrease when auxiliary run capacitance is added, the load on the motor does not. If a motor is overloaded with normal capacitance, it still will be overloaded with auxiliary run capacitance, even though motor amps may be within nameplate values.

Table 15 Auxiliary Capacitor Sizing

MOTOR RATING		NORMAL RUNNING CAPACITOR(S)	AUXILIARY RUNNING CAPACITORS FOR NOISE REDUCTION			MAXIMUM AMPS WITH RUN CAP		
HP	VOLTS	MFD	MFD	MIN. VOLTS	FRANKLIN PART	YELLOW	BLACK	RED
1/2	115	0	60(1)	370	TWO 155327101	8.4	7.0	4.0
1/2	230	0	15(1)	370	ONE 155328101	4.2	3.5	2.0
3/4		0	20(1)	370	ONE 155328103	5.8	5.0	2.5
1		0	25(1)	370	ONE EA. 155328101 155328102	7.1	5.6	3.4
1.5		10	20	370	ONE 155328103	9.3	7.5	4.4
2		20	10	370	ONE 155328102	11.2	9.2	3.8
3		45	NONE	370		17.0	12.6	6.0
5		80	NONE	370		27.5	19.1	10.8
7.5		45	45	370	ONE EA. 155327101 155328101	37.0	32.0	11.3
10		70	30	370	ONE 155327101	49.0	42.0	13.0
15		135	NONE			75.0	62.5	16.9

(1) Do not add running capacitors to 1/3 through 1 hp control boxes, which use solid state switches or QD relays. Adding capacitors will cause switch failure. If the control box is converted to use a voltage relay, the specified running capacitance can be added.

Buck-Boost Transformers

When the available power supply voltage is not within the proper range, a buck-boost transformer is often used to adjust voltage to match the motor. The most common usage on submersible motors is boosting a 208 volt supply to use a standard 230 volt single-phase submersible motor and control. While tables to give a wide range of voltage boost or buck are published by transformer manufacturers, the following table shows Franklin’s recommendations. The table, based on boosting the voltage 10%, shows the minimum rated transformer kVA needed and the common standard transformer kVA.

Table 15A Buck-Boost Transformer Sizing

MOTOR HP	1/3	1/2	3/4	1	1.5	2	3	5	7.5	10	15
LOAD KVA	1.02	1.36	1.84	2.21	2.65	3.04	3.91	6.33	9.66	11.70	16.60
MINIMUM XFMR KVA	0.11	0.14	0.19	0.22	0.27	0.31	0.40	0.64	0.97	1.20	1.70
STANDARD XFMR KVA	0.25	0.25	0.25	0.25	0.50	0.50	0.50	0.75	1.00	1.50	2.00

Buck-Boost transformers are power transformers, not control transformers. They may also be used to lower voltage when the available power supply voltage is too high.

Table 16 Three-Phase 60 °C Cable, 60 Hz (Service Entrance to Motor) Maximum Length in Feet

60 °C

MOTOR RATING			60 °C INSULATION - AWG COPPER WIRE SIZE													MCM COPPER WIRE SIZE					
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500
200 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	710	1140	1800	2840	4420													
	3/4	0.55	510	810	1280	2030	3160													
	1	0.75	430	690	1080	1710	2670	4140	5140											
	1.5	1.1	310	500	790	1260	1960	3050	3780											
	2	1.5	240	390	610	970	1520	2360	2940	3610	4430	5420								
	3	2.2	180	290	470	740	1160	1810	2250	2760	3390	4130								
	5	3.7	**110**	170	280	440	690	1080	1350	1660	2040	2490	3050	3670	4440	5030				
	7.5	5.5	0	0	200	310	490	770	960	1180	1450	1770	2170	2600	3150	3560				
	10	7.5	0	0	0	**230**	370	570	720	880	1090	1330	1640	1970	2390	2720	3100	3480	3800	4420
	15	11	0	0	0	**160**	**250**	390	490	600	740	910	1110	1340	1630	1850	2100	2350	2570	2980
	20	15	0	0	0	0	**190**	**300**	380	460	570	700	860	1050	1270	1440	1650	1850	2020	2360
	25	18.5	0	0	0	0	0	**240**	**300**	**370**	460	570	700	840	1030	1170	1330	1500	1640	1900
	30	22	0	0	0	0	0	0	**250**	**310**	**380**	470	580	700	850	970	1110	1250	1360	1590
230 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	930	1490	2350	3700	5760	8910												
	3/4	0.55	670	1080	1700	2580	4190	6490	8060	9860										
	1	0.75	560	910	1430	2260	3520	5460	6780	8290										
	1.5	1.1	420	670	1060	1670	2610	4050	5030	6160	7530	9170								
	2	1.5	320	510	810	1280	2010	3130	3890	4770	5860	7170	8780							
	3	2.2	240	390	620	990	1540	2400	2980	3660	4480	5470	6690	8020	9680					
	5	3.7	**140**	230	370	590	920	1430	1790	2190	2690	3290	4030	4850	5870	6650	7560	8460	9220	
	7.5	5.5	0	**160**	260	420	650	1020	1270	1560	1920	2340	2870	3440	4160	4710	5340	5970	6500	7510
	10	7.5	0	0	**190**	310	490	760	950	1170	1440	1760	2160	2610	3160	3590	4100	4600	5020	5840
	15	11	0	0	0	**210**	330	520	650	800	980	1200	1470	1780	2150	2440	2780	3110	3400	3940
	20	15	0	0	0	0	**250**	400	500	610	760	930	1140	1380	1680	1910	2180	2450	2680	3120
	25	18.5	0	0	0	0	0	**320**	400	500	610	750	920	1120	1360	1540	1760	1980	2160	2520
	30	22	0	0	0	0	0	**260**	**330**	**410**	510	620	760	930	1130	1280	1470	1650	1800	2110
380 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	2690	4290	6730															
	3/4	0.55	2000	3190	5010	7860														
	1	0.75	1620	2580	4060	6390	9980													
	1.5	1.1	1230	1970	3100	4890	7630													
	2	1.5	870	1390	2180	3450	5400	8380												
	3	2.2	680	1090	1710	2690	4200	6500	8020	9830										
	5	3.7	400	640	1010	1590	2490	3870	4780	5870	7230	8830								
	7.5	5.5	270	440	690	1090	1710	2640	3260	4000	4930	6010	7290	8780						
	10	7.5	**200**	**320**	510	800	1250	1930	2380	2910	3570	4330	5230	6260	7390	8280	9340			
	15	11	0	0	**370**	590	920	1430	1770	2170	2690	3290	4000	4840	5770	6520	7430	8250	8990	
	20	15	0	0	0	**440**	700	1090	1350	1670	2060	2530	3090	3760	4500	5110	5840	6510	7120	8190
	25	18.5	0	0	0	**360**	570	880	1100	1350	1670	2050	2510	3040	3640	4130	4720	5250	5740	6590
	30	22	0	0	0	0	**470**	730	910	1120	1380	1700	2080	2520	3020	3430	3920	4360	4770	5490
	40	30	0	0	0	0	0	**530**	660	820	1010	1240	1520	1840	2200	2500	2850	3170	3470	3990
	50	37	0	0	0	0	0	0	**540**	**660**	820	1000	1220	1480	1770	2010	2290	2550	2780	3190
	60	45	0	0	0	0	0	0	0	**560**	**690**	850	1030	1250	1500	1700	1940	2150	2350	2700
	75	55	0	0	0	0	0	0	0	0	**570**	**700**	**860**	1050	1270	1440	1660	1850	2030	2350
	100	75	0	0	0	0	0	0	0	0	0	**510**	**630**	**760**	910	1030	1180	1310	1430	1650
	125	93	0	0	0	0	0	0	0	0	0	0	0	**620**	**740**	**840**	**950**	1060	1160	1330
	150	110	0	0	0	0	0	0	0	0	0	0	0	0	**620**	**700**	**790**	**880**	**960**	1090
	175	130	0	0	0	0	0	0	0	0	0	0	0	0	0	**650**	**750**	**840**	**920**	1070
	200	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**630**	**700**	**760**	**880**

Lengths in **BOLD** only meet the US National Electrical Code ampacity requirements for individual conductors in free air or water. Lengths NOT in bold meet NEC ampacity requirements for either individual conductors or jacketed cable. See page 11 for additional details.

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Table 17 Three-Phase 60 °C Cable (Continued)

60 °C

MOTOR RATING			60 °C INSULATION - AWG COPPER WIRE SIZE													MCM COPPER WIRE SIZE				
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500
460 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	3770	6020	9460															
	3/4	0.55	2730	4350	6850															
	1	0.75	2300	3670	5770	9070														
	1.5	1.1	1700	2710	4270	6730														
	2	1.5	1300	2070	3270	5150	8050													
	3	2.2	1000	1600	2520	3970	6200													
	5	3.7	590	950	1500	2360	3700	5750												
	7.5	5.5	420	680	1070	1690	2640	4100	5100	6260	7680									
	10	7.5	310	500	790	1250	1960	3050	3800	4680	5750	7050								
	15	11	0	**340**	540	850	1340	2090	2600	3200	3930	4810	5900	7110						
	20	15	0	0	**410**	650	1030	1610	2000	2470	3040	3730	4580	5530						
	25	18.5	0	0	0	**530**	830	1300	1620	1990	2450	3010	3700	4470	5430					
	30	22	0	0	0	**430**	680	1070	1330	1640	2030	2490	3060	3700	4500	5130	5860			
	40	30	0	0	0	0	**500**	790	980	1210	1490	1830	2250	2710	3290	3730	4250			
	50	37	0	0	0	0	0	**640**	800	980	1210	1480	1810	2190	2650	3010	3420	3830	4180	4850
	60	45	0	0	0	0	0	**540**	**670**	**830**	1020	1250	1540	1850	2240	2540	2890	3240	3540	4100
	75	55	0	0	0	0	0	0	0	**680**	**840**	1030	1260	1520	1850	2100	2400	2700	2950	3440
	100	75	0	0	0	0	0	0	0	0	**620**	**760**	**940**	1130	1380	1560	1790	2010	2190	2550
	125	93	0	0	0	0	0	0	0	0	0	0	**740**	**890**	**1000**	1220	1390	1560	1700	1960
	150	110	0	0	0	0	0	0	0	0	0	0	0	**760**	**920**	**1050**	**1190**	1340	1460	1690
	175	130	0	0	0	0	0	0	0	0	0	0	0	0	**810**	**930**	**1060**	**1190**	1300	1510
	200	150	0	0	0	0	0	0	0	0	0	0	0	0	0	**810**	**920**	**1030**	**1130**	1310
575 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	5900	9410																
	3/4	0.55	4270	6810																
	1	0.75	3630	5800	9120															
	1.5	1.1	2620	4180	6580															
	2	1.5	2030	3250	5110	8060														
	3	2.2	1580	2530	3980	6270														
	5	3.7	920	1480	2330	3680	5750													
	7.5	5.5	660	1060	1680	2650	4150													
	10	7.5	490	780	1240	1950	3060	4770	5940											
	15	11	**330**	530	850	1340	2090	3260	4060											
	20	15	0	**410**	650	1030	1610	2520	3140	3860	4760	5830								
	25	18.5	0	0	**520**	830	1300	2030	2530	3110	3840	4710								
	30	22	0	0	**430**	680	1070	1670	2080	2560	3160	3880	4770	5780	7030	8000				
	40	30	0	0	0	**500**	790	1240	1540	1900	2330	2860	3510	4230	5140	5830				
	50	37	0	0	0	0	**640**	1000	1250	1540	1890	2310	2840	3420	4140	4700	5340	5990	6530	7580
	60	45	0	0	0	0	0	**850**	1060	1300	1600	1960	2400	2890	3500	3970	4520	5070	5530	6410
	75	55	0	0	0	0	0	**690**	**860**	**1060**	1310	1600	1970	2380	2890	3290	3750	5220	4610	5370
	100	75	0	0	0	0	0	0	0	**790**	**970**	**1190**	1460	1770	2150	2440	2790	3140	3430	3990
	125	93	0	0	0	0	0	0	0	0	**770**	**950**	**1160**	1400	1690	1920	2180	2440	2650	3070
	150	110	0	0	0	0	0	0	0	0	0	**800**	**990**	**1190**	1440	1630	1860	2080	2270	2640
	175	130	0	0	0	0	0	0	0	0	0	0	**870**	**1050**	**1270**	**1450**	1650	1860	2030	2360
	200	150	0	0	0	0	0	0	0	0	0	0	0	**920**	**1110**	**1260**	**1440**	1620	1760	2050

Lengths in **BOLD** only meet the US National Electrical Code ampacity requirements for individual conductors in free air or water. Lengths NOT in bold meet NEC ampacity requirements for either individual conductors or jacketed cable. See 11 for additional details.

Continued on next page

Table 18 Three-Phase 60 °C Cable (Continued)

60 °C

MOTOR RATING			60 °C INSULATION - AWG COPPER WIRE SIZE													MCM COPPER WIRE SIZE				
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500
200 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	160	250	420	660	1030	1620	2020	2490	3060	3730	4570	5500	6660	7540				
	7.5	5.5	110	180	300	460	730	1150	1440	1770	2170	2650	3250	3900	4720	5340				
	10	7.5	**80**	130	210	340	550	850	1080	1320	1630	1990	2460	2950	3580	4080	4650	5220	5700	6630
	15	11	0	0	**140**	240	370	580	730	900	1110	1360	1660	2010	2440	2770	3150	3520	3850	4470
	20	15	0	0	0	**170**	280	450	570	690	850	1050	1290	1570	1900	2160	2470	2770	3030	3540
	25	18.5	0	0	0	**140**	**220**	360	450	550	690	850	1050	1260	1540	1750	1990	2250	2460	2850
	30	22	0	0	0	0	**180**	294	370	460	570	700	870	1050	1270	1450	1660	1870	2040	2380
230 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	210	340	550	880	1380	2140	2680	3280	4030	4930	6040	7270	8800	9970				
	7.5	5.5	150	240	390	630	970	1530	1900	2340	2880	3510	4300	5160	6240	7060	8010	8950	9750	
	10	7.5	**110**	180	280	460	730	1140	1420	1750	2160	2640	3240	3910	4740	5380	6150	6900	7530	8760
	15	11	0	0	**190**	310	490	780	970	1200	1470	1800	2200	2670	3220	3660	4170	4660	5100	5910
	20	15	0	0	**140**	230	370	600	750	910	1140	1390	1710	2070	2520	2860	3270	3670	4020	4680
	25	18.5	0	0	0	**190**	300	480	600	750	910	1120	1380	1680	2040	2310	2640	2970	3240	3780
	30	22	0	0	0	**150**	**240**	390	490	610	760	930	1140	1390	1690	1920	2200	2470	2700	3160
380 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	600	960	1510	2380	3730	5800	7170	8800										
	7.5	5.5	400	660	1030	1630	2560	3960	4890	6000	7390	9010								
	10	7.5	300	480	760	1200	1870	2890	3570	4360	5350	6490	7840	9390						
	15	11	210	340	550	880	1380	2140	2650	3250	4030	4930	6000	7260	8650	9780				
	20	15	**160**	260	410	660	1050	1630	2020	2500	3090	3790	4630	5640	6750	7660	4260	9760		
	25	18.5	0	**210**	330	540	850	1320	1650	2020	2500	3070	3760	4560	5460	6190	7080	7870	8610	9880
	30	22	0	0	**270**	430	700	1090	1360	1680	2070	2550	3120	3780	4530	5140	5880	6540	7150	8230
	40	30	0	0	0	**320**	510	790	990	1230	1510	1860	2280	2760	3300	3750	4270	4750	5200	5980
	50	37	0	0	0	**250**	**400**	630	810	990	1230	1500	1830	2220	2650	3010	3430	3820	4170	4780
	60	45	0	0	0	0	**340**	540	660	840	1030	1270	1540	1870	2250	2550	2910	3220	3520	4050
	75	55	0	0	0	0	0	**450**	550	690	855	1050	1290	1570	1900	2160	2490	2770	3040	3520
	100	75	0	0	0	0	0	0	**420**	**520**	640	760	940	1140	1360	1540	1770	1960	2140	2470
	125	93	0	0	0	0	0	0	0	**400**	**490**	**600**	730	930	1110	1260	1420	1590	1740	1990
	150	110	0	0	0	0	0	0	0	0	**420**	**510**	**620**	750	930	1050	1180	1320	1440	1630
	175	130	0	0	0	0	0	0	0	0	**360**	**440**	**540**	660	780	970	1120	1260	1380	1600
	200	150	0	0	0	0	0	0	0	0	0	0	**480**	**580**	**690**	790	940	1050	1140	1320
460 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	880	1420	2250	3540	5550	8620												
	7.5	5.5	630	1020	1600	2530	3960	6150	7650	9390										
	10	7.5	460	750	1180	1870	2940	4570	5700	7020	8620									
	15	11	310	510	810	1270	2010	3130	3900	4800	5890	7210	8850							
	20	15	**230**	380	610	970	1540	2410	3000	3700	4560	5590	6870	8290						
	25	18.5	**190**	310	490	790	1240	1950	2430	2980	3670	4510	5550	6700	8140					
	30	22	0	**250**	410	640	1020	1600	1990	2460	3040	3730	4590	5550	6750	7690	8790			
	40	30	0	0	**300**	480	750	1180	1470	1810	2230	2740	3370	4060	4930	5590	6370			
	50	37	0	0	0	**370**	590	960	1200	1470	1810	2220	2710	3280	3970	4510	5130	5740	6270	7270
	60	45	0	0	0	**320**	**500**	810	1000	1240	1530	1870	2310	2770	3360	3810	4330	4860	5310	6150
	75	55	0	0	0	0	**420**	660	810	1020	1260	1540	1890	2280	2770	3150	3600	4050	4420	5160
	100	75	0	0	0	0	0	**500**	**610**	760	930	1140	1410	1690	2070	2340	2680	3010	3280	3820
	125	93	0	0	0	0	0	0	**470**	**590**	**730**	880	1110	1330	1500	1830	2080	2340	2550	2940
	150	110	0	0	0	0	0	0	0	**510**	**630**	**770**	950	1140	1380	1570	1790	2000	2180	2530
	175	130	0	0	0	0	0	0	0	0	**550**	**680**	**830**	1000	1220	1390	1580	1780	1950	2270
	200	150	0	0	0	0	0	0	0	0	0	**590**	**730**	**880**	1070	1210	1380	1550	1690	1970
575 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	1380	2220	3490	5520	8620													
	7.5	5.5	990	1590	2520	3970	6220													
	10	7.5	730	1170	1860	2920	4590	7150	8910											
	15	11	490	790	1270	2010	3130	4890	6090											
	20	15	370	610	970	1540	2410	3780	4710	5790	7140	8740								
	25	18.5	**300**	490	780	1240	1950	3040	3790	4660	5760	7060								
	30	22	**240**	400	645	1020	1600	2500	3120	3840	4740	5820	7150	8670						
	40	30	0	**300**	480	750	1180	1860	2310	2850	3490	4290	5260	6340	7710	8740				
	50	37	0	0	**380**	590	960	1500	1870	2310	2830	3460	4260	5130	6210	7050	8010	8980	9790	
	60	45	0	0	0	**500**	**790**	1270	1590	1950	2400	2940	3600	4330	5250	5950	6780	7600	8290	9610
	75	55	0	0	0	**420**	**660**	1030	1290	1590	1960	2400	2950	3570	4330	4930	5620	6330	6910	8050
	100	75	0	0	0	0	**400**	**780**	960	1180	1450	1780	2190	2650	3220	3660	4180	4710	5140	5980
	125	93	0	0	0	0	0	**600**	**740**	920	1150	1420	1740	2100	2530	2880	3270	3660	3970	4600
	150	110	0	0	0	0	0	0	**650**	**800**	**990**	1210	1480	1780	2160	2450	2790	3120	3410	3950
	175	130	0	0	0	0	0	0	0	**700**	**860**	1060	1300	1570	1910	2170	2480	2780	3040	3540
	200	150	0	0	0	0	0	0	0	0	**760**	**930**	1140	1370	1670	1890	2160	2420	2640	3070

Lengths in **BOLD** only meet the US National Electrical Code ampacity requirements for individual conductors in free air or water. Lengths NOT in bold meet NEC ampacity requirements for either individual conductors or jacketed cable. See page 11 for additional details.

Table 19 Three-Phase 75 °C Cable, 60 Hz (Service Entrance to Motor) Maximum Length in Feet

75 °C

MOTOR RATING			75 °C INSULATION - AWG COPPER WIRE SIZE													MCM COPPER WIRE SIZE				
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500
200 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	710	1140	1800	2840	4420													
	3/4	0.55	510	810	1280	2030	3160													
	1	0.75	430	690	1080	1710	2670	4140	5140											
	1.5	1.1	310	500	790	1260	1960	3050	3780											
	2	1.5	240	390	610	970	1520	2360	2940	3610	4430	5420								
	3	2.2	180	290	470	740	1160	1810	2250	2760	3390	4130								
	5	3.7	**110**	170	280	440	690	1080	1350	1660	2040	2490	3050	3670	4440	5030				
	7.5	5.5	0	0	200	310	490	770	960	1180	1450	1770	2170	2600	3150	3560				
	10	7.5	0	0	**150**	230	370	570	720	880	1090	1330	1640	1970	2390	2720	3100	3480	3800	4420
	15	11	0	0	0	**160**	250	390	490	600	740	910	1110	1340	1630	1850	2100	2350	2570	2980
	20	15	0	0	0	0	**190**	300	380	460	570	700	860	1050	1270	1440	1650	1850	2020	2360
	25	18.5	0	0	0	0	0	**240**	300	370	460	570	700	840	1030	1170	1330	1500	1640	1900
	30	22	0	0	0	0	0	**200**	**250**	310	380	470	580	700	850	970	1110	1250	1360	1590
230 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	930	1490	2350	3700	5760	8910												
	3/4	0.55	670	1080	1700	2580	4190	6490	8060	9860										
	1	0.75	560	910	1430	2260	3520	5460	6780	8290										
	1.5	1.1	420	670	1060	1670	2610	4050	5030	6160	7530	9170								
	2	1.5	320	510	810	1280	2010	3130	3890	4770	5860	7170	8780							
	3	2.2	240	390	620	990	1540	2400	2980	3660	4480	5470	6690	8020	9680					
	5	3.7	**140**	230	370	590	920	1430	1790	2190	2690	3290	4030	4850	5870	6650	7560	8460	9220	
	7.5	5.5	0	**160**	260	420	650	1020	1270	1560	1920	2340	2870	3440	4160	4710	5340	5970	6500	7510
	10	7.5	0	0	**190**	310	490	760	950	1170	1440	1760	2160	2610	3160	3590	4100	4600	5020	5840
	15	11	0	0	0	**210**	330	520	650	800	980	1200	1470	1780	2150	2440	2780	3110	3400	3940
	20	15	0	0	0	**160**	**250**	400	500	610	760	930	1140	1380	1680	1910	2180	2450	2680	3120
	25	18.5	0	0	0	0	**200**	320	400	500	610	750	920	1120	1360	1540	1760	1980	2160	2520
	30	22	0	0	0	0	0	**260**	330	410	510	620	760	930	1130	1280	1470	1650	1800	2110
380 V 60 Hz Three-Phase 3 - Lead	1/2	0.37	2690	4290	6730															
	3/4	0.55	2000	3190	5010	7860														
	1	0.75	1620	2580	4060	6390	9980													
	1.5	1.1	1230	1970	3100	4890	7630													
	2	1.5	870	1390	2180	3450	5400	8380												
	3	2.2	680	1090	1710	2690	4200	6500	8020	9830										
	5	3.7	400	640	1010	1590	2490	3870	4780	5870	7230	8830								
	7.5	5.5	270	440	690	1090	1710	2640	3260	4000	4930	6010	7290	8780						
	10	7.5	**200**	320	510	800	1250	1930	2380	2910	3570	4330	5230	6260	7390	8280	9340			
	15	11	0	0	370	590	920	1430	1770	2170	2690	3290	4000	4840	5770	6520	7430	8250	8990	
	20	15	0	0	**280**	440	700	1090	1350	1670	2060	2530	3090	3760	4500	5110	2840	6510	7120	8190
	25	18.5	0	0	0	**360**	570	880	1100	1350	1670	2050	2510	3040	3640	4130	4720	5250	5740	6590
	30	22	0	0	0	**290**	470	730	910	1120	1380	1700	2080	2520	3020	3430	3920	4360	4770	5490
	40	30	0	0	0	0	0	**530**	660	820	1010	1240	1520	1840	2200	2500	2850	3170	3470	3990
	50	37	0	0	0	0	0	**440**	**540**	660	820	1000	1220	1480	1770	2010	2290	2550	2780	3190
	60	45	0	0	0	0	0	**370**	**460**	**560**	690	850	1030	1250	1500	1700	1940	2150	2350	2700
	75	55	0	0	0	0	0	0	0	**460**	**570**	700	860	1050	1270	1440	1660	1850	2030	2350
	100	75	0	0	0	0	0	0	0	0	**420**	**510**	**630**	760	910	1030	1180	1310	1430	1650
	125	93	0	0	0	0	0	0	0	0	0	0	**510**	**620**	**740**	840	950	1060	1160	1330
	150	110	0	0	0	0	0	0	0	0	0	0	0	**520**	**620**	**700**	**790**	880	960	1090
	175	130	0	0	0	0	0	0	0	0	0	0	0	0	**560**	**650**	**750**	**840**	920	1070
	200	150	0	0	0	0	0	0	0	0	0	0	0	0	0	**550**	**630**	**700**	**760**	880

Lengths in **BOLD** only meet the US National Electrical Code ampacity requirements for individual conductors in free air or water. Lengths NOT in bold meet NEC ampacity requirements for either individual conductors or jacketed cable. See page 11 for additional details.

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Table 20 Three-Phase 75 °C Cable (Continued)

75 °C

MOTOR RATING			75 °C INSULATION - AWG COPPER WIRE SIZE													MCM COPPER WIRE SIZE				
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500
460 V 60 Hz Three- Phase 3 - Lead	1/2	0.37	3770	6020	9460															
	3/4	0.55	2730	4350	6850															
	1	0.75	2300	3670	5770	9070														
	1.5	1.1	1700	2710	4270	6730														
	2	1.5	1300	2070	3270	5150	8050													
	3	2.2	1000	1600	2520	3970	6200													
	5	3.7	590	950	1500	2360	3700	5750												
	7.5	5.5	420	680	1070	1690	2640	4100	5100	6260	7680									
	10	7.5	310	500	790	1250	1960	3050	3800	4680	5750	7050								
	15	11	0	**340**	540	850	1340	2090	2600	3200	3930	4810	5900	7110						
	20	15	0	0	410	650	1030	1610	2000	2470	3040	3730	4580	5530						
	25	18.5	0	0	**330**	530	830	1300	1620	1990	2450	3010	3700	4470	5430					
	30	22	0	0	**270**	430	680	1070	1330	1640	2030	2490	3060	3700	4500	5130	5860			
	40	30	0	0	0	**320**	**500**	790	980	1210	1490	1830	2250	2710	3290	3730	4250			
	50	37	0	0	0	0	**410**	640	800	980	1210	1480	1810	2190	2650	3010	3420	3830	4180	4850
	60	45	0	0	0	0	0	**540**	**670**	830	1020	1250	1540	1850	2240	2540	2890	3240	3540	4100
	75	55	0	0	0	0	0	**440**	**550**	**680**	840	1030	1260	1520	1850	2100	2400	2700	2950	3440
	100	75	0	0	0	0	0	0	0	**500**	**620**	**760**	940	1130	1380	1560	1790	2010	2190	2550
	125	93	0	0	0	0	0	0	0	0	0	**600**	**740**	**890**	1000	1220	1390	1560	1700	1960
	150	110	0	0	0	0	0	0	0	0	0	0	**630**	**760**	**920**	1050	1190	1340	1460	1690
	175	130	0	0	0	0	0	0	0	0	0	0	0	**670**	**810**	**930**	1060	1190	1300	1510
	200	150	0	0	0	0	0	0	0	0	0	0	0	**590**	**710**	**810**	**920**	1030	1130	1310
575 V 60 Hz Three- Phase 3 - Lead	1/2	0.37	5900	9410																
	3/4	0.55	4270	6810																
	1	0.75	3630	5800	9120															
	1.5	1.1	2620	4180	6580															
	2	1.5	2030	3250	5110	8060														
	3	2.2	1580	2530	3980	6270														
	5	3.7	920	1480	2330	3680	5750													
	7.5	5.5	660	1060	1680	2650	4150													
	10	7.5	490	780	1240	1950	3060	4770	5940											
	15	11	**330**	530	850	1340	2090	3260	4060											
	20	15	0	**410**	650	1030	1610	2520	3140	3860	4760	5830								
	25	18.5	0	0	520	830	1300	2030	2530	3110	3840	4710								
	30	22	0	0	**430**	680	1070	1670	2080	2560	3160	3880	4770	5780	7030	8000				
	40	30	0	0	0	**500**	790	1240	1540	1900	2330	2860	3510	4230	5140	5830				
	50	37	0	0	0	**410**	**640**	1000	1250	1540	1890	2310	2840	3420	4140	4700	5340	5990	6530	7580
	60	45	0	0	0	0	**540**	850	1060	1300	1600	1960	2400	2890	3500	3970	4520	5070	5530	6410
	75	55	0	0	0	0	0	**690**	860	1060	1310	1600	1970	2380	2890	3290	3750	5220	4610	5370
	100	75	0	0	0	0	0	0	**640**	**790**	970	1190	1460	1770	2150	2440	2790	3140	3430	3990
	125	93	0	0	0	0	0	0	0	**630**	**770**	**950**	1160	1400	1690	1920	2180	2440	2650	3070
	150	110	0	0	0	0	0	0	0	0	**660**	**800**	**990**	1190	1440	1630	1860	2080	2270	2640
	175	130	0	0	0	0	0	0	0	0	0	**700**	**870**	**1050**	1270	1450	1650	1860	2030	2360
	200	150	0	0	0	0	0	0	0	0	0	0	**760**	**920**	**1110**	1260	1440	1620	1760	2050

Lengths in **BOLD** only meet the US National Electrical Code ampacity requirements for individual conductors in free air or water. Lengths NOT in bold meet NEC ampacity requirements for either individual conductors or jacketed cable. See page 11 for additional details.

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Table 21 Three-Phase 75 °C Cable (Continued)

75 °C

MOTOR RATING			75 °C INSULATION - AWG COPPER WIRE SIZE													MCM COPPER WIRE SIZE				
VOLTS	HP	KW	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500
200 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	160	250	420	660	1030	1620	2020	2490	3060	3730	4570	5500	6660	7540				
	7.5	5.5	110	180	300	460	730	1150	1440	1770	2170	2650	3250	3900	4720	5340				
	10	7.5	**80**	130	210	340	550	850	1080	1320	1630	1990	2460	2950	3580	4080	4650	5220	5700	6630
	15	11	0	0	140	240	370	580	730	900	1110	1360	1660	2010	2440	2770	3150	3520	3850	4470
	20	15	0	0	**120**	170	280	450	570	690	850	1050	1290	1570	1900	2160	2470	2770	3030	3540
	25	18.5	0	0	0	**140**	220	360	450	550	690	850	1050	1260	1540	1750	1990	2250	2460	2850
	30	22	0	0	0	**120**	**180**	294	370	460	570	700	870	1050	1270	1450	1660	1870	2040	2380
230 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	210	340	550	880	1380	2140	2680	3280	4030	4930	6040	7270	8800	9970				
	7.5	5.5	150	240	390	630	970	1530	1900	2340	2880	3510	4300	5160	6240	7060	8010	8950	9750	
	10	7.5	**110**	180	280	460	730	1140	1420	1750	2160	2640	3240	3910	4740	5380	6150	6900	7530	8760
	15	11	0	**130**	190	310	490	780	970	1200	1470	1800	2200	2670	3220	3660	4170	4660	5100	5910
	20	15	0	0	**140**	230	370	600	750	910	1140	1390	1710	2070	2520	2860	3270	3670	4020	4680
	25	18.5	0	0	**120**	190	300	480	600	750	910	1120	1380	1680	2040	2310	2640	2970	3240	3780
	30	22	0	0	0	**150**	240	390	490	610	760	930	1140	1390	1690	1920	2200	2470	2700	3160
380 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	600	960	1510	2380	3730	5800	7170	8800										
	7.5	5.5	400	660	1030	1630	2560	3960	4890	6000	7390	9010								
	10	7.5	300	480	760	1200	1870	2890	3570	4360	5350	6490	7840	9390						
	15	11	210	340	550	880	1380	2140	2650	3250	4030	4930	6000	7260	8650	9780				
	20	15	**160**	260	410	660	1050	1630	2020	2500	3090	3790	4630	5640	6750	7660	4260	9760		
	25	18.5	0	**210**	330	540	850	1320	1650	2020	2500	3070	3760	4560	5460	6190	7080	7870	8610	9880
	30	22	0	0	**270**	430	700	1090	1360	1680	2070	2550	3120	3780	4530	5140	5880	6540	7150	8230
	40	30	0	0	**210**	320	510	790	990	1230	1510	1860	2280	2760	3300	3750	4270	4750	5200	5980
	50	37	0	0	0	**250**	400	630	810	990	1230	1500	1830	2220	2650	3010	3430	3820	4170	4780
	60	45	0	0	0	0	**340**	540	660	840	1030	1270	1540	1870	2250	2550	2910	3220	3520	4050
	75	55	0	0	0	0	**290**	450	550	690	855	1050	1290	1570	1900	2160	2490	2770	3040	3520
	100	75	0	0	0	0	0	**340**	**420**	520	640	760	940	1140	1360	1540	1770	1960	2140	2470
	125	93	0	0	0	0	0	0	**340**	**400**	**490**	600	730	930	1110	1260	1420	1590	1740	1990
	150	110	0	0	0	0	0	0	0	**350**	**420**	**510**	620	750	930	1050	1180	1320	1440	1630
	175	130	0	0	0	0	0	0	0	0	**360**	**440**	**540**	660	780	970	1120	1260	1380	1600
	200	150	0	0	0	0	0	0	0	0	0	**410**	**480**	**580**	690	790	940	1050	1140	1320
460 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	880	1420	2250	3540	5550	8620												
	7.5	5.5	630	1020	1600	2530	3960	6150	7650	9390										
	10	7.5	460	750	1180	1870	2940	4570	5700	7020	8620									
	15	11	310	510	810	1270	2010	3130	3900	4800	5890	7210	8850							
	20	15	230	380	610	970	1540	2410	3000	3700	4560	5590	6870	8290						
	25	18.5	**190**	310	490	790	1240	1950	2430	2980	3670	4510	5550	6700	8140					
	30	22	0	**250**	410	640	1020	1600	1990	2460	3040	3730	4590	5550	6750	7690	8790			
	40	30	0	0	**300**	480	750	1180	1470	1810	2230	2740	3370	4060	4930	5590	6370			
	50	37	0	0	**250**	370	590	960	1200	1470	1810	2220	2710	3280	3970	4510	5130	5740	6270	7270
	60	45	0	0	0	**320**	500	810	1000	1240	1530	1870	2310	2770	3360	3810	4330	4860	5310	6150
	75	55	0	0	0	0	**420**	660	810	1020	1260	1540	1890	2280	2770	3150	3600	4050	4420	5160
	100	75	0	0	0	0	**310**	**500**	610	760	930	1140	1410	1690	2070	2340	2680	3010	3280	3820
	125	93	0	0	0	0	0	**390**	**470**	**590**	730	880	1110	1330	1500	1830	2080	2340	2550	2940
	150	110	0	0	0	0	0	0	**420**	**510**	**630**	770	950	1140	1380	1570	1790	2000	2180	2530
	175	130	0	0	0	0	0	0	0	**450**	**550**	**680**	830	1000	1220	1390	1580	1780	1950	2270
	200	150	0	0	0	0	0	0	0	0	**480**	**590**	**730**	880	1070	1210	1380	1550	1690	1970
575 V 60 Hz Three-Phase 6 - Lead Y-D	5	3.7	1380	2220	3490	5520	8620													
	7.5	5.5	990	1590	2520	3970	6220													
	10	7.5	730	1170	1860	2920	4590	7150	8910											
	15	11	490	790	1270	2010	3130	4890	6090											
	20	15	370	610	970	1540	2410	3780	4710	5790	7140	8740								
	25	18.5	**300**	490	780	1240	1950	3040	3790	4660	5760	7060								
	30	22	**240**	400	645	1020	1600	2500	3120	3840	4740	5820	7150	8670						
	40	30	0	**300**	480	750	1180	1860	2310	2850	3490	4290	5260	6340	7710	8740				
	50	37	0	0	**380**	590	960	1500	1870	2310	2830	3460	4260	5130	6210	7050	8010	8980	9790	
	60	45	0	0	**330**	500	790	1270	1590	1950	2400	2940	3600	4330	5250	5950	6780	7600	8290	9610
	75	55	0	0	0	**420**	660	1030	1290	1590	1960	2400	2950	3570	4330	4930	5620	6330	6910	8050
	100	75	0	0	0	0	**400**	780	960	1180	1450	1780	2190	2650	3220	3660	4180	4710	5140	5980
	125	93	0	0	0	0	0	**600**	740	920	1150	1420	1740	2100	2530	2880	3270	3660	3970	4600
	150	110	0	0	0	0	0	**520**	**650**	800	990	1210	1480	1780	2160	2450	2790	3120	3410	3950
	175	130	0	0	0	0	0	0	**570**	**700**	860	1060	1300	1570	1910	2170	2480	2780	3040	3540
	200	150	0	0	0	0	0	0	**500**	**610**	**760**	930	1140	1370	1670	1890	2160	2420	2640	3070

Lengths in **BOLD** only meet the US National Electrical Code ampacity requirements for individual conductors in free air or water. Lengths NOT in bold meet NEC ampacity requirements for either individual conductors or jacketed cable. See page 11 for additional details.

Table 22 Three-Phase Motor Specifications (60 Hz) 3450 rpm

TYPE	MOTOR MODEL PREFIX	RATING					FULL LOAD		MAXIMUM LOAD		LINE TO LINE RESISTANCE OHMS	EFFICIENCY %		LOCKED ROTOR AMPS	KVA CODE
		HP	KW	VOLTS	HZ	S.F.	AMPS	WATTS	AMPS	WATTS		S.F.	F.L.		
4"	234501	1/2	0.37	200	60	1.6	2.8	585	3.4	860	6.6-8.4	70	64	17.5	N
	234511			230	60	1.6	2.4	585	2.9	860	9.5-10.9	70	64	15.2	N
	234541			380	60	1.6	1.4	585	2.1	860	23.2-28.6	70	64	9.2	N
	234521			460	60	1.6	1.2	585	1.5	860	38.4-44.1	70	64	7.6	N
	234531			575	60	1.6	1.0	585	1.2	860	58.0-71.0	70	64	6.1	N
	234502	3/4	0.55	200	60	1.5	3.6	810	4.4	1150	4.6-5.9	73	69	24.6	N
	234512			230	60	1.5	3.1	810	3.8	1150	6.8-7.8	73	69	21.4	N
	234542			380	60	1.5	1.9	810	2.5	1150	16.6-20.3	73	69	13	N
	234522			460	60	1.5	1.6	810	1.9	1150	27.2-30.9	73	69	10.7	N
	234532			575	60	1.5	1.3	810	1.6	1150	41.5-50.7	73	69	8.6	N
	234503	1	0.75	200	60	1.4	4.5	1070	5.4	1440	3.8-4.5	72	70	30.9	M
	234513			230	60	1.4	3.9	1070	4.7	1440	4.9-5.6	72	70	26.9	M
	234543			380	60	1.4	2.3	1070	2.8	1440	12.2-14.9	72	70	16.3	M
	234523			460	60	1.4	2	1070	2.4	1440	19.9-23.0	72	70	13.5	M
	234533			575	60	1.4	1.6	1070	1.9	1440	30.1-36.7	72	70	10.8	M
	234504	1.5	1.1	200	60	1.3	5.8	1460	6.8	1890	2.5-3.0	76	76	38.2	K
	234514			230	60	1.3	5	1460	5.9	1890	3.2-4.0	76	76	33.2	K
	234544			380	60	1.3	3	1460	3.6	1890	8.5-10.4	76	76	20.1	K
	234524			460	60	1.3	2.5	1460	3.1	1890	13.0-16.0	76	76	16.6	K
	234534			575	60	1.3	2	1460	2.4	1890	20.3-25.0	76	76	13.3	K
	234305	2	1.5	200	60	1.25	7.7	1960	9.3	2430	1.8-2.4	76	76	50.3	K
	234315			230	60	1.25	6.7	1960	8.1	2430	2.3-3.0	76	76	45.0	K
	234345			380	60	1.25	4.1	1960	4.9	2430	6.6-8.2	76	76	26.6	K
	234325			460	60	1.25	3.4	1960	4.1	2430	9.2-12.0	76	76	22.5	K
	234335			575	60	1.25	2.7	1960	3.2	2430	14.6-18.7	76	76	17.8	K
	234306	3	2.2	200	60	1.15	10.9	2920	12.5	3360	1.3-1.7	77	77	69.5	K
	234316			230	60	1.15	9.5	2920	10.9	3360	1.8-2.2	77	77	60.3	K
	234346			380	60	1.15	5.8	2920	6.6	3360	4.7-6.0	77	77	37.5	K
	234326			460	60	1.15	4.8	2920	5.5	3360	7.2-8.8	77	77	31.0	K
	234336			575	60	1.15	3.8	2920	4.4	3360	11.4-13.9	77	77	25.1	K
	234307	5	3.7	200	60	1.15	18.3	4800	20.5	5500	.68-.83	78	78	116	K
	234317			230	60	1.15	15.9	4800	17.8	5500	.91-1.1	78	78	102	K
	234347			380	60	1.15	9.6	4800	10.8	5500	2.6-3.2	78	78	60.2	K
	234327			460	60	1.15	8.0	4800	8.9	5500	3.6-4.4	78	78	53.7	K
	234337			575	60	1.15	6.4	4800	7.1	5500	5.6-6.9	78	78	41.8	K
	234308	7.5	5.5	200	60	1.15	26.5	7150	30.5	8200	.43-.53	78	78	177	K
	234318			230	60	1.15	23.0	7150	26.4	8200	.60-.73	78	78	152	K
	234348			380	60	1.15	13.9	7150	16.0	8200	1.6-2.0	78	78	92.7	K
	234328			460	60	1.15	11.5	7150	13.2	8200	2.3-2.8	78	78	83.8	K
	234338			575	60	1.15	9.2	7150	10.6	8200	3.6-4.5	78	78	64.6	K
	234549	10	7.5	380	60	1.15	19.3	10000	21.0	11400	1.2-1.6	75	75	140	L
	234595			460	60	1.15	15.9	10000	17.3	11400	1.8-2.3	75	75	116.0	L
	234598			575	60	1.15	12.5	10000	13.6	11400	2.8-3.5	75	75	92.8	L

Table 23 Three-Phase Motor Fuse Sizing

TYPE	MOTOR MODEL PREFIX	RATING			CIRCUIT BREAKERS OR FUSE AMPS (MAXIMUM PER NEC)			CIRCUIT BREAKERS OR FUSE AMPS (TYPICAL SUBMERSIBLE)		
		HP	KW	VOLTS	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER
4"	234501	1/2	0.37	200	10	5	8	10	4	15
	234511			230	8	4.5	6	8	4	15
	234541			380	5	2.5	4	5	2	15
	234521			460	4	2.25	3	4	2	15
	234531			575	3	1.8	3	3	1.4	15
	234502	3/4	0.55	200	15	7	10	12	5	15
	234512			230	10	5.6	8	10	5	15
	234542			380	6	3.5	5	6	3	15
	234522			460	5	2.8	4	5	3	15
	234532			575	4	2.5	4	4	1.8	15
	234503	1	0.75	200	15	8	15	15	6	15
	234513			230	15	7	10	12	6	15
	234543			380	8	4.5	8	8	4	15
	234523			460	6	3.5	5	6	3	15
	234533			575	5	2.8	4	5	2.5	15
	234504	1.5	1.1	200	20	12	15	20	8	15
	234514			230	15	9	15	15	8	15
	234544			380	10	5.6	8	10	4	15
	234524			460	8	4.5	8	8	4	15
	234534			575	6	3.5	5	6	3	15
	234305	2	1.5	200	25	15	20	25	11	20
	234315			230	25	12	20	25	10	20
	234345			380	15	8	15	15	6	15
	234325			460	15	6	10	11	5	15
	234335			575	10	5	8	10	4	15
	234306	3	2.2	200	35	20	30	35	15	30
	234316			230	30	17.5	25	30	12	25
	234346			380	20	12	15	20	8	15
	234326			460	15	9	15	15	6	15
	234336			575	15	7	10	11	5	15
	234307	5	3.7	200	60	35	50	60	25	50
	234317			230	50	30	40	45	20	40
	234347			380	30	17.5	25	30	12	25
	234327			460	25	15	20	25	10	20
	234337			575	20	12	20	20	8	20
	234308	7.5	5.5	200	90	50	70	80	35	70
	234318			230	80	45	60	70	30	60
	234348			380	45	25	40	40	20	40
	234328			460	40	25	30	35	15	30
	234338			575	30	17.5	25	30	12	25
	234349	10	7.5	380	70	40	60	60	25	60
	234329			460	60	30	45	50	25	45
	234339			575	45	25	35	40	20	35
	234549			380	70	35	60	60	25	60
	234595			460	60	30	45	50	25	45
	234598			575	45	25	35	40	20	35

Table 24 Three-Phase Motor Specifications (60 Hz) 3450 rpm

TYPE	MOTOR MODEL PREFIX	RATING					FULL LOAD		MAXIMUM LOAD		LINE TO LINE RESISTANCE OHMS	EFFICIENCY %		LOCKED ROTOR AMPS	KVA CODE
		HP	KW	VOLTS	HZ	S.F.	AMPS	WATTS	AMPS	WATTS		S.F.	F.L.		
6" STD.	236650	5	3.7	200	60	1.15	17.5	4700	20.0	5400	.77-.93	79	79	99	H
	236600			230	60	1.15	15	4700	17.6	5400	1.0-1.2	79	79	86	H
	236660			380	60	1.15	9.1	4700	10.7	5400	2.6-3.2	79	79	52	H
	236610			460	60	1.15	7.5	4700	8.8	5400	3.9-4.8	79	79	43	H
	236620			575	60	1.15	6	4700	7.1	5400	6.3-7.7	79	79	34	H
	236651	7.5	5.5	200	60	1.15	25.1	7000	28.3	8000	.43-.53	80	80	150	H
	236601			230	60	1.15	21.8	7000	24.6	8000	.64-.78	80	80	130	H
	236661			380	60	1.15	13.4	7000	15	8000	1.6-2.1	80	80	79	H
	236611			460	60	1.15	10.9	7000	12.3	8000	2.4-2.9	80	80	65	H
	236621			575	60	1.15	8.7	7000	9.8	8000	3.7-4.6	80	80	52	H
	236652	10	7.5	200	60	1.15	32.7	9400	37	10800	.37-.45	79	79	198	H
	236602			230	60	1.15	28.4	9400	32.2	10800	.47-.57	79	79	172	H
	236662			380	60	1.15	17.6	9400	19.6	10800	1.2-1.5	79	79	104	H
	236612			460	60	1.15	14.2	9400	16.1	10800	1.9-2.4	79	79	86	H
	236622			575	60	1.15	11.4	9400	12.9	10800	3.0-3.7	79	79	69	H
	236653	15	11	200	60	1.15	47.8	13700	54.4	15800	.24-.29	81	81	306	H
	236603			230	60	1.15	41.6	13700	47.4	15800	.28-.35	81	81	266	H
	236663			380	60	1.15	25.8	13700	28.9	15800	.77-.95	81	81	161	H
	236613			460	60	1.15	20.8	13700	23.7	15800	1.1-1.4	81	81	133	H
	236623			575	60	1.15	16.6	13700	19	15800	1.8-2.3	81	81	106	H
	236654	20	15	200	60	1.15	61.9	18100	69.7	20900	.16-.20	82	82	416	J
	236604			230	60	1.15	53.8	18100	60.6	20900	.22-.26	82	82	362	J
	236664			380	60	1.15	33	18100	37.3	20900	.55-.68	82	82	219	J
	236614			460	60	1.15	26.9	18100	30.3	20900	.8-1.0	82	82	181	J
	236624			575	60	1.15	21.5	18100	24.2	20900	1.3-1.6	82	82	145	J
	236655	25	18.5	200	60	1.15	77.1	22500	86.3	25700	.12-.15	83	83	552	J
	236605			230	60	1.15	67	22500	75	25700	.15-.19	83	83	480	J
	236665			380	60	1.15	41	22500	46	25700	.46-.56	83	83	291	J
	236615			460	60	1.15	33.5	22500	37.5	25700	.63-.77	83	83	240	J
	236625			575	60	1.15	26.8	22500	30	25700	1.0-1.3	83	83	192	J
	236656	30	22	200	60	1.15	90.9	26900	104	31100	.09-.11	83	83	653	J
	236606			230	60	1.15	79	26900	90.4	31100	.14-.17	83	83	568	J
	236666			380	60	1.15	48.8	26900	55.4	31100	.35-.43	83	83	317	J
	236616			460	60	1.15	39.5	26900	45.2	31100	.52-.64	83	83	284	J
	236626			575	60	1.15	31.6	26900	36.2	31100	.78-.95	83	83	227	J
	236667	40	30	380	60	1.15	66.5	35600	74.6	42400	.26-.33	83	83	481	J
	236617			460	60	1.15	54.9	35600	61.6	42400	.34-.42	83	83	397	J
	236627			575	60	1.15	42.8	35600	49.6	42400	.52-.64	83	83	318	H
	236668	50	37	380	60	1.15	83.5	45100	95	52200	.21-.25	82	83	501	H
	236618			460	60	1.15	67.7	45100	77	52200	.25-.32	82	83	414	H
	236628			575	60	1.15	54.2	45100	61.6	52200	.40-.49	82	83	331	H
	276668			380	60	1.15	82.4	45100	94.5	52200	.21 - .25	82	83	501	H
	276618			460	60	1.15	68.1	45100	78.1	52200	.25 - .32	82	83	414	H
	276628			575	60	1.15	54.5	45100	62.5	52200	.40 - .49	82	83	331	H
	236669	60	45	380	60	1.15	98.7	53500	111	61700	.15-.18	84	84	627	H
	236619			460	60	1.15	80.5	53500	91	61700	.22-.27	84	84	518	H
	236629			575	60	1.15	64.4	53500	72.8	61700	.35-.39	84	84	414	H
	276669			380	60	1.15	98.1	53500	111.8	61700	.15 - .18	84	84	627	H
	276619			460	60	1.15	81.0	53500	92.3	61700	.22 - .27	84	84	518	H
	276629			575	60	1.15	64.8	53500	73.9	61700	.35 - .39	84	84	414	H

Model numbers above are for three-lead motors. Six-lead motors with different model numbers have the same running performance, but when Wye connected for starting have locked rotor amps 33% of the values shown. Six-lead individual phase resistance = table X 1.5.

Table 25 6” Three-Phase Motor Specifications (60 Hz) 3450 rpm

TYPE	MOTOR MODEL PREFIX	RATING					FULL LOAD		MAXIMUM LOAD		LINE TO LINE RESISTANCE OHMS	EFFICIENCY %		LOCKED ROTOR AMPS	KVA CODE
		HP	KW	VOLTS	HZ	S.F.	AMPS	WATTS	AMPS	WATTS		S.F.	F.L.		
6" HI-TEMP 90 °C	276650	5	3.7	200	60	1.15	17.2	5200	19.8	5800	.53 - .65	73	72	124	K
	276600			230	60	1.15	15.0	5200	17.2	5800	.68 - .84	73	72	108	K
	276660			380	60	1.15	9.1	5200	10.4	5800	2.0 - 2.4	73	72	66.0	K
	276610			460	60	1.15	7.5	5200	8.6	5800	2.8 - 3.4	73	72	54.0	K
	276620			575	60	1.15	6.0	5200	6.9	5800	4.7 - 5.7	73	72	43.0	K
	276651	7.5	5.5	200	60	1.15	24.8	7400	28.3	8400	.30 - .37	77	76	193	K
	276601			230	60	1.15	21.6	7400	24.6	8400	.41 - .50	77	76	168	K
	276661			380	60	1.15	13.1	7400	14.9	8400	1.1 - 1.4	77	76	102	K
	276611			460	60	1.15	10.8	7400	12.3	8400	1.7 - 2.0	77	76	84.0	K
	276621			575	60	1.15	8.6	7400	9.9	8400	2.6 - 3.2	77	76	67.0	K
	276652	10	7.5	200	60	1.15	32.0	9400	36.3	10700	.21 - .26	80	79	274	L
	276602			230	60	1.15	27.8	9400	31.6	10700	.28 - .35	80	79	238	L
	276662			380	60	1.15	16.8	9400	19.2	10700	.80 - .98	80	79	144	L
	276612			460	60	1.15	13.9	9400	15.8	10700	1.2 - 1.4	80	79	119	L
	276622			575	60	1.15	11.1	9400	12.7	10700	1.8 - 2.2	80	79	95.0	L
	276653	15	11	200	60	1.15	48.5	14000	54.5	15900	.15 - .19	81	80	407	L
	276603			230	60	1.15	42.2	14000	47.4	15900	.19 - .24	81	80	354	L
	276663			380	60	1.15	25.5	14000	28.7	15900	.52 - .65	81	80	214	L
	276613			460	60	1.15	21.1	14000	23.7	15900	.78 - .96	81	80	177	L
	276623			575	60	1.15	16.9	14000	19.0	15900	1.2 - 1.4	81	80	142	L
	276654	20	15	200	60	1.15	64.9	18600	73.6	21300	.10 - .12	80	80	481	K
	276604			230	60	1.15	56.4	18600	64.0	21300	.14 - .18	80	80	418	K
	276664			380	60	1.15	34.1	18600	38.8	21300	.41 - .51	80	80	253	K
	276614			460	60	1.15	28.2	18600	32.0	21300	.58 - .72	80	80	209	K
	276624			575	60	1.15	22.6	18600	25.6	21300	.93 - 1.15	80	80	167	K
	276655	25	18.5	200	60	1.15	80.0	22600	90.6	25800	.09 - .11	83	82	665	L
	276605			230	60	1.15	69.6	22600	78.8	25800	.11 - .14	83	82	578	L
	276665			380	60	1.15	42.1	22600	47.7	25800	.27 - .34	83	82	350	L
	276615			460	60	1.15	34.8	22600	39.4	25800	.41 - .51	83	82	289	L
	276625			575	60	1.15	27.8	22600	31.6	25800	.70 - .86	83	82	231	L
	276656	30	22	200	60	1.15	95.0	28000	108.6	31900	.07 - .09	81	80	736	K
	276606			230	60	1.15	82.6	28000	94.4	31900	.09 - .12	81	80	640	K
	276666			380	60	1.15	50.0	28000	57.2	31900	.23 - .29	81	80	387	K
	276616			460	60	1.15	41.3	28000	47.2	31900	.34 - .42	81	80	320	K
	276626			575	60	1.15	33.0	28000	37.8	31900	.52 - .65	81	80	256	K
	276667	40	30	380	60	1.15	67.2	35900	76.0	42400	.18 - .23	84	83	545	L
	276617			460	60	1.15	55.4	35900	62.8	42400	.23 - .29	84	83	450	L
	276627			575	60	1.15	45.2	35900	50.2	42400	.34 - .43	84	83	360	L

Model numbers above are for three-lead motors. Six-lead motors with different model numbers have the same running performance, but when Wye connected for starting have locked rotor amps 33% of the values shown. Six-lead individual phase resistance = table X 1.5.

Table 26 Three-Phase Motor Fuse Sizing

TYPE	MOTOR MODEL PREFIX		RATING			CIRCUIT BREAKERS OR FUSE AMPS (MAXIMUM PER NEC)			CIRCUIT BREAKERS OR FUSE AMPS (TYPICAL SUBMERSIBLE)		
			HP	KW	VOLTS	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER
6" STD. & HI-TEMP	236650	276650	5	3.7	200	60	35	45	50	25	45
	236600	276600			230	45	30	40	45	20	40
	236660	276660			380	30	17.5	25	30	12	25
	236610	276610			460	25	15	20	25	10	20
	236620	276620			575	20	12	15	20	8	15
	236651	276651	7.5	5.5	200	80	45	70	80	35	70
	236601	276601			230	70	40	60	70	30	60
	236661	276661			380	45	25	35	40	20	35
	236611	276611			460	35	20	30	35	15	30
	236621	276621			575	30	17.5	25	25	11	25
	236652	276652	10	7.5	200	100	60	90	100	45	90
	236602	276602			230	90	50	80	90	40	80
	236662	276662			380	60	35	45	50	25	45
	236612	276612			460	45	25	40	45	20	40
	236622	276622			575	35	20	30	35	15	30
	236653	276653	15	11	200	150	90	125	150	60	125
	236603	276603			230	150	80	110	125	60	110
	236663	276663			380	80	50	70	80	35	70
	236613	276613			460	70	40	60	60	30	60
	236623	276623			575	60	30	45	50	25	45
	236654	276654	20	15	200	200	110	175	175	80	175
	236604	276604			230	175	100	150	175	70	150
	236664	276664			380	100	60	90	100	45	90
	236614	276614			460	90	50	70	80	35	70
	236624	276624			575	70	40	60	70	30	60
	236655	276655	25	18.5	200	250	150	200	225	100	200
	236605	276605			230	225	125	175	200	90	175
	236665	276665			380	125	80	110	125	50	110
	236615	276615			460	110	60	90	100	45	90
	236625	276625			575	90	50	70	80	35	70
	236656	276656	30	22	200	300	175	250	300	125	250
	236606	276606			230	250	150	225	250	100	200
	236666	276666			380	150	90	125	150	60	125
	236616	276616			460	125	70	110	125	50	100
	236626	276626			575	100	60	90	100	40	80
	236667	276667	40	30	380	200	125	175	200	90	175
	236617	276617			460	175	100	150	175	70	150
	236627	276627			575	150	80	110	125	60	110
	236668	276668	50	37	380	250	150	225	250	110	225
	236618	276618			460	225	125	175	200	90	175
	236628	276628			575	175	100	150	175	70	150
	236669	276669	60	45	380	300	175	250	300	125	250
	236619	276619			460	250	150	225	250	100	225
	236629	276629			575	200	125	175	200	80	175

Table 27 Three-Phase Motor Specifications (60 Hz) 3525 rpm

TYPE	MOTOR MODEL PREFIX	RATING					FULL LOAD		MAXIMUM LOAD		LINE TO LINE RESISTANCE OHMS	EFFICIENCY %		LOCKED ROTOR AMPS	KVA CODE
		HP	KW	VOLTS	HZ	S.F.	AMPS	KILOWATTS	AMPS	KILOWATTS		S.F.	F.L.		
8" STD.	239660	40	30	380	60	1.15	64	35	72	40	.16-.20	86	86	479	J
	239600			460	60	1.15	53	35	60	40	.24-.30	86	86	396	J
	239610			575	60	1.15	42	35	48	40	.39-.49	86	86	317	J
	239661	50	37	380	60	1.15	79	43	88	49	.12-.16	87	87	656	K
	239601			460	60	1.15	64	43	73	49	.18-.22	87	87	542	K
	239611			575	60	1.15	51	43	59	49	.28-.34	87	87	434	K
	239662	60	45	380	60	1.15	92	52	104	60	.09-.11	88	87	797	K
	239602			460	60	1.15	76	52	86	60	.14-.17	88	87	658	K
	239612			575	60	1.15	61	52	69	60	.22-.28	88	87	526	K
	239663	75	55	380	60	1.15	114	64	130	73.5	.06-.09	88	88	1046	L
	239603			460	60	1.15	94	64	107	73.5	.10-.13	88	88	864	L
	239613			575	60	1.15	76	64	86	73.5	.16-.21	88	88	691	L
	239664	100	75	380	60	1.15	153	85	172	97.5	.05-.06	89	89	1466	L
	239604			460	60	1.15	126	85	142	97.5	.07-.09	89	89	1211	L
	239614			575	60	1.15	101	85	114	97.5	.11-.13	89	89	969	L
	239165	125	93	380	60	1.15	202	109	228	125	.03-.04	87	86	1596	K
	239105			460	60	1.15	167	109	188	125	.05-.07	87	86	1318	K
	239115			575	60	1.15	134	109	151	125	.08-.11	87	86	1054	K
	239166	150	110	380	60	1.15	235	128	266	146	.02-.03	88	87	1961	K
	239106			460	60	1.15	194	128	219	146	.04-.05	88	87	1620	K
	239116			575	60	1.15	155	128	176	146	.06-.08	88	87	1296	K
	239167	175	130	380	60	1.15	265	150	302	173	.02-.04	88	88	1991	J
	239107			460	60	1.15	219	150	249	173	.04-.05	88	88	1645	J
	239117			575	60	1.15	175	150	200	173	.06-.08	88	88	1316	J
	239168	200	150	380	60	1.15	298	169	342	194	.02-.03	88	88	2270	J
	239108			460	60	1.15	246	169	282	194	.03-.05	88	88	1875	J
	239118			575	60	1.15	197	169	226	194	.05-.07	88	88	1500	J

Table 27A 8" Three-Phase Motor Specifications (60 Hz) 3525 rpm

TYPE	MOTOR MODEL PREFIX	RATING					FULL LOAD		MAXIMUM LOAD		LINE TO LINE RESISTANCE OHMS	EFFICIENCY %		LOCKED ROTOR AMPS	KVA CODE
		HP	KW	VOLTS	HZ	S.F.	AMPS	KILOWATTS	AMPS	KILOWATTS		S.F.	F.L.		
8" HI-TEMP	279160	40	30	380	60	1.15	69.6	38	78.7	43	.11 - .14	79	78	616	M
	279100			460	60	1.15	57.5	38	65.0	43	.16 - .19	79	78	509	M
	279110			575	60	1.15	46.0	38	52.0	43	.25 - .31	79	78	407	M
	279161	50	37	380	60	1.15	84.3	47	95.4	53	.07 - .09	81	80	832	M
	279101			460	60	1.15	69.6	47	78.8	53	.11 - .14	81	80	687	M
	279111			575	60	1.15	55.7	47	63.0	53	.18 - .22	81	80	550	M
	279162	60	45	380	60	1.15	98.4	55	112	62	.06 - .07	83	82	1081	N
	279102			460	60	1.15	81.3	55	92.1	62	.09 - .11	83	82	893	N
	279112			575	60	1.15	65.0	55	73.7	62	.13 - .16	83	82	715	N
	279163	75	56	380	60	1.15	125	68	141	77	.05 - .06	83	82	1175	L
	279103			460	60	1.15	100	68	114	77	.07 - .09	83	82	922	L
	279113			575	60	1.15	80	68	92	77	.11 - .14	83	82	738	L
	279164	100	75	380	60	1.15	159	88	181	100	.04 - .05	86	85	1508	M
	279104			460	60	1.15	131	88	149	100	.05 - .07	86	85	1246	M
	279114			575	60	1.15	105	88	119	100	.08 - .10	86	85	997	M
	279165	125	93	380	60	1.15	195	109	223	125	.03 - .04	86	85	1793	L
	279105			460	60	1.15	161	109	184	125	.04 - .06	86	85	1481	L
	279115			575	60	1.15	129	109	148	125	.07 - .09	86	85	1185	L
	279166	150	110	380	60	1.15	235	133	269	151	.02 - .03	85	84	2012	K
	279106			460	60	1.15	194	133	222	151	.03 - .05	85	84	1662	K
	279116			575	60	1.15	155	133	178	151	.05 - .07	85	84	1330	K

Model numbers above are for three-lead motors. Six-lead motors with different model numbers have the same running performance, but when Wye connected for starting have locked rotor amps 33% of the values shown. Six-lead individual phase resistance = table X 1.5.

Table 28 Three-Phase Motor Fuse Sizing

TYPE	MOTOR MODEL PREFIX	RATING			CIRCUIT BREAKERS OR FUSE AMPS (MAXIMUM PER NEC)			CIRCUIT BREAKERS OR FUSE AMPS (TYPICAL SUBMERSIBLE)		
		HP	KW	VOLTS	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER
8" STD.	239660	40	30	380	200	125	175	200	80	175
	239600			460	175	100	150	175	70	150
	239610			575	150	80	110	125	60	110
	239661	50	37	380	250	150	200	225	100	200
	239601			460	200	125	175	200	80	175
	239611			575	175	90	150	150	70	150
	239662	60	45	380	300	175	250	300	125	250
	239602			460	250	150	200	225	100	200
	239612			575	200	110	175	175	80	175
	239663	75	55	380	350	200	300	350	150	300
	239603			460	300	175	250	300	125	250
	239613			575	250	150	200	225	100	200
	239664	100	75	380	500	275	400	450	200	400
	239604			460	400	225	350	400	175	350
	239614			575	350	200	300	300	125	300
	239165	125	93	380	700	400	600	600	250	600
	239105			460	500	300	450	500	225	450
	239115			575	450	250	350	400	175	350
	239166	150	110	380	800	450	600	700	300	600
	239106			460	600	350	500	600	250	500
	239116			575	500	300	400	450	200	400
	239167	175	130	380	800	500	700	800	350	700
	239107			460	700	400	600	700	300	600
	239117			575	600	350	450	600	225	450
	239168	200	150	380	1000	600	800	1000	400	800
	239108			460	800	450	700	800	350	700
	239118			575	600	350	500	600	250	500

Table 28A 8" Three-Phase Motor Fuse Sizing

TYPE	MOTOR MODEL PREFIX	RATING			CIRCUIT BREAKERS OR FUSE AMPS (MAXIMUM PER NEC)			CIRCUIT BREAKERS OR FUSE AMPS (TYPICAL SUBMERSIBLE)		
		HP	KW	VOLTS	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER	STANDARD FUSE	DUAL ELEMENT TIME DELAY FUSE	CIRCUIT BREAKER
8" HI-TEMP	279160	40	30	380	225	125	175	200	90	175
	279100			460	175	110	150	175	70	150
	279110			575	150	90	125	125	60	125
	279161	50	37	380	250	150	225	225	110	225
	279101			460	200	125	175	200	90	175
	279111			575	175	100	150	150	70	150
	279162	60	45	380	300	175	250	300	125	250
	279102			460	275	150	225	250	100	225
	279112			575	200	125	175	175	80	175
	279163	75	56	380	400	200	350	350	150	350
	279103			460	300	175	275	300	125	275
	279113			575	275	150	225	225	100	225
	279164	100	75	380	500	300	450	450	200	450
	279104			460	400	250	350	400	175	350
	279114			575	350	200	300	300	125	300
	279165	125	93	380	700	400	600	600	250	600
	279105			460	500	300	450	500	225	450
	279115			575	450	250	350	400	175	350
	279166	150	110	380	800	450	600	700	300	600
	279106			460	600	350	500	600	250	500
	279116			575	500	300	400	450	200	400

Overload Protection of Three-Phase Submersible Motors **Class 10 Protection Required**

The characteristics of submersible motors are different than standard motors and special overload protection is required.

If the motor is locked, the overload protection must trip within 10 seconds to protect the motor windings. Subtrol/SubMonitor, a Franklin-approved adjustable overload relay, or a Franklin-approved fixed heater must be used.

Fixed heater overloads must be the ambient-compensated quick-trip type to maintain protection at high and low air temperatures.

All heaters and amp settings shown are based on total line amps. When determining amperage settings or making heater selections for a six-lead motor with a Wye-Delta starter, divide motor amps by 1.732.

Pages 29, 30 and 31 list the correct selection and settings for some manufacturers. Approval for other manufacturers' types not listed may be requested by calling Franklin's Submersible Service Hotline at 800-348-2420.

Refer to notes on page 30.

Table 29 - 60 Hz 4" Motors

HP	KW	VOLTS	NEMA STARTER SIZE	HEATERS FOR OVERLOAD RELAYS		ADJUSTABLE RELAYS (NOTE 3)	
				FURNAS (NOTE 1)	G.E. (NOTE 2)	SET	MAX.
1/2	0.37	200	00	K31	L380A	3.2	3.4
		230	00	K28	L343A	2.7	2.9
		380	00	K22	L211A	1.7	1.8
		460	00	-	L174A	1.4	1.5
		575	00	-	-	1.2	1.3
3/4	0.55	200	00	K34	L510A	4.1	4.4
		230	00	K32	L420A	3.5	3.8
		380	00	K27	L282A	2.3	2.5
		460	00	K23	L211A	1.8	1.9
		575	00	K21	L193A	1.5	1.6
1	0.75	200	00	K37	L618A	5.0	5.4
		230	00	K36	L561A	4.4	4.7
		380	00	K28	L310A	2.6	2.8
		460	00	K26	L282A	2.2	2.4
		575	00	K23	L211A	1.8	1.9
1.5	1.1	200	00	K42	L750A	6.3	6.8
		230	00	K39	L680A	5.5	5.9
		380	00	K32	L420A	3.3	3.6
		460	00	K29	L343A	2.8	3.0
		575	00	K26	L282A	2.2	2.4
2	1.5	200	0	K50	L111B	8.6	9.3
		230	0	K49	L910A	7.5	8.1
		380	0	K36	L561A	4.6	4.9
		460	00	K33	L463A	3.8	4.1
		575	00	K29	L380A	3.0	3.2
3	2.2	200	0	K55	L147B	11.6	12.5
		230	0	K52	L122B	10.1	10.9
		380	0	K41	L750A	6.1	6.6
		460	0	K37	L618A	5.1	5.5
		575	0	K34	L510A	4.1	4.4
5	3.7	200	1	K62	L241B	19.1	20.5
		230	1	K61	L199B	16.6	17.8
		380	0	K52	L122B	10.0	10.8
		460	0	K49	L100B	8.3	8.9
		575	0	K42	L825A	6.6	7.1
7.5	5.5	200	1	K68	L332B	28.4	30.5
		230	1	K67	L293B	24.6	26.4
		380	1	K58	L181B	14.9	16.0
		460	1	K55	L147B	12.3	13.2
		575	1	K52	L122B	9.9	10.6
10	7.5	380	1	K62	L241B	19.5	21.0
		460	1	K60	L199B	16.1	17.3
		575	1	K56	L165B	12.9	13.6

Table 30 - 60 Hz 6" Standard & Hi-Temp Motors

HP	KW	VOLTS	NEMA STARTER SIZE	HEATERS FOR OVERLOAD RELAYS		ADJUSTABLE RELAYS (NOTE 3)	
				FURNAS (NOTE 1)	G.E. (NOTE 2)	SET	MAX.
5	3.7	200	1	K61	L220B	17.6	19.1
		230	1	K61	L199B	15.4	16.6
		380	0	K52	L122B	9.4	10.1
		460	0	K49	L100B	7.7	8.3
		575	0	K42	L825A	6.1	6.6
7.5	5.5	200	1	K67	L322B	26.3	28.3
		230	1	K64	L293B	22.9	24.6
		380	1	K57	L165B	13.9	14.9
		460	1	K54	L147B	11.4	12.3
		575	1	K52	L111B	9.1	9.8
10	7.5	200	2(1)	K72	L426B	34.4	37.0
		230	2(1)	K70	L390B	29.9	32.2
		380	1	K61	L220B	18.1	19.5
		460	1	K58	L181B	15.0	16.1
		575	1	K55	L147B	12.0	12.9
15	11	200	3(1)	K76	L650B	50.7	54.5
		230	2	K75	L520B	44.1	47.4
		380	2(1)	K68	L322B	26.7	28.7
		460	2(1)	K64	L265B	22.0	23.7
		575	2(1)	K61	L220B	17.7	19.0
20	15	200	3	K78	L787B	64.8	69.7
		230	3(1)	K77	L710B	56.4	60.6
		380	2	K72	L426B	34.1	36.7
		460	2	K69	L352B	28.2	30.3
		575	2	K64	L393B	22.7	24.4
25	18.5	200	3	K86	L107C	80.3	86.3
		230	3	K83	L866B	69.8	75.0
		380	2	K74	L520B	42.2	45.4
		460	2	K72	L426B	34.9	37.5
		575	2	K69	L352B	27.9	30.0
30	22	200	4(1)	K88	L126C	96.7	104.0
		230	3	K87	L107C	84.1	90.4
		380	3(1)	K76	L650B	50.9	54.7
		460	3(1)	K74	L520B	42.0	45.2
		575	3(1)	K72	L390B	33.7	36.2
40	30	380	3	K83	L866B	69.8	75.0
		460	3	K77	L710B	57.7	62.0
		575	3	K74	L593B	46.1	49.6
50	37	380	3	K87	L107C	86.7	93.2
		460	3	K83	L950B	71.6	77.0
		575	3	K77	L710B	57.3	61.6
60	45	380	4(1)	K89	L126C	102.5	110.2
		460	4(1)	K87	L107C	84.6	91.0
		575	4(1)	K78	L866B	67.7	72.8

Footnotes for Tables 29, 30, and 31

NOTE 1: Furnas intermediate sizes between NEMA starter sizes apply where (1) is shown in tables, size 1.75 replacing 2, 2.5 replacing 3, 3.5 replacing 4, and 4.5 replacing 5. Heaters were selected from Catalog 294, table 332 and table 632 (starter size 00, size B). Size 4 starters are heater type 4 (JG). Starters using these heater tables include classes 14, 17 and 18 (inNOVA), classes 36 and 37 (reduced voltage), and classes 87, 88 and 89 (pump and motor control centers). Overload relay adjustments should be set no higher than 100% unless necessary to stop nuisance tripping with measured amps in all lines below nameplate maximum. Heater selections for class 16 starters (Magnetic Definite Purpose) will be furnished upon request.

NOTE 2: General Electric heaters are type CR123 usable only on type CR124 overload relays and were selected from Catalog GEP-126OJ, page 184. Adjustment should be set no higher than 100%, unless necessary to stop nuisance tripping with measured amps in all lines below nameplate maximum.

NOTE 3: Adjustable overload relay amp settings apply to approved types listed. Relay adjustment should be set at the specified SET amps. Only if tripping occurs with amps in all lines measured to be within nameplate maximum amps should the setting be increased, not to exceed the MAX value shown.

NOTE 4: Heaters shown for ratings requiring NEMA size 5 or 6 starters are all used with current transformers per manufacturer standards. Adjustable relays may or may not use current transformers depending on design.

Table 31 - 60 Hz 8" Motors

MOTOR MODEL PREFIX	HP	KW	VOLTS	NEMA STARTER SIZE	HEATERS FOR OVERLOAD RELAYS		ADJUSTABLE RELAYS (NOTE 3)	
					FURNAS (NOTE 1)	G.E. (NOTE 2)	SET	MAX.
239660	40	30	380	3	K78	L866B	68	73
239600			460	3	K77	L710B	56	60
239610			575	3	K73	L520B	45	48
239661	50	37	380	3	K86	L107C	81	87
239601			460	3	K78	L866B	68	73
239611			575	3	K77	L710B	56	60
239662	60	45	380	4(1)	K89	L126C	101	108
239602			460	4(1)	K86	L107C	83	89
239612			575	4(1)	K78	L787B	64	69
239663	75	55	380	4	K92	L142C	121	130
239603			460	4(1)	K89	L126C	100	107
239613			575	4(1)	K85	L950C	79	85
239664	100	75	380	5(1)	K28	L100B	168	181
239604			460	4	K92	L155C	134	144
239614			575	4	K90	L142C	108	116
239165	125	93	380	5	K32	L135B	207	223
239105			460	5(1)	K29	L111B	176	189
239115			575	5(1)	K26	L825A	140	150
239166	150	110	380	5	-	L147B	248	267
239106			460	5(1)	K32	L122B	206	221
239116			575	5(1)	K28	L100B	165	177
239167	175	130	380	6	K26	-	270	290
239107			460	5	K33	L147B	233	250
239117			575	5	K31	L111B	186	200
239168	200	150	380	6	K27	-	316	340
239108			460	5	K33	L165B	266	286
239118			575	5	K32	L135B	213	229

Table 31A - 60 Hz 8" Hi-Temp 75°C Motors

MOTOR MODEL PREFIX	HP	KW	VOLTS	NEMA STARTER SIZE	HEATERS FOR OVERLOAD RELAYS		ADJUSTABLE RELAYS (NOTE 3)	
					FURNAS (NOTE 1)	G.E. (NOTE 2)	SET	MAX.
279160	40	30	380	3	K83	L866B	73	79
279100			460	3	K77	L710B	60	65
279110			575	3	K74	L593B	48	52
279161	50	37	380	3	K87	L107C	89	95
279101			460	3	K83	L866B	73	79
279111			575	3	K77	L710B	59	63
279162	60	45	380	4(1)	K89	L126C	104	112
279102			460	4(1)	K87	L107C	86	92
279112			575	4(1)	K78	L866B	69	74
279163	75	56	380	4	K92	L155C	131	141
279103			460	4(1)	K89	L126C	106	114
279113			575	4(1)	K87	L950C	86	92
279164	100	75	380	5(1)	K28	L100B	168	181
279104			460	5(1)	K26	L825A	139	149
279114			575	4	K90	L142C	111	119
279165	125	93	380	5	K32	L135B	207	223
279105			460	5(1)	K29	L111B	171	184
279115			575	5(1)	K26	L825A	138	148
279166	150	110	380	5	-	L147B	250	269
279106			460	5(1)	K32	L122B	206	222
279116			575	5(1)	K28	L100B	166	178

Note: Other relay types from these and other manufacturers may or may not provide acceptable protection, and they should not be used without approval of Franklin Electric.

Some approved types may only be available for part of the listed motor ratings. When relays are used with current transformers, relay setting is the specified amps divided by the transformer ratio.

Recommended Adjustable Overload Relays

Advance Controls: MDR3 Overload

AEG Series: B17S, B27S, B27-2

ABB Type: RVH 40, RVH65, RVP160, T25DU, T25CT, TA25DU

AGUT: MT03, R1K1, R1L0, R1L3, TE set Class 5

Allen Bradley: Bulletin 193, SMP-Class 10 only

Automatic Switch Types: DQ, LR1-D, LR1-F, LR2 Class 10

Benshaw: RSD6 (Class 10) Soft Start

Bharita C-H: MC 305 ANA 3

Clipsal: 6CTR, 6MTR

Cutler-Hammer: C316F, C316P, C316S, C310-set at 6 sec max, Advantage Class10

Fanal Types: K7 or K7D through K400

Franklin Electric: Subtrol-Plus, SubMonitor

Fuji Types: TR-OQ, TR-OQH, TR-2NQ, TR- 3NQ, TR-4NQ, TR-6NQ, RCa 3737-ICQ & ICQH

Furnas Types: US15 48AG & 48BG, 958L, ESP100-Class 10 only, 3RB10-Class 10

General Electric: CR4G, CR7G, RT*1, RT*2, RTF3, RT*4, CR324X-Class 10 only

Kasuga: RU Set Operating Time Code = 10 & time setting 6 sec max

Klockner-Moeller Types: ZOO, Z1, Z4, PKZM1, PKZM3 & PKZ2

Lovato: RC9, RC22, RC80, RF9, RF25 & RF95

Matsushita: FKT-15N, 15GN, 15E, 15GE, FT-15N, FHT-15N

Mitsubishi: ET, TH-K12ABKP, TH-K20KF, TH-K20KP, TH-K20TAKF, TH-K60KF, TH-K60TAKF

Omron: K2CM Set Operating Timing Code = 10 & time setting 6 sec max, SE-KP24E time setting 6 sec max

Riken: PM1, PM3

Samwha: EOCRS Set for Class 5, EOCR-ST, EOCR-SE, EOCR-AT time setting 6 sec max

Siemens Types: 3UA50, -52, -54, -55, -58, -59, -60, -61, -62, -66, -68, -70, 3VUI3, 3VE, 3UB (Class 5)

Sprecher and Schuh Types: CT, CT1, CTA 1, CT3K, CT3-12 thru CT3-42, KTA3, CEF1 & CET3 set at 6 sec max, CEP 7 Class 10, CT4, 6, & 7, CT3, KT7

Square D/Telemecanique: Class 9065 Types: TD, TE, TF, TG, TJ, TK, TR, TJE &TJF (Class 10), LR1-D, LR1-F, LR2 Class 10, Types 18A, 32A, SS-Class 10, SR-Class 10 and 63-A-LB Series. Integral 18,32,63, GV2-L, GV2-M, GV2-P, GV3-M (1.6-10 amp only) LR9D, SF Class 10, ST Class 10, LT6 (Class 5 or 10), LRD (Class 10), Motor Logic (Class10)

Toshiba Type: 2E RC820, set at 8 sec max.

WEG: RW2

Westinghouse Types: FT13, FT23, FT33, FT43, K7D, K27D, K67D, Advantage (Class 10), MOR, IQ500 (Class 5)

Westmaster: OLWROO and OLWTOO suffix D thru P

SUBMERSIBLE PUMP
Installation Check List

1. Motor Inspection

☐ A. Verify that the model, hp or kW, voltage, phase and hertz on the motor nameplate match the installation requirements.

☐ B. Check that the motor lead assembly is not damaged.

☐ C. Measure insulation resistance using a 500 or 1000 volt DC megohmmeter from each lead wire to the motor frame. Resistance should be at least 200 megohms without drop cable.

☐ D. Keep a record of motor model number, hp or kW, voltage, and serial number (S/N).
(S/N is stamped in shell above the nameplate. A typical example, S/N 07A18 01-0123)

2. Pump Inspection

☐ A. Check that the pump rating matches the motor.

☐ B. Check for pump damage and verify that the pump shaft turns freely.

3. Pump/Motor Assembly

☐ A. If not yet assembled, check that pump and motor mounting faces are free from dirt, debris and uneven paint thickness.

☐ B. Pumps and motors over 5 hp should be assembled in the vertical position to prevent stress on pump brackets and shafts. Assemble the pump and motor together so their mounting faces are in contact and then tighten assembly bolts or nuts evenly to manufacturer specifications.

☐ C. If accessible, check that the pump shaft turns freely.

☐ D. Assemble the pump lead guard over the motor leads. Do not cut or pinch lead wires during assembly or installation.

4. Power Supply and Controls

☐ A. Verify that the power supply voltage, Hertz, and kVA capacity match motor requirements.

☐ B. Verify control box hp and voltage matches motor (3-wire only).

☐ C. Check that the electrical installation and controls meet all safety regulations and match the motor requirements, including fuse or circuit breaker size and motor overload protection. Connect all metal plumbing and electrical enclosures to the power supply ground to prevent shock hazard. Comply with national and local codes.

5. Lightning and Surge Protection

☐ A. Use properly rated surge (lightning) arrestors on all submersible pump installations. Motors 5 hp and smaller, which are marked “Equipped with Lightning Arrestors”, contain internal arrestors.

☐ B. Ground all above ground arrestors with copper wire directly to the motor frame, or to metal drop pipe or casing which reaches below the well pumping level. Connecting to a ground rod does not provide good surge protection.

6. Electrical Drop Cable

☐ A. Use submersible cable sized in accordance with local regulations and the cable charts. See pages 11 and 16-21. Ground motor per national and local codes.

☐ B. Include a ground wire to the motor and surge protection, connected to the power supply ground if required by codes. Always ground any pump operated outside a drilled well.

7. Motor Cooling

☐ A. Ensure at all times that the installation provides adequate motor cooling; see page 6 for details.

SUBMERSIBLE PUMP

Installation Check List

8. Pump/Motor Installation

- ☐ A. Splice motor leads to supply cable using electrical grade solder or compression connectors, and carefully insulate each splice with watertight tape or adhesive-lined shrink tubing, as shown in motor or pump installation data.
- ☐ B. Support the cable to the delivery pipe every 10 feet (3 meters) with straps or tape strong enough to prevent sagging. Use padding between cable and any metal straps.
- ☐ C. A check valve in the delivery pipe is recommended. More than one check valve may be required, depending on valve rating and pump setting; see page 5 for details.
- ☐ D. Assemble all pipe joints as tightly as practical, to prevent unscrewing from motor torque. Torque should be at least 10 pound feet per hp (2 meter-KG per kW).
- ☐ E. Set the pump far enough below the lowest pumping level to assure the pump inlet will always have at least the Net Positive Suction Head (NPSH) specified by the pump manufacturer. Pump should be at least 10 feet (3 meters) from the bottom of the well to allow for sediment build up.
- ☐ F. Check insulation resistance as pump/motor assembly is lowered into the well. Resistance may drop gradually as more cable enters the water, but any sudden drop indicates possible cable, splice or motor lead damage; see page 45.

9. After Installation

- ☐ A. Check all electrical and water line connections and parts before starting the pump.
- ☐ B. Start the pump and check motor amps and pump delivery. If normal, continue to run the pump until delivery is clear. If three-phase pump delivery is low, it may be running backward. Rotation may be reversed (with power off) by interchanging any two motor lead connections to the power supply.
- ☐ C. Check three-phase motors for current balance within 5% of average, using motor manufacturer instructions Imbalance over 5% will cause higher motor temperatures and may cause overload trip, vibration, and reduced life.
- ☐ D. Verify that starting, running and stopping cause no significant vibration or hydraulic shocks.
- ☐ E. After at least 15 minutes running time, verify that pump output, electrical input, pumping level, and other characteristics are stable and as specified.

Date ______________________ Filled In By ____

Notes ____

____

____

____

____

____

SUBMERSIBLE MOTOR INSTALLATION RECORD
Form 2207 - Page 1

RMA Number

KEY DEALER #

DISTRIBUTOR

Name: ____________________________
City: ______________________________
State: ____________ Zip: ___________

INSTALLER

Name: ____________________________
City: ______________________________
State: ____________ Zip: ___________

END USER

Name: ____________________________
City: ______________________________
State: ____________ Zip: ___________

Well ID or GPS: __________ ____________ ________________________ Water Temperature:______________ ☐ °F ☐ °C

Application/Water Use (e.g. potable water, irrigation, municipal, fountain, etc.): ______________________________________

Date Installed (mm/yy): ______________ Date Failed (mm/yy):______________ Motor Position Shaft-Up: ☐ Yes ☐ No

Operating Cycle: ON Time Per Start _____ ☐ Hrs. ☐ Mins. Time OFF Between Stop & Restart _____ ☐ Hrs. ☐ Mins.

MOTOR

Model: ________________________ Serial Number: ____________________________ Date Code (if updated): ___________

MOTOR OVERLOAD

System Typical Operating Current: ________________ Amps @ ________________ Volts

Overload: ☐ FE SubMonitor Input Amps _______ D3 Attached ☐ Yes ☐ No Fault Settings Attached ☐ Yes ☐ No

☐ Other Manufacturer Model: _________________________ Dial Set at: ___________ or Heater# ___________

NEMA Class: ☐ 10 ☐ 20 ☐ 30 Ambient Compensated: ☐ Yes ☐ No

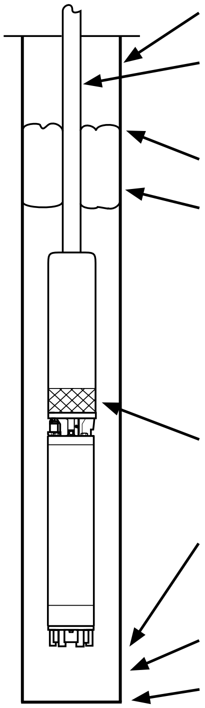
Power to Motor by: ☐ Full Volt Starter ☐ VFD ☐ Soft Starter VFD or Soft Starter Mfr. & Model: ____________________

PUMP

Manufacturer:___________________________
Model: _________________________________
Stages:_________________________________
Design Rating: _______ gpm @ _______ ft TDH
Horsepower Required by Pump End: ___________
Actual Pump Delivery: _______ gpm @ _______ psi
What Controls When System Runs & Stops:

____
(e.g. pressure, level, flow, manual on/off, timer, time clock etc.)

WELL DATA (All measurements from well head down.)



Casing Diameter ________________________ in
Drop Pipe Diameter_____________________ in
Number of Sticks of Drop Pipe ______________
Static Water Level ______________________ ft
Drawdown (pumping) Water Level__________ ft
Spring Assist Check Valves:
(Measured from Well Head Down)
#1 ______ #2______ #3 ______ #4______ ft
☐ Solid ☐ Drilled Poppet ☐ Break-Off Plug
Pump Inlet Setting ______________________ ft
Flow Sleeve ☐ No ☐ Yes, Dia. __________ in
Case Ends_____________________________ ft
☐ Well Screen ☐ Perforated Casing
#1 from ____to____ft & #2 from ____to____ft
Well Depth_____________________________ ft

YOUR NAME / DATE

______________________________ / ___________

Form No. 2207 v6 05/11

Franklin Electric

SUBMERSIBLE MOTOR INSTALLATION RECORD
Form 2207 - Page 2

RMA Number

TRANSFORMERS

Number of Transformers: ☐ Two ☐ Three   Transformers Supply Motor Only: ☐ Yes ☐ No ☐ Unsure

Transformer #1: __________ kVA   Transformer #2: __________ kVA   Transformer #3: __________ kVA

POWER CABLES & GROUND WIRE

1 **Service Entrance to Pump Control Panel:**

Length: __________ ft. & Gauge: __________ AWG/MCM

Material: ☐ Copper ☐ Aluminum   Construction: ☐ Jacketed ☐ Individual Conductors ☐ Web ☐ Twisted

Temperature Rating of Cable: ☐ 60C ☐ 75C ☐ 90C ☐ 125C or Insulation Type: ________________ (e.g. THHN)

2 **Pump Control Panel to Motor:**

Length: __________ ft. & Gauge: __________ AWG/MCM

Material: ☐ Copper ☐ Aluminum   Construction: ☐ Jacketed ☐ Individual Conductors ☐ Web ☐ Twisted

Temperature Rating of Cable: ☐ 60C ☐ 75C ☐ 90C ☐ 125C or Insulation Type: ________________ (e.g. THHN)

3 **Ground Wire Size:** From Control Panel to Motor: __________ AWG/MCM

Control Grounded to (mark all that apply):

☐ Well Head ☐ Metal Casing ☐ Motor ☐ Driven Rod ☐ Power Supply

INCOMING VOLTAGE

No Load   L1-L2 ______ L2-L3 ______ L1-L3 ______

Full Load   L1-L2 ______ L2-L3 ______ L1-L3 ______

RUNNING AMPS & CURRENT BALANCE

Full Load   L1 ________ L2 ________ L3 ________

% Unbalance: ______

CONTROL PANEL

1 **Pump Panel Manufacturer/Fabricator:** ____

2 **Short Circuit Protection - Fuses or Circuit Breaker**

Option #1 - Fuse

Manufacturer: __________________ Model: __________________ Rating: ____________ Amps

Type: ☐ Time-Delay ☐ Standard

Option #2 - Circuit Breaker

Manufacturer: __________________ Model: __________________ Rating: ___________ Amps Setting: _________

3 **Starter - Full Voltage, Reduced Voltage, Soft-Starter or VFD (Variable Frequency Drive)**

Option #1 - Full Voltage

Manufacturer: __________________ Model: ________________ Size: ____________ Contacts: ☐ NEMA ☐ IEC

Option #2 - Reduced Voltage

Manufacturer: __________________ Model: __________________ Ramp Time to Full Voltage: _____________ sec.

Option #3 - Soft-Starter or VFD

Manufacturer: __________________ Model: __________________ Max. Continuous Amp Output Rating: _________

Min. Setting: ____________ Hz & GPM: ____________   Max. Setting: ____________ Hz & GPM: ____________

Start Ramp Time to 30 Hz: ________ sec.   Stop Mode: ☐ Power Off Coast ☐ 30-0 Hz Ramp ________ sec.

Special Output Filter Purchased: ☐ Yes ☐ No

Output Filter Manufacturer: ______________________ Model: ______________________ % Reactance: _________

4 **Surge Arrestor:** ☐ No ☐ Yes, Manufacturer: ____________________ Model: ____________________

Franklin Electric

SUBMERSIBLE MOTOR
Booster Installation Record

RMA Number

Date ______ /______/_______ Filled In By _____________________________________

INSTALLATION

Owner/User ____ Telephone (______) ___________________

Address ____City _______________ State ______ Zip __________

Installation Site, If Different ____

Contact ____ Telephone (______) ___________________

System Application____

____

____

System Manufactured By_____________________________Model ________________ Serial No. _______________

System Supplied By________________________________ City _________________ State ______ Zip __________

Is this a "HERO" system (10.0 - 10.5 PH)? ☐ Yes ☐ No

MOTOR

Model No. _______________ Serial No. _______________ Date Code ______

Horsepower ______ Voltage ______ ☐ Single-Phase ☐ Three-Phase Diameter ______ in.

Slinger Removed? ☐ Yes ☐ No Check Valve Plug Removed? ☐ Yes ☐ No

Motor Fill Solution ☐ Standard ☐ DI Water Model No. _____________ Serial No. _____________ Date Code ______

PUMP

Manufacturer _______________ Model _______________ Serial No. _______________

Stages ______ Diameter ________ Flow Rate Of ________ gpm At ______TDH

Booster Case Internal Diameter ________ Material _______________

CONTROLS AND PROTECTIVE DEVICES

SubMonitor? ☐ Yes ☐ No If Yes, Warranty Registration No.____

If Yes, Overload Set? ☐ Yes ☐ No ______ Set At ____________________________

Underload Sets? ☐ Yes ☐ No ______ Set At __________________________

VFD or Reduced Voltage Starter? ☐ Yes ☐ No If Yes, Type ____

Mfr. ______________Setting ________% Full Voltage In ________sec

Pump Panel? ☐ Yes ☐ No If Yes, Mfr. ______________________________Size _______________________

Magnetic Starter/Contactor Mfr. ___________________________ Model __________________Size______________

Heaters Mfr. _____________________ No. ____________ If Adjustable Set At ________________________________

Fuses Mfr. ____________________ Size ___________ Type ____

Lightning/Surge Arrestor Mfr. ________________________ Model ____

Controls Are Grounded to __________________ with No. ________Wire

Inlet Pressure Control ☐ Yes ☐ No If Yes, Mfr.________ Model _______ Setting _____ psi Delay ____ sec

Inlet Flow Control ☐ Yes ☐ No If Yes, Mfr.________ Model _______ Setting _____ gpm Delay ____ sec

Outlet Pressure Control ☐ Yes ☐ No If Yes, Mfr.________ Model _______ Setting _____ psi Delay ____ sec

Outlet Flow Control ☐ Yes ☐ No If Yes, Mfr.________ Model _______ Setting _____ gpm Delay ____ sec

Water Temperature Control ☐ Yes ☐ No If Yes, Mfr.________ Model _________________________ Delay ____ sec

Set At ________ °F or ______ °C Located ______________________________________

Franklin Electric

SUBMERSIBLE MOTOR
Booster Installation Record

INSULATION CHECK

Initial Megs: Motor & Lead Only Black (T1/U1)_________ Yellow (T2/V1)________ Red (T3/W1)_________

Installed Megs: Motor, Lead, & Cable Black (T1/U1)_________ Yellow (T2/V1)________ Red (T3/W1)_________

VOLTAGE TO MOTOR

Non-Operating: B-Y (T1/U1 - T2/V1)_____ Y-R (T2/V1 - T3/W1)_____ R-B (T3/W1 - T1/U1)_____

At Rated Flow of __________gpm B-Y (T1/U1 - T2/V1)_____ Y-R (T2/V1 - T3/W1)_____ R-B (T3/W1 - T1/U1)_____

At Open Flow ____________gpm B-Y (T1/U1 - T2/V1)_____ Y-R (T2/V1 - T3/W1)_____ R-B (T3/W1 - T1/U1)_____

AMPS TO MOTOR

At Rated Flow of __________gpm Black (T1/U1)_________ Yellow (T2/V1)________ Red (T3/W1)_________

At Open Flow ____________gpm Black (T1/U1)_________ Yellow (T2/V1)________ Red (T3/W1)_________

At Shut Off* Black (T1/U1)_________ Yellow (T2/V1)________ Red (T3/W1)_________

*Do **NOT** run at Shut Off more than two (2) minutes.

Inlet Pressure __________psi Outlet Pressure __________psi Water Temperature _______ °F or _______ °C

If you have any questions or problems, call the Franklin Electric Toll-Free Hot Line: 1-800-348-2420

Comments: ____

____

____

____

PLEASE SKETCH THE SYSTEM

Form No. 3655 11/09

Franklin Electric

SubMonitor Three-Phase Protection

Applications

SubMonitor is designed to protect 3-phase pumps/motors with service factor amp ratings (SFA) from 5 to 350 A (approx. 3 to 200 hp). Current, voltage, and motor temperature are monitored using all three legs and allows the user to set up the SubMonitor quickly and easily.

Protects Against

- Under/Overload
- Under/Overvoltage
- Current Unbalance
- Overheated Motor
  (if equipped with Subtrol Heat Sensor)
- False Start (Chattering)
- Phase Reversal

Power Factor Correction

In some installations, power supply limitations make it necessary or desirable to increase the power factor of a submersible motor. The table lists the capacitive kVAR required to increase the power factor of large Franklin three-phase submersible motors to the approximate values shown at maximum input loading.

Capacitors must be connected on the line side of the overload relay, or overload protection will be lost.

Table 32 kVAR Required 60 Hz

MOTOR		KVAR REQUIRED FOR PF OF:		
HP	**KW**	**0.90**	**0.95**	**1.00**
5	**3.7**	1.2	2.1	4.0
7.5	**5.5**	1.7	3.1	6.0
10	**7.5**	1.5	3.3	7.0
15	**11**	2.2	4.7	10.0
20	**15**	1.7	5.0	12.0
25	**18.5**	2.1	6.2	15.0
30	**22**	2.5	7.4	18.0
40	**30**	4.5	11.0	24.0
50	**37**	7.1	15.0	32.0
60	**45**	8.4	18.0	38.0
75	**55**	6.3	18.0	43.0
100	**75**	11.0	27.0	60.0
125	**93**	17.0	36.0	77.0
150	**110**	20.0	42.0	90.0
175	**130**	9.6	36.0	93.0
200	**150**	16.0	46.0	110.0

Values listed are total required (not per phase).

Three-Phase Starter Diagrams

Three-phase combination magnetic starters have two distinct circuits: a power circuit and a control circuit.

The power circuit consists of a circuit breaker or fused line switch, contacts, and overload heaters connecting incoming power lines L1, L2, L3 and the three-phase motor.

The control circuit consists of the magnetic coil, overload contacts and a control device such as a pressure switch. When the control device contacts are closed, current flows through the magnetic contactor coil, the contacts close, and power is applied to the motor. Hand-Off-Auto switches, start timers, level controls and other control devices may also be in series in the control circuit.

Line Voltage Control

This is the most common type of control encountered. Since the coil is connected directly across the power lines L1 and L2, the coil must match the line voltage.

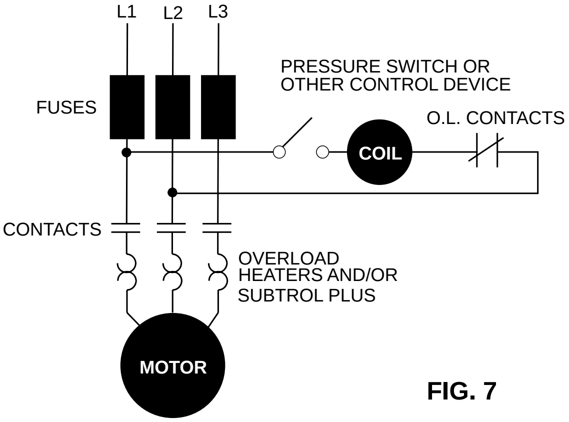


FIG. 7

Low Voltage Transformer Control

This control is used when it is desirable to operate push buttons or other control devices at some voltage lower than the motor voltage. The transformer primary must match the line voltage and the coil voltage must match the secondary voltage of the transformer.

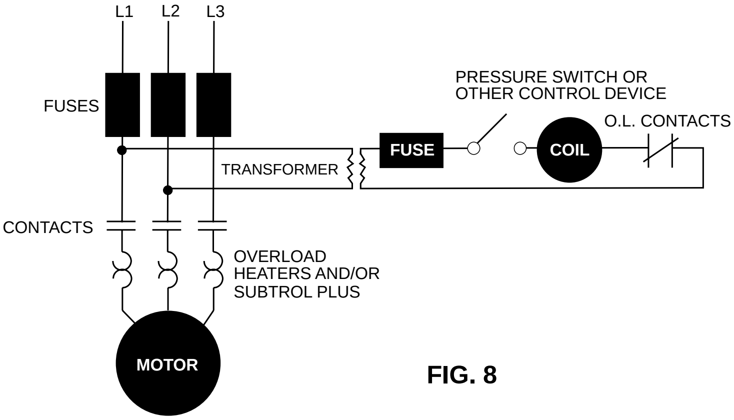


FIG. 8

External Voltage Controls

Control of a power circuit by a lower circuit voltage can also be obtained by connecting to a separate control voltage source. The coil rating must match the control voltage source, such as 115 or 24 volts.

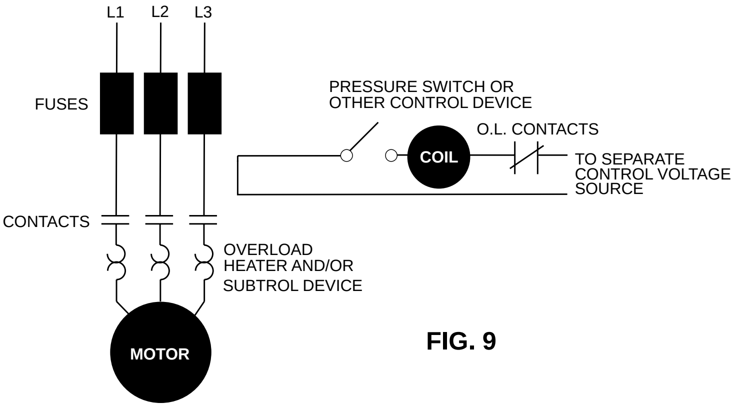


FIG. 9

Three-Phase Power Unbalance

A full three-phase supply is recommended for all three-phase motors, consisting of three individual transformers or one three-phase transformer. So-called “open” delta or Wye connections using only two transformers can be used, but are more likely to cause problems, such as poor performance, overload tripping or early motor failure due to current unbalance.

Transformer rating should be no smaller than listed in table 4 for supply power to the motor alone.

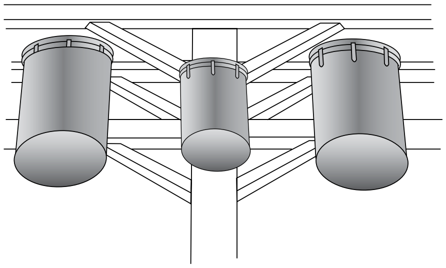


FIG. 10
FULL THREE-PHASE

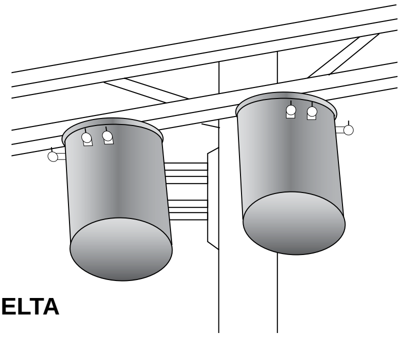


FIG. 11
OPEN DELTA

Checking and Correcting Rotation and Current Unbalance

1. Establish correct motor rotation by running the motor in both directions. Normal rotation is CCW viewing the shaft end. Rotation can be changed by interchanging any two of the three motor leads. The rotation that gives the most water flow is typically the correct rotation.
2. After correct rotation has been established, check the current in each of the three motor leads and calculate the current unbalance as explained in 3 below.

   If the current unbalance is 2% or less, leave the leads as connected.

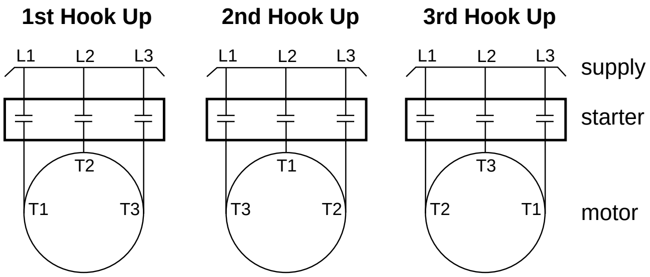
   If the current unbalance is more than 2%, current readings should be checked on each leg using each of three possible hook-ups. Roll the motor leads across the starter in the same direction to prevent motor reversal.
3. To calculate percent of current unbalance:
   - A. Add the three line amps values together.
   - B. Divide the sum by three, yielding average current.
   - C. Pick the amp value which is furthest from the average current (either high or low).
   - D. Determine the difference between this amp value (furthest from average) and the average.
   - E. Divide the difference by the average. Multiply the result by 100 to determine percent of unbalance.
4. Current unbalance should not exceed 5% at max amp load or 10% at rated input load. If the unbalance cannot be corrected by rolling leads, the source of the unbalance must be located and corrected. If, on the three possible hookups, the leg farthest from the average stays on the same power lead, most of the unbalance is coming from the “power side” of the system. If the reading farthest from average moves with the same motor lead, the primary source of unbalance is on the “motor side” of the starter. In this instance, consider a damaged cable, leaking splice, poor connection, or faulty motor winding.

Phase designation of leads for CCW rotation viewing shaft end.

To reverse rotation, interchange any two leads.

Phase 1 or “A” - Black, T1, or U1
Phase 2 or “B” - Yellow, T2, or V1
Phase 3 or “C” - Red, T3, or W1

NOTICE: Phase 1, 2 and 3 may not be L1, L2 and L3.



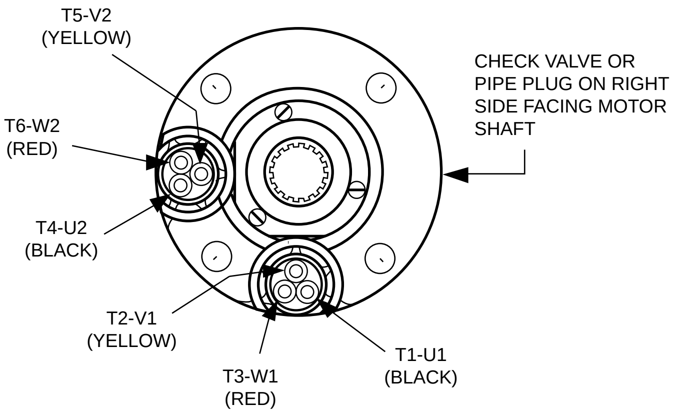
EXAMPLE:

T1 = 51 amps	T3 = 50 amps	T2 = 50 amps
T2 = 46 amps	T1 = 49 amps	T3 = 48 amps
+ T3 = 53 amps	+ T2 = 51 amps	+ T1 = 52 amps
Total = 150 amps	Total = 150 amps	Total = 150 amps
$\frac{150}{3}$ = 50 amps	$\frac{150}{3}$ = 50 amps	$\frac{150}{3}$ = 50 amps
50 - 46 = 4 amps	50 - 49 = 1 amp	50 - 48 = 2 amps
$\frac{4}{50}$ = 0.08 or 8%	$\frac{1}{50}$ = 0.02 or 2%	$\frac{2}{50}$ = 0.04 or 4%

Three-Phase Motor Lead Identification

Line Connections — Six-Lead Motors

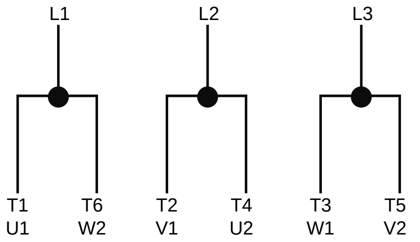
WARNING: When installing 6-lead motors extra care must be used to ensure lead identification at the surface. Leads must be marked and connected per diagram. Motor leads are not connected red to red, yellow to yellow, etc.



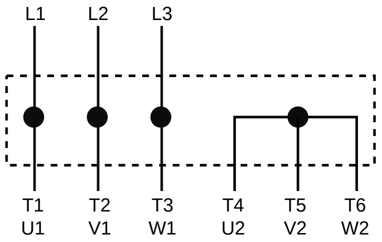
LEADS LOCATED HERE ONLY
FOR 3 LEAD (DOL) MOTORS

90° Lead Spacing

Connections for across-the-line starting, running, and any reduced voltage starting except WYE-DELTA type starters.



WYE-DELTA starters connect the motor as shown below during starting, then change to the running connection shown at the left.



Each motor lead is numbered with two markers, one near each end. To reverse rotation, interchange any two line connections.

Phase Converters

There are a number of different types of phase converters available. Each generates three-phase power from a single-phase power line.

In all phase converters, the voltage balance is critical to current balance. Although some phase converters may be well balanced at one point on the system-operating curve, submersible pumping systems often operate at differing points on the curve as water levels and operating pressures fluctuate. Other converters may be well balanced at varying loads, but their output may vary widely with fluctuations in the input voltage.

The following guidelines have been established for submersible installations to be warrantable when used with a phase converter.

1. Limit pump loading to rated horsepower. Do not load into motor service factor.
2. Maintain at least 3 ft/s flow past the motor. Use a flow sleeve when necessary.
3. Use time delay fuses or circuit breakers in pump panel. Standard fuses or circuit breakers do not provide secondary motor protection.
4. SubMonitor may be used with electro mechanical type phase converters, however special connections are required. Consult SubMonitor Manual for connections of receiver and lightning arrestor.
5. SubMonitor will not work with electronic solid state phase converters.
6. Current unbalance must not exceed 10%.

Reduced Voltage Starters

All Franklin three-phase submersible motors are suitable for full-voltage starting. Under this condition the motor speed goes from zero to full speed within a half second or less. The motor current goes from zero to locked rotor amps, then drops to running amps at full speed. This may dim lights, cause momentary voltage dips to other electrical equipment, and shock power distribution transformers.

In some cases the power companies may require reduced-voltage starters to limit this voltage dip. There are also times when reduced-voltage starters may be desirable to reduce motor starting torque thus reducing the stress on shafts, couplings, and discharge piping. Reduced-voltage starters also slow the rapid acceleration of the water on start-up to help control upthrust and water hammer.

Reduced-voltage starters may not be required if the maximum recommended cable length is used. With maximum recommended cable length there is a 5% voltage drop in the cable at running amps, resulting in about 20% reduction in starting current and about 36% reduction in starting torque compared to having rated voltage at the motor. This may be enough reduction in starting current so that reduced-voltage starters are not required.

Three-Lead Motors: Autotransformer or solid-state reduced-voltage starters may be used for soft-starting standard three-phase motors.

When autotransformer starters are used, the motor should be supplied with at least 55% of rated voltage to ensure adequate starting torque. Most autotransformer starters have 65% and 80% taps. Setting the taps on these starters depends on the percentage of the maximum allowable cable length used in the system. If the cable length is less than 50% of the maximum allowable, either the 65% or the 80% taps may be used. When the cable length is more than 50% of allowable, the 80% tap should be used.

Six-Lead Motors: Wye-Delta starters are used with six-lead Wye-Delta motors. All Franklin 6" and 8" three-phase motors are available in six-lead Wye-Delta construction. Consult the factory for details and availability. Part winding starters are not compatible with Franklin Electric submersible motors and should not be used.

Wye-Delta starters of the open-transition type, which momentarily interrupt power during the starting cycle, are not recommended. Closed-transition starters have no interruption of power during the start cycle and can be used with satisfactory results.

Reduced-voltage starters have adjustable settings for acceleration ramp time, typically preset at 30 seconds. They must be adjusted so the motor is at full voltage within THREE SECONDS MAXIMUM to prevent excessive radial and thrust bearing wear.

If Subtrol-Plus or SubMonitor is used the acceleration time must be set to TWO SECONDS MAXIMUM due to the 3 second reaction time of the Subtrol-Plus or SubMonitor.

Solid-state starters AKA soft starts may not be compatible with Subtrol-Plus/SubMonitor. However, in some cases a bypass contactor has been used. Consult the factory for details.

During shutdown, Franklin Electric's recommendation is for the power to be removed, allowing the pump/motor to coast down. Stopping the motor by ramping down the voltage is possible, but should be limited to three (3) seconds maximum.

Inline Booster Pump Systems

Franklin Electric offers three different types of motors for non-vertical applications.

1. The **Booster** motors are specifically designed for booster applications. They are the **"Best Choice" for sealed Reverse Osmosis applications.** These motors are the result of two years of focused development and bring additional value and durability to booster module systems. These motors are only available to OEMs or Distributors who have demonstrated capability in Booster Module systems design and operation and adhere to Franklin's Application Manual requirements.

2. The **Hi-Temp** motors have many of the internal design features of the Booster motor. It's additional length allows for higher temperature handling and the Sand Fighter sealing system provides greater abrasion resistance. One or both of these conditions are often experienced in open atmosphere applications such as lakes, ponds, etc.

3. The **Standard Vertical Water Well** (40-125 hp) motors can be adapted to non-vertical applications when applied per the below guidelines. However, they will be more sensitive to application variances than the other two designs.

All of the above motors must be applied per the guidelines listed below. In addition, for all applications where the motor is applied in a sealed system, a Submersible Motor Booster Installation Record (Form 3655) or its equivalent must be completed at startup and received by Franklin Electric within 60 days. A sealed system is one where the motor and pump intake are mounted in a sleeve and the water feeding the pump intake is not open to the atmosphere.

Continued on next page

Inline Booster Pump Systems (continued)

Design And Operational Requirements

1. **Non-Vertical Operation:** Vertical Shaft-up (0°) to Horizontal (90°) operation is acceptable as long as the pump transmits "down-thrust" to the motor within 3 seconds after start-up and continuously during operation. However, it is best practice to provide a positive slope whenever it is possible, even if it is only a few degrees.

2. **Motor, Sleeve, and Pump Support System:** The booster sleeve ID must be sized according to the motor cooling and pump NPSHR requirements. The support system must support the motor's weight, prevent motor rotation and keep the motor and pump aligned. The support system must also allow for thermal axial expansion of the motor without creating binding forces.

3. **Motor Support Points:** A minimum of two support points are required on the motor. One in the motor/pump flange connection area and one in the bottom end of the motor area. The motor castings, not the shell area, are recommended as support points. If the support is a full length support and/or has bands in the shell area, they must not restrict heat transfer or deform the shell.

4. **Motor Support Material and Design:** The support system shall not create any areas of cavitation or other areas of reduced flow less than the minimum rate required by this manual. They should also be designed to minimize turbulence and vibration and provide stable alignment. The support materials and locations must not inhibit the heat transfer away from the motor.

5. **Motor and Pump Alignment:** The maximum allowable misalignment between the motor, pump, and pump discharge is 0.025 inch per 12 inches of length (2 mm per 1000 mm of length). This must be measured in both directions along the assembly using the motor/pump flange connection as the starting point. The booster sleeve and support system must be rigid enough to maintain this alignment during assembly, shipping, operation and maintenance.

6. The best motor lubrication and heat resistance is obtained with the factory based propylene glycol fill solution. Only when an application MUST HAVE deionized (DI) water should the factory fill solution be replaced. When a deionized water fill is required, the motor must be derated as indicated on the below chart. The exchange of the motor fill solution to DI water must be done by an approved Franklin service shop or representative using a vacuum fill system per Franklin's Motor Service Manual instruction. The motor shell then must be permanently stamped with a D closely behind the Serial Number.

   The maximum pressure that can be applied to the motor internal components during the removal of the factory fill solution is 7 psi (0.5 bar.)

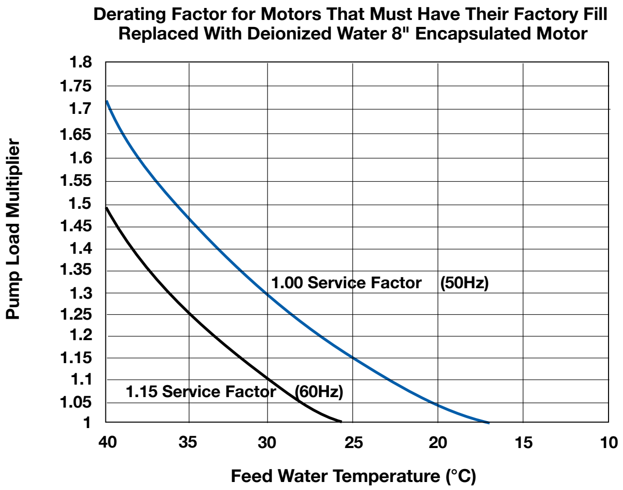


FIG. 12

First: Determine maximum Feed Water Temperature that will be experienced in this application. If the feed water exceeds the maximum ambient of the motor, both the DI water derating and a hot water application derating must be applied.

Second: Determine the Pump Load Multiplier from the appropriate Service Factor curve. (Typical 1.15 Service Factor is for 60 Hz ratings &1.00 Service Factor for 50 Hz ratings).

Third: Multiply the Pump Load Requirement times the pump load multiplier number indicated on the vertical axis to determine the Minimum Motor Nameplate Rating.

Fourth: Select a motor with a nameplate equal or higher than the above calculated value.

7. **Motor Alterations - Sand Slinger & Check Valve Plug:** On 6" and 8" motors, the rubber sand slinger located on the shaft must be removed. If a pipe plug is covering the check valve, it must be removed. The special Booster motor already has these modifications.

8. **Frequency of Starts:** Fewer than 10 starts per 24-hour period are recommended. Allow at least 20 minutes between shutdown and start-up of the motor.

Continued on next page

Inline Booster Pump Systems (continued)

9. **Controls-Soft Starters and VFDs:** Reduced voltage starters and variable speed drives (inverter drives) may be used with Franklin three-phase submersible motors to reduce starting current, upthrust, and mechanical stress during start-up. The guidelines for their use with submersible motors are different than with normal air cooled motor applications. Refer to the Franklin Electric Application, Installation and Maintenance (AIM) Manual Reduced Voltage Starters section or Variable Speed Submersible Pump Operation, Inverter Drives sections for specific details including required filtering.

10. **Motor Overload Protection:** Submersible motors require properly sized ambient compensated Class 10 quick-trip overloads per Franklin's AIM Manual guidelines to protect the motor. Class 20 or higher overloads are NOT acceptable. Franklin's SubMonitor is strongly recommended for all large submersibles since it is capable of sensing motor heat without any additional wiring to the motor. Applications using Soft Starters with a SubMonitor require a start-up bypass - consult the factory for details. SubMonitor can not be used in applications using a VFD control.

11. **Motor Surge Protection:** Properly sized, grounded and dedicated motor surge arrestors must be installed in the supply line of the booster module as close to the motor as possible. This is required on all systems including those using soft-starters and variable speed drives (inverter drives).

12. **Wiring:** Franklin's lead assemblies are only sized for submerged operation in water to the motor nameplate maximum ambient temperature and may overheat and cause failure or serious injury if operated in air. Any wiring not submerged must meet applicable national and local wiring codes and Franklin Cable Chart tables 16-21. (Notice: wire size, wire rating and insulation temperature rating must be known when determining its suitability to operate in air or conduit. Typically, for a given size and rating, as the insulation temperature rating increases its ability to operate in air or conduit also increases.)

13. **Check Valves:** Spring-loaded check valves must be used on start-up to minimize motor upthrusting, water hammer, or in multiple booster (parallel) applications to prevent reverse flow.

14. **Pressure Relief Valves:** A pressure relief valve is required and must be selected to ensure that, as the pump approaches shut-off, it never reaches the point that the motor will not have adequate cooling flow past it.

15. **System Purge (Can Flooding):** An air bleeder valve must be installed on the booster sleeve so that flooding may be accomplished prior to booster start-up. Once flooding is complete, the booster should be started and brought up to operating pressure as quickly as possible to minimize the duration of an upthrust condition. At no time should air be allowed to gather in the booster sleeve because this will prevent proper cooling of the motor and permanently damage it.

16. **System Flush – Must Not Spin Pump:** Applications may utilize a low flow flushing operation. Flow through the booster sleeve must not spin the pump impellers and the motor shaft. If spinning takes place, the bearing system will be permanently damaged and the motor life shortened. Consult the booster pump manufacturer for maximum flow rate through the pump when the motor is not energized.

Table 38 Franklin Cable chart (See 12. Wiring)

CABLE TEMP. RATING (°C)	MOTOR NAMEPLATE RATED AMPS FULL LOAD	#10 AWG		#8 AWG		#6 AWG		#4 AWG		#2 AWG	
		IN AIR	IN CONDUIT	IN AIR	IN CONDUIT	IN AIR	IN CONDUIT	IN AIR	IN CONDUIT	IN AIR	IN CONDUIT
75	3-LEAD (DOL)	40A	28A	56A	40A	76A	52A	100A	68A	136A	92A
	6-LEAD (Y-Δ)	69A	48A	97A	69A	132A	90A	173A	118A	236A	159A
90	3-LEAD (DOL)	44A	32A	64A	44A	84A	60A	112A	76A	152A	104A
	6-LEAD (Y-Δ)	76A	55A	111A	76A	145A	104A	194A	132A	263A	180A
125	3-LEAD (DOL)	66A	46A	77A	53A	109A	75A	153A	105A	195A	134A
	6-LEAD (Y-Δ)	114A	80A	133A	91A	188A	130A	265A	181A	337A	232A

Based on 30 °C maximum ambient with cable length of 100 feet or less.

Continued on next page

Inline Booster Pump Systems (continued)

17. **Open Atmosphere Booster Pump Systems:** When an open booster is placed in a lake, tank, etc. that is open to atmospheric pressure, the water level must provide sufficient head pressure to allow the pump to operate above its NPSHR requirement at all times and all seasons. Adequate inlet pressure must be provided prior to booster start-up.

Four Continuous Monitoring System Requirements for Sealed Booster Systems.

1. **Water Temperature:** Feed water on each booster must be continuously monitored and not allowed to exceed the motor nameplate maximum ambient temperature at any time. IF THE INLET TEMPERATURE EXCEEDS THE MOTOR NAMEPLATE MAXIMUM AMBIENT TEMPERATURE, THE SYSTEM MUST SHUTDOWN IMMEDIATELY TO PREVENT PERMANENT MOTOR DAMAGE. If feed water temperatures are expected to be above the allowable temperature, the motor must be derated. See Franklin's AIM Manual Hot Water Applications section for derating guidelines. (The high temperature feed water derating is in addition to the exchange to DI water derating if the motor factory fill solution was exchanged to DI water.)

2. **Inlet Pressure:** The inlet pressure on each booster module must be continuously monitored. It must always be positive and higher than the NPSHR (Net Positive Suction Head Requirement) of the pump. A minimum of 20 PSIG (1.38 Bar) is required at all times, except for 10 seconds or less when the motor is starting and the system is coming up to pressure. Even during these 10 seconds the pressure must remain positive and be higher than the NPSHR (Net Positive Suction Head Requirement) of the pump.

   PSIG is the actual value displayed on a pressure gauge in the system piping. PSIG is the pressure above the atmospheric conditions. If at any time these pressure requirements are not being met, the motor must be de-energized immediately to prevent permanent damage to the motor. Once the motor is damaged, it is usually not immediately noticeable, but progresses and results in a premature motor failure weeks or months after the damage occurred.

   Motors that will be exposed to pressure in excess of 500 psi (34.47 Bar) must undergo special high pressure testing. Consult factory for details and availability.

3. **Discharge Flow:** The flow rate for each pump must not be allowed to drop below the motor minimum cooling flow requirement. IF THE MOTOR MINIMUM COOLING FLOW REQUIREMENT IS NOT BEING MET FOR MORE THAN 10 SECONDS, THE SYSTEM MUST BE SHUT DOWN IMMEDIATELY TO PREVENT PERMANENT MOTOR DAMAGE.

4. **Discharge Pressure:** The discharge pressure must be monitored to ensure that a downthrust load toward the motor is present within 3 seconds after start-up and continuously during operation.
   IF THE MOTOR DISCHARGE PRESSURE IS NOT ADEQUATE TO MEET THIS REQUIREMENT, THE SYSTEM MUST BE SHUT DOWN IMMEDIATELY TO PREVENT PERMANENT MOTOR DAMAGE.

Variable Frequency Drive Submersible Motor Requirements

Franklin Electric's three-phase, encapsulated submersible motors can be used with variable frequency drives (VFD) when applied within the guidelines below.

All three-phase, encapsulated submersible motors must have the VFD sized based on the motor's nameplate maximum amps, not horsepower. The continuous rated amps of the VFD must be equal to or greater than the motor's nameplate maximum amps or warranty will be void.

Franklin Electric's single-phase, 2- and 3-wire, encapsulated submersible motors can only be used with the appropriate Franklin constant pressure controller.

Franklin Electric's submersible motor Application Installation Maintenance (AIM) manual should be checked for the latest guidelines and can be found online at www.franklin-electric.com.

WARNING: There is a potential shock hazard from contact with and/or touching the insulated cables connected to the variable frequency drive output anytime the motor has energy applied.

Output Filter Requirement Test:

NOTICE: An incoming power supply or line-side filter for the drive does not replace the need for additional output filters.

An output filter is required if the answer is yes to one or both of the items below:
#1 - Is the VFD's pulse width modulation (PWM) voltage rise-time (dV/dt) more than 500 Volts per micro-second (500 V/µ-second)?

#2 - Is the motor nameplate voltage more than 379 Volts and is the cable from drive-to-motor more than 50 ft (15.2 m)?

NOTICE:
More than 99% of the drives applied on water well submersible motors will require the purchase of additional output filtering based on question #1.

Output filters can be expensive. However, when needed, it is required for the motor to be considered for warranty. Make sure this item is not overlooked when quoting a job.

PWM dV/dt value can be defined as: the rate at which voltage is changing with time or how fast the voltage is accelerating. This information can be supplied by the drive manufacturer or the manufacturer's drive specification sheet. The dV/dt value cannot be measured with typical field equipment, even when using a true-RMS voltage/amperage multi-meter.

Franklin Electric has a line of VFDs that are specifically designed for Franklin application systems. These VFDs are used in the MonoDrive and SubDrive constant pressure systems. Franklin drive systems have the required additional output filtering installed; however, the SubDrive HPX does not.

Types of Output Filters:

A resistor-inductor-capacitor (RLC) filter has both a high pass filter & a low pass filter section and are considered the best practice, but a high pass reactor filter is also acceptable.

Filters should be recommended by the drive manufacturer; for the correct recommendations provide them with answers to all five of the items below.

REQUIRED ITEMS FOR PROPER VFD FILTER SIZING:
(1) VFD model (2) Carrier frequency setting (3) Motor nameplate voltage (4) Motor nameplate max amps (5) Cable length from the drive output terminals to the motor

Input Current & Motor Overload Protection:

- Motor input current should be set at the system's typical operating current when running at nameplate rated voltage and frequency (Hz).
- Motor overload protection should be set to trip at 115% of the system's typical operating current.
- Motor overload protection must trip equal to or faster than NEMA Class 10 motor overload curve requirements.

Motor Maximum Load Limits:

- The system must never operate in excess of the motor nameplate maximum amps.
- On 50 Hz motors, nameplate amps are maximum amps as these motors have a 1.0 service factor.

Variable Frequency Drive Submersible Motor Requirements

Motor Operating Hertz, Cooling Requirements & Underload Settings:

- Standard practice for large VFD installations is to limit the operation to 60 Hz max. Operating at greater than 60 Hz requires special system design considerations.
- The motor must never operate below 30 Hz. This is the minimum speed required to provide correct bearing lubrication.
- The motor's operating speed must always operate so the minimum water flow requirements of 0.5 ft/sec for 6-inch & 8-inch motors and 0.25 ft/sec for 4-inch motors is supplied.
- The motor underload protection is normally set to trip at 80% of the system's typical operating current. However, the underload trip point must be selected so that minimum flow requirements are always met.

Starting & Stopping Ramp Settings:

- The motor must reach or pass the 30 Hz operating speed within 1 second of the motor being energized. If this does not occur, the motor bearings will be damaged and the motor life reduced.
- The best stopping method is to turn power off followed by a natural coast to stop.
- A controlled stop from 30 Hz to 0 Hz is allowed if the time does not exceed 1 second.

Drive Carrier Frequency:

- The carrier frequency is set in the field. The drive typically has a selectable range between 2k and 12k Hz. The higher the carrier wave frequency setting, the greater the voltage spikes; the lower the carrier wave frequency setting, the rougher/poorer the shape of the power curve.
- The carrier frequency should be set within the range of 4k to 5k Hz for encapsulated submersible motors.

Application Function Setting:

- If the VFD has a setting of centrifugal pump or propeller fan it should be used.
- Centrifugal pumps and fans have similar load characteristics.

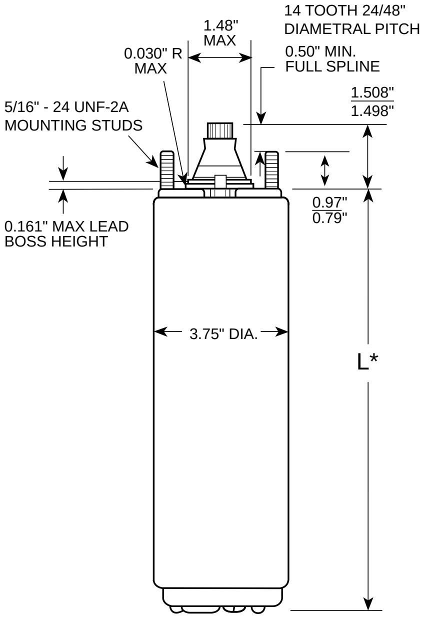
VFD Frequency of Starts:

- Keeping the starts per day within the recommended numbers shown in the frequency of starts section of the AIM manual provides the best system life. However, since in-rush current is typically reduced when used with a properly configured VFD, large 3-phase submersible motors can be started more frequently. In all cases a minimum of 7 minutes must be allowed between a power off and the next restart attempt or consecutive restart attempts.

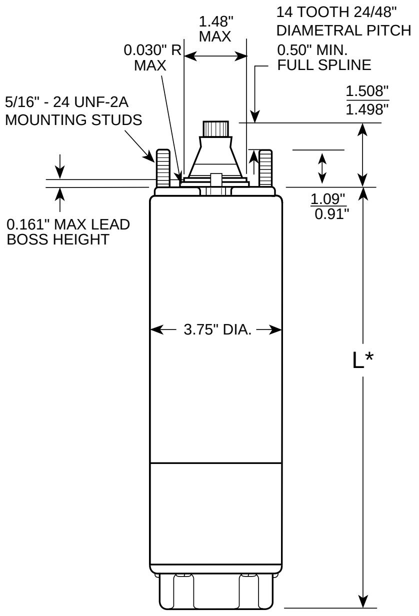
NEMA MG1 Above Ground Motor Standard Comments:

- Franklin Electric encapsulated submersible motors are not declared inverter duty motors by NEMA MG1 standards. The reason is NEMA MG1 standard part 31 does not include a section covering encapsulated winding designs.
- Franklin submersible motors can be used with VFDs without problems or warranty concerns providing Franklin's Application Installation Maintenance (AIM) manual guidelines are followed. See Franklin's on-line AIM manual for the latest guidelines.

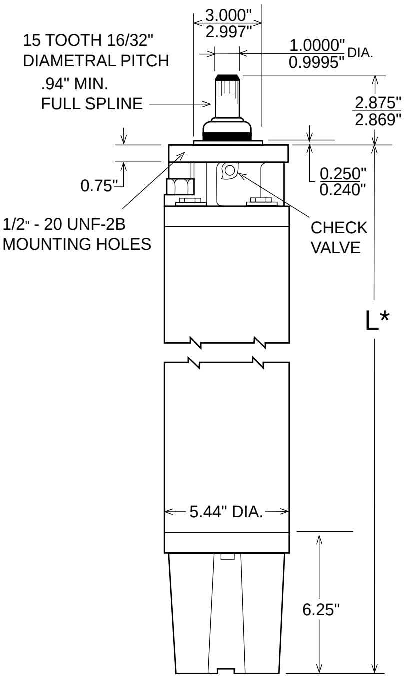
4" Super Stainless — Dimensions (Standard Water Well)



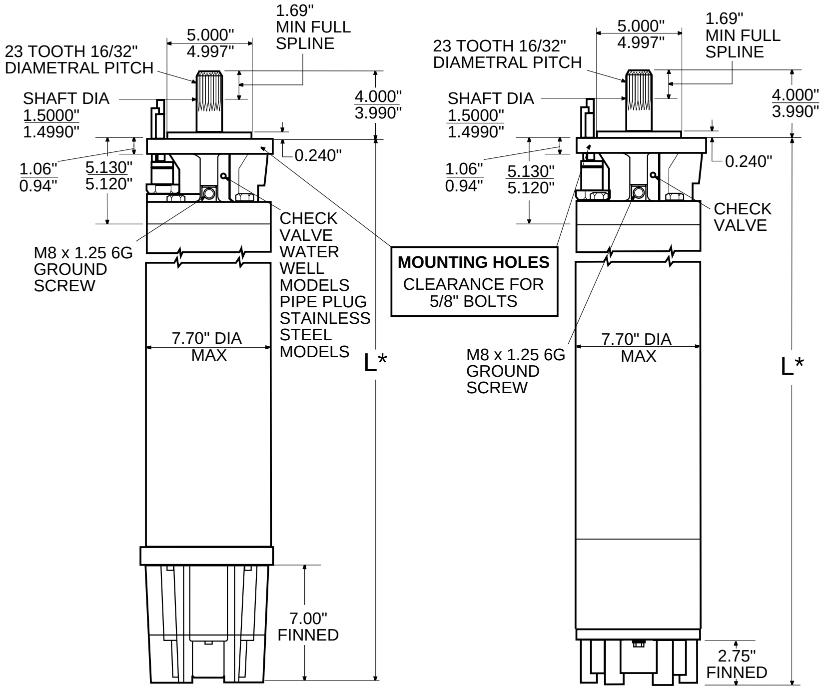
4" High Thrust — Dimensions (Standard Water Well)



6" — Dimensions (Standard Water Well)



8" — Dimensions (Standard Water Well)



40 to 100 hp

125 to 200 hp

*** Motor lengths and shipping weights are available on Franklin Electric's web site (www.franklin-electric.com) or by calling Franklin's submersible hotline (800-348-2420).**

Tightening Motor Lead Connector Jam Nut

4" Motors with Jam Nut:
15 to 20 ft-lb (20 to 27 Nm)

4" Motors with 2 Screw Clamp Plate:
35 to 45 in-lb (4.0 to 5.1 Nm)

6" Motors:
40 to 50 ft-lb (54 to 68 Nm)

8" Motors with 1-3/16" to 1-5/8" Jam Nut:
50 to 60 ft-lb (68 to 81 Nm)

8" Motors with 4 Screw Clamp Plate:
Apply increasing torque to the screws equally in a criss-cross pattern until 80 to 90 in-lb (9.0 to 10.2 Nm) is reached.

Jam nut tightening torques recommended for field assembly are shown. Rubber compression set within the first few hours after assembly may reduce the jam nut torque. This is a normal condition which does not indicate reduced seal effectiveness. Retightening is not required, but is permissible and recommended if original torque was questionable.

A motor lead assembly should not be reused. A new lead assembly should be used whenever one is removed from the motor, because rubber set and possible damage from removal may prevent proper resealing of the old lead.

All motors returned for warranty consideration must have the lead returned with the motor.

Pump to Motor Coupling

Assemble coupling with non-toxic FDA approved waterproof grease such as Mobile FM102, Texaco CYGNUS2661, or approved equivalent. This prevents abrasives from entering the spline area and prolongs spline life.

Pump to Motor Assembly

After assembling the motor to the pump, torque mounting fasteners to the following:

4" Pump and Motor: 10 lb-ft (14 Nm)

6" Pump and Motor: 50 lb-ft (68 Nm)

8" Pump and Motor: 120 lb-ft (163 Nm)

Shaft Height and Free End Play

Table 42

MOTOR	NORMAL SHAFT HEIGHT		DIMENSION SHAFT HEIGHT		FREE END PLAY	
					MIN.	MAX.
4"	1 1/2"	38.1 mm	1.508" 1.498"	38.30 38.05 mm	0.010" 0.25 mm	0.045" 1.14 mm
6"	2 7/8"	73.0 mm	2.875" 2.869"	73.02 72.88 mm	0.030" 0.76 mm	0.050" 1.27 mm
8" TYPE 1	4"	101.6 mm	4.000" 3.990"	101.60 101.35 mm	0.008" 0.20 mm	0.032" 0.81 mm
8" TYPE 2.1	4"	101.6 mm	4.000" 3.990"	101.60 101.35 mm	0.030" 0.76 mm	0.080" 2.03 mm

If the height, measured from the pump-mounting surface of the motor, is low and/or end play exceeds the limit, the motor thrust bearing is possibly damaged, and should be replaced.

Submersible Leads and Cables

A common question is why motor leads are smaller than specified in Franklin’s cable charts.

The leads are considered a part of the motor and actually are a connection between the large supply wire and the motor winding. The motor leads are short and there is virtually no voltage drop across the lead.

In addition, the lead assemblies **operate under water**, while at least part of the supply cable must **operate in air.** Lead assemblies running under water operate cooler.

CAUTION: Lead assemblies on submersible motors are suitable only for use in water and may overheat and cause failure if operated in air.

System Troubleshooting

Motor Does Not Start

POSSIBLE CAUSE	CHECKING PROCEDURES	CORRECTIVE ACTION
A. No power or incorrect voltage.	Check voltage at line terminals. The voltage must be ± 10% of rated voltage.	Contact power company if voltage is incorrect.
B. Fuses blown or circuit breakers tripped.	Check fuses for recommended size and check for loose, dirty or corroded connections in fuse receptacle. Check for tripped circuit breakers.	Replace with proper fuse or reset circuit breakers.
C. Defective pressure switch.	Check voltage at contact points. Improper contact of switch points can cause voltage less than line voltage.	Replace pressure switch or clean points.
D. Control box malfunction.	For detailed procedure, see pages 48-56.	Repair or replace.
E. Defective wiring.	Check for loose or corroded connections or defective wiring	Correct faulty wiring or connections.
F. Bound pump.	Check for misalignment between pump and motor or a sand bound pump. Amp readings will be 3 to 6 times higher than normal until the overload trips	Pull pump and correct problem. Run new installation until the water clears
G. Defective cable or motor.	For detailed procedure, see pages 46 & 47.	Repair or replace.

Motor Starts Too Often

A. Pressure switch.	Check setting on pressure switch and examine for defects.	Reset limit or replace switch.
B. Check valve - stuck open.	Damaged or defective check valve will not hold pressure.	Replace if defective.
C. Waterlogged tank.	Check air charge	Clean or replace.
D. Leak in system.	Check system for leaks.	Replace damaged pipes or repair leaks.

System Troubleshooting

Motor Runs Continuously

POSSIBLE CAUSE	CHECKING PROCEDURES	CORRECTIVE ACTION
A. Pressure switch.	Check switch for welded contacts. Check switch adjustments.	Clean contacts, replace switch, or adjust setting.
B. Low water level in well.	Pump may exceed well capacity. Shut off pump, wait for well to recover. Check static and drawdown level from well head.	Throttle pump output or reset pump to lower level. Do not lower if sand may clog pump.
C. Leak in system.	Check system for leaks.	Replace damaged pipes or repair leaks.
D. Worn pump.	Symptoms of worn pump are similar to those of drop pipe leak or low water level in well. Reduce pressure switch setting, if pump shuts off worn parts may be the fault.	Pull pump and replace worn parts.
E. Loose coupling or broken motor shaft.	Check for loose coupling or damaged shaft.	Replace worn or damaged parts.
F. Pump screen blocked.	Check for clogged intake screen.	Clean screen and reset pump depth.
G. Check valve stuck closed.	Check operation of check valve.	Replace if defective.
H. Control box malfunction.	See pages 47-55 for single-phase.	Repair or replace.

Motor Runs But Overload Protector Trips

A. Incorrect voltage.	Using voltmeter, check the line terminals. Voltage must be within ± 10% of rated voltage.	Contact power company if voltage is incorrect.
B. Overheated protectors.	Direct sunlight or other heat source can raise control box temperature causing protectors to trip. The box must not be hot to touch.	Shade box, provide ventilation or move box away from source.
C. Defective control box.	For detailed procedures, see pages 47-55.	Repair or replace.
D. Defective motor or cable.	For detailed procedures, see pages 45 & 46.	Repair or replace.
E. Worn pump or motor.	Check running current, see tables 13, 22, 24 & 27.	Replace pump and/or motor.

Table 45 Preliminary Tests - All Sizes Single- and Three-Phase

TEST	PROCEDURE	WHAT IT MEANS
Insulation Resistance	1. Open master breaker and disconnect all leads from control box or pressure switch (QD type control, remove lid) to avoid electric shock hazard and damage to the meter. 2. Use a megohmmeter or set the scale lever to R X 100K on an ohmmeter. Zero the meter. 3. Connect one meter lead to any one of the motor leads and the other lead to the metal drop pipe. If the drop pipe is plastic, connect the meter lead to ground.	1. If the ohms value is normal (table 46), the motor is not grounded and the cable insulation is not damaged. 2. If the ohms value is below normal, either the windings are grounded or the cable insulation is damaged. Check the cable at the well seal as the insulation is sometimes damaged by being pinched.
Winding Resistance	1. Open master breaker and disconnect all leads from control box or pressure switch (QD type control, remove lid) to avoid electric shock hazard and damage to the meter. 2. Set the scale lever to R X 1 for values under 10 ohms. For values over 10 ohms, set the scale lever to R X 10. “zero” the ohmmeter. 3. On 3-wire motors measure the resistance of yellow to black (main winding) and yellow to red (start winding). On 2-wire motors: measure the resistance from line-to-line. Three-phase motors: measure the resistance line-to-line for all three combinations.	1. If all ohms values are normal (tables 13, 22, 24 & 27), the motor windings are neither shorted nor open, and the cable colors are correct 2. If any one value is less than normal, the motor is shorted. 3. If any one ohm value is greater than normal, the winding or the cable is open, or there is a poor cable joint or connection. 4. If some ohms values are greater than normal and some less on single-phase motors, the leads are mixed. See page 46 to verify cable colors.

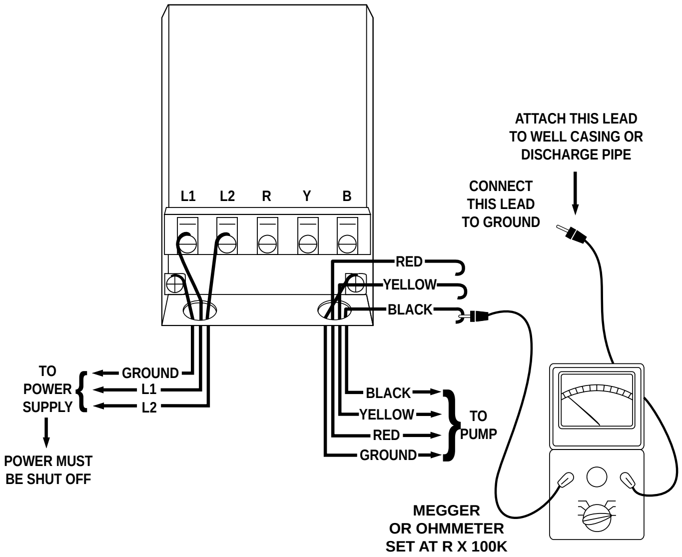


FIG. 13

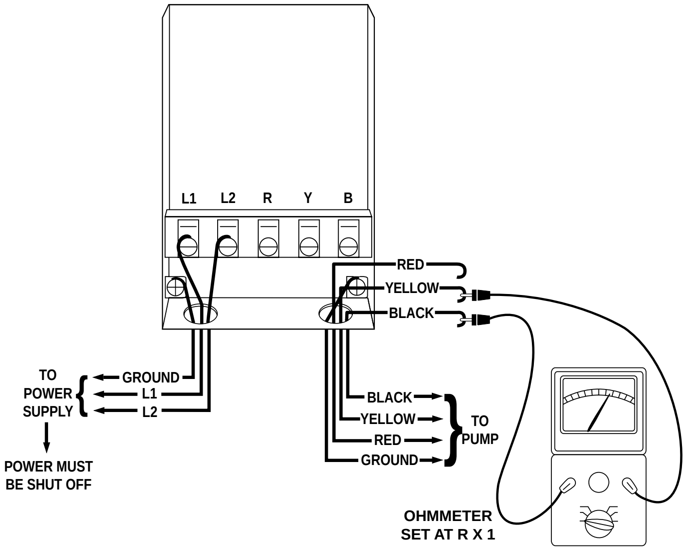


FIG. 14

Insulation Resistance Readings

Table 46 Normal ohm and Megohm Values Between All Leads and Ground

CONDITION OF MOTOR AND LEADS	OHMS VALUE	MEGOHM VALUE
A new motor (without drop cable).	200,000,000 (or more)	200.0 (or more)
A used motor which can be reinstalled in well.	10,000,000 (or more)	10.0 (or more)
MOTOR IN WELL. READINGS ARE FOR DROP CABLE PLUS MOTOR.		
New motor.	2,000,000 (or more)	2.0 (or more)
Motor in good condition.	500,000 - 2,000,000	0.50 - 2.0
Insulation damage, locate and repair.	Less than 500,000	Less than .50

Insulation resistance varies very little with rating. Motors of all hp, voltage, and phase rating have similar values of insulation resistance.

The table above is based on readings taken with a megohm meter with a 500 VDC output. Readings may vary using a lower voltage ohmmeter, consult Franklin Electric if readings are in question.

Resistance of Drop Cable (ohms)

The values below are for copper conductors. If aluminum conductor drop cable is used, the resistance will be higher. To determine the actual resistance of the aluminum drop cable, divide the ohm readings from this chart by 0.61. This chart shows total resistance of cable from control to motor and back.

Winding Resistance Measuring

The winding resistance measured at the motor should fall within the values in tables 13, 22, 24 & 27. When measured through the drop cable, the resistance of the drop cable must be subtracted from the ohmmeter readings to get the winding resistance of the motor. See table below.

Table 46A DC Resistance in ohms per 100 ft of Wire (Two conductors) @ 50 °F

AWG OR MCM WIRE SIZE (COPPER)	14	12	10	8	6	4	3	2
OHMS	0.544	0.338	0.214	0.135	0.082	0.052	0.041	0.032

1	1/0	2/0	3/0	4/0	250	300	350	400	500	600	700
0.026	0.021	0.017	0.013	0.010	0.0088	0.0073	0.0063	0.0056	0.0044	0.0037	0.0032

Identification Of Cables When Color Code Is Unknown (Single-Phase 3-Wire Units)

If the colors on the individual drop cables cannot be found with an ohmmeter, measure:

Cable 1 to Cable 2
Cable 2 to Cable 3
Cable 3 to Cable 1

Find the highest resistance reading.

The lead not used in the highest reading is the yellow lead.

Use the yellow lead and each of the other two leads to get two readings:

Highest is the red lead.
Lowest is the black lead.

EXAMPLE:
The ohmmeter readings were:

Cable 1 to Cable 2 - 6 ohms
Cable 2 to Cable 3 - 2 ohms
Cable 3 to Cable 1 - 4 ohms

The lead not used in the highest reading (6 ohms) was

Cable 3—Yellow

From the yellow lead, the highest reading (4 ohms) was

To Cable 1—Red

From the yellow lead, the lowest reading (2 ohms) was

To Cable 2—Black

Single-Phase Control Boxes

Checking and Repairing Procedures (Power On)

WARNING: Power must be on for these tests. Do not touch any live parts.

A. VOLTAGE MEASUREMENTS

Step 1. Motor Off

1. Measure voltage at L1 and L2 of pressure switch or line contactor.
2. Voltage Reading: Should be ± 10% of motor rating.

Step 2. Motor Running

1. Measure voltage at load side of pressure switch or line contactor with pump running.
2. Voltage Reading: Should remain the same except for slight dip on starting. Excessive voltage drop can be caused by loose connections, bad contacts, ground faults, or inadequate power supply.
3. Relay chatter is caused by low voltage or ground faults.

B. CURRENT (AMP) MEASUREMENTS

1. Measure current on all motor leads.
2. Amp Reading: Current in red lead should momentarily be high, then drop within one second to values in table 13. This verifies relay or solid state relay operation. Current in black and yellow leads should not exceed values in table 13.
3. Relay or switch failures will cause red lead current to remain high and overload tripping.
4. Open run capacitor(s) will cause amps to be higher than normal in the black and yellow motor leads and lower than normal in the red motor lead.
5. A bound pump will cause locked rotor amps and overloading tripping.
6. Low amps may be caused by pump running at shutoff, worn pump, or stripped splines.
7. Failed start capacitor or open switch/relay are indicated if the red lead current is not momentarily high at starting.

CAUTION: The tests in this manual for components such as capacitors, relays, and QD switches should be regarded as indicative and not as conclusive. For example, a capacitor may test good (not open, not shorted) but may have lost some of its capacitance and may no longer be able to perform its function.

Ohmmeter Tests

QD, Solid State Control Box (Power Off)

A. START CAPACITOR AND RUN CAPACITOR IF APPLICABLE (CRC)

1. Meter Setting: R x 1,000.
2. Connections: Capacitor terminals.
3. Correct meter reading: Pointer should swing toward zero, then back to infinity.

B. Q.D. (BLUE) RELAY

Step 1. Triac Test

1. Meter setting: R x 1,000.
2. Connections: Cap and B terminal.
3. Correct meter reading: Infinity for all models.

Step 2. Coil Test

1. Meter Setting: R x 1.
2. Connections: L1 and B.
3. Correct meter reading: Zero ohms for all models.

C. POTENTIAL (VOLTAGE) RELAY

Step 1. Coil Test

1. Meter setting: R x 1,000.
2. Connections: #2 & #5.
3. Correct meter readings:

   For 115 Volt Boxes:
   0.7-1.8 (700 to 1,800 ohms).

   For 230 Volt Boxes:
   4.5-7.0 (4,500 to 7,000 ohms).

Step 2. Contact Test

1. Meter setting: R x 1.
2. Connections: #1 & #2.
3. Correct meter reading: Zero for all models.

Ohmmeter Tests

Integral Horsepower Control Box (Power Off)

A. OVERLOADS (Push Reset Buttons to make sure contacts are closed.)

1. Meter Setting: R x 1.
2. Connections: Overload terminals.
3. Correct meter reading: Less than 0.5 ohms.

B. CAPACITOR (Disconnect leads from one side of each capacitor before checking.)

1. Meter Setting: R x 1,000.
2. Connections: Capacitor terminals.
3. Correct meter reading: Pointer should swing toward zero, then drift back to infinity, except for capacitors with resistors which will drift back to 15,000 ohms.

C. POTENTIAL (VOLTAGE) RELAY

Step 1. Coil Test

1. Meter setting: R x 1,000.
2. Connections: #2 & #5.
3. Correct meter readings: 4.5-7.0 (4,500 to 7,000 ohms) for all models.

Step 2. Contact Test

1. Meter Setting: R x 1.
2. Connections: #1 & #2.
3. Correct meter reading: Zero ohms for all models.

D. CONTACTOR

Step 1. Coil

1. Meter setting: R x 100
2. Connections: Coil terminals
3. Correct meter reading:
   1.8-14.0 (180 to 1,400 ohms)

Step 2. Contacts

1. Meter Setting: R X 1
2. Connections: L1 & T1 or L2 & T2
3. Manually close contacts
4. Correct meter reading: Zero ohms

CAUTION: The tests in this manual for components such as capacitors, relays, and QD switches should be regarded as indicative and not as conclusive. For example, a capacitor may test good (not open, not shorted) but may have lost some of its capacitance and may no longer be able to perform its function.

Table 49 QD Control Box Parts 60 Hz

HP	VOLTS	CONTROL BOX MODEL NUMBER	QD (BLUE) RELAY	START CAPACITOR	MFD	VOLTS	RUN CAPACITOR	MFD	VOLTS
1/3	115	280 102 4915	223 415 905	275 464 125	159-191	110			
	230	280 103 4915	223 415 901	275 464 126	43-53	220			
1/2	115	280 104 4915	223 415 906	275 464 201	250-300	125			
	230	280 105 4915	223 415 902	275 464 105	59-71	220			
	230	282 405 5015 (CRC)	223 415 912	275 464 126	43-53	220	156 362 101	15	370
3/4	230	280 107 4915	223 415 903	275 464 118	86-103	220			
	230	282 407 5015 (CRC)	223 415 913	275 464 105	59-71	220	156 362 102	23	370
1	230	280 108 4915	223 415 904	275 464 113	105-126	220			
	230	282 408 5015 (CRC)	223 415 914	275 464 118	86-103	220	156 362 102	23	370

Table 49A QD Capacitor Replacement Kits

CAPACITOR NUMBER	KIT
275 464 105	305 207 905
275 464 113	305 207 913
275 464 118	305 207 918
275 464 125	305 207 925
275 464 126	305 207 926
275 464 201	305 207 951
156 362 101	305 203 907
156 362 102	305 203 908

Table 49B Overload Kits 60 Hz

HP	VOLTS	KIT (1)
1/3	115	305 100 901
1/3	230	305 100 902
1/2	115	305 100 903
1/2	230	305 100 904
3/4	230	305 100 905
1	230	305 100 906

(1) For Control Boxes with model numbers that end with 4915.

Table 49C QD Relay Replacement Kits

QD RELAY NUMBER	KIT
223 415 901	305 101 901
223 415 902	305 101 902
223 415 903	305 101 903
223 415 904	305 101 904
223 415 905	305 101 905
223 415 906	305 101 906
223 415 912 (CRC)	305 105 901
223 415 913 (CRC)	305 105 902
223 415 914 (CRC)	305 105 903

FOOTNOTES:

(1) Control boxes supplied with QD Relays are designed to operate on 230-volt systems. For 208-volt systems or where line voltage is between 200 volts and 210 volts use the next larger cable size, or use a boost transformer to raise the voltage.

(2) Voltage relays kits for 115-volts (305 102 901) and 230-volts (305 102 902) will replace current, voltage or QD Relays, and solid state switches.

Table 50 Integral Horsepower Control Box Parts 60 Hz

MOTOR SIZE	MOTOR RATING HP	CONTROL BOX (1) MODEL NO.	CAPACITORS				OVERLOAD (2) PART NO.	RELAY (3) PART NO.	CONTACTOR (2) PART NO.
			PART NO. (2)	MFD.	VOLTS	QTY.			
4"	1 - 1.5 STANDARD	282 300 8110 (See Note 5)	275 464 113 S 155 328 102 R	105-126 10	220 370	1 1	275 411 107	155 031 102	
		282 300 8110 (See Note 5)	275 464 113 S 155 328 101 R	105-126 15	220 370	1 1	275 411 114 S 275 411 113 M	155 031 102	
		282 300 8610	275 464 113 S 155 328 101 R	105-126 15	220 370	1 1	None (See Note 4)	155 031 102	
4"	2 STANDARD	282 301 8110	275 464 113 S 155 328 103 R	105-126 20	220 370	1 1	275 411 117 S 275 411 113 M	155 031 102	
4"	2 DELUXE	282 301 8310	275 464 113 S 155 328 103 R	105-126 20	220 370	1 1	275 411 117 S 275 411 113 M	155 031 102	155 325 102 L
4"	3 STANDARD	282 302 8110	275 463 123 S 155 327 109 R	208-250 45	220 370	1 1	275 411 118 S 275 411 115 M	155 031 102	
4"	3 DELUXE	282 302 8310	275 463 123 S 155 327 109 R	208-250 45	220 370	1 1	275 411 118 S 275 411 115 M	155 031 102	155 325 102 L
4" & 6"	5 STANDARD	282 113 8110	275 468 119 S 155 327 114 R	270-324 40	330 370	1 2	275 411 119 S 275 406 102 M	155 031 601	
4" & 6"	5 DELUXE	282 113 9310	275 468 119 S 155 327 114 R	270-324 40	330 370	1 2	275 411 119 S 275 406 102 M	155 031 601	155 326 101 L
6"	7.5 STANDARD	282 201 9210	275 468 119 S 275 468 118 S 155 327 109 R	270-324 216-259 45	330 330 370	1 1 1	275 411 102 S 275 406 122 M	155 031 601	
6"	7.5 DELUXE	282 201 9310	275 468 119 S 275 468 118 S 155 327 109 R	270-324 216-259 45	330 330 370	1 1 1	275 411 102 S 275 406 121 M	155 031 601	155 326 102 L
6"	10 STANDARD	282 202 9210	275 468 119 S 275468 120 S 155 327 102 R	270-324 350-420 35	330 330 370	1 1 2	275 406 103 S 155 409 101 M	155 031 601	
6"	10 STANDARD	282 202 9230	275 463 120 S 275 468 118 S 275 468 119 S 155 327 102 R	130-154 216-259 270-324 35	330 330 330 370	1 1 1 2	275 406 103 S 155 409 101 M	155 031 601	
6"	10 DELUXE	282 202 9310	275 468 119 S 275468 120 S 155 327 102 R	270-324 350-420 35	330 330 370	1 1 2	275 406 103 S 155 409 101 M	155 031 601	155 326 102 L
6"	10 DELUXE	282 202 9330	275 463 120 S 275 468 118 S 275 468 119 S 155 327 102 R	130-154 216-259 270-324 35	330 330 330 370	1 1 1 2	275 406 103 S 155 409 101 M	155 031 601	155 326 102 L
6"	15 DELUXE	282 203 9310	275 468 120 S 155 327 109 R	350-420 45	330 370	2 3	275 406 103 S 155 409 102 M	155 031 601	155 429 101 L
6"	15 DELUXE	282 203 9330	275 463 122 S 275 468 119 S 155 327 109 R	161-193 270-324 45	330 330 370	1 2 3	275 406 103 S 155 409 102 M	155 031 601	155 429 101 L
6"	15 X-LARGE	282 203 9621	275 468 120 S 155 327 109 R	350-420 45	330 370	2 3	275 406 103 S 155 409 102 M	155 031 601 2 required	155 429 101 L

FOOTNOTES:

(1) Lightning arrestors 150 814 902 are suitable for all control boxes.

(2) S = Start, M = Main, L = Line, R = Run
Deluxe = Control box with line contactor.

(3) For 208-volt systems or where line voltage is between 200 volts and 210 volts, a low voltage relay is required. On 3 hp and smaller control boxes use relay part 155 031 103 in place of 155 031 102 and use the next larger cable size than specified in the 230-volt table. On 5 hp and larger use relay 155 031 602 in place of 155 031 601 and next larger wire. Boost transformers per page 15 are an alternative to special relays and cable.

(4) Control box model 282 300 8610 is designed for use with motors having internal overload protectors. If used with a 1.5 hp motor manufactured prior to date code 06H18, Overload/Capacitor Kit 305 388 901 is required.

(5) Control box model 282 300 8110 with date code 11C19 (March 2011) and newer contain 15 MFD run capacitor and both start and run overloads. This box is designed for use with any Franklin 1.5 hp motor.

Table 51 Integral hp Capacitor Replacement Kits

CAPACITOR NUMBER	KIT
275 463 120	305 206 920
275 463 122	305 206 922
275 463 123	305 206 923
275 464 113	305 207 913
275 468 118	305 208 918
275 468 119	305 208 919
275 468 120	305 208 920
155 327 101	305 203 901
155 327 102	305 203 902
155 327 109	305 203 909
155 327 114	305 203 914
155 328 101	305 204 901
155 328 102	305 204 902
155 328 103	305 204 903

Table 51A Integral hp Overload Replacement Kits

OVERLOAD NUMBER	KIT
275 406 102	305 214 902
275 406 103	305 214 903
275 406 121	305 214 921
275 406 122	305 214 922
275 411 102	305 215 902
275 411 107	305 215 907
275 411 108	305 215 908
275 411 113	305 215 913
275 411 114	305 215 914
275 411 115	305 215 915
275 411 117	305 215 917
275 411 118	305 215 918
275 411 119	305 215 919

Table 51B Integral hp Voltage Relay Replacement Kits

RELAY NUMBER	KIT
155 031 102	305 213 902
155 031 103	305 213 903
155 031 601	305 213 961
155 031 602	305 213 962

Table 51C Integral hp Contactor Replacement Kits

CONTACTOR	KIT
155 325 102	305 226 902
155 326 101	305 347 903
155 326 102	305 347 902
155 429 101	305 347 901

FOOTNOTES:

(1) The following kit number changes were made for number consistency purposes only. Parts in the kit did not change.

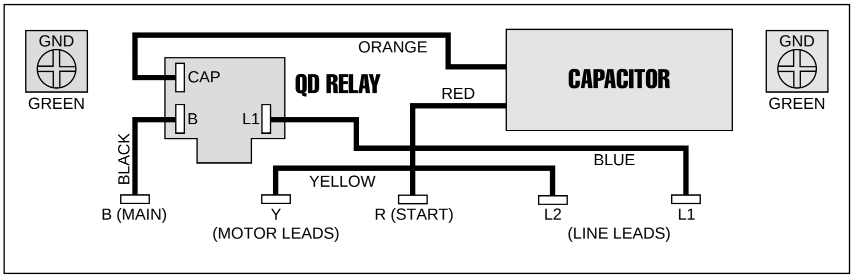
305 206 922 was 305 206 912

305 206 923 was 305 206 911

305 213 962 was 305 213 904

305 226 902 was 305 226 901

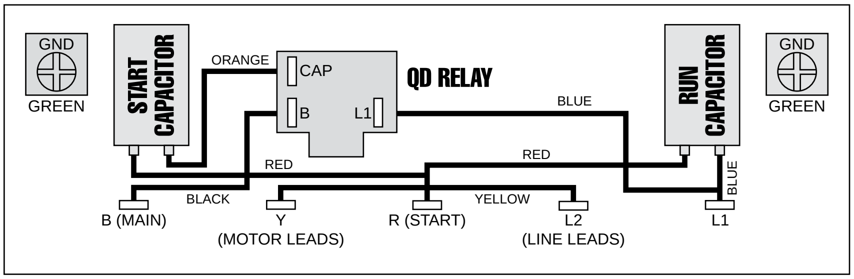
Control Box Wiring Diagrams



1/3 - 1 hp QD RELAY

280 10_ 4915

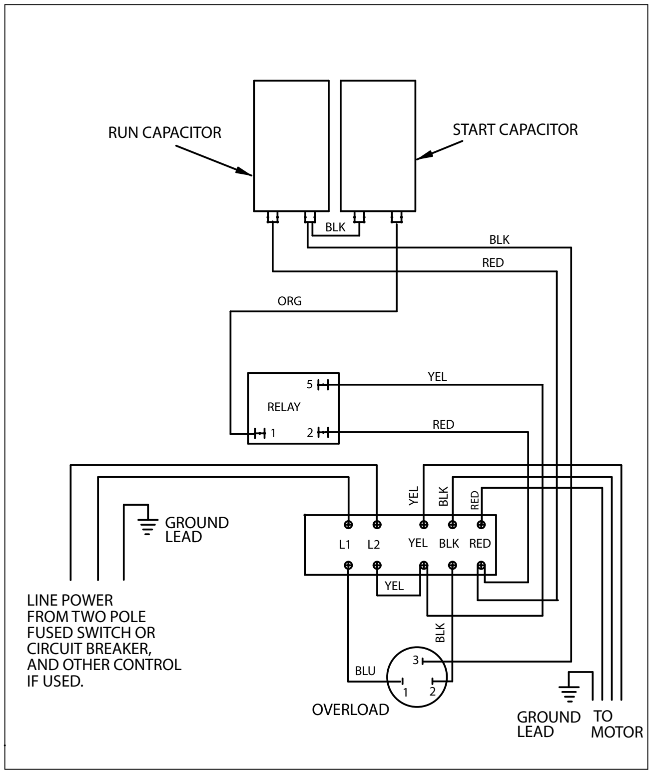
Sixth digit depends on hp



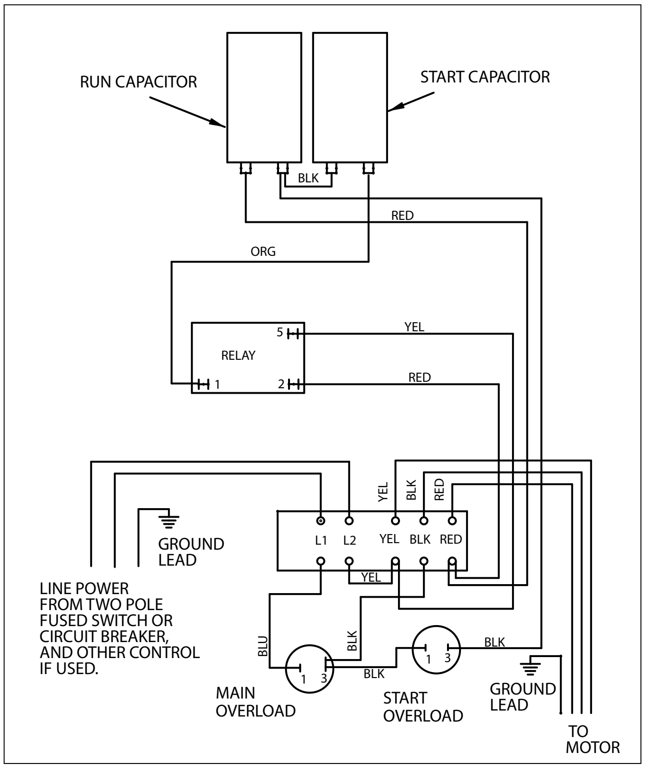
1/2 - 1 hp CRC QD RELAY

282 40_ 5015

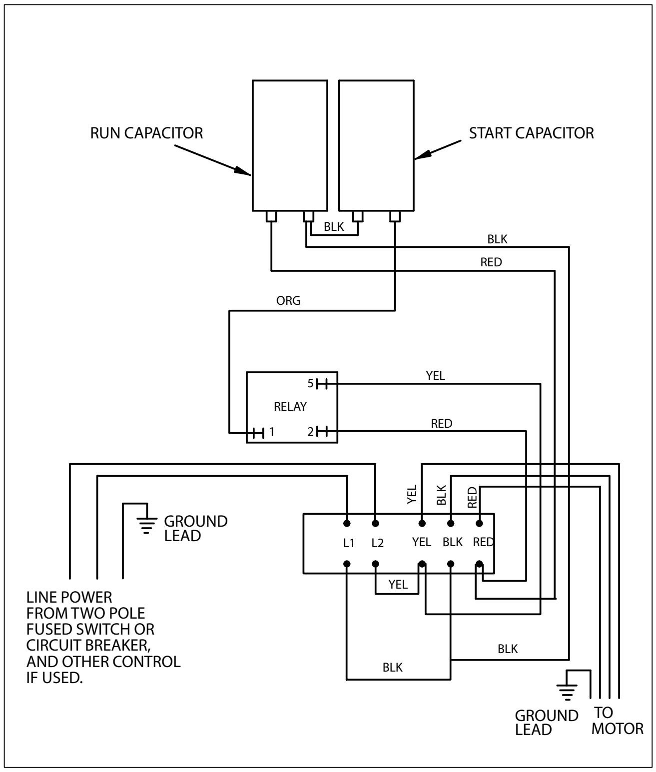
Sixth digit depends on hp



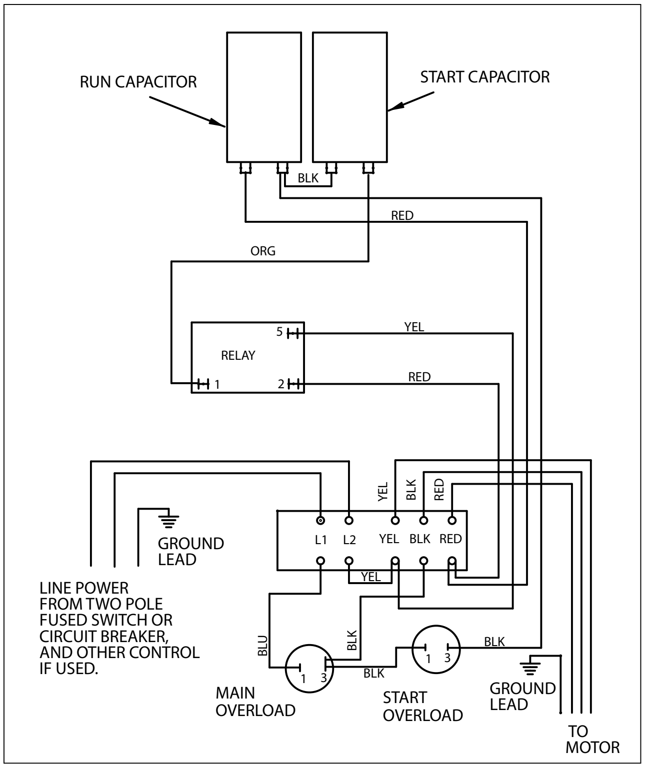
1 - 1.5 hp
282 300 8110
(Date Codes 11C19 & Older)



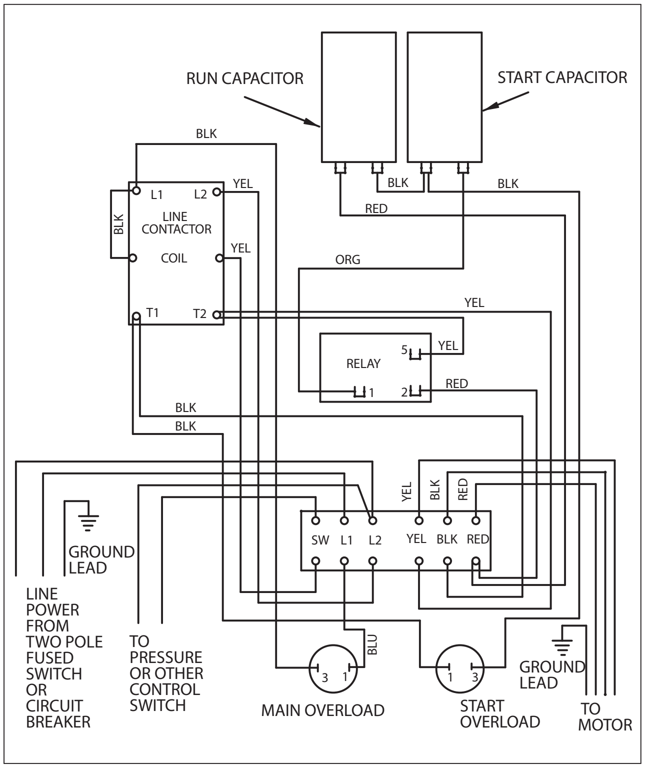
1 - 1.5 hp
282 300 8110
(Date Codes 11C19 & Newer)



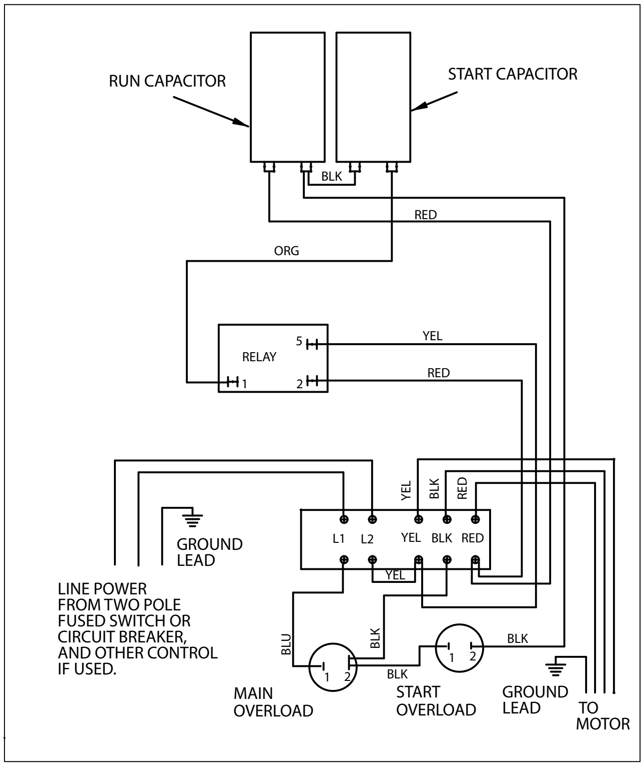
1 - 1.5 hp
282 300 8610



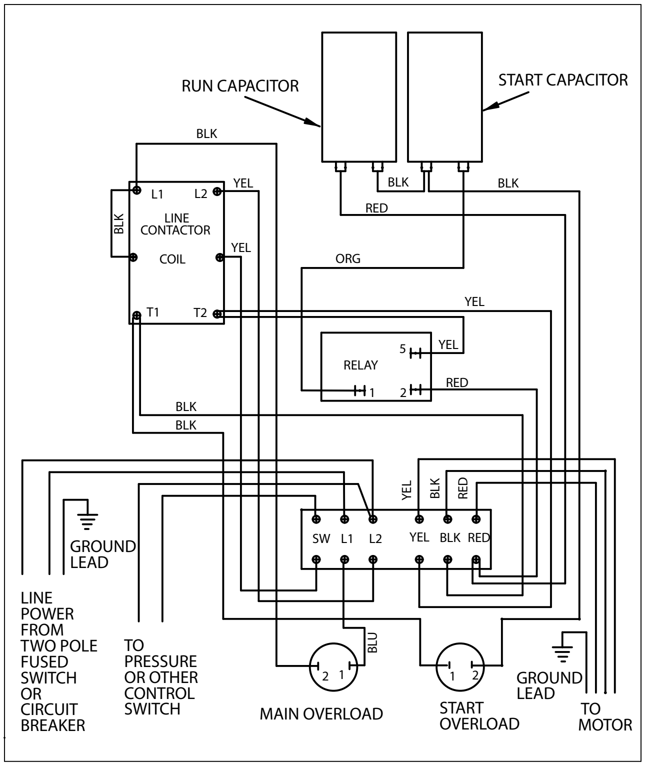
2 hp STANDARD
282 301 8110



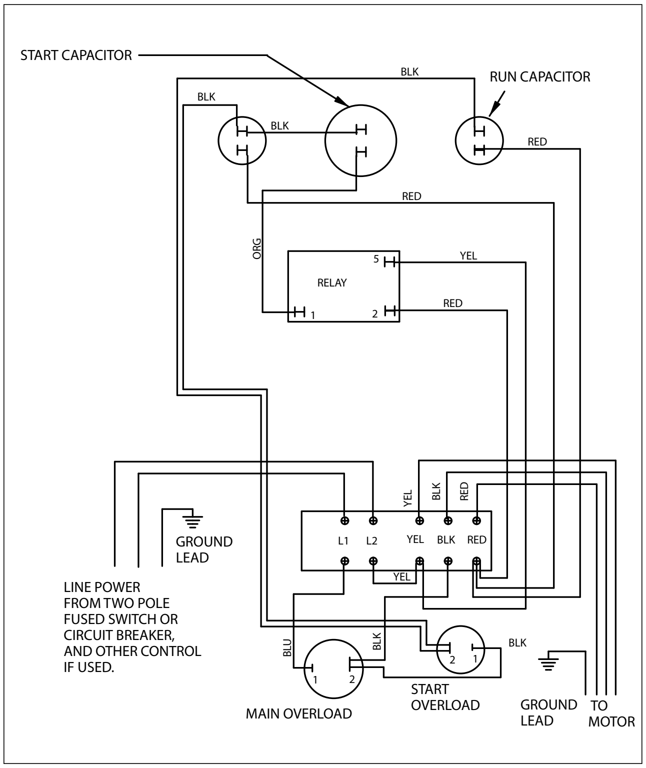
2 hp DELUXE
282 301 8310



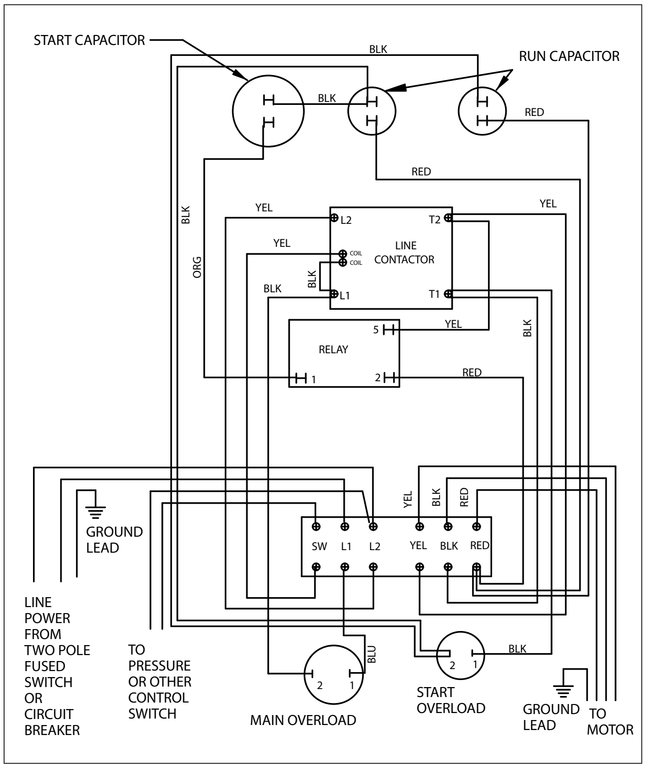
3 hp STANDARD
282 302 8110



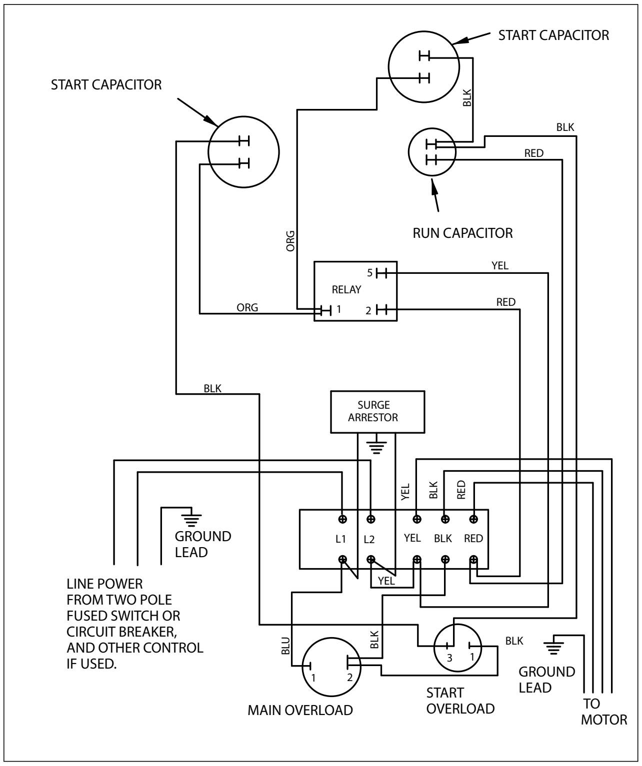
3 hp DELUXE
282 302 8310



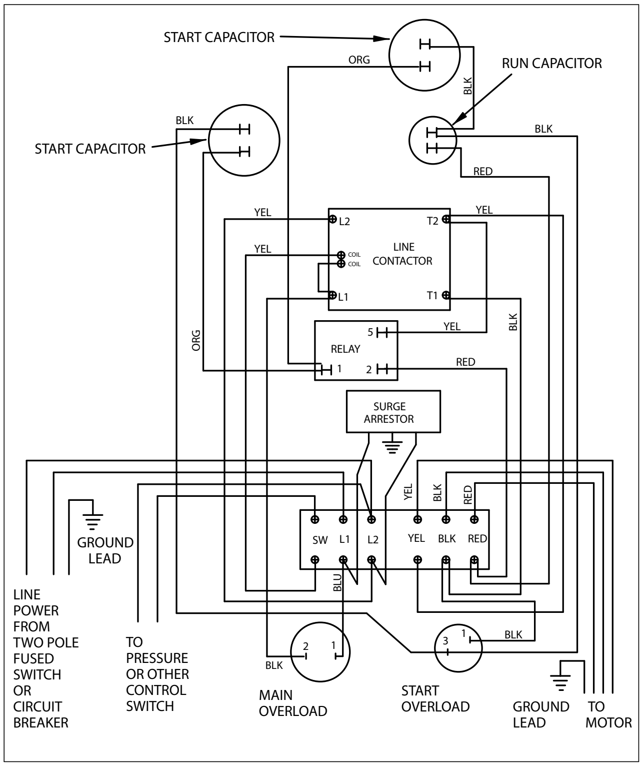
5 hp STANDARD
282 113 8110



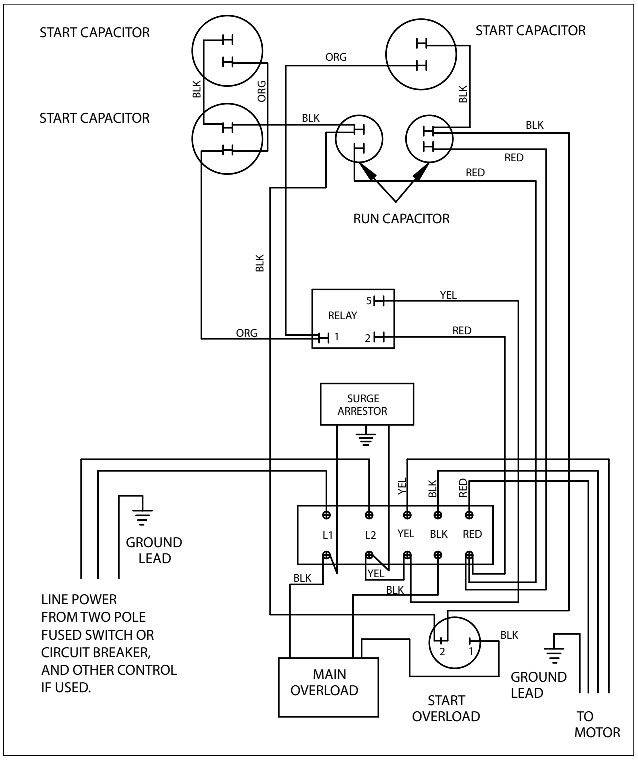
5 hp DELUXE
282 113 8310 or 282 113 9310



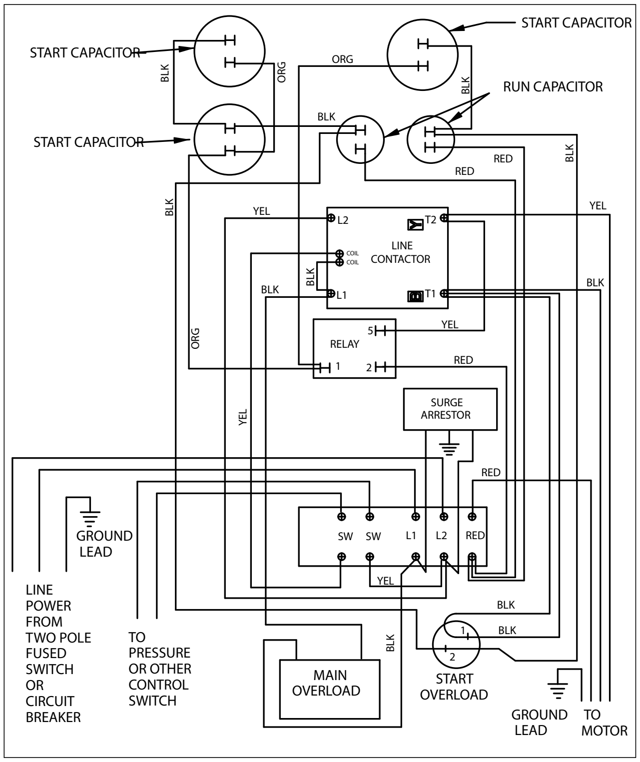
7.5 hp STANDARD
282 201 9210



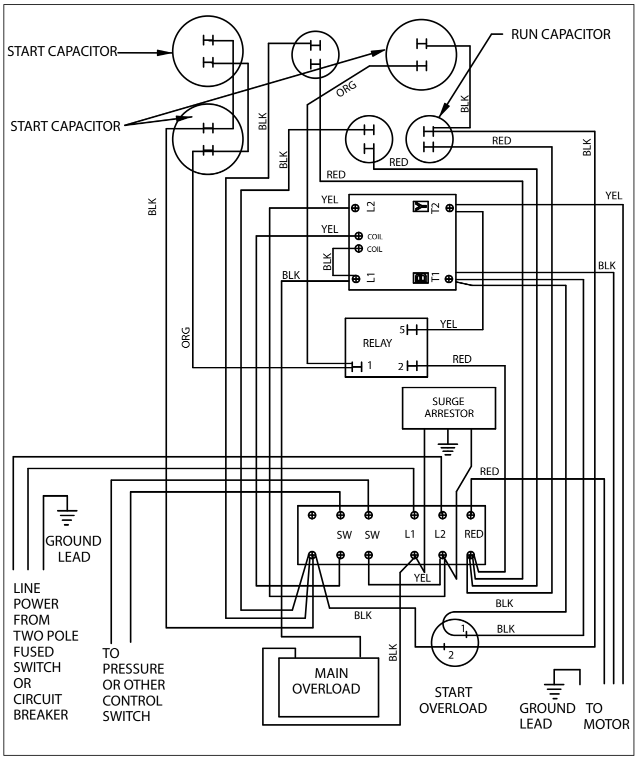
7.5 hp DELUXE
282 201 9310



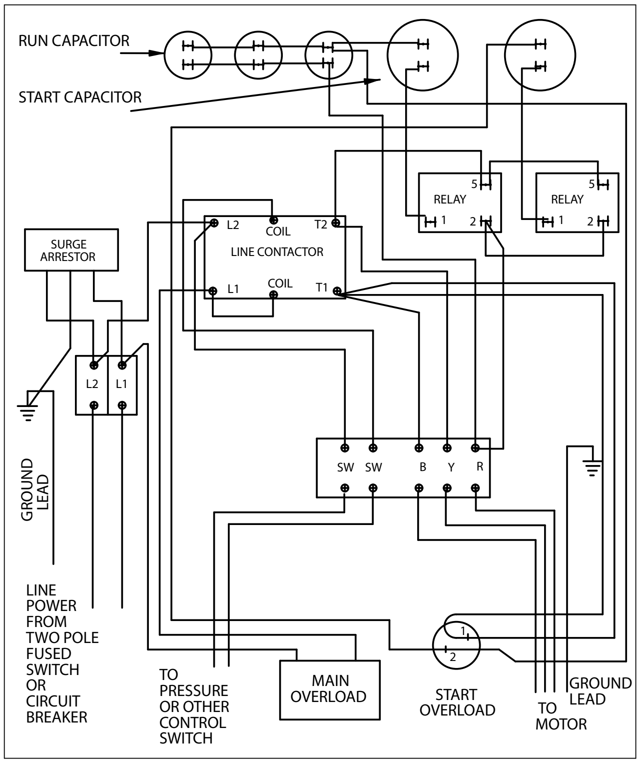
10 hp STANDARD
282 202 9210 or 282 202 9230



10 hp DELUXE
282 202 9230 or 282 202 9330



15 hp DELUXE
282 203 9310 or 282 203 9330



15 hp X-LARGE
282 203 9621

Pumptec-Plus

Pumptec-Plus is a pump/motor protection device designed to work on any 230 V single-phase induction motor (PSC, CSCR, CSIR, and split phase) ranging in size from 1/2 to 5 horsepower. Pumptec-Plus uses a micro-computer to continuously monitor motor power and line voltage to provide protection against dry well, water logged tank, high and low voltage and mud or sand clogging.

Pumptec-Plus – Troubleshooting During Installation

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Unit Appears Dead (No Lights)	No Power to Unit	Check wiring. Power supply voltage should be applied to L1 and L2 terminals of the Pumptec-Plus. In some installations the pressure switch or other control devices is wired to the input of the Pumptec-Plus. Make sure this switch is closed.
Flashing Yellow Light	Unit Needs to Be Calibrated	Pumptec-Plus is calibrated at the factory so that it will overload on most pump systems when the unit is first installed. This overload condition is a reminder that the Pumptec-Plus unit requires calibration before use. See step 7 of the installation instructions.
	Miscalibrated	Pumptec-Plus should be calibrated on a full recovery well with the maximum water flow. Flow restrictors are not recommended.
Flashing Yellow Light During Calibration	2-Wire Motor	Step C of the calibration instructions indicate that a flashing green light condition will occur 2 to 3 seconds after taking the SNAPSHOT of the motor load. On some two-wire motors the yellow light will flash instead of the green light. Press and release the reset button. The green should start flashing.
Flashing Red and Yellow Lights	Power Interruption	During the installation of Pumptec-Plus power may be switched on and off several times. If power is cycled more than four times within a minute Pumptec-Plus will trip on rapid cycle. Press and release the reset button to restart the unit.
	Float Switch	A bobbing float switch may cause the unit to detect a rapid cycle condition on any motor or an overload condition on two-wire motors. Try to reduce water splashing or use a different switch.
Flashing Red Light	High Line Voltage	The line voltage is over 253 volts. Check line voltage. Report high line voltage to the power company.
	Unloaded Generator	If you are using a generator the line voltage may become too high when the generator unloads. Pumptec-Plus will not allow the motor to turn on again until the line voltage returns to normal. Overvoltage trips will also occur if line frequency drops too far below 60 Hz.
Solid Red Light	Low Line Voltage	The line voltage is below 207 volts. Check line voltage.
	Loose Connections	Check for loose connections which may cause voltage drops.
	Loaded Generator	If you are using a generator the line voltage may become too low when the generator loads. Pumptec-Plus will trip on undervoltage if the generator voltage drops below 207 volts for more than 2.5 seconds. Undervoltage trips will also occur if the line frequency rises too far above 60 Hz.

Pumptec-Plus

Pumptec-Plus - Troubleshooting After Installation

SYMPTOM	POSSIBLE CAUSE	SOLUTION
Solid Yellow Light	Dry Well	Wait for the automatic restart timer to time out. During the time out period the well should recover and fill with water. If the automatic reset timer is set to the manual position, then the reset button must be pressed to reactivate the unit.
	Blocked Intake	Clear or replace pump intake screen.
	Blocked Discharge	Remove blockage in plumbing.
	Check Valve Stuck	Replace check valve.
	Broken Shaft	Replace broken parts.
	Severe Rapid Cycling	Machine gun rapid cycling can cause an underload condition. See flashing red and yellow lights section below.
	Worn Pump	Replace worn pump parts and recalibrate.
Yellow Flashing Light	Stalled Motor	Repair or replace motor. Pump may be sand or mud locked.
	Float Switch	A bobbing float switch can cause two-wire motors to stall. Arrange plumbing to avoid splashing water. Replace float switch.
	Ground Fault	Check insulation resistance on motor and control box cable.
Solid Red Light	Low Line Voltage	The line voltage is below 207 volts. Pumptec-Plus will try to restart the motor every two minutes until line voltage is normal.
	Loose Connections	Check for excessive voltage drops in the system electrical connections (i.e. circuit breakers, fuse clips, pressure switch, and Pumptec-Plus L1 and L2 terminals). Repair connections.
Flashing Red Light	High Line Voltage	The line voltage is over 253 volts. Check line voltage. Report high line voltage to the power company.
Flashing Red and Yellow Lights	Rapid Cycle	The most common cause for the rapid cycle condition is a waterlogged tank. Check for a ruptured bladder in the water tank. Check the air volume control or snifter valve for proper operation. Check setting on the pressure switch and examine for defects.
	Leaky Well System	Replace damaged pipes or repair leaks.
	Stuck Check Valve	Failed valve will not hold pressure. Replace valve.
	Float Switch	Press and release the reset button to restart the unit. A bobbing float switch may cause the unit to detect a rapid cycle condition on any motor or an overload condition on 2-wire motors. Try to reduce water splashing or use a different switch.

QD Pumptec and Pumptec

QD Pumptec and Pumptec are load sensing devices that monitor the load on submersible pumps/motors. If the load drops below a preset level for a minimum of 4 seconds the QD Pumptec or the Pumptec will shut off the motor.

The QD Pumptec is designed and calibrated expressly for use on Franklin Electric 230 V 3-wire motors (1/3 to 1 hp.) The QD Pumptec must be installed in QD relay boxes.

The Pumptec is designed for use on Franklin Electric 2- and 3-wire motors (1/3 to 1.5 hp) 115 and 230 V. The Pumptec is not designed for jet pumps.

QD Pumptec & Pumptec – Troubleshooting

SYMPTOM	CHECKS OR SOLUTION
If the QD Pumptec or Pumptec trips in about 4 seconds with some water delivery.	A. Is the voltage less than 90% of nameplate rating? B. Are the pump and motor correctly matched? C. Is the **QD Pumptec** or **Pumptec** wired correctly? For the **Pumptec** check the wiring diagram and pay special attention to the positioning of the power lead (230 V or 115 V). D. For **QD Pumptec** is your system 230 V 60 Hz or 220 V 50 Hz?
If the QD Pumptec or Pumptec trips in about 4 seconds with no water delivery.	A. The pump may be airlocked. If there ia a check valve on top of the pump, put another section of pipe between the pump and the check valve. B. The pump may be out of water. C. Check the valve settings. The pump may be dead-heading. D. Pump or motor shaft may be broken. E. Motor overload may be tripped. Check the motor current (amperage).
If the QD Pumptec or Pumptec will not timeout and reset.	A. Check switch position on side of circuit board on **Pumptec**. **QD Pumptec** check timer position on top/front of unit. Make sure the switch is not between settings. B. If the reset time switch is set to manual reset (position 0), **QD Pumptec** and **Pumptec** will not reset (turn power off for 5 sec. then back on to reset).
If your pump/motor will not run at all.	A. Check voltage. B. Check wiring. C. Remove the **QD Pumptec** from the control box. Reconnect wires in box to original state. If motor does not run the problem is not **QD Pumptec**. Bypass **Pumptec** by connecting L2 and motor lead with jumper. Motor should run. If not, the problem is not **Pumptec**. D. On **Pumptec** only check that **Pumptec** is installed between the control switch and the motor.
If your QD Pumptec or Pumptec will not trip when the pump breaks suction.	A. Be sure you have a Franklin motor. B. Check wiring connections. On **Pumptec** is lead power (230 V or 115 V) connected to correct terminal? Is motor lead connected to correct terminal? C. Check for ground fault in the motor and excessive friction in the pump. D. The well may be "gulping" enough water to keep **QD Pumptec** or **Pumptec** from tripping. It may be necessary to adjust the **QD Pumptec** or the **Pumptec** for these extreme applications. Call the Franklin Electric Service Hotline at 800-348-2420 for information. E. On **Pumptec** applications does the control box have a run capacitor? If so, **Pumptec** will not trip. (Except for Franklin 1.5 hp motors).
If your QD Pumptec or Pumptec chatters when running.	A. Check for low voltage. B. Check for waterlogged tank. Rapid cycling for any reason can cause the **QD Pumptec** or the **Pumptec** relay to chatter. C. On **Pumptec** make sure the L2 and motor wires are installed correctly. If they are reversed, the unit can chatter.

SubDrive2W, 75, 100, 150, 300, MonoDrive, & MonoDrive XT

The Franklin Electric SubDrive/MonoDrive Constant Pressure controller is a variable-speed drive that delivers water at a constant pressure.

WARNING: Serious or fatal electrical shock may result from failure to connect the motor, SubDrive/MonoDrive Controller, metal plumbing and all other metal near the motor or cable to the power supply ground terminal using wire no smaller than motor cable wires. To reduce the risk of electrical shock, disconnect power before working on or around the water system. Capacitors inside the SubDrive/MonoDrive Controller can still hold a lethal voltage even after power has been removed. Allow 10 minutes for dangerous internal voltage to discharge. Do not use motor in swimming areas.

SubDrive2W, 75, 100, 150, 300, MonoDrive, & MonoDrive XT

SubDrive/MonoDrive Troubleshooting

Should an application or system problem occur, built-in diagnostics will protect the system. The “FAULT” light or digital display on the front of the SubDrive/MonoDrive Controller will flash a given number of times or display a number indicating the nature of the fault. In some cases, the system will shut itself off until corrective action is taken. Fault codes and their corrective actions are listed below. See SubDrive/MonoDrive Installation Manual for installation data.

NUMBER OF FLASHES OR DIGITAL DISPLAY	FAULT	POSSIBLE CAUSE	CORRECTIVE ACTION
1	MOTOR UNDERLOAD	- Overpumped well - Broken shaft or coupling - Blocked screen, worn pump - Air/gas locked pump - SubDrive not set properly for pump end	- Frequency near maximum with less than 65% of expected load, 42% if DIP #3 is “on” - System is drawing down to pump inlet (out of water) - High static, light loading pump - reset DIP switch #3 to “on” for less sensitivity if not out of water - Check pump rotation (SubDrive only) reconnect if necessary for proper rotation - Air/gas locked pump - if possible, set deeper in well to reduce - Verify DIP switches are set properly
2	UNDERVOLTAGE	- Low line voltage - Misconnected input leads	- Line voltage low, less than approximately 150 VAC (normal operating range = 190 to 260 VAC) - Check incoming power connections and correct or tighten if necessary - Correct incoming voltage - check circuit breaker or fuses, contact power company
3	LOCKED PUMP	- Motor and/or pump misalignment - Dragging motor and/or pump - Abrasives in pump	- Amperage above SFL at 10 Hz - Remove and repair or replace as required
4 (MonoDrive & MonoDriveXT only)	INCORRECTLY WIRED	- MonoDrive only - Wrong resistance values on main and start	- Wrong resistance on DC test at start - Check wiring, check motor size and DIP switch setting, adjust or repair as needed
5	OPEN CIRCUIT	- Loose connection - Defective motor or drop cable - Wrong motor	- Open reading on DC test at start. - Check drop cable and motor resistance, tighten output connections, repair or replace as necessary, use “dry” motor to check drive functions, if drive will not run and exhibits underload fault replace drive
6	SHORT CIRCUIT	- When fault is indicated immediately after power-up, short circuit due to loose connection, defective cable, splice or motor	- Amperage exceeded 50 amps on DC test at start or max amps during running - Incorrect output wiring, phase to phase short, phase to ground short in wiring or motor - If fault is present after resetting and removing motor leads, replace drive
	OVER CURRENT	- When fault is indicated while motor is running, over current due to loose debris trapped in pump	- Check pump
7	OVERHEATED DRIVE	- High ambient temperature - Direct sunlight - Obstruction of airflow	- Drive heat sink has exceeded max rated temperature, needs to drop below 85 °C to restart - Fan blocked or inoperable, ambient above 125 °F, direct sunlight, air flow blocked - Replace fan or relocate drive as necessary
8 (SubDrive300 only)	OVER PRESSURE	- Improper pre-charge - Valve closing too fast - Pressure setting too close to relief valve rating	- Reset the pre-charge pressure to 70% of sensor setting. Reduce pressure setting well below relief valve rating. Use next size larger pressure tank. - Verify valve operation is within manufacturer’s specifications. - Reduce system pressure setting to a value less than pressure relief rating.
RAPID	INTERNAL FAULT	- A fault was found internal to drive	- Unit may require replacement. Contact your supplier.
9 (SubDrive2W only)	OVER RANGE (Values outside normal operating range)	- Wrong hp/voltage - Internal fault	- Verify motor hp and voltage - Unit may require replacement. Contact your supplier.

SubMonitor

SubMonitor Troubleshooting

FAULT MESSAGE	PROBLEM/CONDITION	POSSIBLE CAUSE
SF Amps Set Too High	SF Amps setting above 359 Amps.	Motor SF Amps not entered.
Phase Reversal	Reversed incoming voltage phase sequence.	Incoming power problem.
Underload	Normal line current.	Wrong SF Max Amps setting.
	Low line current.	Over pumping well. Clogged pump intake. Closed valve. Loose pump impeller. Broken shaft or coupling. Phase loss.
Overload	Normal line current.	Wrong SF Max Amps setting.
	High line current.	High or low line voltage. Ground fault. Pump or motor dragging. Motor stalled or bound pump.
Overheat	Motor temperature sensor has detected excess motor temperature.	High or low line voltage. Motor is overloaded. Excessive current unbalance. Poor motor cooling. High water temperature. Excessive electrical noise (VFD in close proximity).
Unbalance	Current difference between any two legs exceeds programmed setting.	Phase loss. Unbalanced power supply. Open Delta transformer.
Overvoltage	Line voltage exceeds programmed setting.	Unstable power supply.
Undervoltage	Line voltage below programmed setting.	Poor connection in motor power circuit. Unstable or weak power supply.
False Starts	Power has been interrupted too many times in a 10 second period.	Chattering contacts. Loose connections in motor power circuit. Arcing contacts.

Continued on next page

Subtrol-Plus (Obsolete - See SubMonitor)

Subtrol-Plus - Troubleshooting After Installation

SYMPTOM	POSSIBLE CAUSE OR SOLUTION
Subtrol-Plus Dead	When the Subtrol-Plus reset button is depressed and released, all indicator lights should flash. If line voltage is correct at the Subtrol-Plus L1, L2, L3 terminals and the reset button does not cause lights to flash, Subtrol-Plus receiver is malfunctioning.
Green Off Time Light Flashes	The green light will flash and not allow operation unless both sensor coils are plugged into the receiver. If both are properly connected and it still flashes, the sensor coil or the receiver is faulty. An ohmmeter check between the two center terminals of each sensor coil connected should read less than 1 ohm, or coil is faulty. If both coils check good, receiver is faulty.
Green Off Time Light On	The green light is on and the Subtrol-Plus requires the specified off time before the pump can be restarted after having been turned off. If the green light is on except as described, the receiver is faulty. Note that a power interruption when the motor is running will initiate the delay function.
Overheat Light On	This is a normal protective function which turns off the pump when the motor reaches maximum safe temperatures. Check that amps are within the nameplate maximum on all three lines, and that the motor has proper water flow past it. If overheat trip occurs without apparent motor overheating, it may be the result of an arcing connection somewhere in the circuit or extreme noise interference on the power lines. Check with the power company or Franklin Electric. A true motor overheat trip will require at least five minutes for a motor started cold. If trips do not conform to this characteristic, suspect arcing connections, power line noise, ground fault, or SCR variable speed control equipment.
Overload Light On	This is a normal protective function, protecting against an overload or locked pump. Check the amps in all lines through a complete pumping cycle, and monitor whether low or unbalanced voltage may be causing high amps at particular times. If overload trip occurs without high amps, it may be caused by a faulty rating insert, receiver, or sensor coil. Recheck that the insert rating matches the motor. If it is correct, carefully remove it from the receiver by alternately lifting sides with a knife blade or thin screwdriver, and make sure it has no pins bent over. If the insert is correct and its pins are okay, replace receiver and/or sensor coils.
Underload Light On	This is a normal protective function. A. Make sure the rating insert is correct for the motor. B. Adjusting the underload setting as described to allow the desired range of operating conditions. Note that a DECREASE in underload setting is required to allow loading without trip. C. Check for drop in amps and delivery just before trip, indicating pump breaking suction, and for unbalanced line current. D. With the power turned off, recheck motor lead resistance to ground. A grounded lead can cause underload trip.

Subtrol-Plus (Obsolete - See SubMonitor)

Subtrol-Plus - Troubleshooting After Installation (Continued)

SYMPTOM	POSSIBLE CAUSE OR SOLUTION
Tripped Light On	Whenever the pump is off as a result of Subtrol-Plus protective function, the red tripped light is on. A steady light indicates the Subtrol-Plus will automatically allow the pump to restart as described, and a flashing light indicates repeated trips, requiring manual reset before the pump can be restarted. Any other red light operation indicates a faulty receiver. One-half voltage on 460 V will cause tripped light on.
Control Circuit Fuse Blows	With power turned off, check for a shorted contactor coil or a grounded control circuit lead. The coil resistance should be at least 10 ohms and the circuit resistance to panel frame over 1 megohm. A standard or delay-type 2 amp fuse should be used.
Contactor Will Not Close	If proper voltage is at the control coil terminals when controls are operated to turn the pump on, but the contactor does not close, turn off power and replace the coil. If there is no voltage at the coil, trace the control circuit to determine if the fault is in the Subtrol-Plus receiver, fuse, wiring, or panel operating switches. This tracing can be done by first connecting a voltmeter at the coil terminals, and then moving the meter connections step by step along each circuit to the power source, to determine at which component the voltage is lost. With the Subtrol-Plus receiver powered up, with all leads disconnected from the control terminals and with an ohmmeter set at RX10, measure the resistance between the control terminals. It should measure 100 to 400 ohms. Depress and hold in the reset button. The resistance between the control terminals should measure close to infinity.
Contactor Hums or Chatters	Check that coil voltage is within 10% of rated voltage. If voltage is correct and matches line voltage, turn off power and remove the contactor magnetic assembly and check for wear, corrosion, and dirt. If voltage is erratic or lower than line voltage, trace the control circuit for faults similar to the previous item, but looking for a major drop in voltage rather than its complete loss.
Contactor Opens When Start Switch is Released	Check that the small interlocks switch on the side of the contactor closes when the contactor closes. If the switch or circuit is open, the contactor will not stay closed when the selector switch is in HAND position.
Contactor Closes But Motor Doesn't Run	Turn off power. Check the contactor contacts for dirt, corrosion, and proper closing when the contactor is closed by hand.
Signal Circuit Terminals Do Not Energize	With the Subtrol-Plus receiver powered up and all leads disconnected from the signal terminals, with an 0hmmeter set at RX10, measure the resistance between the signal terminals. Resistance should measure close to infinite. Depress and hold in the reset button. The resistance between the signal terminals should measure 100 to 400 ohms.

Abbreviations

A	Amp or amperage
AWG	American Wire Gauge
BJT	Bipolar Junction Transistor
°C	Degree Celsius
CB	Control Box
CRC	Capacitor Run Control
DI	Deionized
Dv/dt	Rise Time of the Voltage
EFF	Efficiency
°F	Degree Fahrenheit
FDA	Federal Drug Administration
FL	Full Load
ft	Foot
ft-lb	Foot Pound
ft/s	Feet per Second
GFCI	Ground Fault Circuit Interrupter
gpm	Gallon per Minute
HERO	High Efficiency Reverse Osmosis
hp	Horsepower
Hz	Hertz
ID	Inside Diameter
IGBT	Insulated Gate Bipolar Transistor
in	Inch
kVA	Kilovolt Amp
kVAR	Kilovolt Amp Rating
kW	Kilowatt (1000 watts)
L1, L2, L3	Line One, Line Two, Line Three
lb-ft	Pound Feet
L/min	Liter per Minute
mA	Milliamp
max	Maximum
MCM	Thousand Circular Mils
mm	Millimeter
MOV	Metal Oxide Varister
NEC	National Electrical Code
NEMA	National Electrical Manufacturer Association
Nm	Newton Meter
NPSH	Net Positive Suction Head
OD	Outside Diameter
OL	Overload
PF	Power Factor
psi	Pounds per Square Inch
PWM	Pulse Width Modulation
QD	Quick Disconnect
R	Resistance
RMA	Return Material Authorization
RMS	Root Mean Squared
rpm	Revolutions per Minute
SF	Service Factor
SFhp	Service Factor Horsepower
S/N	Serial Number
TDH	Total Dynamic Head
UNF	Fine Thread
V	Voltage
VAC	Voltage Alternating Current
VDC	Voltage Direct Current
VFD	Variable Frequency Drive
W	Watts
XFMR	Transformer
Y-D	Wye-Delta
Ω	ohms

Notes

Notes

TOLL FREE HELP FROM A FRIEND

800-348-2420 • 260-827-5102 (fax)

Phone Franklin's toll free SERVICE HOTLINE for answers to your pump and motor installation questions. When you call, a Franklin expert will offer assistance in troubleshooting and provide immediate answers to your system application questions. Technical support is also available online. Visit our website at:

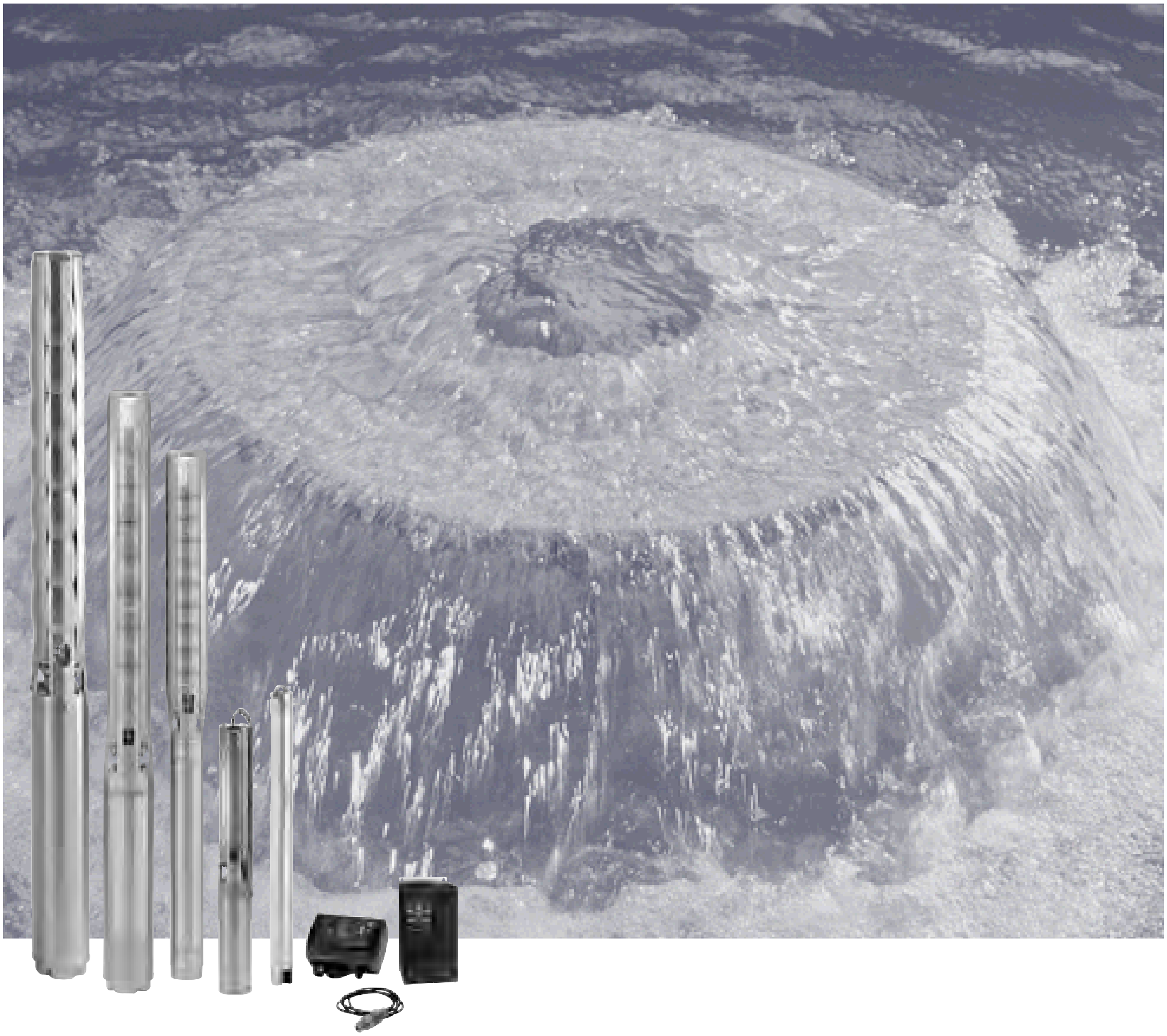
www.franklin-electric.com

Franklin Electric
The Company You Trust Deep Down

GRUNDFOS **PRODUCT GUIDE**

SQ, SQE, SP

Stainless steel submersible pumps and accessories
60 Hz



BE > THINK > INNOVATE >

GRUNDFOS®

Mission

- to successfully develop, produce, and sell high quality pumps and pumping systems worldwide, contributing to a better quality of life and healthier environment

Bjerringbro, Denmark

Fresno, California

Olathe, Kansas

Monterrey, Mexico

Allentown, Pennsylvania

Oakville, Ontario

- One of the 3 largest pump companies in the world with over 11,000 employees worldwide
- World headquarters in Denmark
- North American headquarters in Kansas City - Manufacturing in Fresno, California
- 60 companies in 40 countries
- More than 10 million pumps produced annually worldwide
- North American companies operating in USA, Canada and Mexico
- Continuous reinvestment in growth and development enables the company to **BE** responsible, **THINK** ahead, and **INNOVATE**

Submittal Data Sheet

Company name:
Prepared by:
Phone number: ( ) -
Fax number: ( ) -
Date: Page 1 of:
Quote number:

Client Information

Project title: Client name:
Reference number: Client number:
Client contact: Client phone no: ( ) -

Location Information

For: Unit:
Site: Service:
Address: City: State: Zip Code:

Technical Data

Flow (GPM)
Head (Ft)
Motor
Max Fluid Temp
Min Fluid Temp
Max Working Pressure
Min Required Inlet Pressure
Connection Type and Size

Motor Information

HP:
Phase:
Voltage:
Enclosure:

Pump Information

Model Information from Type Key and Codes:
Quantity Required: Example: SP 150S
Minimum required flow: NPSH required at duty point:

Product Guide additional information pages

Materials page number: Performance curve page number:
Technical data page number: Motor data page number:

Custom-built pump information (optional):

Additional Information

TABLE OF CONTENTS

STAINLESS STEEL CONSTRUCTION

Grundfos submersibles feature rugged and durable stainless steel construction for all vital pump components. Impellers, diffusers, shafts, vanes, cable guards, couplings...even the nuts and bolts are stainless steel. Grundfos' 4-inch pump systems include the stainless steel pump, motor, and control box and are delivered ready to install.

Computer-aided design and manufacturing techniques ensure that each *pump* is built to exacting tolerance and performs to industry-leading standards. Grundfos state-of-the-art production equipment includes extensive use of robotics and advanced quality assurance procedures. You can rely on quality Grundfos' groundwater products for outstanding pump performance and best value.

SUBMERSIBLES

4-INCH and LARGER WELLS
The 4-inch submersibles line covers all flow requirements from 1.2 to 95 gpm and heads to 2000 feet. This broad range ensures proper pump selection for all domestic groundwater system applications.

6, 8, & 10-INCH and LARGER WELLS
For high flow requirements, this submersible line includes 6, 8, and 10-inch models for flows up to 1,400 gpm and heads to 2100 feet.

Grundfos offers 18 models of submersible pumps designed for domestic and industrial applications with flow rates from five to 1,400 gpm. Horsepower range extends from 1/3 hp to 250 hp. These pumps are marketed through more than 300 distributors and nearly 2,000 dealers nationwide.

THE STAINLESS STEEL ADVANTAGE

TOP PUMP PERFORMANCE
Grundfos pumps are built to work hard with every component designed for maximum hydraulic efficiency. With the inherently smooth surfaces of fabricated stainless steel, peak performance is maintained over many years of service.

RELIABLE OPERATION
Highly advanced design and manufacturing techniques minimize the number of moving parts. This, plus Grundfos' use of rugged stainless steel construction, make GRUNDFOS groundwater pumps the toughest, most reliable pumps on the market. With Grundfos you can rely on getting the water you need, when you need it.

LONG PUMP LIFE
Stainless steel is the best available material to resist wear and corrosion in water system applications. Compare Grundfos' stainless steel construction to the best the other manufactures have to offer. Grundfos stainless steel pumps are designed to operate efficiently and effectively for a long, long time.

SQ/SQE SUBMERSIBLE PUMPS

3-Inch SQ/SQE Submersible Well Pumps
3-Inch and Larger Wells

SQ/SQE pumps are suitable for both continuous and intermittent operation for a variety of applications:

- Domestic water supply
- Small waterworks
- Irrigation
- Tank applications

SQ, SQE pumps offer the following features:

- Dry-Run protection
- High efficiency pump and motor
- Protection against up-thrust
- Soft-start
- Over-voltage and under-voltage protection
- Overload protection
- Over-temperature protection
- High starting torque

Additionally, the SQE pumps offer:

- Constant pressure control
- Variable speed
- Electronic control and communication

The SQ and SQE pump models incorporate an innovative motor design. With the use of permanent-magnet technology within the motor, the SQ/SQE pumps deliver unmatched performance. By combining permanent-magnet motors and Grundfos's own micro frequency converter, we are now able to control and communicate with the pump in ways never before possible. A few of the features that come out of this combination are Constant Pressure Control, Soft-Start, and integrated Dry-Run protection. These are just a few of the many features that the SQ/SQE pumps can offer.

The SQ pump models operate at a constant speed much like today's conventional pumps. The difference between it and traditional pumps is you get all the benefits of an electronically controlled permanent-magnet motor that cannot be accomplished with a conventional induction motor. The SQ pumps are available for single phase power. They use a simple 2-wire design making installation easy.

The SQE uses the Grundfos "Smart Motor". Like the SQ model, we still use the high efficiency permanent magnet motor, but we give this motor the ability to communicate. The "Smart Motor" communicates via the CU301 status box through the power leads. It is not necessary to run any additional wires down the well. By being able to communicate with the pump you can have Constant Pressure Control and the ability to change the pump performance while the pump is installed in the well. Like the SQ motor, this is also a 2-wire motor designed for single-phase operation.

TYPE KEYS

SP Example 10 S 05 - 9

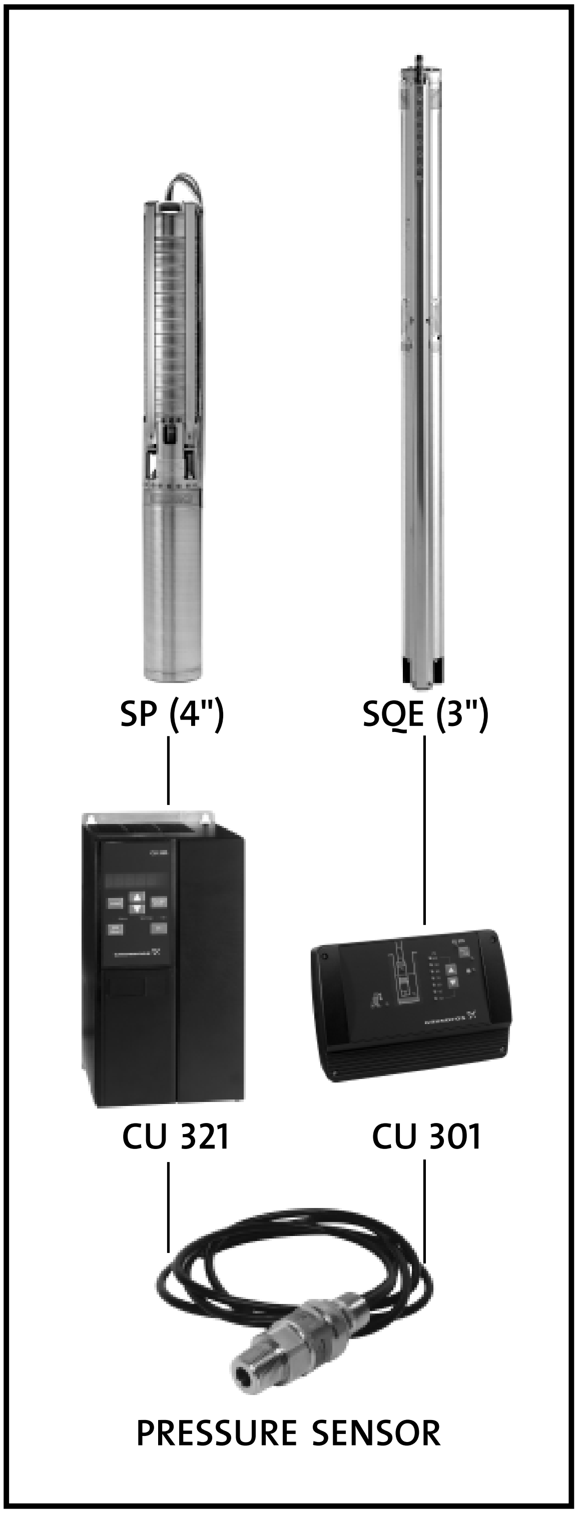
Rated gallons per minute	10
Material of construction	S
Horsepower	05
Number of pump stages	9

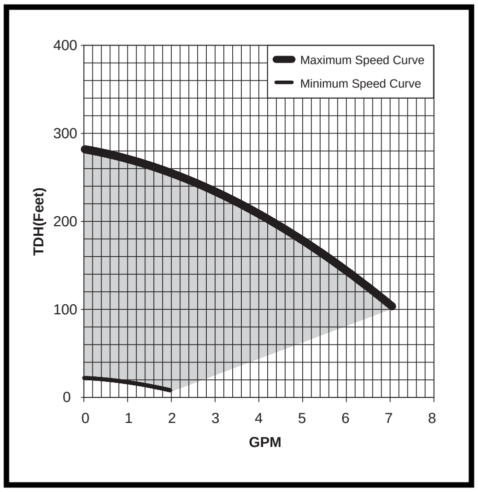
SQ/SQE Example 10 SQ E 05 - 160

Rated gallons per minute	10
Basic version (without communication)	SQ
Electronic communication	E
Horsepower	05
Total Dynamic Head in (ft) at rated flow	160

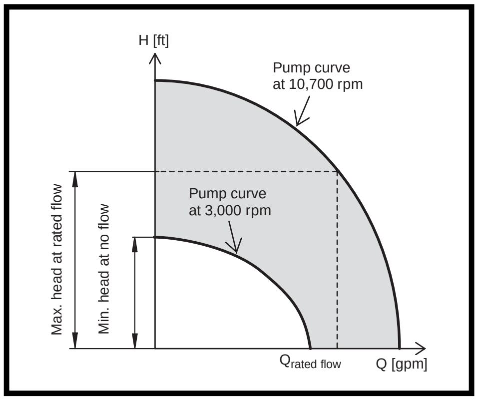
Performance Curves and Technical Data

For 3-Inch & larger well applications





Performance Curves

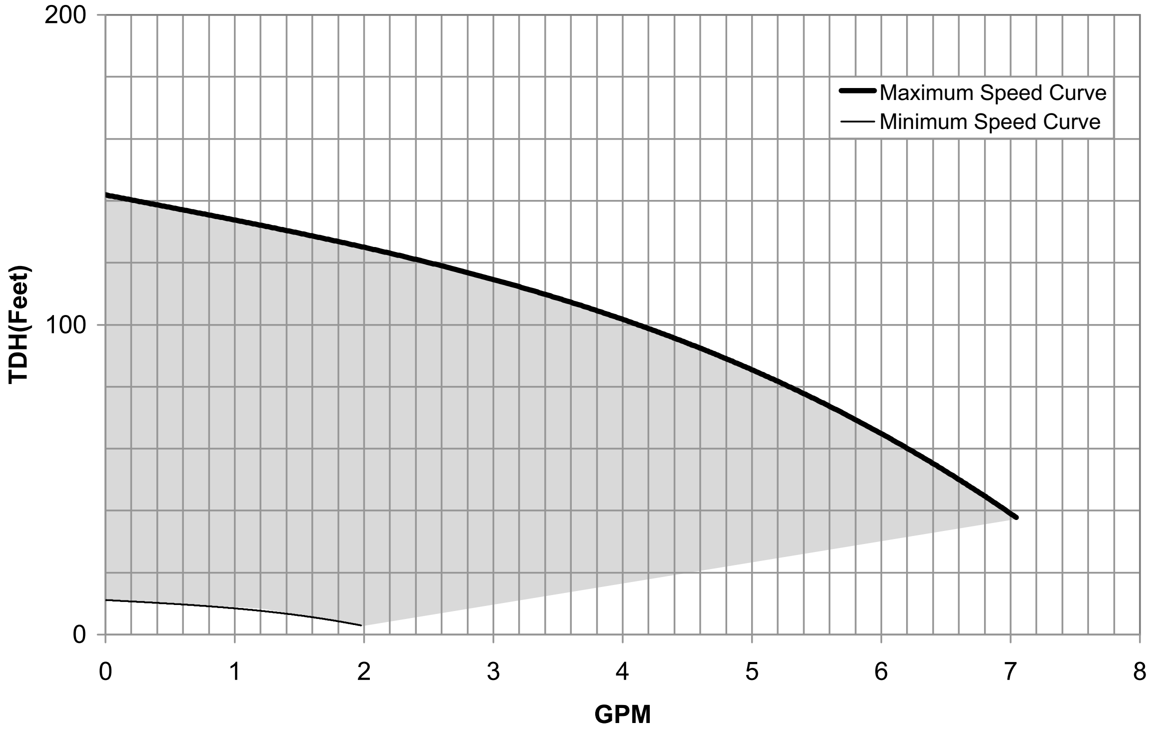


System Sizing Guide

WATER TANK

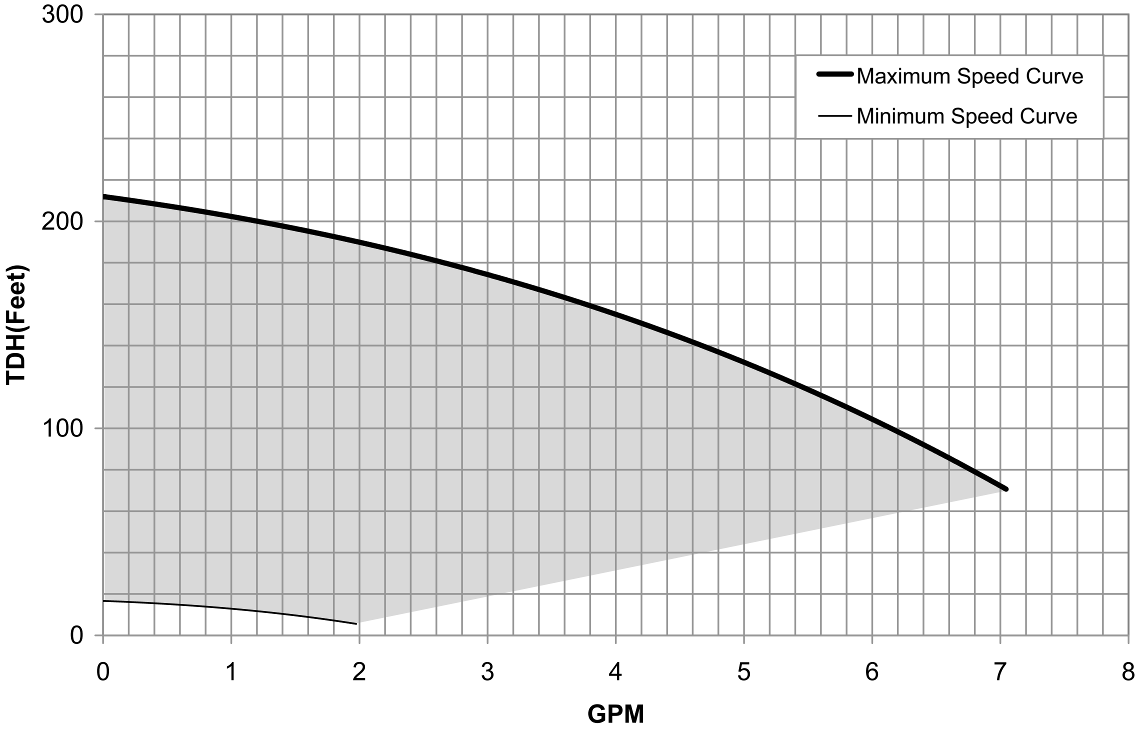
2 gallon tank min. for SQE
4 gallon tank min. for CU 321

5 GPM • MODEL 5SQE05-90



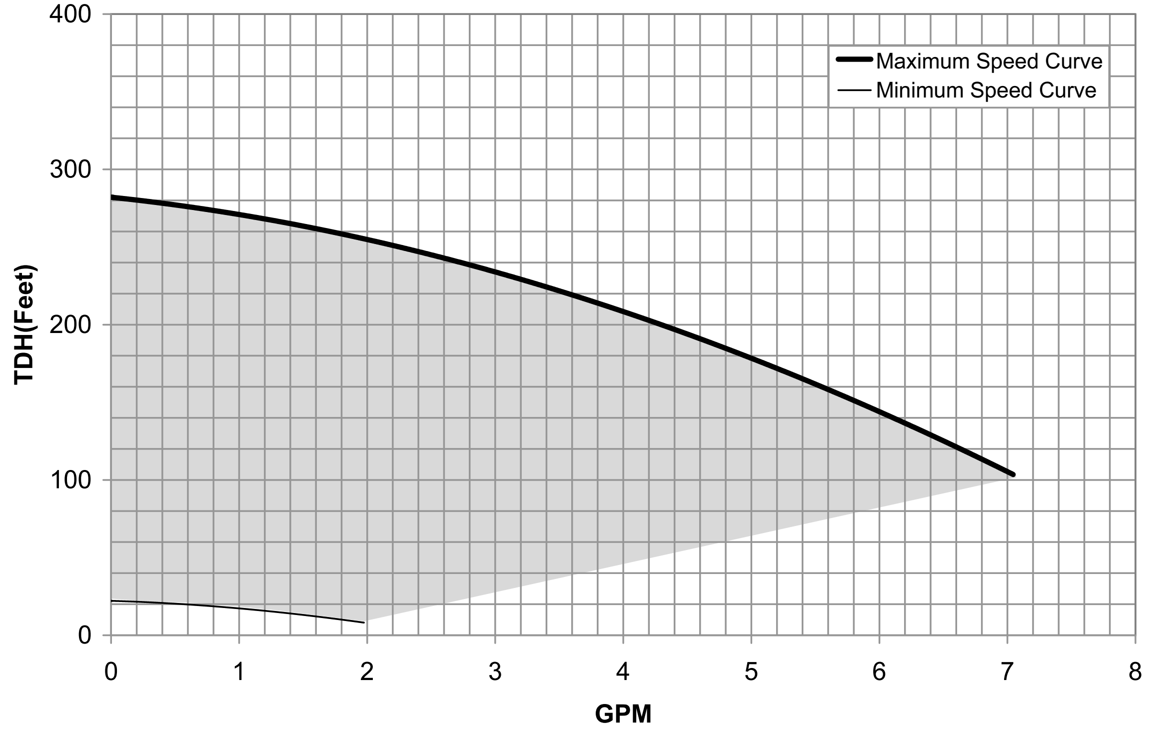
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE05-140



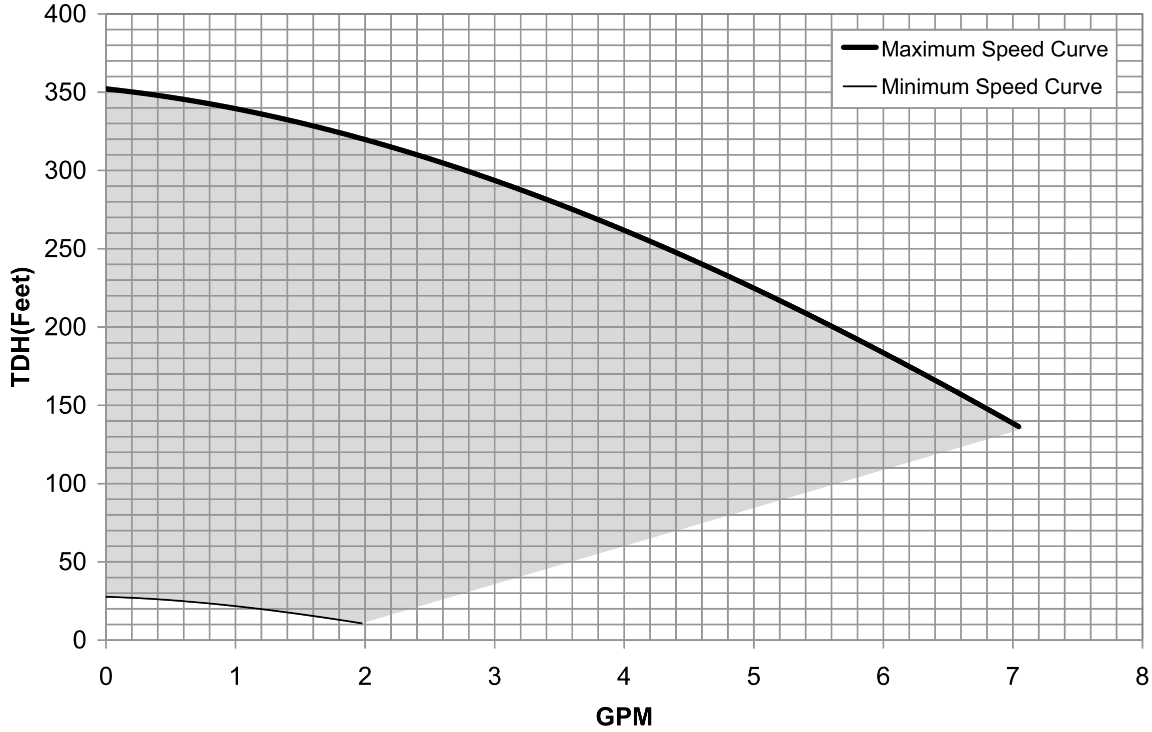
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE05-180



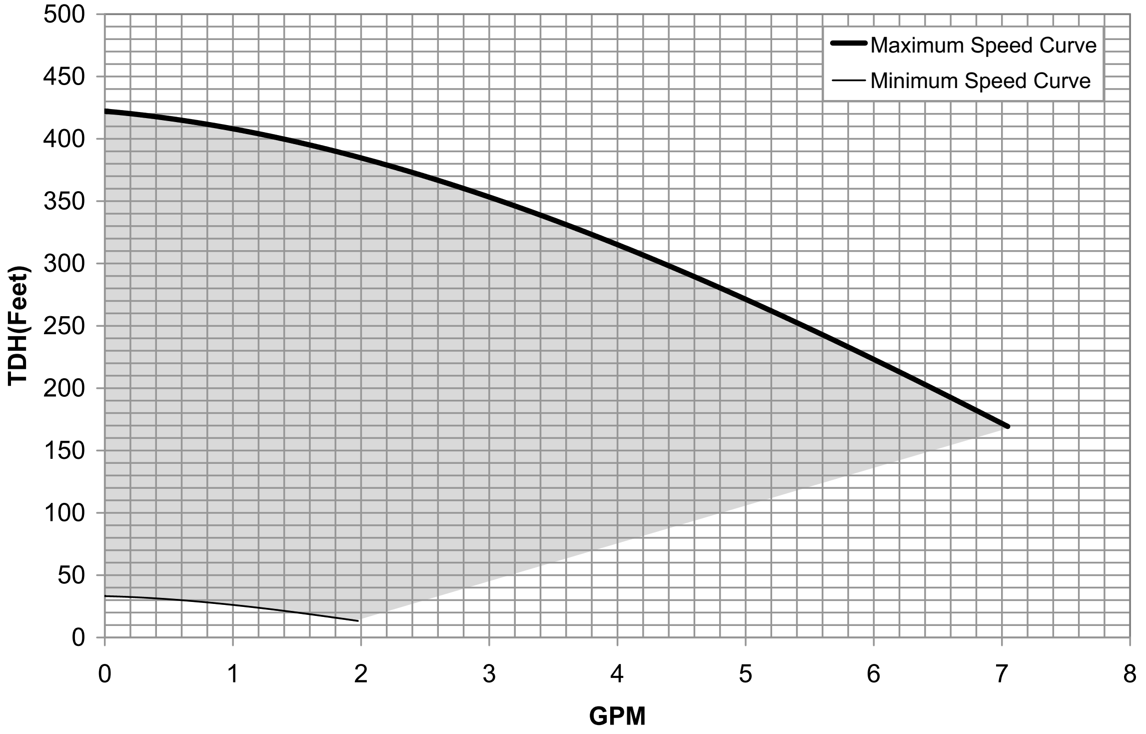
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE07-230



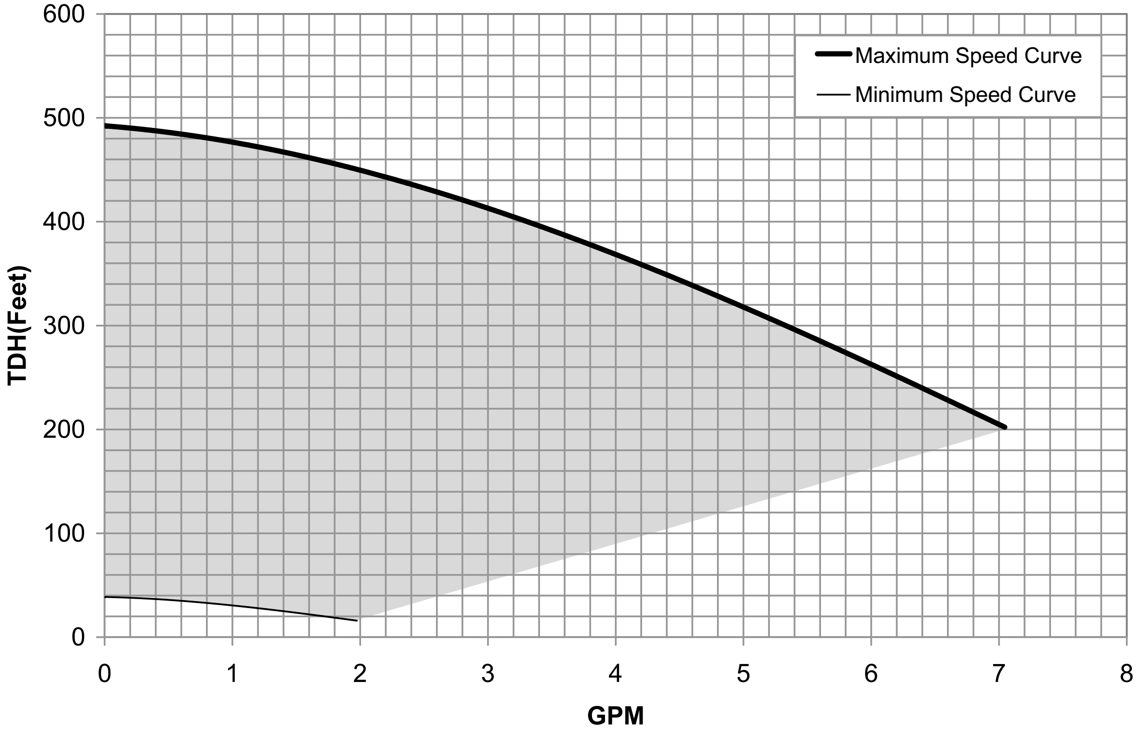
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE07-270



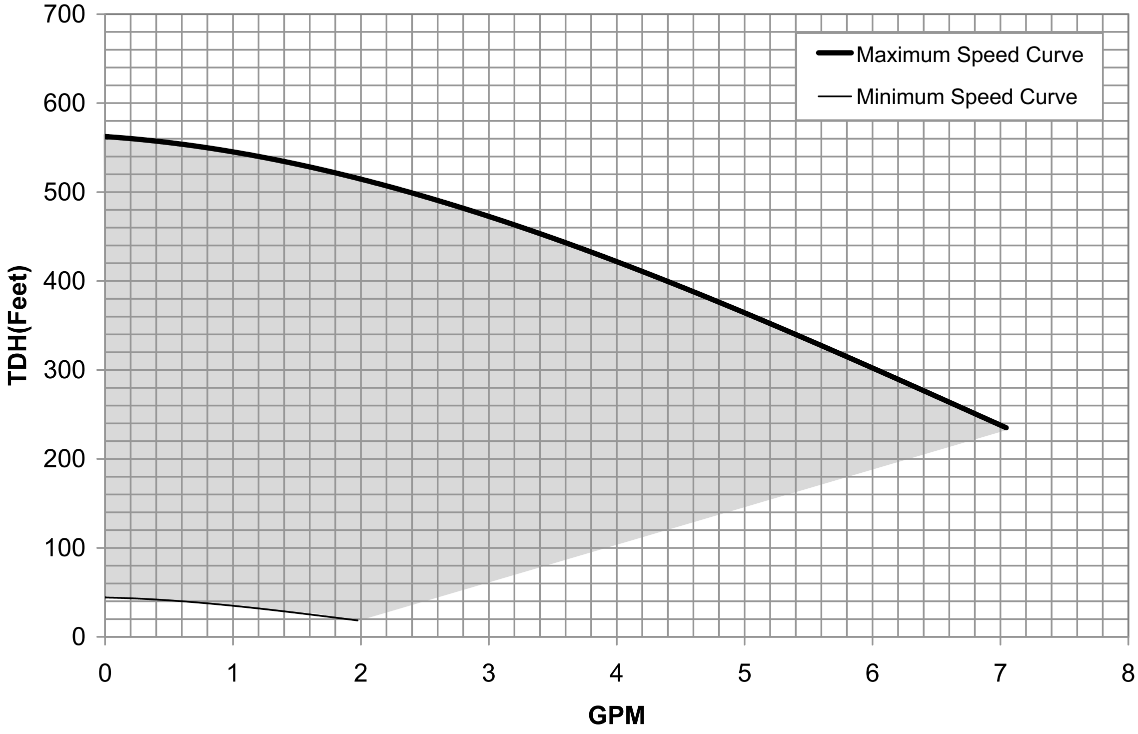
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE07-320



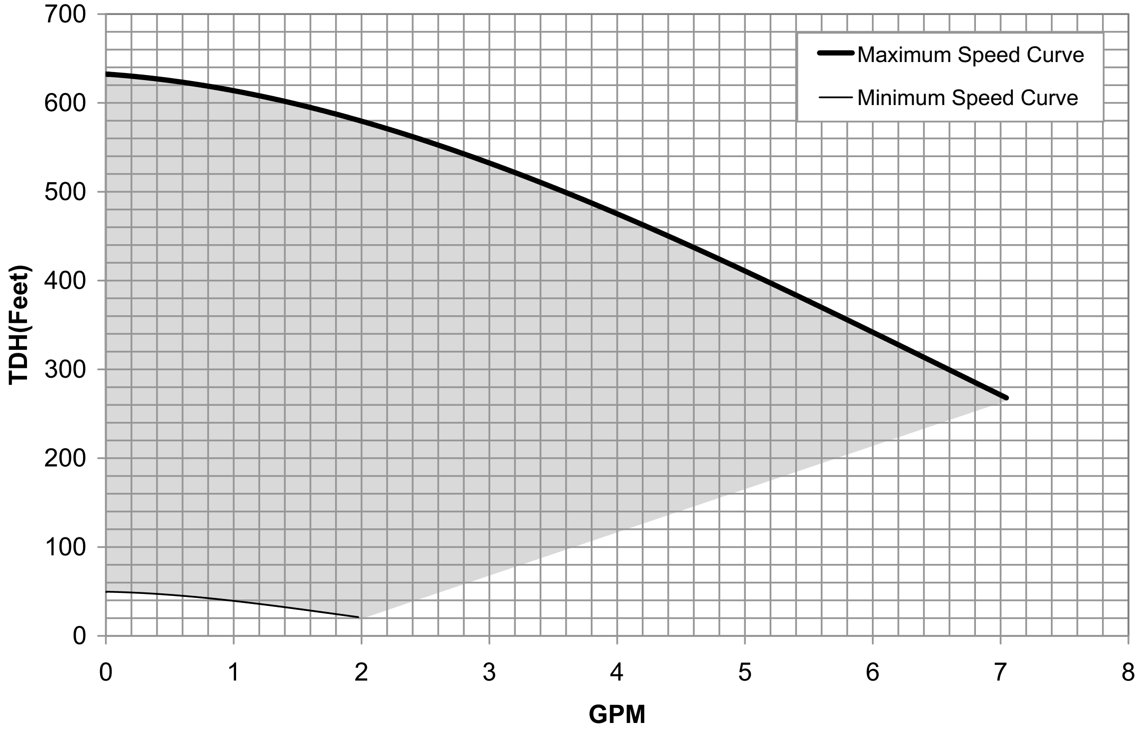
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE10-360



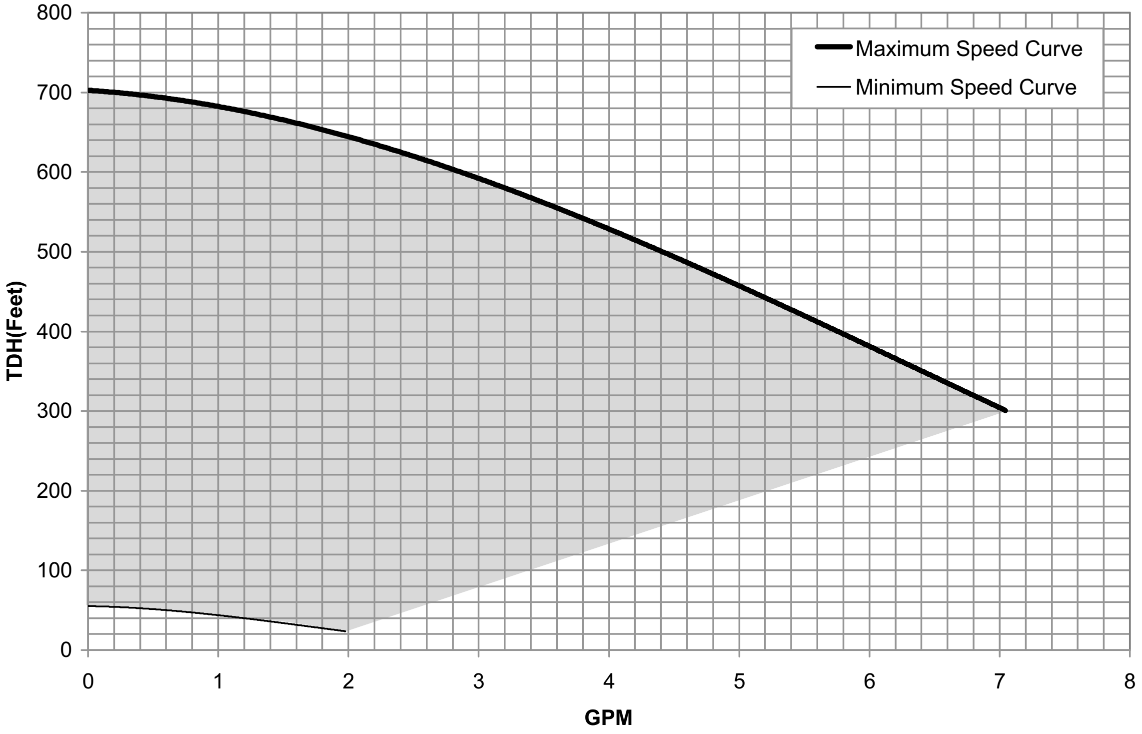
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE10-410



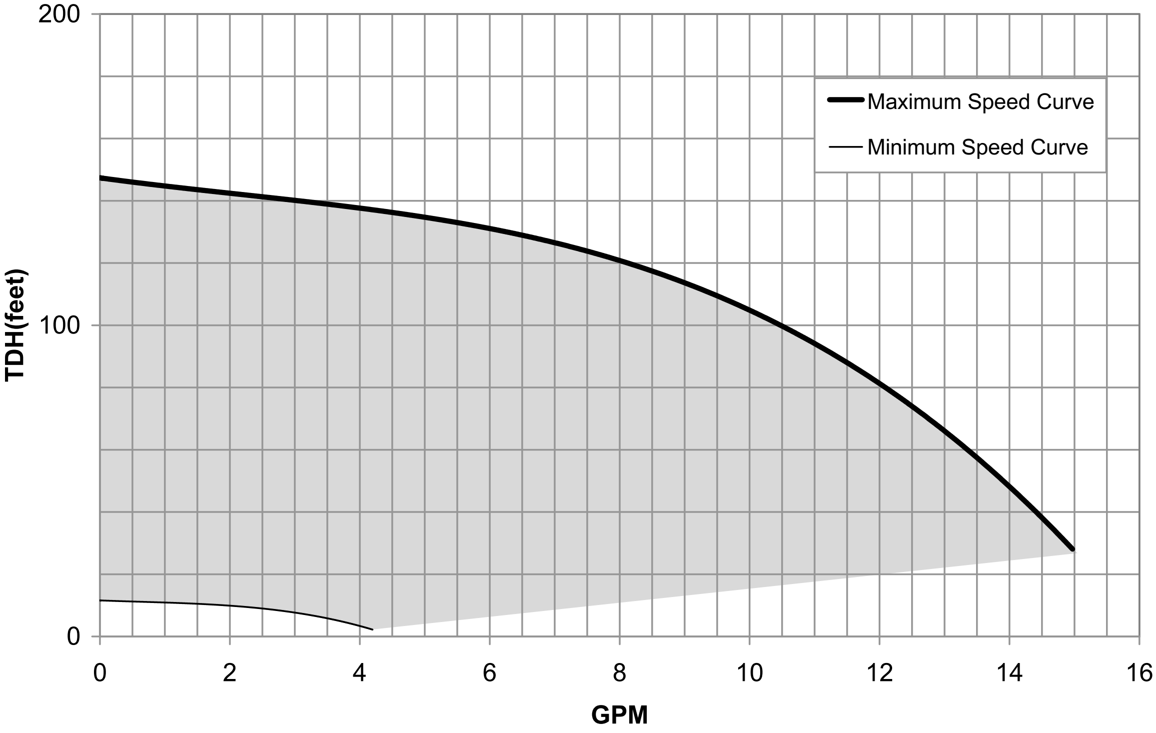
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

5 GPM • MODEL 5SQE15-450



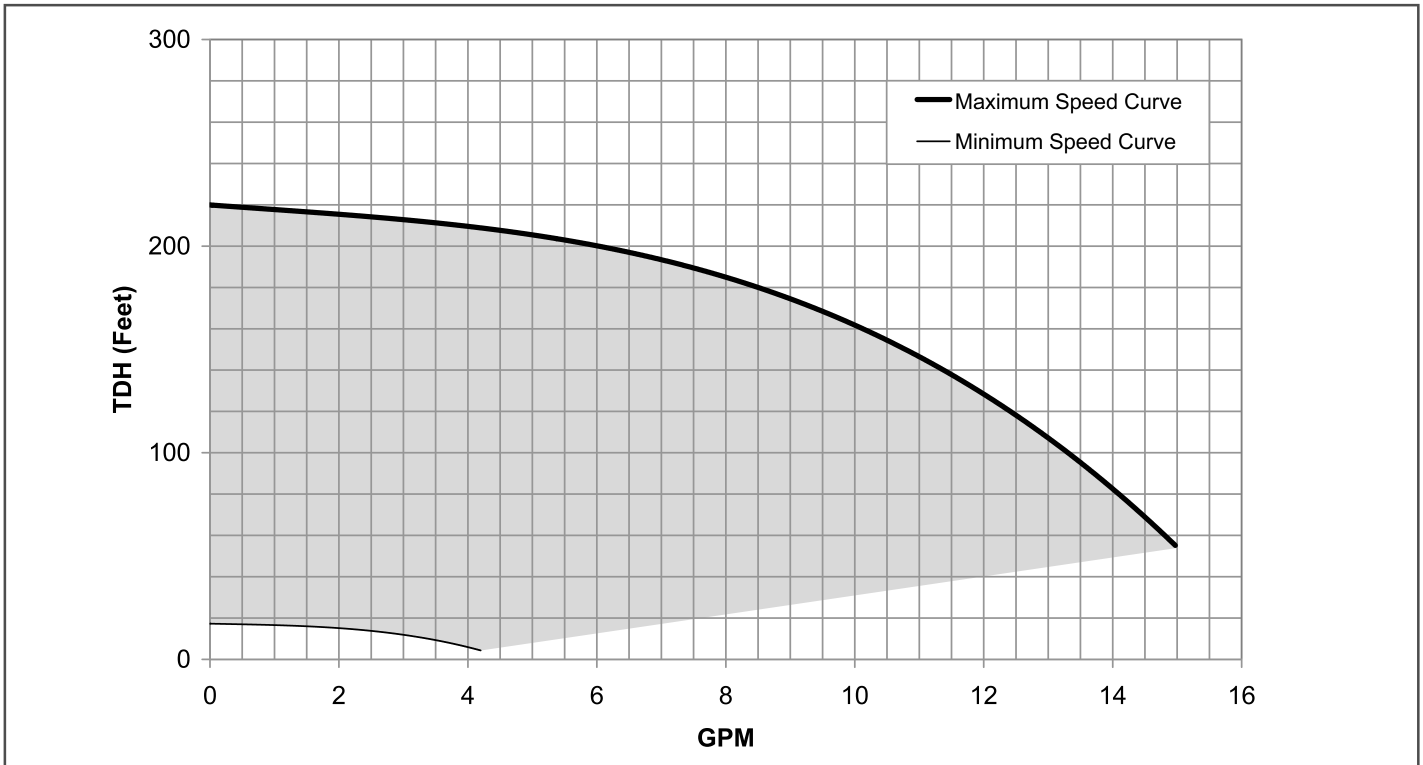
OUTLET SIZE: 1" NPT **NOMINAL DIA. 3"**

10 GPM • MODEL 10SQE05-110



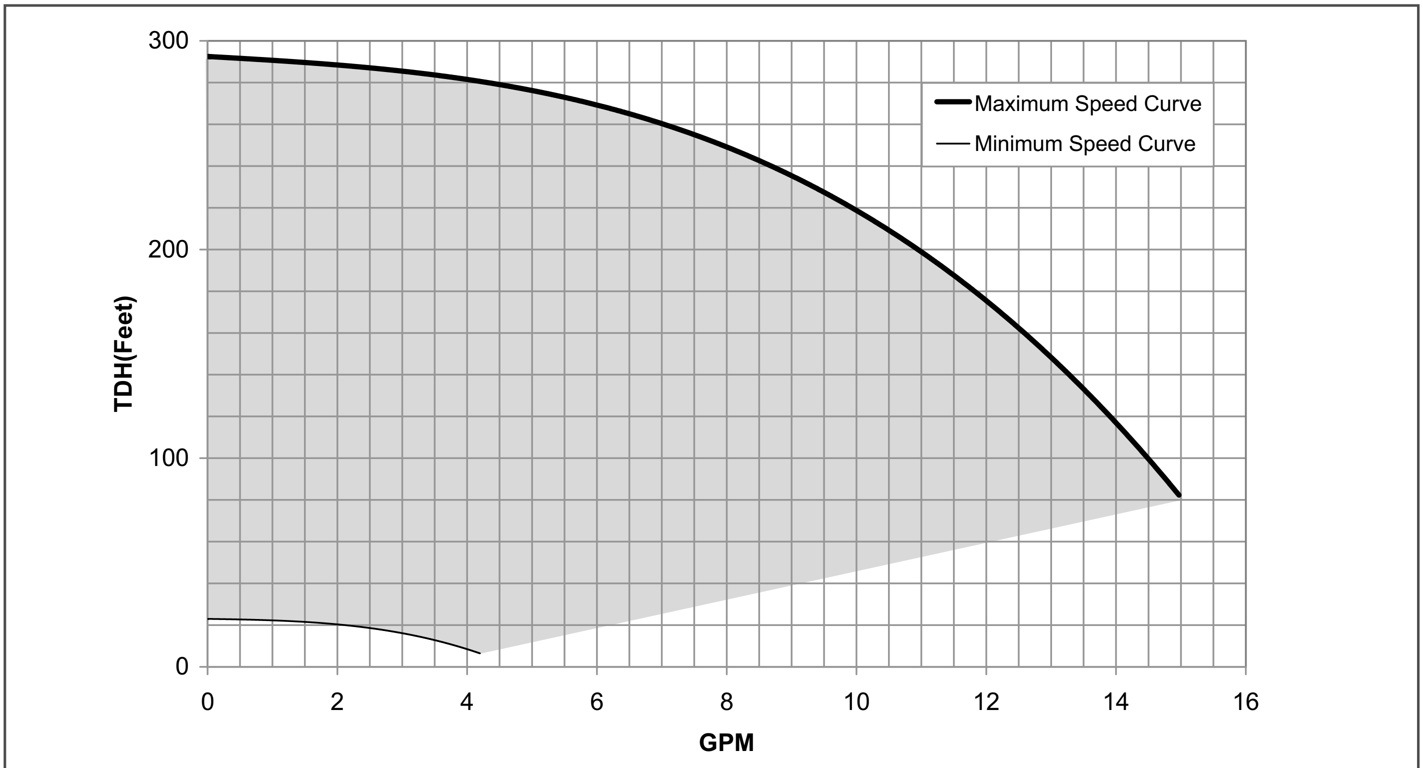
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

10 GPM • MODEL 10SQE05-160



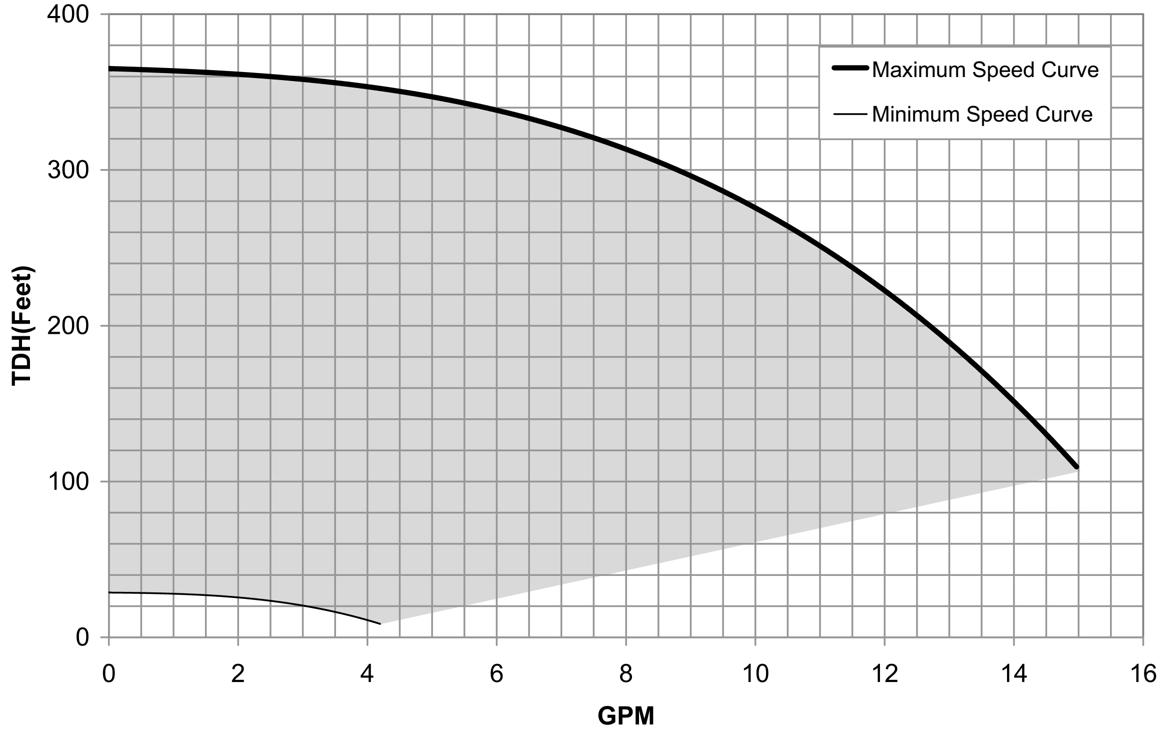
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

10 GPM • MODEL 10SQE07-200



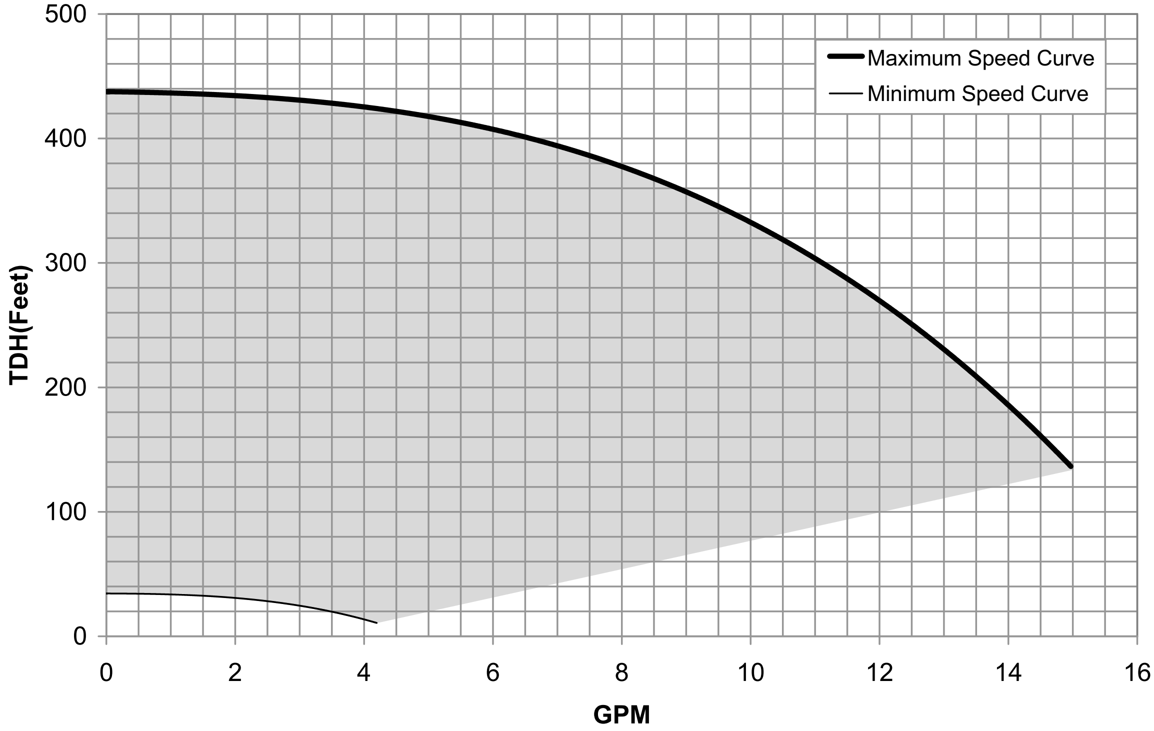
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

10 GPM • MODEL 10SQE07-240



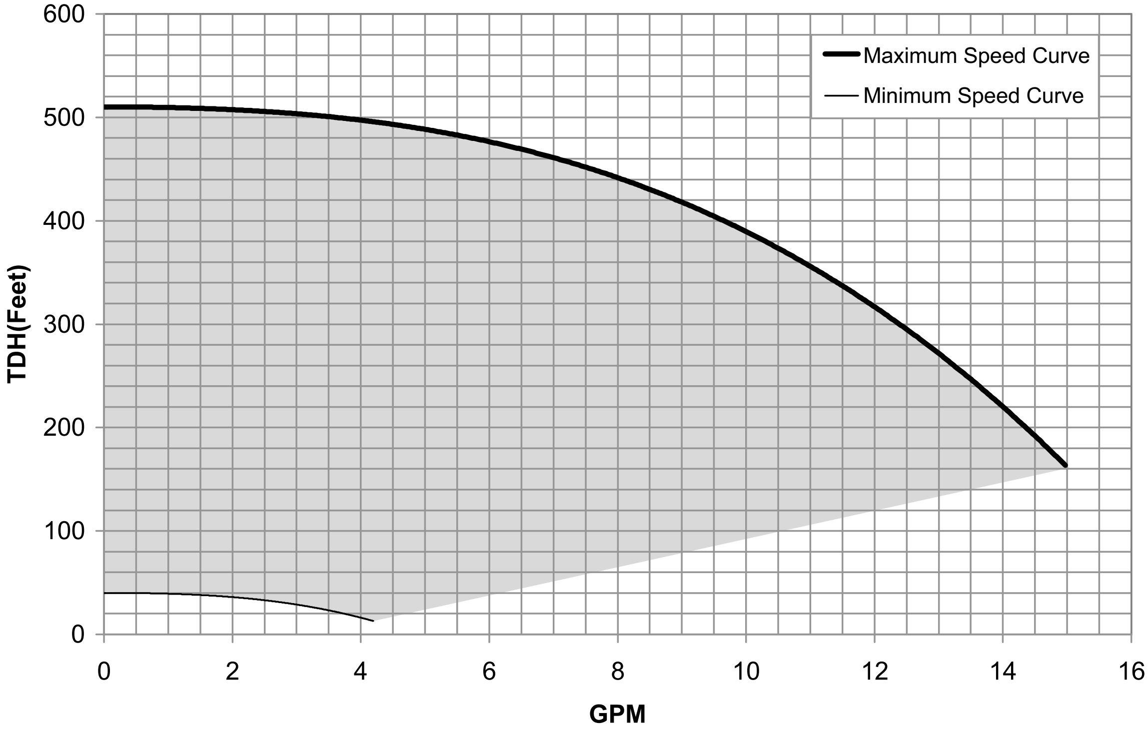
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

10 GPM • MODEL 10SQE10-290



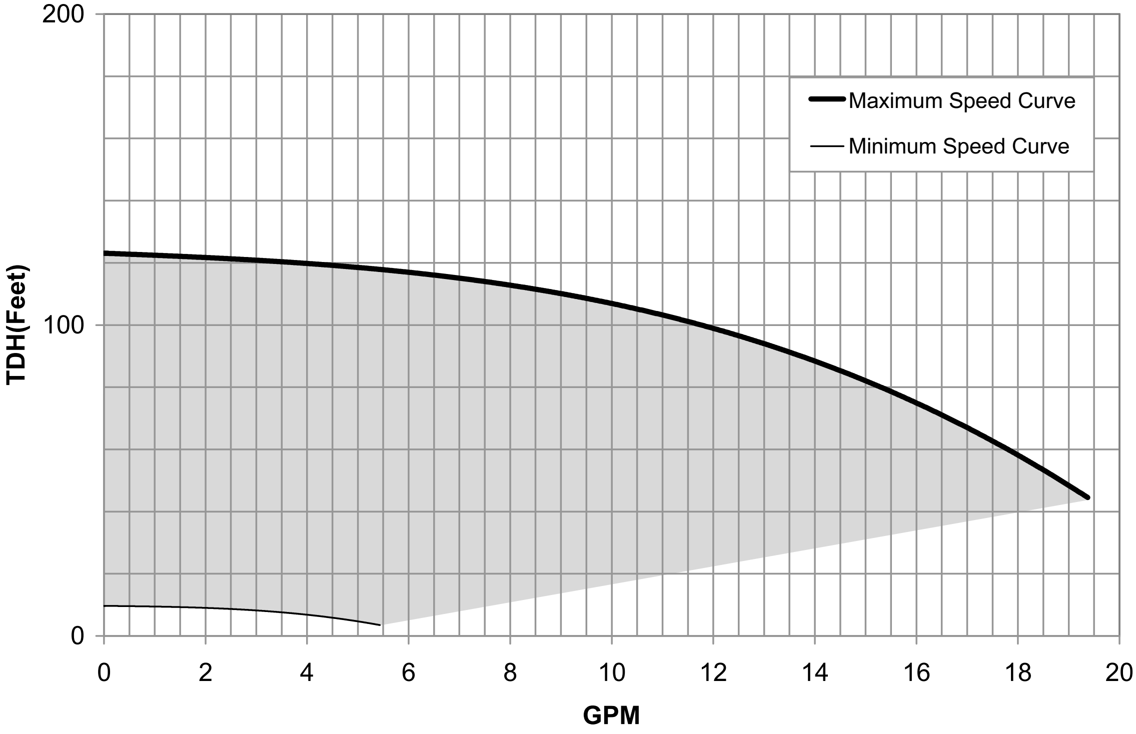
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

10 GPM • MODEL 10SQE15-330



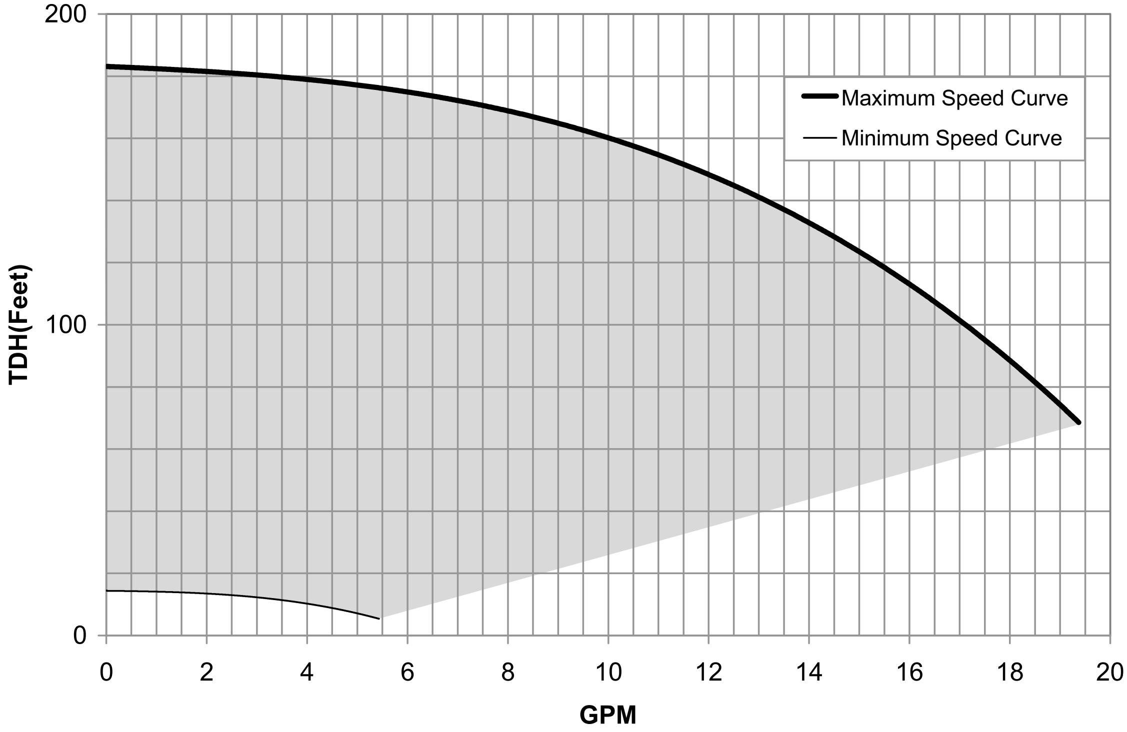
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

15 GPM • MODEL 15SQE05-70



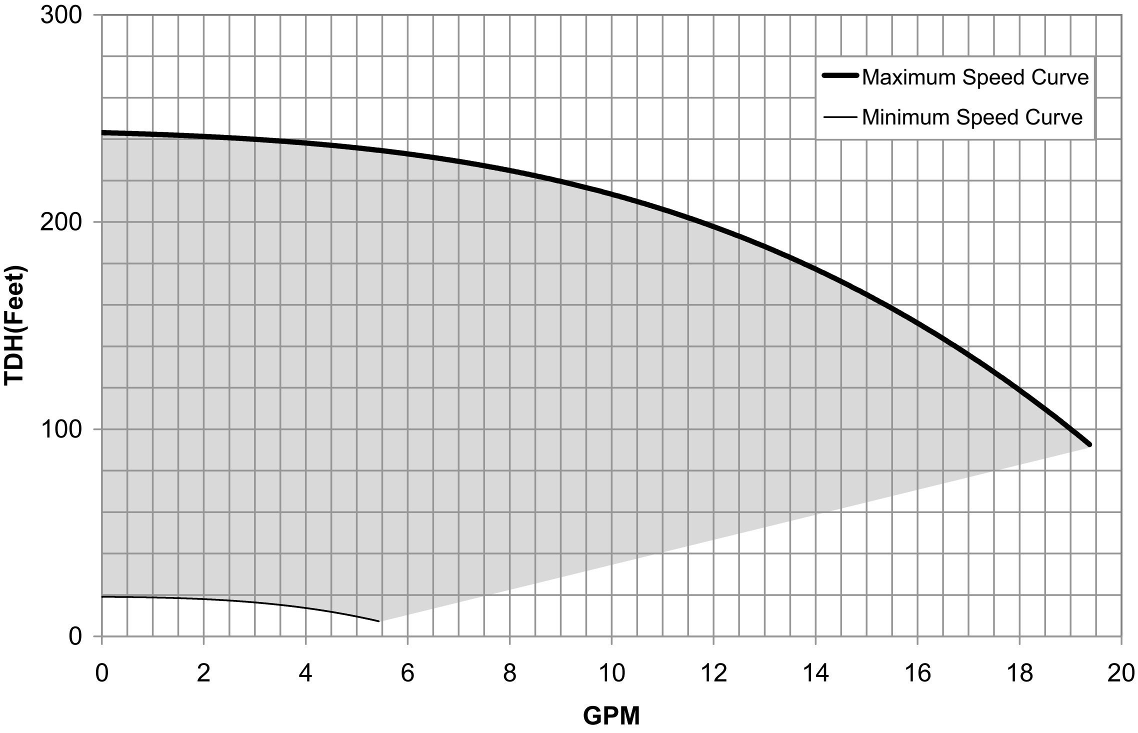
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

15 GPM • MODEL 15SQE05-110



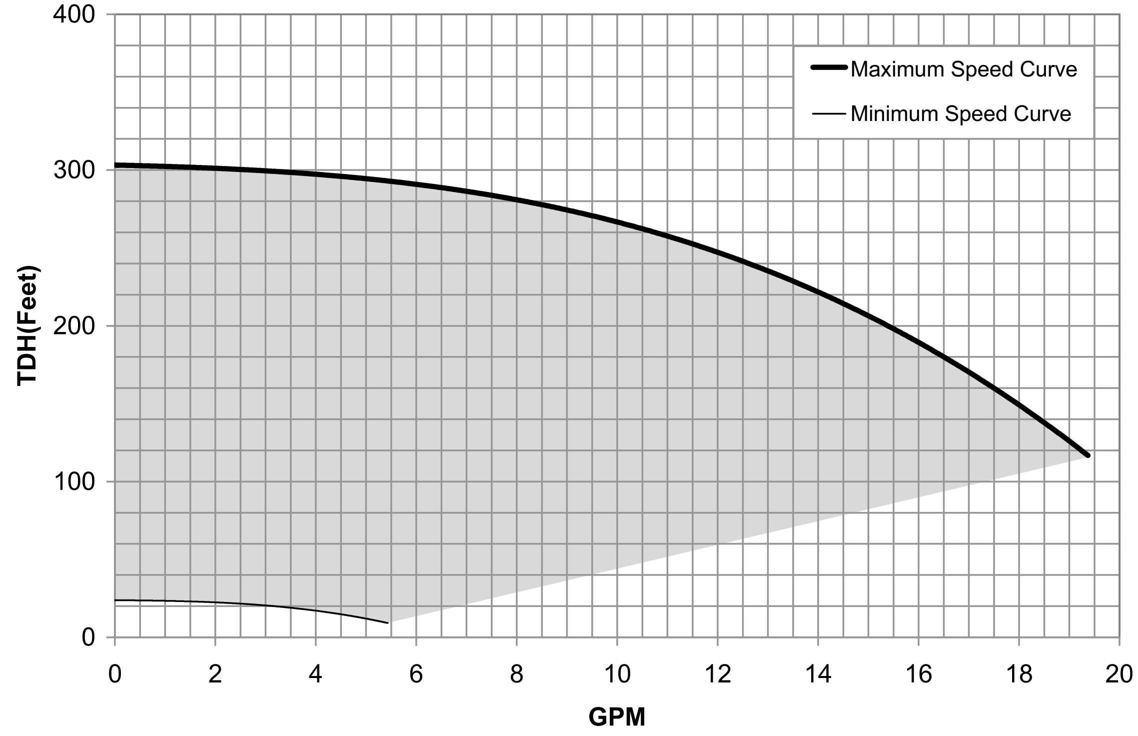
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

15 GPM • MODEL 15SQE07-150



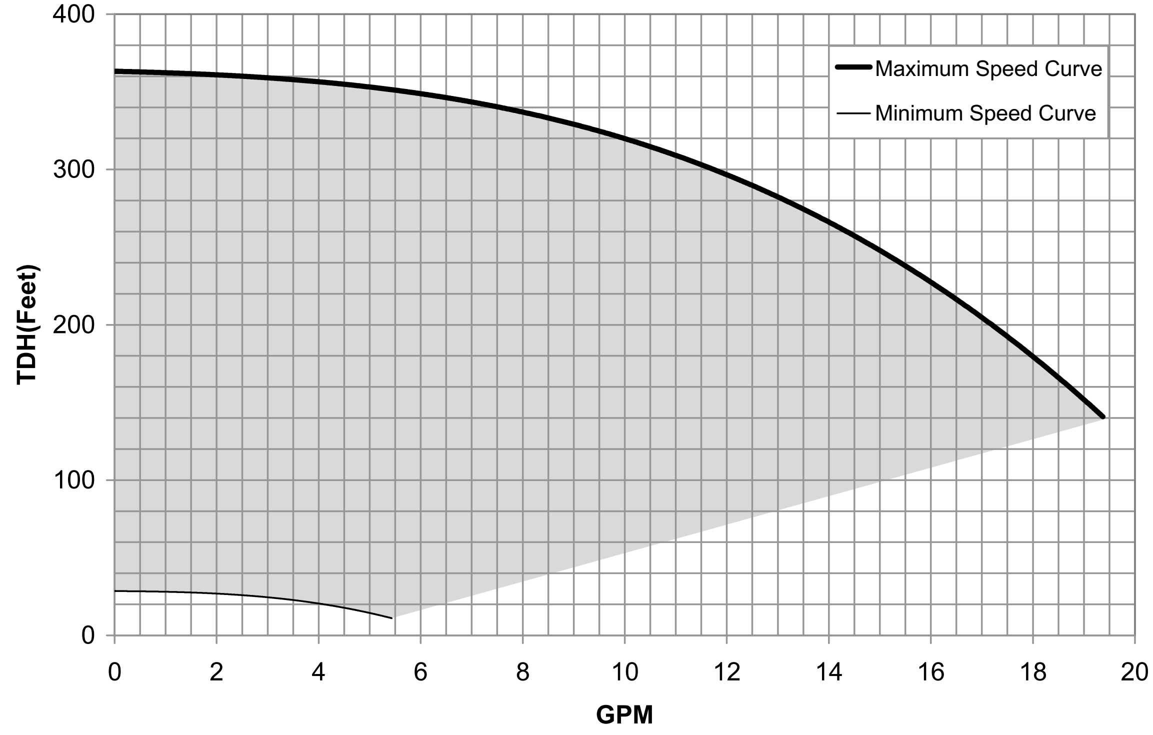
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

15 GPM • MODEL 15SQE07-180



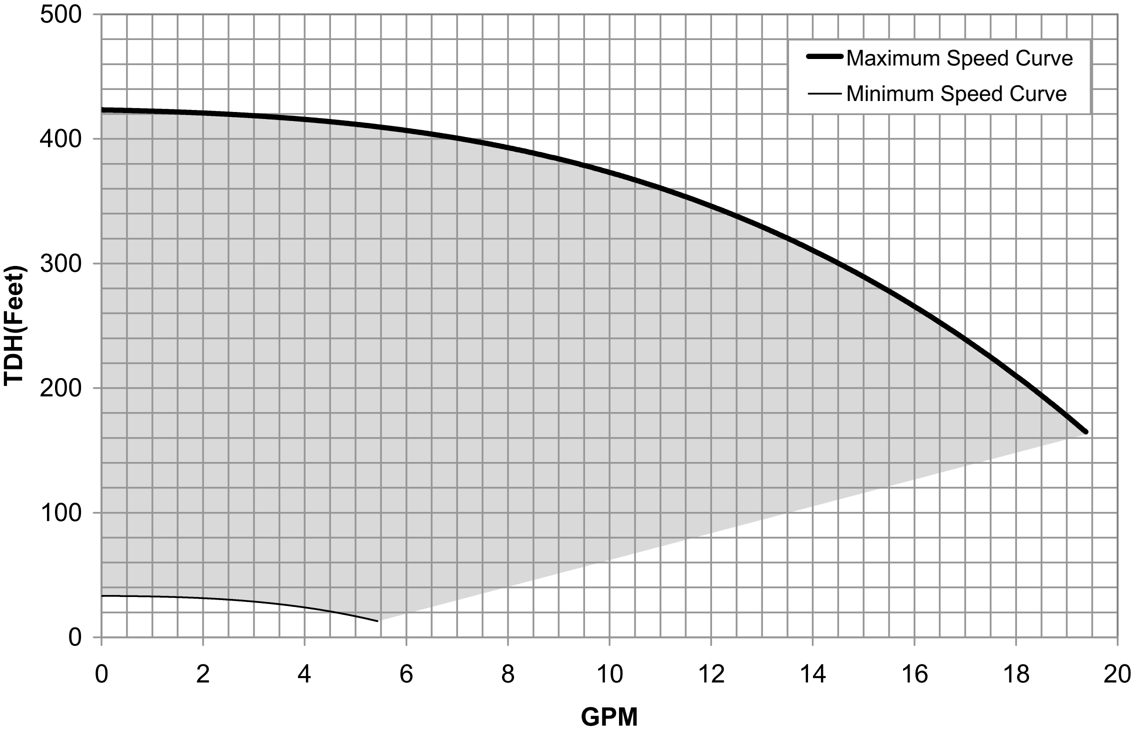
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

15 GPM • MODEL 15SQE10-220



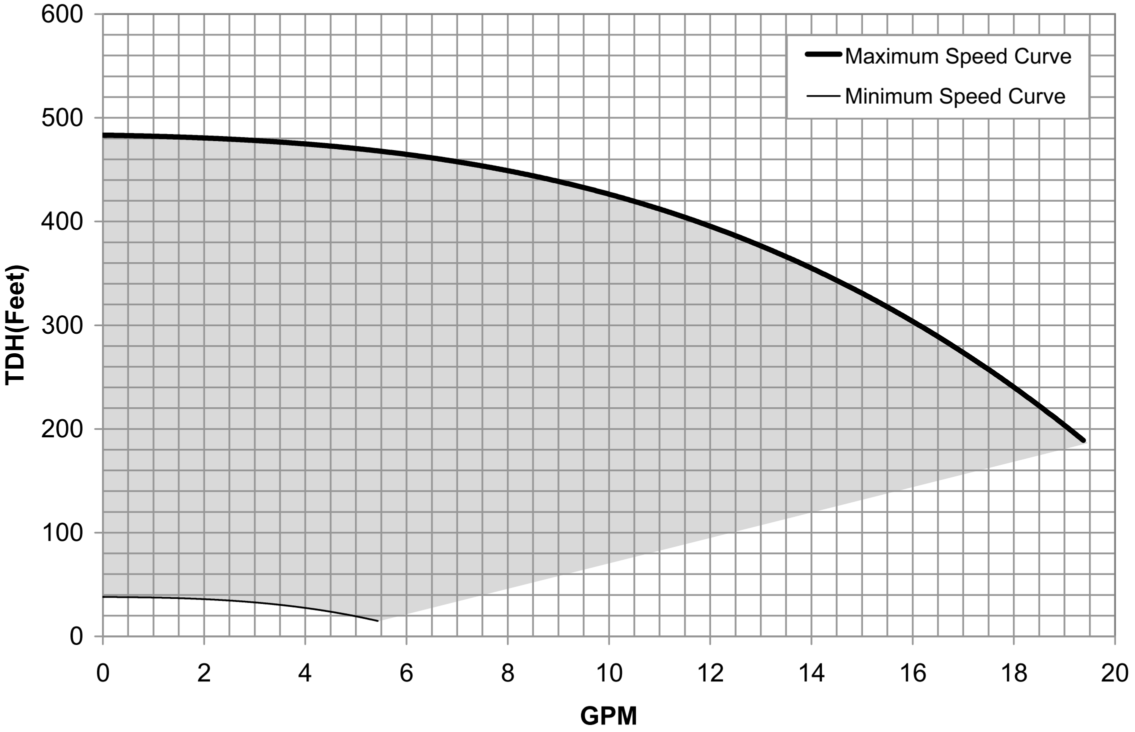
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

15 GPM • MODEL 15SQE10-250



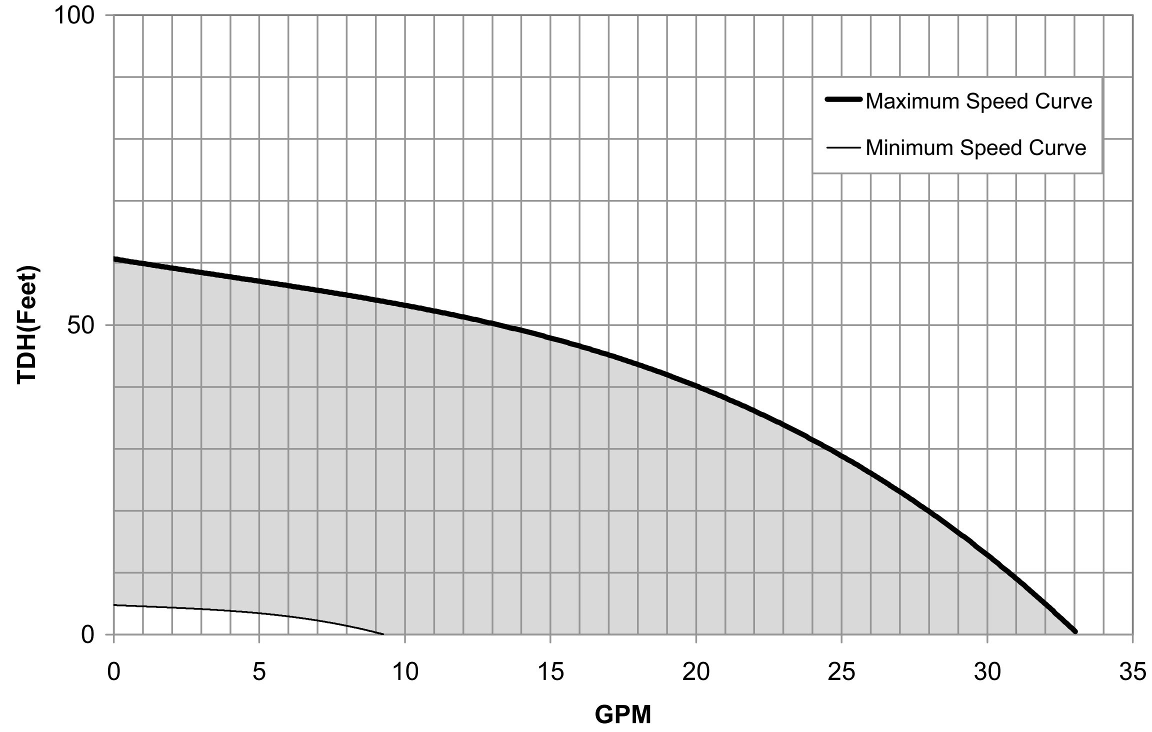
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

15 GPM • MODEL 15SQE15-290



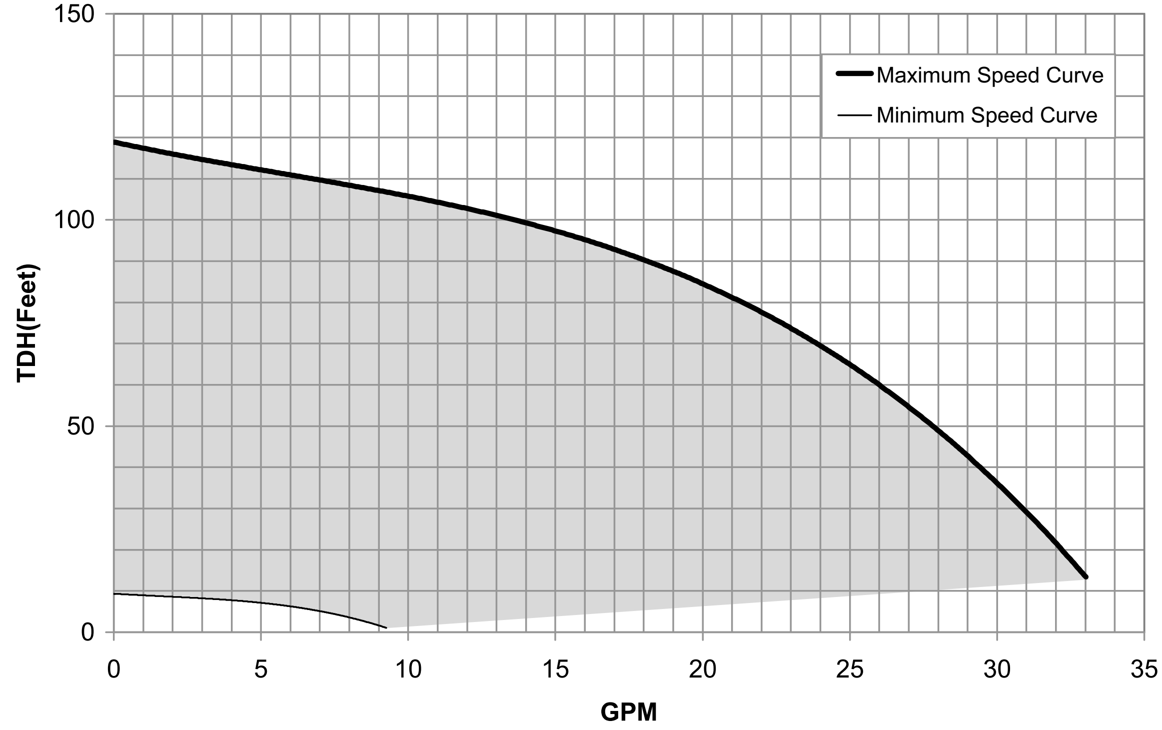
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**

22 GPM • MODEL 22SQE05-40



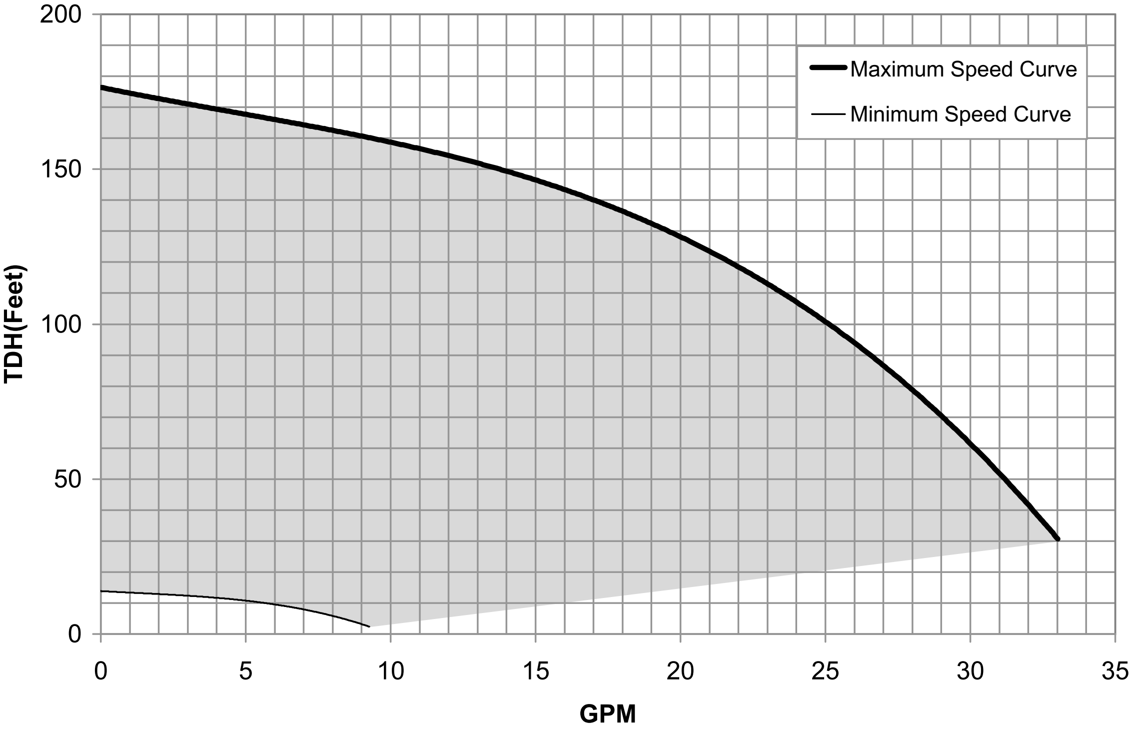
OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

22 GPM • MODEL 22SQE05-80



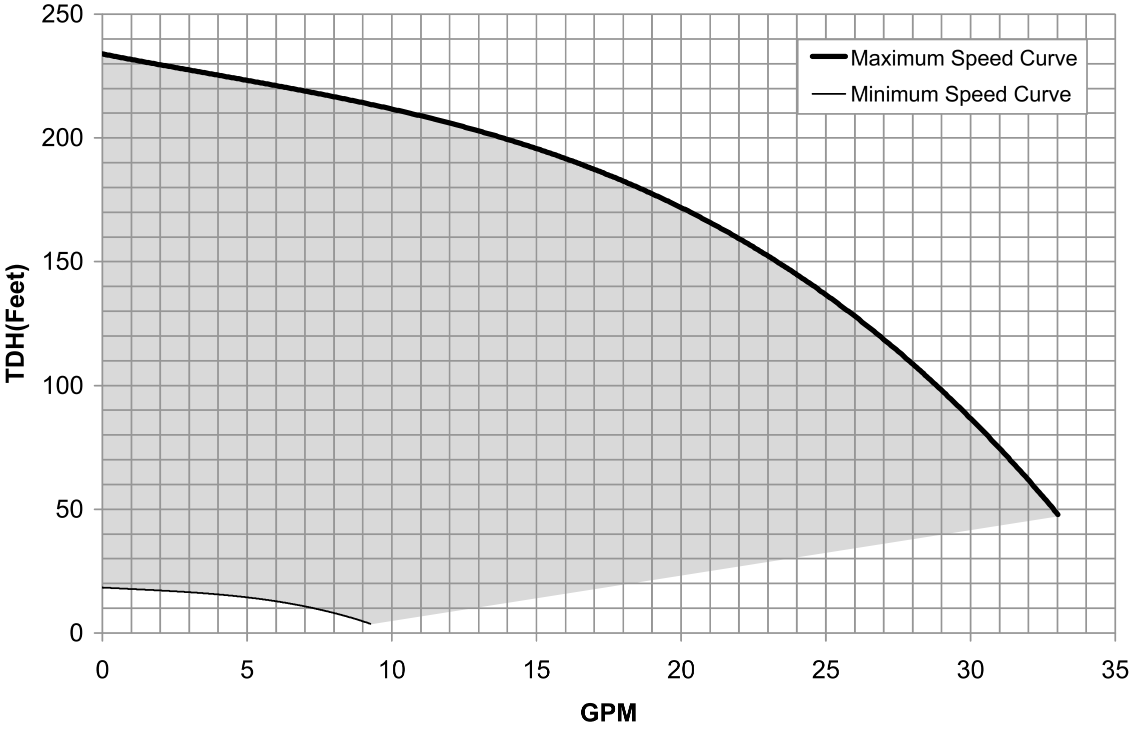
OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

22 GPM • MODEL 22SQE07-120



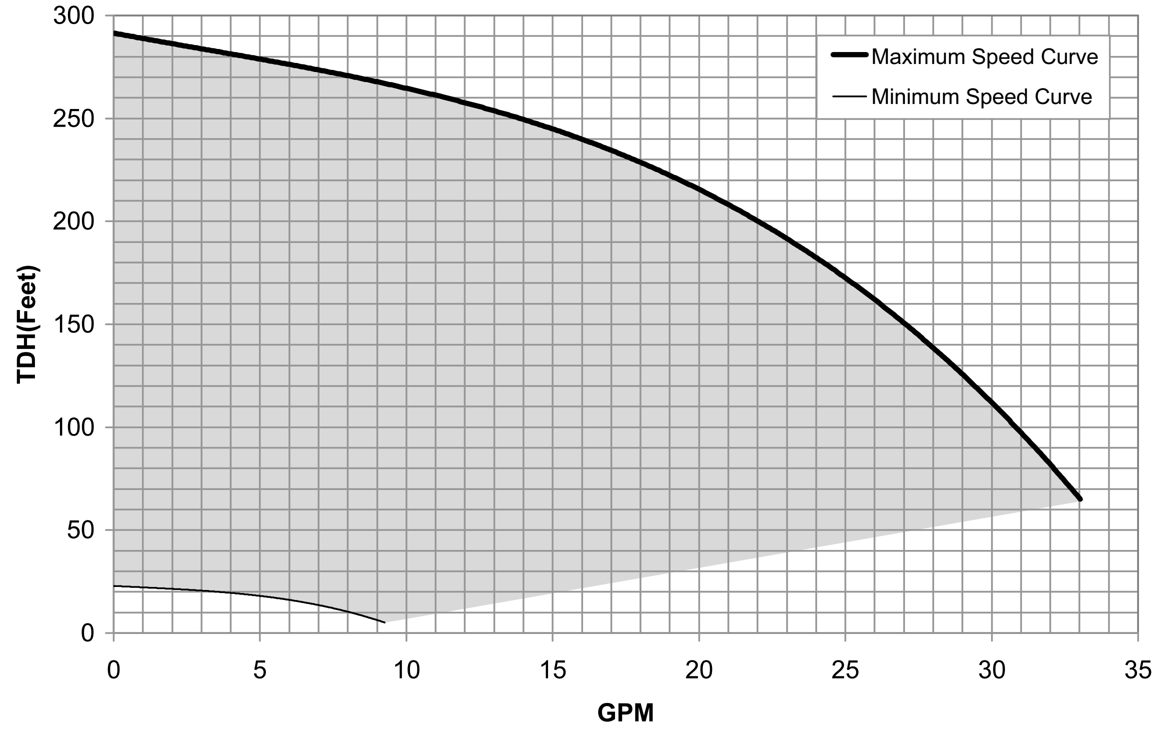
OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

22 GPM • MODEL 22SQE07-160



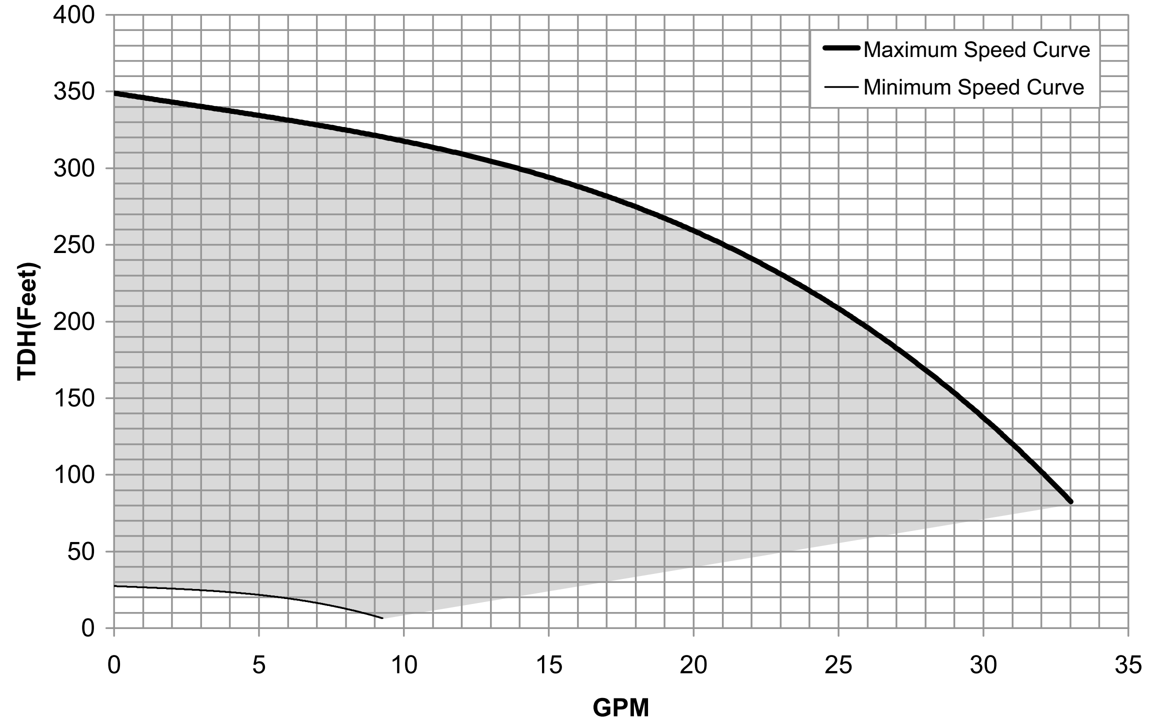
OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

22 GPM • MODEL 22SQE10-190



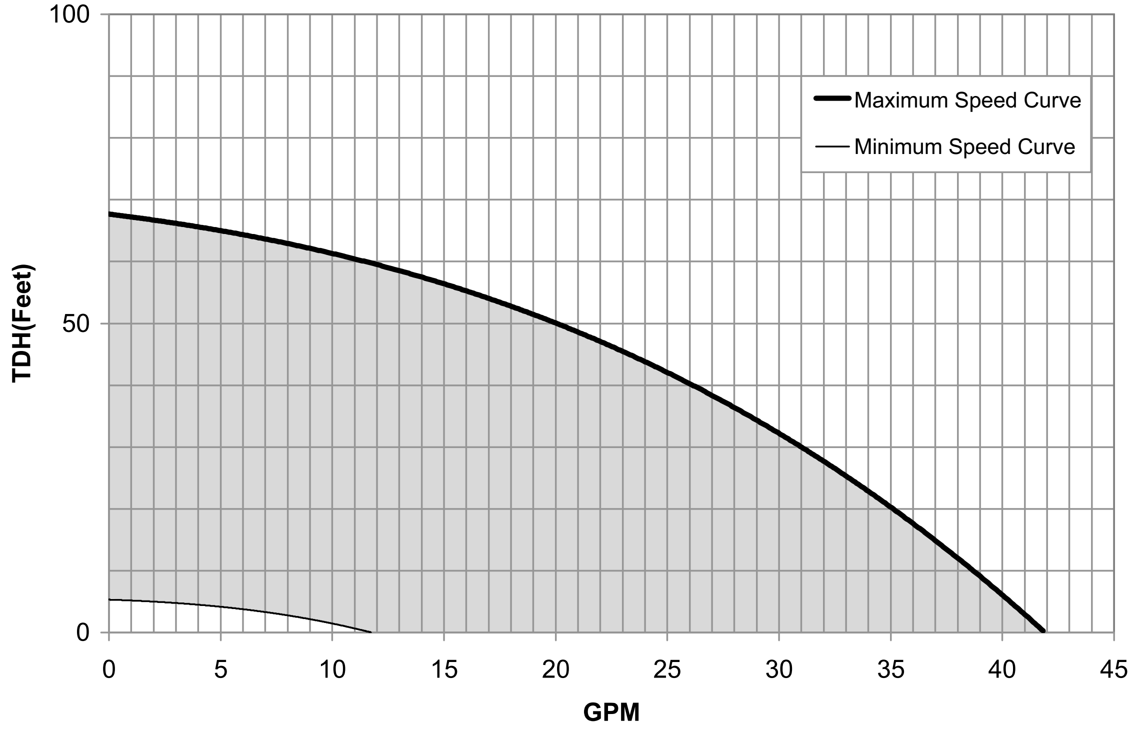
OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

22 GPM • MODEL 22SQE15-220



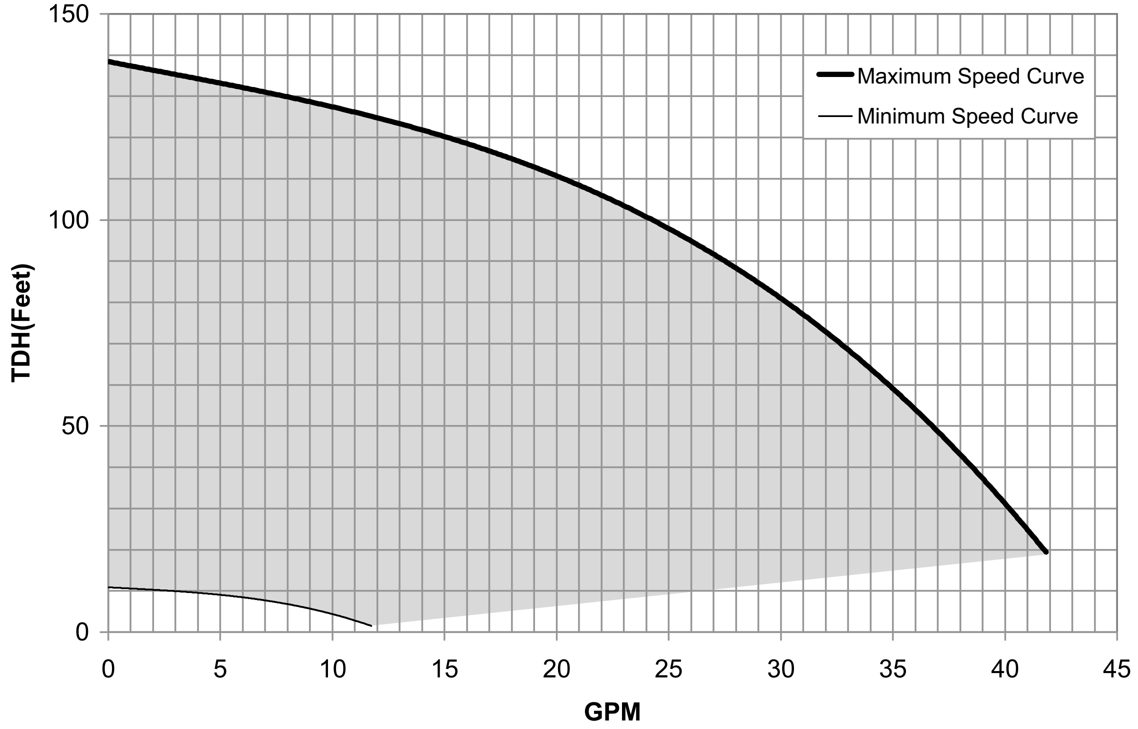
OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

30GPM • MODEL 30SQE05-40



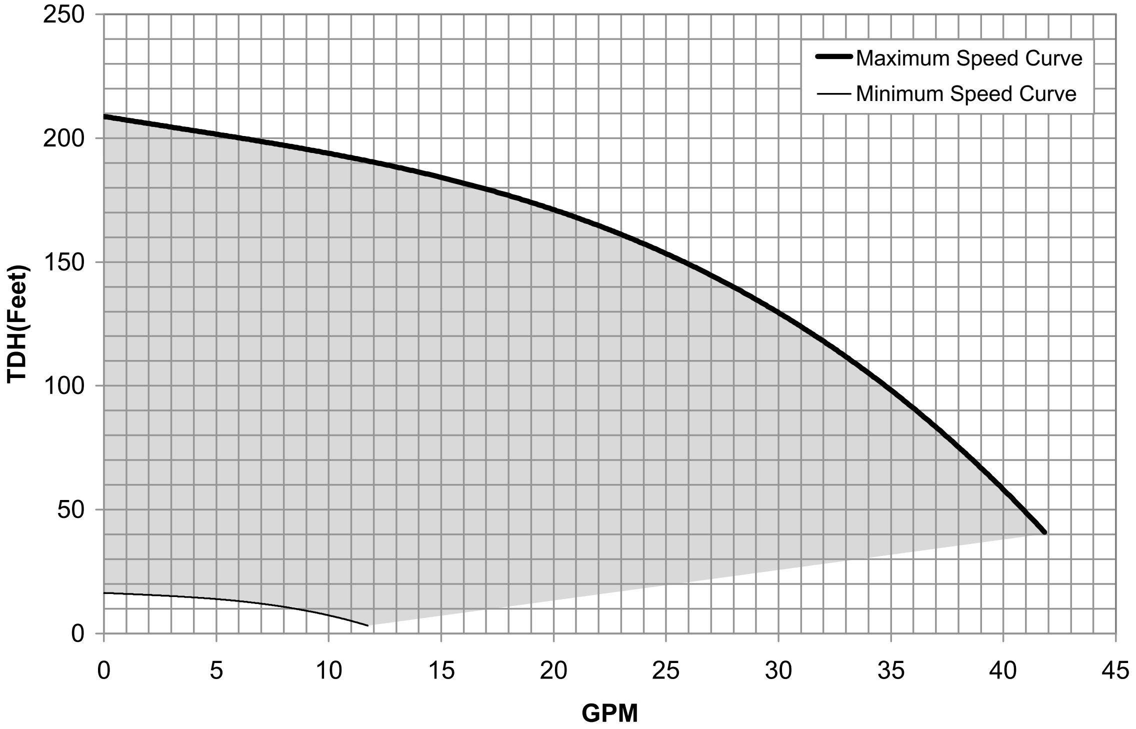
OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

30 GPM • MODEL 30SQE07-90



OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

30 GPM • MODEL 30SQE10-130



OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

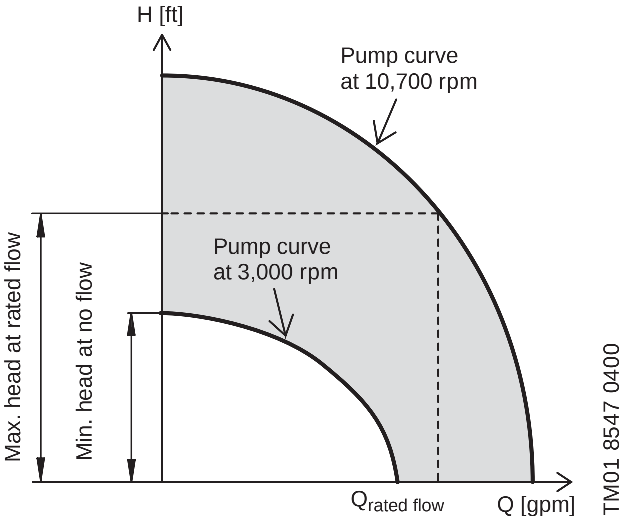
Step 1
Calculate minimum head requirements at no flow conditions:

Hmax (required) = dynamic head + system pressure (in feet) + above grade elevation + friction loss.

Step 2
Select pump from chart as follows:

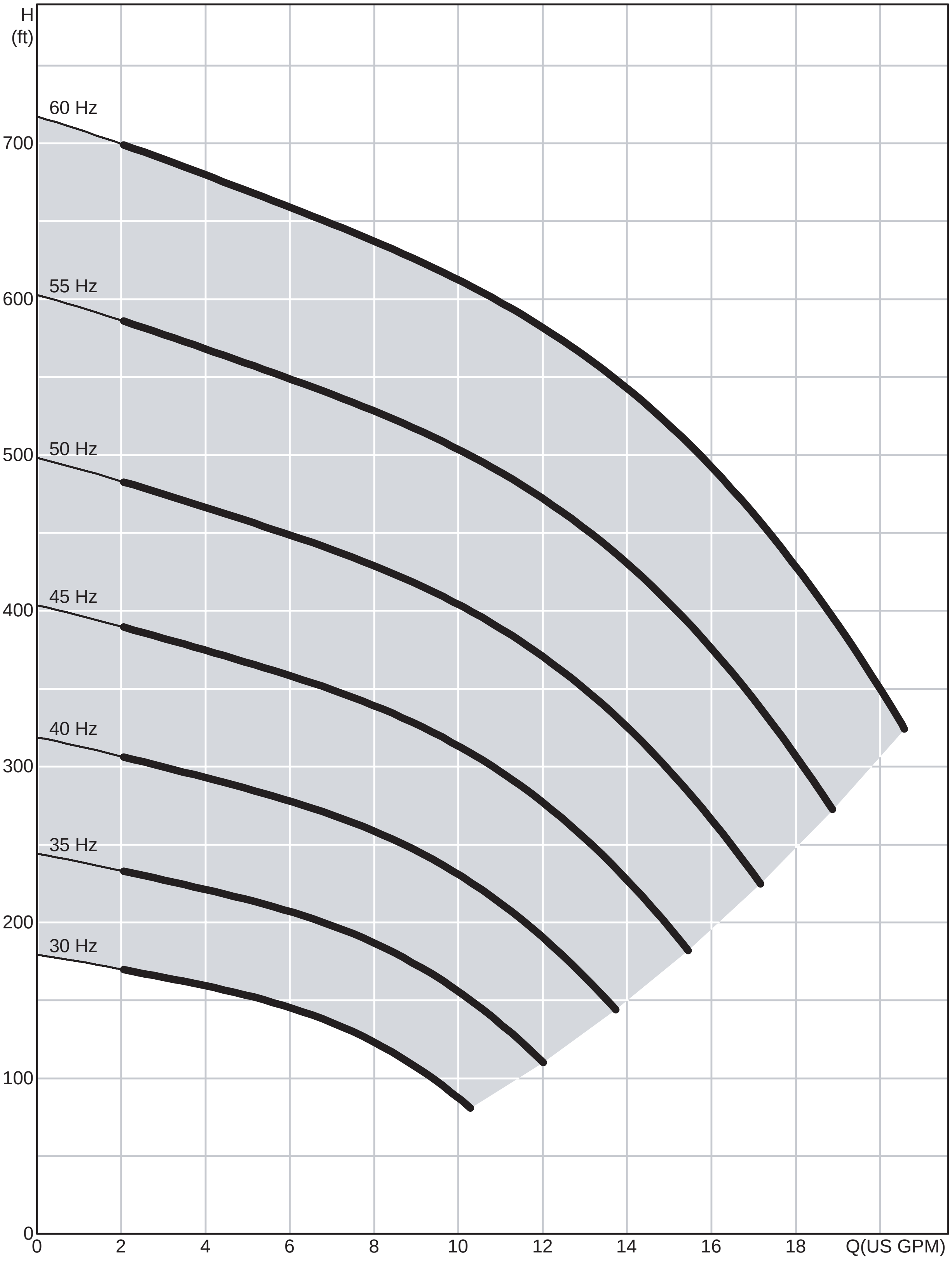
- Choose model family based on the desired flow rate. i.e. 15SQE for a flow rate of 15gpm
- Select the first model with a value in Column 2 greater than the Hmax calculated in Step 1
- For example: the choice for a 22gpm model with an Hmax of 140' would be the 22SQE-160. Double check your selection in the performance curves found in the previous pages of this book.

	Col. 1	**Col. 2**
System Sizing Matrix		
Pump Type Model B	**Shutoff Head (0 GPM) @ 3000 RPM Min. Speed**	**Head @ Rated GPM @ 10700 RPM Max. Speed**
	TDH(Feet)	**TDH(Feet)**
5SQE-90	11	86
5SQE-140	17	131
5SQE-180	22	177
5SQE-230	28	222
5SQE-270	34	270
5SQE-320	39	315
5SQE-360	45	360
5SQE-410	51	405
5SQE-450	56	450
10SQE-110	12	105
10SQE-160	17	164
10SQE-200	23	215
10SQE-240	29	267
10SQE-290	34	328
10SQE-330	40	390
15SQE-70	10	75
15SQE-110	14	123
15SQE-150	19	164
15SQE-180	24	205
15SQE-220	29	246
15SQE-250	33	287
15SQE-290	38	328
22SQE-40	5	36
22SQE-80	9	77
22SQE-120	14	117
22SQE-160	18	159
22SQE-190	23	200
22SQE-220	27	240
30SQE-40	5	33
30SQE-90	11	82
30SQE-130	16	126



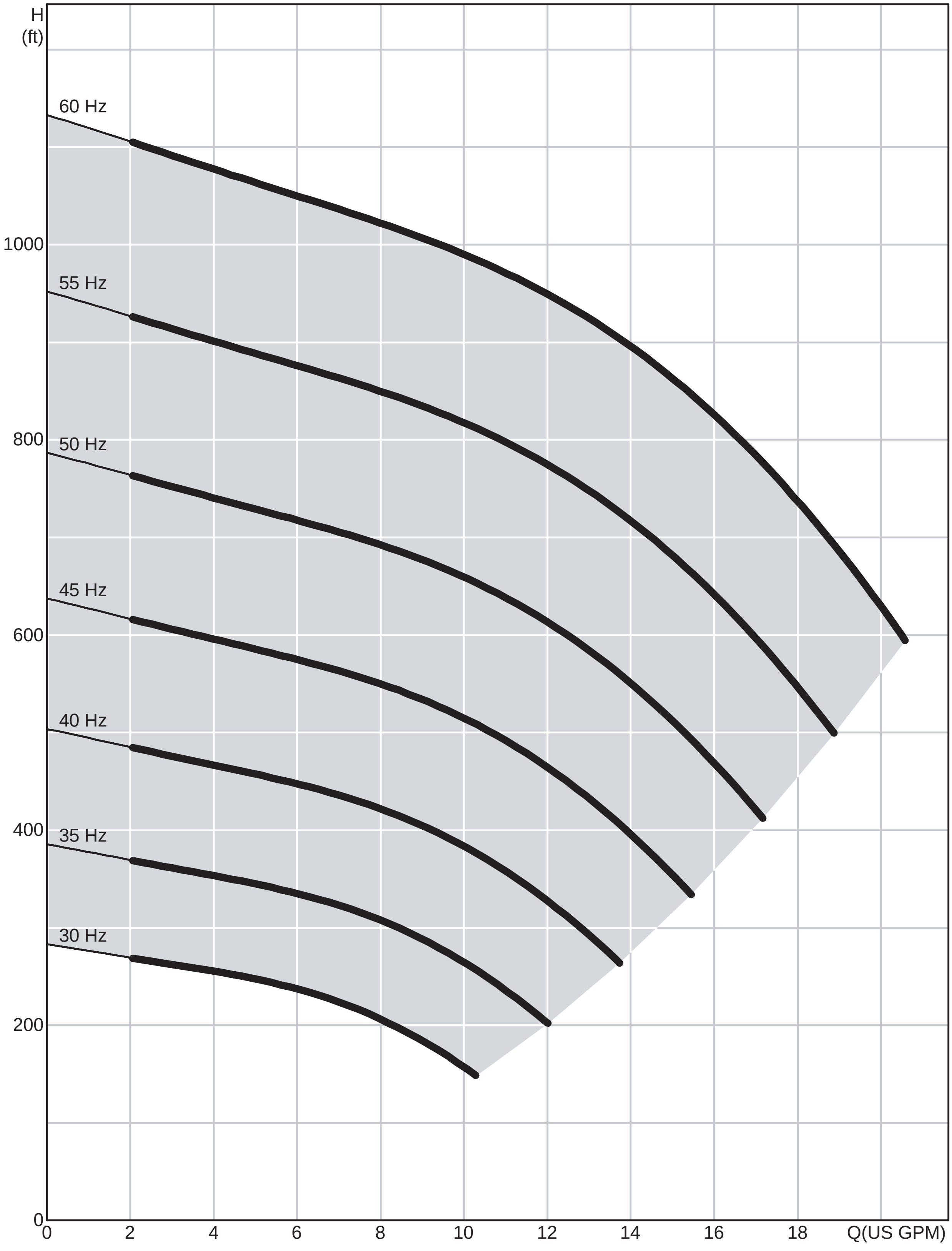
Note: All calculated head requirements must lie between the selected pump models minimum and maximum speed speed curves.

16 GPM • MODEL 16S30-24



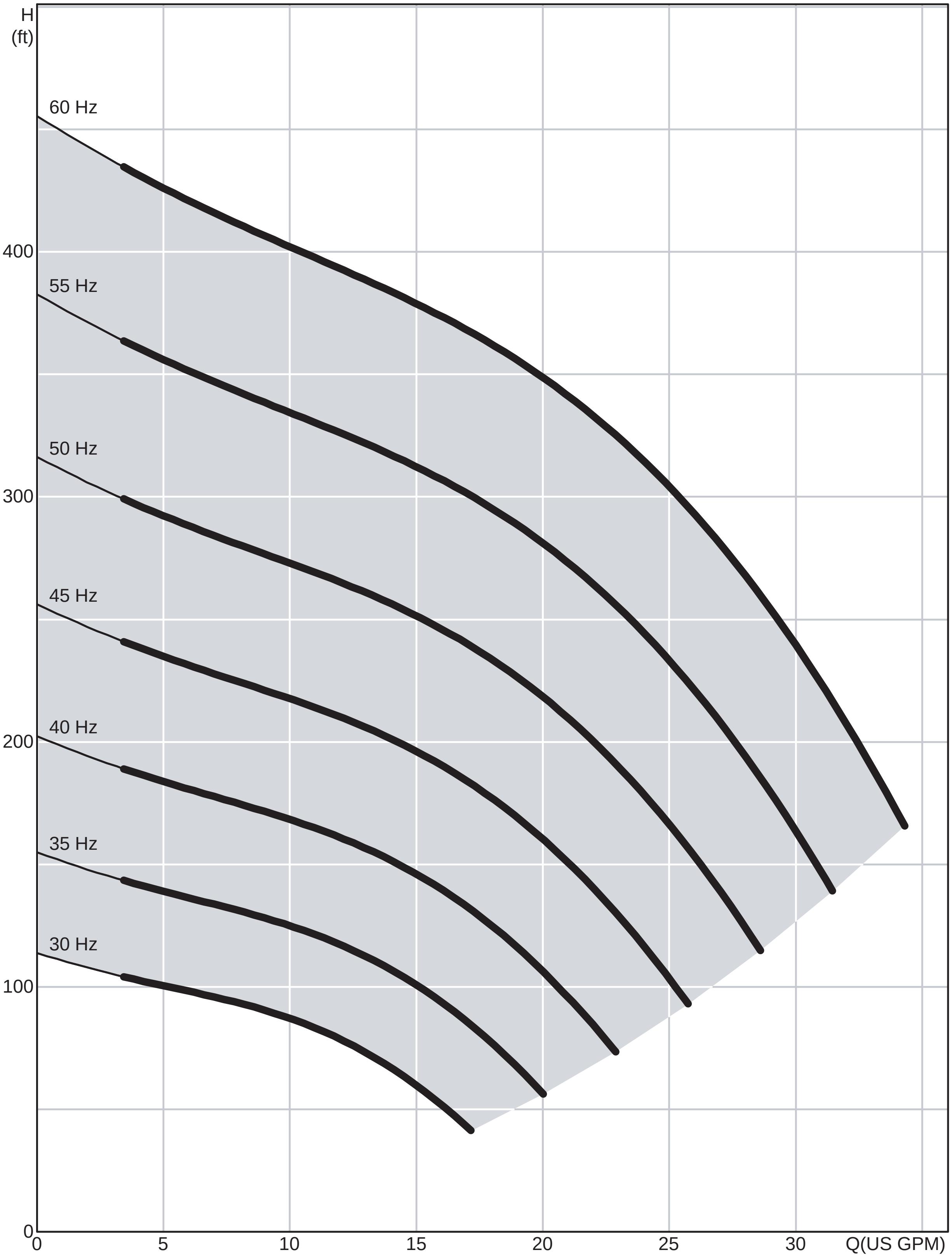
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

16 GPM • MODEL 16S50-38



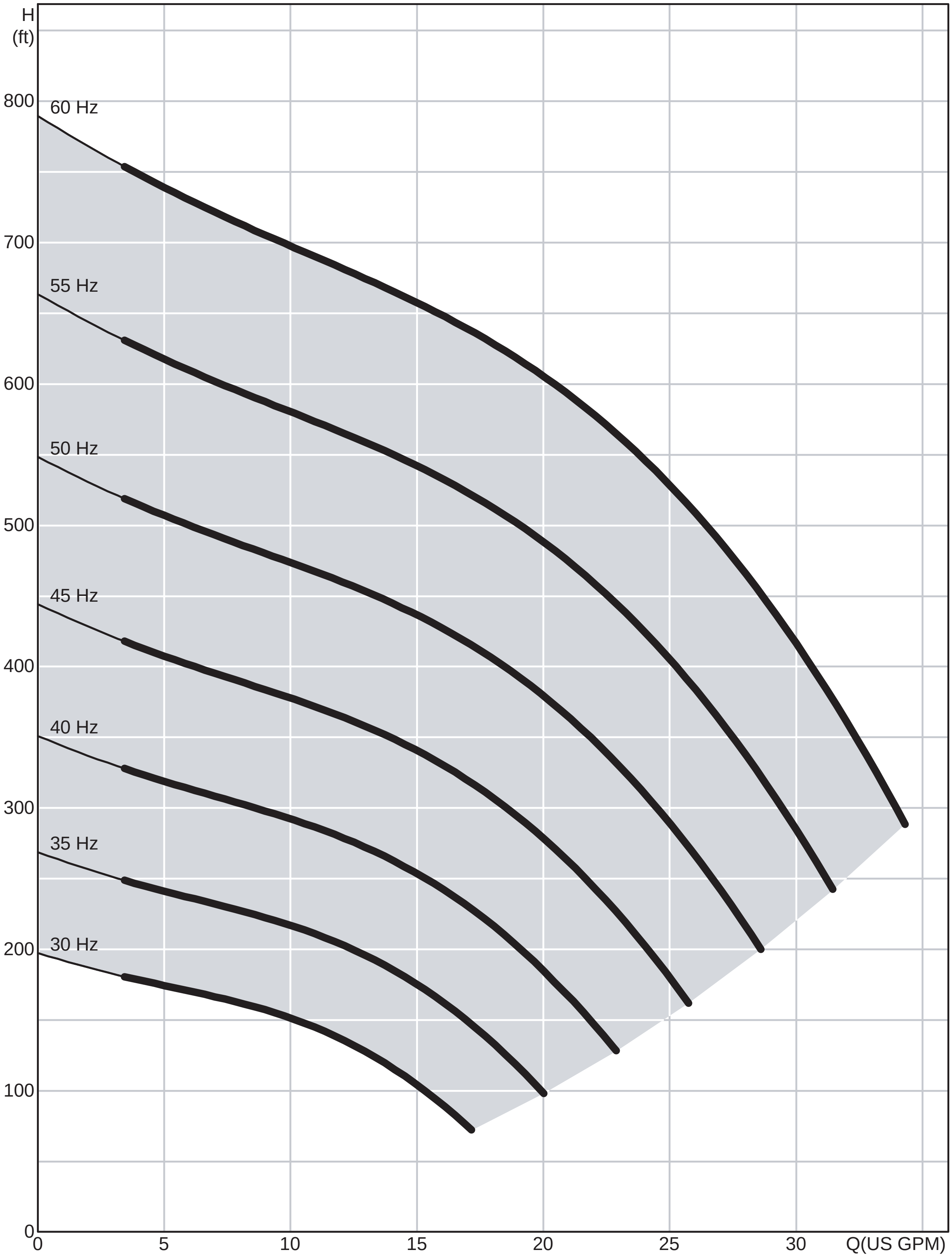
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

25 GPM • MODEL 25S30-15



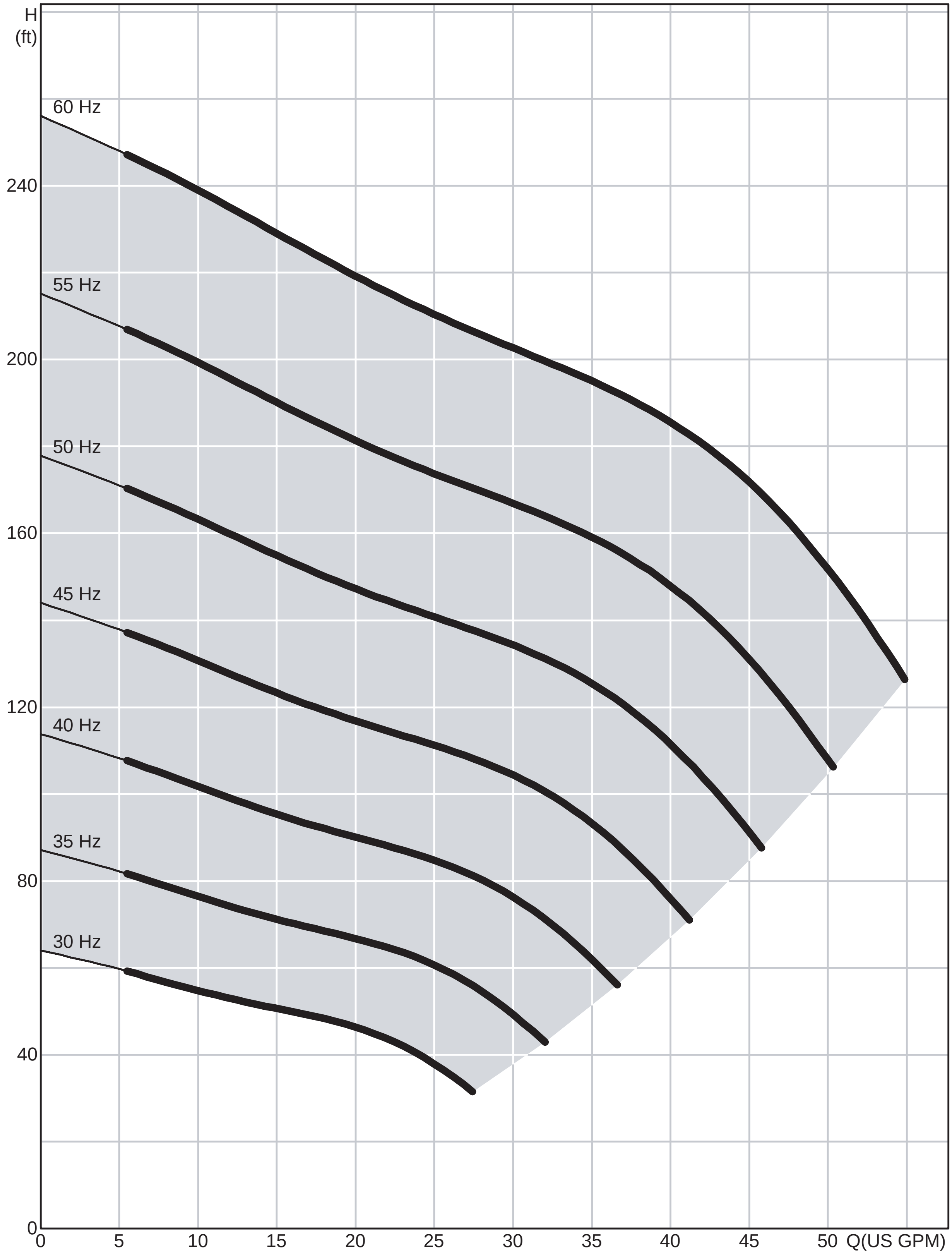
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

25 GPM • MODEL 25S50-26



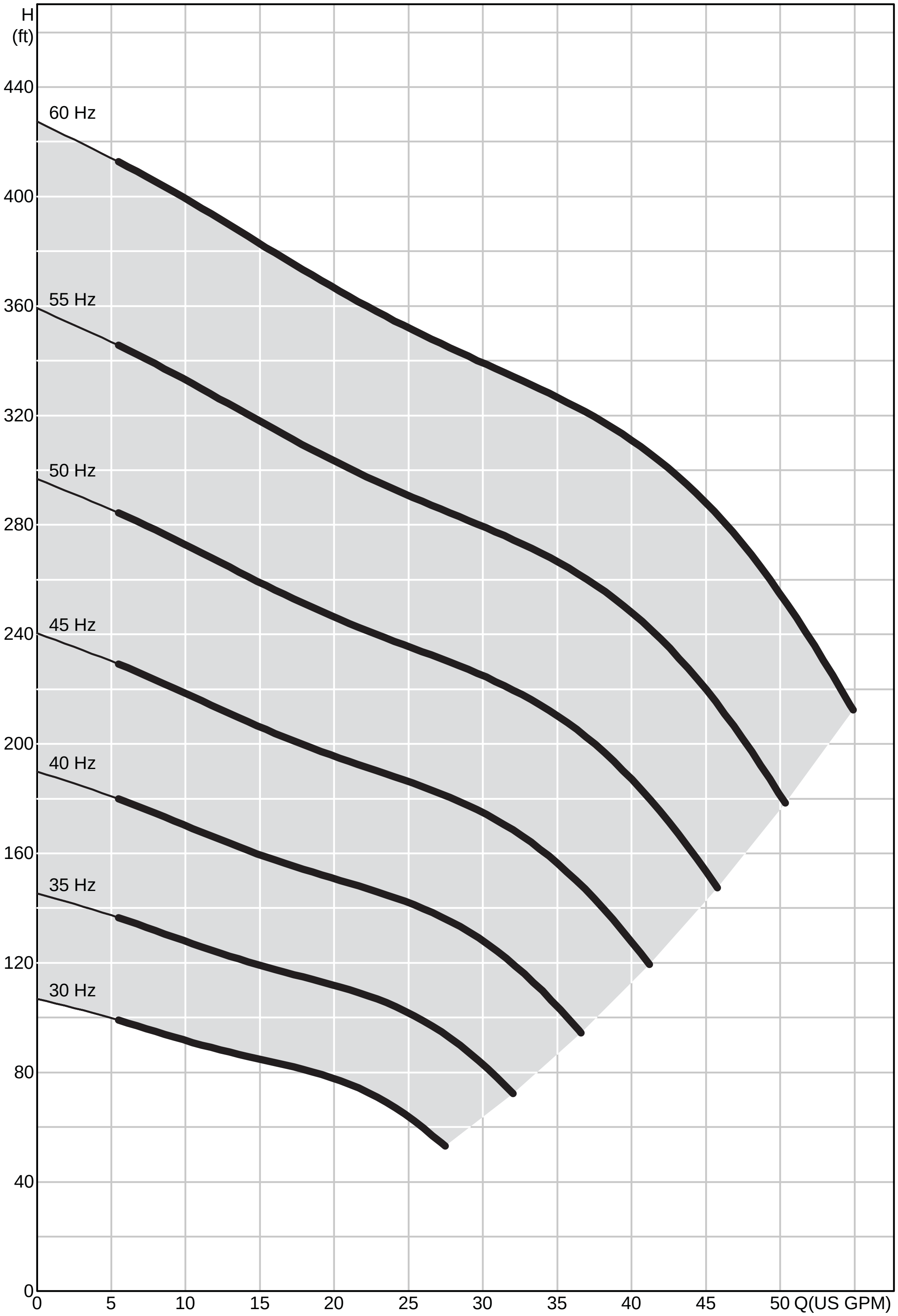
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

40 GPM • MODEL 40S30-9



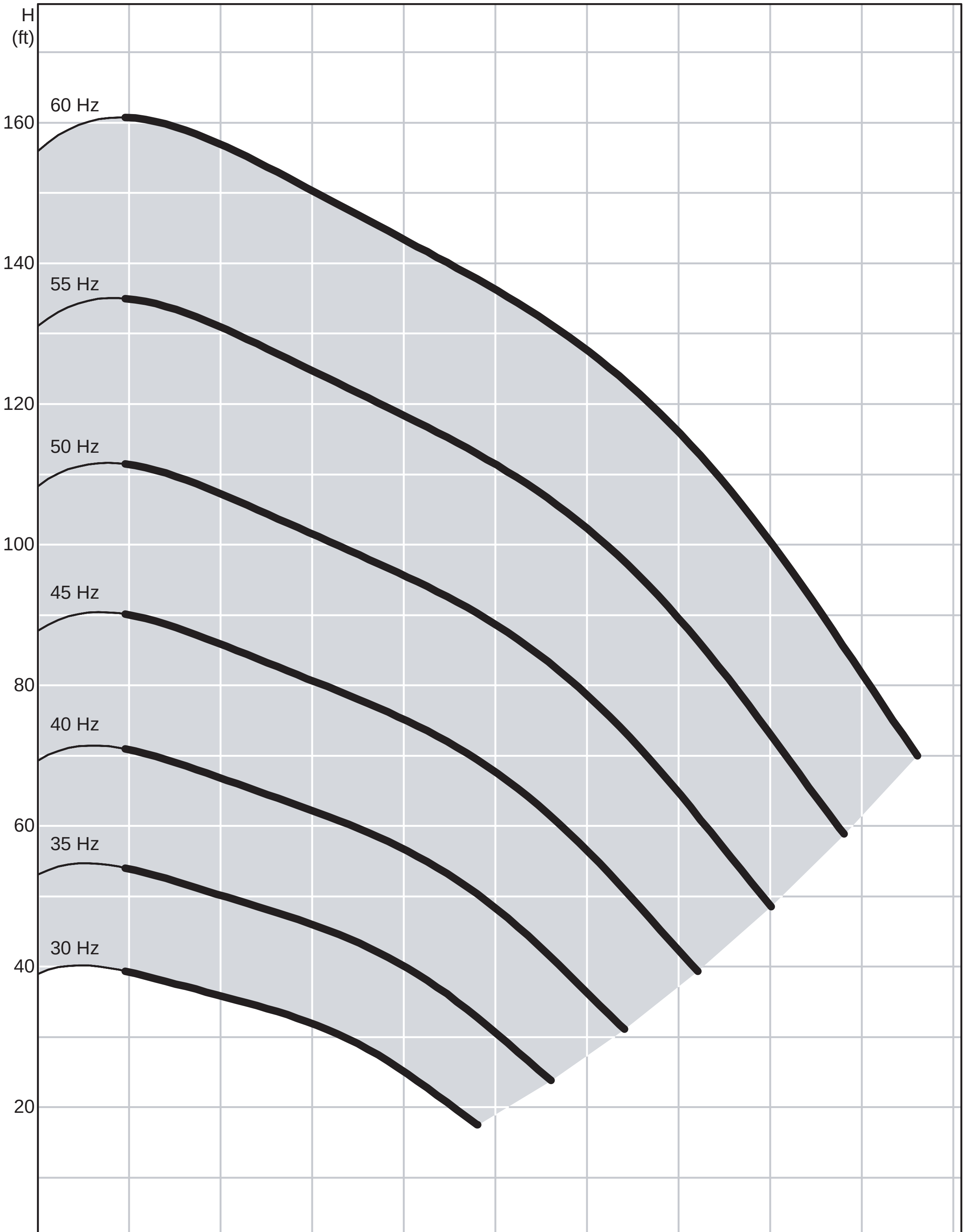
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

40 GPM • MODEL 40S50-15



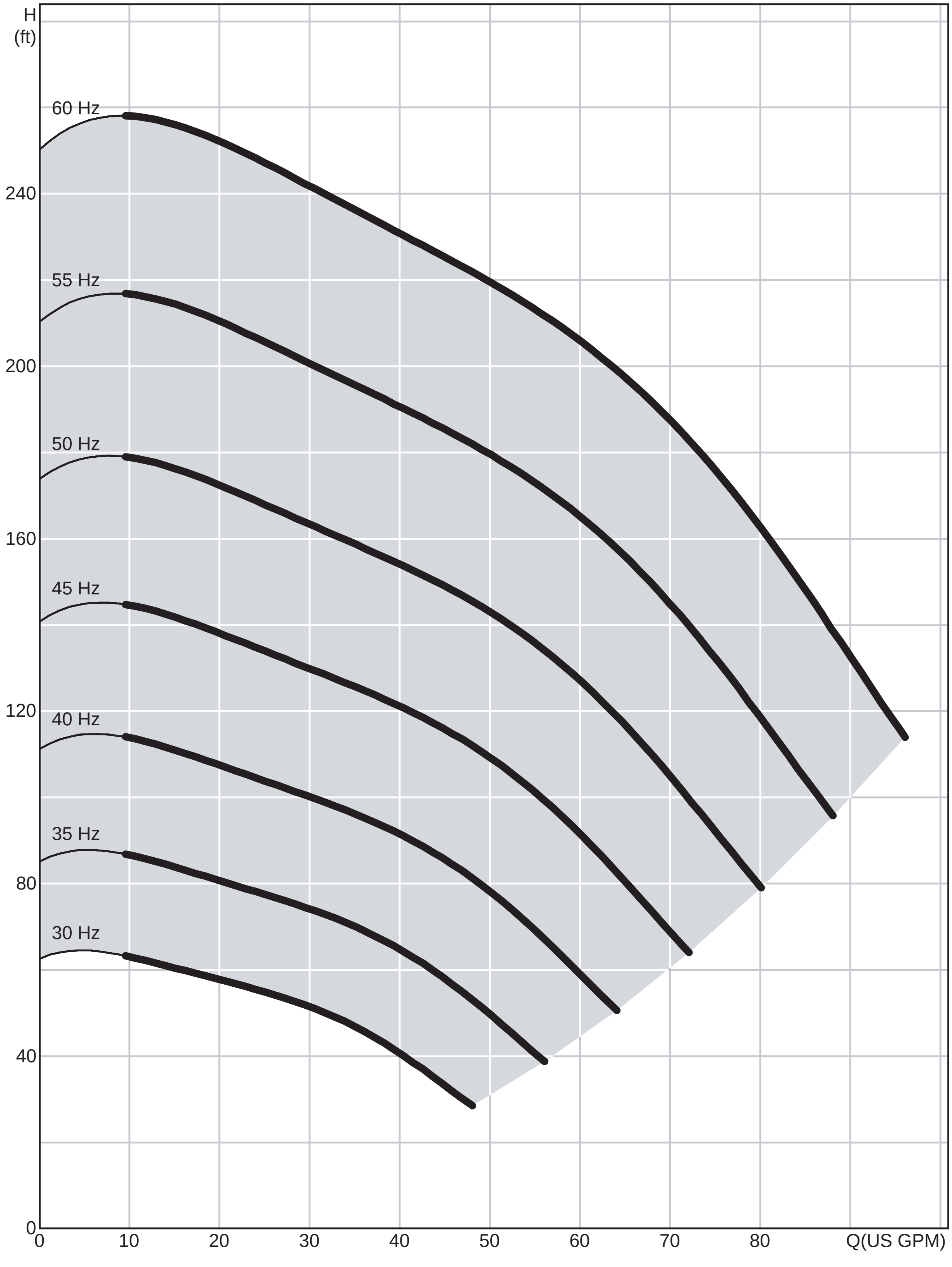
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

75 GPM • MODEL 75S30-5



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

75 GPM • MODEL 75S50-8



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

Step 1
Calculate maximum head requirements at rated flow conditions:

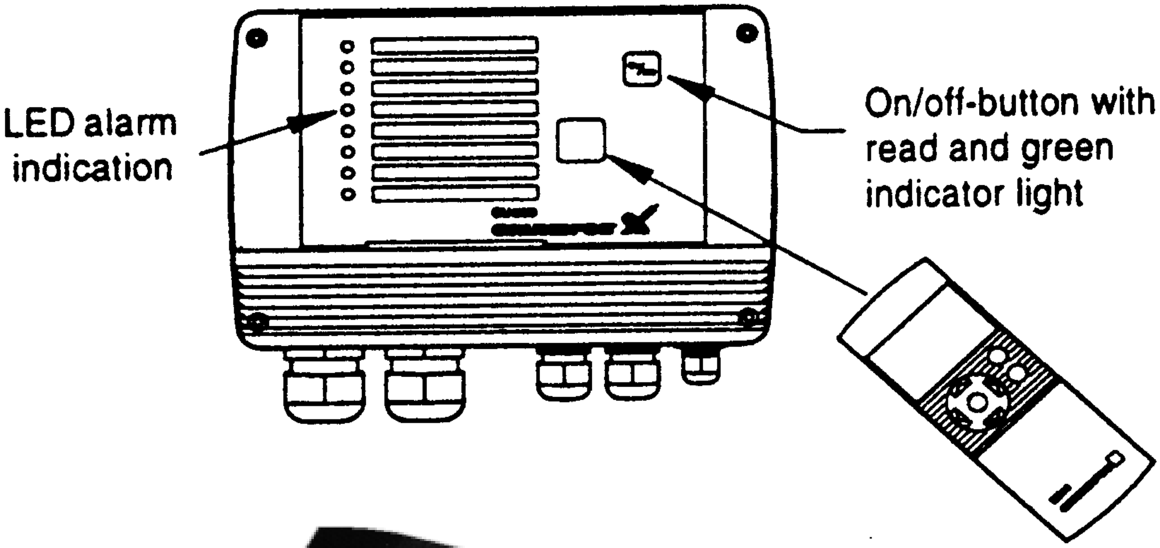
Hmax = dynamic head + system psi (in feet) + friction loss + above grade elevation

Step 2
Select pump from chart as follows:

- Select a model in which the calculated value of Hmax is below the value in columns 2
- For example: the choice for a 40gpm model with an Hmax of 150 would be the 40S30-9

	Col. 1	Col. 2
System Sizing Matrix		
Pump Type	Shutoff Head (0 GPM) @ 1500 RPM Min. Speed	Head @ Rated GPM @ 3600 RPM Max. Speed
3HP	TDH(Feet)	TDH(Feet)
16S30-24	128	490
25S30-15	80	305
40S30-9	45	185
75S30-5	30	105
5HP		
16S50-38	200	825
25S50-26	105	530
40S50-15	75	310
75S50-8	45	175

SmartFlo™ Accessories



CU301 SQE 3" Constant Pressure System "SmartFlo"

Description	Product no.
"SmartFlo" Constant Pressure Kit (Includes CU301 and Transducer)	96438895

CU321 SP 4" Constant Pressure System "SmartFlo"

Description	HP	Input PH	Input VOLTS	Product no.
CU321 Constant Pressure Kit	3	1	200-240	96581690
CU321 Constant Pressure Kit	5	3	200-240	96581691
Pressure Sensor	_	_	_	96437852

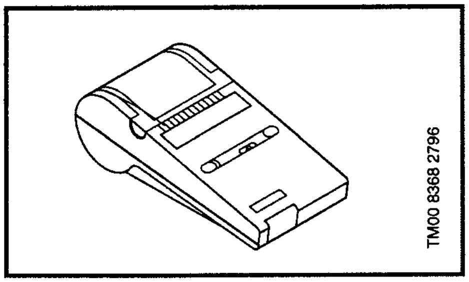
Note: Kits include CU321 and pressure sensor

CU300 Status Box & R100

Description	Product no.
CU300 Status Box	96422776

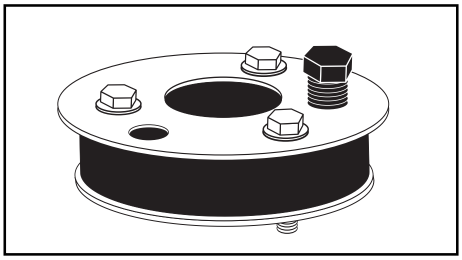
Description	Product no.
The R100 is used for wireless infrared communication with the CU300	625333

Printer



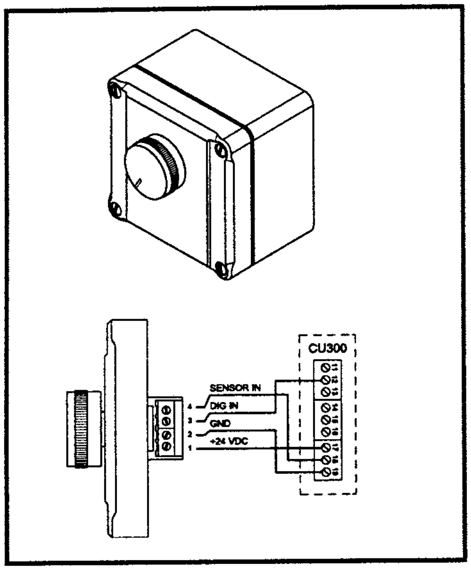
Description	Product no.
Printer for R100, infrared communication Type: Hewlett Packard, HP 82240B	620480
Paper Roll	620481

3" Well Seal



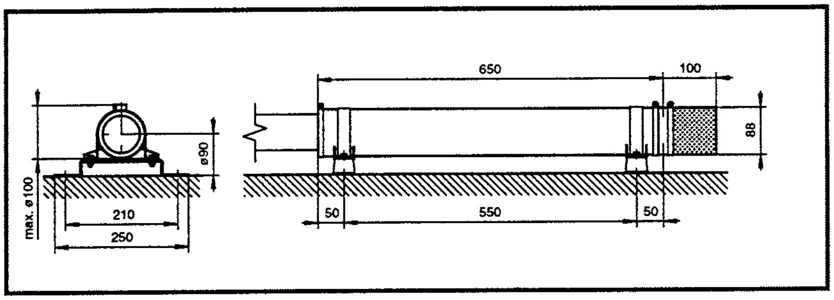
Description	Product no.
3" Sanitary Well Seal	1B5102

Potentiometer



Description	Version	Product no.
External potentiometer with cabinet for wall mounting. Screened cables, 4-wire cable, max. length of cable: 100m	Grundfos potentiometer, SPP1 Enclosure class: IP 55	625468

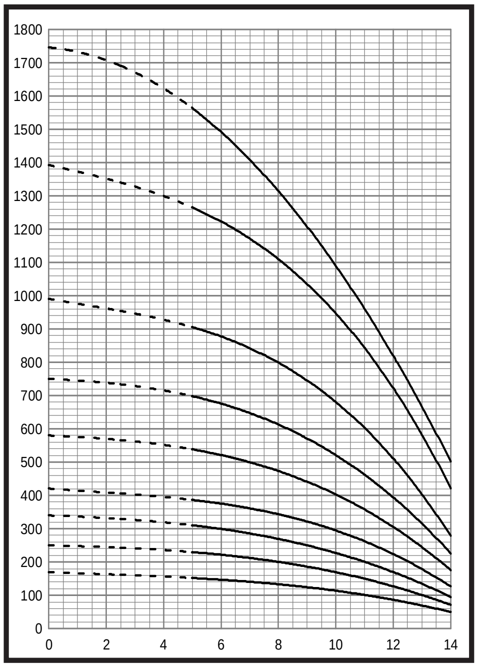
SQ/SQE - Flow sleeve



Description	Product no.
Flow Sleeve Complete	96037505

Performance Curves and Technical Data

For 3-Inch & larger well applications

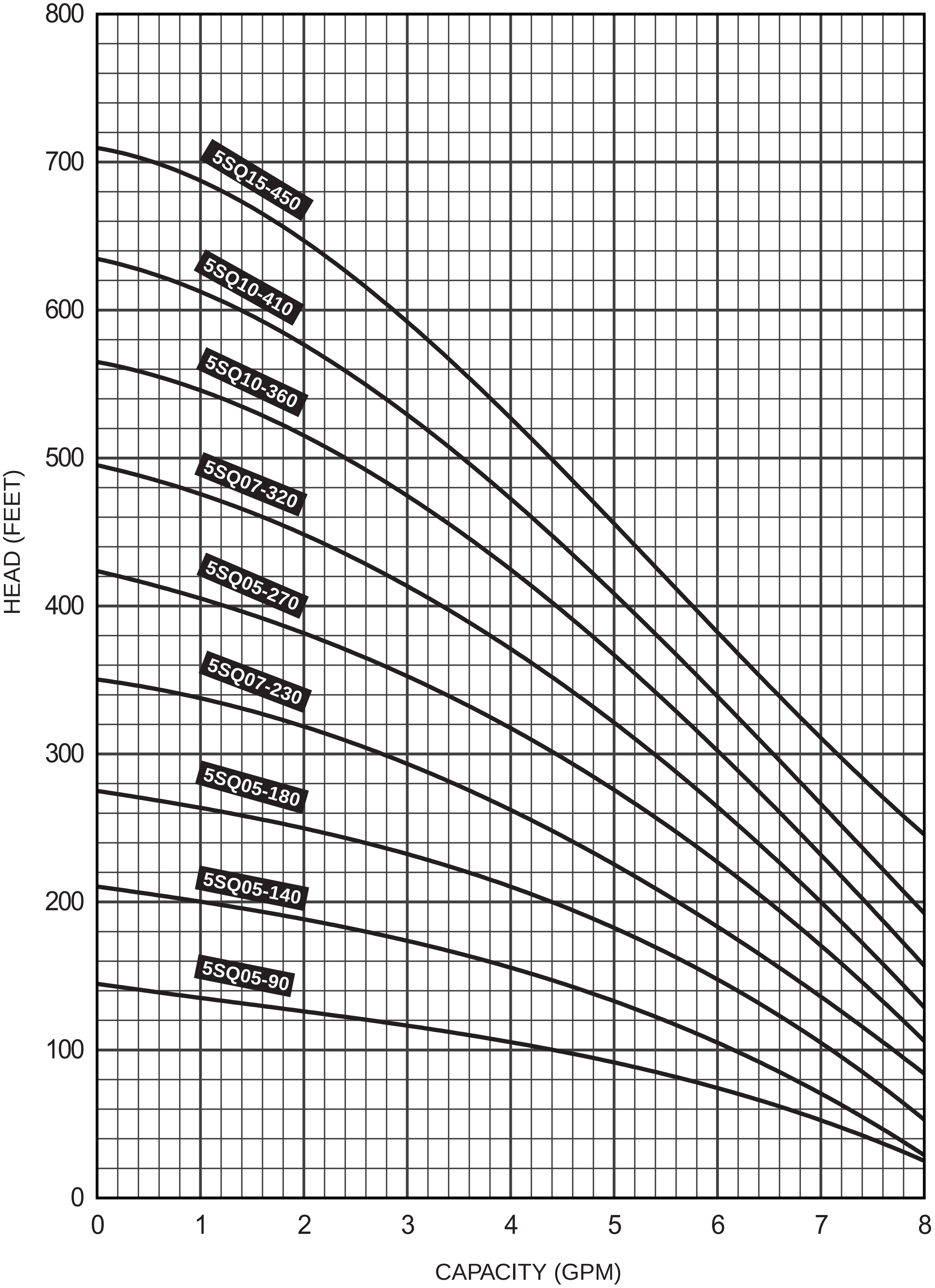


Performance Curves

Materials of Construction

OUTLET SIZE: 1" NPT

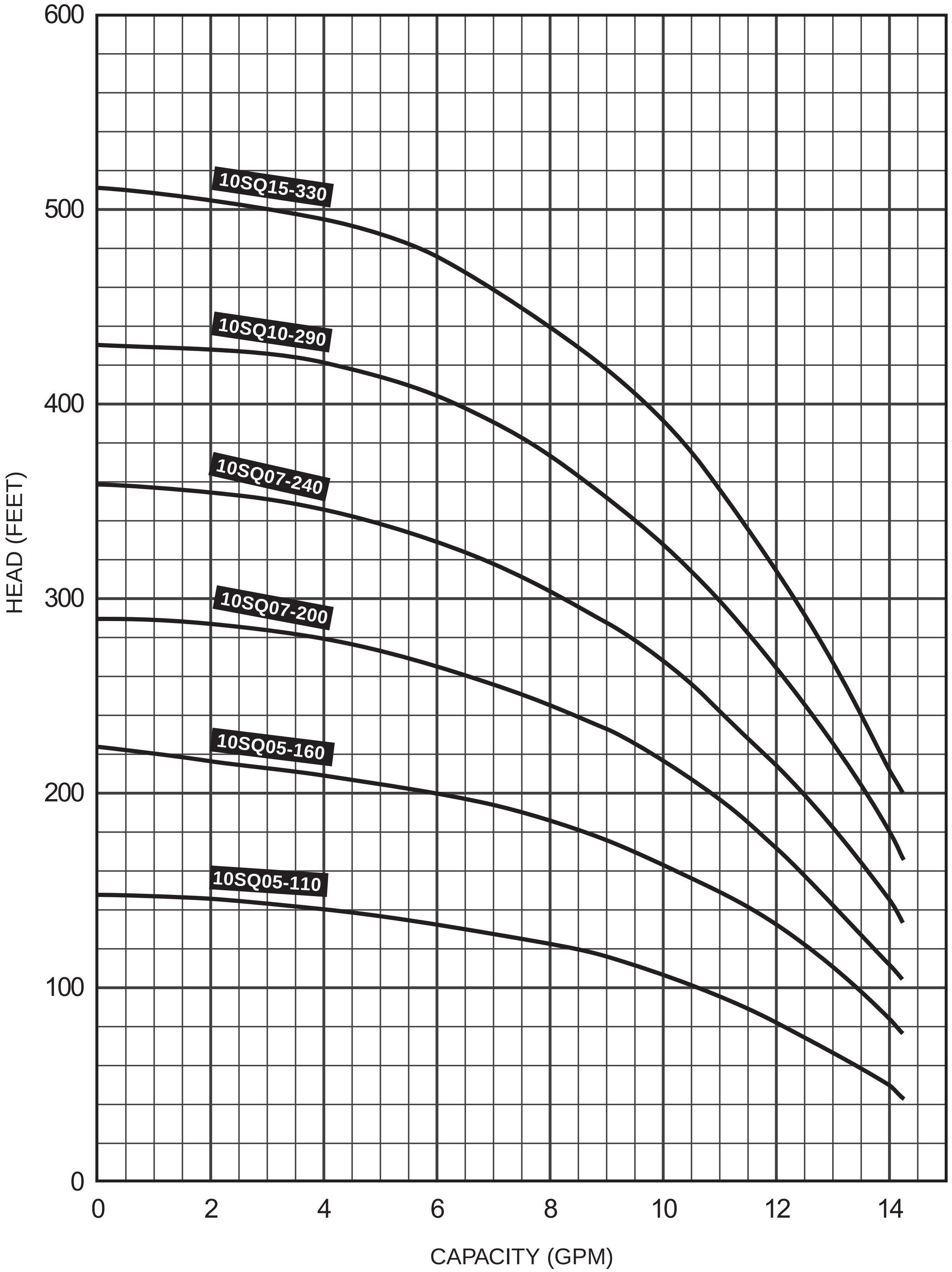
NOMINAL DIA. 3"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

PERFORMANCE CONFORMS TO ISO 9906 ANNEX A

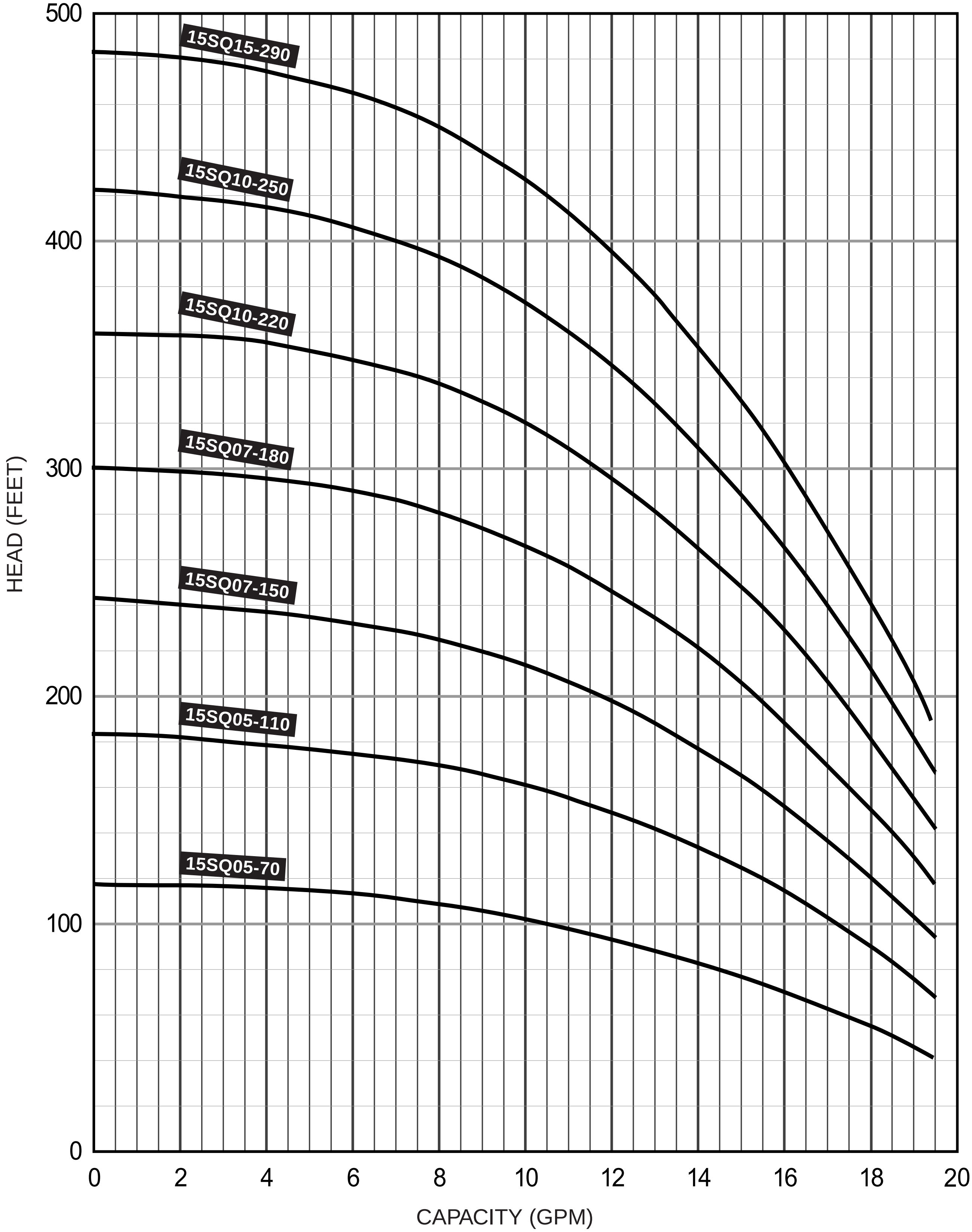
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

PERFORMANCE CONFORMS TO ISO 9906. (E) ANNEX A

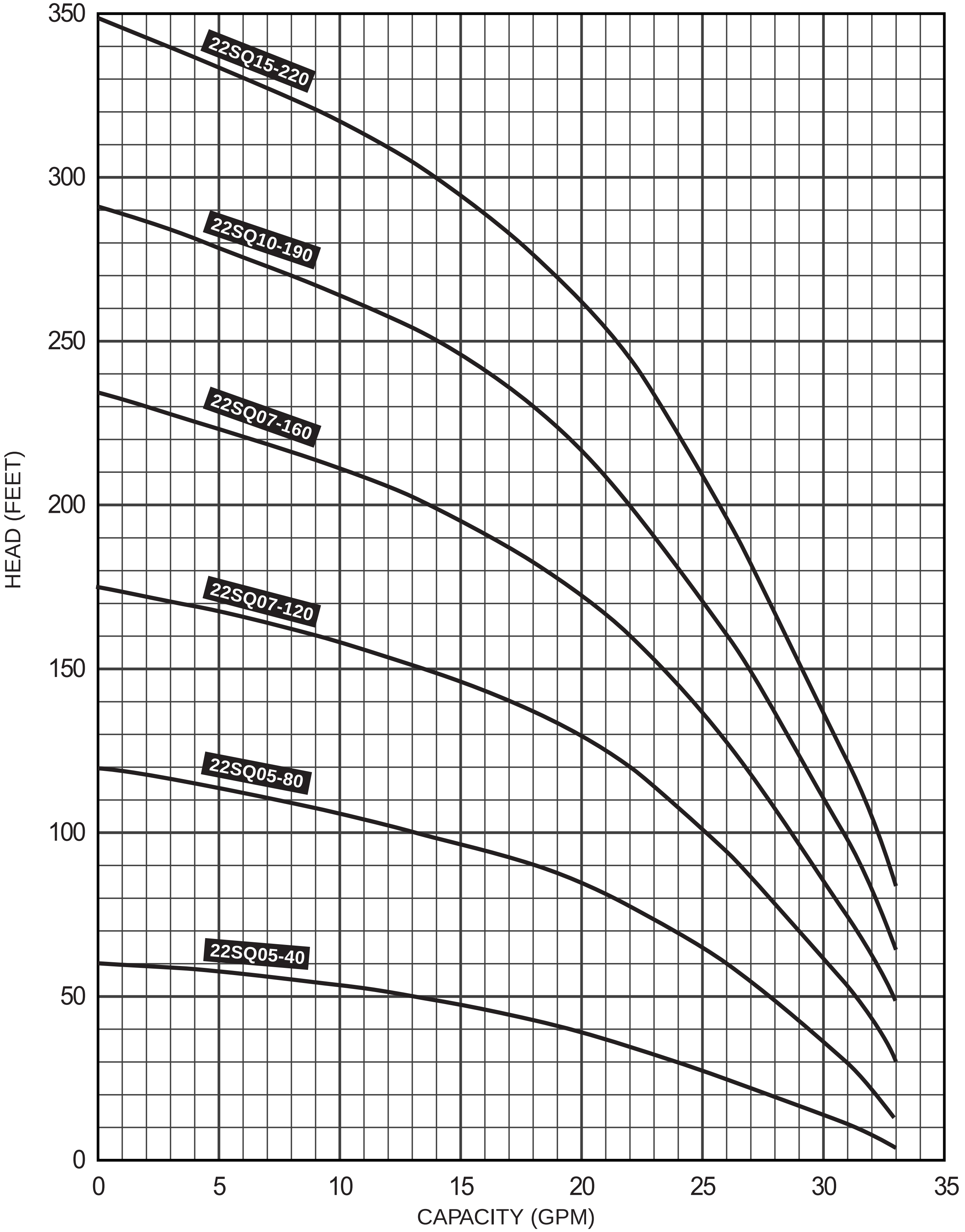
OUTLET SIZE: 1 1/4" NPT **NOMINAL DIA. 3"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

PERFORMANCE CONFORMS TO ISO 9906. (E) ANNEX A

OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**

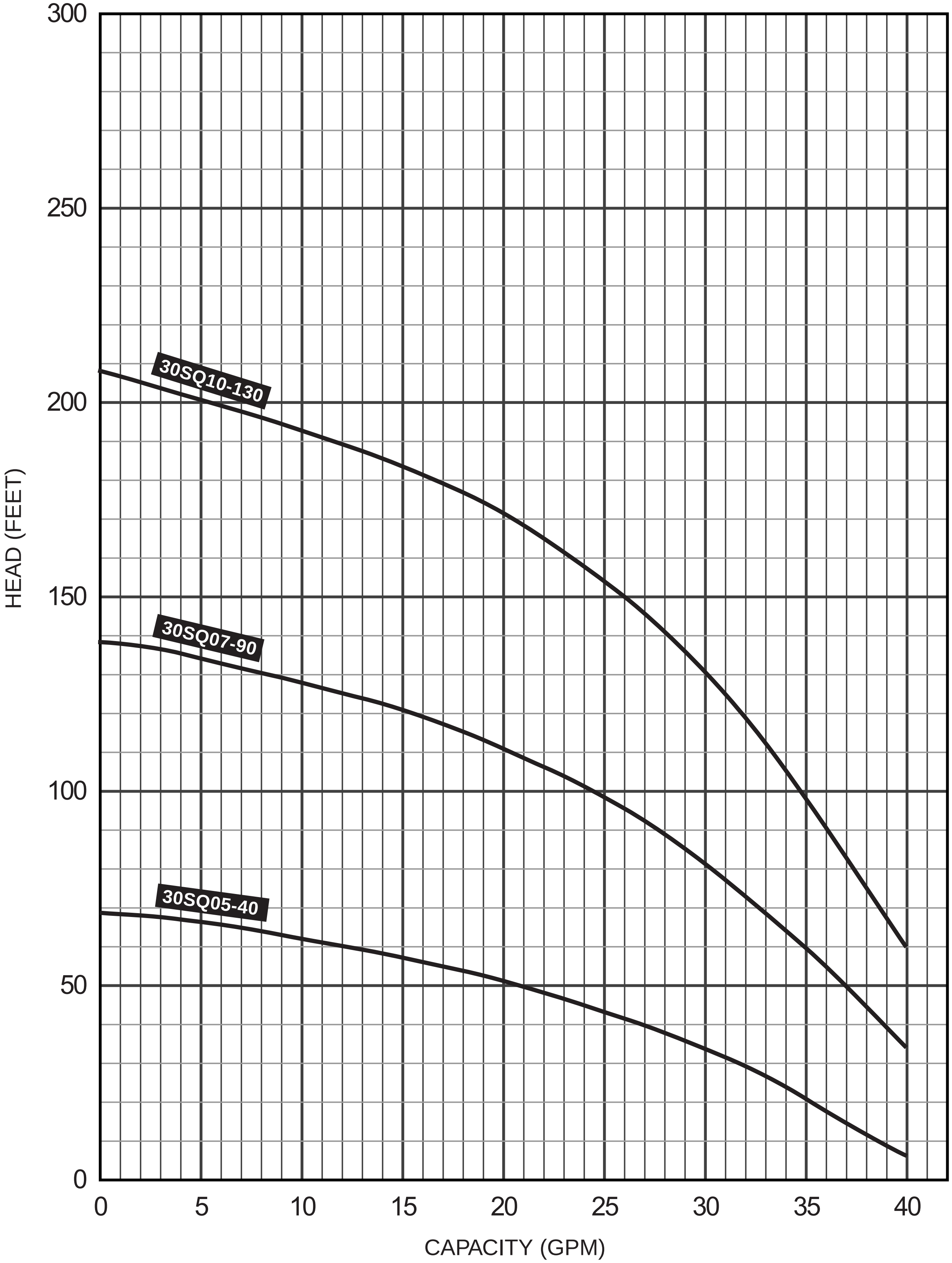


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

PERFORMANCE CONFORMS TO ISO 9906. (E) ANNEX A

PERFORMANCE CURVES 30 GPM MODELS 30 SQ

OUTLET SIZE: 1 1/2" NPT **NOMINAL DIA. 3"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

PERFORMANCE CONFORMS TO ISO 9906. (E) ANNEX A

Dimensions and Weights

MODEL	FIG.	HP	MOTOR SIZE	DISCHARGE SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
5SQ/SQE05-90	A	1/2	3"	1" NPT	30.4	19.8	10.6	2.6	2.9	12
5SQ/SQE05-140	A	1/2	3"	1" NPT	30.4	19.8	10.6	2.6	2.9	12
5SQ/SQE05-180	A	1/2	3"	1" NPT	31.5	19.8	11.6	2.6	2.9	12
5SQ/SQE07-230	A	3/4	3"	1" NPT	33.6	19.8	13.7	2.6	2.9	13
5SQ/SQE07-270	A	3/4	3"	1" NPT	33.6	19.8	13.7	2.6	2.9	13
5SQ/SQE07-320	A	3/4	3"	1" NPT	34.6	19.8	14.8	2.6	2.9	13
5SQ/SQE10-360	A	1	3"	1" NPT	38.2	21.3	16.9	2.6	2.9	16
5SQ/SQE10-410	A	1	3"	1" NPT	38.2	21.3	16.9	2.6	2.9	16
5SQ/SQE15-450	A	1 1/2	3"	1" NPT	39.3	21.3	18.0	2.6	2.9	16
10SQ/SQE05-110	A	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
10SQ/SQE05-160	A	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
10SQ/SQE07-200	A	3/4	3"	1 1/4" NPT	31.5	19.8	11.6	2.6	2.9	13
10SQ/SQE07-240	A	3/4	3"	1 1/4" NPT	33.6	19.8	13.7	2.6	2.9	13
10SQ/SQE10-290	A	1	3"	1 1/4" NPT	35.0	21.3	13.7	2.6	2.9	16
10SQ/SQE15-330	A	1 1/2	3"	1 1/4" NPT	36.14	21.3	14.8	2.6	2.9	16
15SQ/SQE05-70	A	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
15SQ/SQE05-110	A	1/2	3"	1 1/4" NPT	30.4	19.8	10.6	2.6	2.9	12
15SQ/SQE07-150	A	3/4	3"	1 1/4" NPT	31.5	19.8	11.6	2.6	2.9	13
15SQ/SQE07-180	A	3/4	3"	1 1/4" NPT	33.6	19.8	13.7	2.6	2.9	13
15SQ/SQE10-220	A	1	3"	1 1/4" NPT	35.0	21.3	13.7	2.6	2.9	16
15SQ/SQE10-250	A	1	3"	1 1/4" NPT	36.1	21.3	14.8	2.6	2.9	16
15SQ/SQE15-290	A	1 1/2	3"	1 1/4" NPT	38.2	21.3	16.9	2.6	2.9	16
22SQ/SQE05-40	A	1/2	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	12
22SQ/SQE05-80	A	1/2	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	12
22SQ/SQE07-120	A	3/4	3"	1 1/2" NPT	31.5	19.8	11.6	2.6	2.9	13
22SQ/SQE07-160	A	3/4	3"	1 1/2" NPT	33.6	19.8	13.7	2.6	2.9	13
22SQ/SQE10-190	A	1	3"	1 1/2" NPT	38.2	21.3	16.9	2.6	2.9	16
22SQ/SQE15-220	A	1 1/2	3"	1 1/2" NPT	38.2	21.3	16.9	2.6	2.9	16
30SQ/SQE05-40	A	1/2	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	12
30SQ/SQE07-90	A	3/4	3"	1 1/2" NPT	30.4	19.8	10.6	2.6	2.9	13
30SQ/SQE10-130	A	1	3"	1 1/2" NPT	35.0	21.3	13.7	2.6	2.9	13

DISCHARGE SIZES
1" NPT 5SQ/SQE
1 1/4" NPT 10-15SQ/SQE
1 1/2" NPT 22-30 SQ/SQE

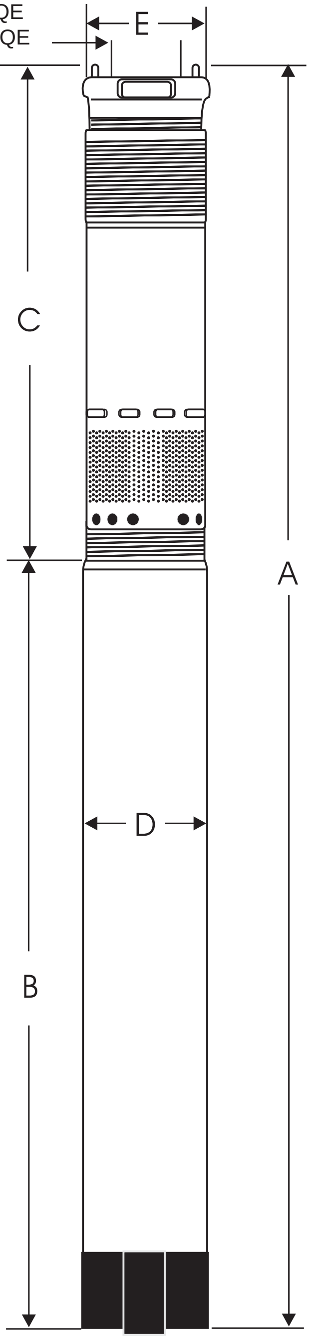


Fig. A

MATERIALS OF CONSTRUCTION

COMPONENT	SPLINED SHAFT
Valve Casing	Polyamide
Discharge Chamber	304 Stainless Steel
Valve Guide	Polyamide
Valve Spring	316LN Stainless Steel
Valve Cone	Polyamide
Valve Seat	NBR Rubber
O-ring	NBR Rubber
Lock Ring	310 Stainless Steel
Top Bearing	NBR Rubber
Top Chamber	Polyamide
Guide Vanes	Polyamide
Impeller	Polyamide w/tungsten carbide bearings
Bottom Chamber	Polyamide
Neck Ring	TPU/PBT
Bearing	Aluminum Oxide
Suction Interconnector	Polyamide
Ring	304 Stainless Steel
Pump Sleeve	304 Stainless Steel
Cone for Pressure Equalization	Polyamide
Spacer	Polyamide
Sand Trap	316 Stainless Steel
Shaft w/Coupling	304 Stainless Steel
Cable Guard	304 Stainless Steel

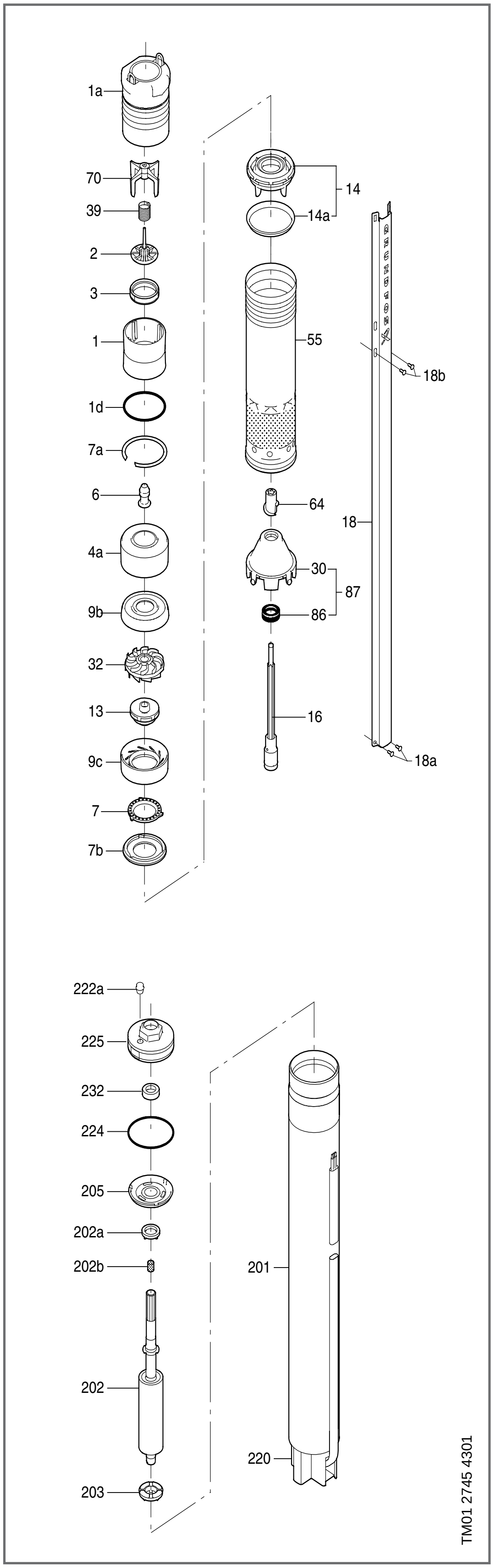
NOTES: Specifications subject to change without notice.

Material specification (Pump)

Pos.	Component	Material	DIN W.-Nr. SQ/SQE	AISI	DIN W.-Nr. SQ-N	AISI
1	Valve casing	Polyamide				
1a	Discharge chamber	Stainless steel	1.4301	304	1.4401	316
1d	O-ring	NBR rubber				
2	Valve cup	Polyamide				
3	Valve seat	NBR rubber				
4a	Empty chamber	Polyamide				
6	Top bearing	NBR rubber				
7	Neck ring	TPU/PBT				
7a	Lock ring	Stainless spring steel	1.4310	310	1.4401	316
7b	Neck ring retainer	Polyamide				
9b	Chamber top	Polyamide				
9c	Chamber bottom	Polyamide				
13	Impeller with tungsten carbide bearing	Polyamide				
14	Suction interconnector	Polyamide				
14a	Ring	Stainless steel	1.4301	304	1.4401	316
16	Shaft with coupling	Stainless steel	1.4301	304	1.4401	316
		Sintered steel				
18	Cable guard	Stainless steel	1.4301	304	1.4401	316
18a 18b	Screws for cable guard	Stainless steel	1.4401	316	1.4401	316
30	Cone for pressure equalisation	Polyamide				
32	Guide vanes	Polyamide				
39	Spring	Stainless spring steel	1.4406	316LN	1.4406	316LN
55	Pump sleeve	Stainless steel	1.4301	304	1.4401	316
64	Priming screw	Polyamide				
70	Valve guide	Polyamide				
86	Lip seal ring	NBR rubber				
87	Cone for pressure equalization complete	Polyamide/ NBR rubber				

Material specification (Motor)

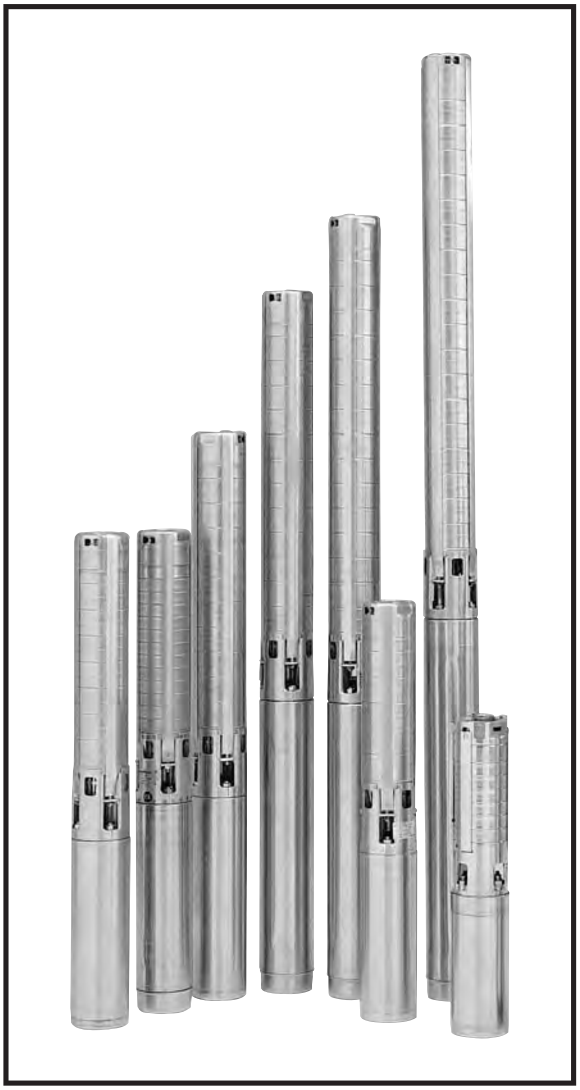
Pos.	Component	Material	DIN W.-Nr. MS 3/ MSE 3	AISI	DIN W.-Nr. MS 3-NE	AISI
201	Stator	Stainless steel	1.4301	304	1.4401	316
202	Rotor	Stainless steel	1.4301	304	1.4401	316
202a	Stop ring	PP				
202b	Filter	Polyester				
203	Thrust bearing	Carbon				
205	Radial bearing	Ceramic/ tungsten carbide				
220	Motor cable with plug	EPR				
222a	Filling plug	MS 3: NBR MSE 3: FKM				
224	O-ring	FKM				
225	Top cover	PPS				
232	Shaft seal	MS 3: NBR MSE 3: FKM				
	Motor liquid	SML-2				

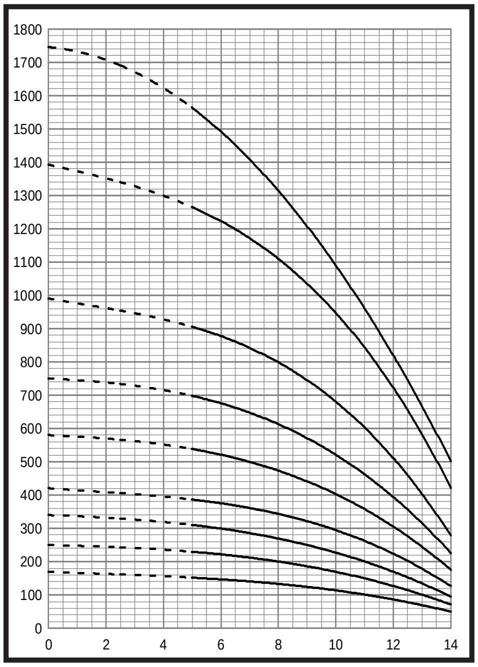


ELECTRIC	
Supply Voltage:	1x200-240V +6%/-10%, 50/60 Hz, PE 1x100-115V +6%/-10%, 50/60 Hz, PE
Operation Via Generator:	As a minimum, the generator output must be equal to the motor P1[kw] + 10%
Starting Current:	The motor starting current is equal to the highest value stated on the motor nameplate
Starting:	Soft Start
Run-up Time:	Maximum: 2-seconds
Motor Protection:	Motor is protected against: Dry running, overvoltage, undervoltage, overload, overtemperature
Power Factor:	PF=1
Motor Cable:	3 Wire, 14AWG XLPE
Motor Liquid:	Type SML 2
pH Values:	SQ and SQE: 5 to 9
Liquid Temperature:	The temperature of the pumped liquid must not exceed 104°F
Note: If liquids with a viscosity higher than that of water are to be pumped, please contact Grundfos	
PIPING CONNECTION	
Discharge Port:	5SQ/SQE - 1” NPT 10-15SQ/SQE - 1-1/4” NPT 22-30SQ/SQE - 1-1/2” NPT
STORAGE CONDITIONS	
Minimum Ambient Temperature:	-4°F
Maximum Ambient Temperature:	+140°F
Frost Protection:	If the pump has to be stored after use, it must be stored at a frost-free location or it must be ensured that the motor liquid is frost proof.
OPERATING CONDITIONS	
Minimum Ambient Fluid Temperature: **Maximum Ambinet Fluid Temperature:**	+ 34°F +140°F
APPROXIMATE DIMENSIONS AND WEIGHT	
Motor Dimensions (MS 3 & MSE 3): 0.50 [Hp] 0.75 [Hp] 1.0 - 1.5 [Hp]	 20.9” length x 2.68 diameter 20.9” length x 2.68 diameter 22.3” length x 2.68 diameter
Motor Weights (MS3 & MSE3) 0.50 [Hp] 0.75 [Hp] 1.0 - 1.5 [Hp]	 6.0 lbs 7.1 lbs 8.2 lbs
Pump End Dimensions: Pump Diameter: Pump Diameter, incl cable guard	 2.68 2.91
Pump End Dimensions (min. and max.): 5SQ/SQE 10SQ/SQE 15SQ/SQE 22SQ/SQE 30SQ/SQE	 10.6” to 18.0” 10.6” to 14.8” 10.6” to 16.9” 10.6” to 13.7” 10.6" to 13.7"
Pump End Weights (min. and max.): All SQ/SQE Models	 2.2 lbs to 3.5 lbs
Well Diameter:	3-inch or larger
Installation Depth (maximum)	500 feet below static water level

Easy Selection Chart
Performance Curves and Technical Data

4-Inch Submersible Pumps





Performance Curves

Materials of Construction

Grundfos Stainless Steel Submersible Pumps

4" Submersible
Easy Selection Charts.

SELECTION CHARTS
(Ratings are in GALLONS PER MINUTE-GPM)

40 GPM
FLOW RANGE
(24 TO 55 GPM)

DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET

PUMP OUTLET
2" NPT

10 GPM
FLOW RANGE
(5 TO 14 GPM)

PUMP OUTLET
1 1/4" NPT

See 10S performance curves for higher head models.
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

5S EASY SELECTION CHART

5 GPM

SELECTION CHARTS

(Ratings are in GALLONS PER MINUTE-GPM)

FLOW RANGE

(1.2 TO 7 GPM)

PUMP OUTLET
1 " NPT

			DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																								
PUMP MODEL	**HP**	**PSI**	**20**	**40**	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**	**340**	**400**	**460**	**520**	**600**	**700**	**800**	**900**	**1000**	**1100**
5S03-9	**1/3**	0				7.1	6.7	6.2	5.8	5.3	4.8	4.3	3.2	2.1													
		20		7.0	6.6	6.1	5.7	5.2	4.6	4.0	2.8	1.6															
		30		6.5	6.0	5.6	5.1	4.6	3.8	2.9	1.5																
		40	6.7	6.0	5.5	5.1	4.4	3.8	2.4																		
		50	6.2	5.5	4.9	4.4	3.4	2.5	1.3																		
		60	5.6	4.9	4.2	3.5	1.9																				
SHUT-OFF PSI:			102	94	85	76	68	59	50	42	33	24	16	7													
5S05-13	**1/2**	0						7.1	6.8	6.4	6.1	5.8	5.5	5.2	4.8	4.5	3.9	2.3									
		20			7.3	7.0	6.7	6.3	6.0	5.7	5.4	5.1	4.7	4.3	3.7	3.1	2.0										
		30		7.2	6.9	6.6	6.3	6.0	5.7	5.4	5.0	4.7	4.2	3.7	2.8	2.0											
		40	7.2	6.9	6.6	6.3	5.9	5.6	5.3	5.0	4.6	4.2	3.5	2.8	1.6												
		50	6.8	6.5	6.2	5.9	5.6	5.3	4.9	4.6	4.0	3.5	2.6	1.6													
		60	6.5	6.2	5.8	5.5	5.2	4.9	4.5	4.0	3.3	2.6	1.3														
SHUT-OFF PSI:			152	143	134	126	117	108	100	91	82	74	65	56	48	39	30	13									
5S07-18	**3/4**	0								7.1	6.9	6.7	6.4	6.2	6.0	5.8	5.6	5.1	4.2	2.7							
		20						7.1	6.8	6.6	6.4	6.2	5.9	5.7	5.5	5.3	5.0	4.5	3.2								
		30					7.0	6.8	6.6	6.3	6.1	5.9	5.7	5.5	5.2	5.0	4.7	4.0	2.5								
		40			7.2	7.0	6.8	6.5	6.3	6.1	5.9	5.6	5.4	5.2	4.9	4.7	4.4	3.5	1.5								
		50		7.2	7.0	6.7	6.5	6.3	6.1	5.8	5.6	5.4	5.1	4.9	4.6	4.3	3.9	2.9									
		60	7.1	6.9	6.7	6.5	6.2	6.0	5.8	5.6	5.3	5.1	4.9	4.6	4.3	3.9	3.4	2.1									
SHUT-OFF PSI:			213	204	195	187	178	169	161	152	143	135	126	117	109	100	91	74	48	22							
5S10-22	**1**	0										7.1	6.9	6.7	6.6	6.4	6.2	5.8	5.3	4.7	3.8	1.7					
		20								7.1	6.9	6.7	6.5	6.3	6.1	6.0	5.8	5.4	4.8	4.0	2.8						
		30							7.0	6.8	6.7	6.5	6.3	6.1	5.9	5.7	5.6	5.2	4.6	3.6	2.1						
		40						7.0	6.8	6.6	6.5	6.3	6.1	5.9	5.7	5.5	5.4	5.0	4.3	3.1	1.3						
		50				7.2	7.0	6.8	6.6	6.4	6.2	6.1	5.9	5.7	5.5	5.3	5.1	4.7	3.9	2.5							
		60			7.1	6.9	6.8	6.6	6.4	6.2	6.0	6.0	5.7	5.5	5.3	5.1	4.9	4.4	3.5	1.7							
SHUT-OFF PSI:					245	237	228	219	211	202	194	185	176	168	159	150	142	124	98	72	46	12					
5S15-26	**1 1/2**	0												7.1	7.0	6.8	6.7	6.4	5.9	5.4	4.9	4.1	2.1				
		20										7.1	6.9	6.8	6.6	6.5	6.3	6.0	5.5	5.1	4.5	3.4					
		30									7.1	6.9	6.7	6.6	6.4	6.3	6.1	5.8	5.4	4.8	4.2	2.9					
		40								7.0	6.9	6.7	6.6	6.4	6.3	6.1	6.0	5.6	5.2	4.6	5.6	2.4					
		50							7.0	6.9	6.7	6.5	6.4	6.2	6.1	5.9	5.8	5.5	5.0	4.4	3.6	1.7					
		60						7.0	6.8	6.7	6.5	6.4	6.2	6.1	5.9	5.8	5.6	5.3	4.8	4.1	3.1						
SHUT-OFF PSI:								269	260	252	243	234	226	217	208	200	191	174	148	122	96	61	18				
5S15-31	**1 1/2**	0														7.1	7.0	6.7	6.3	5.9	5.5	6.7	4.1	2.6			
		20												7.1	6.9	6.8	6.7	6.4	6.0	5.6	5.2	4.6	3.5	1.6			
		30											7.0	6.9	6.8	6.6	6.5	6.2	5.9	5.5	5.1	4.4	3.2	0.9			
		40										7.0	6.9	6.8	6.6	6.5	6.4	6.1	5.7	5.3	4.9	4.2	2.8				
		50								7.1	7.0	6.9	6.7	6.6	6.5	6.3	6.2	6.0	5.6	5.2	4.7	4.0	2.3				
		60							7.1	7.0	6.8	6.7	6.6	6.5	6.3	6.2	6.1	5.8	5.4	5.0	4.5	3.7	1.7				
SHUT-OFF PSI:									320	311	303	294	285	277	268	259	251	233	207	181	155	121	77	34			

See 5S performance curves for higher head models.
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

7S EASY SELECTION CHART

7 GPM

SELECTION CHARTS

FLOW RANGE

PUMP OUTLET
1 " NPT

(Ratings are in GALLONS PER MINUTE-GPM)

(3 TO 10 GPM)

DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																											
PUMP MODEL	**HP**	**PSI**	**20**	**40**	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**	**340**	**400**	**460**	**520**	**600**	**700**	**800**	**900**	**1000**	**1100**
7S03-8	**1/3**	20	10.0	9.5	8.7	8.0	7.2	6.4	5.0	3.7	1.8																
		30	9.3	8.7	7.9	7.1	6.1	5.1	2.6																		
		40	8.5	7.8	7.0	6.1	4.5	2.9	1.5																		
		50	7.6	6.9	5.8	4.7	2.3																				
		60	6.7	5.8	3.9	2.0																					
SHUT-OFF PSI:			86	77	69	60	52	43	34	26	17	8															
7S05-11	**1/2**	0					9.9	9.5	8.9	8.4	7.8	7.3	6.7	6.0	5.0	4.0											
		20			9.8	9.3	8.8	8.2	7.7	7.1	6.5	5.8	4.7	3.5	1.8												
		30	10.1	9.7	9.2	8.7	8.1	7.6	7.0	6.4	5.6	4.7	2.9														
		40	9.6	9.2	8.6	8.1	7.5	6.9	6.2	5.6	4.3	3.0	1.5														
		50	9.1	8.5	8.0	7.4	6.8	6.2	5.3	4.3	2.2																
		60	8.4	7.9	7.3	6.8	6.0	5.3	3.8	2.3																	
SHUT-OFF PSI:			122	113	105	96	87	79	70	61	53	44	35	27	18	10											
7S07-15	**3/4**	0						10.2	9.9	9.5	9.2	8.8	8.4	8.0	7.6	7.1	6.7	5.6	2.9								
		20				10.1	9.8	9.4	9.0	8.6	8.2	7.8	7.4	7.0	6.5	6.1	5.4	3.6									
		30			10.0	9.7	9.4	9.0	8.6	8.2	7.8	7.4	6.9	6.5	5.9	5.4	4.5	1.8									
		40		10.0	9.7	9.3	8.9	8.5	8.1	7.7	7.3	6.9	6.4	5.9	5.2	4.5	3.2	1.0									
		50	9.9	9.6	9.2	8.9	8.5	8.1	7.6	7.2	6.8	6.4	5.8	5.2	4.2	3.2	1.6										
		60	9.5	9.2	8.8	8.4	8.0	7.6	7.2	6.7	6.2	5.7	4.9	4.2	2.8	1.4											
SHUT-OFF PSI:			170	101	153	144	135	127	118	110	101	92	84	75	66	58	49	32	6								
7S10-19	**1**	0								10.1	9.8	9.6	9.3	9.0	8.7	8.4	8.0	7.4	6.4	4.8							
		20						10.0	9.8	9.5	9.2	8.9	8.6	8.3	7.9	7.6	7.3	6.6	5.3	2.8							
		30					10.0	9.7	9.5	9.2	8.9	8.5	8.2	7.9	7.6	7.3	6.9	6.2	4.6	1.4							
		40				10.0	9.7	9.4	9.1	8.8	8.5	8.2	7.8	7.5	7.2	6.9	6.5	5.6	3.7								
		50		10.2	9.9	9.7	9.4	9.1	8.8	8.4	8.1	7.8	7.5	7.2	6.8	6.5	6.0	5.0	2.4								
		60	10.1	9.9	9.6	9.3	9.0	8.7	8.4	8.1	7.8	7.4	7.1	6.8	6.4	6.0	5.5	4.2									
SHUT-OFF PSI:			218	209	200	192	183	174	166	157	148	140	131	123	114	105	97	79	53	27							
7S15-26	**1 1/2**	0											10.1	9.9	9.7	9.5	9.3	8.8	8.1	7.4	6.7	5.5					
		20									10.0	9.8	9.6	9.4	9.2	9.0	8.8	8.3	7.6	6.9	6.1	4.4					
		30								10.0	9.8	9.6	9.4	9.2	9.0	8.7	8.5	8.0	7.3	6.6	5.7	3.7					
		40						10.1	10.0	9.8	9.6	9.4	9.1	8.9	8.7	8.5	8.2	7.8	7.1	6.3	5.2	2.9					
		50					10.1	9.9	9.7	9.6	9.3	9.1	8.9	8.7	8.4	8.2	8.0	7.5	6.8	5.9	4.7	1.9					
		60				10.1	9.9	9.7	9.5	9.3	9.1	8.9	8.6	8.4	8.2	7.9	7.7	7.2	6.5	5.5	4.1						
SHUT-OFF PSI:						274	265	257	248	239	231	222	213	205	196	187	179	161	135	110	84	49					
7S20-32	**2**	0	0										10.6	10.5	10.4	10.4	10.3	10.1	9.6	9.1	8.4	7.3	5.7				
		20	46.2								10.5	10.5	10.4	10.3	10.3	10.2	10.0	9.8	9.2	8.6	7.8	6.6	4.8				
		30	69.3							10.5	10.5	10.4	10.3	10.2	10.1	10.0	9.9	9.6	9.0	8.3	7.5	6.2	4.3				
		40	92.4						10.5	10.5	10.4	10.3	10.2	10.1	10.0	9.9	9.7	9.4	8.8	8.0	7.2	5.8	3.9				
		50	116						10.5	10.4	10.3	10.2	10.1	10.0	9.8	9.7	9.5	9.1	8.5	7.7	6.8	5.4	3.3				
		60	139					10.5	10.4	10.3	10.2	10.1	10.0	9.8	9.7	9.5	9.3	8.9	8.2	7.4	6.4	5.0					
SHUT-OFF PSI:							343	334	326	317	308	300	291	282	274	265	256	239	213	187	161	126	83				

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

10 GPM

SELECTION CHARTS

(Ratings are in GALLONS PER MINUTE-GPM)

FLOW RANGE

(5 TO 14 GPM)

PUMP OUTLET
1 1/4" NPT

			DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																								
PUMP MODEL	**HP**	**PSI**	**20**	**40**	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**	**340**	**400**	**460**	**520**	**600**	**700**	**800**	**900**	**1000**	**1100**
10S03-6	**1/3**	20	14.0	13.2	12.4	10.6	8.9	5.3																			
		30	13.2	11.8	10.4	8.4																					
		40	11.9	10.1	8.3																						
		50	9.8	7.5																							
		60	7.7	3.9																							
SHUT-OFF PSI:			64	55	47	38	29	21	12	3																	
10S05-9	**1/2**	0				14.1	13.4	12.4	11.4	10.4	9.5	8.3	6.6	3.5													
		20		13.9	13.1	12.1	11.1	10.1	9.2	7.9	5.8	2.0															
		30	13.8	13.0	12.0	11.0	10.0	9.0	7.6	5.3	1.2																
		40	12.8	11.8	10.8	9.8	8.8	7.3	4.8																		
		50	11.7	10.7	9.7	8.6	7.0	4.3																			
		60	10.5	9.5	8.4	6.7	3.7																				
SHUT-OFF PSI:			100	92	83	74	66	57	48	40	31	23	14	5													
10S07-12	**3/4**	0					14.3	13.8	13.2	12.5	11.7	11.0	10.2	9.5	8.7	7.6	6.0										
		20			14.2	13.6	12.9	12.2	11.5	10.7	10.0	9.3	8.4	7.2	5.4	2.6											
		30		14.1	13.5	12.9	12.1	11.4	10.6	9.9	9.2	8.2	7.0	5.0	2.0												
		40	14.0	13.4	12.8	12.0	11.3	10.5	9.8	9.0	8.1	6.7	4.7	1.4													
		50	13.3	12.6	11.9	11.1	10.4	9.7	8.9	7.9	6.5	4.2															
		60	12.5	11.8	11.0	10.3	9.6	8.8	7.7	6.2	3.8																
SHUT-OFF PSI:			137	129	120	111	103	94	85	77	68	59	51	42	33	25	16										
10S10-15	**1**	0							14.1	13.6	13.1	12.5	11.9	11.3	10.7	10.1	9.6	8.2	3.8								
		20					13.9	13.5	12.9	12.3	11.7	11.1	10.5	10.0	9.4	8.7	7.9	5.2									
		30				13.9	13.4	12.8	12.2	11.6	11.0	10.5	9.9	9.3	8.6	7.7	6.6	2.6									
		40		14.2	13.8	13.3	12.7	12.1	11.5	10.9	10.4	9.8	9.2	8.5	7.6	6.3	4.6										
		50	14.1	13.7	13.2	12.6	12.1	11.4	10.9	10.3	9.7	9.1	8.3	7.4	6.1	4.3	1.7										
		60	13.6	13.1	12.6	12.0	11.4	10.8	10.2	9.6	9.0	8.2	7.2	5.9	3.9												
SHUT-OFF PSI:			174	165	157	148	139	131	122	113	105	96	87	79	70	61	53	35	10								
10S15-21	**1 1/2**	0									14.2	13.9	13.6	13.3	12.9	12.5	12.0	11.2	9.9	8.5	6.3						
		20							14.1	13.9	13.5	13.1	12.7	12.3	11.9	11.5	11.0	10.2	8.9	6.9	2.9						
		30						14.1	13.8	13.5	13.1	12.7	12.3	11.8	11.4	11.0	10.5	9.7	8.3	5.7							
		40					14.1	13.8	13.4	13.0	12.6	12.2	11.8	11.3	10.9	10.5	10.1	9.2	7.5	4.1							
		50				14.0	13.7	13.3	13.0	12.5	12.1	11.7	11.3	10.8	10.4	10.0	9.6	8.7	6.5	2.0							
		60		14.2	14.0	13.6	13.3	12.9	12.5	12.1	11.6	11.2	10.8	10.4	9.9	9.5	9.1	8.0	5.1								
SHUT-OFF PSI:				237	229	220	211	203	194	185	177	168	159	151	142	133	125	107	81	55	29						
10S20-27	**2**	0												14.1	13.9	13.7	13.4	12.8	11.8	10.8	9.8	8.3	4.7				
		20										14.1	13.8	13.6	13.3	13.0	12.7	12.0	11.0	10.0	9.0	7.1	1.5				
		30									14.0	13.8	13.5	13.3	12.9	12.6	12.3	11.6	10.6	9.7	8.6	6.2					
		40							14.2	14.0	13.8	13.5	13.2	12.9	12.6	12.2	11.9	11.2	10.3	9.3	8.1	5.2					
		50						14.2	14.0	13.7	13.5	13.2	12.8	12.5	12.2	11.9	11.5	10.9	9.9	8.9	7.4	3.8					
		60					14.1	13.9	13.7	13.4	13.1	12.8	12.5	12.1	11.8	11.5	11.1	10.5	9.5	8.4	6.6	2.1					
SHUT-OFF PSI:							285	276	268	259	250	242	233	224	216	207	198	181	155	129	103	68	25				
10S30-34	**3**	0																13.8	13.2	12.5	11.9	10.9	9.6	7.9	4.8		
		20														13.9	13.7	13.3	12.7	12.0	11.3	10.3	8.9	6.7	2.7		
		30													13.9	13.7	13.5	13.1	12.4	11.7	11.0	10.0	8.5	6.0	1.3		
		40											14.0	13.8	13.7	13.5	13.3	12.8	12.2	11.5	10.8	9.7	8.0	5.1			
		50										14.0	13.8	13.6	13.4	13.2	13.0	12.6	11.9	11.2	10.5	9.4	7.5	4.2			
		60										13.8	13.6	13.4	13.2	13.0	12.8	12.3	11.6	10.9	10.2	9.0	6.9	3.1			
SHUT-OFF PSI:												332	324	315	306	298	289	272	246	220	194	159	116	73	29		

See 10S performance curves for higher head models.
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

16S EASY SELECTION CHART

16 GPM

SELECTION CHARTS

(Ratings are in GALLONS PER MINUTE-GPM)

FLOW RANGE

(10 TO 20 GPM)

PUMP OUTLET
1 1/4 " NPT

PUMP MODEL	HP	PSI	DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																								
			20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
16S05-5	**1/2**	20	20.3	18.2	14.1	10.0	5.0																				
		30	17.3	14.4	8.0	1.6																					
		40	12.7	8.0	4.0																						
		50	6.5																								
		60	2.9																								
SHUT-OFF PSI:			58	49	40	32	23	14																			
16S07-8	**3/4**	0					20.5	19.2	17.5	15.8	12.8	9.8	5.2														
		20			20.1	18.8	16.9	15.2	11.8	8.5	4.3																
		30	21.2	19.9	18.4	16.9	14.3	11.8	7.5	3.2	1.6																
		40	19.7	18.3	16.3	14.3	10.8	7.2	3.6																		
		50	17.9	16.3	13.5	10.7	6.2	1.7																			
		60	15.7	13.5	9.6	5.8	2.9																				
SHUT-OFF PSI:			97	88	80	71	62	54	45	36	28	19	10														
16S10-10	**1**	0						20.8	19.8	18.8	17.3	15.9	13.7	11.4	8.0	4.7											
		20				20.5	19.4	18.3	16.8	15.3	12.9	10.5	7.0	3.5	1.8												
		30			20.3	19.3	18.1	16.8	14.8	12.8	9.8	6.7	3.3														
		40		20.2	19.1	18.0	16.4	14.8	12.2	9.6	5.9	2.3															
		50	20.0	19.0	17.7	16.3	14.2	12.0	8.8	5.6	2.8																
		60	18.8	17.6	15.8	14.1	11.3	8.6	4.8																		
SHUT-OFF PSI:			123	115	106	97	89	80	71	63	54	45	37	28	19	11											
16S15-14	**1 1/2**	0								21.0	20.3	19.6	18.8	18.0	16.9	15.8	14.3	10.7	3.3								
		20							20.1	19.3	18.5	17.7	16.6	15.4	13.8	12.2	10.0	5.1									
		30					20.7	20.0	19.2	18.4	17.4	16.5	15.1	13.7	11.8	9.8	7.3	2.4									
		40				20.6	19.8	19.1	18.3	17.4	16.0	15.0	13.3	11.6	9.3	7.0	4.3										
		50			20.4	19.8	18.9	18.2	17.2	16.1	14.7	13.2	11.2	9.1	6.5	3.9	2.0										
		60		20.3	19.6	18.8	18.0	17.1	15.8	14.5	12.8	11.0	8.6	6.3	3.4												
SHUT-OFF PSI:				167	158	149	141	132	123	115	106	97	89	80	71	63	54	37	28								
16S20-18	**2**	0										21.2	20.6	20.0	19.5	18.9	18.2	16.7	13.5	8.8	2.7						
		20									20.4	19.8	19.3	18.7	18.0	17.3	16.4	14.3	10.0	4.2							
		30								20.3	19.8	19.2	18.6	17.9	17.2	16.3	15.3	12.8	7.9	1.9							
		40							20.3	19.7	19.1	18.5	17.8	17.1	16.1	15.2	13.9	11.1	5.7								
		50						20.2	19.6	19.0	18.3	17.7	16.8	16.0	14.9	13.8	12.3	9.2	3.2								
		60					20.1	19.5	18.9	18.3	17.5	16.8	15.8	14.8	13.5	12.3	10.6	7.0									
SHUT-OFF PSI:							194	186	177	168	160	151	142	134	125	116	108	90	65	39	13						
16S30-24	**3**	0																19.6	18.3	16.5	14.2	9.8	2.1				
		20													20.3	19.9	19.5	18.6	17.0	14.8	11.8	6.5					
		30												20.3	19.8	19.4	19.0	18.0	16.3	13.7	10.4	4.7					
		40											20.2	19.8	19.3	18.9	18.4	17.3	15.3	12.5	8.9	2.8					
		50										20.2	19.8	19.3	18.8	18.3	17.8	16.7	14.3	11.3	7.3						
		60									20.1	19.7	19.2	18.8	18.3	17.8	17.2	15.8	13.3	9.8	5.5						
SHUT-OFF PSI:											239	230	221	213	204	195	187	169	143	117	91	57	13				
16S50-38	**5**	0																			21.5	20.4	18.7	16.5	13.4	8.9	2.1
		20																			20.9	19.6	17.7	15.2	11.5	6.1	
		30																		21.4	20.5	19.2	17.2	14.5	10.5	4.5	
		40																		21.1	20.2	18.8	16.7	13.7	9.3	2.7	
		50																	21.6	20.7	19.8	18.4	16.1	12.8	8.0	0.8	
		60																	21.3	20.4	19.4	17.9	15.4	11.9	6.6		
SHUT-OFF PSI:																			314	288	262	227	184	141	98	54	11

See 16S performance curves for higher head models.
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

25 GPM

SELECTION CHARTS

(Ratings are in GALLONS PER MINUTE-GPM)

FLOW RANGE

(18 TO 32 GPM)

PUMP OUTLET

1 1/2" NPT

			DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																								
PUMP MODEL	**HP**	**PSI**	**20**	**40**	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**	**340**	**400**	**460**	**520**	**600**	**700**	**800**	**900**	**1000**	**1100**
25S05-3	**1/2**	20	18.6	6.5	3.3																						
		30	10.5																								
		40																									
		50																									
		60																									
SHUT-OFF PSI:			31	22	13	5																					
25S07-5	**3/4**	0			34.5	29.8	23.9	18.1																			
		20	32.9	28.6	21.8	15.1	7.5																				
		30	27.1	22.5	12.3	2.0																					
		40	19.5	11.8	5.8																						
		50	10.1																								
		60	4.1																								
SHUT-OFF PSI:			57	48	39	31	22	13																			
25S10-7	**1**	0					31.3	28.5	24.3	20.2	12.7	5.1															
		20		33.2	30.3	27.6	22.9	18.3	10.4	2.5	1.3																
		30	33.0	29.9	26.5	23.1	13.0	9.6	4.8																		
		40	29.4	26.6	21.3	16.2	8.2																				
		50	25.3	21.5	14.3	7.0	3.5																				
		60	19.7	13.9	7.0																						
SHUT-OFF PSI:			83	74	65	57	48	39	31	22	13	5															
25S15-9	**1 1/2**	0						32.2	30.0	27.9	24.8	21.6	16.3	10.8													
		20				31.5	29.3	27.2	23.7	20.3	14.5	8.8	4.4														
		30			31.3	29.1	26.4	23.7	18.9	14.2	7.8	1.5															
		40		30.8	28.6	26.3	22.6	18.8	12.8	6.8	3.4																
		50	30.6	28.4	25.5	22.5	17.4	12.3	6.2																		
		60	27.8	25.5	21.3	17.2	11.0	4.8	2.4																		
SHUT-OFF PSI:			109	100	91	83	74	65	57	48	39	31	22	13													
25S20-11	**2**	0						33.1	31.1	29.3	27.6	25.1	22.5	18.5	14.5	9.3											
		20					32.5	30.6	28.8	27.0	24.3	21.5	17.3	13.0	7.8	2.5											
		30				32.0	30.3	28.7	26.4	24.2	20.6	16.9	12.0	7.0	3.5												
		40			31.8	30.1	28.2	26.3	23.3	20.4	15.9	11.4	6.3														
		50		31.5	29.8	28.1	25.7	23.3	19.4	15.6	10.4	5.3	2.7														
		60	31.3	29.6	27.6	25.6	22.4	19.3	14.5	9.8	4.9																
SHUT-OFF PSI:			135	126	118	109	100	92	83	74	66	57	48	40	31	23											
25S30-15	**3**	0										32.3	31.0	29.8	28.4	27.1	25.2	20.7									
		20								31.8	30.6	29.3	28.0	26.6	24.6	22.7	19.8	13.5									
		30						33.0	31.7	30.4	29.2	27.8	26.2	24.5	22.1	19.7	16.4	9.3									
		40					32.8	31.5	30.3	29.0	27.5	26.0	24.0	21.9	19.0	16.1	12.4	4.9									
		50				32.6	31.3	30.0	28.7	27.4	25.7	23.8	21.3	18.8	15.3	12.0	8.2	2.2									
		60			32.4	31.1	29.8	28.6	27.0	25.5	23.3	21.2	18.1	15.0	11.3	7.6	3.8										
SHUT-OFF PSI:					170	161	152	144	135	126	118	109	100	92	83	74	66	48									
25S50-26	**5**	0																32.5	30.3	28.0	25.3	19.9	10.2				
		20															32.3	30.8	28.6	25.9	22.5	15.8	5.0				
		30														32.1	31.3	29.9	27.7	24.7	20.8	13.5	2.5				
		40													32.0	31.3	30.5	29.1	26.7	23.3	18.9	11.0					
		50											32.7	31.8	31.2	30.4	29.7	28.2	25.5	21.8	16.8	8.5					
		60										32.5	31.8	31.0	30.3	29.6	28.8	27.3	24.3	20.0	14.6	5.8					
SHUT-OFF PSI:												253	245	236	227	219	210	193	167	141	115	80	37				

See 25S performance curves for higher head models.
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

40S EASY SELECTION CHART

40 GPM

SELECTION CHARTS

(Ratings are in GALLONS PER MINUTE-GPM)

FLOW RANGE

(24 TO 55 GPM)

PUMP OUTLET
2 " NPT

DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																												
PUMP MODEL	HP	PSI		20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
40S10-3	1	20	46.2	33.0																								
		30	69.3																									
		40	92.4																									
		50	116																									
		60	139																									
SHUT-OFF PSI:			0	28	19	11	2																					
40S15-5	1 1/2	0	0				52.0	41.0	24.0																			
		20	46.2	57.0	50.0	37.0	18.0																					
		30	69.3	48.0	34.0	15.0																						
		40	92.4	31.0	11.0																							
		50	116	7.0																								
		60	139																									
SHUT-OFF PSI:			0	52	44	35	26	18	9																			
40S20-7	2	0	0					54.0	49.0	40.0	29.0	15.0																
		20	46.2			53.0	46.0	37.0	25.0	10.0																		
		30	69.3		52.0	45.0	35.0	23.0	8.0																			
		40	92.4	51.0	44.0	33.0	21.0	5.0																				
		50	116	42.0	32.0	18.0	2.0																					
		60	139	30.0	16.0																							
SHUT-OFF PSI:			0	77	68	59	51	42	33	25	16	7																
40S30-9	3	0	0							53.0	47.0	41.0	32.0	22.0														
		20	46.2					51.0	45.0	38.0	29.0	19.0																
		30	69.3				50.0	44.0	37.0	28.0	17.0																	
		40	92.4		54.0	50.0	43.0	35.0	26.0	15.0																		
		50	116	54.0	49.0	42.0	34.0	24.0	13.0																			
		60	139	48.0	41.0	33.0	23.0	11.0																				
SHUT-OFF PSI:			0	102	94	85	76	68	59	50	42	33	24	16	7													
40S50-12	5	0	0									53.0	49.0	44.0	39.0	32.0	25.0	16.0										
		20	46.2							52.0	48.0	43.0	37.0	30.0	22.0	13.0												
		30	69.3						51.0	47.0	42.0	36.0	29.0	21.0	12.0													
		40	92.4					51.0	46.0	41.0	35.0	28.0	20.0	11.0														
		50	116			54.0	50.0	45.0	40.0	34.0	26.0	18.0	9.0															
		60	139		53.0	49.0	45.0	39.0	33.0	25.0	17.0	8.0																
SHUT-OFF PSI:			0		130	122	113	104	96	87	78	70	61	52	44	35	26	18										
40S50-15	5	0	0											52.0	49.0	46.0	42.0	37.0	26.0									
		20	46.2									51.0	48.0	45.0	40.0	35.0	30.0	24.0										
		30	69.3								51.0	48.0	44.0	40.0	35.0	29.0	23.0	16.0										
		40	92.4							51.0	47.0	43.0	39.0	34.0	28.0	21.0	14.0											
		50	116						50.0	47.0	43.0	38.0	33.0	27.0	20.0	13.0												
		60	139					50.0	46.0	42.0	37.0	32.0	26.0	19.0	12.0													
SHUT-OFF PSI:			0					141	132	124	115	107	98	89	81	72	63	55	37	11								
40S75-21	7 1/2	0	0																49.0	41.0	29.0	15.0						
		20	46.2													53.0	51.0	48.0	43.0	32.0	19.0							
		30	69.3												52.0	50.0	48.0	45.0	39.0	27.0	13.0							
		40	92.4											52.0	50.0	48.0	45.0	42.0	35.0	22.0	6.0							
		50	116										52.0	50.0	47.0	44.0	41.0	38.0	30.0	16.0								
		60	139									51.0	49.0	47.0	44.0	41.0	38.0	34.0	25.0	10.0								
SHUT-OFF PSI:			0									181	172	163	155	146	137	129	111	85	59	33						
40S75-25	7 1/2	0	0																	51.0	45.0	37.0	23.0					
		20	46.2																52.0	47.0	39.0	29.0	14.0					
		30	69.3															54.0	50.0	44.0	35.0	25.0						
		40	92.4														54.0	52.0	48.0	41.0	32.0	21.0						
		50	116													53.0	52.0	50.0	45.0	38.0	28.0							
		60	139												53.0	51.0	49.0	47.0	43.0	34.0	24.0							
SHUT-OFF PSI:			0												203	194	186	177	160	134	108	82	47					
*40S100-30 40S100-30	10	0	0																		53.0	49.0	41.0	27.0				
		20	46.2																	54.0	50.0	44.0	35.0	20.0				
		30	69.3																	52.0	48.0	42.0	32.0	16.0				
		40	92.4																	51.0	46.0	39.0	28.0	12.0				
		50	116																	49.0	43.0	36.0	25.0	8.0				
		60	139																52.0	47.0	41.0	33.0	21.0					
SHUT-OFF PSI:																			222	196	170	144	110	66	23			

*** 6" Motor**

See 40S performance curves for higher head models.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

60 GPM

SELECTION CHARTS
(Ratings are in GALLONS PER MINUTE-GPM)

FLOW RANGE
(40 TO 75 GPM)

PUMP OUTLET
2 " NPT

			DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																								
PUMP MODEL	HP	PSI	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460	520	600	700	800	900	1000	1100
60S20-4	2	20	72.3	64.5	38.6	12.7	6.3																				
		30	58.6	44.9	22.4																						
		40	30.4																								
		50	17.9																								
		60																									
SHUT-OFF PSI:			46	37	29	20	11	3																			
60S30-5	3	0				74.8	66.8	58.8	34.3																		
		20	77.8	72.9	63.8	54.8	27.4																				
		30	76.0	64.3	47.3	30.0	15.0																				
		40	60.4	49.9	25.0																						
		50	40.4	19.4	9.8																						
		60	22.0																								
SHUT-OFF PSI:			60	51	42	34	25	16	8																		
60S50-7	5	0					77.5	73.8	68.4	63.1	52.2	41.3															
		20			76.3	72.4	66.6	61.1	48.3	35.8	17.9																
		30		76.0	71.3	66.5	57.8	49.2	24.6																		
		40	75.1	71.0	64.6	58.2	43.8	29.4	14.8																		
		50	69.7	64.6	54.8	44.9	22.5																				
		60	62.3	55.3	38.7	22.0	11.0																				
SHUT-OFF PSI:			88	80	71	62	54	45	36	28	19	10															
60S50-9	5	0							74.8	71.7	67.3	63.0	55.6	48.2	32.8	17.3											
		20					73.8	70.5	65.9	61.3	53.0	44.8	27.5	10.2	5.1												
		30			76.5	73.5	69.6	65.7	59.4	53.2	40.7	28.1	14.0														
		40		76.2	72.8	69.3	64.3	59.4	50.3	41.0	20.5																
		50	75.5	72.5	68.3	64.2	57.3	50.4	36.3	22.2	11.1																
		60	71.7	68.1	62.7	57.3	47.1	36.8	18.4																		
SHUT-OFF PSI:			115	106	98	89	81	72	63	55	46	37	29	20	11	3											
*60S75-13	7 1/2	0									77.3	75.4	73.1	70.7	67.8	64.8	60.7	50.0	21.5								
		20							76.8	74.8	72.3	69.9	66.8	63.8	59.3	55.0	47.9	28.9									
		30						76.6	74.3	72.1	69.3	66.6	62.8	59.2	53.3	47.7	38.2	14.3									
		40					76.2	74.1	71.6	69.1	65.8	62.7	57.9	53.3	45.6	37.9	25.0	6.0									
		50				75.9	73.6	71.3	68.4	65.6	61.7	57.7	51.6	45.4	35.0	24.7	12.3										
		60			75.5	73.3	70.8	68.2	64.8	61.4	56.3	51.3	43.1	34.8	20.8	6.8											
SHUT-OFF PSI:					152	143	134	126	117	108	100	91	82	74	65	56	48	30	4								
*60S100-18	10	0													76.5	75.0	73.3	69.8	63.1	52.6	35.8						
		20											76.1	74.6	72.8	71.2	69.2	64.7	55.8	40.0	14.2						
		30										75.9	74.3	72.7	70.8	68.9	66.7	61.6	50.9	31.5							
		40									75.7	74.1	72.3	70.6	68.5	66.5	63.9	58.0	45.0	20.7							
		50								75.4	73.8	72.1	70.2	68.3	66.0	63.7	60.7	53.6	37.5	10.0							
		60							75.2	73.6	71.8	70.0	67.8	65.8	63.1	60.5	56.8	48.2	28.3								
SHUT-OFF PSI:									186	177	169	160	152	143	134	126	117	100	74	46	22						

*** 6" Motor**
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

75S EASY SELECTION CHART

75 GPM

SELECTION CHARTS
(Ratings are in GALLONS PER MINUTE-GPM)

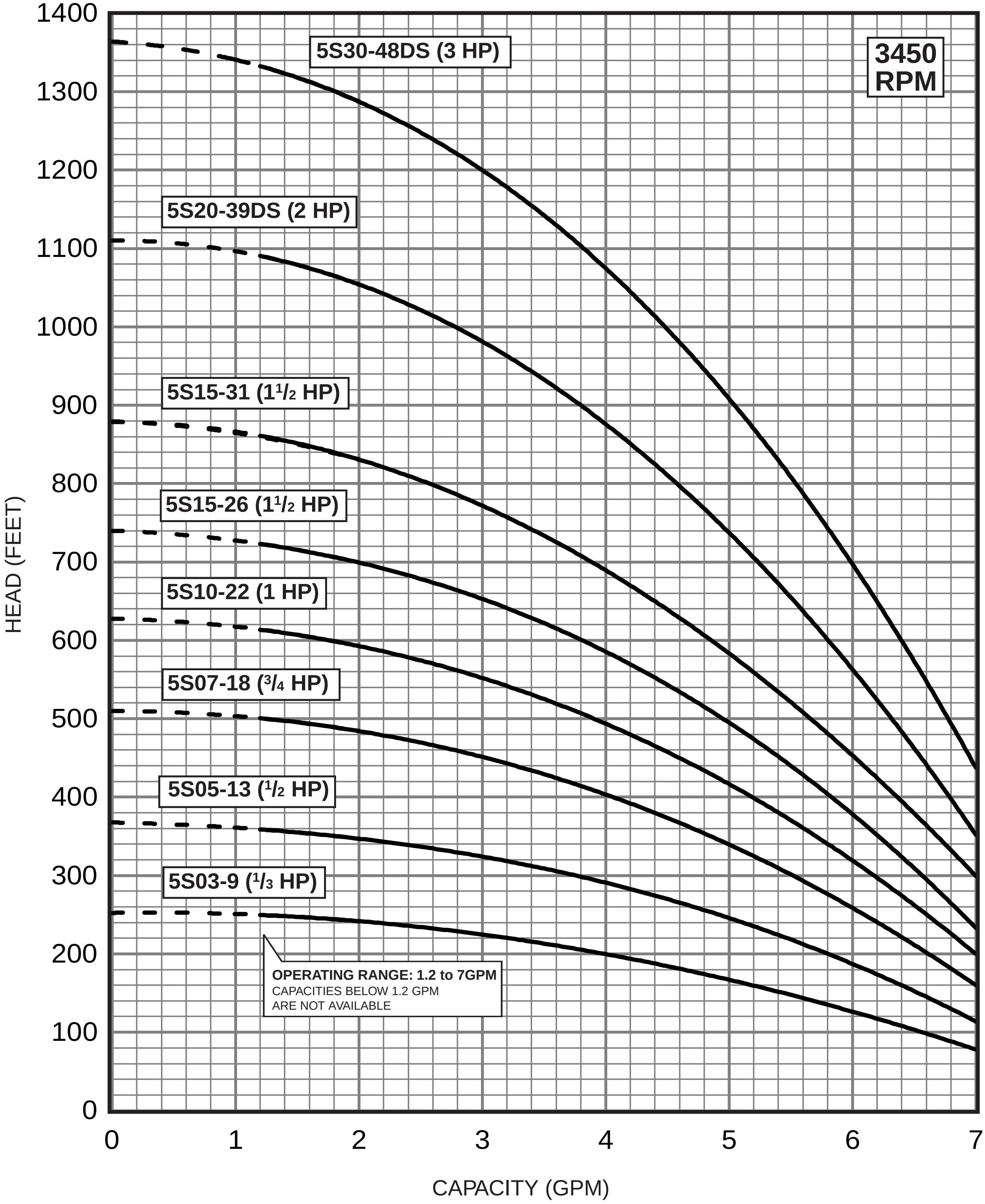
FLOW RANGE
(45 TO 95 GPM)

PUMP OUTLET
2" NPT

			DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																								
PUMP MODEL	**HP**	**PSI**	**20**	**40**	**60**	**80**	**100**	**120**	**140**	**160**	**180**	**200**	**220**	**240**	**260**	**280**	**300**	**340**	**400**	**460**	**520**	**600**	**700**	**800**	**900**	**1000**	**1100**
75S20-3	**2**	20	69.6	45.8	22.9																						
		30	36.2																								
		40	12.4																								
		50																									
		60																									
SHUT-OFF PSI:			32	23	14	6																					
75S30-5	**3**	0			89.8	90.2	78.8	67.6																			
		20	96.3	86.8	74.8	62.9	31.5																				
		30	85.8	74.2	51.8	29.5	14.8																				
		40	70.2	57.1	28.6																						
		50	35.3																								
		60	24.2																								
SHUT-OFF PSI:			58	49	41	32	23	15																			
75S50-8	**5**	0						93.3	86.5	79.6	72.0	64.5	46.9	29.4													
		20			97.4	91.3	84.7	77.5	69.4	61.3	40.3	19.4	9.8														
		30		96.9	90.1	83.3	76.3	69.3	56.3	43.1	21.6																
		40	95.5	89.1	82.3	75.4	66.5	57.5	28.8																		
		50	88.0	81.2	73.9	66.7	51.2	35.8	17.9																		
		60	80.2	73.3	63.2	53.0	26.5																				
SHUT-OFF PSI:			98	90	81	72	64	55	46	38	29	20	12	3													
***75S75-11**	**7 1/2**	0								97.8	93.3	88.8	84.3	79.8	75.1	70.4	63.7	43.4									
		20						96.5	92.0	87.4	82.9	78.3	73.5	68.8	61.4	54.0	38.8	11.8									
		30					95.7	91.3	86.8	82.2	77.6	73.1	67.3	61.4	50.3	39.3	19.7										
		40				95.2	90.6	86.0	81.5	77.0	72.0	67.0	58.9	50.8	33.5	16.3	8.2										
		50			94.3	89.9	85.3	80.8	76.2	71.6	65.3	59.0	46.6	34.2	17.1												
		60	97.9	93.8	89.2	84.6	80.1	75.6	70.3	65.2	56.1	47.0	23.5														
SHUT-OFF PSI:			151	142	133	125	116	107	99	90	81	73	64	55	47	38	29	12									
***75S100-15**	**10**	0											96.7	93.4	90.0	86.5	83.2	76.3	64.7	40.9							
		20									95.7	92.4	88.9	85.5	82.1	78.7	75.2	67.4	49.3	12.5							
		30								95.3	91.8	88.4	85.0	81.5	78.2	74.8	70.9	61.6	37.1								
		40						98.0	94.7	91.3	87.8	84.4	81.0	77.7	74.1	70.6	66.0	54.0	19.9								
		50					97.3	94.3	90.8	87.3	83.9	80.5	77.1	73.7	69.7	65.8	59.8	43.5									
		60				97.0	93.7	90.3	86.8	83.3	80.0	76.6	73.0	69.3	64.5	59.6	51.5	21.7									
SHUT-OFF PSI:						178	170	161	152	144	135	126	118	109	100	92	83	66	40	14							

*** 6" Motor** Performance is the same at Best Efficiency Point only, consult factory for actual performance.
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

FLOW RANGE: 1.2 - 7 GPM **OUTLET SIZE: 1" NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 3450 RPM.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 2 feet.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
5S03-9	A	1/3	4"	1" NPT	22.3	8.8	13.5	3.8	3.9	27
5S05-13	A	1/2	4"	1" NPT	26.4	9.5	16.9	3.8	3.9	31
5S07-18	A	3/4	4"	1" NPT	31.7	10.7	21.0	3.8	3.9	34
5S10-22	A	1	4"	1" NPT	36.1	11.8	24.3	3.8	3.9	42
5S15-26	A	1 1/2	4"	1" NPT	41.2	13.6	27.6	3.8	3.9	46
5S15-31	A	1 1/2	4"	1" NPT	47.1	13.6	33.5	3.8	3.9	58
5S20-39DS	A	2	4"	1" NPT	55.2	15.1	40.1	3.8	3.9	65
5S30-48DS	A	3	4"	1" NPT	70.0	20.6	45.8	3.8	3.9	90

NOTES: All models suitable for use in 4" wells.
Weights include pump end with motor in lbs.

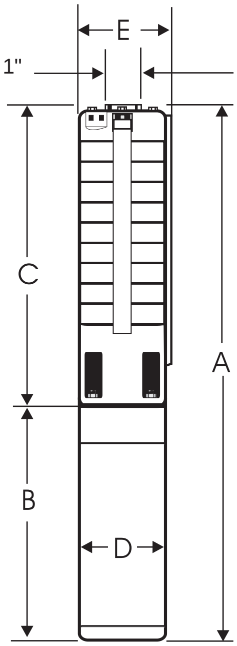


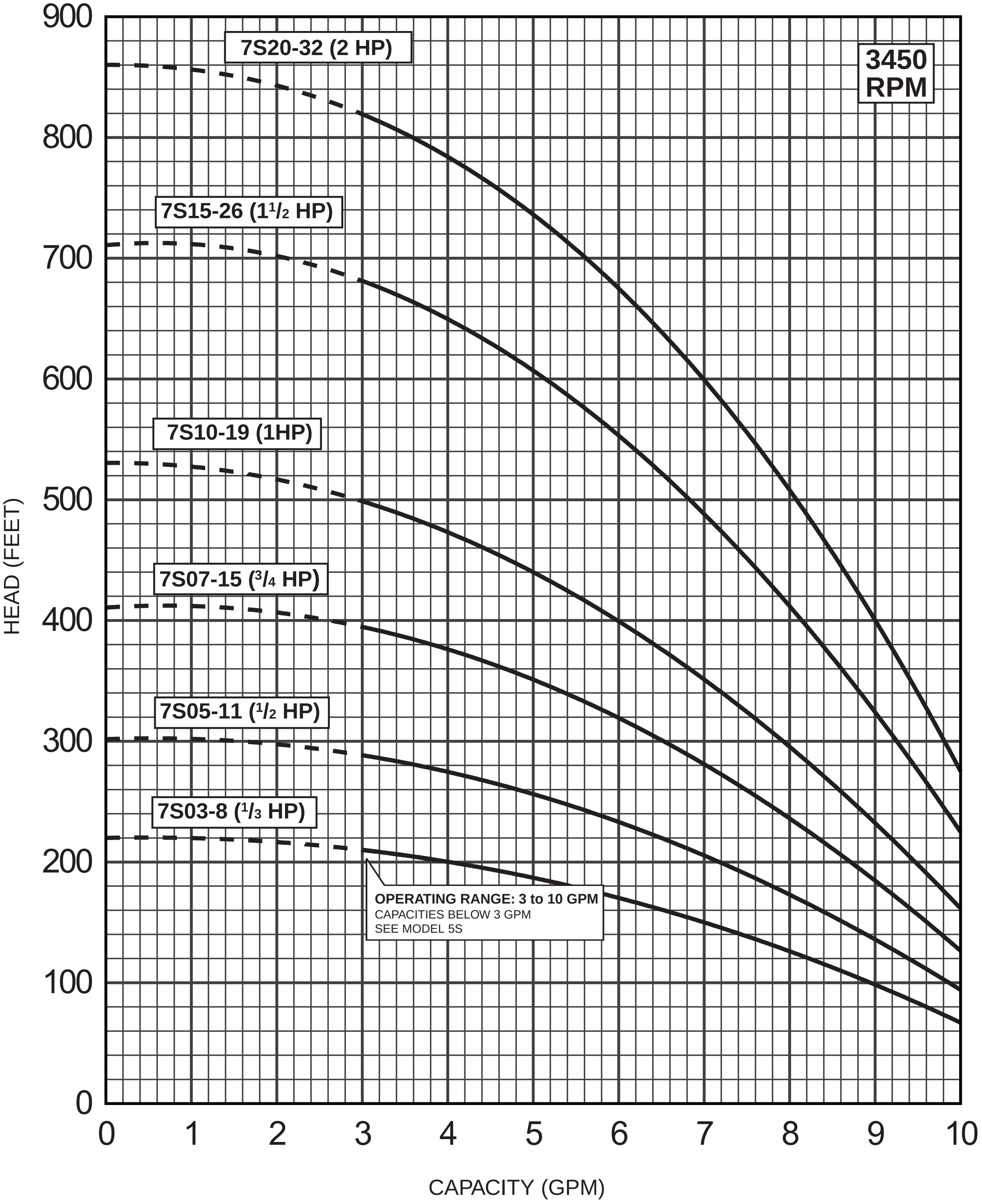
Fig. A

MATERIALS OF CONSTRUCTION

COMPONENT	SPLINED SHAFT (9-26 Stgs.)	CYLINDRICAL SHAFT (31-48 Stgs.)
Check Valve Housing	304 Stainless Steel	304 Stainless Steel
Check Valve	304 Stainless Steel	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel	304 Stainless Steel
Impeller	304 Stainless Steel	304 Stainless Steel
Suction Interconnector	304 Stainless Steel	304 Stainless Steel
Inlet Screen	304 Stainless Steel	304 Stainless Steel
Pump Shaft	304 Stainless Steel	431 Stainless Steel
Straps	304 Stainless Steel	304 Stainless Steel
Cable Guard	304 Stainless Steel	304 Stainless Steel
Priming Inducer	304 Stainless Steel	316 Stainless Steel
Coupling	329/420/431 Stainless Steel	329/420/431 Stainless Steel
Check Valve Seat	NBR/304 Stainless Steel	NBR/316 Stainless Steel
Top Bearing	NBR/304 Stainless Steel	NBR/316 Stainless Steel
Impeller Seal Ring	NBR/PBT (Valox®)	NBR/PPS (Ryton®)
Intermediate Bearings	NBR	304 Stainless Steel
Shaft Washer	Not Required	LCP (Vectra®)
Split Cone	Not Required	304 Stainless Steel
Split Cone Nut	Not Required	316 Stainless Steel

NOTES: Specifications subject to change without notice.
Valox® is a registered trademark of General Electric Co.
Vectra® is a registered trademark of Hoechast Calanese Corporation.
Ryton® is a registered trademark of Phillips 66.

FLOW RANGE: 3 -10 GPM **OUTLET SIZE: 1" NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 3450 RPM.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 2 feet.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SHIP WT.
7S03-8	A	1/3	4"	1" NPT	21.5	8.8	12.7	3.8	3.9	27
7S05-11	A	1/2	4"	1" NPT	24.7	9.5	15.2	3.8	3.9	30
7S07-15	A	3/4	4"	1" NPT	29.2	10.7	18.5	3.8	3.9	33
7S10-19	A	1	4"	1" NPT	33.6	11.8	21.8	3.8	3.9	36
7S15-26	A	1 1/2	4"	1" NPT	41.2	13.6	27.6	3.8	3.9	46
7S20-32	A	2	4"	1" NPT	48.5	14.0	34.5	3.8	3.9	59

NOTES: All models suitable for use in 4" wells.
Weights include pump end with motor in lbs.

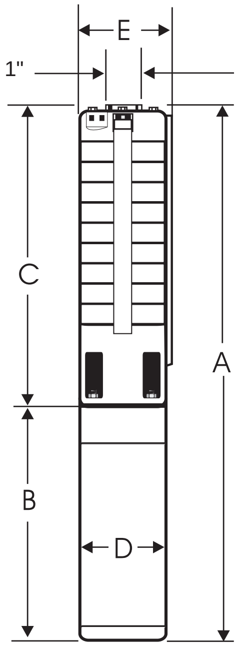


Fig. A

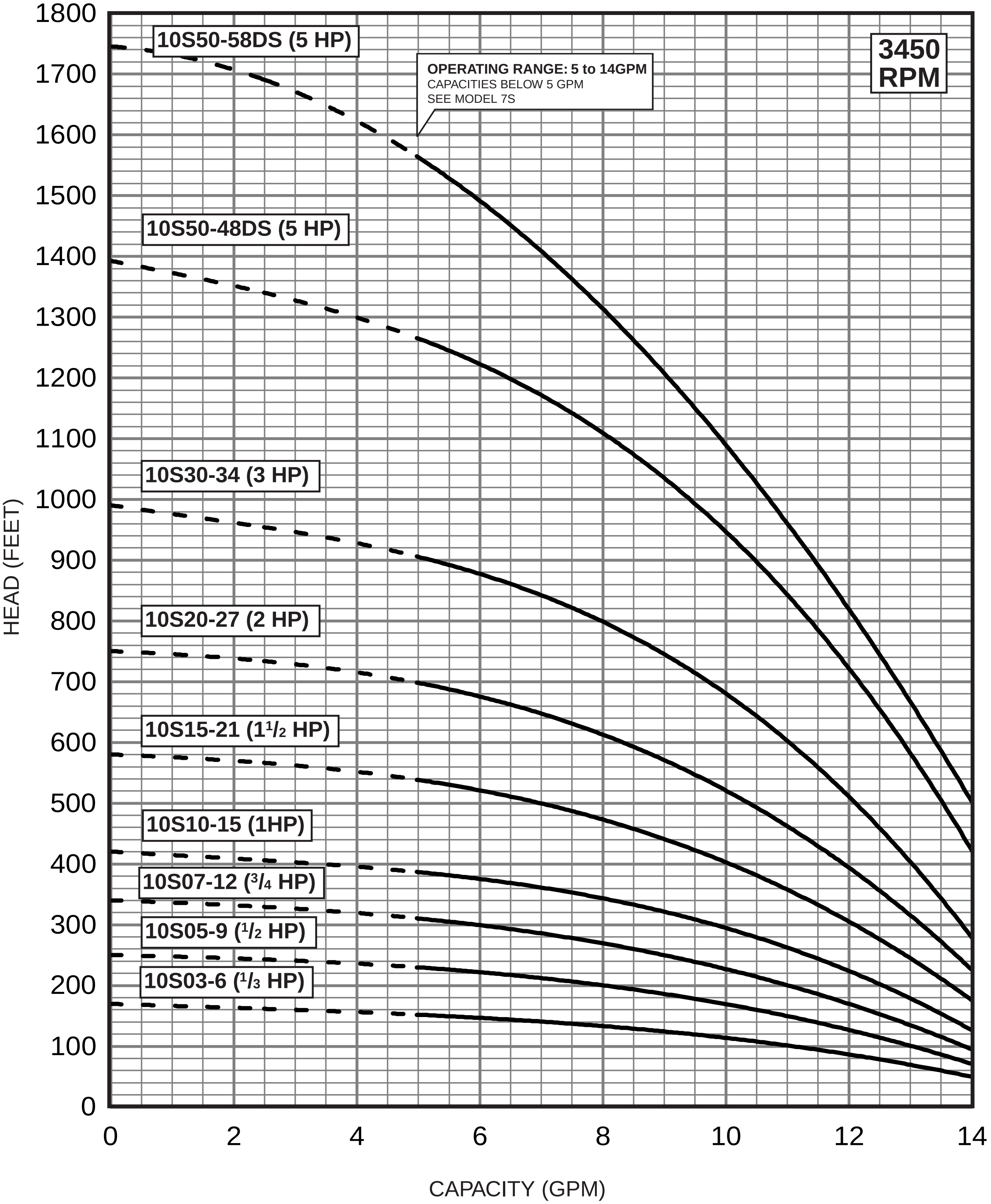
MATERIALS OF CONSTRUCTION

COMPONENT	SPLINE SHAFT
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Pump Shaft	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	316/431 Stainless Steel
Check Valve Seat	NBR/304 Stainless Steel
Top Bearing	NBR
Impeller Seal Ring	NBR/PBT (Valox ®)
Intermediate Bearings	NBR

NOTES: Specifications subject to change without notice.
Valox® is a registered trademark of General Electric Co.

PERFORMANCE CURVES 10 GPM MODEL 10S

FLOW RANGE: 5 -14 GPM **OUTLET SIZE: 1$^1/_4$ " NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 3450 RPM.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 2 feet.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SHIP WT.
10S03-6	A	1/3	4"	1 1/4" NPT	19.9	8.8	11.1	3.8	3.9	26
10S05-9	A	1/2	4"	1 1/4" NPT	23.0	9.5	13.5	3.8	3.9	29
10S07-12	A	3/4	4"	1 1/4" NPT	26.7	10.7	16.0	3.8	3.9	32
10S10-15	A	1	4"	1 1/4" NPT	30.3	11.8	18.5	3.8	3.9	34
10S15-21	A	1 1/2	4"	1 1/4" NPT	37.1	13.6	23.5	3.8	3.9	44
10S20-27	A	2	4"	1 1/4" NPT	43.5	15.1	28.4	3.8	3.9	49
10S30-34	A	3	4"	1 1/4" NPT	54.7	20.6	34.1	3.8	3.9	83
10S50-48DS	A	5	4"	1 1/4" NPT	71.3	23.6	47.7	3.8	3.9	115
10S50-58DS*	B	5	4"	1 1/4" MPT	88.2	23.6	64.5	3.8	4.3	142

NOTES: All models suitable for use in 4" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Built into sleeve $1^{1}/_{4}$" MPT discharge, 5" min. well dia.

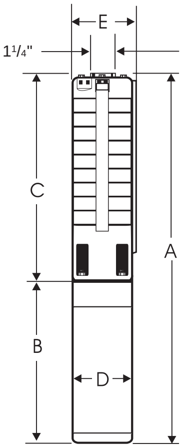


Fig. A

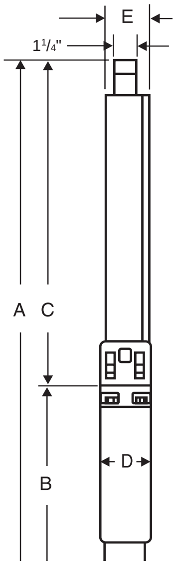


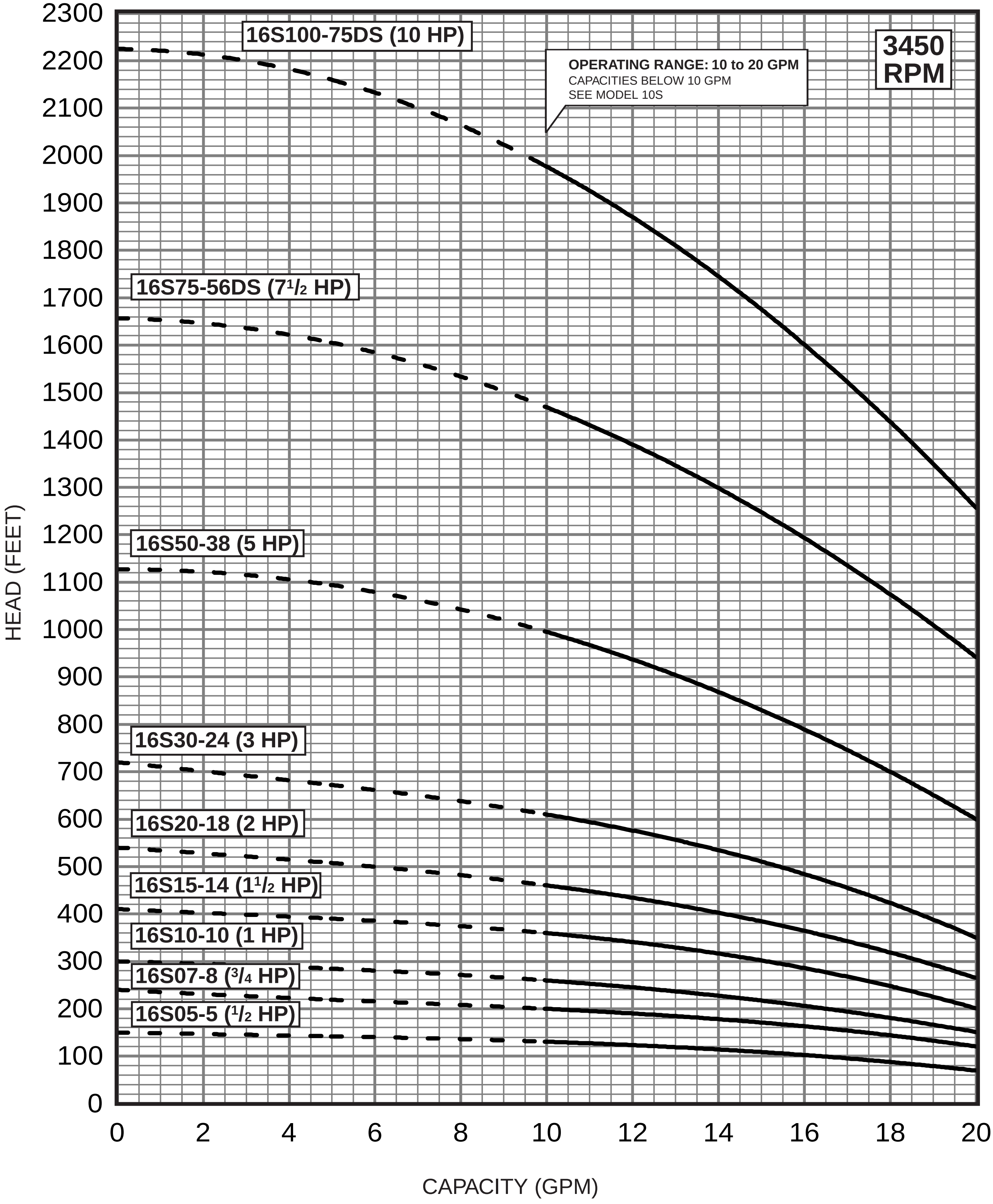
Fig. B

MATERIALS OF CONSTRUCTION

COMPONENT	SPLINED SHAFT (6-27 Stgs.)	CYLINDRICAL SHAFT (34-48 Stgs.)	DEEP SET (58 Stgs.)
Check Valve Housing	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Check Valve	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Impeller	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Suction Interconnector	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Inlet Screen	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Pump Shaft	304 Stainless Steel	431 Stainless Steel	431 Stainless Steel
Straps	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Cable Guard	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Priming Inducer	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Coupling	316/431 Stainless Steel	316/431 Stainless Steel	316/431 Stainless Steel
Check Valve Seat	NBR/304 Stainless Steel	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Top Bearing	NBR	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Impeller Seal Ring	NBR/PBT (Valox®)	NBR/PPS (Ryton®)	NBR/PPS (Ryton®)
Intermediate Bearings	NBR	304 Stainless Steel	NBR/316 Stainless Steel
Shaft Washer	Not Required	LCP (Vectra®)	LCP (Vectra®)
Split Cone	Not Required	304 Stainless Steel	304 Stainless Steel
Split Cone Nut	Not Required	316 Stainless Steel	304 Stainless Steel
Sleeve	Not Required	Not Required	316 Stainless Steel
Sleeve Flange	Not Required	Not Required	Zincless Bronze*

NOTES: Specifications subject to change without notice.
Valox® is a registered trademark of General Electric Co.
Vectra® is a registered trademark of Hoechast Calanese Corporation.
Ryton® is a registered trademark of Phillips 66.
*** Stainless Steel option available.**

FLOW RANGE: 10 -20 GPM **OUTLET SIZE: 1$^1/_4$ " NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, .5 -5 HP/3450 RPM.
6" MOTOR STANDARD,7.5 -10HP/3450 RPM.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 2 feet.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SHIP WT.
16S05-5	A	1/2	4"	1 1/4" NPT	19.7	9.5	10.2	3.8	3.9	27
16S07-8	A	3/4	4"	1 1/4" NPT	23.4	10.7	12.7	3.8	3.9	29
16S10-10	A	1	4"	1 1/4" NPT	26.2	11.8	14.4	3.8	3.9	32
16S15-14	A	1 1/2	4"	1 1/4" NPT	32.8	15.1	17.7	3.8	3.9	36
16S20-18	A	2	4"	1 1/4" NPT	36.0	15.1	20.9	3.8	3.9	40
16S30-24	A	3	4"	1 1/4" NPT	46.5	20.6	25.9	3.8	3.9	64
16S50-38	A	5	4"	1 1/4" NPT	61.1	23.6	37.5	3.8	3.9	94
16S75-56DS*	B	7 1/2	6"	1 1/4" MPT	93.0	24.2	68.8	5.4	4.6	220
16S100-75DS*	B	10	6"	1 1/4" MPT	109.9	25.4	84.5	5.4	4.6	245

NOTES: All models suitable for use in 4" wells, unless otherwise noted.
Weights include pump end with motor in lbs..
* Built into sleeve 1 1/4" MPT discharge, 6" min. well dia.

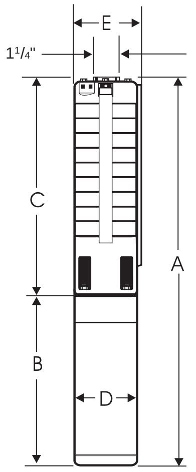


Fig. A

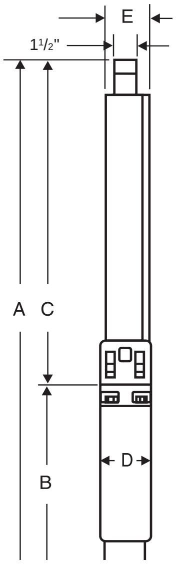


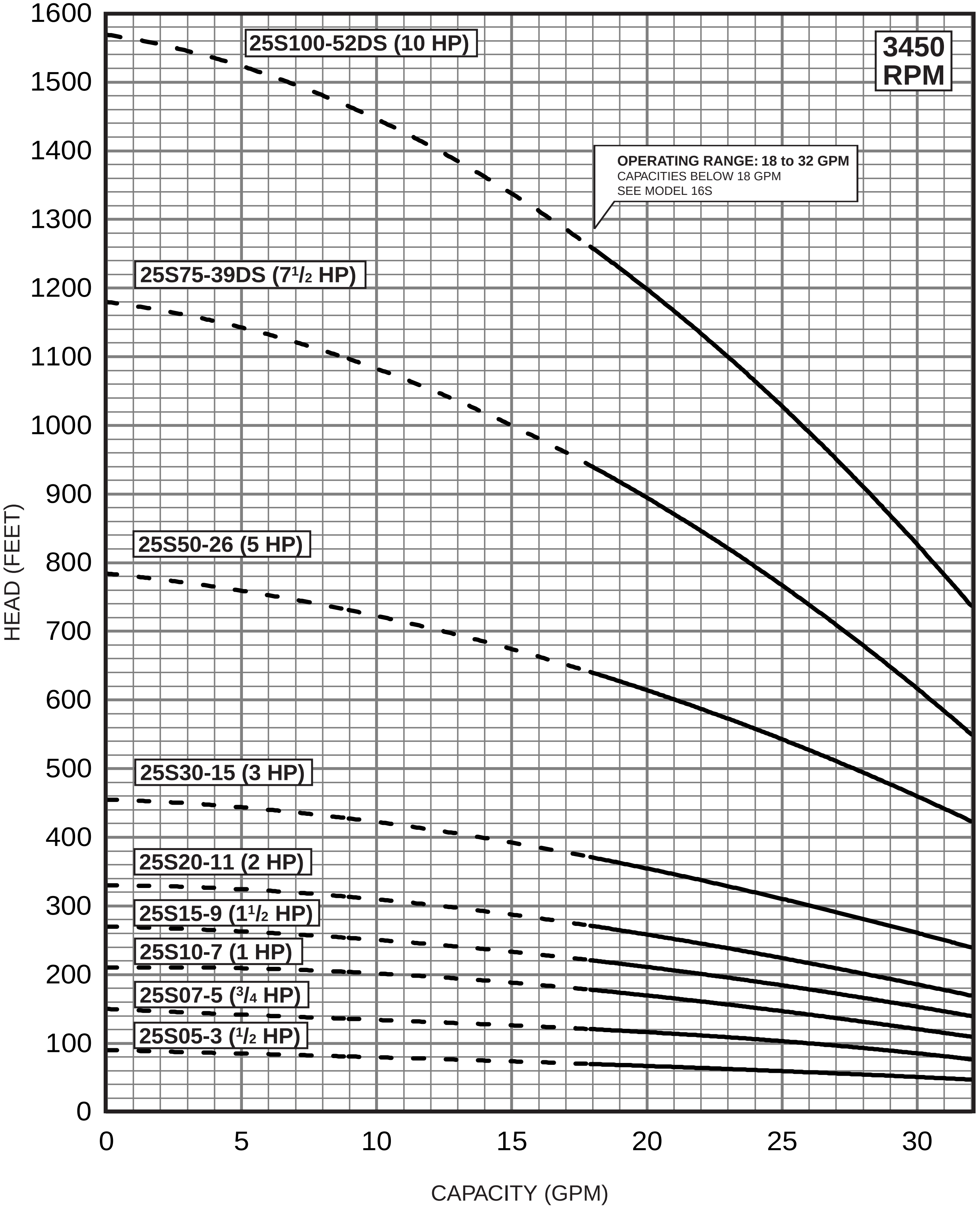
Fig. B

MATERIALS OF CONSTRUCTION

COMPONENT	SPLINED SHAFT (5-24 Stgs.)	CYLINDRICAL SHAFT (38 Stgs.)	DEEP SET (56-75 Stgs)
Check Valve Housing	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Check Valve	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Impeller	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Suction Interconnector	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Inlet Screen	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Pump Shaft	304 Stainless Steel	431 Stainless Steel	431 Stainless Steel
Straps	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Cable Guard	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Priming Inducer	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Coupling	316/431 Stainless Steel	316/431 Stainless Steel	329/416 Stainless Steel**
Check Valve Seat	NBR/304 Stainless Steel	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Top Bearing	NBR	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Impeller Seal Ring	NBR/PBT (Valox®)	NBR/PPS (Ryton®)	NBR/PPS (Ryton®)
Intermediate Bearings	NBR	304 Stainless Steel	NBR/316 Stainless Steel
Shaft Washer	Not Required	LCP (Vectra®)	LCP (Vectra®)
Split Cone	Not Required	304 Stainless Steel	304 Stainless Steel
Split Cone Nut	Not Required	316 Stainless Steel	304 Stainless Steel
Sleeve	Not Required	Not Required	316 Stainless Steel
Sleeve Flange	Not Required	Not Required	304 Stainless Steel
Coupling Key	Not Required	Not Required	302/304 Stainless Steel**

NOTES: Specifications are subject to change without notice.
Valox® is a registered trademark of General Electric Co.
Vectra® is a registered trademark of Hoechast Calanese Corporation.
Ryton® is a registered trademark of Phillips 66.
***Stainless Steel option available.**
** If using 4" non-standard motors, refer to 329/420/431 Stainless Steel for coupling.
A coupling key is not required.

FLOW RANGE: 18 -32 GPM **OUTLET SIZE: $1^1/_2$ " NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, .5 -5 HP/3450 RPM.
6" MOTOR STANDARD,7.5 -10HP/3450 RPM.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 2 feet.

MODEL 25S 25 GPM TECHNICAL DATA

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SHIP WT.
25S05-3	A	1/2	4"	1 1/2" NPT	18.1	9.5	8.6	3.8	3.9	26
25S07-5	A	3/4	4"	1 1/2" NPT	20.9	10.7	10.2	3.8	3.9	28
25S10-7	A	1	4"	1 1/2" NPT	23.7	11.8	11.9	3.8	3.9	29
25S15-9	A	1 1/2	4"	1 1/2" NPT	27.1	13.6	13.5	3.8	3.9	34
25S20-11	A	2	4"	1 1/2" NPT	30.3	15.1	15.2	3.8	3.9	37
25S30-15	A	3	4"	1 1/2" NPT	39.1	20.6	18.5	3.8	3.9	59
25S50-26	A	5	4"	1 1/2" NPT	51.2	23.6	27.6	3.8	3.9	76
25S75-39DS	A	7 1/2	6"	1 1/2" NPT	66.8	24.2	42.6	5.4	4.6	168
25S100-52DS*	B	10	6"	1 1/2" MPT	90.9	25.4	65.5	5.4	5.4	226

NOTES: All models suitable for use in 4" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Built into sleeve 1½" MPT discharge, 6" min. well dia.

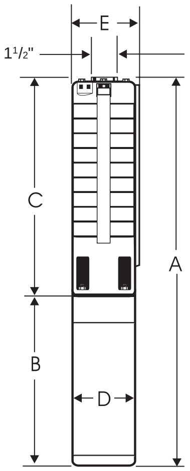


Fig. A

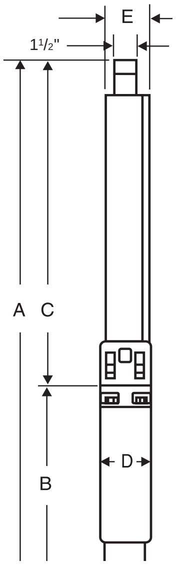


Fig. B

MATERIALS OF CONSTRUCTION

COMPONENT	SPLINED SHAFT (3-26 Stgs.)	CYLINDRICAL SHAFT (39 Stgs.)	DEEP SET (52 Stgs)
Check Valve Housing	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Check Valve	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Impeller	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Suction Interconnector	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Inlet Screen	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Pump Shaft	304 Stainless Steel	431 Stainless Steel	431 Stainless Steel
Straps	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Cable Guard	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Priming Inducer	304 Stainless Steel	304 Stainless Steel	304 Stainless Steel
Coupling	316/431 Stainless Steel	316/431 Stainless Steel	329/416 Stainless Steel**
Check Valve Seat	NBR/304 Stainless Steel	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Top Bearing	NBR	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Impeller Seal Ring	NBR/PBT (Valox®)	NBR/PPS (Ryton®)	NBR/PPS (Ryton®)
Intermediate Bearings	NBR	304 Stainless Steel	NBR/316 Stainless Steel
Shaft Washer	Not Required	LCP (Vectra®)	LCP (Vectra®)
Split Cone	Not Required	304 Stainless Steel	304 Stainless Steel
Split Cone Nut	Not Required	316 Stainless Steel	304 Stainless Steel
Sleeve	Not Required	Not Required	316 Stainless Steel
Sleeve Flange	Not Required	Not Required	304 Stainless Steel
Coupling Key	Not Required	Not Required	302/304 Stainless Steel**

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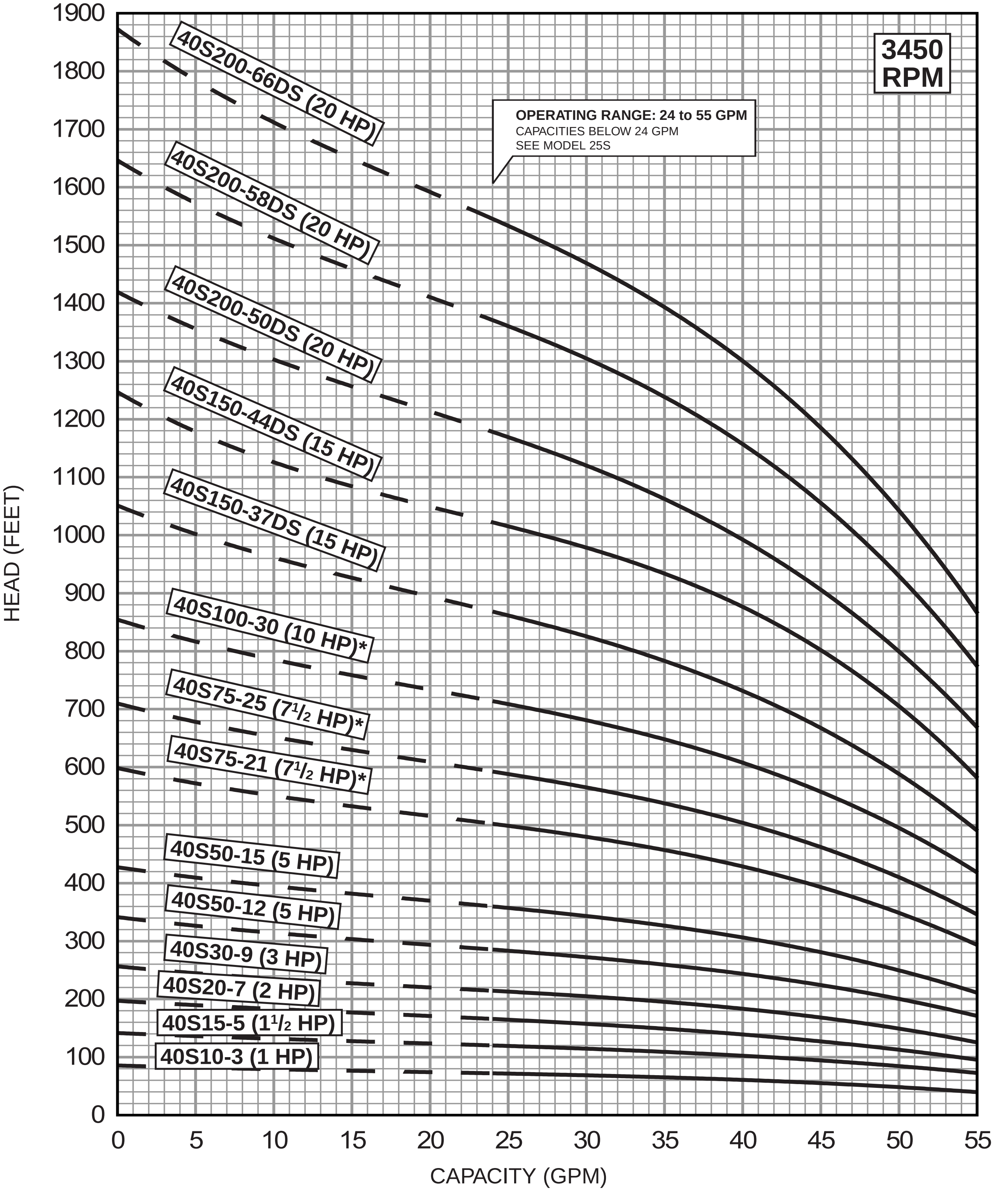
Vectra® is a registered trademark of Hoechast Calanese Corporation.
Ryton® is a registered trademark of Phillips 66.

***Stainless Steel option available.**

** If using 4" non-standard motors, refer to 329/420/431 Stainless Steel for coupling. A coupling key is not required.

PERFORMANCE CURVES 40 GPM MODEL 40S

FLOW RANGE: 24 - 55 GPM **OUTLET SIZE: 2 " NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 1-10 HP/3450 RPM.
6" MOTOR STANDARD,15-20 HP/3450 RPM.
* Also available with 6" motor.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 5 feet.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
40S10-3	A	1	4"	2" NPT	24.6	11.8	12.8	3.8	3.9	32
40S15-5	A	1 1/2	4"	2" NPT	29.7	13.6	16.1	3.8	3.9	37
40S20-7	A	2	4"	2" NPT	34.5	15.1	19.4	3.8	3.9	41
40S30-9	A	3	4"	2" NPT	43.3	20.6	22.7	3.8	3.9	65
40S50-12	A	5	4"	2" NPT	51.3	23.6	27.7	3.8	3.9	78
40S50-15	A	5	4"	2" NPT	56.2	23.6	32.6	3.8	3.9	84
40S75-21*	A	7 1/2	4"	2" NPT	74.6	29.6	45.0	3.8	3.9	120
40S75-25*	A	7 1/2	4"	2" NPT	81.2	29.6	51.6	3.8	3.9	124
40S100-30*	A	10	4"	2" NPT	103.7	43.9	59.8	3.8	3.9	181
40S150-37DS	A	15	6"	2" NPT	99.5	28.0	71.5	5.4	5.4	244
40S150-44DS	A	15	6"	2" NPT	111.0	28.0	83.0	5.4	5.4	340
40S200-50DS**	B	20	6"	2" MPT	136.0	30.6	105.4	5.4	5.5	319
40S200-58DS**	B	20	6"	2" MPT	149.2	30.6	118.6	5.4	5.5	334
40S200-66DS**	B	20	6"	2" MPT	162.4	30.6	131.8	5.4	5.5	394

NOTES: All models suitable for use in 4" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Also available with 6" motor.
** Built into sleeve 2" MPT discharge, 6" min. well dia.

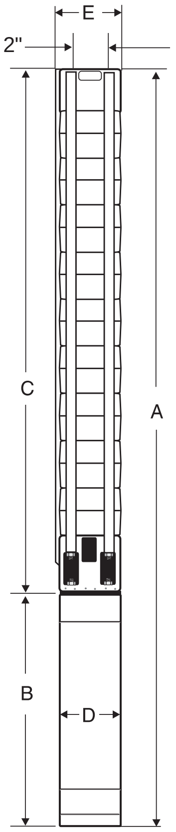


Fig. A

MATERIALS OF CONSTRUCTION

COMPONENT	CYLINDRICAL SHAFT (3-44 Stgs.)	DEEP SET (50-66 Stgs.)
Check Valve Housing	304 Stainless Steel	304 Stainless Steel
Check Valve	304 Stainless Steel	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel	304 Stainless Steel
Impeller	304 Stainless Steel	304 Stainless Steel
Suction Interconnector	304 Stainless Steel	304 Stainless Steel
Inlet Screen	304 Stainless Steel	304 Stainless Steel
Pump Shaft	431 Stainless Steel	431 Stainless Steel
Straps	304 Stainless Steel	304 Stainless Steel
Cable Guard	304 Stainless Steel	304 Stainless Steel
Priming Inducer	304 Stainless Steel	304 Stainless Steel
Coupling	316/431 Stainless Steel **	329/ 416 Stainless Steel
Check Valve Seat	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Top Bearing	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Impeller Seal Ring	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Intermediate Bearings	NBR/316 Stainless Steel	NBR/316 Stainless Steel
Shaft Washer	LCP (Vectra®)	LCP (Vectra®)
Split Cone	304 Stainless Steel	304 Stainless Steel
Split Cone Nut	304 Stainless Steel	304 Stainless Steel
Sleeve	Not Required	316 Stainless Steel
Sleeve Flange	Not Required	304 Stainless Steel

NOTES: Specifications are subject to change without notice.
Vectra® is a registered trademark of Hoechast Calanese Corporation.
***Stainless Steel option available.**

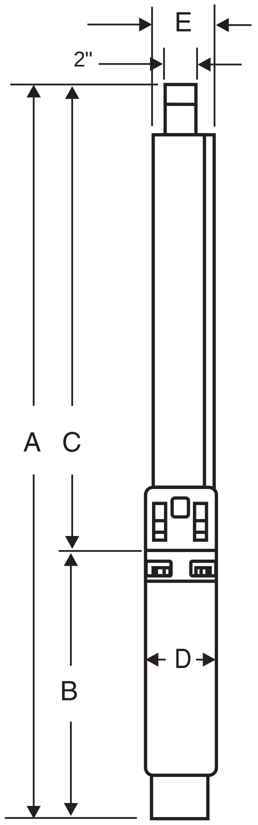
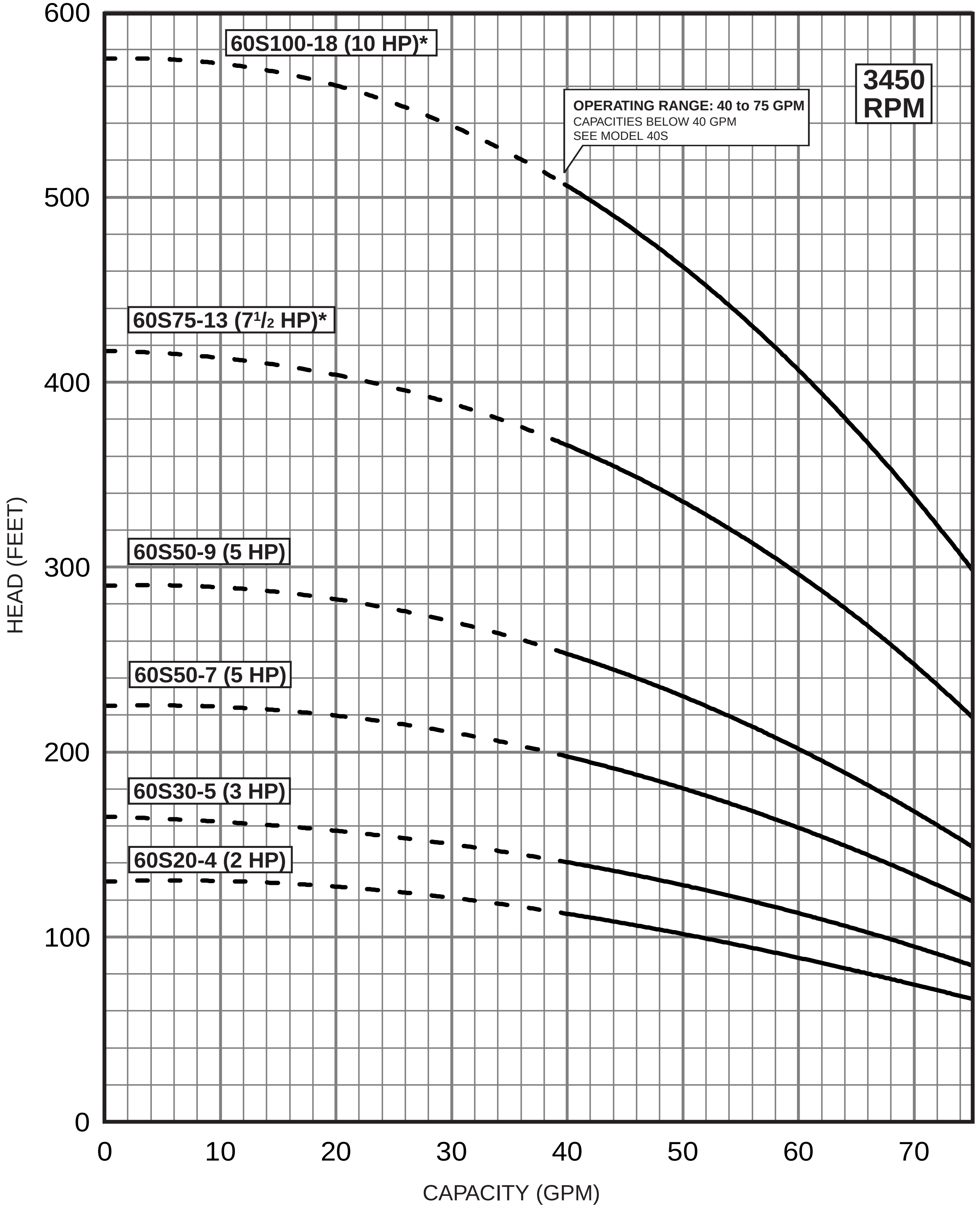


Fig. B

FLOW RANGE: 40 -75 GPM **OUTLET SIZE: 2 " NPT** **NOMINAL DIA. 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 3450 RPM.
* Also available with 6" motor.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 5 feet.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
60S20-4	A	2	4"	2" NPT	32.6	15.1	17.5	3.8	3.9	39
60S30-5	A	3	4"	2" NPT	40.7	20.6	20.1	3.8	3.9	64
60S50-7	A	5	4"	2" NPT	48.8	23.6	25.2	3.8	3.9	75
60S50-9	A	5	4"	2" NPT	53.9	23.6	30.3	3.8	3.9	80
60S75-13*	A	7 1/2	4"	2" NPT	70.1	29.6	40.5	3.8	3.9	105
60S100-18*	A	10	4"	2" NPT	97.3	43.9	53.4	3.8	3.9	160

NOTES: All models suitable for use in 4" wells, unless otherwise noted.
Weights include pump end with motor in lbs..
* Also available with 6" motor.

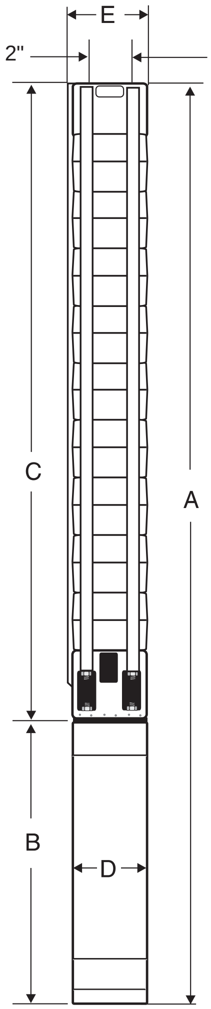


Fig. A

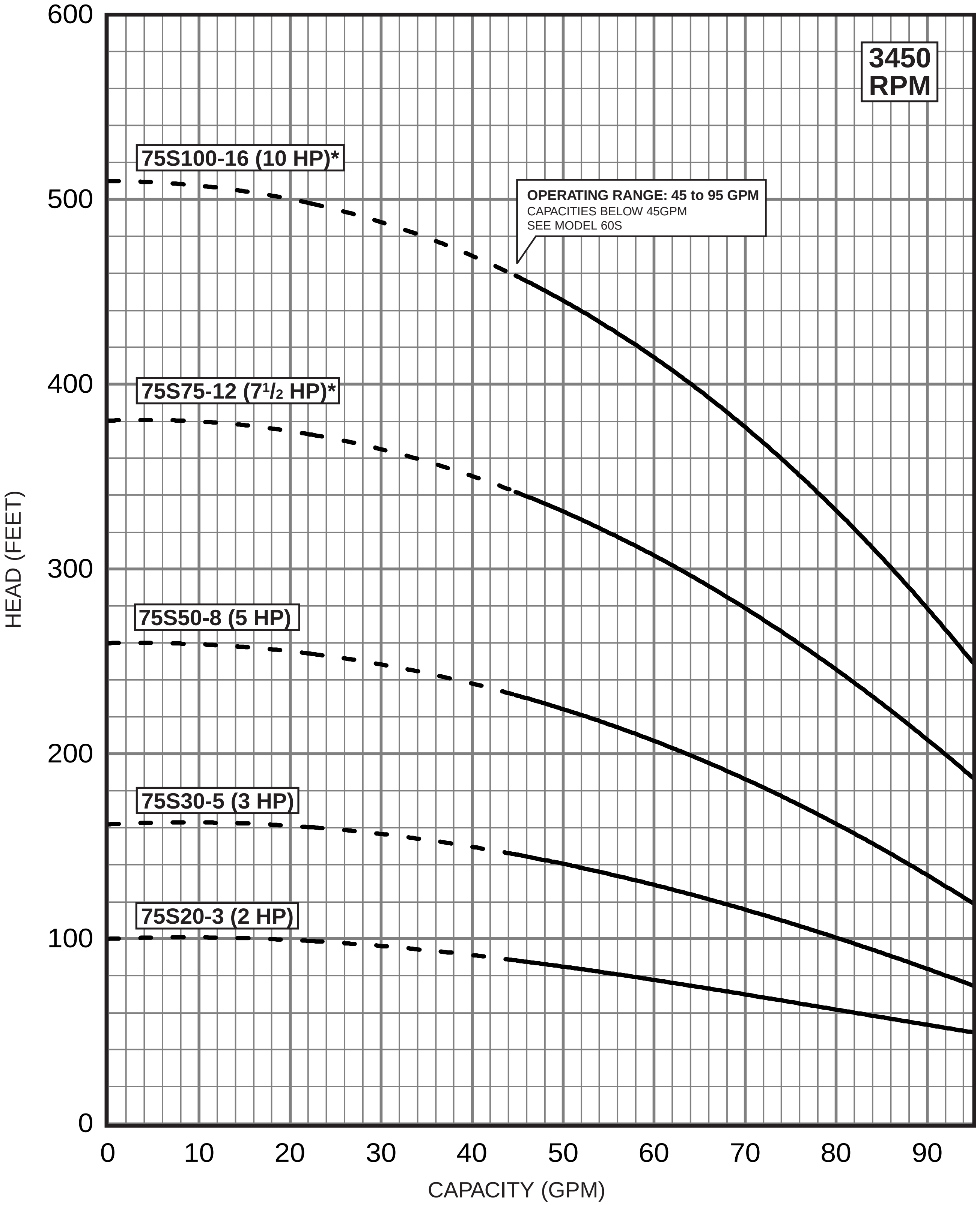
MATERIALS OF CONSTRUCTION

COMPONENT	CYLINDRICAL SHAFT (4-18 Stgs.)
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Pump Shaft	431 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	316/431 Stainless Steel**
Check Valve Seat	NBR/316 Stainless Steel
Top Bearing	NBR/316 Stainless Steel
Impeller Seal Ring	NBR/316 Stainless Steel
Intermediate Bearings	NBR/316 Stainless Steel
Shaft Washer	LCP (Vectra®)
Split Cone	304 Stainless Steel
Split Cone Nut	304 Stainless Steel

NOTES: Specifications are subject to change without notice.
Vectra® is a registered trademark of Hoechast Calanese Corporation.

PERFORMANCE CURVES 75 GPM MODEL 75S

FLOW RANGE: 45 - 95 GPM **OUTLET SIZE: 2" NPT** **NOMINAL DIA.: 4"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD,2-10 Hp 3450 RPM.
* Also available with 6" motor, performance is the same only at Best Effeciency point.
Consult factory for actual performance.

Performance conforms to ISO 9906. 1999 (E) Annex A
Minimum submergance is 5 feet.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SHIP WT.
75S20-3	A	2	4"	2" NPT	30.0	15.1	14.9	3.8	3.9	38
75S30-5	A	3	4"	2" NPT	40.7	20.6	20.1	3.8	3.9	64
75S50-8	A	5	4"	2" NPT	51.4	23.6	27.8	3.8	3.9	78
75S75-12*	A	7 1/2	4"	2" NPT	67.5	29.6	37.9	3.8	3.9	100
75S100-16*	A	10	4"	2" NPT	92.1	43.9	48.2	3.8	3.9	155

NOTES: All models suitable for use in 4" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Also available with 6" motor, performance is the same only at Best Efficiency point. Consult factory for actual performance.

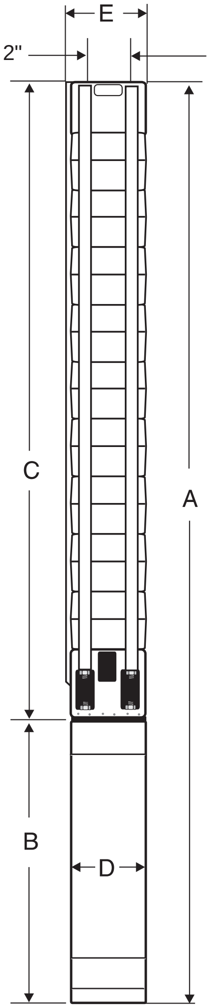


Fig. A

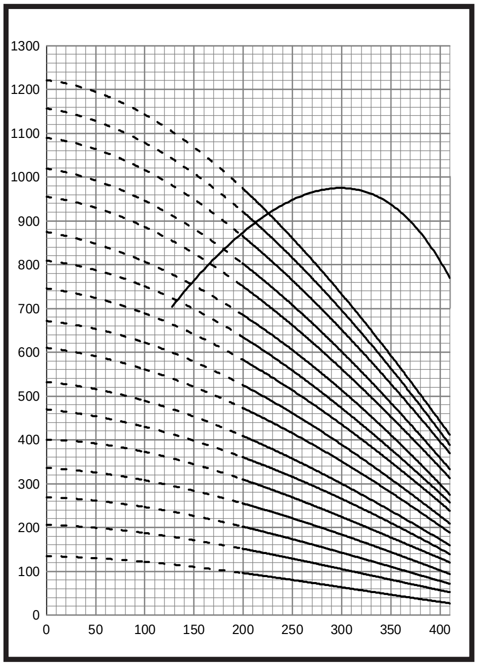
MATERIALS OF CONSTRUCTION

COMPONENT	CYLINDRICAL SHAFT (3-16 Stgs.)
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Pump Shaft	431 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	316/431 Stainless Steel**
Check Valve Seat	NBR/316 Stainless Steel
Top Bearing	NBR/316 Stainless Steel
Impeller Seal Ring	NBR/316 Stainless Steel
Intermediate Bearings	NBR/316 Stainless Steel
Shaft Washer	LCP (Vectra®)
Split Cone	304 Stainless Steel
Split Cone Nut	304 Stainless Steel

NOTES: Specifications are subject to change without notice.
Vectra® is a registered trademark of Hoechast Calanese Corporation.

Performance Curves and Technical Data

6-Inch, 8-Inch & 10-Inch Submersible Pumps



Performance Curves

Materials of Construction

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SHIP WT.
85S15-1	A	1 1/2	4"	3" NPT	25.9	13.6	12.3	3.75	5.2	37
85S30-2	A	3	4"	3" NPT	35.3	20.6	14.7	3.75	5.2	61
85S50-3	A	5	4"	3" NPT	40.7	23.6	17.1	3.75	5.2	75
85S50-4	A	5	4"	3" NPT	43.1	23.6	19.5	3.75	5.2	77
85S75-5	A	7 1/2	4"	3" NPT	51.5	29.6	21.9	3.75	5.2	95
85S75-6	A	7 1/2	4"	3" NPT	53.9	29.6	24.3	3.75	5.2	97
85S100-7	A	10	4"	3" NPT	70.5	43.9	26.6	3.75	5.2	151
85S100-8	A	10	4"	3" NPT	72.9	43.9	29.0	3.75	5.2	154
85S100-9	A	10	4"	3" NPT	75.3	43.9	31.4	3.75	5.2	156
85S75-5	A	7 1/2	6"	3" NPT	46.7	24.2	22.5	5.38	5.6	135
85S75-6	A	7 1/2	6"	3" NPT	49.1	24.2	24.9	5.38	5.6	137
85S100-7	A	10	6"	3" NPT	52.7	25.4	27.3	5.38	5.6	148
85S100-8	A	10	6"	3" NPT	55.0	25.4	29.6	5.38	5.6	151
85S100-9	A	10	6"	3" NPT	57.4	25.4	32.0	5.38	5.6	153
85S150-10	A	15	6"	3" NPT	62.4	28.0	34.4	5.38	5.6	170
85S150-11	A	15	6"	3" NPT	64.8	28.0	36.8	5.38	5.6	174
85S150-12	A	15	6"	3" NPT	67.2	28.0	39.2	5.38	5.6	176
85S150-13	A	15	6"	3" NPT	69.6	28.0	41.6	5.38	5.6	178
85S200-14	A	20	6"	3" NPT	74.5	30.6	43.9	5.38	5.6	193
85S200-15	A	20	6"	3" NPT	76.9	30.6	46.3	5.38	5.6	198
85S200-16	A	20	6"	3" NPT	79.3	30.6	48.7	5.38	5.6	200
85S200-17	A	20	6"	3" NPT	81.7	30.6	51.1	5.38	5.6	202
85S200-18	A	20	6"	3" NPT	84.1	30.6	53.5	5.38	5.6	204
85S250-19	A	25	6"	3" NPT	88.9	33.1	55.8	5.38	5.6	240
85S250-20	A	25	6"	3" NPT	91.9	33.1	58.8	5.38	5.6	244
85S250-21	A	25	6"	3" NPT	94.3	33.1	61.2	5.38	5.6	246
85S250-22	A	25	6"	3" NPT	96.7	33.1	63.6	5.38	5.6	249
85S300-23	A	30	6"	3" NPT	101.9	35.7	66.2	5.38	5.6	264
85S300-24	A	30	6"	3" NPT	104.1	35.7	68.4	5.38	5.6	266
85S300-25	A	30	6"	3" NPT	106.4	35.7	70.7	5.38	5.6	271
85S300-26	A	30	6"	3" NPT	108.8	35.7	73.1	5.38	5.6	273
85S300-27	A	30	6"	3" NPT	116.3	40.8	75.5	5.38	5.6	278
85S400-28	A	40	6"	3" NPT	118.7	40.8	77.9	5.38	5.6	281
85S400-29	A	40	6"	3" NPT	121.1	40.8	80.3	5.38	5.6	283
85S400-30	A	40	6"	3" NPT	123.4	40.8	82.6	5.38	5.6	287
85S400-33*	B	40	6"	3" NPT	139.7	40.8	98.9	5.38	6.9	343
85S400-36*	B	40	6"	3" NPT	146.9	40.8	106.1	5.38	6.9	354
85S500-39*	B	50	6"	3" NPT	171.0	57.8	113.2	5.38	6.9	448
85S400-33*	B	40	8"	3" NPT	134.7	35.8	98.9	7.5	6.9	377
85S400-36*	B	40	8"	3" NPT	141.9	35.8	106.1	7.5	6.9	390
85S500-39*	B	50	8"	3" NPT	152.0	38.8	113.2	7.5	6.9	498

NOTES: All models suitable for use in 6" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Built into sleeve 3" NPT discharge, 8" min. well dia.

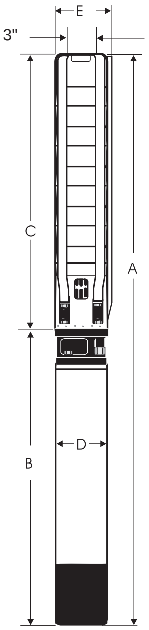


Fig. A

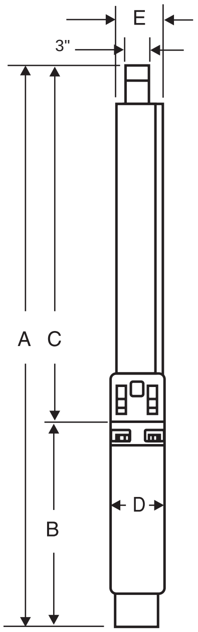
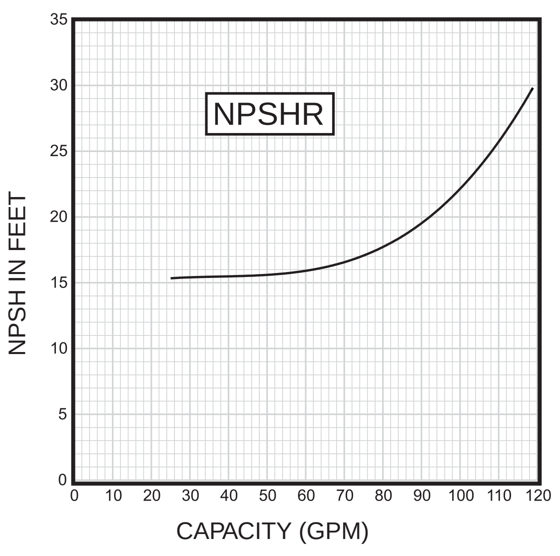


Fig. B

MATERIALS OF CONSTRUCTION

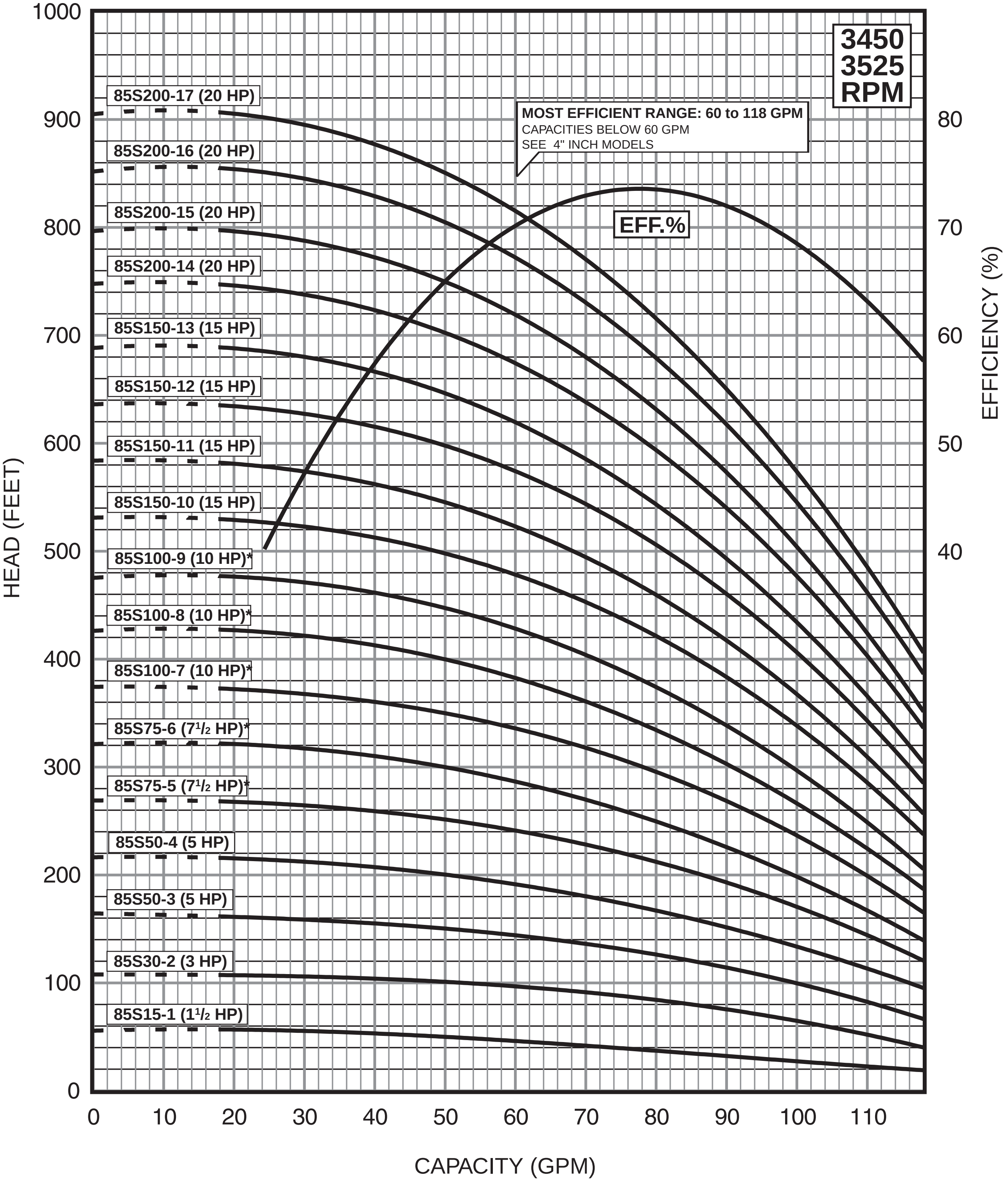
COMPONENT	CYLINDRICAL SHAFT (1- 39 Stgs.)
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Seal Ring Support	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	316/329 Stainless Steel**
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Check Valve Seat	NBR/316 Stainless Steel
Upthrust Disc	Carbon/Graphite
Upthrust Stop Washer	304 Stainless Steel
8" Motor Adaptor Plate	304 Stainless Steel
Sleeve *	316 Stainless Steel
Sleeve Flange *	316 Stainless Steel

NOTES: Specifications are subject to change without notice.
* Required for 33-39 stages.
** 4" Coupling made of 316 Stainless Steel



PERFORMANCE CURVES 85 GPM MODEL 85S

FLOW RANGE: 18 -118 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**

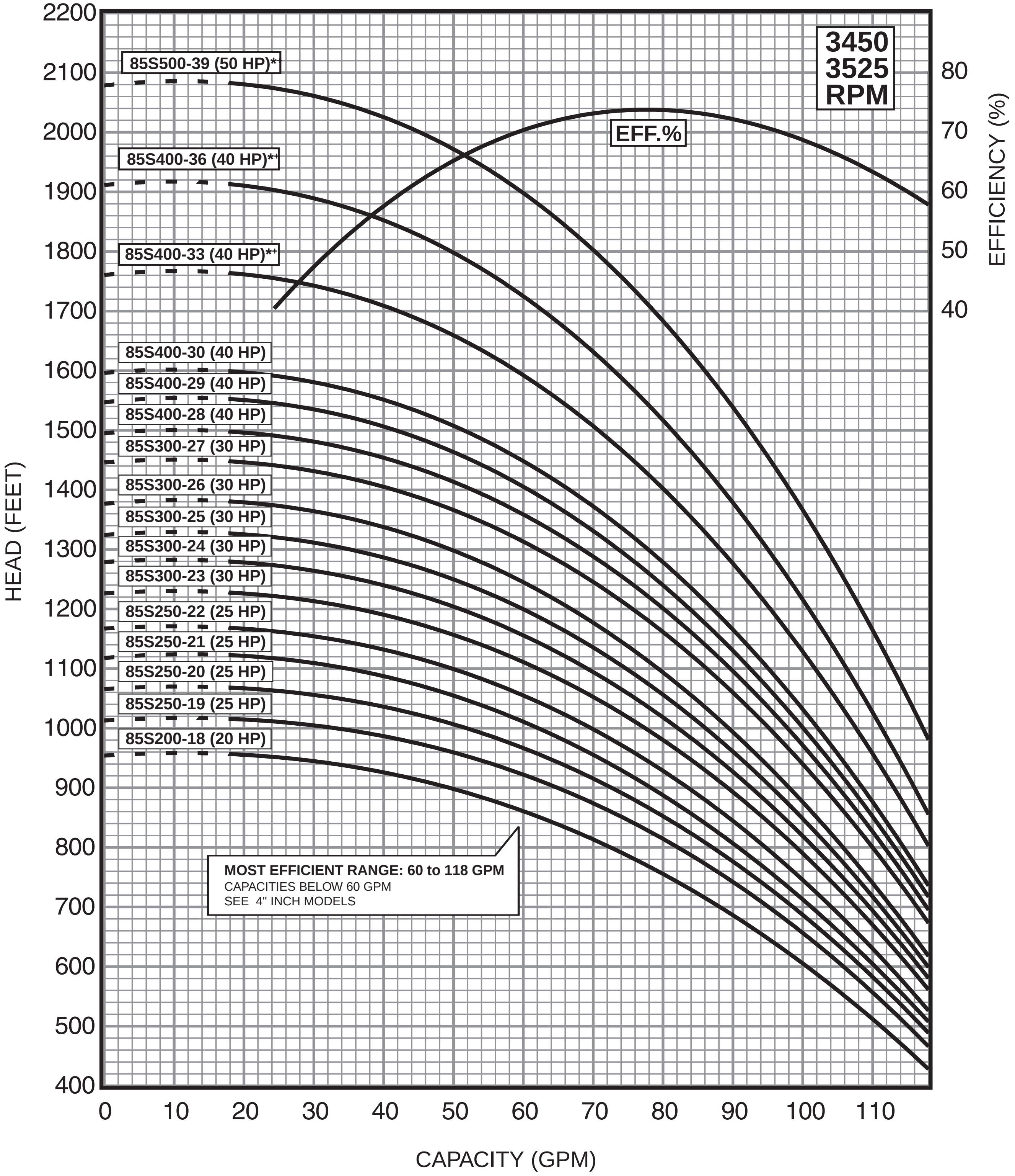


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 1.5-5 HP/3450 RPM
6" MOTOR STANDARD, 7.5-50 HP/3450 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.

MODEL 85S 85 GPM PERFORMANCE CURVES

FLOW RANGE: 18 -118 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**



MOST EFFICIENT RANGE: 60 to 118 GPM
CAPACITIES BELOW 60 GPM
SEE 4" INCH MODELS

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
* Built into sleeve 3" male NPT discharge/ 8" min. well diameter.
6" MOTOR STANDARD, 7.5-50 HP/3450 RPM.
+Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	APPROX. SHIP WT.
150S20-1	A	2	4"	3" NPT	27.3	13.6	13.7	3.75	5.2	55
150S50-2	A	5	4"	3" NPT	41.1	23.6	17.5	3.75	5.2	75
150S75-3	A	7 1/2	4"	3" NPT	50.9	29.6	21.3	3.75	5.2	92
150S75-4	A	7 1/2	4"	3" NPT	54.7	29.6	25.1	3.75	5.2	97
150S100-5	A	10	4"	3" NPT	72.8	43.9	28.9	3.75	5.2	151
150S75-4	A	7 1/2	6"	3" NPT	49.9	24.2	25.7	5.38	5.6	135
150S100-5	A	10	6"	3" NPT	54.9	25.4	29.5	5.38	5.6	148
150S150-6	A	15	6"	3" NPT	61.3	28.0	33.3	5.38	5.6	167
150S150-7	A	15	6"	3" NPT	65.0	28.0	37.0	5.38	5.6	169
150S150-8	A	15	6"	3" NPT	68.8	28.0	40.8	5.38	5.6	174
150S200-9	A	20	6"	3" NPT	75.2	30.6	44.6	5.38	5.6	191
150S200-10	A	20	6"	3" NPT	79.0	30.6	48.4	5.38	5.6	193
150S200-11	A	20	6"	3" NPT	82.8	30.6	52.2	5.38	5.6	198
150S250-12	A	25	6"	3" NPT	89.0	33.1	55.9	5.38	5.6	235
150S250-13	A	25	6"	3" NPT	92.8	33.1	59.7	5.38	5.6	238
150S250-14	A	25	6"	3" NPT	96.6	33.1	63.5	5.38	5.6	242
150S300-15	A	30	6"	3" NPT	103.0	35.7	67.3	5.38	5.6	260
150S300-16	A	30	6"	3" NPT	106.8	35.7	71.1	5.38	5.6	262
150S300-17	A	30	6"	3" NPT	110.5	35.7	74.8	5.38	5.6	266
150S400-18	A	40	6"	3" NPT	119.4	40.8	78.6	5.38	5.6	306
150S400-19	A	40	6"	3" NPT	123.2	40.8	82.4	5.38	5.6	308
150S400-20	A	40	6"	3" NPT	127.0	40.8	86.2	5.38	5.6	323
150S400-21	A	40	6"	3" NPT	130.8	40.8	90.0	5.38	5.7	334
150S400-22	A	40	6"	3" NPT	134.5	40.8	93.7	5.38	5.7	338
150S400-23	A	40	6"	3" NPT	138.3	40.8	97.5	5.38	5.7	340
150S500-24	A	50	6"	3" NPT	162.2	57.8	104.4	5.38	6.1	442
150S500-25	A	50	6"	3" NPT	166.0	57.8	108.2	5.38	6.1	444
150S500-26	A	50	6"	3" NPT	169.8	57.8	112.0	5.38	6.1	446
150S500-27	A	50	6"	3" NPT	173.6	57.8	115.8	5.38	6.1	448
150S500-28	A	50	6"	3" NPT	183.4	63.8	119.6	5.38	7.1	450
150S600-29	A	60	6"	3" NPT	193.7	63.8	129.9	5.38	7.1	448
150S600-31	A	60	6"	3" NPT	201.3	63.8	137.5	5.38	7.1	452
150S600-33	A	60	6"	3" NPT	208.8	63.8	145.0	5.38	7.1	456
150S500-24	A	50	8"	3" NPT	143.2	38.8	104.4	7.50	7.5	492
150S500-25	A	50	8"	3" NPT	147.0	38.8	108.2	7.50	7.5	495
150S500-26	A	50	8"	3" NPT	150.8	38.8	112.0	7.50	7.5	497
150S500-27	A	50	8"	3" NPT	154.6	38.8	115.8	7.50	7.5	499
150S500-28	A	50	8"	3" NPT	158.4	38.8	119.6	7.50	7.5	501
150S600-29*	B	60	8"	3" NPT	169.7	41.8	127.9	7.50	7.5	539
150S600-31*	B	60	8"	3" NPT	177.3	41.8	135.5	7.50	7.5	543
150S600-33*	B	60	8"	3" NPT	184.8	41.8	143.0	7.50	7.5	547
150S750-36*	B	75	8"	3" NPT	201.8	47.4	154.4	7.50	7.5	592
150S750-39*	B	75	8"	3" NPT	213.1	47.4	165.7	7.50	7.5	598

NOTES: All models suitable for use in 6" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
* Built into sleeve 3" NPT discharge, 8" min. well dia.

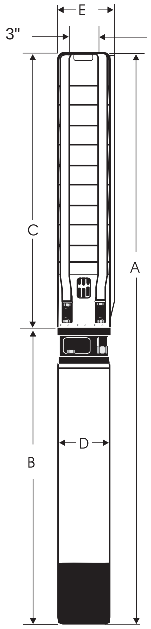


Fig. A

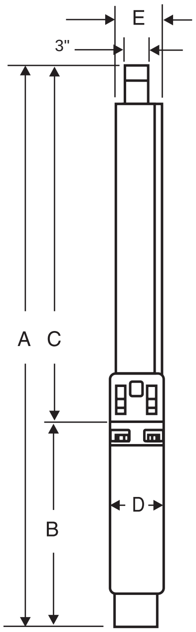


Fig. B

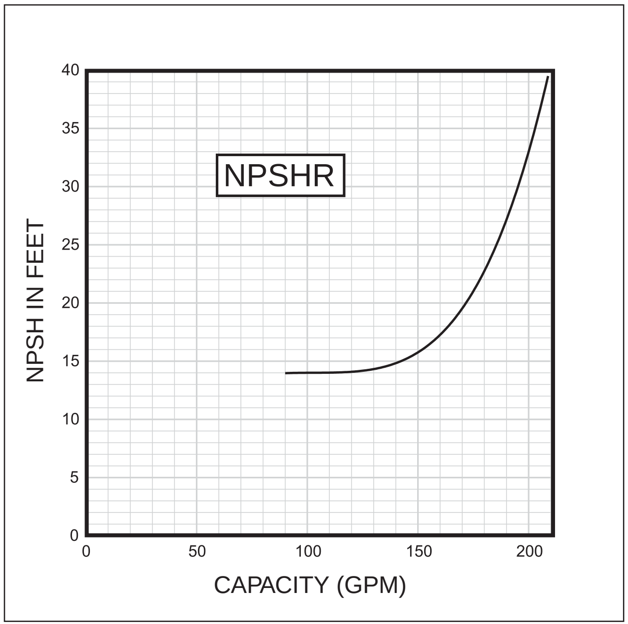
MATERIALS OF CONSTRUCTION

COMPONENT	**CYLINDRICAL SHAFT (1-39 Stgs.)**
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Seal Ring Support Plate	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Priming Inducer	304 Stainless Steel
Coupling	316/329 Stainless Steel**
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Check Valve Seat	NBR/316 Stainless Steel
Top Bearing	NBR/304 Stainless Steel
Upthrust Disc	Carbon/Graphite
Upthrust Stop Washer	304 Stainless Steel
8" Motor Adaptor Plate	304 Stainless Steel
Sleeve*	316 Stainless Steel
Sleeve Flange	304 Stainless Steel

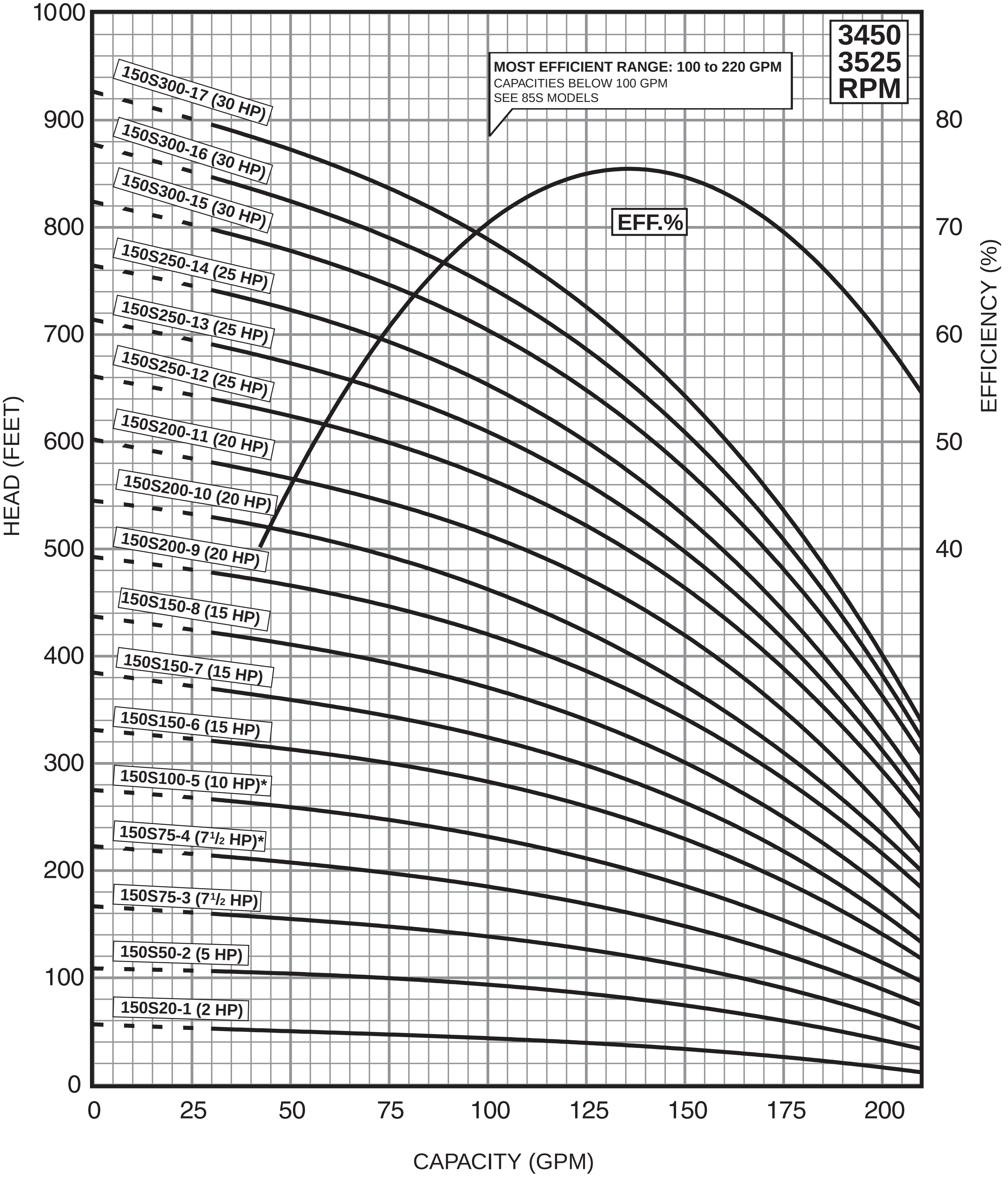
NOTES: Specifications are subject to change without notice.

***Required for 29-39 stage models.**

** 4" Coupling made of 316 Stainless Steel.



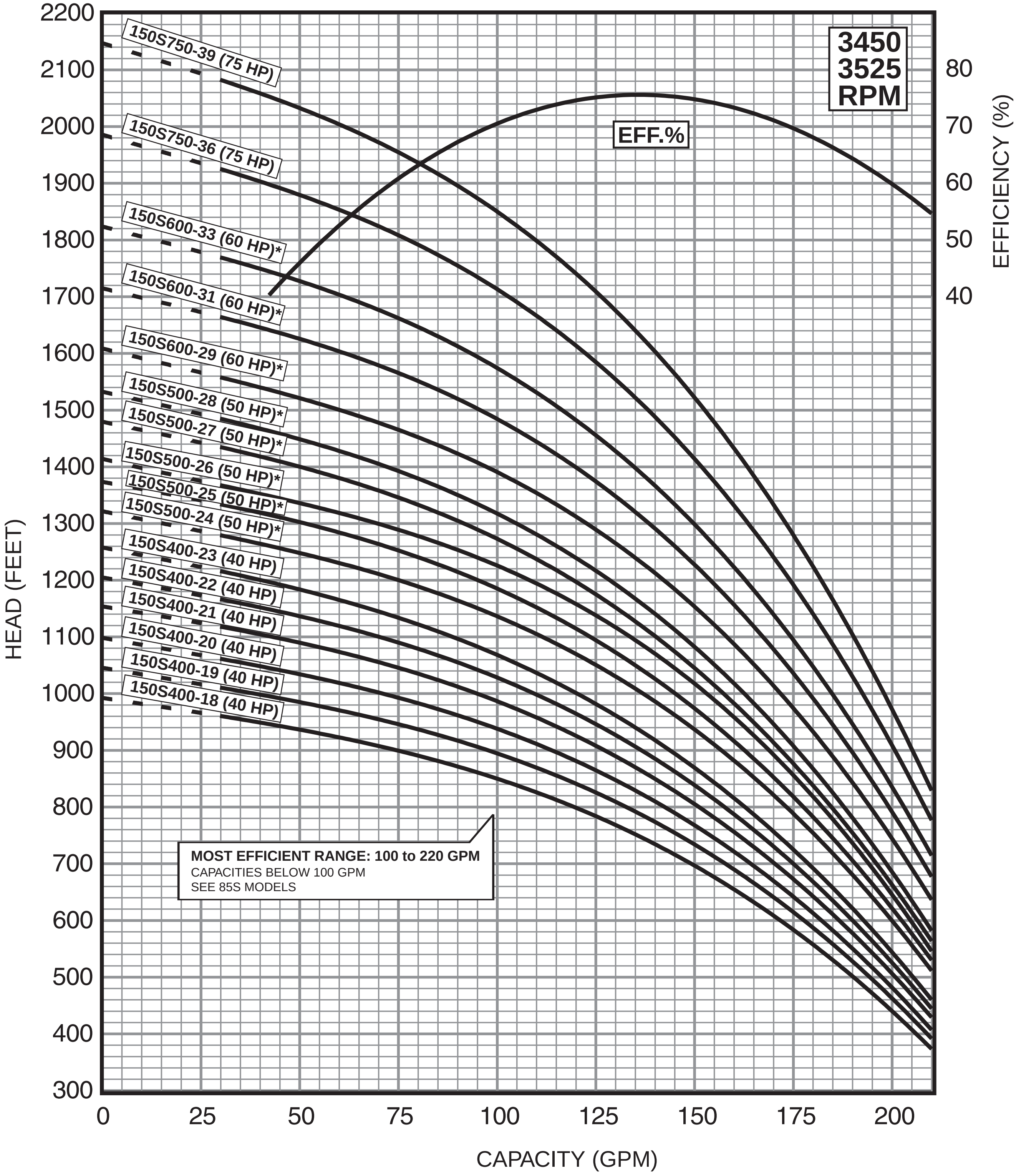
FLOW RANGE: 30 -220 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 2-10 HP/3450 RPM
6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.
8" MOTOR STANDARD, 75 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.

FLOW RANGE: 30 -220 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.
8" MOTOR STANDARD, 75 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 5 ft. min. submergence.

DIMENSIONS AND WEIGHTS

			MOTOR	DISCH.	DIMENSIONS IN INCHES					APPROX.
MODEL NO.	FIG.	HP	SIZE	SIZE	A	B	C	D	E	SHIP WT.
230S20-1B	A	2	4"	3" NPT	29.7	15.1	14.6	3.8	5.7	44
230S30-1A	A	3	4"	3" NPT	38.2	23.6	14.6	3.8	5.7	55
230S50-1	A	5	4"	3" NPT	44.2	29.6	14.6	3.8	5.7	65
230S50-2AB	A	5	4"	3" NPT	48.5	29.6	18.9	3.8	5.7	71
230S75-2	A	7.5	4"	3" NPT	48.5	29.6	18.9	3.8	5.7	88
230S75-2	A	7.5	6"	3" NPT	43.0	24.2	18.9	5.4	5.7	124
230S75-3BB	A	7.5	4"	3" NPT	53.5	29.6	23.9	3.8	5.7	96
230S75-3BB	A	7.5	6"	3" NPT	48.1	24.2	23.9	5.4	5.7	96
230S100-3	A	10	4"	3" NPT	67.8	43.9	23.9	3.8	5.7	146
230S100-3	A	10	6"	3" NPT	49.3	25.4	23.9	5.4	5.7	140
230S100-4BC	A	10	4"	3" NPT	72.3	43.9	28.4	3.8	5.7	147
230S100-4BC	A	10	6"	3" NPT	53.8	25.4	28.4	5.4	5.7	147
230S150-4	A	15	6"	3" NPT	56.4	28.0	28.4	5.4	5.7	161
230S150-5B	A	15	6"	3" NPT	60.8	28.0	32.8	5.4	5.7	165
230S200-5	A	20	6"	3" NPT	63.4	30.6	32.8	5.4	5.7	167
230S200-6	A	20	6"	3" NPT	67.8	30.6	37.3	5.4	5.7	186
230S200-7C	A	20	6"	3" NPT	67.8	30.6	37.3	5.4	5.7	202
230S250-7	A	25	6"	3" NPT	74.9	33.1	41.7	5.4	5.7	202
230S250-8B	A	25	6"	3" NPT	79.3	33.1	46.2	5.4	5.7	209
230S250-8	A	25	6"	3" NPT	79.3	33.1	46.2	5.4	5.7	209
230S250-9BB	A	25	6"	3" NPT	83.8	33.1	50.6	5.4	5.7	228
230S300-9	A	30	6"	3" NPT	86.3	35.7	50.6	5.4	5.7	228
230S400-10*	A	40	6"	3" NPT	95.9	40.81	55.1	5.4	5.7	234
230S400-11*	A	40	6"	3" NPT	100.3	40.81	59.5	5.4	5.7	273
230S400-12*	A	40	6"	3" NPT	104.8	40.81	64.0	5.4	5.7	279
230S400-13*	A	40	6"	3" NPT	109.2	40.81	68.4	5.4	5.7	284
230S500-14*	A	50	6"	3" NPT	130.7	57.83	72.9	5.4	5.7	388
230S500-15*	A	50	6"	3" NPT	135.2	57.83	77.3	5.4	5.7	393
230S500-16*	A	50	6"	3" NPT	139.6	57.83	81.8	5.4	5.7	399
230S600-17*	A	60	6"	3" NPT	151.2	63.83	87.4	5.4	5.7	438
230S600-18*	A	60	6"	3" NPT	155.6	63.83	91.8	5.4	5.7	445
230S600-19*	A	60	6"	3" NPT	160.1	63.83	96.3	5.4	5.7	449
230S600-17	A	60	8"	3" NPT	129.2	41.79	87.4	7.5	7.6	544
230S600-18	A	60	8"	3" NPT	133.6	41.79	91.8	7.5	7.6	551
230S600-19	A	60	8"	3" NPT	138.0	41.79	96.3	7.5	7.6	555
230S750-20**	B	75	8"	4" M-NPT	154.7	47.41	107.3	7.5	7.6	634
230S750-22**	B	75	8"	4" M-NPT	163.6	47.41	116.2	7.5	7.6	681

NOTES: All models suitable for use in 6" wells, unless equipped with 8" motor.
Weights include pump end with motor in lbs.
* Alternate motor sizes available.
** Built into sleeve, 4" NPT, 8" motor required.

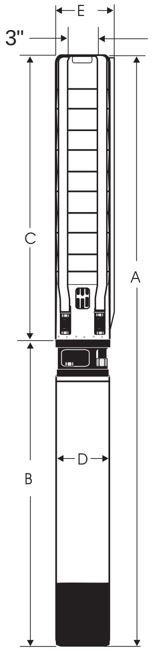


Fig. A

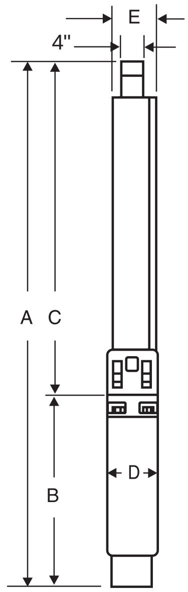
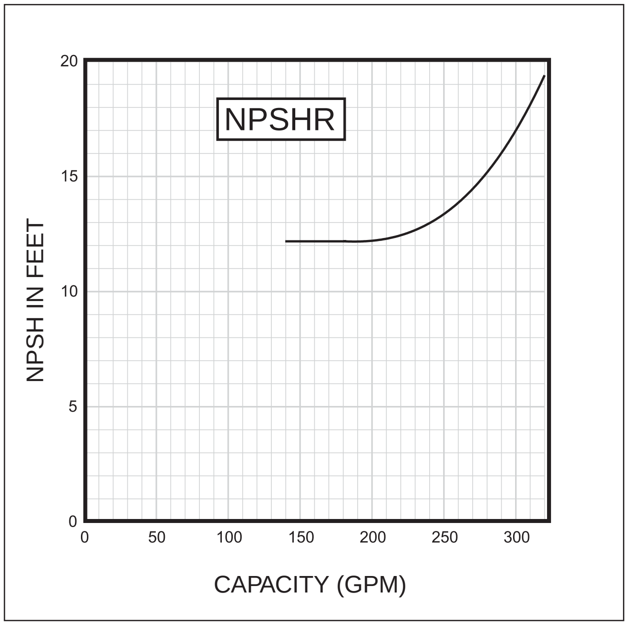


Fig. B

MATERIALS OF CONSTRUCTION

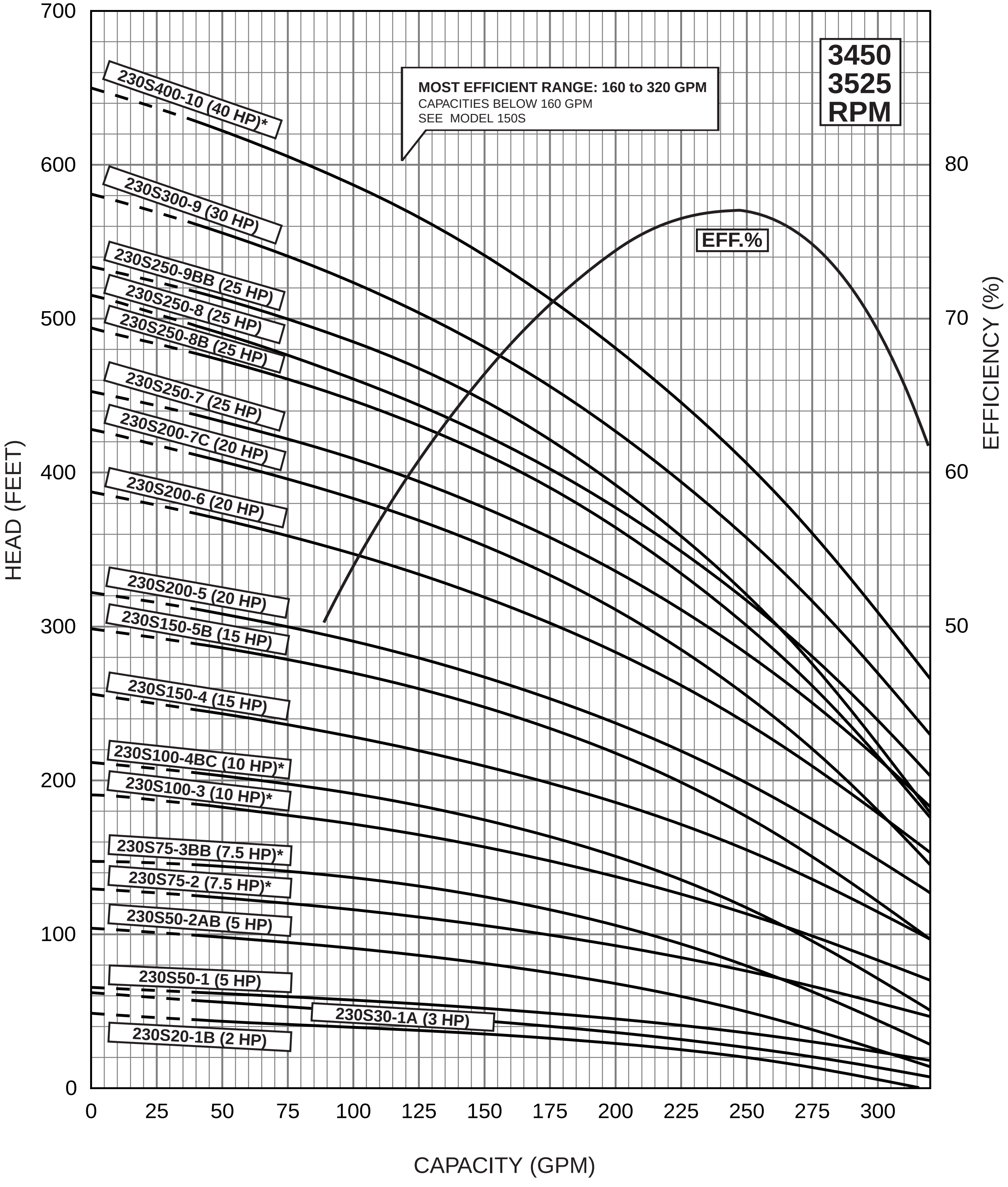
COMPONENT	CYLINDRICAL SHAFT (2-18 Stgs.)
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Coupling	316/329 Stainless Steel**
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/304 Stainless Steel
Check Valve Seat	NBR/316 Stainless Steel
Top/Lower Bearing	NBR/316 Stainless Steel
8" Motor Adaptor Plate	304 Stainless Steel
Upthrust Washer	Carbon/Graphite HY22
Upthrust stop ring	304 S.S./Tungsten Carbide
Sleeve*	304 Stainless Steel
Sleeve Flange*	304 Stainless Steel

NOTES: Specifications subject to change without notice.
* Required for 20-22 stage only.
** 4" Coupling made of 316 Stainless Steel.



PERFORMANCE CURVES 230 GPM MODEL 230S

FLOW RANGE: 160 -320 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**

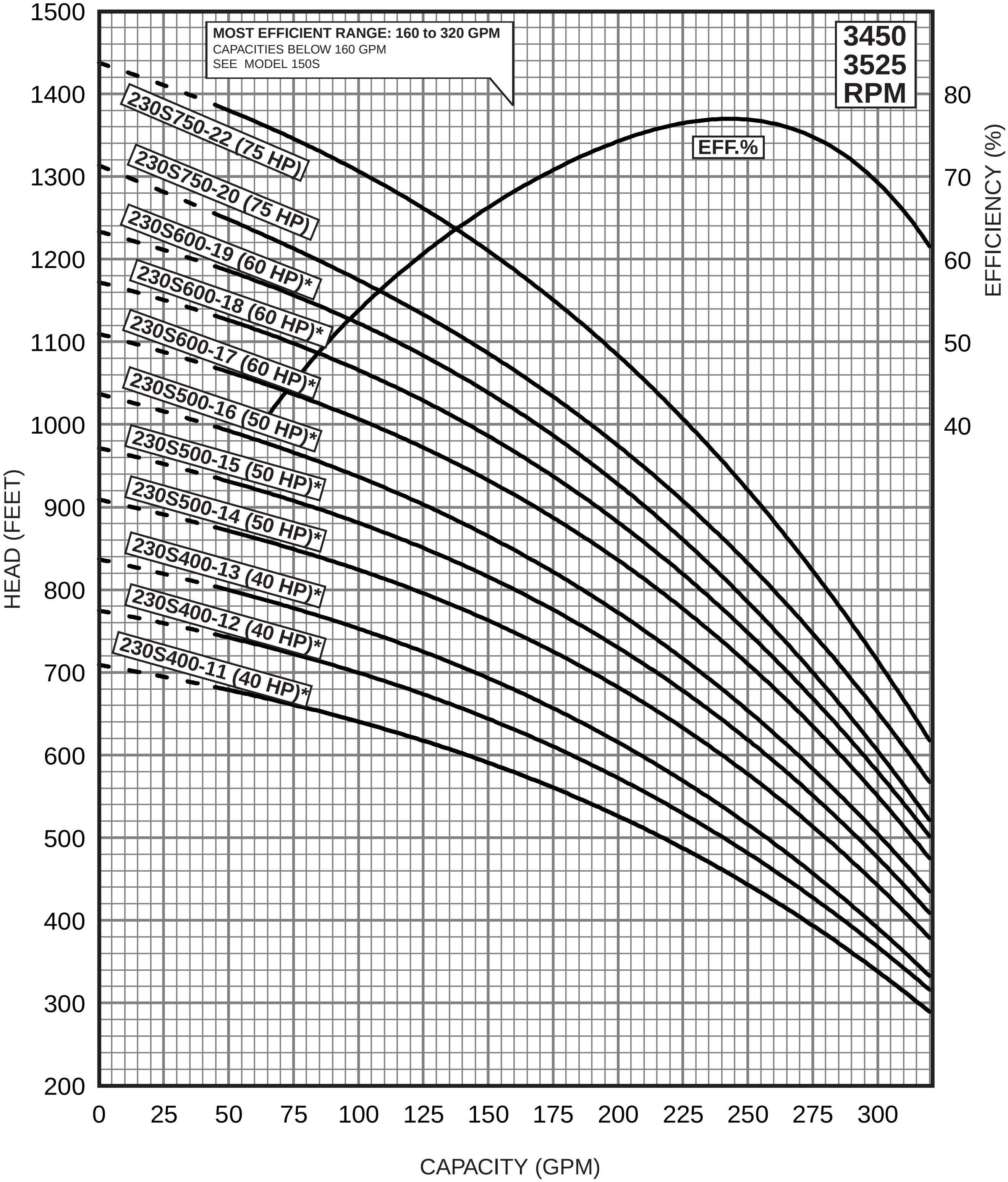


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 7.5 HP/3450 RPM
6" MOTOR STANDARD, 10-60 HP/3450 RPM.
8" MOTOR STANDARD, 75 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

MODEL 230S 230 GPM PERFORMANCE CURVES

FLOW RANGE: 160 -320 GPM **OUTLET SIZE: 3" NPT** **NOMINAL DIA. 6"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 7.5 HP/3450 RPM
6" MOTOR STANDARD, 10-60 HP/3450 RPM.
8" MOTOR STANDARD, 75 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

DIMENSIONS AND WEIGHTS

			MOTOR	DISCH.	DIMENSIONS IN INCHES					APPROX.
MODEL NO.	FIG.	HP	SIZE	SIZE	A	B	C	D	E	SHIP WT.
300S30-1B	A	3	4"	3" NPT	38.1	23.6	14.5	3.8	5.7	65
300S50-1	A	5	4"	3" NPT	44.1	29.6	14.5	3.8	5.7	82
300S50-2BB	A	5	4"	3" NPT	49.1	29.6	19.5	3.8	5.7	87
300S75-2	A	7 1/2	4"	3" NPT	43.5	24.0	19.5	3.8	5.7	113
300S75-2*	A	7 1/2	6"	3" NPT	49.1	29.6	19.5	5.4	5.7	104
300S100-3A	A	10	4"	3" NPT	67.8	43.9	23.9	3.8	5.7	154
300S100-3A	A	10	6"	3" NPT	49.3	25.4	23.9	5.4	5.7	130
300S150-3	A	15	6"	3" NPT	51.9	28.0	23.9	5.4	5.7	146
300S150-4AA	A	15	6"	3" NPT	56.4	28.0	28.4	5.4	5.7	161
300S150-4	A	15	6"	3" NPT	56.4	28.0	28.4	5.4	5.7	161
300S200-5AA	A	20	6"	3" NPT	63.4	30.6	32.8	5.4	5.7	172
300S200-5	A	20	6"	3" NPT	63.4	30.6	32.8	5.4	5.7	172
300S200-6B	A	20	6"	3" NPT	67.9	30.6	37.3	5.4	5.7	177
300S250-6	A	25	6"	3" NPT	70.4	33.1	37.3	5.4	5.7	192
300S250-7AA	A	25	6"	3" NPT	74.8	33.1	41.7	5.4	5.7	201
300S300-7	A	30	6"	4" NPT	74.8	33.1	41.7	5.4	5.7	220
300S300-8	A	30	6"	4" NPT	81.9	35.7	46.2	5.4	5.7	241
300S300-9B	A	30	6"	4" NPT	81.9	35.7	46.2	5.4	5.7	246
300S400-9*	A	40	6"	4" NPT	91.4	40.8	50.6	5.4	5.7	281
300S400-10*	A	40	6"	4" NPT	95.9	40.8	55.1	5.4	5.7	286
300S500-11*	A	50	6"	4" NPT	117.3	57.8	59.5	5.4	5.7	292
300S500-12*	A	50	6"	4" NPT	116.8	57.8	63.9	5.4	5.7	396
300S500-13*	A	50	6"	4" NPT	126.2	57.8	68.4	5.4	5.7	402
300S600-14*	A	60	6"	4" NPT	135.3	61.3	74.0	5.4	7.1	447
300S600-15*	A	60	8"	4" NPT	120.3	41.8	78.5	7.5	7.1	484
300S750-16	A	75	8"	4" NPT	130.3	47.4	82.9	7.5	7.1	540
300S750-17	A	75	8"	4" NPT	134.8	47.4	87.4	7.5	7.1	544
300S750-18	A	75	8"	4" NPT	139.2	47.4	91.8	7.5	7.1	626

NOTES: Models 2-15 Stgs. are suitable for use in 6" wells, 16-18 Stgs. are suitable for use in 8" wells.
Weights include pump end with motor in lbs.
* Alternate motor sizes available.

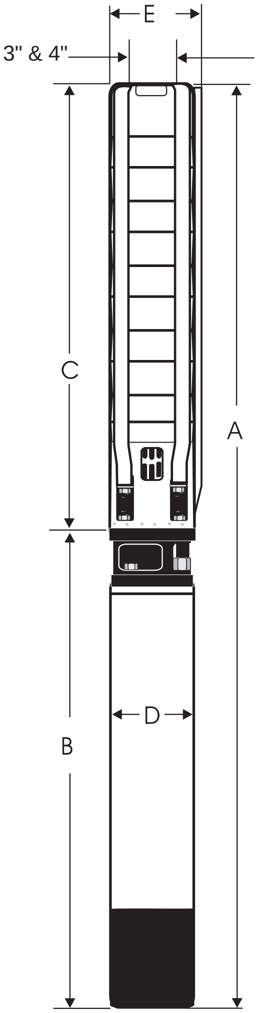


Fig. A

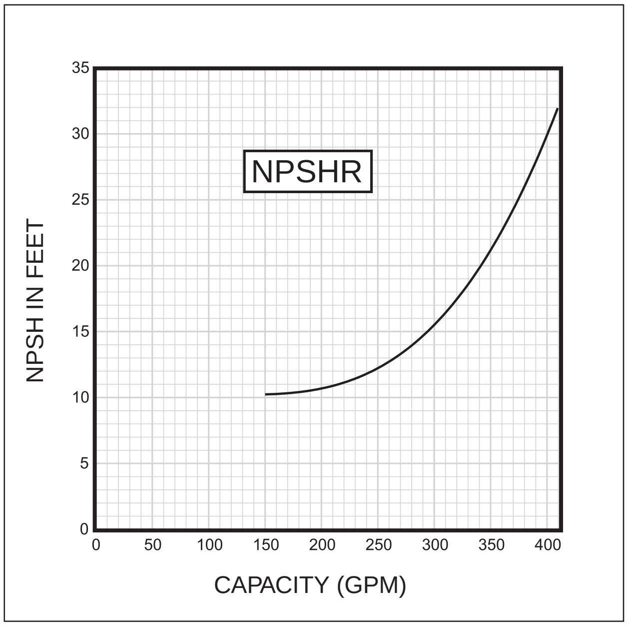
MATERIALS OF CONSTRUCTION

COMPONENT	**CYLINDRICAL SHAFT (2-18 Stgs.)**
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Coupling	316/329 Stainless Steel**
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/304 Stainless Steel
Check Valve Seat	NBR/316 Stainless Steel
Top/Lower Bearing	NBR/316 Stainless Steel
8" Motor Adaptor Plate	304 Stainless Steel
Upthrust Washer	Carbon/Graphite HY22
Upthrust stop ring	304 S.S./Tungsten Carbide

NOTES: Specifications are subject to change without notice.

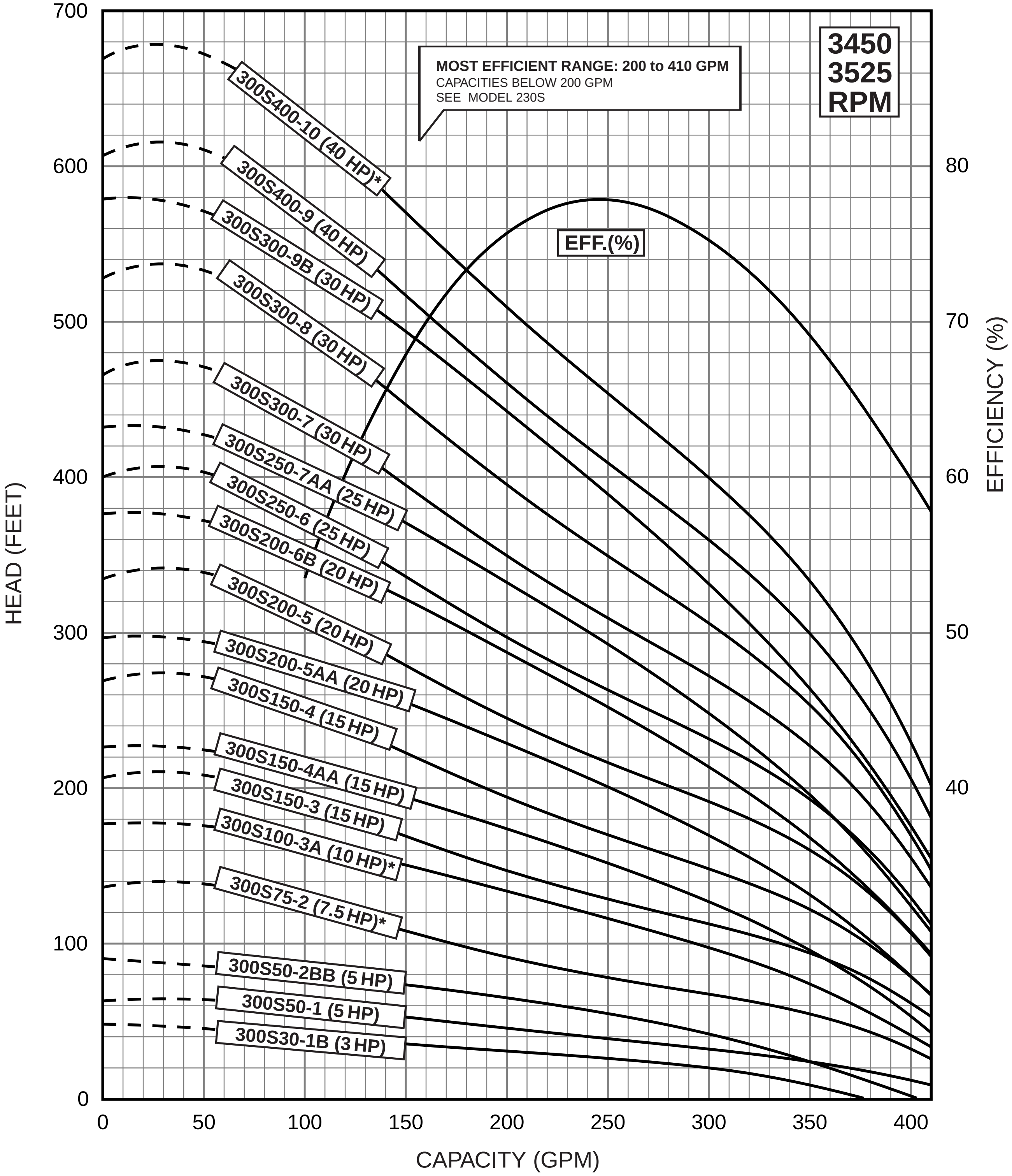
***Stainless Steel options available.**

** 4" Coupling made of 316 Stainless Steel.



PERFORMANCE CURVES 300 GPM MODEL 300S

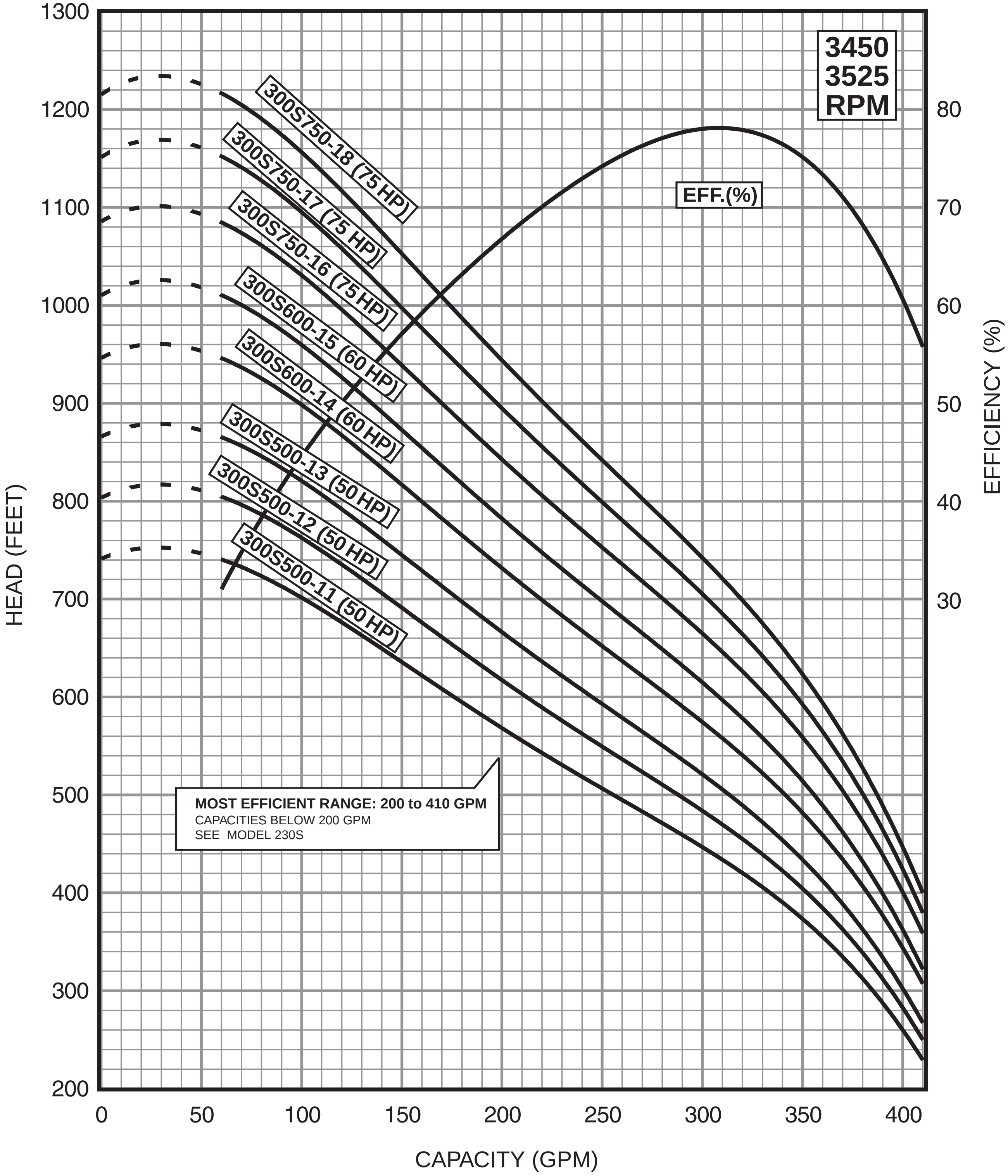
FLOW RANGE: 60 -410 GPM **OUTLET SIZE: 3"& 4" NPT*** **NOMINAL DIA. 6"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 7.5 HP/3450 RPM.
6" MOTOR STANDARD,15-60 HP/3450 RPM.
8" MOTOR STANDARD, 75 HP/3525 RPM.
* 3" NPT 2-6 STAGES, 4" NPT 7-18 STAGES.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

FLOW RANGE: 60 -410 GPM **OUTLET SIZE: 3"& 4" NPT*** **NOMINAL DIA. 6"**

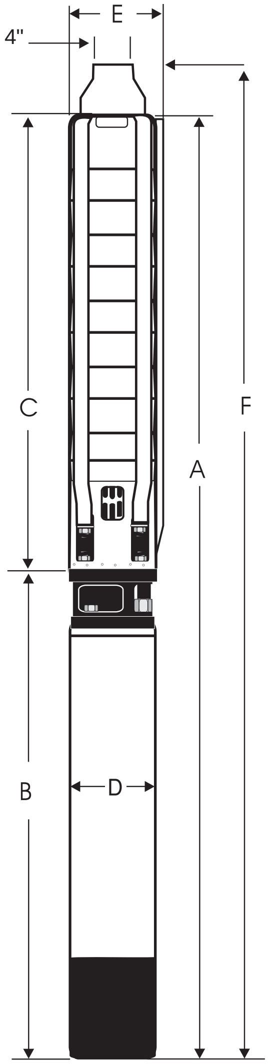


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
4" MOTOR STANDARD, 7.5 HP/3450 RPM.
6" MOTOR STANDARD,15-60 HP/3450 RPM.
8" MOTOR STANDARD, 75 HP/3525 RPM.
* 3" NPT 2-6 STAGES, 4" NPT 7-18 STAGES.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES						APPROX. SHIP WT.
					A	B	C	D	E	F	
385S75-1	A	7.5	6"	4" NPT	48.3	24.0	24.3	5.4	7.0	53.1	148
385S100-2BA	A	10	6"	4" NPT	54.8	25.4	29.4	5.4	7.0	59.6	178
385S150-2	A	15	6"	4" NPT	57.4	28.0	29.4	5.4	7.0	62.2	192
385S200-3A	A	20	6"	4" NPT	65.0	30.6	34.4	5.4	7.0	69.8	223
385S250-3	A	25	6"	4" NPT	67.5	33.1	34.4	5.4	7.0	72.3	210
385S250-4B	A	25	6"	4" NPT	72.6	33.1	39.5	5.4	7.0	77.4	210
385S300-4	A	30	6"	4" NPT	75.2	35.7	39.5	5.4	7.0	80.0	243
385S300-5BB	A	30	6"	4" NPT	80.2	35.7	44.5	5.4	7.0	85.0	252
385S400-5*	A	40	6"	4" NPT	85.3	40.8	44.5	5.4	7.0	90.1	276
385S400-6B	A	40	6"	4" NPT	90.4	40.8	49.6	5.4	7.0	95.2	285
385S500-6*	A	50	6"	4" NPT	107.4	57.8	49.6	5.4	7.0	112.2	285
385S500-7A	A	50	6"	4" NPT	113.0	57.8	55.2	5.4	7.0	117.8	450
385S600-7*	A	60	6"	4" NPT	119.0	63.8	55.2	5.4	7.0	123.8	450
385S600-8*	A	60	6"	4" NPT	124.0	63.8	60.2	5.4	7.0	128.8	459
385S750-9	A	75	8"	4" NPT	112.7	47.4	65.3	7.6	7.7	117.5	577
385S750-10	A	75	8"	4" NPT	117.7	47.4	70.3	7.6	7.7	122.5	586
385S1000-11	A	100	8"	4" NPT	130.3	54.91	75.4	7.6	7.7	135.1	672
385S1000-12	A	100	8"	4" NPT	135.3	54.91	80.4	7.6	7.7	140.1	701
385S1000-13	A	100	8"	4" NPT	140.3	54.91	85.4	7.6	7.7	145.1	709
Pipe Adapter	A									4.8	

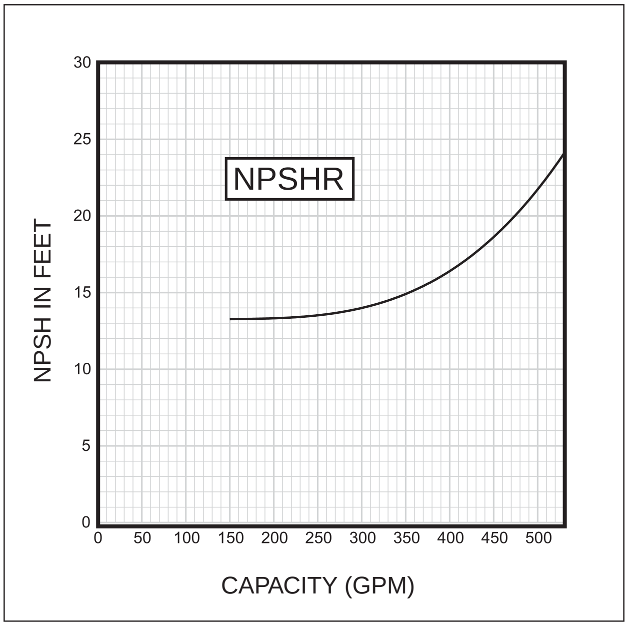


NOTES: All models suitable for use in 8" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
*Alternate motor sizes available.
All models come with a standard 5"-4" Pipe Adapter. Refer to chart for dimensions.

MATERIALS OF CONSTRUCTION

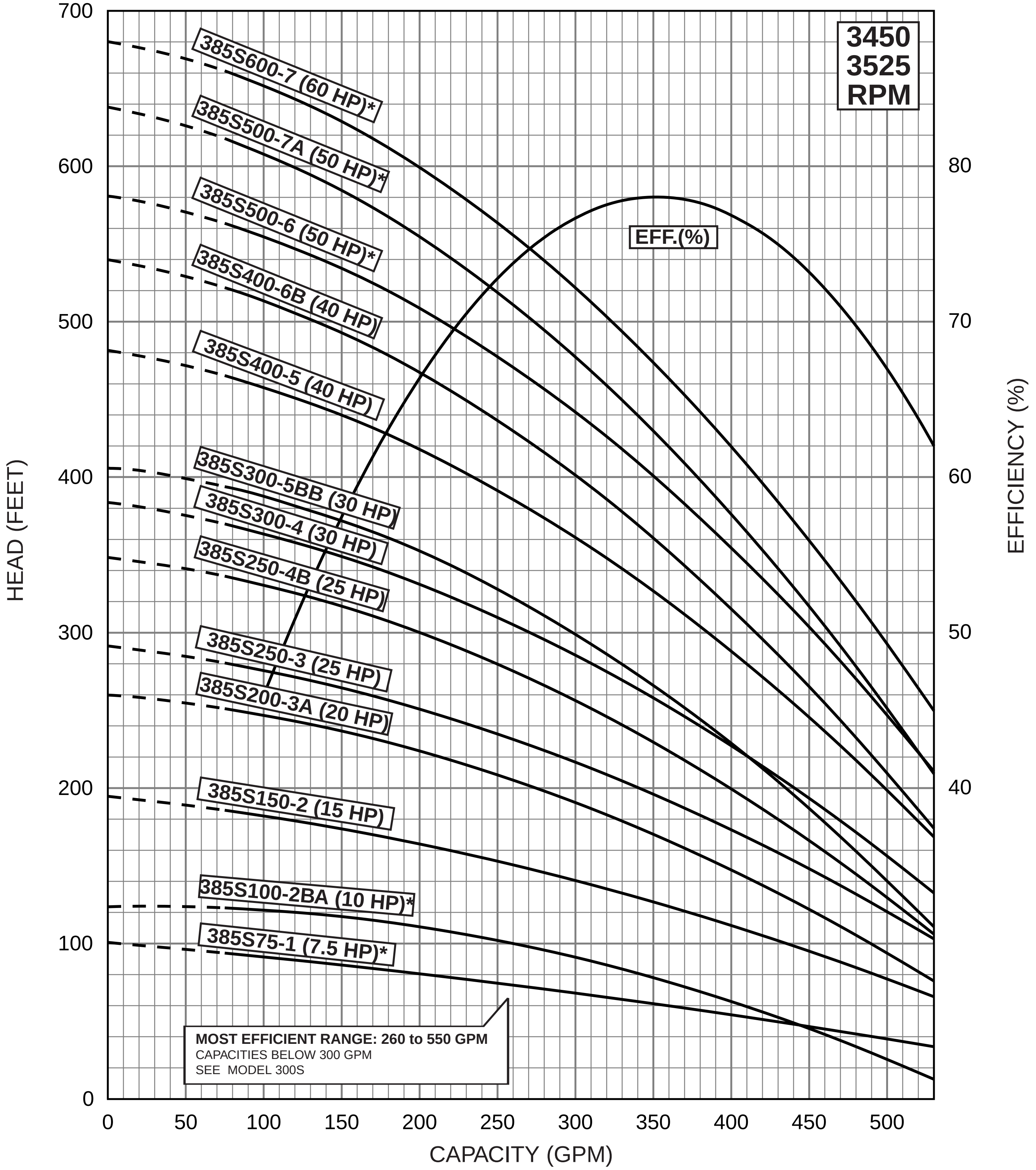
COMPONENT	CYLINDRICAL SHAFT (1-13 Stgs.)
Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Coupling	316/329 Stainless Steel
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Lower Bearing	NBR/316 Stainless Steel
Upthrust Washer	Carbon/Graphite HY22
Upthrust stop ring	304 S.S./Tungsten Carbide
O-Ring	NBR
Valve Seat	304 Stainless Steel
Lower Valve Seat Retainer	316 Stainless Steel
Upper Valve Seat Retainer	304 Stainless Steel
Valve Guide	304 Stainless Steel
Valve Cup Spring	304 Stainless Steel

NOTES: Specifications are subject to change without notice.



PERFORMANCE CURVES 385 GPM MODEL 385S

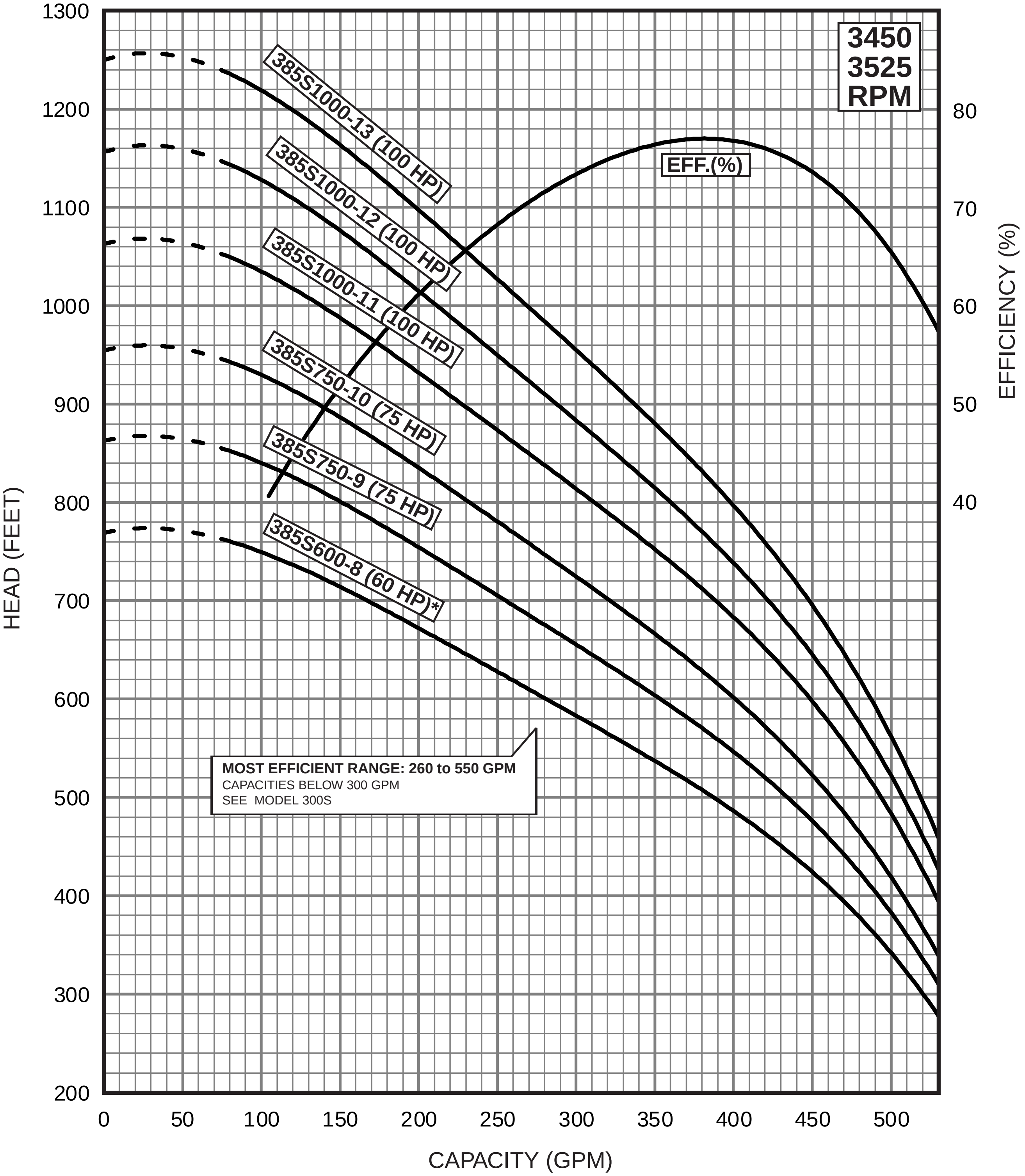
FLOW RANGE: 75 - 550 GPM **OUTLET SIZE: 4" NPT** **NOMINAL DIA. 8"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.
8" MOTOR STANDARD,75-100 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

FLOW RANGE: 75 - 550 GPM **OUTLET SIZE: 4" NPT** **NOMINAL DIA. 8"**



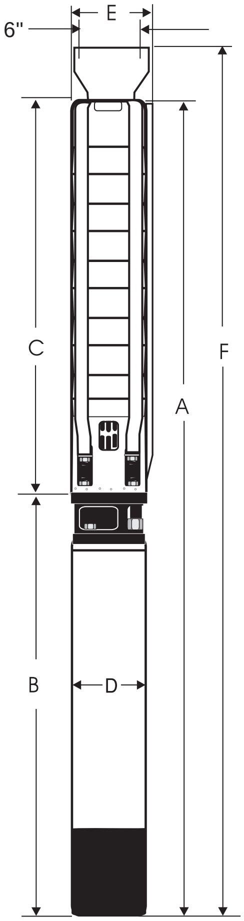
SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 7.5-60 HP/3450 RPM.
8" MOTOR STANDARD,75-100 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

DIMENSIONS AND WEIGHTS

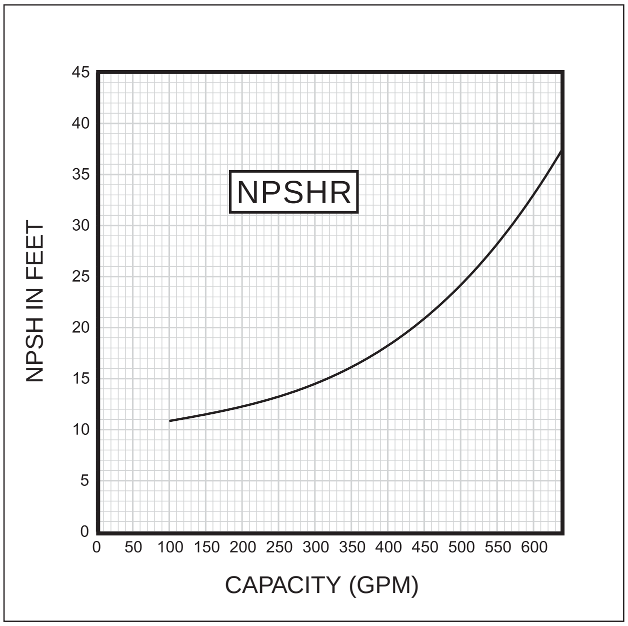
MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES A	B	C	D	E	F	APPROX. SHIP WT.
475S75-1A	A	7.5	6"	6" NPT	48.5	24.2	24.3	5.4	7	54.6	161
475S100-1	A	10	6"	6" NPT	49.7	25.4	24.3	5.4	7	55.8	171
475S150-2B	A	15	6"	6" NPT	57.4	28.0	29.4	5.4	7	63.5	195
475S200-2	A	20	6"	6" NPT	60.0	30.6	29.4	5.4	7	66.1	210
475S250-3A	A	25	6"	6" NPT	67.5	33.1	34.4	5.4	7	73.6	230
475S300-3	A	30	6"	6" NPT	70.1	35.7	34.4	5.4	7	76.2	230
475S300-4AB	A	30	6"	6" NPT	75.2	35.7	39.5	5.4	7	81.3	295
475S400-4*	A	40	6"	6" NPT	80.3	40.8	39.5	5.4	7	86.4	328
475S500-5B*	A	40	6"	6" NPT	85.3	40.8	44.5	5.4	7	91.4	336
475S500-5*	A	50	6"	6" NPT	102.5	58.0	44.5	5.4	7	108.6	428
475S500-6A*	A	50	6"	6" NPT	108.1	58.0	50.1	5.4	7	114.2	437
475S600-6*	A	60	6"	6" NPT	111.8	61.7	50.1	5.4	7.0	117.9	403
475S600-7*	A	60	6"	6" NPT	116.9	61.7	55.2	5.4	7.0	123.0	467
475S750-8	A	75	8"	6" NPT	107.6	47.4	60.2	7.5	7.7	113.6	547
475S1000-9	A	100	8"	6" NPT	120.1	54.9	65.2	7.5	7.7	126.2	641
475S1000-10	A	100	8"	6" NPT	125.2	54.9	70.3	7.5	7.7	131.2	648
475S1000-11	A	100	8"	6" NPT	130.3	54.9	75.4	7.5	7.7	136.4	654
475S1250-12	A	125	8"	6" NPT	149.2	68.8	80.4	7.5	7.7	155.3	862
475S1250-13	A	125	8"	6" NPT	154.3	68.8	85.5	7.5	7.7	160.4	868
Pipe Adapter	A									6.1	

NOTES: All models suitable for use in 8" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
*Alternate motors sizes available.
All models come with a standard 5"-6" Pipe Adapter refer to chart for dimensions.



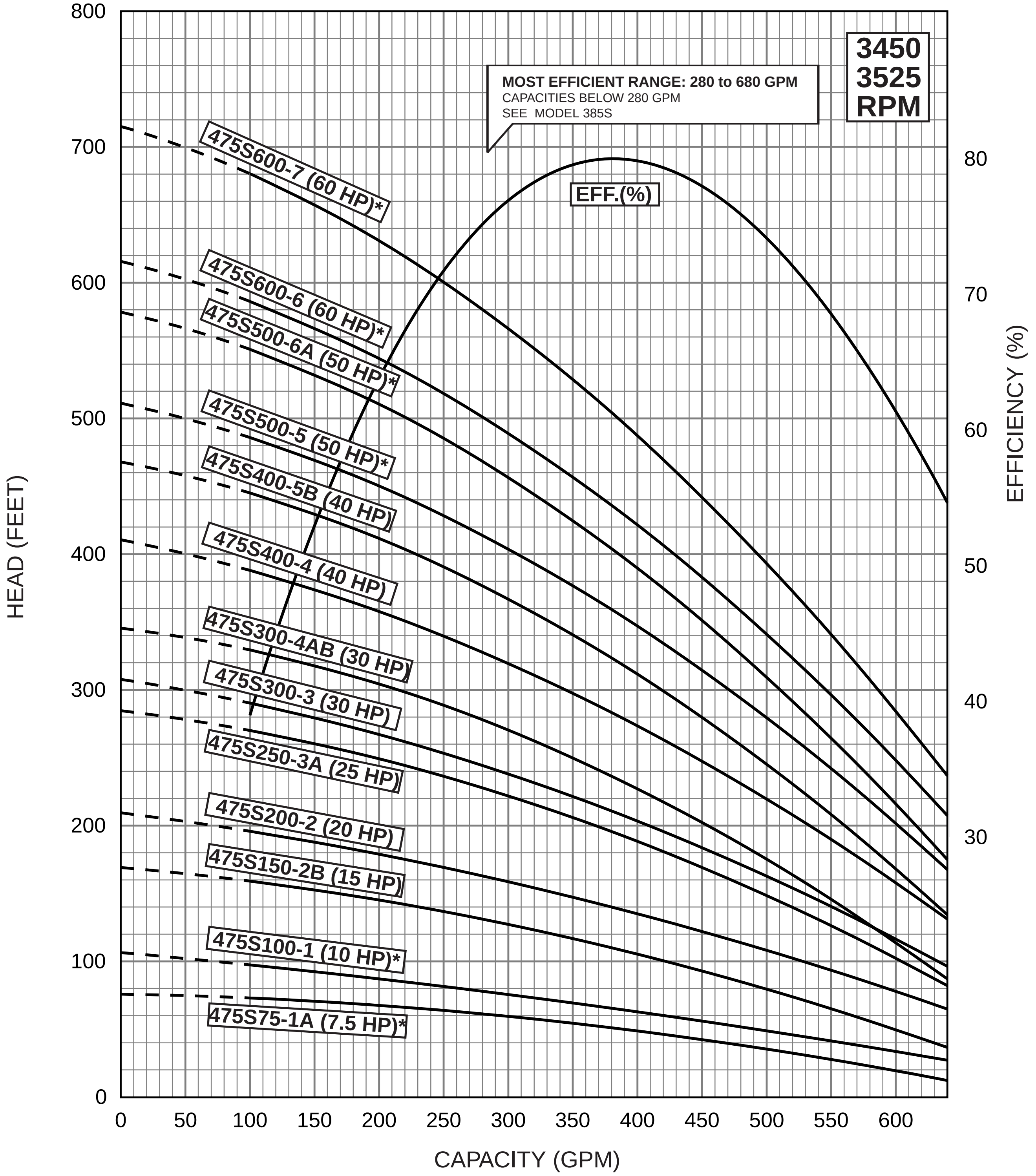
MATERIALS OF CONSTRUCTION

COMPONENT	CYLINDRICAL SHAFT (1-13 Stgs.)
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Coupling	316/329 Stainless Steel
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Check Valve Seat	NBR/316 Stainless Steel
Lower Bearing	NBR/316 Stainless Steel
Upthrust Washer	Carbon/Graphite HY22
Upthrust stop ring	304 S.S./Tungsten Carbide
O-Ring	NBR
Valve Seat	304 Stainless Steel
Lower Valve Seat Retainer	316 Stainless Steel
Upper Valve Seat Retainer	304 Stainless Steel
Valve Guide	304 Stainless Steel
Valve Cup Spring	304 Stainless Steel
NOTES: Specifications are subject to change without notice.	



PERFORMANCE CURVES 475 GPM MODEL 475S

FLOW RANGE: 95 - 680 GPM **OUTLET SIZE: 6" NPT** **NOMINAL DIA. 8"**

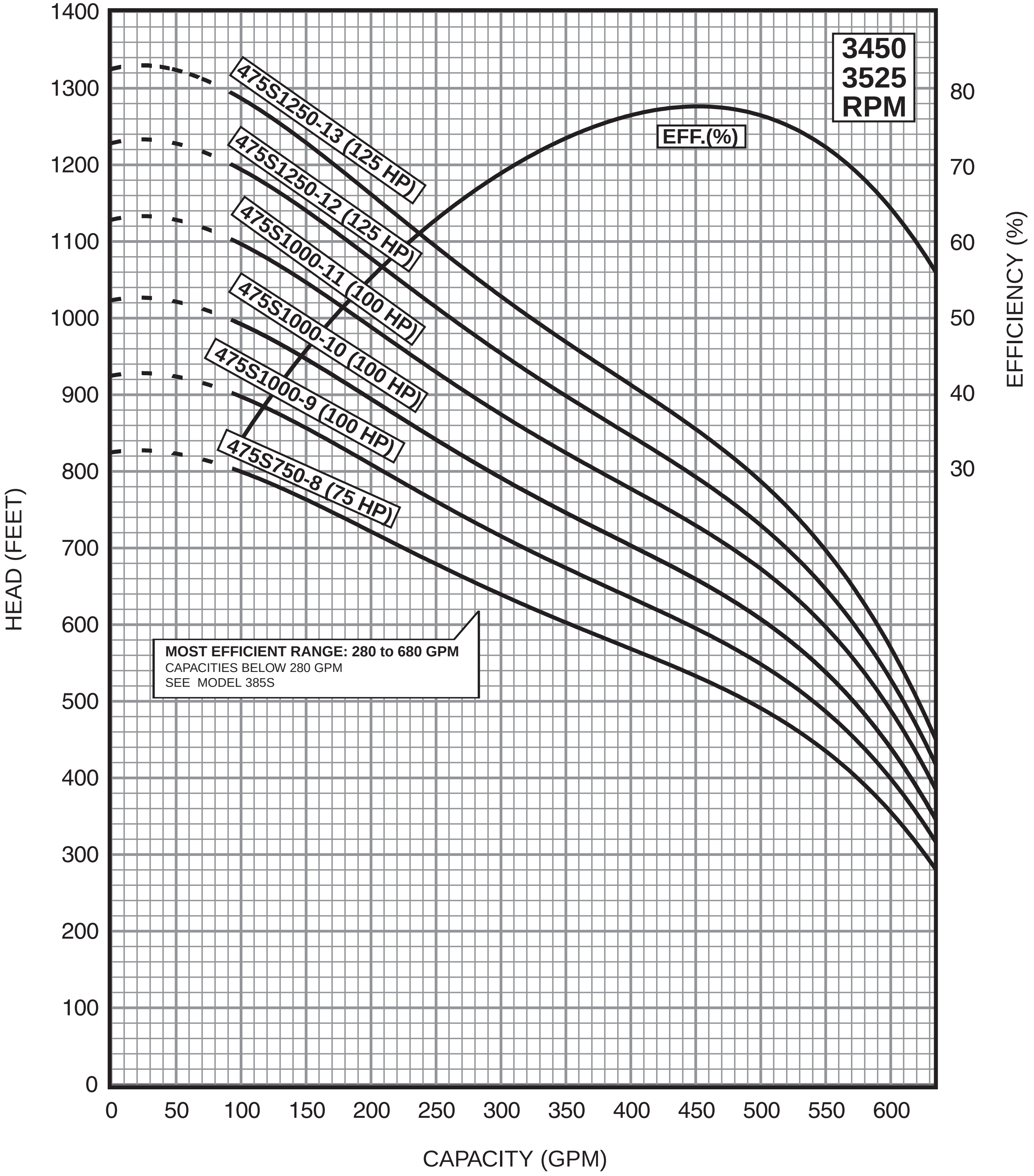


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 10-60 HP/3450 RPM.
8" MOTOR STANDARD,75-125 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

MODEL 475S 475 GPM PERFORMANCE CURVES

FLOW RANGE: 95 - 680 GPM **OUTLET SIZE: 6" NPT** **NOMINAL DIA. 8"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 10-60 HP/3450 RPM.
8" MOTOR STANDARD,75-125 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 8 ft. min. submergence.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
625S150-1A	A	15	6"	6" NPT	50.6	25	25.6	5.4	8.3	208
625S250-1	A	25	6"	6" NPT	58.7	33.1	25.6	5.4	8.3	235
625S300-2AA	A	30	6"	6" NPT	63.8	32	31.8	5.4	8.3	296
625S400-2A	A	40	6"	6" NPT	66.2	34.4	31.8	5.4	8.3	307
625S400-2*	A	40	6"	6" NPT	66.2	34.4	31.8	5.4	8.3	320
625S500-3AA*	A	50	6"	6" NPT	93.6	55.7	37.9	5.4	8.3	415
625S600-3A*	A	60	6"	6" NPT	99.6	61.7	37.9	5.4	8.3	448
625S600-3*	A	60	6"	6" NPT	99.6	61.7	37.9	5.4	8.3	448
625S750-4AA	A	75	8"	6" NPT	91.4	47.4	44.0	7.5	8.6	560
625S750-4A	A	75	8"	6" NPT	91.4	47.4	44.0	7.6	8.6	560
625S1000-4	A	100	8"	6" NPT	98.9	54.9	44.0	7.6	8.6	638
625S1000-5AA	A	100	8"	6" NPT	105.0	54.9	50.1	7.6	8.6	661
625S1000-5A	A	100	8"	6" NPT	105.0	54.9	50.1	7.6	8.6	661
625S1000-5	A	100	8"	6" NPT	105.0	54.9	50.1	7.6	8.6	661
625S1250-6AA	A	125	8"	6" NPT	125.0	68.8	56.2	7.7	8.6	855
625S1250-6A	A	125	8"	6" NPT	125.0	68.8	56.2	7.7	8.6	855
625S1250-6	A	125	8"	6" NPT	125.0	68.8	56.2	7.7	8.6	855
625S1250-7AA	A	125	8"	6" NPT	131.2	68.8	62.4	7.7	8.6	890
625S1500-7A	A	150	8"	6" NPT	140.2	77.8	62.4	7.7	8.6	983
625S1500-7	A	150	8"	6" NPT	140.2	77.8	62.4	7.7	8.6	983

NOTES: All models suitable for use in 10" wells unless otherwise noted.
Weights include pump end with motor in lbs.
*Alternate motor sizes available.

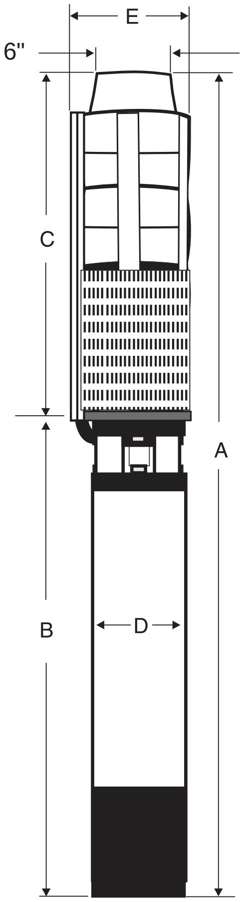
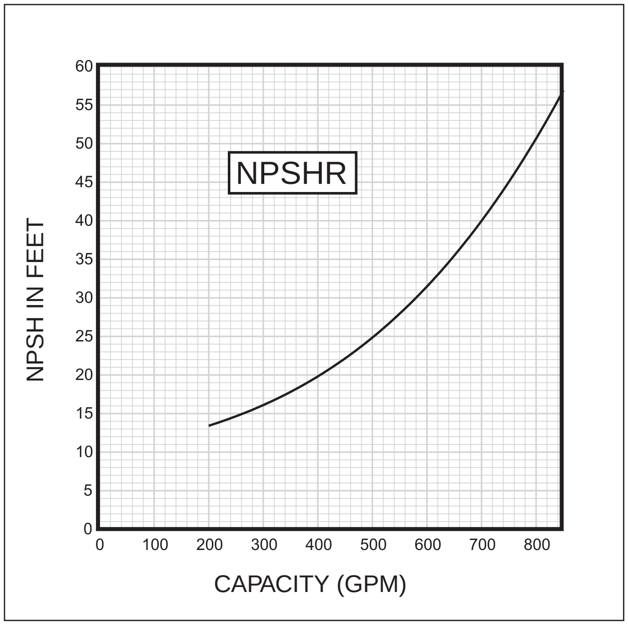


Fig. A

MATERIALS OF CONSTRUCTION

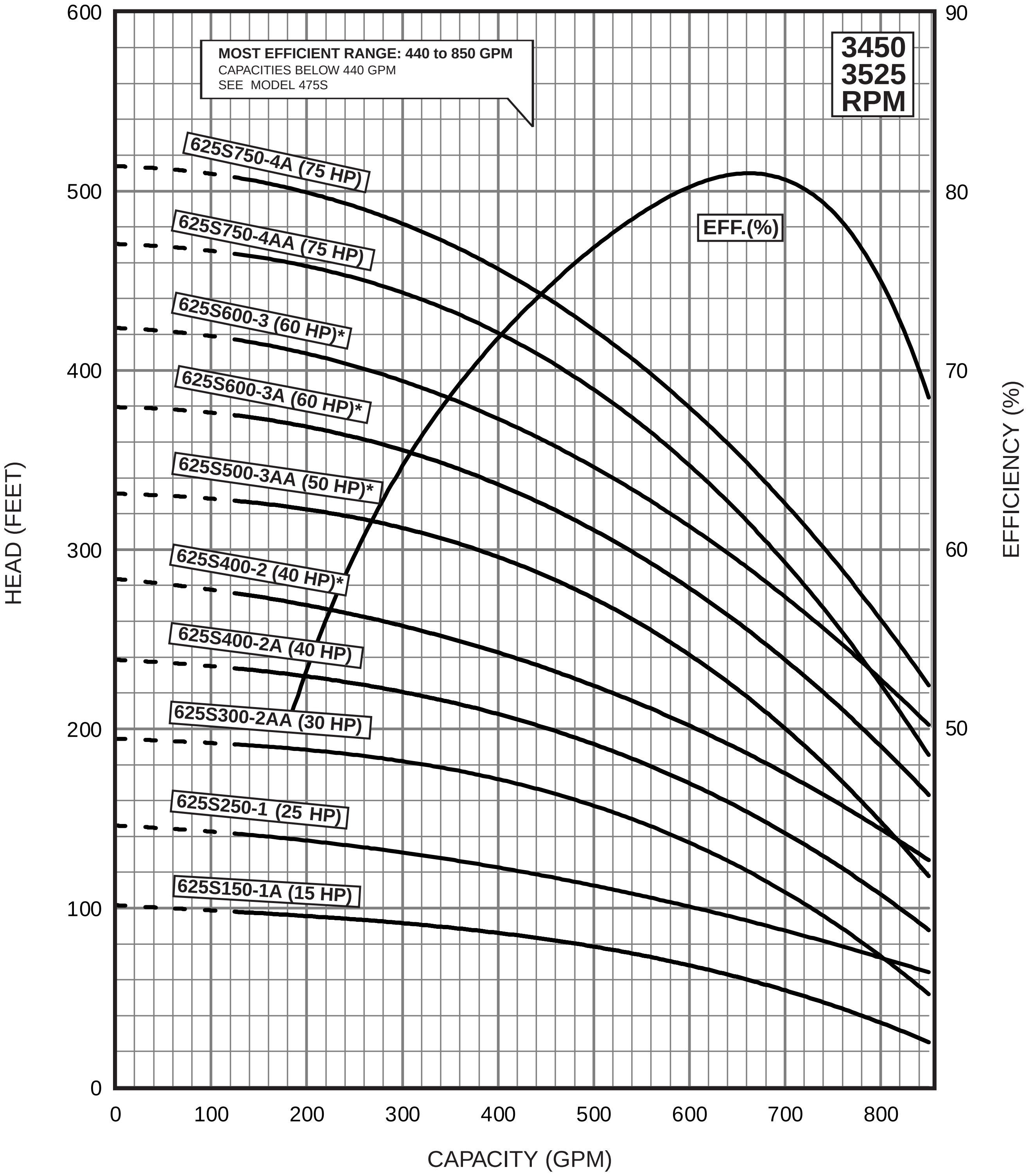
COMPONENT	CYLINDRICAL SHAFT (1-7 Stgs.)
Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	304 Stainless Steel
Coupling	316/329 Stainless Steel
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Check Valve Seat	NBR/316 Stainless Steel
Top Bearing	NBR/304 Stainless Steel
Upthrust Disc	Carbon/Graphite HY22
Check Valve Spring	401 Stainless Steel
O-Ring	NBR
Valve Seat	304 Stainless Steel
Lower Valve Seat Retainer	304 Stainless Steel
Upper Valve Seat Retainer	316 Stainless Steel
Valve Guide	304 Stainless Steel

NOTES: Specifications are subject to change without notice.



PERFORMANCE CURVES 625 GPM MODEL 625S

FLOW RANGE: 125 - 850 GPM **OUTLET SIZE: 6" NPT** **NOMINAL DIA. 10"**

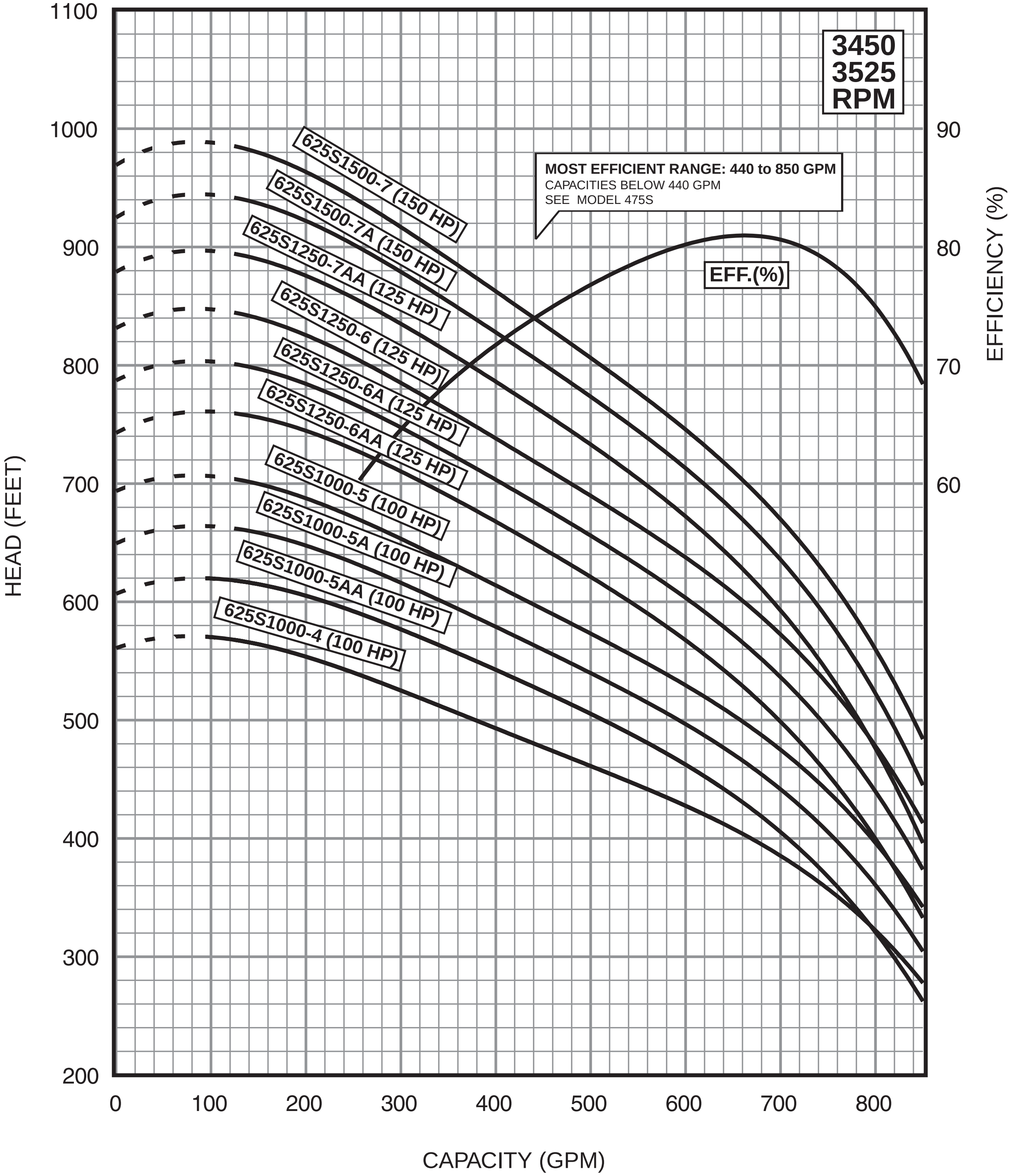


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD,15-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-150 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 10 ft. min. submergence.

MODEL 625S 625 GPM PERFORMANCE CURVES

FLOW RANGE: 125 - 850 GPM **OUTLET SIZE: 6" NPT** **NOMINAL DIA. 10"**



MOST EFFICIENT RANGE: 440 to 850 GPM
CAPACITIES BELOW 440 GPM
SEE MODEL 475S

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD,15-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-150 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 10 ft. min. submergence.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
800S200-1A	A	20	6"	6" NPT	53.1	27.5	25.6	5.4	8.3	219
800S300-1	A	30	6"	6" NPT	57.6	32.0	25.6	5.4	8.3	241
800S400-2AA*	A	40	6"	6" NPT	66.2	34.4	31.8	5.4	8.3	320
800S500-2A*	A	50	6"	6" NPT	87.5	55.7	31.8	5.4	8.3	402
800S500-2*	A	50	6"	6" NPT	87.5	55.7	31.8	5.4	8.3	402
800S600-3AA*	A	60	6"	6" NPT	99.6	61.7	37.9	5.4	8.3	448
800S400-2AA*	A	40	8"	6" NPT	66.2	34.4	31.8	7.5	8.6	459
800S500-2A*	A	50	8"	6" NPT	87.5	55.7	31.8	7.5	8.6	499
800S500-2*	A	50	8"	6" NPT	87.5	55.7	31.8	7.5	8.6	499
800S600-3AA*	A	60	8"	6" NPT	99.6	61.7	37.9	7.5	8.6	477
800S750-3A	A	75	8"	6" NPT	85.3	47.4	37.9	7.5	8.6	547
800S750-3	A	75	8"	6" NPT	85.3	47.4	37.9	7.5	8.6	547
800S1000-4AA	A	100	8"	6" NPT	98.9	54.9	44.0	7.5	8.6	635
800S1000-4A	A	100	8"	6" NPT	98.9	54.9	44.0	7.5	8.6	635
800S1000-4	A	100	8"	6" NPT	98.9	54.9	44.0	7.5	8.6	635
800S1250-5AA	A	125	8"	6" NPT	118.9	68.8	50.1	7.5	8.6	837
800S1250-5A	A	125	8"	6" NPT	118.9	68.8	50.1	7.7	8.6	837
800S1250-5	A	125	8"	6" NPT	118.9	68.8	50.1	7.7	8.6	837

NOTES: All models suitable for use in 10" wells, unless otherwise noted.
Weights include pump end with motor in lbs.
*Alternate motor sizes available.

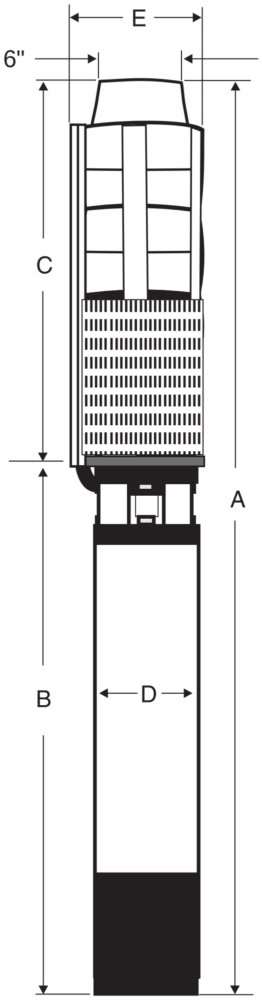
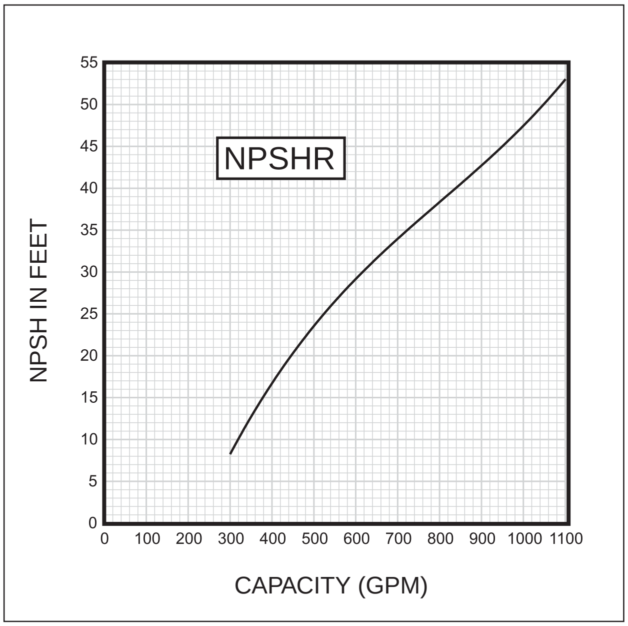


Fig. A

MATERIALS OF CONSTRUCTION

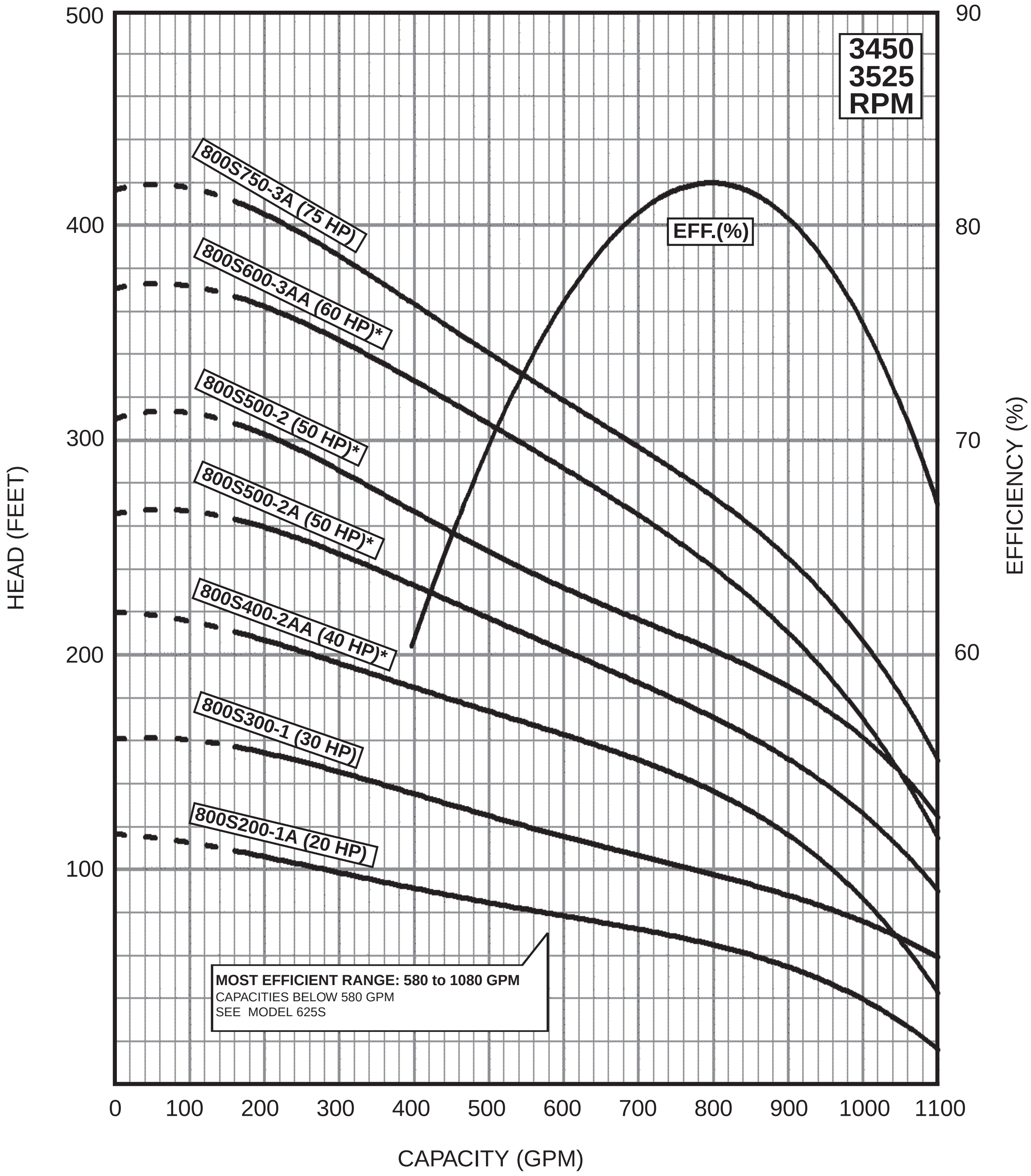
COMPONENT	CYLINDRICAL SHAFT
Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	316 Stainless Steel
Coupling	316/329 Stainless Steel
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Top Bearing	NBR/316 Stainless Steel
Upthrust Disc	Carbon/Graphite HY22
O-Ring	NBR
Valve Seat	304 Stainless Steel
Lower Valve Seat Retainer	316 Stainless Steel
Upper Valve Seat Retainer	304 Stainless Steel
Valve Guide	304 Stainless Steel
Valve Cup Spring	304 Stainless Steel

NOTES: Specifications are subject to change without notice.



PERFORMANCE CURVES 800 GPM MODEL 800S

FLOW RANGE: 160 - 1100 GPM **OUTLET SIZE: 6" NPT** **NOMINAL DIA. 10"**



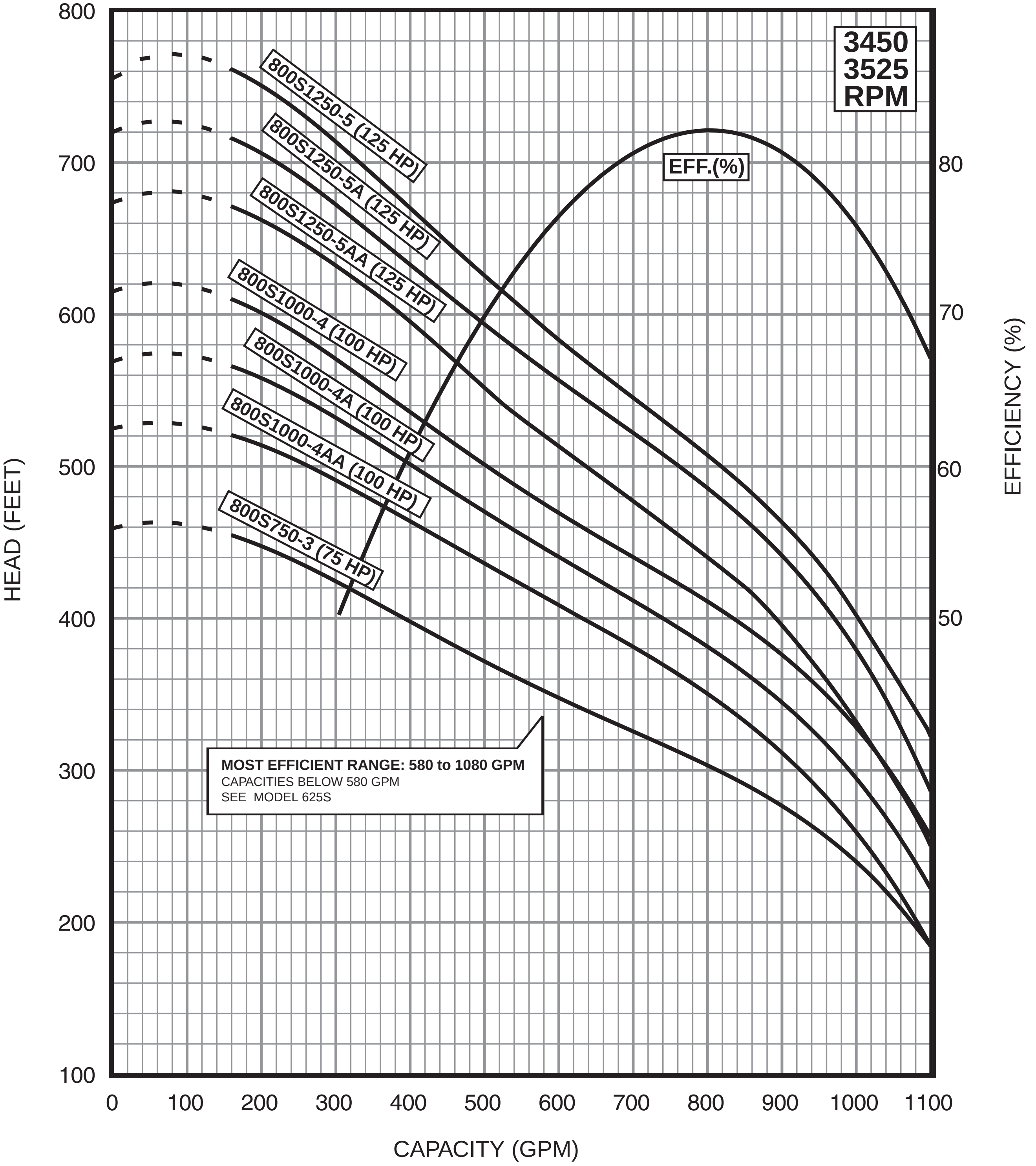
MOST EFFICIENT RANGE: 580 to 1080 GPM
CAPACITIES BELOW 580 GPM
SEE MODEL 625S

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 20-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-125 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 10 ft. min. submergence.

MODEL 800S 800 GPM PERFORMANCE CURVES

FLOW RANGE: 160 - 1080 GPM **OUTLET SIZE: 6" NPT** **NOMINAL DIA. 10"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 20-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-125 HP/3525 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 10 ft. min. submergence.

DIMENSIONS AND WEIGHTS

MODEL NO.	FIG.	HP	MOTOR SIZE	DISCH. SIZE	DIMENSIONS IN INCHES					APPROX. SHIP WT.
					A	B	C	D	E	
1100S300-1A	A	30	6"	6" NPT	66.8	35.7	31.1	5.4	9.7	252
1100S400-1*	A	40	6"	6" NPT	68.3	37.2	31.1	5.4	9.7	276
1100S600-2AA*	A	60	6"	6" NPT	79.9	41.8	38.1	5.4	9.7	459
1100S750-2A	A	75	8"	6" NPT	85.5	47.4	38.1	7.6	9.7	558
1100S1000-2	A	100	8"	6" NPT	93.8	55.7	38.1	7.6	9.7	558
1100S1000-3AA	A	100	8"	6" NPT	100.8	55.7	45.1	7.6	9.7	657
1100S1250-3A	A	125	8"	6" NPT	102.1	57.0	45.1	7.7	9.7	836
1100S1250-3	A	125	8"	6" NPT	102.1	57.0	45.1	7.7	9.7	836
1100S1500-4AA	A	150	8"	6" NPT	129.8	77.8	52.0	7.7	9.7	1007
1100S1500-4A	A	150	8"	6" NPT	129.8	77.8	52.0	7.7	9.7	1007
1100S1750-4	A	175	8"	6" NPT	137.8	85.8	52.0	7.7	9.7	1007
1100S1750-5AA*	A	175	8"	6" NPT	144.7	85.8	58.9	7.7	9.7	1089
1100S1750-5A*+	A	175	8"	6" NPT	144.7	85.8	58.9	7.7	9.7	1089
1100S2000-5*+	A	200	8"	6" NPT	153.7	94.8	58.9	7.7	9.7	1197
1100S2500-6AA+	A	250	10"	6" NPT	145.2	79.5	65.7	9.1	10.9	1263
1100S2500-6A+	A	250	10"	6" NPT	145.2	79.5	65.7	9.1	10.9	1263
1100S2500-6+	A	250	10"	6" NPT	145.2	79.5	65.7	9.1	10.9	1263

NOTES: All models suitable for use in 10" wells, unless equipped with 10" motor.
Weights include pump end with motor in lbs.
* Alternate motor sizes available.
\+ Designed to fit Hitachi® Motors.

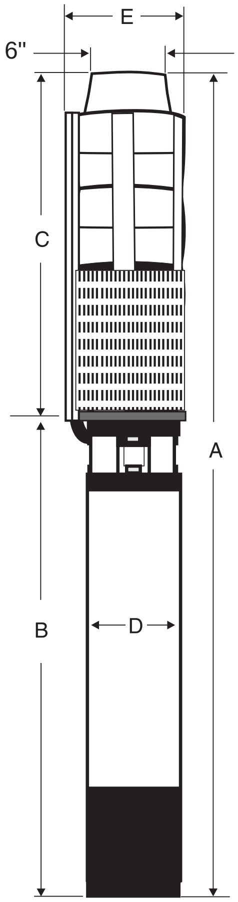
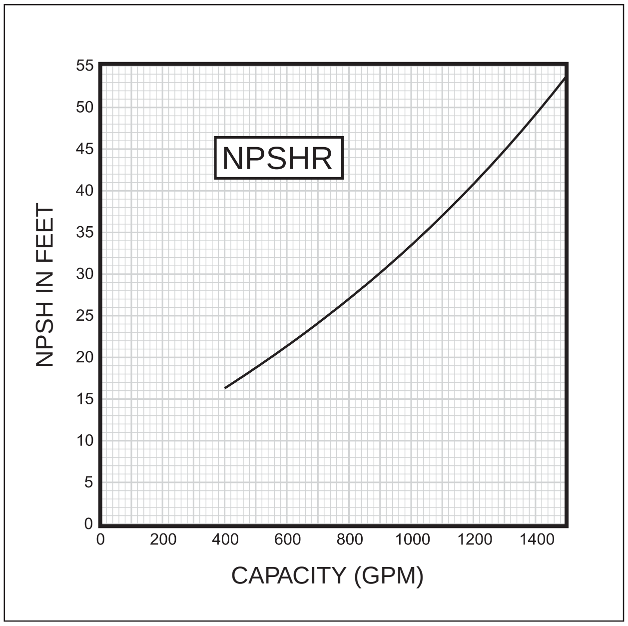


Fig. A

MATERIALS OF CONSTRUCTION

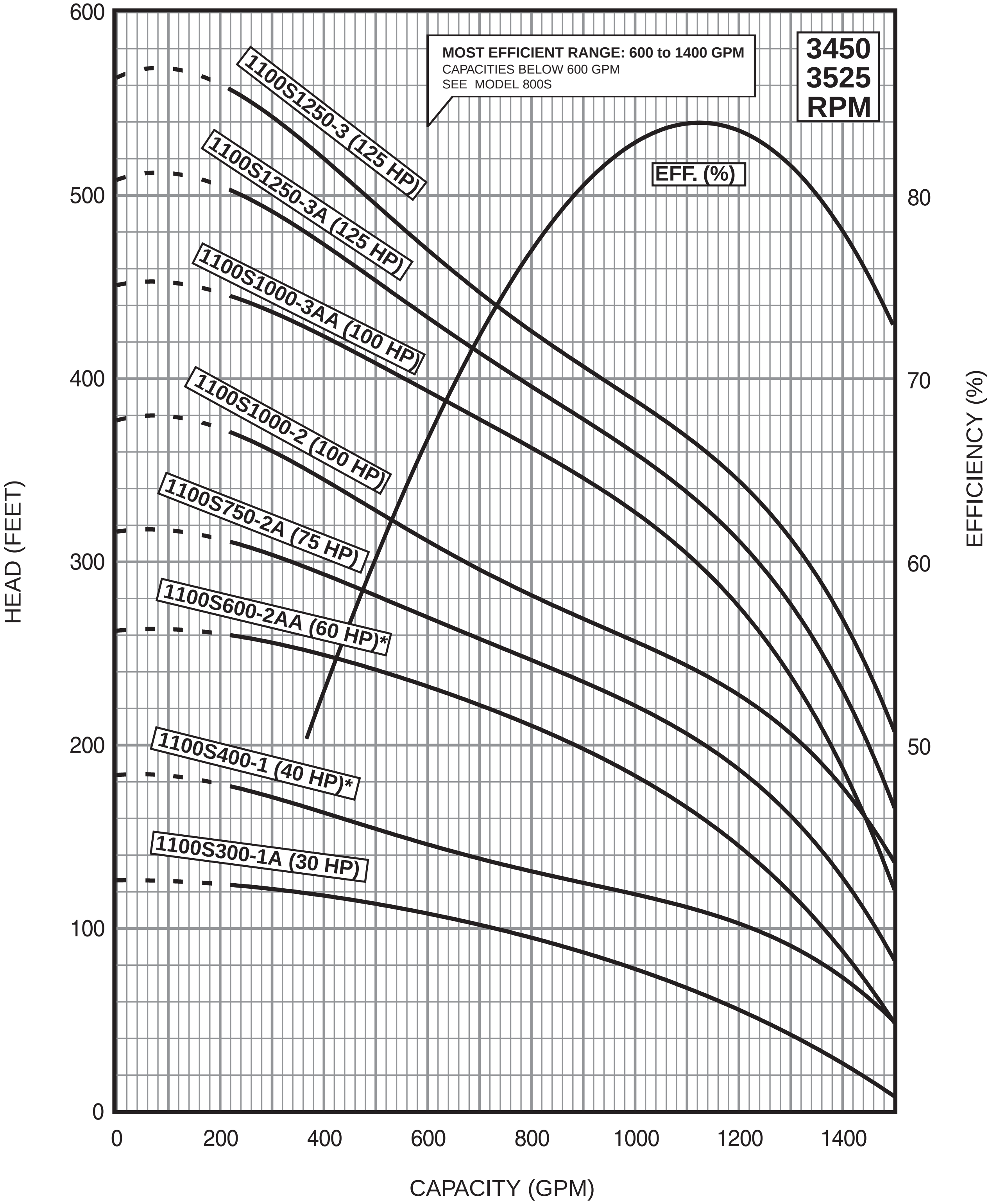
COMPONENT	CYLINDRICAL SHAFT
Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Diffuser Chamber	304 Stainless Steel
Split Cone Nut	304 Stainless Steel
Split Cone	304 Stainless Steel
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Straps	304 Stainless Steel
Cable Guard	316 Stainless Steel
Coupling	316/329 Stainless Steel*
Coupling Key	302/304 Stainless Steel**
Pump Shaft	431 Stainless Steel
Intermediate Bearings	NBR
Impeller Seal Ring	NBR/PPS
Top Bearing	NBR/316 Stainless Steel
Upthrust Disc	Carbon/Graphite HY22
O-Ring	NBR
Valve Seat	304 Stainless Steel
Lower Valve Seat Retainer	316 Stainless Steel
Upper Valve Seat Retainer	304 Stainless Steel
Valve Guide	304 Stainless Steel
Valve Cup Spring	304 Stainless Steel

NOTES: Specifications are subject to change without notice.
* 10" Coupling made of 329 Stainless Steel.
** Used in 10" motor coupling only.



PERFORMANCE CURVES 1100 GPM MODEL 1100S

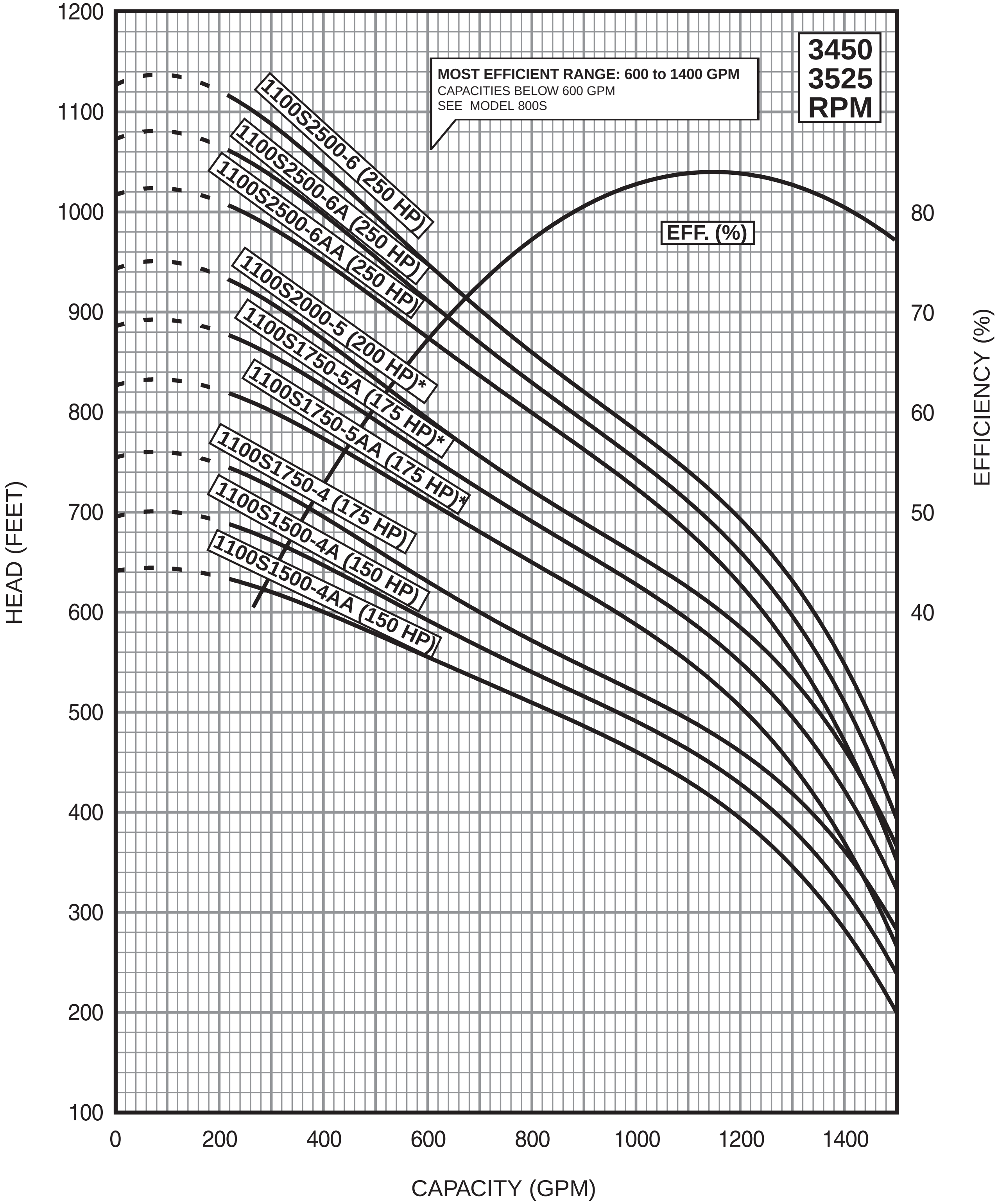
FLOW RANGE: 220 -1400 GPM **OUTLET SIZE: 6 " NPT** **NOMINAL DIA. 10"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 30-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-200 HP/3525 RPM.
10" MOTOR STANDARD, 250 HP/3500 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 10 ft. min. submergence.

FLOW RANGE: 220 -1400 GPM **OUTLET SIZE: 6 " NPT** **NOMINAL DIA. 10"**



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
6" MOTOR STANDARD, 30-60 HP/3450 RPM.
8" MOTOR STANDARD, 75-200 HP/3525 RPM.
10" MOTOR STANDARD, 250 HP/3500 RPM.
* Alternate motor sizes available.

Performance conforms to ISO 9906 Annex A
@ 10 ft. min. submergence.

CONTROL BOX SA-SPM5

Enclosure

NEMA Type 3R rated suitable for outdoor mounting provided with mounting holes, progressive knockouts, and hinged door. 18 gauge steel construction with a gray colored epoxy coating provides great mechanical properties and corrosion protection.

Product Range

Provided in 115 VAC, 60 Hz, Single-phase for 1/3 HP and 1/2 HP motors.

Provided in 230 VAC, 60 Hz, single-phase for 1/3 HP, to 5 HP motors.

Internal wiring

Internal wire is 14 AWG, THHN, 105 degrees C, 600 VAC rated insulation.

Voltage relay

UL Recognized General Electric™ voltage relay.

Start capacitor

User friendly quick disconnect brackets for UL Recognized Mallory™ start capacitor.

Pull handle disconnect

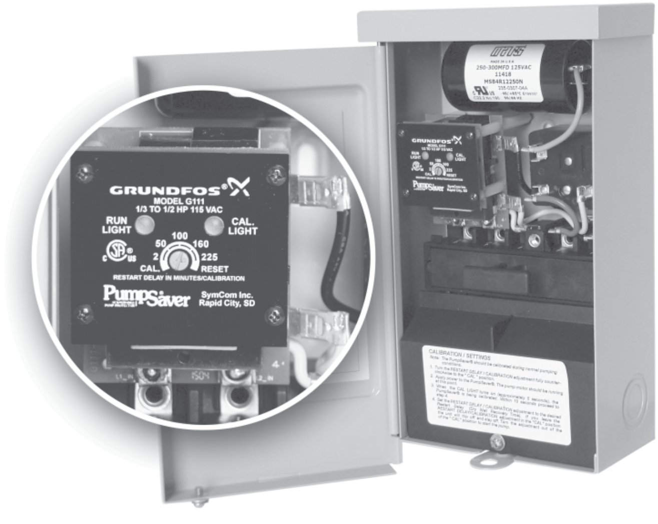
The pull handle disconnect is available to break voltage between line/service voltage and the starting components and motor leads.

G111 & G231 PumpSaver

The **Model G111** fits inside 1/3 and 1/2 Hp 115V control boxes.
Model G231 fits inside 1/3, 1/2, 3/4, and 1 Hp 230V control boxes. The PumpSaver Model G111/231 is a current monitor designed to protect single phase pumps from dry well, dead head, jammed impeller, and over & under voltage conditions. Typical applications include residential waterwells, commercial water wells, irrigation wells, and golf course systems.

Features and benefits:

- Restart delay can be set up to 225 minutes or placed in manual reset mode.
- Can be calibrated to specific pump/motor combinations and various conditions.
- “Run Light” conveniently shows that the unit is functional.
- Fits in existing Grundfos control box – saving enclosure costs.
- Quick easy installation.



Made for pumps by pump experts

Electronic pump protection made simple
Submersible motors are made to be very strong indeed. But that does not mean they cannot benefit from extra protection that prolongs their lifetime and safeguards them against external threats. That is why we created the new MP 204 motor protection unit. Made especially for pump motors by pump specialists, it was designed to bring you protection that is as simple to use as it is efficient. Our engineers crammed it full of all the protection features you need – but kept it easy to install, set, and use.

Protect your motors against external threats
The MP 204 protects pump motors against undervoltage, overvoltage and other variations in power supply. So even if your external power supply is not entirely steady, your SP pump will remain as reliable as ever. Very importantly, the extra protection also reduces wear, thereby prolonging the motor's lifespan. Reduced power consumption is a strong indication that the pump is about to run dry, so the MP 204 will immediately stop the pump if the well goes dry.

Simple set-up a priority
Simple installation and set-up was a major priority for the MP 204 designers. Mounting is done by means of four screws or by sliding the unit onto a mounting rail, and the entire set-up can be completed in just two minutes. The simple menu is used to set four parameters: rated motor amps, nominal voltage, trip class, and no. of motor phases. After just 120 seconds of setting, the unit is ready to go.

Access more functions with the R 100 remote control
The R 100 remote control from Grundfos gives you access to even more options. For example, you can adjust factory settings, carry out service and troubleshooting, and get read-outs of data stored in the MP 204 unit.


R 100 remote

Technical data – MP 204

Enclosure class:	NEMA 1 (IP 20)
Ambient temperature:	-4°F to 140°F (-20°C to 60°C)
Relative humidity:	99%
Voltage range:	80-610VAC
Current range:	3-999A
Frequency:	47 – 63 Hz
IEC trip class:	1 – 45
Special Grundfos trip class:	0.1 – 30 s
Voltage variations:	-25/+15% of nominal voltage
Approvals:	EN 60947, EN 60355, UL/CSA 508
Marking:	SE, cUL, C-tick

* For currents above 120A, external transformers required

Monitoring parameters

- Insulation resistance before start-up
- Temperature (Tempcon, PT sensor and PTC/thermal switch)
- Overload / underload
- Overvoltage / undervoltage
- Phase sequence
- Phase missing
- Power factor (cos φ)
- Power consumption
- Harmonic distortion
- Current asymmetry
- Run and start capacitor (single-phase)
- Operating hours and number of starts

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

GRUNDFOS Single Phase Lightning Arrestor

(Optional accessory for surge protection in single phase submersible motors.)

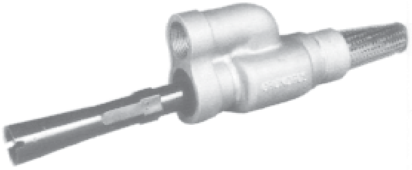
Part No. 825017

GRUNDFOS Three Phase Lightning Arrestor

All Ratings
Part No. 825045

Parallel Pipe Ejector/Foot Valve

EJECTOR	FOR USE WITH	HP	NOM. DEPTH	MIN. WELL DIA.	PRESSURE CONNECT	SUCTION CONNECT	ORDER NO.
5050	JS-5	1/2	50'	4"	1"	11/4"	465118
5100	JS-5	1/2	100'	4"	1"	11/4"	465119
7050	JS-7	3/4	50'	4"	1"	11/4"	465120
7100	JS-7	3/4	100'	4"	1"	11/4"	465121
10050	JS-10	1	50'	4"	1"	11/4"	465136
10100	JS-10	1	100'	4"	1"	11/4"	465137



GRUNDFOS Three Inch Stainless Steel Well Seal

Part No.	Part Name
1B5102	Well Seal

Part 1 – INTRODUCTION

Part 2 – CABLE SELECTION

Part 3 – MISC. TECHNICAL DATA, FORMULAS, AND CONVERSIONS

PART 1: INTRODUCTION

General

This section will provide the technical information needed to properly select GRUNDFOS groundwater products. The information applies primarily to domestic groundwater systems using 4-inch wells with submersible or jet pumps, pressure tanks, and accessories. It is important to be familiar with typical system components and their basic hydraulic principles to ensure a better understanding of the more technical information found later in this section.

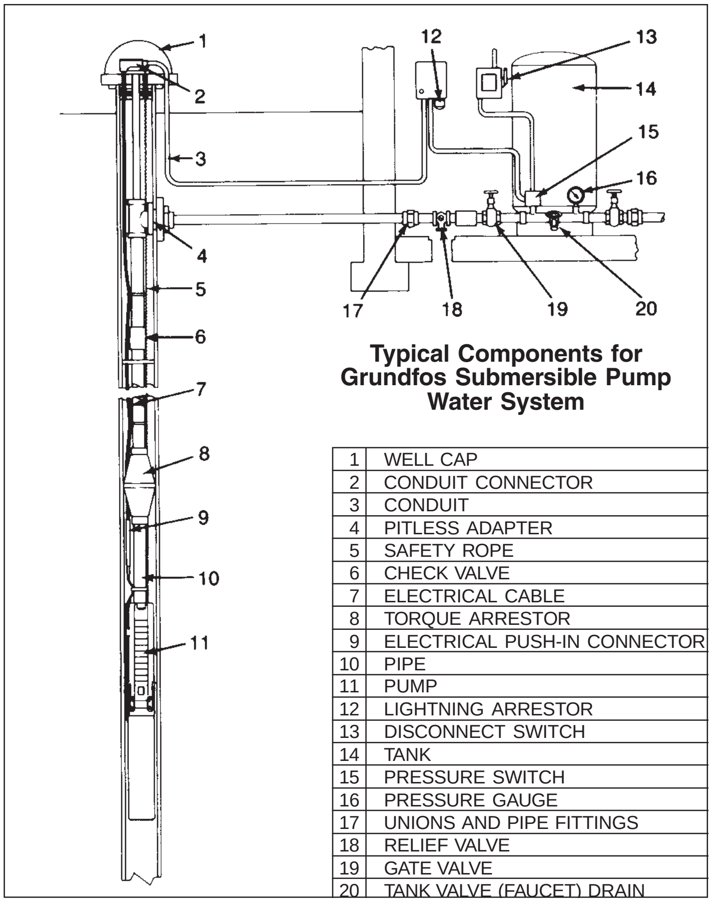
Prior to selecting the pump, the basic system requirements must be determined. System capacity and system pressure must be calculated and friction losses determined to ensure proper system performance. These calculations are covered in detail in **Part 1.** In **Part 2**, information is provided on proper cable selection. Also provided in **Part 3** are miscellaneous technical data and formulas commonly used in the selection of domestic groundwater systems.

Typical System Components

Domestic groundwater systems are made up of a pump, storage tank, and accessories to operate the system automatically. Pumps are generally of the submersible or jet variety and include the pump and motor as a unit. Refer to Figure 8-A for the components found in a typical automatic groundwater pumping system.

In a ***closed, automatic water system*** a pressure tank is used to store water and maintain system pressure between specified limits (such as 30 to 50 psi). As the water level in the tank rises, tank air is compressed in the upper part of the tank until the upper pressure limit is reached (i.e., 50 psi). At this “cut-out” point a pressure switch opens the electrical circuit to the motor and the pump stops.

The compressed air in the tank acts like a spring pushing down on the water to create system pressure. When a valve is opened in the water system, the air pressure in the upper part of the tank forces the water to flow out of the tank and into the system. As the water is drawn from the tank, the air occupies a larger space and the pressure drops until the lower limit is reached (i.e., 30 psi). At this “cut-in” point the pressure switch closes the electrical circuit to the motor and the pump starts. A cycle is thereby completed.



Typical Components for Grundfos Submersible Pump Water System

1	WELL CAP
2	CONDUIT CONNECTOR
3	CONDUIT
4	PITLESS ADAPTER
5	SAFETY ROPE
6	CHECK VALVE
7	ELECTRICAL CABLE
8	TORQUE ARRESTOR
9	ELECTRICAL PUSH-IN CONNECTOR
10	PIPE
11	PUMP
12	LIGHTNING ARRESTOR
13	DISCONNECT SWITCH
14	TANK
15	PRESSURE SWITCH
16	PRESSURE GAUGE
17	UNIONS AND PIPE FITTINGS
18	RELIEF VALVE
19	GATE VALVE
20	TANK VALVE (FAUCET) DRAIN

FIGURE 8-A

Components found in a typical automatic groundwater pumping system including a submersible pump, pressure tank, and pressure control accessories.

In an ***open, automatic water system*** the pump is used to fill a large, elevated storage tank which utilizes gravity to maintain system pressure. Tank level controls are used to cycle the pump to maintain water levels within prescribed limits.

Refer to the following illustrations for schematic layouts of typical domestic groundwater systems and components: Figure 8-B (Submersible Pump - Closed System), Figure 8-C (Submersible Pump - Open System), Figure 8-D (Shallow Well Jet Pump), and Figure 8-E (Deep Well Jet Pump).

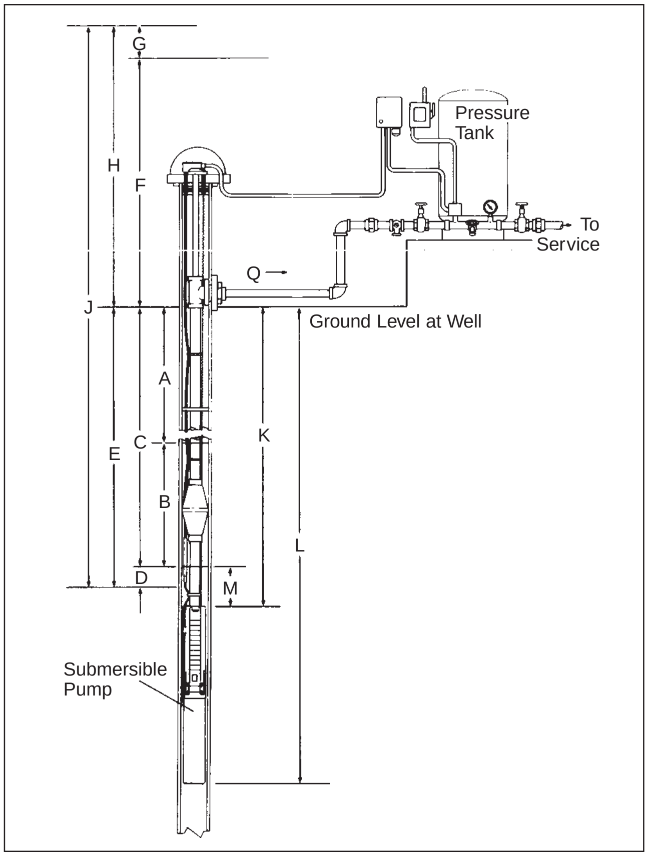
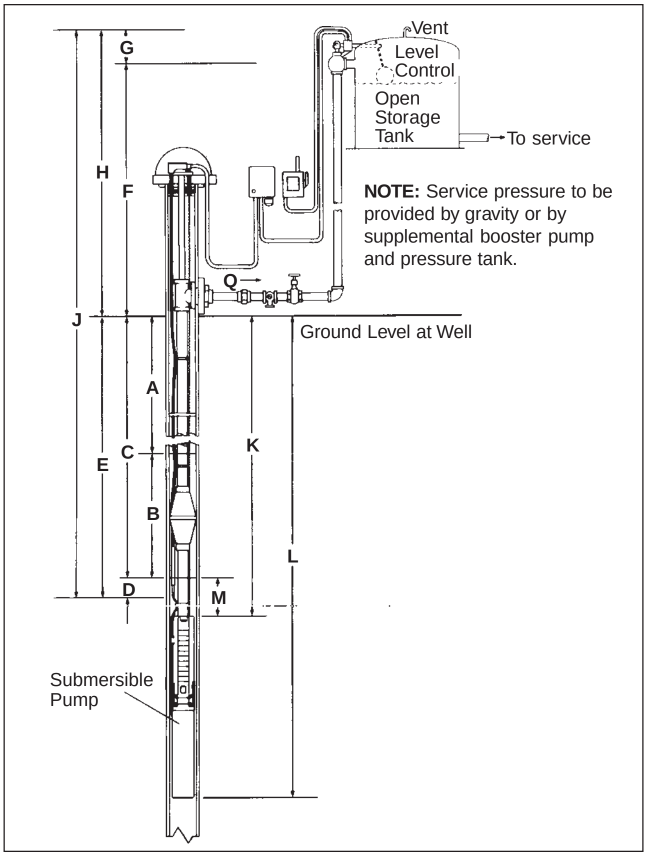


FIGURE 8-B
Figure 8-B illustrates a schematic layout of a CLOSED goundwater pumping system using a submersible pump and pressure tank set for automatic operation. A pressure switch controls the cycling of the pump.

Closed Groundwater System with Submersible Pump

- **A. STATIC WATER LEVEL (in feet):** vertical distance from the top of the well to the standing water level or water table.
- **B. DRAWDOWN (in feet):** reduction in the water level during pumping (varies with well yield and pump capacity).
- **C. PUMPING WATER LEVEL or LIFT (in feet):** C = A + B.
- **D. FRICTION LOSSES in the WELL (in feet):** friction losses caused by the drop pipe and fittings between the pump and the top of the well.
- **E. TOTAL LIFT in the WELL (in feet):** E = A + B + D.
- **F. STATIC DISCHARGE HEAD (in feet):** for PRESSURE TANK SYSTEMS it is the elevation rise in feet of the pressure tank, discharge nozzles, etc., above the top of the well plus the pressure (in feet) required at that level.
- **G. FRICTION LOSSES in the DISCHARGE SYSTEM (in feet):** friction losses caused by piping, valves, and fittings between the top of the well and the point of discharge.
- **H. TOTAL DISCHARGE HEAD (in feet):** H = F + G.
- **J. TOTAL PUMPING HEAD (in feet):** J = E + H.
- **K. SETTING OF PUMP (in feet):** vertical distance from the top of the well to the top of the pump.
- **L. OVERALL LENGTH (in feet):** vertical distance from the top of the well to the bottom of the pump.
- **M. SUBMERGENCE (in feet):** M = K - C.
- **Q. CAPACITY (in gpm or gph):** rate of pumping.



NOTE: Service pressure to be provided by gravity or by supplemental booster pump and pressure tank.

FIGURE 8-C
Figure 8-C illustrates a schematic layout of an OPEN groundwater pumping system using a submersible pump and an elevated storage tank set for automatic operation. A level control on the storage tank controls the cycling of the pump.

Open Groundwater System with Submersible Pump

- **A. STATIC WATER LEVEL (in feet):** vertical distance from the top of the well to the standing water level or water table.
- **B. DRAWDOWN (in feet):** reduction in the water level during pumping (varies with well yield and pump capacity).
- **C. PUMPING WATER LEVEL or LIFT (in feet):** C = A + B.
- **D. FRICTION LOSSES in the WELL (in feet):** friction losses caused by the drop pipe and fittings between the pump and the top of the well.
- **E. TOTAL LIFT in the WELL (in feet):** E = A + B + D.
- **F. STATIC DISCHARGE HEAD (in feet):** for OPEN DISCHARGE SYSTEMS it is the elevation of the highest water level above the top of the well.
- **G. FRICTION LOSSES in the DISCHARGE SYSTEM (in feet):** friction losses caused by piping, valves, and fittings between the top of the well and the point of discharge.
- **H. TOTAL DISCHARGE HEAD (in feet):** H = F + G.
- **J. TOTAL PUMPING HEAD (in feet):** J = E + H.
- **K. SETTING OF PUMP (in feet):** vertical distance from the top of the well to the top of the pump.
- **L. OVERALL LENGTH (in feet):** vertical distance from the top of the well to the bottom of the pump.
- **M. SUBMERGENCE (in feet):** M = K - C.
- **Q. CAPACITY (in gpm or gph):** rate of pumping.

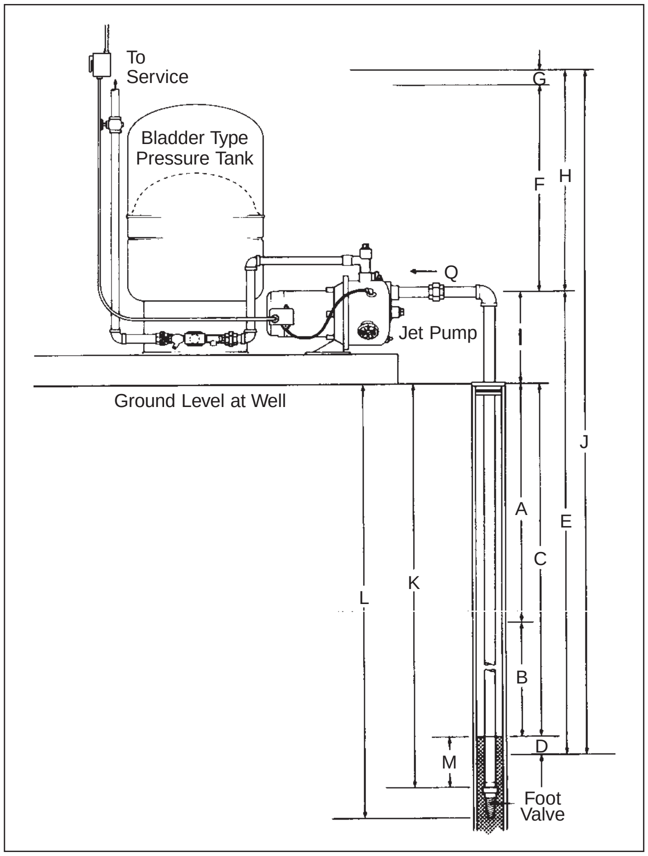


FIGURE 8-D
Figure 8-D illustrates a schematic layout of a SHALLOW WELL groundwater pumping system using a shallow well JET PUMP designed for setting to 25 feet. The pressure tank is set for automatic operation with a pressure switch controlling the cycling of the pump.

CLOSED GROUNDWATER SYSTEM WITH SHALLOW WELL JET PUMP

A. **Statics Water Level (in feet):** vertical distance from the top of the well to the standing water level or water table.

B. **Drawdown (in feet):** reduction in the water level during pumping (varies with well yield and pump capacity).

C. **Pumping Water Level or Lift (in feet):** C = A + B.

D. **Friction Losses in the Suction System (in feet):** friction losses caused by suction piping between the pump and foot valve.

E. **Total Suction Lift (in feet):** E = A + B + D + I.

F. **Static Discharge Head (in feet):** for *Pressure Tanks Systems* it is the elevation rise in feet of the pressure tank, discharge nozzles, etc., above the pump plus the pressure (in feet) discharge nozzles, etc., above the pump plus the pressure (in feet) required at that level. For *Open Discharge Systems* it is the elevation in feet of the highest water level above the pump.

G. **Friction Losses in the Discharge System (in feet):** friction losses caused by piping, valves, and fittings between the top of the well and the point of discharge.

H. **Total Discharge Head (in feet):** H = F + G.

I. **Elevation of the Pump above the Top of the Well (in feet).**

J. **Total Pumping Head (in feet):** J = E + H.

K. **Setting of the Foot Valve or Strainer (in feet):** vertical distance from the top of the well to the top of the foot valve or strainer.

L. **Overall Length (in feet):** vertical distance from the top of the well to the bottom of the foot valve or strainer.

M. **Submergence (in feet):** M = K - C.

Q. **Capacity (in gpm or gph):** rate of pumping.

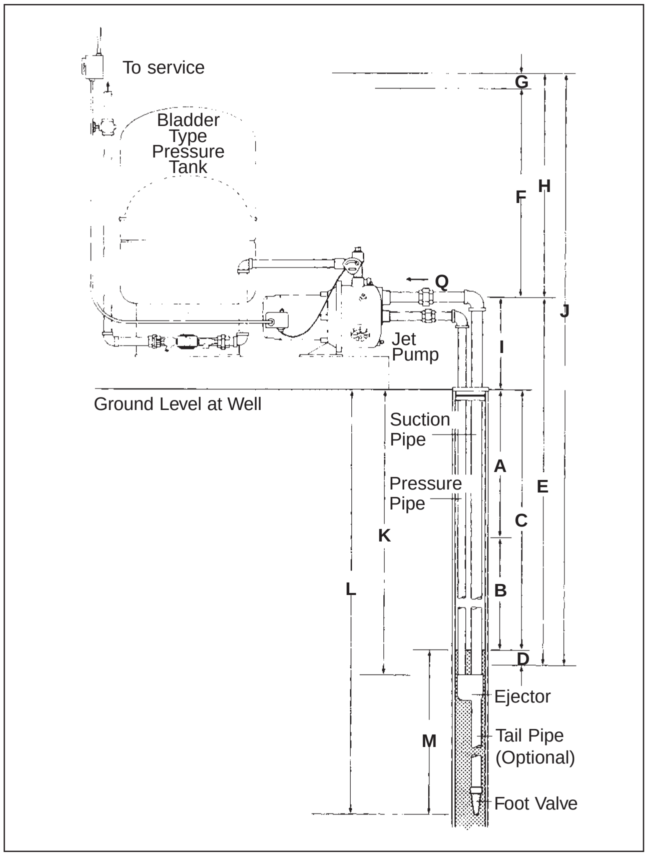


FIGURE 8-E
Figure 8-E illustrates a schematic layout of an DEEP WELL groundwater pumping system using a deep well JET PUMP designed for settings to 100 feet. The pressure tank is set for automatic operation with a pressure switch controlling the cycling of the pump.

CLOSED GROUNDWATER SYSTEM WITH SHALLOW WELL JET PUMP

A. **Static Water Level (in feet):** vertical distance from the top of the well to the standing water level or water table.

B. **Drawdown (in feet):** reduction in the water level during pumping (varies with well yield and pump capacity).

C. **Pumping Water Level or Lift (in feet):** C = A + B.

D. **Friction Losses in the Suction System (in feet):** friction losses caused by suction piping between the pump and foot valve.

E. **Total Suction Lift (in feet):** E = A + B + D + I.

F. **Static Discharge Head (in feet):** for PRESSURE TANK SYSTEMS it is the elevation rise in feet of the pressure tank, discharge nozzles, etc., above the pump plus the pressure (in feet) discharge nozzles, etc., above the pump plus the pressure (in feet) required at that level. For OPEN DISCHARGE SYSTEMS it is the elevation in feet of the highest water level above the pump.

G. **Friction Losses in the Discharge System (in feet):** friction losses caused by piping, valves, and fittings between the top of the well and the point of discharge.

H. **Total Discharge Head (in feet):** H = F + G.

I. **Elevation of the Pump above the Top of the Well (in feet).**

J. **Total Pumping Head (in feet):** J = E + H.

K. **Setting of the Foot Valve or Strainer (in feet):** vertical distance from the top of the well to the top of the foot valve or strainer.

L. **Overall Length (in feet):** vertical distance from the top of the well to the bottom of the foot valve or strainer.

M. **Submergence (in feet):** M=K–C. The ejector should be set as close to the bottom of its maximum depth rating as the well will permit.

Q. **Capacity (in gpm or gph):** rate of pumping.

Head and Pressure

Head and pressure are related in a very simple and direct manner. Since water has known weight, we know that a 231 foot long, one-inch square pipe holds 100 pounds of water. At the bottom of the one-inch square pipe we refer to the pressure as 100 pounds per square inch (psi). For any diameter pipe 231 feet high, the pressure will always be 100 psi at the bottom. Refer to Figure 8-F**.**

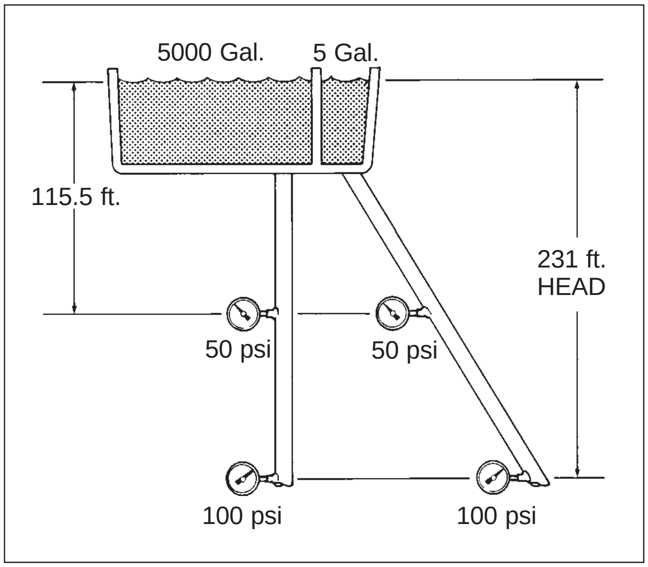


FIGURE 8-F
Figure 8-F illustrates the relationship between head and pressure.

Head is usually expressed in feet and refers to the height, or elevation, of the column of water. In Figure 8-F we see that a column of water 231 feet high creates a pressure reading of 100 psi. That same column of water is referred to as having 231 feet of **head**. Thus, for water, 231 feet of head is equivalent to 100 psi. Or, 2.31 feet of head equals 1 psi.

It should be noted that head and pressure readings for non-flowing water depend on the elevation of the water and not on the volume of water nor the size or length of piping.

Flow and Friction Loss

Flow is measured as the volume of water moved over a given length of time. This is generally referred to as gallons per minute (gpm) for larger flows and gallons per hour (gph) for smaller flows. When water moves through a pipe, it must overcome resistance to flow caused by friction as it moves along the walls of the pipe as well as resistance caused by its own turbulence. Added together, these losses are referred to as **friction losses** and may significantly reduce system pressure.

Figure 8-G illustrates the relationship of flow and friction loss. For any flow through a level pipe the gauge pressure at the pipe inlet will be greater than the gauge pressure at the pipe outlet. The difference is attributed to friction losses caused by the pipe itself and by fittings.

In general, friction losses occur or are increased under the following conditions:

1. Friction losses result from flow through any size or length of pipe (Figure 8-G).

2. Friction losses increase as the flow rate increases or as the pipe size decreases (if the flow rate doubles for a given pipe size, friction losses quadruple, Figure 8-G).

3. Friction losses increase with the addition of valves and fittings to the system (Figure 8-G).

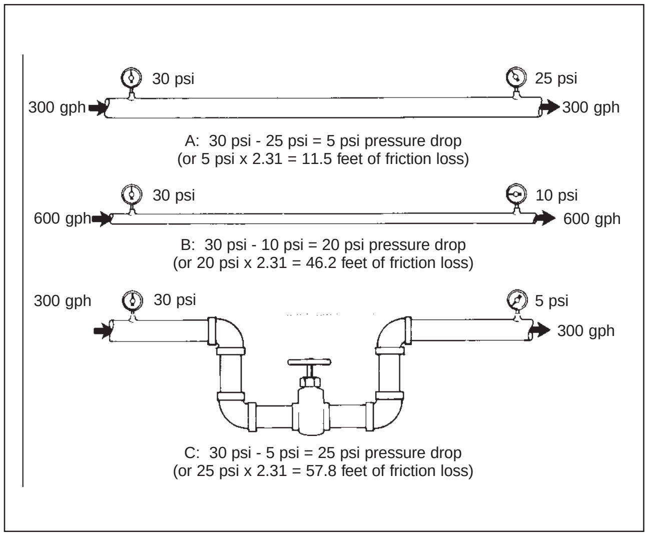


FIGURE 8-G
As shown in these illustrations friction losses increase with additional flow

Power is required to push water to a higher elevation, to increase outlet pressure, to increase flow rates, and to overcome friction losses. Good system design and common sense indicate that friction losses should be minimized whenever possible. The costs of larger pumps, bigger motors, and increased power consumption to overcome friction losses must be balanced against the increased cost of larger, but more efficient, system piping. In either case, unnecessary valves and fittings should be eliminated wherever possible.

Submersible Pumps vs. Jet Pumps

Submersible and jet pumps are both used in domestic groundwater systems. When high flow rates and pressure settings are required at high operating efficiencies, submersible pumps are generally preferred. Submersible pumps have the advantage of performing well both in shallow well applications as well as at depths to 2,000 feet. An extensive range of submersible pump models is also available allowing a precise match to exact system requirements.

Convertible jet pumps are sometimes an economical alternative to submersibles, especially in shallow well installations of 25 feet or less. The pumps are less expensive, installation is simplified, and they are easily converted for deep well installations down to 100 feet (Figure 8-H).

In “weak” well applications where the pump lowers the water level in the well faster than the well can replenish itself, a deep well jet pump with a tail pipe is particularly effective when flow requirements are relatively small. By adding 35 feet of tail pipe below the jet assembly with the foot valve attached to the bottom, it will not be possible to pull the well down and allow air to enter the system. Pump delivery remains at 100% of the rated capacity down to the level of the jet assembly. If the water level falls below that point, flow decreases in proportion to the drawdown as shown in Figure 8-I. When pump delivery equals well inflow, the water level remains constant until the pump shuts off. At 33.9 feet of drawdown the pump will no longer deliver water but the foot valve will remain fully submerged.

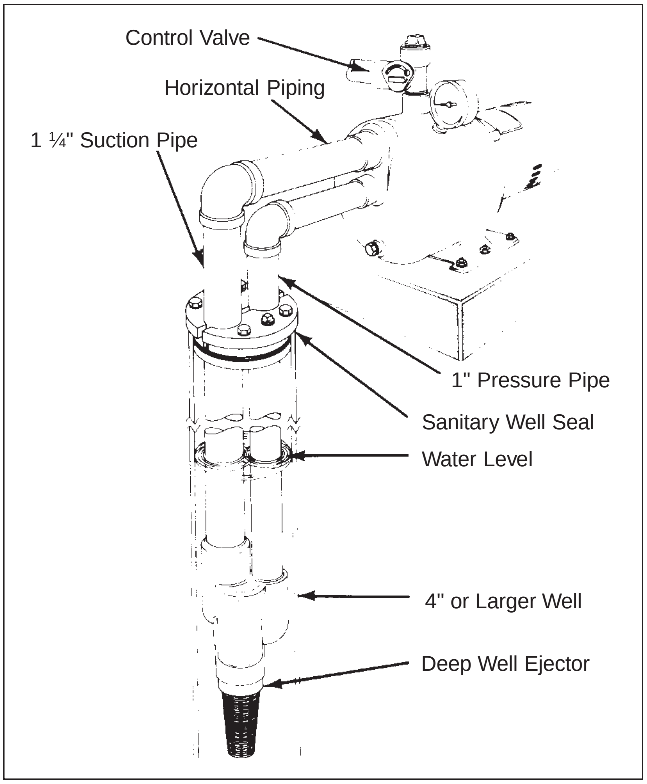


FIGURE 8-H
Figure 8-H illustrates a convertible jet pump set for deep well use (to 100 feet).

Final Pump Selection

Final pump selection will depend upon specific application requirements and cost considerations. Regardless of the pump type, system flow and head requirements (discussed in detail in Part 2) must be determined prior to actual pump selection.

Flow requirement will be determined by the size of the house or farm (including the number of bathrooms, outlets and appliances), the size of family, and the number of farm animals, if applicable.

Total Pumping Head must be calculated to ensure that the pump selected will meet all head or discharge pressure requirements. Total pumping head is the combination of the total suction lift (or lift in well), plus the pump discharge head (consisting of the elevation from the pumping water level to pressure tank plus pressure tank discharge pressure), plus all system friction losses.

Total Dynamic Head is equivalent to total pumping head plus velocity head. In most residential systems, velocity head is negligible. Because of this, the velocity head term has been left out of future examples and formulas. From the information gathered on flow and head requirements, a specific submersible or jet pump may be selected and an appropriately sized pressure tank ordered.

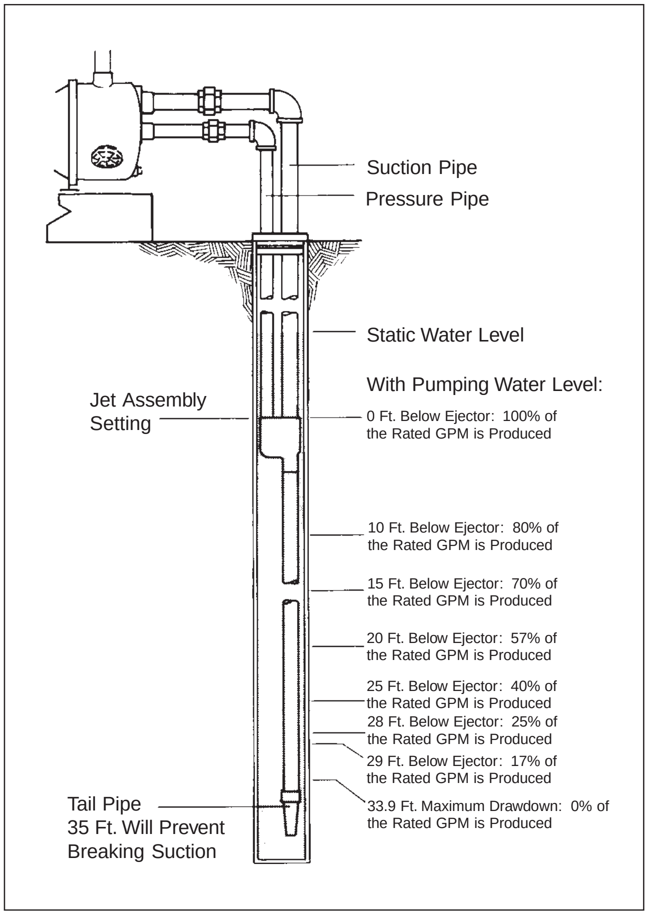


FIGURE 8-I
Figure 8-I illustrates the use of a tail pipe on a deep well convertible jet pump to compensate for weak well conditions.

PART 2: CABLE SELECTION

Submersible Pump Cable Selection Charts (60 Hz)

CABLE LENGTH SELECTION TABLES

The following table (Table 8-Q(2)) lists the recommended copper cable sizes and various cable lengths for submersible pump motors. Proper wire size will ensure that adequate voltage will be supplied to the motor.

This table complies with the 1978 edition of the National Electric Table 310-16, Column 2 for 75°C wire. The ampacities (current carrying properties of a conductor) have been divided by 1.25 per the N.E.C., Article 430-22, for motor branch circuits based on motor amps at rated horsepower.

To assure adequate starting torque, the maximum cable lengths are calculated to maintain 95% of the service entrance voltage at the motor when the motor is running at maximum nameplate amps. Cable sizes larger than specified may always be used and will reduce power usage.

The use of cables smaller than the recommended sizes will void the warranty. Smaller cable sizes will cause reduced starting torque and poor motor operation.

CALCULATING MIXED CABLE SIZES

In a submersible pump installation any combination of cable sizes may be used as long as the total percentage length of the individual cables does not exceed 100%. Mixed cable sizes are most often encountered when a pump is being replaced with a larger horsepower model and part of the old cable will be left in place.

In the following example, a 2 HP, 230 volt, 1 phase pump is being installed to replace a smaller model. The 115 feet of buried #12 cable located between the service entrance and the well head will be used in the replacement installation. The well driller must be able to calculate the required size of cable in the well to connect the new motor at a setting of 270 feet.

Cable Size Calculation:

Step 1–Check Table 8-Q(2) to see if the 115 feet of existing #12 cable is large enough to provide current to the larger 2 HP replacement pump. The table tells us that #12 cable is adequate for a maximum length of 250 feet.

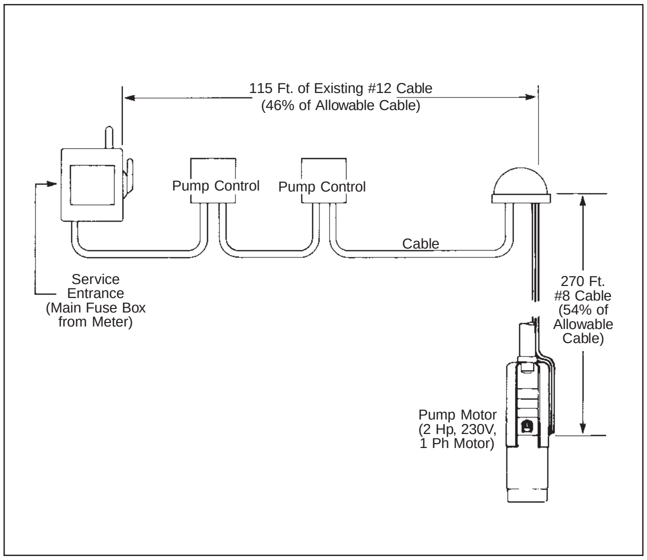


FIGURE 8-Q(1)
Example of Mixed Cable Installation

Step 2–Since 250 feet is the maximum allowable cable length for the #12 cable, calculate the percent used by the 115-foot run. (115 ft. ÷ 250 ft. = 46%)

Step 3–With 46% of the total allowable cable used between the service entrance and the well head, 54% remains for use in the well (100% - 46% = 54%). Therefore, the 270 feet of cable required in the well can utilize only 54% of the total feet allowed in the table.

Step 4–From Table 8-Q(2) determine the proper size cable required for the 2 HP pump set at 270 feet. (Remember, you are limited to 54% of the length listed in the table.) A check of #10 cable at 2 HP indicates that only 210 feet of this cable could be used (390 ft. x 54% = 210 ft.). Since this is less than the 270 required, the next larger size should be tried. For #8 cable, 54% of 620 feet = 335 feet. ***The #8 cable is suitable for use in the well at a pump setting of 270 feet.***

See Chart 8-Q(2) next page.

MAXIMUM MOTOR CABLE LENGTH

(Motor Service to Entrance)

TABLE 8-Q(2)
Single Phase 60Hz

Motor Rating		Copper Wire Size												
Volts	**HP**	**14**	**12**	**10**	**8**	**6**	**4**	**2**	**0**	**00**	**000**	**0000**	**250**	**300**
115	1/3	130	210	340	540	840	1300	1960	2910					
	1/2	100	160	250	390	620	960	1460	2160					
230	1/3	550	880	1390	2190	3400	5250	7960						
	1/2	400	650	1020	1610	2510	3880	5880						
	3/4	300	480	760	1200	1870	2890	4370	6470					
	1	250	400	630	990	1540	2380	3610	5360	6520				
	1½	190	310	480	770	1200	1870	2850	4280	5240				
	2	150	250	390	620	970	1530	2360	3620	4480				
	3	120	190	300	470	750	1190	1850	2890	3610				
	5			180	280	450	710	1110	1740	2170				
	7½				200	310	490	750	1140	1410				
	10					250	390	600	930	1160				

Three Phase 60Hz

Volts	HP	14	12	10	8	6	4	2	0	00	000	0000	250	300
208	1½	310	500	790	1260									
	2	240	390	610	970	1520								
	3	180	290	470	740	1160	1810							
	5		170	280	440	690	1080	1660						
	7½			200	310	490	770	1180	1770					
	10				230	370	570	880	1330	1640				
	15					250	390	600	910	1110	1340			
	20						300	460	700	860	1050	1270		
	25							370	570	700	840	1030	1170	
	30							310	470	580	700	850	970	1110
230	1½	360	580	920	1450									
	2	280	450	700	1110	1740								
	3	210	340	540	860	1340	2080							
	5		200	320	510	800	1240	1900						
	7½			230	360	570	890	1350	2030					
	10				270	420	660	1010	1520	1870				
	15					290	450	690	1040	1280	1540			
	20						350	530	810	990	1200	1450		
	25						280	430	650	800	970	1170	1340	
	30							350	540	660	800	970	1110	1270
460	1½	1700												
	2	1300	2070											
	3	1000	1600	2520										
	5	590	950	1500	2360									
	7½	420	680	1070	1690	2640								
	10	310	500	790	1250	1960	3050							
	15			540	850	1340	2090	3200						
	20			410	650	1030	1610	2470	3730					
	25				530	830	1300	1990	3010	3700				
	30				430	680	1070	1640	2490	3060	3700			
	40						790	1210	1830	2250	2710	3290		
	50						640	980	1480	1810	2190	2650	3010	
	60							830	1250	1540	1850	2240	2540	2890
	75								1030	1260	1520	1850	2100	2400
	100									940	1130	1380	1560	1790
	125											1080	1220	1390
	150												1050	1190
	200												1080	1300
	250													1080
575	1½	2620												
	2	2030												
	3	1580	2530											
	5	920	1480	2330										
	7½	660	1060	1680	2650									
	10	490	780	1240	1950									
	15		530	850	1340	2090								
	20			650	1030	1610	2520							
	25			520	830	1300	2030	3110						
	30				680	1070	1670	2560	3880					
	40					790	1240	1900	2860	3510				
	50						1000	1540	2310	2840	3420			
	60						850	1300	1960	2400	2890	3500		
	75							1060	1600	1970	2380	2890	3290	

CAUTION: Use of wire size smaller than listed will void warranty.

Notes:

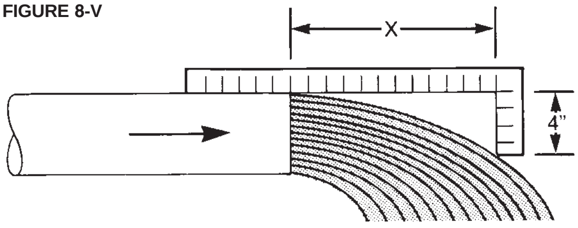
1. If aluminum conductor is used, multiply lengths by 0.5 Maximum allowable length of aluminum is considerably shorter than copper wire of same size.
2. The portion of the total cable which is between the service entrance and a 3ø motor starter should not exceed 25% of the total maximum length to assure reliable starter operation. Single-phase control boxes may be connected at any point of the total cable length.
3. Cables #14 to #0000 are AWG sizes, and 250 to 300 are MCM sizes.

Calculating Discharge Rate by Using The Horizontal Open Discharge Method

The most reliable method of measuring flow is to use a flow meter. When a flow meter is not available, however, it is possible to estimate the discharge capacity by constructing an "L" shaped measuring stick similar to that shown in Figure 8-V. With the water flowing from the pipe, place the long end of the "L" on top of the pipe. Position the "L" so that the end of the short 4-inch side just touches the stream of water as the stream slants downward. Note the horizontal distance "X" from this point to the open end of the discharge pipe. With the value "X" and and the nominal inside diameter of the pipe, use Table 8-X to find the discharge rate in gallons per minute.

EXAMPLE: Horizontal distance "X" is measured to be 12 inches. The size of the pipe Is known to be 1½" (nominal diameter). Find 12 inches in the left hand column of the chart and move across to the 1½" pipe size column. Table 8-X indicates that the discharge rate is 40.0 gallons per minute.

FIGURE 8-V



Calculating Low Capacity Outlets: A simple procedure for measuring low capacity outlets such as small pump outlets, hose spigots, and faucets is to record the amount of time it takes to fill a container of known size.

EXAMPLE: Select a container of known size such as a 5-gallon paint bucket. With a watch, measure, in seconds, the amount of time it takes to fill the bucket. If it takes 30 seconds to fill a 5-gallon bucket, Table 8-W indicates that the flow is 10.0 gallons per minute. To obtain gallons per hour (gph) multiply 10.0 x 60 to obtain 600 gph.

TABLE 8-W

Discharge Rate in Gallons Per Minute (GPM) for Low Capacity Systems

Capacity of Container (Gallons)	Time (in seconds) to Fill Container							
	10	15	20	30	45	60	90	120
	Discharge Rate in Gallons Per Minute (GPM)							
1	6.0	4.0	3.0	2.0	1.3	1.0	.7	.5
3	18.0	12.0	9.0	6.0	4.0	3.0	2.0	1.5
5	30.0	20.0	15.0	10.0	6.7	5.0	3.3	2.5
10	60.0	40.0	30.0	20.0	13.3	10.0	6.7	5.0

NOTE: Multiply gallons per minute (GPM) by 60 to obtain gallons per hour (GPH).

Calculating Distance to Water Level

Install ⅛" or ¼" pipe or tubing into the well so that the end of the tubing extends 10 to 20 feet below the lowest possible pumping water level. Be sure that all joints in the tubing are airtight. As the tubing is lowered into the well measure its length. Record the measurement.

TABLE 8-X

Discharge Rate in Gallons Per Minute (GPM) for Large Capacity Systems

Horiz. Dist. (X) Inches	Nominal Pipe Size (in Inches)									
	1	1 ¼"	1 ½"	2"	2 ½"	3"	4"	5"	6"	8"
	Discharge Rate in Gallons Per Minute (GPM)									
4	5.7	9.8	13.3	22.0	31	48	83			
5	7.1	12.2	16.6	27.5	39	61	104	163		
6	8.5	14.7	20.0	33.0	47	73	125	195	285	
7	10.0	17.1	23.2	38.5	55	85	146	228	334	380
8	11.3	19.6	26.5	44.0	62	97	166	260	380	665
9	12.8	22.0	29.8	49.5	70	110	187	293	430	750
10	14.2	24.5	33.2	55.5	78	122	208	326	476	830
11	15.6	27.0	36.5	60.5	86	134	229	360	525	915
12	17.0	29.0	40.0	66.0	94	146	250	390	570	1000
13	18.5	31.5	43.0	71.5	102	158	270	425	620	1080
14	20.0	34.0	46.5	77.0	109	170	292	456	670	1160
15	21.3	36.3	50.0	82.5	117	183	312	490	710	1250
16	22.7	39.0	53.0	88.0	125	196	334	520	760	1330
17		41.5	56.5	93.0	133	207	355	550	810	1410
18			60.0	99.0	144	220	375	590	860	1500
19				100.0	148	232	395	620	910	1580
20					156	244	415	650	950	1660
21						256	435	685	1000	1750

Once the tubing is fixed in a stationary position at the top of the well, connect an air line and pressure gauge. With a tire pump or other air supply, pump air into the line until the pressure gauge reaches a point where it doesn't read any higher. Record the pressure gauge reading at this point.

Figure 8-Y illustrates a typical method for measuring distance to water level:

X = Distance to water level (in feet). This figure to be determined.

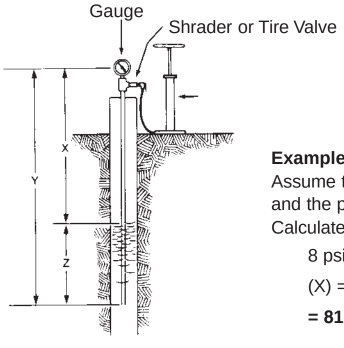
Y = Total length of air line (in feet).

Z = Length of submerged air line. This value is obtained from the pressure gauge reading which reads in pounds per square inch (psi). Multiply the pressure gauge reading by 2.31 to obtain the length of the submerged air line in feet.

Distance to water level (X) = (Y) - (Z)
= The total length of the air line (Y) minus the length of the submerged portion of the air line (Z).

Figure 8-Y

Calculating the distance to water level.



Example:
Assume that the air line is 100 feet long and the pressure gauge reads 8 psi. Calculate the distance to water level (X).

8 psi x 2.31 = 18.5 feet

(X) = 100 feet (Y) - 18.5 feet (Z)

= 81.5 feet = distance to water level

FORMULAS

TEMPERATURE CONVERSIONS:

$$\text{Degrees } \mathbf{C} = \frac{5}{9} \times (\text{Degrees F} - 32)$$

$$\text{Degrees } \mathbf{F} = (\frac{9}{5} \times \text{Degrees C}) + 32$$

Area of a Circle:

Area = πr^2

Circumference of a Circle:

Circumference = $2 \pi r$

r = radius

π = 3.14

Volume of a Tank or Cistern:

3.14 x (radius of tank)^2 x (ht. of tank) x 7.48 = Gallons
Radius and height of tank measured in feet
7.48 = number of gallons per cubic foot of water

WORK, POWER, AND EFFICIENCY:

The amount of work required to lift 1 pound to a height of 1 foot is defined as 1 ft.-lb. To lift 100 pounds to a height of 60 feet is 100 pounds x 60 feet = 6,000 ft-lbs. This amount of energy remains the same whether it takes one minute or one hour to lift the weight. The rate of working, however, is referred to as **power** and was 6,000 ft-lbs. per minute in the first case and 100 foot pounds per minute in the second case.

Power can be represented either mechanically or electrically. **Mechanical power** is measured in horsepower (HP). One HP is the theoretical power required to raise 33,000 pounds to a height of one foot in one minute, or:

1 HP = 33,000 ft.-lb./minute
= 550 ft.-lb./second

Electrical power is measured in watts(w) or kilowatts(kw), and:

1,000 w = 1 kw = 1.34 hp, or
1 HP = 745 w = 0.746 kw

WATER HORSEPOWER (WHP):

Water horsepower is the power required to raise water at a specified rate against a specified head, assuming 100% efficiency.

$$\frac{\text{WHP} = \text{GPM} \times \text{Total Pumping Head}}{3{,}960}$$

BRAKE HORSEPOWER (BHP):

Brake horsepower is based on test data and can be either the horsepower developed at the motor shaft (motor output) or that absorbed at the pump shaft (pump input).

$$\text{Pump BHP} = \frac{\text{WHP} \times 100}{\text{Pump Efficiency (\%)}}$$

$$= \frac{\text{GPM} \times \text{Total Pumping Head} \times 100}{3{,}960 \times \text{Pump Efficiency (\%)}}$$

$$\text{Motor BHP} = \frac{\text{Power input} \times \text{Motor Efficiency (\%)}}{100}$$

$$= \frac{1.34 \times \text{kw input} \times \text{Motor Efficiency (\%)}}{100}$$

PUMP EFFICIENCY:

Pumps and motors, like all machines, are not 100% efficient. Not all of the energy supplied to them is converted into useful work. Pump efficiency is the ratio of power output to power input, or:

$$\text{Efficiency (\%)} = \frac{\text{Power Output} \times 100}{\text{Power Input}}$$

$$\text{Pump Eff. (\%)} = \frac{\text{WHP} \times 100}{\text{Pump BHP (Input)}}$$

$$= \frac{\text{GPM} \times \text{Total Pumping Head} \times 100}{3960 \times \text{Pump BHP (Input)}}$$

$$\text{Motor Eff. (\%)} = \frac{\text{Motor BHP (Output)} \times 100}{1.34 \times \text{kw input}}$$

$$\text{Plant Eff. (\%)} = \frac{\text{GPM} \times \text{Total Pumping Head} \times 100}{5{,}300 \times \text{kw Input}}$$

ELECTRIC POWER (AC):

E = Electrical pressure (volts). Similar to hydraulic head.

I = Electrical current (amps). Similar to rate of flow.

W = Electrical power (watts) = E x I x PF

kw = Kilowatt (1,000 watts)

kw-hr. = Kilowatt-hour = 1,000 watts for one hour

Apparent Power = E x I = volt-amperes

PF = Power Factor = Useful Power ÷ Apparent Power

Power Calculations for Single-Phase Power

W (Watts) = E x I x PF
NOTE: When measuring single-phase power use a single-phase wattmeter.

Input HP to motor = W ÷ 746 = 1.34 x kw

Power Calculations for Three-Phase Power

W (Watts) = 1.73 x E x I x PF
Where: E = effective (RMS) voltage between phases
I = average current in each phase
NOTE: When measuring three-phase power use either (1) three-phase wattmeter, (2) single-phase wattmeters, or the power company's revolving disc wattmeter.

When calculating power with a revolving disc wattmeter use the following formulas:

$$\text{kw input} = \frac{K \times R \times 3.60}{t}$$

$$\text{Input HP (to motor)} = \frac{K \times R \times 3{,}600}{746 \times t}$$

$$= \frac{K \times R \times 4.83}{t}$$

FORMULAS

$$\text{Motor BHP (output)} = \frac{\text{Input HP x Motor Eff.(\%)}}{100}$$

Where K = Meter constant = watts per revolution of revolving disc (value of K is marked on the meter nameplate or on the revolving disc). Where current transformers are used, multiply meter constant by current transformer ratio.

R = Number of disc revolutions counted.

t = Time in seconds for R revolutions.

CALCULATING OPERATING COSTS OF PUMPS:
Costs in Cents per 1,000 Gallons:

$$\text{Cost (¢)} = \frac{\text{kw Input x r x 1,000}}{\text{GPH}}$$

Cost in Cents per Acre-Inch

$$\text{Cost (¢)} = \frac{\text{kw Input x r x 452.6}}{\text{GPM}}$$

Where: r = cost of power in cents per kw-hr.

FRICTION LOSS TABLES

Friction Loss Table – SCH 40 STEEL PIPE

(Friction Loss in Feet of Head Per 100 Feet of Pipe)

		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
GPM	**GPH**	ID 0.622"	ID 0.824"	ID 1.049"	ID 1.380"	ID 1.610"	ID 2.067"	ID 2.469"	ID 3.068"	ID 4.026"
2	120	4.8								
3	180	10	2.5							
4	240	17.1	4.2							
5	300	25.8	6.3	1.9						
6	360	36.5	8.9	2.7						
7	420	48.7	11.8	3.6						
8	480	62.7	15	4.5						
9	540	78.3	18.8	5.7						
10	600	95.9	23	6.9	1.8					
12	720		32.6	9.6	2.5	1.2				
14	840		43.5	12.8	3.3	1.5				
16	960		56.3	16.5	4.2	2				
20	1,200		86.1	25.1	6.3	2.9				
25	1,500			38.7	9.6	4.5	1.3			
30	1,800			54.6	13.6	6.3	1.8			
35	2,100			73.3	18.2	8.4	2.4			
40	2,400			95	23.5	10.8	3.1	1.3		
45	2,700				29.4	13.5	3.9	1.6		
50	3,000				36	16.4	4.7	1.9		
60	3,600				51	23.2	6.6	2.7		
70	4,200				68.8	31.3	8.9	3.6	1.2	
80	4,800				89.2	40.5	11.4	4.6	1.6	
90	5,400					51	14.2	5.8	2	
100	6,000					62.2	17.4	7.1	2.4	
120	7,200						24.7	10.1	3.4	
140	8,400						33.2	13.5	4.5	1.2
160	9,600						43	17.5	5.8	1.5
200	12,000						66.3	27	8.9	2.3
260	15,600							45	14.8	3.7
300	18,000							59.6	19.5	4.9

Friction Loss Table – SCH 40 PVC

(Friction Loss in Feet of Head Per 100 Feet of Pipe)

		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
GPM	**GPH**	ID 0.622"	ID 0.824"	ID 1.049"	ID 1.380"	ID 1.610"	ID 2.067"	ID 2.469"	ID 3.068"	ID 4.026"
2	120	4.1								
3	180	8.7	2.2							
4	240	14.8	3.7							
5	300	22.2	5.7	1.8						
6	360	31.2	8	2.5						
7	420	41.5	10.6	3.3						
8	480	53	13.5	4.2						
9	540	66	16.8	5.2						
10	600	80.5	20.4	6.3	1.7					
12	720		28.6	8.9	2.3	1.1				
14	840		38	11.8	3.1	1.4				
16	960		48.6	15.1	4	1.9				
20	1,200		60.5	22.8	6	2.8				
25	1,500			38.7	9.1	4.3	1.3			
30	1,800				12.7	6	1.8			
35	2,100				16.9	8	2.4			
40	2,400				21.6	10.2	3	1.1		
45	2,700				28	12.5	3.8	1.4		
50	3,000					15.4	4.6	1.7		
60	3,600					21.6	6.4	2.3		
70	4,200					28.7	8.5	3	1.2	
80	4,800					36.8	10.9	3.8	1.4	
90	5,400					45.7	13.6	4.8	1.8	
100	6,000					56.6	16.5	5.7	2.2	
120	7,200						23.1	8	3	
140	8,400						30.6	10.5	4	1.1
160	9,600						39.3	13.4	5	1.4
200	12,000						66.3	20.1	7.6	2.1
260	15,600							32.4	12.2	3.4
300	18,000							42.1	15.8	4.4

Friction Loss Table – VALVES and FITTINGS

(Friction Loss in Equivalent Number of Feet of Straight Pipe)

TYPE OF FITTING AND APPLICATION	PIPE AND FITTING	NOMINAL SIZE OF FITTING AND PIPE						
		1/2"	**3/4"**	**1"**	**1 1/4"**	**1 1/2"**	**2"**	**2 1/2"**
		EQUIVALENT LENGTH OF PIPE(IN FEET)						
Insert Coupling	Plastic	3	3	3	3	3	3	3
Threaded Adapter (Plastic to Thread)	Plastic	3	3	3	3	3	3	3
90° Standard Elbow	Steel	2	2	3	4	4	5	6
	Plastic	2	2	3	4	4	5	6
Standard Tee (Flow Through Run)	Steel	1	2	2	3	3	4	4
	Plastic	1	2	2	3	3	4	4
Standard Tee (Flow Through Side)	Steel	4	5	6	7	8	11	13
	Plastic	4	5	6	7	8	11	13
Gate Valve[1]	Steel	1	1	1	1	2	2	2
Swing Check Valve[1]	Steel	5	7	9	12	13	17	21

NOTES:

Based on schedule 40 steel and plastic fittings.

Figures given are friction losses in terms of Equivalent Lenghts of straight pipe.

① Friction loss figures are for screwed valves and are based on equivalent lengths of steel pipe.

CONVERSION TABLES

UNITS OF FLOW

CONVERT TO ▶ / CONVERT FROM ▼	U.S. GALLONS PER MINUTE	MILLION U.S. GALLONS PER DAY	CUBIC FEET PER SECOND	CUBIC METERS PER HOUR	LITERS PER SECOND
	MULTIPLY BY:				
(1) U.S. GALLON PER MINUTE	1	0.001440	0.00223	0.2271	0.0631
(1) MILLION U.S. GALLONS PER DAY	694.5	1	1.547	157.7	43.8
(1) CUBIC FOOT PER SECOND	448.83	0.646	1	101.9	28.32
(1) CUBIC METER PER HOUR	4.403	0.00634	0.00982	1	0.2778
(1) LITER PER SECOND	15.85	0.0228	0.0353	3.60	1

UNITS OF PRESSURE AND HEAD

CONVERT TO ▶ / CONVERT FROM ▼	LBS. PER SQUARE INCH	FEET OF WATER ①	METERS OF WATER ①	INCHES OF MERCURY ②	ATMOSPHERES	KILOGRAMS PER SQUARE CM
	MULTIPLY BY:					
(1) LB. PER SQUARE INCH	1	2.31	0.704	2.04	0.0680	0.0703
(1) FOOT OF WATER ①	0.433	1	0.305	0.881	0.02945	0.0304
(1) METER OF WATER ①	1.42	3.28	1	2.89	0.0966	.1
(1) INCH OF MERCURY ②	0.491	1.135	0.346	1	0.0334	0.0345
(1) ATMOSPHERE (at Sea Level)	14.70	33.96	10.35	29.92	1	1.033
(1) KILOGRAM PER SQUARE CM	14.22	32.9	10	28.96	0.968	1

NOTES: ① Equivalent units are based on density of fresh water at 68°F.
② Equivalent units are based on density of mercury at 32°F.
Each 1,000 feet of ascent decreases pressure about ½ pound per square inch.

UNITS OF VOLUME AND WEIGHT

CONVERT TO ▶ / CONVERT FROM ▼	U.S. GALLONS	IMPERIAL GALLONS	CUBIC INCHES	CUBIC FEET	ACRE FEET	POUNDS ③	CUBIC METERS	LITERS
(1) U.S. GALLON	1	0.833	231	0.1337	3.07x10^{-6}	8.34	0.003785	3.785
(1) IMPERIAL GALLON	1.201	1	277.4	0.1605	3.69x10^{-6}	10.01	0.004546	4.546
(1) CUBIC INCH	0.00433	0.00360	1	0.000579	—	0.0361	1.64x10^{-5}	0.0164
(1) CUBIC FOOT	7.48	6.23	1728	1	2.30x10^{-5}	62.4	0.02832	28.32
(1) ACRE FOOT	325,850	271,335	—	43,560	1	2.7x10^{6}	1233.5	1.23x10^{6}
(1) POUND ③	0.120	0.0998	27.7	0.0160	3.68x10^{-7}	1	4.54x10^{-4}	0.454
(1) CUBIC METER	264.2	220	61,024	35.315	8.11x10^{-4}	2202	1	1000
(1) LITER	0.2642	0.220	61.024	0.0353	8.11x10^{-7}	2.202	0.001	1

NOTES: ③ Weight equivalent basis water at 60°F.

UNITS OF LENGTH

(1) Inch = 0.0833 Ft. = 0.0278 Yd. = 25.4 mm = 2.54 cm
(1) Ft. = 12 Inches = 0.333 Yd. = 30.48 cm = 0.3048 Meter
(1) Yard = 36 Inches = 3 Ft. = 91.44 cm = 0.9144 Meters

(1) Mile = 5280 Ft. = 1760 Yds. = 1.61 km = 1609 Meters
(1) Meter = 3.281 Ft. = 39.37 In. = 0.000621 Miles = 0.001 km
(1) Kilometer = 1000 m = 1093.61 Yds. = 0.62137 Miles = 3281 Ft.

L-SP-PG-001	2/06
PRINTED IN USA	

Subject to alterations.

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APPENDIX G
Drilling Logbook

747784-04000

①
3 / 14 / 11

Mobilization Day!! Overcast & Drizzle in AM 60-75°F
Pt. Cloudy in PM

0745 S. Pearson on site. Kyle Caskey has escorted USA to WWTP with rolloff. Meet USA at site. Drop box & open. Has about 1.5 C.Y. of dirt in it. Call Rene Jones, he will look at it.

0815 At office.

0845 Rene said USA will bring out another box that is clean.

0900 Inventory supplies & review safety plan.

1015 Go Office Max & Home Depot for supplies

1130 Spoke with GeoProjects. They will be here at 1300.

Lunch Break

1230 Return to CSSA. GPI almost here. Go to gate 9.

1250 Escort GPI to drilling site, then take them to badging office.

1330 at CSSA office. Safety meeting.
- Scott Pearson, Kyle Caskey
- Lee Gebbert, Kevin Gebbert, Adrian Soriano, Kevin Graham

Review - emergency procedures
- Route to hospital
- AHAs
- Drilling Hazards
- Chemical Exposure
- Facility procedures & requirements
- etc. required by HSP
- Sign all documents

1445 Mobilize to MW35 & get set up.

1700 Hole is set up & ready to drill MW35-LGR

Scott Pe

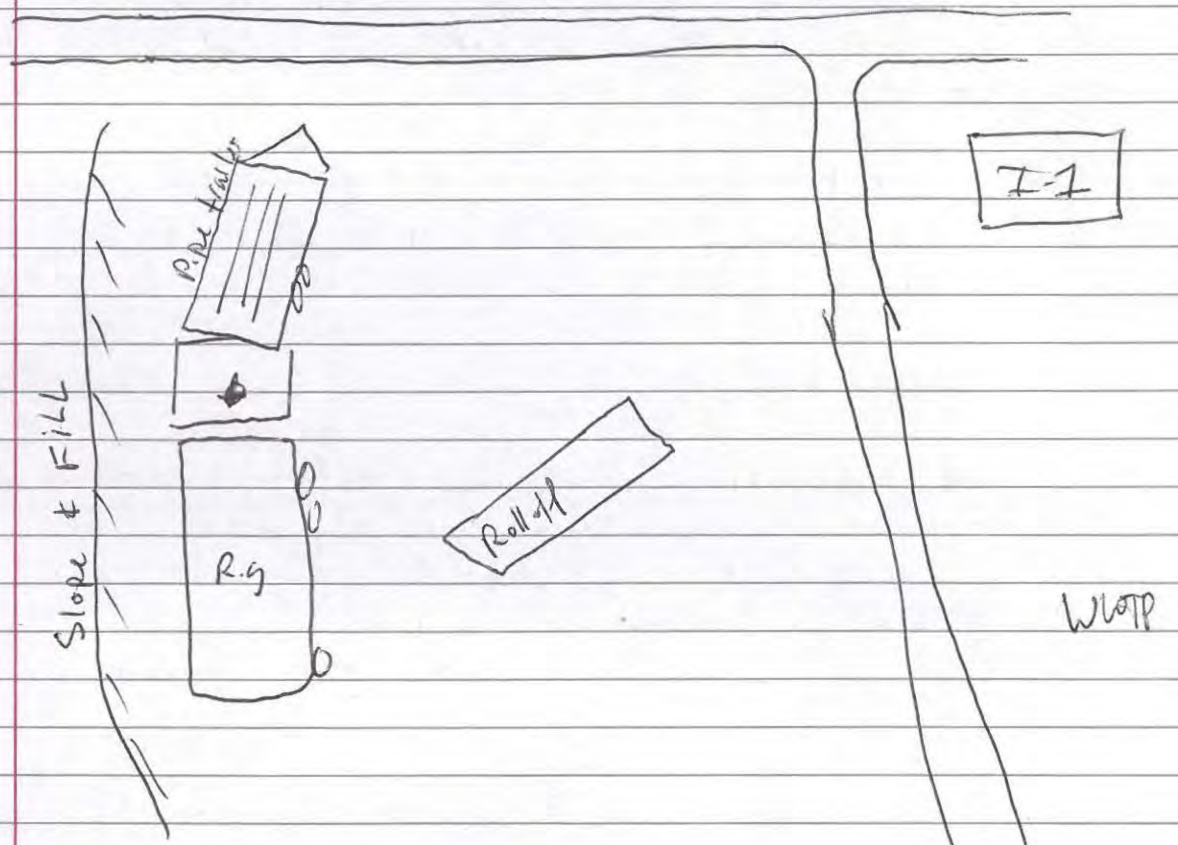
② 747781-04000 3/15/2011

Pt. Cloudy 55-80F

Parsons: Scott Pearson
GPI: Lee Gebbert, Kevin Gebbert, Adrian Soriano

0715 At CSSA. GPI arrives at 0730. Sign in at ENV.
0730 Safety Meeting: Slips, Trips, Falls, Good Housekeeping

Site Map



SP

---

③ 747781-04 3/15/11

Overcast 55°F

0830 Start drilling. 3' of clay, then bedrock with marl + clay.
0900 Samantha Elliott calls. Needs help downloading the ~~WB05S~~ WB04.
Notice that replacement rolloff is being delivered through Gate 9. Kyle Caskey will escort to MW35 drill site.
0915 Download WB04 Datalogger + remove MosDAX tool
0930 Lee Gebbert calls. This rolloff also has dirt (couple wheelbarrows worth) We shovel it out + place it in original container that is being hauled out.
1000 USA demobs original container. Kyle Caskey says we have been requested to go to CS-12 construction site.
1020 Meet Hillbrig + SCI for consultation on plumbing the mixing tank + solution tank. Have conference call with Kenneth Kuhr (Parsons Design Engineer). Explain + resolve all questions.
1100 Return to drill site. 15' advancement.
1115 Go to ENV.
1130 Lunch break. Drilling @ 17'.
1230 Return to CSSA. Drill to 20'. Add collar to drill stem.
1300 Go to ENV to perform tasks requested by Julie Burdey during lunch break.
1320 Work on Building 36 alarm ~~codes~~ SP codes + contacts with John Zigmond (SCI).
1400 Go out to GAC Shack to find 75 µm bag filters and inspect bag filtration unit.

Scott P

3-15-2011

Clear 75°F

1430 Found filter & unit looks servicable. Will move unit to MW35 location tommorrow with GPI.

1445 Samantha asks me to come out to WB-4 to help re-install MesDAX

1515 data logging probe.

~~1530~~ SP Return to MW35-LGR drill site.

1640 Return to ENV. Rig is at 47'. Will run TOTCO @ 50'.

1740 Drilled to 60'. TOTCO run @ 50' = $\frac{1}{4} - \frac{1}{2}^\circ$

1755 Leave CSSA.

Scott P

3/16/11

AM Drizzle, 63°F – 85°F

Parsons: Scott Pearson

GPI: Lee Gebbert, Kenn Gebbert, Adrian Soriano

0720 S. Pearson @ CSSA

0730 Daily Safety Meeting – Slick Surfaces & Heavy Lifting Continue drilling from 60'.

0800 Go get bag filter unit from BioReactor

0845 Clean up unit & get it ready for use.

0915 Go to bioreactor and dig up end of

1030 Finally uncover end of line.

1040 Go back to ENV.

Ken Rice & Gabe M-F ask me to join them in a discussion about upgrading the bioreactor. Wants to drill 2 new LGR wells at SWMU B3 while the rig is still here. Rebuild entire system & completely automate thru SCADA.

Noon Lunch break

1300 Return to ENV.

1310 Go to rig. The 100' TOTCO run was $\frac{1}{2}^{+\circ}$ Continue drilling. Go back to bioreactor to measure fitting for VAC truck.

1345 Find a NPT connection at end of Trench 5. Will scavange that fitting to use on Trench 4.

1430 Go back to ENV. Samantha has recieved results from Off-Post Sampling. 2 wells @ TOWSC in Scenic Oaks have F-flagged hits for PCE.

1600 Drilling is at 130'.

- Have discussion with Julie Burley about TOWSC well results
- Discuss B3 well options w/ Chris Beal.

1745 - Notify Gabe of TOWSC results.

1800 S. Pearson off-pst

S. Pe

3-17-2011

67°-83°F

PARSONS: S. Pearson
GPI: L. Gebhert, K. Gebhert, A. Soriano
H&S: Driving Safety. Speed Limit, seat belts, yield to traffic

0715 S. Pearson & GPI at CSSA. Sign in at ENV. Will resume drilling at 140'. Lee is going back to get VAC truck this AM.

0800 Return to ENV to work on additional drilling budget.

0830 Brenda asks me to escort Bill Gilke (CSSA) out to CS-12 worksite. Andrew Wallace also has a question about the low float cut-off at the mixing tank.

1030 Stop by rig. Down to 170'. 150' TOCTO = 3/4°

1100 Return to ENV to work on estimate.

1115 Escort Kevin Gebbert to CS-10 to get a load of water.

1145 Lunch Break. See Lee return with VAC Truck.

1250 Return to CSSA. Work with Chris Beal on drilling location evaluations for B-3.

1430 Go out to rig. Getting close to 200'. Lee & I stake out MW36-LGR west of Building 90. Morlandt is going to insulate the power line.

1450 Go out to B-3. Show Lee the trench & inlet.

1515 Return to rig. Getting ready for 200' ~~TOTC~~ SP TOTCO = 1/4°

1530 Return to ENV. Work on Teaming Agreements. Meet with Gabe about B-3.

1700 Head back out to rig. Also sent GPI a RFP to drill 2 EXW wells.

3/17/2011

Pt. Cloudy 67-84°F

PARSONS: S. Pearson
GPI: L. Gebbert, K. Gebbert, A. Soriano
H&S: PPE. Hard Hats & Ear Protection

0700 GPI at CSSA

0715 S. Pearson at ~~CS~~ SP CSSA. Sign in at ENV. H&S Meeting. Resume drilling at 220'.

0850 Morlandt is here to insulate the 4K lines at the MW36LGR drill site. Escort them to the location.

1000 Morlandt is done wrapping the lines. Gabe will pay with credit card.

1030 Go out to B-3. Lee is dumping 1st load (~~2000~~ 2,500 SP gal) of filtered drill water. Remove sprinkler head from Southern-most end of T4 line to facilitate speed.

1130 Finish dumping water. Go to ENV. Help Gabe set up credit card payment to Morlandt.

1145 Lunch break.

1215 Back at Rig. 250' TOTCO was 1/8°. Now at 280'.

1230 Back at ENV. Looking for GAC Shack photos for Gabe.

1300 Go to GAC to take photos for Gabe.

1345 Edward from J. Sanchez Calls. The plumbing subcontractor wants to test the plumbing system. Notify CSSA the J. Sanchez needs to coordinate with CSSA, not PARSONS

1400 Go to Rig. 300' TOTCO is 1/4° Resume drilling.

1730 Stop drilling at 340'.

1745 Leave CSSA.

S. P

3-21-11

PARSONS: S. Pearson, A. Lindley
GPI: A. Soriano, L. Gebbert, K. Gebbert
H+S: Heavy Lifting, pinch points, Overhead lifting

0715 S. Pearson + A. Soriano on-site. A. Lindley is also here.

0730 Go over status of drilling with A. Lindley. Go out + visit rig. Show Adrian the rig, rolloffs, filtering, sampling, + Well CS-10 operation.

0800 SCI asked if GPI can support light installation at CS-12 location. Lee is not here with the Smeal yet.

0815 Lee arrives with Smeal. Adrian is cleaning out the hole. Had about 3' of muck.

0845 Resume drilling at 340'. Lee + I go to CS-12 to help SCI set light poles.

1015 Return to rig. 350' TOTCO = 1/4°

1400 Drill to 400'. Starting to see white cuttings typical with base portion of LGR. TOTCO = 3/4°

1645 Hit tough drilling at 426'. Either very hard or a big fracture.

1740 Finally get ~~p~~ past crack + can drill with some pressure.

1755 Cuttings are turning greyish at 432'. Possibly BS?

1810 Go dump 3000 gallons at B-3.

1845 Return to well. Definitely BS. Driller called it at 429-430'. Stop drilling @ TD = 440'

1900 Secure Site.

1910 Leave CSSA.

3/22/11

Pt.Cldy 65-80°F

Parsons: A. Lindley
GPI: L. Gebbert, A. Soriano, K. Gebbert
H+S: Moving heavy equipment.

0720 A. Lindley, L. Gebbert, A. Soriano on site

0800 Go over decon rig-move plan with Lee.

0810 Collect water sample for VOC characterization from roll-off. (MW35-WC-01)

0840 Go dump 3000 gallons at B3 (L. Gebbert)

0845 Begin cleaning out well.

0915 Begin laying down drill pipe

1030 Lee returns. Drill pipe laid down. Begin decon.

1045 To 606 to check email and CHERPs for samples.

1120 Lunch break. GeoProjects to lunch and HomeDepot for containment materials.

1230 Return to CSSA. To 606 for call with S. Pearson + J. Booch about drilling schedule.

1345 Geo Projects returns, begins moving equipment and materials to new site.

1400 Collect waste characterization sample of cuttings for VOC analysis (MW35-WC-02)

1630 GeoProjects completed building containment and moving equipment and vehicles over to new location. Secure Site.

1645 Spoke with Rene (USA) about roll-off. It will be delivered tomorrow (Wednesday) morning around 9AM.

1705 GeoProjects departs CSSA.

1720 Leave CSSA.

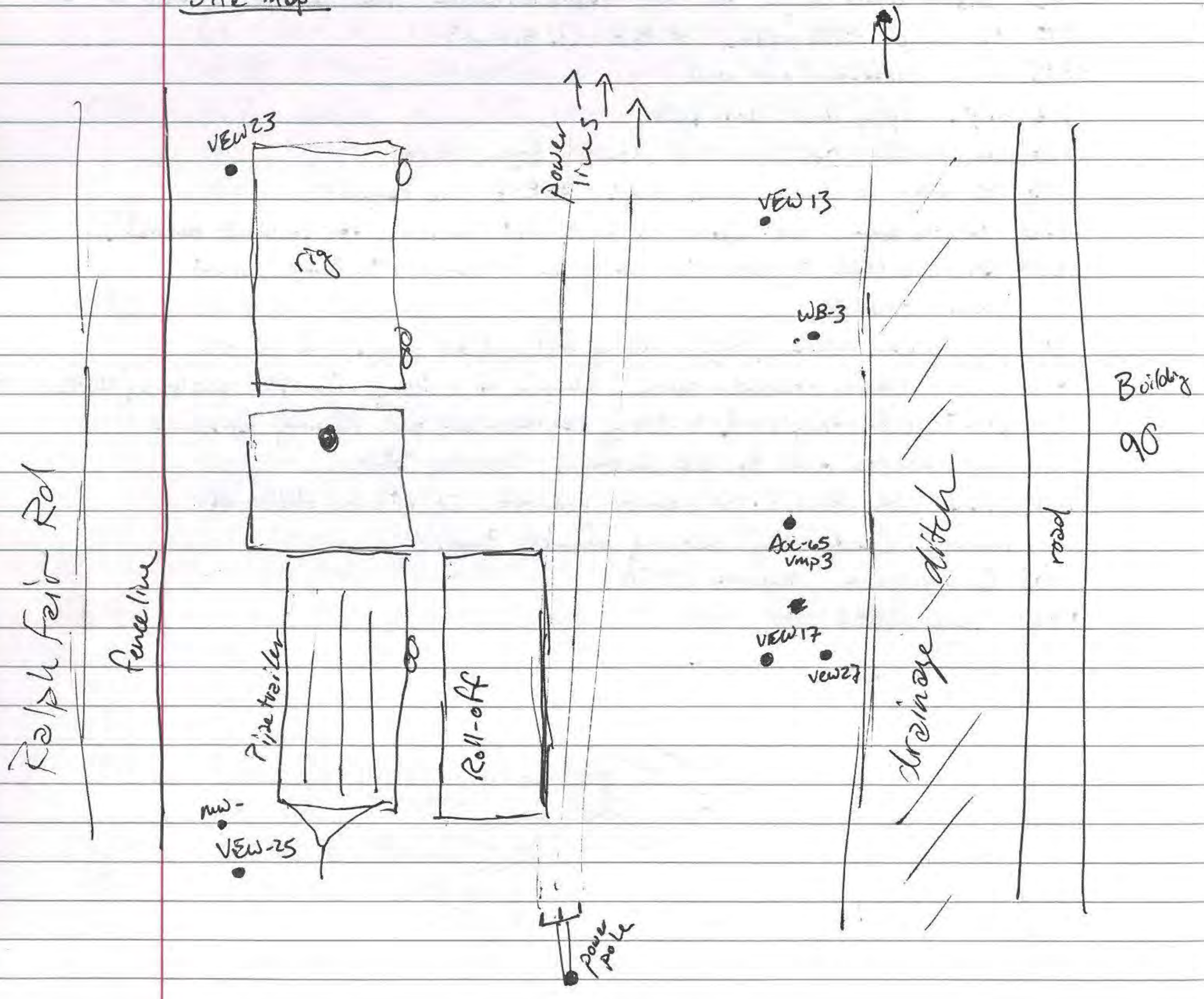
3/22/11

747781-04 3-23-11

Clear 60-89°F

Parsons: A. Lindley, J. Bouch
GPI: L. Gebbert, K. Gebbert, A. Soriano
H+S: Slips + Trips; Hand Safety (Pinch-points + PPE)
0650 A. Lindley @ CSSA. GPI Arrives @ 0720

Site Map



Clear 60-89°F

0735 GPI complete final preparations to commence drilling.
0845 Begin drilling CS-MW36 LGR. 1' of Clay, then bedrock (LS - light tan)
0945 Meet with USGS at MW35LGR, Chris Beal to GPS well for USGS.
1005 Return from meeting USGS. Rig at 10'.
1030 To 606 to check email.
1050 Spoke with Rene (USA) about status of Roll-off, said it is 5 minutes away. Back to Rig.
1105 Roll-off arrives J. Bouch to escort to location.
1145 Break for lunch (A. Lindley).
1300 Return from lunch. Rig @ 26'. Collar added during lunch.
1450 Drilled to 40', collar added. Continue Drilling.
1520 L. Gebbert went to dump 1,500 gallons at B3 (from MW35LGR roll-off).
1530 Rig @ 47'. Will run TOTCO @ 50'.
1730 Rig @ 57'. Secure Site
1735 Depart CSSA

3/23/11

747781.04

3-24-11

Ptly Cldy 60-

Parsons: A. Lindley
GPI: L. Gebbert, K. Gebbert, A. Serino
H+S: Heavy lifting.
0700 A. Lindley on Site. GPI arrives @ 0710 Sign in at ENV.
0740 Resume drilling @ 57'.
0830 Drilled to 60'. TOTCO run @ 50' = 3/4°+. Adrian will ream out hole.
0930 Reemed hole. Re-run TOTCO @ 50' = 0-1/8°. Resume drilling.
1130 Rig @ 75'. A. Lindley Break for Lunch.
1245 Return from Lunch. Rig @ 85'.
1345 Lee Gebbert and A. Lindley to B3-EXW02 to look at pump.
1415 Rig @ 94'. Return from EXW02. Julie Bouch arrives.
Go over status of drilling, CS-10, rolloffs, filters etc.
1524 Rig @ 100' - ran TOTCO bullseye+
Lee and Kevin went to pull B3EXW02
Resume drilling
1600- back to 606 to get my computer and complete timesheet
1620- back to AOC 65, rig @ 110'
1724- Lee back from pulling B3EXW02
1730 Rig @ 120', Secure site
1745- Depart CSSA

3.24.11

3/25/11

Cloudy 65°

Parsons: J. Bouch
GPI: L. Gebbert, K. Gebbert, A. Serino
Health and Safety: Working with heavy equipment; driving safety and proper PPE
0730 GPI onsite and signed in @ 606, resume drilling
0800 J. Bouch onsite
0810 L. Gebbert went to dump
0830 Rig @ 132'
0845 J. Bouch to 606, then to B-3 for morning readings
0900 USGS @ B3 EXW 02, started logging this morning
0940 Back to AOC 65
Rig @ 137', said they hit a large fracture at about 136'
1025- L. Gebbert back from dumping water, dumped about 1500 gallons
1230 J. Bouch offsite for lunch, rig @ 146'
1305 J. Bouch onsite, rig @ 156', Lee went to get water @ CS-10
1400 ran TOTCO test bullseye+, rig @ 150'
1415 J. Bouch down to receiving, package gone / Brenda picked it up
1440 J. Bouch back onsite rig @ 167'
closing up shop for the weekend
1500 GPI offsite, secured site
1515 Before Lee left he said he thinks we may have hit water @ 120' - will check PZ wells Monday
J. Bouch Back to 606

3.25.11

3.28.11

3.28.11

Parsons - J.Bouch
GPI - L.Gebbert, K. Gebbert, A. Soreno
H.S - Rainy weather, slips trips falls, watch for lightening

0720 GPI onsite
0815 J.Bouch onsite, Lee said they started about 0800.
Rig @ 168'
Bouch back to 606 to get materials for the day and check in w/ Sam for B-3 work.
0925 Back to rig, rig @ 180'
0945 Back to 606 to pick up Sam, heading out to WB-07 to try to retreive probe and tubes
1100 Back to rig to see if we can get Lee to help us pull equipment out of Westbay 07, rig @ 200'
1107 Ran TOTCO 1/8° (bullseye +)
1115 Back to WB07, Lee pulled on it, moved alittle, going to get Kevin for more muscle
1220 Got equipment out, back to 606
1230 back to rig, rig @ 210'
1245 - J.Bouch; S.Elliott offsite for lunch
1400 back to 606, back to rig.
Rig @ 224'
1600 - out to B-3 to take daily readings, back to 606 to check email, do time sheet and pack up computer
1630 back at MW36 LGR, rig at 232'
1730 Called WSD to touch base w/ him.
1745 Rig @ 150', securing site for the evening
1755 GPI offsite
1800 J.Bouch offsite

3/28/11

3/29/11

50° - heavy fog, rainy

Parsons - J.Bouch
GPI - L. Gebbert, K. Gebbert, A. Soriano
H.S Tailgate - Watch for thunderstorms w/ lightening strikes, fog (heavy fog in the am), slippery equipment

0715 GPI - onsite and signed in at 606
0845 J.Bouch onsite due to heavy fog and traffic on I10, and also stopped and uploaded data from WB04.
- GPI ran TOTCO test at 250' 1/8
- rig @ 270' upon arrival
0900 Lee left to dump 1500 gallons of water at the Bioreactor
0915 Back to 606 to check e-mails then out to B-3 for morning readings, saw USGS said they would finish today @ BEXW02
1030 Back at ~~B3~~ MW36 LGR, rig @ 280'
1145 L.Gebbert back onsite from dumping water, rig @ 293'
1206 Rig @ 299', J.Bouch offsite for quick lunch
1245 J.Bouch onsite, rig at 312'
- Ran TOTCO @ 300'
1345 J.Bouch to MW35 LGR to look at cuttings
1400 Back at MW36 LGR, saw USGS, said they will be done will B3BXW02 tom. and pump can be replaced.
1800 - touched base with Scott Pearson about drilling. Expects contact to be about 367', rig @ 340'
1813 securing site for the evening
1820 GPI offsite
1830 J.Bouch back to 606 to get computer and do time sheet.

3.29.11

7477810700

3.30.11 40° | overcast | windy

Parsons : J Bonch
GPI : K. Gebbert, L. Gebbert, A Soriano
H+S Tailgate working w/ heavy equipment in cool weather
0715 GPI onsite rig @ 340', resume drilling
0815 J. Bonch onsite, rig @ 352' ran TOTCO @ 350'
'1/4'
0835 Back to office to drop computers and get jars
0915 Back to rig, rig at 360'
1035 Scott called talking about packers
345 - 370 orange cuttings
370 - 375 cuttings gray w/ some orange (BS)
375 - 380 dark gray cuttings
1045 Confirmed w/ Scott going to go 5' more feet, TD 385'
1105 Lee offsite to go dump water @ B-3 ~2900 gallons
1130 GPI to lunch
1130 J. Bonch back to 606
1200 J. Bonch of post for lunch
1300 J. Bonch back onsite, to 606 to collect bottles
1348 J. Bonch back to rig, all piping is pulled and rig is off the hole. L. Gebbert went to get water in order to decon the pipe. K Gebbert and A. Soriano are taking rig and vac truck over to stage at MW35 LGR
1415 Collect WC samples of water from roll-off box. Do not need to collect cutting WC samples (per Adrien) because we will keep cuttings until other wells are complete.
1430 ~~off post~~ UOE over to MW35 LGR to check roll off box for Scott need to find something to measure depth, back to B-3 to take daily readings and look in GAC for stick
1500 Back to MW 35 LGK, there is approximately 1 foot of sludge in the bottom of the roll off.
GPI back at MW35 LGR, starting to decon and get ready for packer tests tomorrow.
1530 back to 606 to pack and ship WC sample, talked to Scott. He wants full suite of VOCs and a 3 day TAT
1730 Back down to MW 35 LGR, GPI ready to go for the night

3/30/11

1735 GPI offsite
J. Bonch checked to make sure all was secure
1745 J. Bonch offsite
* Lee dumped ≈ 1500 gallons today

JB
3.30.11

3.30.11
~~4.1.11~~ JDR

Parsons: J.Bonch
GPI: K. Gebbert, L. Gebbert, A. Soriano
H&S: Tailgate: working w/ Nitrogen and packer equipment
0720 GPI onsite at 0720, began to get ready for packer test
0815 J.Bonch onsite, down to MW35-LGR, GPI wiring pump for packer test.
0835 Back to 606 to read emails and get ready for packer test
0940 back to MW35 Spoke w/ Lee about intervals he wants to have sampled (Scott Pearson)
- Scott wants T#1 259-271'
T#2 374-386'
T#3 414-426'
if one zone does not produce water go to 396-408'
- VOCs (full suite) will be sampled in each location
1060 Talked w/ Scott to touch base
1020 Talked w/ Adrien Lindley about Bldg 90 schedule
1045 Looking at USGS logs on FTP site
1115 J.Bonch offsite for lunch
1135 J.Bonch back onsite, back to 606, Check emails, grab VOAS
1205 Back to MW35LGR, GPI almost ready to start, all piping and packers down to 1st zone 259'-271'
1215 Start test - stop. Were inflating packers and had a hole in tubing. Located hole.
1231 inflating packer
(259-271') 1305 Started pump. Pumped at 5 gpm for about 4 min — pumped off. Pumped ≈ 12 gallons. Let recover for about 7 minutes. Started @ 1316 and adjusted pump to about 1/3 gallon per minute. Pumped off at 1322
1325 started it up again, running at about 1/3 gpm, pumped off at 1336, about 14 gallons total right now
- tried to call Scott, no answer, talked to Adrien. Continue on
1410 Turned on pump, ran about 10 seconds, pumped ≈ 2.5 gallons then dry. Pump was on high, not adjusted because pump

JDR ~~4/1/11~~
3/31/11

was cavitating at such a slow speed. Would not hold at a 1/4 gpm — would pump off.
1421 talked to Scott — said to let it ~~dis~~recharge ~~until~~ and try to grab a sample, remove about 20 gallons.
1447 Turned on pump removed ≈ 1.0 gallon of water.
1530 Turned on pump and removed ≈ 1.5 gallons of water
1615 Collect sample @ 259-271' interval and removed about 1.5 additional gallons. (per Scott Pearson)
Total gallons removed from MW35-LGR (259-271') was 20 gallons.
1620 Lee noticed a leak in the nitrogen tube, need to find leak and fix it, deflating packer
1625 J.Bonch to 606 to do time Sheet
1700 Back to MW35, they found the leak and repaired it.
1730 Back in the hole will start tomorrow and finish up the packer tests.
- securing the site for the night
- tomorrow will also try to replace pump in EXW02 because USGS is done logging
1745 J.Bonch and GPI offsite

4.1.11

4-1-11 747781.04 Kyle Caskey

0800 KKC arrives site.
GPI: Kevin Gebhart + Lee Gebhart
Today's objective: Perform packer test on zones: 374 to 386 + 414 to 426.
GPI has already started tripping pipe + packer into MW-35 LGR.
0815 Start inflating packer in zone 374 to 386.
0845 Start pumping water out of zone 374 to 386.
0950 Have pumped over 160 gallons and H2O is not clear. Will pump another 100 gallons.
1010 Have pumped ~260 gallons. H2O is clear.
1012 KKC collects a sample. GPI team will re-locate packer to invervial 414-426.
1100 Start pumping.
1125 Have pumped ~210 gallons and H2O is clear.
1128 Collect sample.
1200 KKC leaves CSSA.

Kyle Caskey
4-1-11

4.1.11
1200 J. Bonch onsite and relieved Kyle Caskey
GPI installing pump at EXW02
Health and Safety Tailgate: Working with overhead hazards, well pipe, packer pipe
1205 J. Bonch out to B-3 for daily readings and to check ~~on~~ on drillers.
1235 drillers are starting to replace drill pipe
1440 J. Bonch down to receiving to pick up package
1505 Back to GAC shack to find a piece of PVC for drop tube
1630 Trying to turn on EXW02 - Lee called Scott, got pump running at 1700 and shut off after about 10 min. Going to watch pump for awhile to make sure it turns off and on. Lee + Kevin off to get vac truck and dump 3000 gallons over the weekend.
1805 Back to 606 to get computer and lock up
1426 Out to B3EXW02
Well cycled on and off a few times, talked to Scott he said go home
1745 GPI offsite
1900 J. Bonch offsite

4.1.11

747781.04000

4.4.11

Parsons : J. Bonch, A. Lindley
GPI : L. Gebbert, K. Gebbert, R. Bell
H+S Tailgate : High wind
1400 GPI onsite over to MW-35LGR to unload equipment
1500 J. Bonch; L. Gebbert. A. Lindly; G. Moreno to Bldg 90 to plan drilling activities
1530 Determined that SIW01 will be drilled in the northern quarter of vat, and the well head will be set above the vat on top of the steel plate.
1600 Access for building 90 has been granted between 7:30 and 4 pm.
1630 Depart Site.

4/4/11

747781.04000

Parsons : A. Lindley, J. Bouch.
GPI. : L. Gebbert, R. Bell., K. Gebbert
H+S Tailgate : Moving heavy equipment.
0700 A. Lindley on site.
0730 GPI on site. Sign in at 606. To MW-35 to organize equipment.
0745 B. 90 accessed. Have access until 1530. Maneuver small rig to vat area.
0830 Escort delivery of generator to building 90.
0945 Cement corer arrives. Begin set up of corer.
1015 Begin coring vat area
1030 Core cut. 0.0 PID.
1100 collect soil sample from beneath concrete plug. (0-6")
1145 collect another soil sample in dry, dark brown soil (6-8")
no PID reading (0.0)
1200 R. Bell, K. Gebbert Lunch.
1230 GPI return from lunch.
1250 G. Moreno brings hot work permit.
1255 GPI cuts approx ~9" hole in steel plate covering.
1320 Set up rig over hole.
1520 Clean up around work area, & exit building 90.
1610 Escort air compressor to building 90.
1700 Site Secure. GPI Depart site
1740 Depart Site Parsons (A. Lindly, J. Bouch)

4-5-11

4-6-11 747781.04000

Parsons: A. Lindly, J. Bouch
GPI : L. Gebbert,
H+S Tailgate: PPE, pinch points.

0700 A. Lindly on Site.
0705 GPI Arrives, sign in @ 606.
0745 Access to Building 90. GPI begins preparing workspace and rig.
0945 Begin coring SIW-01,
1130 drill to 5.5'
1145 drillers are buffing out core barrel in order to try to get better recovery
1235 Return to coring.
1245 Drillers experiencing water pressure delivery issues.
1320 Core to 6.5'
(AL) 1354 ~~1515 TD @~~ Collect sample from 8' - 8.5'.
1515 TD @ 24.65'
1525 Collect sample from 23.5 to 24'.
1540 Site Secure. GPI departs. Building 90 closed. Parsons Departs.

4-6-11

4/7/11

747781.04000

Parsons: A. Lindly, J. Bouch
GPI: L. Gebbert, K. Gebbert. G. Erwin, R. Bell
H+S Tailgate: Slips + Trips / Housekeeping

0700 A. Lindley on site, GPI Arrives, sign in at 606.
0725 Collect Waste characterization sample from MW-36LGR containment. Sample will be analyzed for full-VOC. ~~labeled~~ CS-MW36-LGR-WC-02.
0750 Access granted for Building 90. GPI begins making preparations to ream out hole.
0815 Vacuuming out water + materials from vat.
0830 As per conversation with Scott Pearson, core-hole will be reamed 8" to TD.
0850 Begin reaming core-hole
0930 J. Bouch; A. Lindley took pictures of core boxes
1155 Rig reamed to 16.5'. 0.0 PID in BZ, 1.0 PID in Vat.
1200 Well materials arrive. Shut down rig to unload supplies.
1230 Back to ~~606~~ (AL) Bldg. 90, resume reaming, rig ream @ 18.5'
1350 K. Gebbert + R. Bell to move equipment to MW-36LGR for Packer test tomorrow. J. Bouch to 606 to begin CHERPs.
1450 Completed reaming to 24.65'. Begin cleaning out hole.
1510 Hole clean, begin pulling pipe.
1530 Rig and equipment inside Bldg. 90 secure. L. Gebbert to dump 1,600 gallons into bioreactor. K. Gebbert, R. Bell begin setting up equipment for packer test at MW-36LGR. First zone will be 320' - 332'.
1635 Packers set. Will wait until morning to inflate and collect sample. GPI securing site (MW-36).
1700 Site Secure GPI Departs.
1710 Cooler packed.
1730 Depart Site.

4-7-11

4-8-11 747781.04000

Parsons: A. Lindley, J. Booch

GPI = L. Gebbert, K. Gebbert, R. Bell

H&S Tailgate: Overhead hazards and pinch points.

0710 Arrive on site. A. Lindley + GPI sign in at 606. TO AOC-65.

0730 Begin inflating packers @ MW36LGR 320-332'.

0745 Access to building 90.

0904 Begin purging 320-332' zone, running @ 11 gpm

0944 collect sample at CSMW36LGR (320-332'), purged ≈ 330 gallons, water was clear

0946 moving packer to 294-306' interval

1030 J.bouch down to escort NEFF who is picking up generator

1050 NEFF offsite

1054 start packer test on 294-306'

1057 pumped off after ≈ 10.5 gallons

1124 started pumping after letting the zone recharge for a half hour

1137 pumped off after pumping ≈ 2 gallons at less than 1/4 gpm

1200 Lunch @ building 90

1220 setup Camera to log SIW-01.

1240 Start log - water @ 20.5'.

1310 Packer test at 294-306 terminated as per Scott Pearson. Total purged ≈ 14 gallons. Begin deflating packers.

1320 Prep pipe for cutting and welding.

1330 Raise packers to 270-282'. Begin inflating packers.

1345 Cut plate over vat and cut pipe. Weld sections of pipe together.

1425 Installed casing. Shale trap leaking so will cement next week.

1435 started packer test purge at 270-282' interval. pumped of after 1/4 gallon was purged. Will let well recharge and try again.

1450 Pumped ~1 gallon from 270-282' interval. Terminated packer test in this zone. Begin deflating packers.

1515 Begin pulling packers for last interval 128-140'.

1610 Packer set at 142'. Begin inflating.

1630 L. Gebbert to Bioreactor to dump 1950 gallons from vac truck.

1700 Site Secure. Depart Site.

4-8-11

(4/11/11)

L 747781.04000

Parsons; A. Lindley, J. Booch

GPI: L. Gebbert, K. Gebbert, R. Bell

H&S Topic: Heavy lifting.

0810 A. Lindley arrive at CSSA. R. Bell arrives sign in at 606.

0825 Access granted at building 90.

0845 Water level in MW-36 LGR ≈ 115'.

0910 L. Gebbert, K. Gebbert arrive.

0930 sample packer set @ 142' after ≈ 10 gallons purged – will resample after more water is purged, 91 gallons purged

0945 L. Gebbert to get parts for packer in SIW-01; K. Gebbert, R. Bell to bioreactor to get vac-truck.

1030 L. Gebbert Returns.

1045 Collect sample from SIW-01.

1106 Allowed CSMW36LGR (142') to recharge – purged ≈ 90 additional gallons, collected sample

1150 GPI begin pulling pipe from MW36-LGR.

1230 USGS Arrives and begins logging MW36-LGR. GPI installed packer in SIW-01, Hole plug also used, hydrated.

1350 Begin adding cement to SIW-01, will allow it to cure before adding more.

1400 GPI moving equipment from MW36 back to staging area around MW-35.

1500 Discussed cleaning out cuttings from vat, will wait for guidance from Gabe (confined space permit required) before proceeding. GPI to MW35 to begin breaking containment and laying out well materials.

1510 Building 90 secure.

1600 Break down containment begin moving cuttings to roll-off.

1710 Site Secure. Depart Site.

4-11-11

(28)

4-12-11 747781.04000

Personnel Persons: Adrian Lindley, Julie Bouch
GPI : Lee Gebbert, Kevin Gebbert, Robert Bell
H+S Tailgate: Proper PPE usage.

0700 A. Lindley arrives on site sign-in at 606, prepare confined space entry checklist.
0710 GPI arrives, sign-in at 606. GPI to MW 35-LGR for equipment.
0750 Wait for building 90 access.
0815 Access to building 90 granted. GPI preparing to finish cementing (Portland) SJW-01 casing.
0850 Cementing complete. Begin de mobing rig from building 90.
0950 J. Bouch to escort Associated Drilling to MW-35 LGR and unload well materials.
1045 Return to Bldg. 90. Discussed pulling pumps for USGS.
1050 Began cleaning out vat.
1230 Inside of vat clean. Begin cleaning around vat area.
1325 Install steam injection pipe on flange (3' section added to accomodate new height.
1330 Mop floor
1400 Called to have building 90 closed up - we are all done inside, had him check to make sure that floor looked ok - he said it looked fine. I told him that if anyone wanted it mopped again we would buy a mop and mop again. That was not a problem. He said OK.
1405 J. Bouch and L. Gebbert to CS MW35 LGR. A. Lindley to pull pump at LS4.
1420 A. Lindley return. J. Bouch and A. Lindley to lunch.
1500 Return from lunch. GPI begin assembling casing and prepare well materials at CS MW35-LGR.
1640 Clean up site. Boxes to recycling.
1500 Site secure. Depart Site.

4-12-11

4/13/11

(29)

747781.04000

Parsons: A. Lindley, J. Bouch
GPI: L. Gebbert, K. Gebbert, R. Bell
H+S tailgate: Housekeeping, heavy lifting, overhead work.

0650 A. Lindley arrives on-site, sign in at 606.
0700 GPI arrives (L. Gebbert, K. Gebbert, R. Bell) sign in at 606, to MW 35 LGR to begin construction.
0730 Hole plug added (~4 bags) to plug bottom 8 ft.
0800 Begin running casing/screen in borehole.
0930 Lay out Tremme pipe.
0950 Begin running Tremme pipe in hole.
1030 Begin adding sand.
1124 done with sand - 16 bags of sand, 3 bags of bentonite - hydrate.
1210 J. Bouch to escort sunbelt
1226 J. Bouch back onsite.
1230 J. Bouch, A. Lindley offsite to grab a quick lunch.
GPI offsite @ 1200
onsite @ 1230
1300 J. Bouch, A. Lindley onsite
L. Gebbert offsite to check out Fred Friars well for USGS well logging next week, with Samantha Elliott
1320 A. Lindley offsite to check emails
1335 L. Gebbert back onsite
1400 Begin mixing grout. Approximate ratio 24 gal water per bag.
1430 9 bags added. Pull 5 joints of tremmie. ~192 gallon water used
1455 10 more bags added (19 total), ~240 gallon used (~~384~~ 432 gallon total). 6 joints pulled.
1530 10 more bags added (29 total), ~240 gallon used (~~584~~ 672 gallon total).
1600 Pulled tremmie pipe. Cleaned pipe + water trough.
1630 Site Secure. GPI Depart Site. A. Lindley, J. Bouch to 606.

4-13-11

4-14-11 747781.04000

Parsons: A. Lindley, J. Bouch
GPI : L. Gebbert, K. Gebbert, R. Bell
H+S Tailgate : moving equipment.
0650 A. Lindley on site, to 606. Sign-in.
0710 GPI arrives. Tom MW 35-LGR.
0750 Added 8 more sacks of vorclay grout + ~192 gallons water (37 sacks total).
Begin pulling Treme pipe.
0755 Ed Grimwald, Kyle Caskey, + Mike Short arrived for safety inspection.
H+S Tailgate meeting forms provided to Ed.
0810 Ed, Kyle + Mike depart. GPI begin gathering equipment to move to MW36-LGR.
0855 Mob to MW 36-LGR.
0910 Start to put together well Casing
1030 Begin to put in hole plug, 6 bags of hole plug used, A. Lindley offsite for H+S
1107 Begin installing screen and casing.
1210 GPI, Parsons to lunch
1320 Parsons, GPI return from lunch.
1350 Trem pipe run in.
1440 17 sacks sand added.
1500 Break down containment around MW 36-LGR.
1530 Back hoe arrives to move cuttings to roll-off.
1545 A. Lindley to East Pasture with Kyle Caskey to see where
roll-offs should be unloaded.
1610 A. Lindley return to MW 36-LGR.
1615 Cuttings removed from around well. L. Gebbert to CS-10 for load of water.
1650 L. Gebbert returns with 1,000 gallons.
1700 Site Secure, Depart Site.

4-14-11

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4 / 15 / 11

747781.04000

Parsons : A. Lindley
GPI: L. Gebbert, K. Gebbert, R. Bell
H+S Tailgate: Slips, Trips, good Housekeeping.
0700 A. Lindley, GPI (L. Gebbert, K. Gebbert, R. Bell) arrive on site, sign
in at 606.
0720 5 bags grout added to MW 35-LGR (43 secs total)
0755 To MW 36-LGR to prep site to remove roll off.
0815 GPI to clear brush from off-post wells with Samantha Elliott.
0840 Escort Vorclay delivery to MW 36 LGR. Unload vorclay grout.
0930 Escort Rolloff mover. GPI Returns. begins putting tremme pipe
in hole
1130 GPI finished with grout. 26 bags of grout so far +3.5 bags pellets
1145 J. Bonch, A. Lindley offsite for lunch
1230 back onsite, 606
1300 J. Bonch to MW35 LGR - GPI Cleaning up for the weekend
and securing sites, getting rid of garbage and plastic
1515 GPI offsite
1530 A Lindley offsite
1600 J Bonch offsite

4/15/11

4.21.11

Parsons: J Bonch, A. Lindley
GPI : L Gebbert ; K. Gebbert
H+S Tailgate: Slips trips and falls, working w/water
and stick surfaces.
GPI begins to develope CS MW35 LGR
pump keeps pumping off after about 20 gallons
purged.
Allowing well to recharge and keep pumping on it.
1445 pH : 7.28
DO : 5.35 mg/L
ORP : 32.0
Temp : 24.06
Cond : 0.495
cloudy water ≈ 682 gallons pumped during
developing.
GPI, Parsons offsite

4/22/11

Parsons: J. Bonch
GPI : L Gebbert ; K. Gebbert
H+S Tailgate: working w/ pumps
0800 GPI continues to develope MW35 LGR
0900 J. Bonch to B-3 to take readings and paint GPS
points on ground at B-4
1146 Back to MW35 LGR - have about 640 gallons
pumped.
Temp: 24.32
Cond: 0.466
DO: 4.88
pH: 7.11
ORP: -39.6
NTU: 0.8 on ten ~~scre~~ scale, pumped ≈ 40 more
gallons
680 Total today.
1230 GPI offsite
1300 J. Bonch offsite

4.22.11

4.25.11

Parsons: J.Bonch; B.Martin
GPI: L.Gelbert, K.Gelbert
H.S Tailgate: Slips trips falls, rainy weather, equipment may be slippery
Mobilization day for smaller rig to do borings at B-4 and borings at AOC-65.

0900 Lee over to CSMW35 LGR to take Static water level and continue w/development. LEVEL = 260.5

1030 J.Bonch to escort equipment to B-4, B.Martin onsite

1130 Back to 606

1300 JOSE LANDEROS + KEVEN GRAHM FROM GPI ON SITE WITH CME 75 RIG. JULIE ESCORTS THEM TO B-4. BRAD MARTIN MEETS THEM AT SITE + PROVIDES HEALTH + SAFETY BRIEF. ERIC NORTH PRESENT TO DISCUSS EXCAVATION PRECAUTIONS. JOSE + KEVEN PREP RIG FOR AUGER + AIRCORE.

1320 JULIE + BRAD MOB TO MW-35 FOR WATER QUALITY CHECK.

1330 KEVEN GEBERT ON SITE AT ~~MW-37~~ MW-35. SAYS PUMP IS SET AT 460' - IS PUMPING APPROX 28 GAL THEN RESTING 10 MIN. + REPEAT CYCLE.
TURB = 5.3 NTU
PH 6.72
TEMP 24.6
COND 618 μS

1400 MOB BACK TO B-4. JULIE BACK TO OFFICE. JOSE + KEVEN STILL PREPING RIG. AIR COMPRESSOR IS BLOWING OIL. DRILLERS CALL RANDY DUFFY TO ADVISE + COORDINATE ~~ME~~ REPLACEMENT OR REPAIR.

1530 LEE + KEVIN TO FILL WATER TRUCK

1600 LEE + KEVEN HEAD BACK TO MW-35 TO MEET ADRIAN + COLLECT WQ SAMPLE.

1635 JULIE B. ESCORTS MIKE FROM MCKENZIE TO B-4 TO FIX COMPRESSOR. - COMPRESSOR HAS FAULTY OIL CHECK VALVE + MAY HAVE BEEN

4-25-11 MONDAY (CONT)

TILTED TOO MUCH WHEN DELIVERED. THE TILTING ALLOWS OIL TO SOAK AIR FILTER.

1730. COMPRESSOR IS FIXED. JB2 ESCORTS MIKE OFF POST + GPI DEMOBS AS WELL. JB2 LEAVES.

1745 WDM LEAVES SITE. -

✱ WATER QUALITY NOTES FROM A. LINDLEY FOR MW-35.

1645 DRILLERS RETURN FROM FILLING WATER TRUCK
TOTAL FOR DAY 4 TROUGHS @ 693.5 gts.

1652 20 NTU
26.27 °C
COND - 0.700 mS/cm²
DO - 2.68 mg/L
pH - 6.93
ORP - -41.3

1657 26 NTU
23.40 °C
COND - 0.699
DO - 2.26
pH - 6.93
ORP - -70.8 PURGE 35 gal recharge.

1707 BEGIN PURGE AGAIN

1708 41 NTU
23.95 °C
COND - 0.697
DO - 2.76
pH - 6.97
ORP - -32.1

1713 18 NTU
23.57 °C
COND - 0.685
DO - 2.71
pH - 6.88
ORP - -27.1 2.5' = 18.5 gal.

END — WDM

4/26/2011
TUESDAY.

B-4 DRILLING FOR WESTON & MW-35/36 DEVELOPMENT.

0730 B. MARTIN, JOSE LANDEROS, KEVIN GRAM, (GPI) AND WESTON FROM WESTON SOLUTIONS. AT CSSA GATE; SIGN IN AT BLD 606.

0745 B. MARTIN CAL PH METER & GATHER EQUIPMENT FOR ACTIVITES. WESTON AND GPI TO B-4.

0800 B. MARTIN TO B-4 - HEALTH & SAFETY MEETING LIFTING TECHNEQUES & WATCH FOR SNAKES.

0830 DRILLERS BEGIN DRILLING, AIRCORE AT 12' BGS. (CB2) THE SET AUGERS THE DAY BEFORE.

0845 BRAD MARTIN MEETS WITH LEE GEBERT & JB2 FOR ESCORT TRAINING AT BLD 36 (SECURITY).

0915 BRAD MARTIN BACK AT B-4.

1000 DRILLERS FINISH CB2 21.7' TD = 12' AUGERS 9.7' AIR CORE CORE HOLE FILLED WITH BENTONITE CHIPS PRIOR TO PULLING AUGERS, AUGER HOLE BACK FILLED WITH CUTTINGS

~1030 TALK TO S PEARSON ABOUT MW-35. DECIDE TO STOP DEVELOPMENT AND MOVE TO MW-36.

1045 DRIVE TO MW-35 WITH KEVIN GEBERT & TALK TO LEE.

1100 DRIVE TO BLD 606. CHECK IN WITH B-3 SAMPLE TEAM.

1130 BACK TO B-4, DRILLERS MAKING 2ND CORE RUN. (5' BARREL), DRILLING D-3

1230 DRILLERS FINISH D3. TD = 21.8' AUGERS TO 11.8 10.0' AIR CORE.

1245 DRILLERS MOB TO LUNCH AS DOES WESTON.

1330 DRILLERS BACK, WESTON BACK. DRILLERS BEGIN SETUP ON D.5

1430 DRILLERS BEGIN DRILLING. LEE HAS MOBED WATER TRUCK TO B-3 TO DRAIN FULL TANK OF DEVELOPMENT WATER FROM MW-35, APPROX 2200 FROM 35

* DEVELOMENT DATA:

0943 TURB = 3.0, pH 6.93, COND - 7.07, TEMP: 23.5°C 320 gal.

1020 TURB = 0.7 pH 6.94 COND - 7.05 TEMP - 23.3°C 480 gal

571 gallons TOTAL FOR TODAY FROM MW-35.

4/26/2011
(CONT)

1530 DRILLERS FINISH 1ST CORE RUN. 13.4 TO 18.4

1630 DRILLERS FINISH 2ND CORE RUN 18.4 TO 23.4.

DRILLERS PLUG HOLE & MOB EQUIPMENT TO B5. THEY WILL SHUT DOWN AND DRILL B5 IN THE MORNING.

DRIVE TO MW-36.

1700 LEE HAS SET PUMP IN MW-36 DTW = 274.40.

INITIAL WATER IS CLOUDY W/ REDDISH COLOR.

NO W.Q. READINGS UNTIL WATER CLEARS SOME.

1730 LEE SHUTS DOWN PUMPING AT MW-36. PUMPED APPROX - gallons.

1745 GPI, B MARTIN LEAVE SITE.

4/27/2011
WEDNESDAY

B-4 & AOC 65 DRILLING.

0730 B. MARTIN (WBM) & GPI, LEE, KEVIN G., KEVIN GEBERT,
& JOSE ON SITE. ALL SIGN IN AT BLD 606 THEN
MOD TO B-4. WESTON FROM WESTON ON SITE.
0800 SAFETY HUDDLE TOPIC IS PINCH POINT AND SHARP CORNERS
ON EQUIPMENT.
0830 DRILLERS BEGIN DRILLING. WBM TO MW-36 TO CHECK
DEVELOPMENT PROGRESS. - INITIAL WATER LEVEL = 274.40.
WATER STILL CLOUDY. LEE HAS FULL TROUGH which is
gallons. WELL HAS LOW. YEILD.
0915 WBM BACK TO B-4. DRILLERS HAVE PULLED
FIRST CORE.
1000 DRILLERS PULL 2ND CORE. TD = 21.6 bgs. DRILLERS
PLUG HOLE THEN PREP TO DEMOB.
1030 WESTON FROM WESTON LEAVES SITE. WDM BACK TO
OFFICE.
1100 LOAD AOC-65 VEW BORING LOCATIONS TO GPS.
1200 MARK LOCATION AT AOC 65, LEE STILL PUMPING
MW-36. DRILLERS BULDING A DECON PAD & PREPARING
TO DRILL THE VEWS!
1300 TALK TO JOE (CSSA PLUMBER) ABOUT CLEARING
THE DRILLING LOCATIONS. HE SAID HED SWING BY
AND TAKE OF IT WHEN HE FINISHED HIS CURRET
TASK
1400 JOE HAS CLEARED ALL LOCATION EXCEPT VEW-33. I MUST
BE MOVED 3 FEET EAST TO AVOID 10" WATER LINE.
1630 DRILLERS HAVE PREPPED SITE AND ARE READY TO DRILL.
JOSE, KEVIN AND KEVIN LEAVE CSSA. LEE CONTINUES TO
PUMP MW-36
1700 STOP MW-36 DEVELOPMENT, LEE & WBM LEAVE SITE.

4/28/11

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Parsons: A. Lindley, B. Martin
GPI : L. Gebbert, K. Gebbert, J. Landros, K. Gram
H+S Tailgate: PPE + Houskeeping.
0715 A. Lindley, B. Martin, L. Gebbert, K. Gebbert, J. Landros, K. Gram
on site. Sign in at 606.
0745 L. Gebbert begin purging MW-36LGR. J. Landros, K. Gebbert, K. Gram begin
prepping equipment + building containment @ VEW-32.
1000 Begin coring VEW-32
1035 L. Gebbert to Preferred Pump to get new pump for development of MW-36LGR.
1330 Complete coring of VEW-32. Core hole TD = 26.8'.
1345 GPI Lunch. (J. Landros, K. Gebbert, K. Gram). L. Gebbert replacing
pump in MW-36LGR.
1430 Return from lunch. Begin reaming core hole.
1630 DRILLERS STILL REAMING w/ 6 in bit (VEW-32) LEE
HAS SET NEW PUMP TO ~ 370' bgs. BEGINS PUMPING AGAIN
WATER LEVEL WAS 279.5'. PUMP FOR APPROX 5 min =
~ 70 gallons before PUMP STOPPED.
1630 BEGIN PUMPING WELL AT ~ ~~1 gpm~~ - 0.7 gpm. ONLY SUSTAIND
FOR 10 MIN.
1700 STOP PUMPING. PUMPED APPROX 90 gallons from MW-36.
DRILLERS BREAK DOWN EQUIPMENT.
1710 WBMARTIN & GPI LEAVE CSSA.

4/29/2011
FRIDAY.

㊵

AOC 65 SVE DRILLING

0730 GPI ON SITE. LEE GEBERT, KEVIN GEBERT, JOSÉ LANDEROS, KEVIN GRAHAM, BOB BRAD MARTIN ON SITE.
0800 HEALTH & SAFETY MEETING - DRIVING SAFETY.
JOSE WILL BE UNABLE TO DRILL TODAY BECAUSE HE HAS TO LEAVE AT APPROX 1400 FOR ANOTHER JOB. DRILLERS WILL BE BUILDING THE PAD AT MW-35 AND DECONING / CLEANING MW-35 SITE. LEE CONTINUES TO WORK ON MW-36 WELL DEVELOPMENT. LEE IS KEEPING A SEPEATE LOG OF DEVELOPMENT ACTIVITES THAT WILL BE INCLUDED IN THE WELL FILE AND NOT RECORDED IN THIS LOG BOOK.
1300 LEE DRIVES FULL WATER TRUCK TO B-3. CHANGES FILTERS DRIVES GD TO BUILDING 90 TO PREPARE TO DRILL WITH IT ON MONDAY MORNING. JOSÉ IS NO EXPECTED BACK TO CSSA WITH THE CME UNTIL AFTERNOON MONDAY.
1400 DRILLERS LEAVE SITE, WBM LEAVES SITE.

WBM

5/2/2011
MONDAY

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AOC 65 SVE DRILLING

0800 BRAD MARTIN AT CSSA. WORKING IN 606. J. BOUCH & A. LINDLEY WILL ARIVE LATER. GPI IS MOBING FROM AUSTIN AND WILL ARIVE LATER.
1200 GPI ARIVES @ CSSA. L. GEBBERT, K. GEBBERT, B. BELL, K. GRAHAM. SEEMS TO BE SOME CONFUSION AT THE GATE. B BELL IS NOT ON THE LIST SO HE MUST HAVE AN ESCORT TO GET IN. CME 75 ENTERS THROUGH GATE 9.
1230 LEE PICKSUP VAC TRUCK AT B-3 + DRIVES TO MW-36. TO START DEVELOPMENT PUMPING.
1330 DRILLERS MOB CME TO AOC 65. & SET UP ON SIW-02. ALSO SET GARDNER DENVER (GD) UP ON VEW-31. BUILD CONTAINMENT.
1700 · DRILLERS READY TO DRILL IN MORNING LEAVE SITE.

5/3/2011
TUESDAY

SVE DRILLING AOC 65.

0730 B. MARTIN, A. LINDLEY CHECK IN AT 606. GPI ON SITE: L. GEBBERT, K GEBBERT, B BELL, J LANDEROS. K GRAHAM.

0800 ALL MEET AT DRILLSITE + DISCUSS DETAILS of WORK DAY. HEALTH + SAFTY HUDDLE · SITUATIONAL AWARENESS. GD DRILLING VEW-31, + CME to DRILL SIW-02.

0830 GD STARTS FIRST CORE RUN 3.0-8.0. CAL PID.

1100 GD NOT MAKING PROGRESS AT ~17.3' bgs. DRILLERS PULL BARREL TO CHANGE BIT. BIT HAD 4 broken TEETH.

1115 CME PULLS LAST CORE FROM SIW-02 CORED TO 26.5

1145 DRILLERS BREAK FOR CHOW.

1245 DRILLERS BACK FROM CHOW. GPI continue coring.

1600 SIW-02 Reamed to 28.2'.

1630 SIW-02 cleared ~~washed~~ out. Hole open to 27'.0. VEW-31 reamed to 45'.

1645 DRILLERS FINISH VEW-31. CORED TO 40.8, REAMED TO 45' bgs. DRILLERS SHUT DOWN + SECURE SITE. WILL MOVE + CLEAN IN MORNING.

1730 B MARTIN GPI LEAVE SITE.

5/4/2011
WEDNESDAY.

SVE DRILLING AOC 65.

0730 A LINDLEY GPI ON SITE. SAME GPI CREW AS YESTERDAY. HEALTH + SAFETY TAILGATE HUDDLE - TOPIC -
DRILLERS BREAK DOWN PREVIOUS LOCATIONS AND MOVE TO NEW SPOTS. GD SET ON VEW-29. CME SET ON VEW-33.

0815 B. MARTIN ON SITE

0900 JOSE ON CME REPORTS "CHEMICAL" SMELL. HE IS TOLD TO STOP UNTIL A BREATHING SPACE CHECK IS MADE.

0945 GAISE ON SITE. BREATHING ZONE IS CHECKED AND FOUND TO BE BELOW THE ACTION LEVEL of 25ppm. 2.5 WAS THE Highest READING.

1200 GD CREW TO LUNCH.

1230 FINISH CORING VEW-33 CORED TO 26.8'. JOSE TO LUNCH, WILL REAM TO 8" WHEN RETURNS.

1315 CREWS BACK ON SITE, ALL BEGIN DRILLING

1630 VEW-29 cored to 40'. L. Gebbert to ream corehole. DRILLERS BREAK DOWN EQUIP + PREPARE TO LEAVE FOR DAY

1720 DRILLERS LEAVE CSSA. B MARTIN LEAVES CSSA

5/5/2011
THURSDAY

SVE DRILLING AOC 65

0700 GPI + A. LINDLEY SIGN IN + ON SITE. GPI CREW IS SAME AS YESTERDAY. CREW MOBS TO SITE + BEGINS TO CLEAN UP. LEE FINISHES REAMING VEW-29 TO 45' + JOSE CLEANS UP + MOBS CME TO DECON AREA. HEALTH + SAFETY TAILGATE HUDDLE - SECURE FOOTING ON SLICK SURFACES.

0900 B. MARTIN ON SITE. REVIEWS H+S MEETING NOTES, J BOCH TOO.

1015 LEE ON GD BEGINS DRILLING VEW-30-

1330 FINISH CORING VEW-30; CORED TO 28'
REAMED TO 30.0'

(1230) McKINZIE PICKS UP AIR COMPRESSOR.

1400- JOSE + CME LEAVE CSSA KEVIN GRAHAM + BOB BELL LEAVE TOO.

1500 LEE FINISHES REAMING. STARTS TO BREAK DOWN RIG + CLEAN AREA.

1715 DRILLERS LEAVE SITE.

1730 B. MARTIN LEAVES SITE.

(5/6/11)

Video log

1000 Parsons J. Bonch

1000 GeoCam: Kelly Tuten; Erasmo Delafuente
J. Bonch escorts GeoCam to 606 to Sign in to AOC 65
Health and Safety Tailgate: Slips Trips Falls and Pinch Points.

1100 - Set up on VEW-32, running Camera, Caliper | Gamma on each VEW
Lee is purging CS MW36 as well

1210 Setting up on VEW-33. Tied a flag to the camera to see if we can capture any flow in the boring with SVE system on. Turned on SVE System.

1300 SIW-02, ran camera and logs.
- Also taking readings on CS MW36 LGR
Calibrated YSI and Turbidimeter

1316 NTU: 26
Temp: 24.12
spec Conductivity: 0.465
pH: 7.05
DO: 5.85
ORP: 9.0

1330 Set up on VEW-30

1410 NTU: 24
Temp: 24.57
spec: Conductivity: 0.466
DO: 5.20
ORP: -2.5
pH: 7.05

1504 NTU: 36
Temp: 24.24
spec. cond: 0.466
DO: 5.00
pH: 7.04
ORP: -11.6

1510 Finished w/ VEW-29, got to 45'

1515 Setting up on VEW

1540 35 - NTU
23.74 - Temp
5.46 - DO
4.97 - pH
-13.5 - ORP
0.463 - specific Conductivity
pumped about 2800 gallons today
Lee took truck out to dump at B-3
Also dumped 2500 gallons from drilling
1620 GeoCam offsite, GPI offsite
J.Bouch back to B-3 to take readings
16LGK : DTW 284.07 481583 / 7.48
16CC : DTW 360.83 273933 / 12.04
B3EXW01 : DTW 261.80 6698788 / 0 — well off
B3EXW02 : DTW 317.60 2,634,310 / 10.48
Tank is 4/16 full
Bag Filter 38-36 = 2
T_1 - 13.0 / 8,806,230
T_6 - 41.0 / 770,233

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Parsons : A. Lindley, J. Bouch
GPI : K. Gebbert, E. Schaefer, J. Fisher
H+S Tailgate : Driving safety, Heavy lifting, work safe.
0830 A. Lindley, J. Bouch on site. sign in at 606. Waits on drillers to arrive.
0930 To B-3 to collect dailys.
1000 Return to 606. Calibrate YSI, calibrate turibidimeter, grab supplies for Waste-characterization of roll-off set by building 90.
1030 GPI arrives, sign-in at 606 to Aoc-65.
1100 collect WC sample from roll-off. (AOC65-WC01)
1130 GPI to B-3 to collect vac truck.
1155 GPI return to AOC-65. Discussed well installation with E. Schaefer. ~~GP~~ (AL)
1230 GPI to get fuel, water truck + well materials.
1345 GPI return with well materials.
1400 Begin construction w/ VEW-32. TD @ 27.89', WL @ 18.89'.
1430 Well set @ 25' bgs. 10.5 bags sand added to 4.5' bgs. 0.5 bags bentonite ~~sack~~ (AC) added to 3' bgs. GPI to MW-35LGR for more sand.
1450 Begin construction of VEW-33. TD @ 32', WL @ 31.5'.
1515 Well set @ 25' bgs. 16 bags sand added to 4.5' bgs. 0.5 bags hole plug added to 3' bgs.
1535 Begin construction of VEW-30. TD @ 30', 0.2' muck noted in hole.
1550 Well set @ 25' bgs. 13 3/4 bags sand added to 4.5' bgs. 0.25 bags hole plug added to 3' bgs.
1610 GPI cleaning up work area. Returning Vac truck and water truck to laydown area.
1625 Site Secure. GPI departs site.

5-9-11

5/10/11 747781.04000

Parsons : A. Lindley
GPI : E. Schaefer, J. Fisher, K. Gebbert.
H+S Tail gate: Slips, Trips.
0715 A. Lindley on site, sign in at 606.
0740 GPI arrives, sign in at 606. To laydown area to pick up equipment.
0800 GPI begin purging MW 36 LGR and excavating around SIW-02 for installation of well materials.
0915 Water Quality MW 36 LGR 750 gallons purged,
Temp 22.99 °C DO 5.10 mg/L
Cond 0.450 mS/cm ORP 0.4 mV
pH 7.14
0930 GPI to get well materials for NEWS on SIW-02
0945 GPI to Lowes to rent a jackhammer.
1100 GPI return w/ jackhammer, continue excavating around SIW-02.
1135 SIW-02 excavated to 18" bgs. Break Lunch.
1215 K. Gebbert & J. Fisher to begin work on bollards at MW 35-LGR.
E. Schaefer to drain vac-truck at bioreactor.
1245 E. Schaefer + A. Lindley to CS-12.
1355 E. Schaefer + A. Lindley return from CS-12. To MW 35-LGR.
1405 Bollard holes completed.
1420 Return to AOC-65. Begin setting well materials in SIW-02. TD@27.1' BGS. Less than 1' water in hole.
1510 Casing set in SIW-02 @ 14" bgs. 1 bag portland added to 6' bgs.
1530 Begin construction of VEW-29. TD=44', 1 bag hole-plug added to 42'. Well set @ 40' bgs. 19.5 bags sand added to 4.5' bgs. 0.5 bags hole-plug added to 3' bgs.
1620 GPI move water truck back to laydown area. 2,700 gallons purged from MW 36.
1645 Site Secure. Depart site.

5-10-11

747781.04000

Parsons : A. Lindley
GPI : E Schaefer, J. Fischer, K. Gebbert
H+S Tailgate : Hand tool, hand safety.
0705 A. Lindley on site, sign in at 606.
0750 GPI on site, sign in at 606. To laydown area to pick up equipment and B-3 to collect vac truck.
0840 Add second lift portland to SIW-02. 2 bags portland added (3 total bags).
0855 Resume purging MW-36 LGR.
1000 GPI to Hotel to pick up well material delivery.
1050 GPI returns. ~1000 gal. purged from MW-36 LGR. Begin to pull pump.
1110 Lightning detected in 5 mi radius. Shut down operation sent GPI to lunch.
1200 GPI return from lunch.
1220 ~~Begin~~ AL Resume pulling pump from MW-36 LGR.
1300 Pump pulled, ~~[illegible]~~ AL nipple removed.
1310 To laydown yard to unload equipment. TO CS-12.
1400 Arrive CS-12.
1500 Begin purge CS-12
1530 Drillers back to AOC-65.
1600 Begin construction of VEW-31. TD= 44.7' bgs. WL = 35.7'. 1.25 bags hole plug added to 42' bgs. Well set @ 40' bgs.
1630 19.5 bags sand added to 4.5' bgs. 0.5 bags hole-plug added to 3' bgs.
1640 Begin installing perforated steam injection pipe in SIW-02.
1700 Steam injection pipe installed 20.25' below flange.
1710 Site Secure. Depart Site.

5-11-11

5/12/11 747781.04000

Parsons: A. Lindley

GPI: J. Fischer, E. Schaefer, K. Gebbert.

H+S Topic: Severe weather / Rain / Lightning

0720 Drillers on-site. J. Fischer + K. Gebbert. E. Schaefer is collecting chemicals for chlorination of CS-12.

0730 A. Lindley on-site. Drillers to CS-10 to collect load of water.

0830 Load of water collected. Large threatening thunderstorm approaching. Weather delay. Drillers off-post.

1300 Drillers back on-post. To CS-12.

1330 Begin purging CS-12.

1335 Collect BACT sample.

1345 Lift pump.

1355 Begin mixing chems in water truck.

1600 Replaced pump headed back to 606

1620 GPI offsite

J. Bonch to B-3

5.12.11

5/13/11

Parsons: J. Bonch; S. Pearson; E. Rice

GPI: J. Fischer; E. Schaefer; K. Gebbert

H+S Tailgate: Working w/ High pressure water and Site housekeeping

0700 Drillers onsite - finished pad at CSMW36LGR

0800 J. Bonch onsite to 606 the B-3

S. Pearson, E. Rice out to CS-12 to hook up lines to purge well, for dechlorination

1100 GPI offsite, lunch

1200 S. Pearson, E. Rice back to CS-12, J. Bonch back to B-3

1430 Begin purging CS-12 and taking chlorine readings

1500 1.5 ppm

1505 J. Bonch onsite

1515 0.39 ppm

1548 0.28 ppm

1550 S. Pearson, E. Rice offsite

1616 0.0 ppm

1630 R. Fink onsite to install Software on SCADA

1645 0.01 ppm

1700 0.13 ppm

1715 J. Bonch; R. Fink offsite.

J. Bonch back to 606

1745 J. Bonch offsite

5.13.11

5.14.11
Parsons : J. Bonch
Health and Safety Tailgate : Working alone in the north pasture.
1000 J. Bonch onsite and to 606, then to CS-12
1030 Turned on CS-12. No problems
Water level at 292
1035 Chorine reading 0.07 ppm
Touched base w/ Cheryl and Joanie about power outage
Will check B-3 before I leave for the day
1125 0.04 ppm, depth to Water 323.70.
1230 Water level is 329.10
0.07 ppm
1315 331.3 is the water level
0.05 ppm
1430 DTW = 334.20
0.0 ppm
1530 0.04 ppm
1600 0.07 ppm DTW 341.42 - screen not working
Checked w/ water level
1615 Went to check GAC shack due to power outage -
B3 EW02 was off - turned it on
1634 Back to CS-12
0.03 ppm
Spoke to Scott coming back tomorrow off to check B-3
1645 Shut down CS-12 till tomorrow
B-3 seems to be running OK
1730 J Bonch offsite

5.14.11

5/15/11

Parsons : J. Bonch
Health and Safety Tailgate: Working alone in the North Pasture
0800 J Bonch onsite to 606
0900 J. Bonch out to CS-12 and began purge, screen still not working.
0.04 ppm
316.7 DTW (eline)
1000 0.04 ppm
328.4 DTW
1100 0.04 ppm
336.65 DTW
1200 0.09 ppm
340.0 DTW
1300 343.30 DTW
0.0 ppm
1400 0.05 ppm
343.30 DTW
1500 343.70 DTW
0.01 ppm
1600 344.30 DTW
0.01 ppm
1645 0.00 ppm
344.60 DTW, Shut off CS-12
1655 To B-3
To EXW02 to check water level - 314.2
1710 Back to 606

5.15.11

5.16.11
Parsons: J.Bonch; A.Lindley
Health and Safety Tailgate: Working w/ High Pressure Water
0930 J.Bonch to CS-12
0950 Turned on CS-12, took reading
0.0 ppm
1005 DTW - 321.90
1015 A. Lindley arrives. Took reading 0.0 ppm
1105 Took reading 0.04 ppm. WL = 330.75'
1125 A. Lindley to 606 and Lunch.
1250 Return from Lunch. WL - 338.18'. Take reading 0.08 ppm.
1350 WL = 340.30', Reading = 0.04 ppm
1545 WL = 301.50', Reading = 0.03 ppm
0.03 ppm
1615 WL = 329.10
0.03 ppm
1645 WL = 333.40
0.0 ppm
1650 J.Bonch and A.Lindley shut down CS-12, back to
B3EXW02 to take WL
*Well was shut down from 1350 ~~1545~~ to ~~[illegible]~~ 1545

5.16.11

5/17/11

5-17-11 747781.04000
Parsons: J. Bonch, A. Lindley
GPI: Lee Gebbert, K. Gebbert
H+S Tailgate: Chiggers and Environmental Hazards
0745 Turned on CS-12, WL = 298.3' reading = 0.04 ppm.
0820 WL = 322.50 reading = 0.01 ppm
0845 WL = 327.20 reading = 0.01 ppm
0900 Back to 606.
1015 Drillers arrive. To lay-down area.
1100 Drillers mob GD to ExW03.
1245 CS-12 WL = 341.4', reading 0.04 ppm.
1300 Collect BACT sample at CS-12. To 606.
Pack sample
1340 Take sample to San Antonio Testing
- lunch
1530 To EXW03 to check on drillers, filling water truck
1600 To CS-12
354.30 DTW
0.04 ppm
1630 354.30 DTW
0.0 ppm
1640 Back to B-3, check on GPI.
GPI setting up to start drilling tomorrow.
1720 Site secure, depart site.

5-17-11

5-18-11 747781.04000

Parsons: A. Lindley, S. Pearson, J. Bouch

GPI: L. Gebbert, K. Gebbert

H&S Topic: Chlorine safety, PPE usage.

0658 A. Lindley on site. sign in @ 606.

0720 GPI on site sign in @ 606. To EXW-03.

0725 S. Pearson on site sign in @ 606.

0740 W.S. Pearson to CS-12.

0820 Drillers @ 6.5' bgs.

1100 Drillers @ 42' bgs.

1130 - lunch

1230 back from lunch, to CS-12 to pick up BACT sample

1250 ~~back to~~ Collected BACT sample

1300 Headed to EXW02, 314.45

1315 checked on drillers, drillers at 75'

1400 ~~Collected~~ Packed and shipped coolers — left to drop off coolers at San Antonio Testing and FedEx

1530 back onsite / to 606

1650 Out to 63EXW03 with A. Lindley, J. Bouch + WSD. Drillers at 85'

1730 Site Secure. GPI + Parsons depart site.

5.18.11

5/19/11

747781.04000

Parsons: A. Lindley, J. Bouch

GPI: L. Gebbert, K. Gebbert

H&S Topic: Working in wet weather, slippery surfaces

0730 A. Lindley, GPI on site sign in @ 606.

0800 Continue drilling from 90'.

1040 Drillers at 104'. 50' Totco = 1-1/8, 100' TOTCO = 1/8+

1425 Drillers at 140'.

1720 back to B3EXW03 after going to San Antonio Testing and dropping off BACT Sample.
rig at 170', ran TOTCO @ 150' @ 1/8+

1730 Shutting down for the night.
Back to 606

5.19.11

(58)

5.20.11 747781.04000

Parsons: J. Bonch

GPI: L. Gebbert, K. Gebbert

H+S Tailgate: Working on a friday pay attention to detail and don't get lazy. Also rainy weather watch for slips, trips and falls

0730 GPI onsite

0830 J. Bonch onsite, drillers at 182'
to 606 to calibrate YSI to take readings in UGR wells.

1045 Rig at 200 feet, running TOTCO 1/4+

1330 Back to Rig, @ 230', compression valve broke turned off rig to fix it.

1400 Up and running

1435 235', another rig problem may be the other compression valve. Changing it out to see if that is the problem.
Rig back up and running

1530 Shut down rig @ 240'

1535 GPI offsite
J. Bonch back to 606

1630 J. Bonch offsite

5.20.11

5/23/11

(59)

5.23.11

Parsons: J. Bonch

GPI: L. Gebbert; K. Gebbert

H+S Tailgate: High Winds

0800 GPI onsite. GPI had to watch UXO training video from 0830-0930.

0845 J. Bonch onsite

0930 GPI back to B3EXW03 to resume drilling activities
J. Bonch 606 paperwork etc.

1115 J. Bonch out to B-3 to take readings and to check on drilling activities. Rig @ 260'
Ran TOTCO test @ 250' 1/8+

1245 Back to 606 to check e-mails, scan B-3 fieldforms and help Sam w/ GW bottle order

1455 Back to rig, rig @ 300', ran TOTCO 1/8+

1550 Back to 606 for Conference Call

1730 Back to rig 342', Lee thinks he is in the BS but he isn't seeing it in the cuttings.
267-275' - fractured
300-330 water bearing
Rotton till 348'
Lee says that he is drilling like its the BS - he thinks about 338' - May be in a collapsed spot.

1800 GPI offsite

1805 J. Bonch offsite

5.23.11

5.24.11 747781.04000

Parsons: J.Bonch; Brad Martin

GPI: K.Gebbert; L.Gebbert

H&S Tailgate: House keeping

0715 GPI onsite

0800 B.Martin, J.Bonch onsite

B.Martin out to B3EXW03, told Lee to go to 350' doesn't look like we are in the BS yet.

0930 J.Bonch out to rig — @ 350', cuttings look like we have hit BS.

TD - 350'

1145 J.Bonch to lunch - GPI offsite to get parts to fix Milty's well tomorrow.

1300 GPI BACK ON SITE. BRAD WORKING AT SALADO CREEK SITE. GPI WASHES HOLE & TRIPS OUT TO PREPARE FOR GEOPHYSICAL LOGGING.

1700 GPI off SITE.

5/25/2011 WEDNESDAY

0730 GPI ON SITE, L GEBBERT, K GEBBERT

0800 B.MARTIN J BOUCH ON SITE. H&S TAILGATE HUDDLE, SNAKE SAFETY & HEAT ILLNESS.

DRILLERS CONTINUE TO PREP FOR GEOPHYSICAL SURVEY. J BOUCH WORKING IN GOG office, B MARTIN COLLECTING DATA AT B-3

1230 GEOCAM ON SITE (MIKE MILLER), L GEBBERT ESCORTS.

1300 GEOCAM SETS UP AND RUNS CAMERA SURVEY, THEN RESISTIVITY SURVEY, THEN CALIPER SURVEY.

1630 SURVEY COMPLETE. GEOCAM LEAVES SITE AS DOES GPI.

SURVEY SHOWS ACTUAL CONTACT FOR LGR/BS TO BE AT ~321'. DUE TO FRACTURED NATURE OF UPPER BEXAR SHALE, DECISION WAS MADE TO LEAVE IT OPEN AND BACK FILL W/ BENTONITE TO 340' BGS. DECISION HAS NOT BEEN MADE ABOUT SURFACE CASING YET. WILL SEND S. PEARSON WELL DATA & STAND BY FOR DIRECTIVE.

1730 B. MARTIN LEAVES CSSA.

5/26/2011 THURSDAY

0715 GPI ON SITE L. GEBBERT K. GEBBERT.

0800 B MARTIN, J BOUCH ON SITE. TAILGATE H+S HUDDLE. HEAT SAFETY, HYDRATION.

DRILLERS SET TO REAM UPPER PORTION OF B3-EXW-03. WILL REAM TO 20' THEN BREAK TO FIX OFF POST WELL. (MILTYS)

0830 J BOUCH IN WEEKLY MEETING B MARTIN PREPING FOR WESTBAY PROFILE.

0915 MOB TO B-3 TO PROFILE WESTBAY.

1130 J.B2 AND WBM FINISH PROFILING. DRILLERS WITH S. ELLIOT OFF POST TO FIX MILTY'S WELL.

1330 DRILLERS BACK + BEGIN TO REAM. WILL STOP AT 50' UNTIL A FINAL DECISON IS MADE.

1600 GPI OFF SITE. J BOUCH OFF SITE

1730 B MARTIN OFFSITE.

5/27/11

747781 04000

0730 GPI onsite L. Gebbert, K. Gebbert

0800 Parsons onsite: J. Bouch

H+S Tailgate: Working w/ drill pipe — also stay downwind from grout while mixing bags

GPI will ream to 65' and set casing.

6 bags whole plug to grout up bottom of well from 350-340'

- Set shale trap at 65' and casing to surface

Used 10 bags of Vorclay granular grout.

Also 3 bags whole plug above shale trap

1215 GPI — done need to (let) grout sit for weekend

1230 GPI secured site — offsite

JBouch to B-3 and 606 for other work.

5-27-11

5-31-11

747781.04000

Parsons: A. Lindly, C. Huey
GPI: L. Gebbert, K. Gebbert, R. Bell.
H+S Topic: Overhead hazards.

0900 A. Lindly, C. Huey, GPI on post.
0945 GPI to begin topping off grout. and begin developing ~~pulling + tripping~~ ~~down drill pipe.~~ well EXW-03. (5 bags grout added)
1330 GPI developing EKW-03.
1510 Development complete,
1520 GPI Depart site.

5/31/11

6/1/11

747781.04000

Parsons: A. Lindly
GPI = L. Gebbert, K. Gebbert, R. Bell
H+S Topic: Rig move, housekeeping.

0630 A. Lindly sign in @ 606.
0700 GPI on-site sign in at 606. To EXW-03.
0715 GPI begin installing e-line tube for pump test. A. Lindly and L. Gebbert to EXW-04 location. Showed Lee new location.
1000 Prepare rig and site for move to EXW-04 Location. Continue to develop EXW-03.
1345 5800 gallons of development water injected into trench 4 at the bioreactor. Move rig to EXW-04 location.
1430 Begin drilling Exw-04.
1530 Rig @ 7'.
1630 Driller notes loss of returns @ ~~18~~ AL 17.5'.
1655 Rig @ 23'.
1700 Site Secure. Depart Site.

6/1/11

6-2-11 747781.04000

Parsons: A. Lindly, S. Elliott
GPI : L. Gebhart, K. Gebbert, R. Bell
H+S Topic: Hand safety, PPE, pinch points.

0710 GPI arrives. Sign in @ 606 and to Rig.
0725 Continue drilling from 23'. Begin developing EXW-03.
1445 Rig @ 57'. 50' TOTCO < 1/8°. No returns. 8800
gallons ~~purge~~ pumped from EXW-03.
1640 Rig @ 80'.
1708 Site Secure. Depart site.

6-2-11

6/03/11

747781.04000

Parsons : A. Lindley
GPI : L. Gebbert, K. Gebbert, R. Bell
H+S Topic: Heat. Stay hydrated and take breaks as needed.

0705 GPI and A. Lindley on-site sign in at 606.
0755 Continue drilling from 80'. Resume pumping on EXW-03.
1430 Rig at 126'. 100' TOTCO survey 1/2°. 11,760 gallons
transferred to Bioreactor trench 4.
1445 Site Secure. Depart Site.

6/3/11

6/6/11 747781.04000

Parsons: A. Lindley
GPI : L. Gebbert,
H+S Topic: Slips/Trips and PPE.

1245 GPI on site, sign in at 606. A. Lindly return from lunch.
1310 Continue drilling from 126' at EXW-04. Continue purging EXW-03.
1645 Rig at 142'. And 1 load (2940 gallons) purged from EXW-03.
1705 Site secure. GPI departs.

6/6/11

6/7/11

747781.04000

Parsons: A. Lindly
GPI : L Gebbert, K. Gebbert, R. Bell
H+S Topic: Driving safety, hand tool usage.

0700 A. Lindley GPI on site, sign in at 606
0715 Continue drilling from 142'. Pull pump from EXW 03.
(AC) 0830 Installing 75GS50 to produce more purge water at EXW-03.
1045 Rig @ 157'.
1100 Complete installing larger pump in EXW-03.
1130 Pump is not working. Pull pump and troubleshoot.
1630 Pump pulled. Pump was set too low and sucked up mud and debris. Rig@ 185'.
1700 Site secure depart site.

Building 90 / AOC-65

0800 A. Lindly + K. Rice to Building 90 to meet Cory (USA).
0930 J. Vega, J. Mollinger, C. George arrive (USA). Begin excavating asphalt and manifold. Asphalt containerized in roll-off.
(AC) [illegible] to Home depot for supplies.
1300 Begin excavating trenches for new lines.
1320 Damaged pvc extraction line for VEW-16 while excavating.
1340 Renee Jones, K. Rice, K. Casky arrive to troubleshoot damaged line. Determined the line will be spliced using hose barbs, hose clamps and new tubing.
1350 Continue Excavating.
1430 R. North arrives w/ parts for splice.
1700 Site Secure. Depart Site.

6-7-11

6/8/11 747781.04000

Parsons : A. Lindley
GPI : L. Gebbert, K. Gebbert, R. Bell
USA: J. Vega, J. Mollenger, C. George
H+S Topic = Heat illness.

0620 A. Lindley sign in @ 606.
0635 J. Vega sign in @ 606, to AOC-65.
0700 USA continue installation of VEW lines. GPI on site sign in @ 606. L. Gebbert continue drilling from 185', 150 TOTCO = 3/4°. K. Gebbert + R. Bell prepare to move to MW 18 LGR to develop.
0800 K. Gebbert R. Bell pull pump in 18-LGR.
0810 Gabe informed of problem with CS-1. Request Lee take a look.
0820 Lee, Gabe, Eli, Cheryl, Willie, Joani, [illegible] and Adrien to CS-1 to trouble shoot.
0850 CS-1 turned on. Determined thermal conductors may be causing pump to turn off.
0930 Determined that CS-1 will be utilized until CS-12 is on line at which time the pump will be replaced and the well control box (electrical).
0950 Return to 606. Lee back to drilling, Kevin + Bob back to installing pump in MW18 LGR.
1000 USA subs arrive to install steam line. E. North gave them a H+S briefing.
1040 USA subs to get parts. K/ay to get parts for manifold.
1200 USA to Lunch.
1220 Rig @ 204'. 200' TOTCO = 3/4.
1245 USA Back from lunch. Continue installing SVE lines.
1300 K. Rice, E. North arrives, building 90 access. Steam pipe installers accessed vat.
1330 E. North arrives. A. Lindley to MW18-LGR.
1340 Begin purging MW 18-LGR. WL = 395' TOC. Pump set @ 400' bgs pH 7.49, DO 4.09, ORP -32.2, cond 0.324 mS/cm^c
1400 Return AOC-65. PVC connections to VEWs complete. Steam line installed between SIW-02 and Building 90 dock.
1500 Begin back filling trenches. Steam line installers depart site.

6/8/11

747781.04000

1630 USA cleaning up around site.
1635 Site Secure. USA Departs.
1650 Rig @ 216'.
1700 Site Secure GPI departs.

6-8-11

6-9-11

747781.04000

Parsons: A. Lindley

GPI : K. Gebbart, L. Gebbart, R. Bell.

USA : J. Vega, J. Mollenger, C. George.

H+S Topic: Heavy lifting + Hand tool usage, Power tool usage.

0700 A. Lindley + GPI on-site.

0720 GPI continue re-developing MW 18-LGR, and continue drilling from 216'. TO AOC-65.

0725 Klay (USA) arrives. Discuss compaction of soil in trenches, management of debris and housekeeping.

0730 Steam line subs arrive.

0735 J. Vega and rest of USA crew arrive.

0745 J. Vega to rent compactor.

0815 Klay to get monuments for VEW pads.

0830 J. Vega returns. Begin compacting fill in trenches.

0910 J. Vega to Home depot for parts.

0945 J. Vega + Klay return. Continue soil compaction.

1045 2940 gallons purge water from MW18-LGR to bioreactor. Continue purging.

1055 K. Gebbart + R. Bell deliver 6 bags bentonite to seal VEWS. Steam guys depart.

1200 USA. Lunch

1300 USA return from lunch.

1345 Hole plug added around VEW casings and hydrated.

1350 Steam line installers return from shop, fabricating parts for inside building 90. Begin installation of lines inside.

1505 Begin well pad construction.

1515 Steam line installers depart.

1645 Rig @ 256'. 2940 gallons (2nd load) to bioreactor. USA departs AOC 65.

1700 Site secure. GPI Departs site.

6-9-11

6/10/11

747781.04000

Parsons: A. Lindley.

GPI : K. Gebbart, L. Gebbart, R. Bell

USA : J. Vega, J. Mollenger, C. George.

H+S Topics: Working on friday, heavy lifting, overhead hazards.

0630 A. Lindley on site, sign in at 606.

0700 GPI on-site sign in at 606. To rig.

0715 R. Bell to MW 18-LGR to continue purging. Rig continues drilling from 256'. A. Lindley to AOC-65. Building 90 accessed.

0745 USA arrives. Continue building pads.

0945 Steam line installers arrive.

1010 Installed union on steam line @ SIW-02. Continue inside Bg.90.

1030 USA begins installing vault for SIW-02.

1145 Steam line installers leave to get parts.

1346 Steam line installers return.

1500 Steam line installed. They depart.

1505 USA to 606. Sign out.

1530 Site Secure (AOC-65) USA departs.

1600 - Drillers stop at 360'. Bexar Shale in cuttings. Circulate out cuttings. Will log hole next week.

- Stopped development on MW18-LGR. Remove pump & reinstall QED pump.
- Install test pump into B3-EXW03-LGR. Ready for pump test.

1615 GPI leaves CSSA.

6-10-11

6/13/2011
MONDAY
(74)

747781.04000 -

0800 S PEARSON ON SITE. A. LINDLEY IN AUSTIN. B. MARTIN MOBING FROM TYLER. GPI MOBING FROM AUSTIN.
GPI PUMPS CS-EXW-03 & PREPARES FOR GEO-CAM.
BOB BECKNAL FROM GEO CAM LOGS CS-EXW-03
S PEARSON REVIEWS LOG & DECIDES TO SET SURFACE CASING TO 55' bgs. -
DRILLERS PREPARE TO REAM HOLE TO 55'.
END of DAY.

WBMARTIN

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(75)

6/14/2011
TUESDAY

747781.04000 DRILLING.

0700 GPI, L GEBBERT, K. GEBBERT, B. BELL ON SITE. - SET UP AT CS-EXW-04 & PREPARE TO REAM

0800 B. MARTIN ON SITE. CHECK IN AT LOG.

0810 DRIVE TO AOC 65 - K. RICE & C. BEAL ARE ON SITE. & SUPERVISING WORK THERE.

0820 CHECK WITH L GEBBERT AT RIG, BREAK FOR H&S TAILGATE HUDDLE. DRILLERS ARE GOING TO REAM B3-EXW-04 TO 55' bgs & SET PVC SURFACE CASING. DURING REVIEW of CAMERA SURVEY, A WEEP WAS DISCOVERED AT 21' bgs. AFTER REAMING AN ATTEMPT WILL BE MADE TO COLLECT A SAMPLE THERE.

0900 ATTEMPT TO LOCATE A DOWN HOLE CAMERA TO FACILITATE THE COLLECTION EFFORT.

1000 BACK TO AOC 65. USA IS IN PROCESS OF WRAPPING INSULATION ON STEAM PIPES.

1030 DRILLERS STILL REAMING.

1200 COLLECT MEASUREMENTS of MW-35
STICKUP = 2.82', 0.3' CLEARANCE ABOVE COVER,
DTW = 294.67 - CORRECTION of -1.3' =

1220 MEASURE MW-36, FLUSH MOUNT, STICKUP = -0.1' bgs
0.3' CLEARANCE. DTW = 296.40 - CORRECTION of -1.3' =

1630 DRILLERS CONTINUED TO PUMP B3-EW-03 @ ~18GPM & FINISHED REAMING B3-EXW-04 TO 55' bgs. ONE ATTEMPT WAS MADE TO COLLECT A SAMPLE AT 21' BUT W/OUT A CAMERA, IT'S USELESS.
END of DAY

6/15/2011
WEDNESDAY
(76)

HOT DRY WINDY
~100°

747781.04000

0715 B MARTIN, GPI ON SITE. GPI CREW IS L GEBBERT, K. GEBBERT + Bob BELL. MEET AT B3-EXW-03. H+S TAILGATE HUDDLE + DISCUSSION of DAY'S OBJECTIVES

0752 BEGIN 8 hrs PUMP TEST ON B3-EXW-03 DATA ~~to~~ RECORDED ON A SEPERATE SHEET.

0930 S. PEARSON ON SITE WITH A CAMERA FOR COLLECTING A SAMPLE AT B3-EXW-04 ~21'. CONFERENCE CALL WITH BRIAN ROUT (QED) ABOUT PUMPS FOR WELLS CS-MW35 + 36. - LGR.

1030 BEGIN SAMPLE COLLECTION ATTEMPT AT EXW-04.

1415 FINALLY COLLECT SAMPLE USING WADDED PAPER TOWELS + HELD TO BORE HOLE SIDE FOR 1 HR. FILLED 3 VOA's FOR VOC's

1440 COLLECT B3-EXW03-WC02 3 VOAs for VOCS

1445 COLLECT B3-EXW03-WC01 1 8oz soil from P.T.

1552 END PUMP TEST ON EXW-03 MAINTAINED ~18gpm @ ~288' BGS.

1630 SECURE FROM SITE. DRILLERS FINISHED SETTING CASING TO 55' bgs IN EXW-04 TOOK ~~8~~ 16 Bags VOLCLAY TO FILL VOID AT 19-20'

1700 LEAVE CSSA

HOT DRY WINDY
100+°
6/16/2011
THURSDAY
(77)

747781.04000

0700 DRILLERS ON SITE

0730 B MARTIN ON SITE MEET AT B3-EXW-04 FOR H+S TAILGATE HUDDLE. DRILLERS WILL CLEAN EXW-03 SITE + PULL PUMP. WILL ALSO CLEAN OUT EXW-04 TO TD + SET PUMP.

0830 RECEIVE CALL FROM MR. KABLUNDY THAT HE HAS NO WATER DRIVE TO HIS HOUSE W/SAM + JB2. COULD NOT DETERMINE WHAT WAS WRONG SO WE CALL LEE GEBBERT TO COME OUT + SEE.

1000 LEE DETERMINED THAT WELL TRIPPED A SWITCH + SHOULD BE UP GRADDED (ELECTRICAL). WE STAYED TO MAKE SURE ALL WAS WELL W/ SYSTEM. THEN BACK TO CSSA.

1200 DRILLERS FINISH CLEANING EXW-04 THEN WILL SET PUMP. B. MARTIN + ERIC NORTH PROFILE WESTBAYS AT B-3

1400 BACK AT 606. DRILLERS SETTING PUMP.

1500 LEE ATTEMPTS TO FIND WATER LEVEL PUMP RATE BALANCE ON EXW-04. IT DOES NOT MAKE MUCH WATER. LEE CYCLES TO CLEAN it OUT.

1630 DRILLERS LEAVE SITE.

1700 B MARTIN LEAVES SITE.

6/17/2011
FRIDAY

HOT DRY WINDY

747781.04000

~~08~~ 0700 DRILLERS ON SITE L GEBBERT, K GEBBERT, B. BELL

0800 B MARTIN ON SITE. DRIVE TO B3 AREA.
H&S HUDDLE & DISCUSS PLANS FOR DAY.
WILL CONTINUE TO CLEAN EXW-03 SITE &
PUMP EXW-04.

1030 MAKE PLANS TO TRY TO MOD SMEAL TO
CS-1 TO MAKE SURE IT IS CAPABLE OF
PULLING PUMP.

1400 UNABLE TO GET TO CS-1 AS CHERYL IS
TOO BUSY.
DRILLERS SHUT DOWN PUMP. INFO:
PUMPED FROM 0800 - 1400 @ ~ 6.6 gpm. WATER
LEVEL FINALLY STABLE AT 311'. PUMP SET @ 327'

~~#~~1430 DRILLERS LEAVE SITE W/ GOOSE NECK.
WILL BE BACK ~ 1000 TO RUN PUMP TEST AT
B3-EXW-04. B MARTIN BACK TO 606 TO
CLEAN & FINISH PAPERWORK.

1630 B MARTIN LEAVES CSSA.

6/20/11

747781.04000

Parsons : A. Lindley
GPI : L. Gebbert, K. Gebbert, R. Bell
H+S Topic : Heat stress

0800 A. Lindley on site. Sign-in @ 606.

1130 GPI on site. Sign-in @ 606.

1200 Begin purging B3-EXW04. WL @ 240.4' Bgs. (Surging)
~~Pumping rate 6.6 gpm~~ (AL). Pumping down to 311' and allow
to recover.

1210 Begin installation of surface casing @ B3-EXW03 and protective
well cover.

1430 Pumped approx ~800 gal. Continue to clean up around EXW-03 site
and pump EXW-04.

1700 Site secure. Depart site.

6-20-11

6-21-11 747781.04000

Parsons : A. Lindley
GPI : L. Gebbert, K. Gebbert, R. Bell.
H+S topic : Heat Stress + Hand Safety.

0700 A. Lindley on-site. 606 sign-in.
0710 GPI arrives signs in at 606.
0730 R. Bell + K. Gebbert to MW35-LGR to paint bollards.
0800 Prepare for pump test @ EXW-04.
0825 Begin pump test @ EXW-04. Initial WL = 247.98' (below TOC).
2.85' stick-up. TD = 335'; eline tube set at 320.0' suction set @ 327'.
pumping rate = 6.6 gpm.
0900 R. Bell + K. Gebbert return from MW35-LGR. TO EXW-03 to paint
surface casing.
1015 Vac truck emptied into bioreactor (2940 gallons).
1030 L. Gebbert, R. Bell + A. Lindley to CS-1.
1100 Set up SMEAL at CS-1. C. Beal, C. Henderson at CS-1.
1130 Break for Lunch, Waiting on TCEQ Approval.
1215 Spoke with Gabe M., said to go ahead and pull pump
at CS-1. GPI return from lunch.
1240 Arrive at CS-1. Begin pulling pump.
1630 Pump pulled.
1640 Site secure. Depart Site.

6-22-11

6/22/11

747781.04000

Parsons : A. Lindley, C. Huey, E. Atkinson
GPI : L. Gebbert, K. Gebbert, R. Bell
USGS : J. Thomas
H+S Topic: Slick surfaces, inclimate weather.

0630 A. Lindley on-site, sign in @ 606.
0730 GPI arrives. To EXW-04 begin purging.
0830 USGS Arrives sign in @ 606. USGS to San Antonio
office to pick up a down-hole camera.
0835 1 casing volume purged ~ 240 gal
Temp 23.33 °C Turb 12.9 NTU
pH 6.93 Cond 0.391
ORP -10.5 DO 2.13
0905 2 casing volumes purged ~ 480 gal
Temp 23.66 °C Turb 6.31 NTU
pH 6.96 Cond 0.386
ORP 44.6 DO 2.90
0925 3 casing volumes purged ~ 720 gal
Temp 23.80 Turb 3.96 NTU
pH 6.96 Cond 0.386
ORP 49.4 DO 2.72
0955 3+ casing volumes purged ≈ 900 gal
Temp 23.79 Turb 2.03 NTU
pH 6.96 Cond 0.386
ORP 65.5 DO 2.00
1000 Collected WC sample @ EXW-04 (WC01).
1040 Geo cam arrives. GPI, Geo cam, + USGS to CS-1.
1050 Arrive at CS-1. Gabe M. on site.
1100 Geo cam running camera.
1230 Geo Cam finished running video. GeoCam + GPI depart CS-1.
Geo Cam demobs. GPI to EXW-04 to set SMEAL up. USGS
begins setting up to log CS-1.
1530 Pump pulled in EXW-04.
1610 Well materials arrive with GPI at CS-1. GPI back to install
surface casing at EXW-04. USGS finished logging.
1700 USGS Departs.
1720 GPI departs. Site secure, Depart Site.

6-23-11 747781.04000

Parsons: A. Lindley
GPI: L. Gebbert, K. Gebbert, R. Bell, K. Grahm
H&S Topic: Overhead hazards; Heat Stress.

0720 A. Lindley on-site sign-in @ 606.
0845 GPI arrives, sign in at 606. To EXW-04 for equipment.
0905 Small mob to CS-1.
0930 Begin preparing pipe and pump for installation @ CS-1. Splice wire to pump.

Pump info: Franklin Electric - Model # 705R15F6A-1563
Order # 96160070005
Date code: 09J70 21-0025
15 Stage w/ 6" bracket
15 hp (min) required

Pump motor: Franklin Electric Sand Fighter ~~motor~~:
Model # 2366038120
Serial # 11E19-10-06010A
Date code 11E19
15 HP, 230 V, 41.6 A, 3450 RPM, 47.4 Max A, 60 HZ
wire info: #4-3 with ground. Type THW 4; double-jacketed

1250 Kevin Grahm (GPI) arrives to help install pump.
1145 K. Gebbert, R. Bell to lunch and for supplies.
1330 K. Gebbert + R. Bell return. Pump and motor joined. Begin running pump in.
1645 Pump is in.
1700 GPI to get water truck and load of water to chlorinate well.
1830 Turned pump on. purging to vac truck.
1850 Begin mixing chlorine batch. NSF approved chlorine used.
1910 Begin chlorinating well.
1955 Finished Chlorination. GPI moves equipment from CS-1 to EXW-04. CSSA Security informed that water truck is still @ CS-1. G. Moreno also informed of water truck. Site Secure.
2015 GPI Departs.
2025 Depart Site.

6-23-11

6/24/11

747781.04000

Parsons: J. Bouch
GPI: L. Gibbert; K. Gebbert; R. Bell
H+S Topic: Working w/ high pressure water

0730 J. Bouch onsite — to 606 to meet w/ Gabe
Gabe and J. Bouch to B3EXW04 to get Lee and take 2940 gallons of chlorinated water to dump
0800 Headed over to CS-1 to purge another truck load of water.
0915 Headed back to East Pasture. Saw Joe on the way. He is getting fire hydrant ready in order to have Sanchez fillup their trucks as well as to purge line. Will call him when we are ready.
0918 Got a call from Gabe — Sanchez can use some of the dirty/chlorinated water from next purge. Will call Gabe when we are finished dumping.
- dumped 2940 gallons of H_2O.
0920 Called Gabe headed back to CS-1, Sanchez never showed — Filled Truck
1022 Headed back to east pasture, called Gabe — Sanchez will head out, Lee thinks we should dump a few more truck loads, dumped 2940 gallons
1040 Headed back to CS-1 to fill truck again
check chlorine — 2.9 ppm
Cheryl says OK to put chlorine in line after this one.
1115 Started sending water into line — filled up truck
1135 To East Pasture, dumped 2940 gallons
1200 GPI offsite to Austin, will be back later pick up more equipment
J. Bouch to 606
J. Bouch to get lunch
1230 Back at CSSA. Checked CS-1 chlorine reading @ CS-1 was 0.30
- Took a reading at fire hydrant — 0.9 ppm
- back to 606
1530 Back to CS-1 Well was off, Joe turned off well at 1500. Gabe and I got well ready to pump Sat. morning.

1830 J. Bonch offsite
Final chlorine reading @ CS-1 was 0.03 ppm

747781.04000

0730 J. Bonch onsite
Health and Safety Tailgate - working on a Saturday
0800 Met w/ Gabe @ 606 - ~~when~~ we went out to CS-1 to turn on well, Static water level @ 270.3.
- took chlorine reading 0.08 ppm.
0830 went out to Bioreactor to take readings, back to CS-1 took another reading 0.03 ppm. Turned off well @ 0930
0930 J. Bonch offsite. Gabe let well run for 3 hrs.
[illegible] ~~Turned off well @~~ later in the day after he allows well to recharge
1200 Gabe turned well back on @ 1200, 0.04 ppm
1500 Turned off CS-1, 0.02 ppm. of chlorine pumped 12000 gallons of water for the entire day

6.25.11

6.26.11

747781.04000

0830 Parsons: J.Bonch onsite, met w/ Gabe @ 606
H&S Topic: Working w/ high pressure water
0845 Out to CS-1 to turn on well. Static water level @ 269
Chlorine reading at 0.0 ppm
0900 Went to B-3 to take readings and back to 606
Static water level at 325.3, went back to CS-1
Chlorine reading @ 0.01, turned off well for an hour or so to let it recharge
1100 Headed back out to CS-1 to ~~let~~ resume purging the well. Static water level @ 279.0
0.03 ppm of chlorine
1118 Took another reading @ well head — 0.02 ppm
Headed back to 606
1215 Back to CS-1, Static water level @ 333.0
Chlorine @ 0.03 ppm, pumped 9,962 gallons
Turned off well @ 1220.
Done for the day

6.26.11

6/27/11

747781.04000

0800 Parsons: J.Bonch
H&S Topic:
Gabe said well CS-1 was started @ ~~070~~ 0750. Static water level was @ 268.2. Chlorine was @ 0.0 ppm
0900 Cheryl turned off CS-1.
1015 Joe turned on CS-1, static water level @ 269.0 and chlorine level @ 0.3 ppm.
1102 Static water level: 322.0
chlorine: 0.0 ppm
Talked to Cheryl — She wants well put in auto.
1115 Put well in auto so it can cycle on its own.
Cheryl will Sample the well for the rest of the week

6.27.11

6·30·11

0800 J. Bonch; C. Huey

H· Safety Tailgate: Heat Stress

JDB C. Huey onsite to Sample B3EXW03/04 and Car Wash.

CHERPS load equipment.

0950 Collected Composite WC Sample from B3EXW03 and B3EXW04.

1045 Car Wash Sample

1130 Back to office / CHERPS

6.30.11

7/18/11

74778.04000

Parsons: Adrian Lindley

Earth Data: George Seidman

0745 A. Lindley arrives. Sign in @ 606.

0815 G. Seidman arrives. Sign in @ 606. Sign H+S plan.

0830 A. Lindley + G. Seidman to WB-07.

0845 To Receiving to collect shipment from EarthData. Back to 606 + Unload equipment.

1030 Equipment arrives from Westbay.

1130 Lunch.

1220 Return from lunch. Load equipment.

1245 To WB-07.

1300 Begin perforating packers.

1600 Return from WB-07.

1630 Site Secure Depart site.

7-18-11

7-19-11

747781.04000

Parsons: A. Lindly
Earth Data: G. Seidman
GPI: L. Gebbart, K. Graham
H+S Topic: Heat, overhead hazards.

0800 A. Lindly + G. Seidman on site. Sign in @ 606.
0900 Load equipment.
1030 GPI arrives.
1050 Safety inspection of SMEAL.
1110 To WB-07. Set SMEAL up.
1130 Re-perforated top packer. Put 300 lbs pull on, no movement.
1240 Thunder in area. Break for lunch.
1345 Return from lunch.
1530 Successfully perforated upper 4 packers. Ran perforation tool down
to 262.5' but unable to lower it deeper.
1545 Thunder storm. Pack up and return to 606 to wait it out.
1620 Lightning still in area, GeoProjects + Earth Data depart.
1720 Site Secure. A. Lindly Depart site.

7-19-11

7/20/11

747781.04000

Parsons: A. Lindly
Earth Data: G. Seidman
GPI: L. Gebbart, K. Graham
H+S Topics: Heat, weather, overhead.

0700 A. Lindley, Earth Data, GPI on site. Sign in at 606.
Load equipment. To WB-07.
0730 Tried to get tool past obstruction. No success. Tool brought out.
Clay was noted on bottom of weight. Pipe has separated.
Begin pulling out pipe.
0810 Pipe out. Broke-off at 247'.
0900 Unable to fish the perf. tool into casing. GPI to shop
to fabricate fishing /outside perf. tool.
0910 Continue to try and fish perf. toolin.
1045 Unsuccessful fishing. Pack up tools. Back to 606. Site secure.
1115 G. Seidman (Earth Data) sign-out @ 606 and departs.

7-20-11

(92)

7-21-11 747781.04000

Parsons : A. Lindley
GPI : L. Gebbert, K. Grau
Earth Data : G. Seidman.
H+S Topic : Heat, overhead hazards, crush-by

0700 A. Lindley, Earth Data, GPI on-site. Sign in @ 606. Load equipment, To WB-07.
0730 Begin running pipe in hole to fish for broken casing.
0815 Perforated last packer. Begin pulling broken casing out of hole.
0845 L. Gebhart, A. Lindley to 606 for Safety comittee meeting.
0925 Return from 606. Resume pulling pipe.
0950 Fish off. Latch bent on tool. GPI back to shop to rebuild tool.
1038 Lunch.
1200 Return from lunch. Await GPI.
1445 GPI Returns.
1455 Begin running in hole with new tool.
1600 Successfully fished out pipe. Clean up around site. Lay out new well materials.
1625 Site Secure. To 606 to unload equipment.
1700 Depart Site.

7-22-11

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(93)

7/22/11

747781.04000

Parsons : A. Lindley
GPI : L. Gebbart, K. Grau
Earth Data : G. Seidman
H+S Topic : Overhead hazards, heat.

0700 A. Lindley, Earth Data, GPI on-site. Sign in @ 606. Load equipment. To WB-07.
0725 Begin assembly of WB components. Testing couplings.
0830 Begin running well materials in hole + testing each coupling (pressure).
1130 Materials installed.
1145 Profile: Atm = 14.07 Inside / Zone
UGR-01 (14) 14.09 / 14.09
LGR-01 (90) 14.13 / 14.13
LGR-02 (175) 14.17 / 14.16
LGR-03A (208) 14.17 / 14.17
LGR-03B (257) 14.20 / 14.19
LGR-04 (318) 14.22 / 39.45 → WL = 259.5' in borehole.
1215 Inside WL 298.76'
1230 Lunch.
1330 Return from Lunch. Inside WL. 298.73' Integrety test successful.
1345 Run packer inflation tool in.
1355 Begin packer inflation.
1530 Packers inflated. Profile. Atm 14.04 Inside / ~~outs~~ zone
UGR-01 (14) 14.04 / 14.54
LGR-01 (90) 14.08 / 14.15
LGR-02 (175) 14.11 / 14.32
LGR-03A (208) 14.13 / 14.10
LGR-03B (257) 14.15 / 14.12
LGR-04 (318) 24.64 / 39.37
1600 Load Equipment. Site Secure. To 606.
1700 Depart Site.

7-22-11

7-27-11 747781.04000

Parsons : Adrian Lindley

GPI : Lee Gebbert, Kevin Gebbert, Kevin Grahm

H+S Topic : Environmental hazards, overhead hazards.

0715 A. Lindley on site.

1030 GPI arrives at LS-5. Lee troubleshooting.

1115 It appears that the contactor in the control box has gone out. Tested the pump with a temporary box 1.5hp rated, and pump works. 60 psi on pressure tank, opened valve to the system and pressure held at 50 psi.

1145 Lee removed bad control box and is taking it tobe repaired / replaced. Lunch.

1245 Return from Lunch. GPI arrives with new contactor. Possible cause of malfunction: ants inside box.

1315 Contactor replaced. Appears to work. Pick up used drop pipe.

1400 GPI sign in @ 606. Take used drop pipe to B-27 for recycling.

1425 Set up @ B3-EXW-03. Begin splice and tighten couplings.

Submersible Motor Info: Franklin Electric Date code : 11D14

- Model # : 2343078602
- S/N # : 11D14-08-02200C
- 3 phase; 200V; 60 Hz; 5 hp

Pump info : GRUNDFOS 40S50-15

- Model # : A11890015 - P11117385
- 40 gpm series
- 5 hp
- 15 stage

1650 Couplings tightened.

1700 Site Secure. Depart site.

7-27-11

7/28/11

747781.04000

Parsons : A. Lindley

GPI : L. Gebbert, K. Gebbert, K. Grahm

H+S Topic : overhead hazards + working with drop-pipe

0700 A. Lindley on-site. Sign in @ 606.

0720 GPI on-site. Sign in @ 606. To EXW-03.

0745 Begin installing pump in EXW-03.

0945 Cut pipe to set pump @ 335' BGS.

1315 Well set @ 335', eline tube set at 330' bgs.

1325 Set up at EXW-04. Begin splice.

Submersible Motor info : Franklin Electric Date code : 11D14

- model # : 2343078602
- S/N # : 10F14-24-0580
- 3 phase ; 200V, 60 HZ ; 5hp

Pump info : GRUNDFOS 40S50-15

- model # A11890015 - P11113 282

1400 Begin installing pump in EXW-04.

1520 Pump set @ 330', eline tube set at 325' bgs.

1600 Drillers pick up old WB-07 casing for disposal.

1615 Site Secure. GPI departs.

7-28-11