Vol 1-1
TIM 4

MEETING MINUTES
FACILITY INVESTIGATIONS, CLOSURE PROJECTS, AND WELL INSTALLATIONS
CAMP STANLEY STORAGE ACTIVITY
F11623-94-D0024/RL83
PARSONS ES 736071.02

Date: 22 May 2001

Time: 9:00 A.M. - 4:30 P.M.

Place: Camp Stanley Storage Activity, Boerne, Texas

Subject: CSSA Data Quality Objectives for Groundwater Monitoring Program

Attendees:

Attendee	Organization	Phone
Brian K. Murphy	CSSA ENV	(210) 698-5208
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Minutes prepared by Julie Burdey, Parsons ES.

The meeting commenced at 9:00 AM at the CSSA conference room. The objectives of the meeting were to 1) continue the discussion of DQOs for the upcoming June 2001 quarterly groundwater monitoring event; and 2) discuss draft schedule for all delivery orders currently being prepared by Parsons ES.

DQO DISCUSSION

The meeting began with a review of the preliminary draft RL74 TIM #5 minutes. The first activity was to identify items that were discussed during that meeting that pertained to the June 2001 quarterly groundwater monitoring event. Of the general CSM points, it was agreed that items 3, 4, 5, and 7 pertained to the upcoming monitoring. Objectives of the groundwater program that pertain to the monitoring include: monitoring groundwater, evaluating open versus closed boreholes, evaluating well placement, identifying sources of contamination, determining lateral and vertical extent of contamination, determining flow direction and seasonal variability, comparing formations, updating/refining conceptual site model, evaluating need for additional

ATTACHMENT 1
EPA DQO PROCESS

2.5.4. Off-Site Well Investigations

The objective of the off-site well investigation is to determine if contamination from identified CSSA source areas has migrated off base and is impacting off base groundwater well users. Preliminary investigations have indicated the need to monitor certain wells for specific volatile organic compounds. These compounds are tricholoroethene, tetrachloroethene, cis-1, 2-dichloroethene and vinyl chloride. Method SW8260 will be used for investigating the presence of the above analytes in off-site well water samples. The reporting limits and the quality control criteria for those analytes in Method SW8260 presented in Section 4.0 are applicable.

If additional investigations are required in future, the choice of the analytical methods, the list of analytes and the level of quality control will be directed by the DQOs.

2.6 Data Quality Objectives Process

Data Quality Objective process is a systematic process for generating environmental data that will be sufficient for their intended use. This is a seven step process: 1) State the Problem, 2) Identify the Decision, 3) Identify the Inputs to the Decision, 4) Define the Boundaries of the Study, 5) Develop a Decision Rule, 6) Specify Tolerable Limits on Decision Errors and 7) Optimize the Design. The DQO process is iterative, i.e., the seven-step process should be repeated, as needed, based on newly acquired data and/or information. The DQO process should be applied to each program and to each site prior to sampling and analytical activities.

The DQO process is more substantially expanded below with additional details: (Reference: Chapters 1 – 7, DATA QUALITY OBJECTIVE PROCESS FOR SURPERFUND, INTERIM FINAL GUIDANCE, EPA/540/G-93/071, September 1993)

STEP ONE: STATE THE PROBLEM

Purpose: Summarize the contamination problem that will require new environmental data, and identify the resources available to resolve the problem.

Activities:

1. Identify members of the scoping team.
2. Develop/refine the conceptual site model.
3. Define the exposure pathways and exposure scenarios.
4. Specify available resources.
5. Write a brief summary of the contamination problem.

STEP TWO: IDENFITY THE DECISION

Purpose: Identify the decision that requires new environmental data to address the contamination problem.

Activities:

1. Identify the key decision for the current phase or stage of the project.
2. Identify alternative actions that may be taken based on the findings of the field investigation.
3. Identify relationships between this decision and any other current or subsequent decisions.

STEP THREE: IDENTIFY THE INPUTS TO THE DECISION

Purpose: Identify the information needed to support the decision, and specify which inputs require new environmental measurements.

Activities:

1. Identify the information inputs needed to resolve the decision.
2. Identify sources for each information input, and list those inputs that are obtained through environmental measurements.
3. Define the basis for establishing contaminant-specific action levels.
4. Identify potential sampling approaches and appropriate analytical methods.

STEP 4: DEFINE THE BOUNDARIES OF THE STUDY

Purpose: Specify the spatial and temporal aspects of the environmental media that the data must represent to support the decision.

Activities:

1. Define the geographic areas of the field investigation.
2. Define each environmental medium of concern.
3. Divide each medium into strata having relatively homogeneous characteristics.
4. Define the scale of decision making.
5. Determine the time frame to which the decision applies.
6. Determine when to take samples.
7. Identify practical constraints that may hinder sample collection (reconsider previous steps as necessary).

STEP 5: DEVELOP A DECISION RULE

Purpose: Develop a logical *if...then...*statement that defines the conditions that would cause the decision-maker to choose among alternative actions.

Activities:

1. Specify the parameter of interest (such as mean, median, maximum, or proportion).
2. Specify the action level for the decision.
3. Combine the outputs of the previous DQO steps into an *if...then...*decision rule that includes the parameter of interest, the action levels, and the alternative actions.

STEP 6: SPECIFY LIMITS ON DECISION ERRORS

Purpose: Specify the decision-maker's acceptable limits on decision errors, which are used to establish appropriate performance goals for limiting uncertainty in the data.

Activities

1. Determine the possible range of the parameter of interest.
2. Define both types of decision errors and identify the potential consequences of each.
3. Specify a range of possible parameter values where the consequences of decision errors are relatively minor (gray region).
4. Assign probability values to points above and below the action level that reflect the acceptable probability for the occurrence of decision errors.
5. Check the limits on decision errors to ensure that they accurately reflect the decision-maker's concern about the relative consequences for each type of decision error.

STEP 7: OPTIMIZE THE DESIGN

Purpose: Identify the most resource-effective sampling and analysis design for generating data that are expected to satisfy the DQOs.

Activities

1. Review the DQO outputs and existing environmental data.
2. Develop general sampling and analysis design alternatives.
3. For each design alternative, verify that the DQOs are satisfied.
4. Select the most resource-effective design that satisfies all of the DQOs.
5. Document the operational details and theoretical assumptions of the selected design in the Sampling and Analysis Plan.

ATTACHMENT 2
WELLS TO BE SAMPLED, JUNE 2001

Wells to Sampled
June 2001 Ground Water Sampling Event
Camp Stanley Storage Activity

Well ID	Sampling Method	Analyses	Comment
'Old' Wells (13 total)			
1	High Capacity Down Hole	VOCs (short list) & Metals	Normal sampling procedures.
2	Dedicated Low Flow Pump	VOCs (short list) & Metals	Normal sampling procedures.
9	High Capacity Down Hole	VOCs (short list) & Metals	Normal sampling procedures.
10	High Capacity Down Hole	VOCs (short list) & Metals	Normal sampling procedures.
11	High Capacity Down Hole	VOCs (short list) & Metals	Normal sampling procedures.
16	Dedicated Low Flow Pump	VOCs (short list) & Metals	Normal sampling procedures.
D	Dedicated Low Flow Pump	VOCs (short list) & Metals	Normal sampling procedures.
G	"Grab" sample w/bailer	VOCs (short list) & Metals	Sucker rods have been removed. Well is now accessible to sample.
H	"Grab" sample w/bailer	VOCs (short list) & Metals	Sucker rods have been removed. Well is now accessible to sample.
I	Windmill	VOCs (short list) & Metals	Normal sampling procedures.
MW-1 LGR	Dedicated Low Flow Pump	VOCs (short list) & Metals	Normal sampling procedures.
MW-2 LGR	Dedicated Low Flow Pump	VOCs (short list) & Metals	Normal sampling procedures.
LS-7	High Capacity Down Hole	VOCs (**full list, especially ketones, acetone, and toluene**)	Need additional VOCs results in raw data and report hits for ketones, acetone, and toluene.
"New" Wells (11 total)			
MW-3 LGR	Dedicated Low Flow Pump	VOCs (**full list**) & Metals	Low Flow Pumps to be installed Week of May 7, 2001.
MW-4 LGR	Dedicated Low Flow Pump	VOCs (**full list**) & Metals	Low Flow Pumps to be installed Week of May 7, 2001.
MW-5 LGR	Dedicated Low Flow Pump	VOCs (**full list**) & Metals	Low Flow Pumps to be installed Week of May 7, 2001.
MW-6 LGR	Dedicated Low Flow Pump or "Grab" sample w/bailer	VOCs (**full list**) & Metals	Assumes low flow pumps delivered and installed by sampling date. If low flow not installed, a grab sample collected using a bailer will be adequate.
MW-6 BS	Dedicated Low Flow Pump or "Grab" sample w/bailer	VOCs (**full list**) & Metals	Assumes low flow pumps delivered and installed by sampling date. If low flow not installed, a grab sample collected using a bailer will be adequate.
MW-6 CC	Dedicated Low Flow Pump or "Grab" sample w/bailer	VOCs (**full list**) & Metals	Assumes low flow pumps delivered and installed by sampling date. If low flows not installed, a grab sample collected using a bailer will be adequate.
MW-8 LGR	Dedicated Low Flow Pump or "Grab" sample w/bailer	VOCs (**full list, especially ketones, acetone, and toluene**) & Metals	A grab sample shall be collected using a bailer in coordination with well development. Will get a slow-flow pump sample in September 2001.
MW-8 CC	Dedicated Low Flow Pump or "Grab" sample w/bailer	VOCs (**full list, especially ketones, acetone, and toluene**) & Metals	A grab sample shall be collected using a bailer in coordination with well development. Will get a slow-flow pump sample in September 2001.
MW-9 LGR	Dedicated Low Flow Pump	VOCs (**full list**) & Metals	Low Flow Pump Installed.
MW-9 BS	Dedicated Low Flow Pump	VOCs (**full list**) & Metals	Low Flow Pump Installed.
MW-9 CC	Dedicated Low Flow Pump	VOCs (**full list**) & Metals	Low Flow Pump Installed.
24 Wells to be sampled ("New" and "Old")			

Notes: **1) Confirm full list of VOCs includes acetone, ketones, and BTEX compounds.**
2) Confirm that "water quality" parameters (cation/anion) samples have been collected for new wells.

9056
Ca, Mg, K, Na, Mn, Fe

ATTACHMENT 3
DQO EVALUATION

Objective: Determine the Vertical and Lateral Extent of Groundwater Contamination

STEP ONE: STATE THE PROBLEM

1. Members of Scoping Team.

CSSA, AFCEE, WPI, Informatics, and Parsons ES

2. Develop/refine the CSM.

Chlorinated solvent groundwater contamination is known to exist in the Lower Glen Rose formation water-bearing unit in the vicinity of well 16 (central portion of CSSA) and in the southwest corner of CSSA. The lateral extent of contamination in these areas is unknown. It is thought that these two areas may represent two separate plumes. Low levels of chlorinated solvents have also been recently detected at CSSA Well 1 (south of CSSA). Since most of the wells in which contamination has been detected cross multiple water-bearing zones, the vertical extent of contamination is also unknown.

3. Define exposure pathways and exposure scenarios.

Exposure could potentially occur at CSSA water supply wells 1, 9, and 10, and at off-site well LS-7. Additional exposure pathways are probable due to the large number of water supply wells (both private and municipal) in the area; however, specifics regarding contamination levels in these wells are currently unavailable.

4. Identify available resources.

Groundwater monitoring is planned to be conducted under AETC delivery order DO5084; however, a modification to the contract will be necessary. Funds initially intended for monitoring of 20 off-site wells will be reprogrammed for sampling of 24 wells identified in Attachment 2. A laboratory capable of attaining quality requirements specified in the AFCEE QAPP has been identified and audited for several SW-846 methods.

5. Write a brief summary of the contamination problem.

See item 2 above.

STEP TWO: IDENTIFY THE DECISION

1. Identify the key decision.

Is the well network adequate to define the extent of contamination?

Other associated decisions/questions include: How many monitoring events are required to determine the objective? Are any contaminants occurring in new wells? What are the contaminant-specific action levels and requirements?

2. **Identify alternative actions that may be taken based on the findings of the field investigation.**

None noted.

3. **Identify relationships between this decision and any other current or subsequent decisions.**

See Step One, item 1.

STEP THREE: IDENTIFY THE INPUTS TO THE DECISION

1. **Identify the information inputs needed to resolve the decision.**

Analytical data to define the COCs and action levels to define extent.

2. **Identify sources for each information input, and list those inputs that are obtained through environmental measurements.**

Source of analytical data will be groundwater samples collected during groundwater monitoring program.

3. **Define the basis for establishing contaminant-specific action levels.**

To the extent possible, action levels are defined by regulations. Data from drinking water wells will be compared to MCLs and Texas Action Levels. For drinking water wells, the action will be to treat water at the wellhead, provide an alternate source of water, or remove the well from the distribution system. For all other wells, the reporting limit (RL) is considered the action level, and for these wells, the action is continued monitoring.

4. **Identify potential sampling approaches and appropriate analytical methods.**

Sampling approaches depend on the construction of the well. For the June 2001 event, sampling approaches are listed in Attachment 2. SW-846 analytical methods are planned for the June 2001 event. As noted in Attachment 2, samples from new wells and LS-7 will be analyzed for the entire list of SW-8260A analytes. Existing wells will be analyzed for the short list only. 500 series may be appropriate for drinking water wells, though use of it has never been required by regulatory agencies. Samples will also be analyzed for the metals arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, and zinc.

STEP FOUR: DEFINE THE BOUNDARIES OF THE STUDY

1. **Define the geographic areas of the field investigation.**

The geographic area of the field investigation is the CSSA facility and the offsite area southwest of CSSA.

2. Define each environmental medium of concern.

Groundwater.

3. Divide each medium into strata having relatively homogeneous characteristics.

Lower Glen Rose groundwater, Bexar Shale groundwater (if any), and Cow Creek groundwater.

4. Define the scale of decision making.

Temporally – decisions regarding the well network can be made on a quarterly basis. Spatially – above-action level analytical data should be bounded by non-detect analytical data to define the extent of contamination, both vertically and laterally. However, analytical data very close to the action level could also be used to define the extent.

5. Determine the time frame to which the decision applies.

See Step Four, item 4 above.

6. Determine when to take samples.

EPA 3008(h) order requires quarterly monitoring. This interval is sufficient for acquiring seasonal data. Occasionally, CSSA may consider collecting samples after heavy precipitation since a correlation between increased contaminant levels and precipitation has been observed.

7. Identify practical constraints that may hinder sample collection.

Sample locations are dictated by locations of monitoring wells. Installation of monitoring wells is expensive and can take several months, depending on the number of wells.

STEP FIVE: DEVELOP A DECISION RULE

1. Specify the parameter of interest.

The maximum concentration of each analyte is the parameter of interest.

2. Specify the action level for the decision.

For monitoring wells, the action level is the reporting limit. For drinking water wells, the action level is the MCL or the Texas action level, whichever is lower. If the result is below these action levels, then the monitoring network will be considered adequate in that area. If the result is above action levels, then the well network may not be adequate in that area and additional wells may be necessary.

3. Combine the outputs into an "if,... then" decision rule.

If the result is below these action levels, then the monitoring network will be

considered adequate in that area. If the result is above action levels, then the well network may not be adequate in that area and additional wells may be necessary.

STEP SIX: SPECIFY LIMITS ON DECISION ERRORS

1. Determine the possible range of the parameter of interest

Reporting limits must be equal to, but preferably below, action limits identified above. Highest levels detected are listed below:

Analyte	Maximum detected value (1991-2000)
Acetone	NA
Bromodichloromethane	4.7 ug/L
Chloroform	52.647 ug/L
Dibromochloromethane	4.5 ug/L
1,1-DCE	1.0 ug/L
cis-1,2-DCE	290 ug/L
trans-1,2-DCE	9.59 ug/L
Dichloromethane	9.6 ug/L
PCE	204 ug/L
TCE	509 ug/L
Vinyl chloride	ND
Arsenic	0.02 mg/L
Barium	0.064 mg/L
Cadmium	0.008 mg/L
Chromium	0.009 mg/L
Copper	0.18 mg/L
Lead	0.094 mg/L
Mercury	0.004 mg/L
Nickel	0.216 mg/L
Zinc	9.9 mg/L

2. Define both types of decision errors and identify the potential consequences of each.

Error one (false negative, false nondetect results): well network is mistakenly considered to be adequate in a given area. Potential consequence: For any one monitoring event, the consequence for CSSA monitoring wells is a delayed identification of the plume location; the well network will be re-evaluated quarterly. The monitoring wells at CSSA are not being used for any other purpose (such as water supply, irrigation, etc). However, for drinking water wells, the consequence is potential ingestion of above-MCL water by humans.

Error two (false positive, false above action-level results): well network is mistakenly considered to be inadequate in a given area. Potential consequence:

Unnecessary additional wells could be installed in some locations. Well head treatment or supply of an alternate source of water could be initiated unnecessarily.

3. Specify a range of possible parameter values where the consequences of decision errors are relatively minor (gray region).

Detected results near the action level would result in a gray area. Also, a one-time detection of an analyte above the action level, followed be several rounds of nondetect could be considered a gray area.

4. Assign probability values to points above and below the action level that reflect the acceptable probability for the occurrence of decision errors.

Assignment of quantitative probability values associated with CSSA's acceptable limits for making an incorrect decision is not appropriate based on the number of factors involved. Decision errors associated with drinking water wells are very important to avoid. Decision errors are most likely when detected contaminant levels are at or near the MCL. During the data validation process, a review will be made to ensure that drinking water well sampling and analysis are in 100% concurrence with the AFCEE QAPP and the approved variances. Any deviations will be identified to CSSA and AFCEE as soon as possible so that an appropriate corrective action can be identified. In these cases, resampling may be necessary. In addition, if detected analytical results for the drinking water wells are within 10% of the MCL, resampling of the wells where the detection occurred will take place. Resampling will only be for the analytes within the 10% range, unless there were other QA/QC problems requiring resampling.

For all wells (drinking water and monitoring), results will be evaluated against historic data, where available. Any results which do not agree with previous trends will also be carefully evaluated to ensure that it is compliant with the AFCEE QAPP (and approved variances). Where discrepancies are identified, CSSA and AFCEE will be notified as soon as possible so that an appropriate corrective action can be identified.

Analyte (units)	MCL	Conc. betw. 90% and 110% MCL	TNRCC Public Drinking Water Level (30 TAC 290.107(c) (2) (C) (iii)	Conc. betw 90% and 110% TNRCC Level
Acetone			NA	NA
Bromodichloromethane (ug/L)	100	90-110	NA	NA
Chloroform (ug/L)	100	90-110	NA	NA
Dibromochloromethane (ug/L)	100	90-110	0.5	0.45-0.55
1,1-DCE (ug/L)	7	6.3-7.7	0.5	0.45-0.55
cis-1,2-DCE (ug/L)	70	63-77	0.5	0.45-0.55
trans-1,2-DCE (ug/L)	100	90-110	0.5	0.45-0.55
Dichloromethane (ug/L)	5	4.5-5.5	0.5	0.45-0.55
PCE (ug/L)	5	4.5-5.5	0.5	0.45-0.55
TCE (ug/L)	5	4.5-5.5	0.5	0.45-0.55
Vinyl chloride (ug/L)	2	1.8-2.2	0.5	NA
Arsenic (mg/L)	0.05	0.045-0.055	NA	NA

Analyte (units)	MCL	Conc. betw. 90% and 110% MCL	TNRCC Public Drinking Water Level (30 TAC 290.107(c) (2) (C) (iii)	Conc. betw 90% and 110% TNRCC Level
Barium (mg/L)	2.0	1.8-2.2	NA	NA
Cadmium (mg/L)	0.005	0.0045-0.0055	NA	NA
Chromium (mg/L)	0.1	0.09-0.11	NA	NA
Copper (mg/L)	1.3	1.17-1.43	NA	NA
Lead (mg/L)	0.015	0.0135-0.0165	NA	NA
Mercury (mg/L)	0.002	0.0018-0.0022	NA	NA
Nickel (mg/L)	0.1	0.09-0.11	NA	NA
Zinc (mg/L)	NA	NA	NA	NA

5. Check the limits on decision errors to ensure that they accurately reflect the decision-maker's concern about the relative consequences for each type of decision error.

The acceptable limits on decision errors are smallest for cases where there is greatest concern for decision errors – incorrectly identifying wells as exceeding drinking water standards, and not identifying drinking water wells that do exceed drinking water standards.

STEP SEVEN: OPTIMIZE THE DESIGN

1. Review the DQO outputs and existing environmental data.

See Steps 1-6.

2. Develop general sampling and analysis design alternatives.

Sampling locations are limited to well locations. Ultimately, each of the CSSA wells will be sampled via a low-flow pump; however, these pumps will not all be installed by the June 2001 sampling event. Private wells are sampled at the tap. Samples will be analyzed via SW-846 methods for consistency in analytical results. Level of data validation and quality of data provide design alternatives.

One alternative is that all analytical data be required to meet stringent AFCEE QAPP criteria and undergo 100% data validation. Data resulting from this level of QA/QC could be used for site characterization, risk assessment, and identification of remedial alternatives. However, a large amount of very high quality data is already available for many of the wells. Producing data with this very high quality level costs more in data validation time, but does not necessarily provide new information.

An alternative is to require very high quality data for all drinking water wells and new wells. Data from the other wells needs verification, but does not need data validation, nor does it need to meet stringent AFCEE QAPP requirements. This alternative will be evaluated for future monitoring events.

Other alternatives are associated with the number and type of QA samples needed. In the past, duplicate groundwater samples were collected during every sampling event, at a rate of one after every nine environmental samples. MS and MSD samples were collected during every sampling event, at a rate of one MS and one MSD after every eighteen samples (including duplicates). These collection frequencies were based on a conservative interpretation of the AFCEE QAPP.

Since duplicates have been collected for about five years of monitoring and no discrepancies between the sample and duplicate results have been identified, an alternative is to limit collection of duplicate samples only to new wells which have not been sampled previously. This would allow comparison of results from new pumps. In addition, these could be collected at a rate of one per ten samples, the alternative, commonly accepted interpretation of the AFCEE QAPP.

Sampling locations are limited to well locations. Ultimately, each of the CSSA wells will be sampled via a low-flow pump; however, these pumps will not all be installed by the June 2001 sampling event. Private wells are sampled at the tap. Samples will be analyzed via SW-846 methods for consistency in analytical results. Level of data validation and quality of data provide design alternatives.

One alternative is that all analytical data be required to meet stringent AFCEE QAPP criteria and undergo 100% data validation. Data resulting from this level of QA/QC could be used for site characterization, risk assessment, and identification of remedial alternatives. However, a large amount of very high quality data is already available for many of the wells. Producing data with this very high quality level costs more in data validation time, but does not necessarily provide new information.

An alternative is to require very high quality data for all drinking water wells and new wells. Data from the other wells does not need data validation, nor does it need to meet stringent AFCEE QAPP requirements. This alternative will be evaluated for future monitoring events.

Other alternatives are associated with the number and type of QA samples needed. In the past, duplicate groundwater samples were collected during every sampling event, at a rate of one after every nine environmental samples. MS and MSD samples were collected during every sampling event, at a rate of one MS and one MSD after every eighteen samples (including duplicates). These collection frequencies were based on a conservative interpretation of the AFCEE QAPP.

Since duplicates have been collected for approximately five years of monitoring and no discrepancies between the sample and duplicate results have been identified, an alternative is to limit collection of duplicate samples only to new wells that have not previously been sampled. This would allow comparison of duplicate results collected from new pumps. In addition, the duplicates could be collected at a rate of one per ten samples, the alternative, commonly accepted interpretation of the AFCEE QAPP.

An alternative for MS/MSD samples is the collection and analysis of a matrix spike (MS) and a matrix duplicate (MD). The matrix spike is used to assess the accuracy of the method in a given sample matrix. Previously, a matrix spike duplicate has been used to assess the precision of the method in a given sample matrix. However, the analysis of an MSD also provides accuracy information because the sample is spiked with a known concentration of the target analyte(s). The guidance in SW-846 indicates that a matrix duplicate may be used to assess matrix precision instead of using a matrix spike duplicate. A matrix duplicate is defined as "An intralaboratory split sample which is used to document the precision of a method in a given sample matrix." and is also commonly referred to as a laboratory duplicate or an analytical duplicate. The use of an MS/MD prevents confusion that may arise when the accuracy of the MS and the accuracy of the MSD are in conflict because an MD can only be used to assess precision. An alternative for the collection frequency of the MS/MD is to collect one MS and one MD per twenty normal field samples. This collection frequency is based on the alternative, commonly accepted interpretation of the AFCEE QAPP.

3. For each design alternative, verify that the DQOs are satisfied.

See Step 7 Item 2.

4. Select the most resource-effective design that satisfies all of the DQOs.

For the June 2001 groundwater monitoring event, each of the wells identified in Attachment 2 of the RL83 TIM #4 Minutes will be sampled. Samples from the existing monitoring wells will be analyzed for metals and the short list of VOCs approved by EPA. Samples from drinking water wells and the new cluster wells will be analyzed for the full list of VOCs (plus acetone) and metals. All data will be validated in accordance with AFCEE QAPP requirements. Any rejected data will be brought to CSSA and AFCEE's attention as soon as possible so that the need for resampling can be evaluated. The quality of drinking water well data will be required to be very high; more flexibility is allowed for monitoring well data. If any drinking water well results are within the 90-110% MCL or TNRCC action level range, that well will be resampled for the parameters in that range. Due to the large amount of historic data from the existing wells, duplicate samples will not be collected from the existing well group. Duplicates will be collected from the new wells only, at a rate of one per ten samples. MS samples will be collected at a rate of one per twenty samples (including all wells). MSD samples will not be collected. The need for 100% data validation will be evaluated for future monitoring events.

ATTACHMENT 4
EXCERPT FROM SW-846 REGARDING MS/MSD SAMPLES

Each day of sampling, at least one field duplicate and one equipment rinsate should be collected for each matrix sampled. If this frequency is not appropriate for the sampling equipment and method, then the appropriate changes should be clearly identified in the QAPjP. When samples are collected for volatile organic analysis, a trip blank is also recommended for each day that samples are collected. In addition, for each sampling batch (20 samples of one matrix type), enough volume should be collected for at least one sample so as to allow the laboratory to prepare one matrix spike and either one matrix duplicate or one matrix spike duplicate for each analytical method employed. This means that the following control samples are recommended:

- Field duplicate (one per day per matrix type)
- Equipment rinsate (one per day per matrix type)
- Trip blank (one per day, volatile organics only)
- Matrix spike (one per batch [20 samples of each matrix type])
- Matrix duplicate or matrix spike duplicate (one per batch)

Additional control samples may be necessary in order to assure data quality to meet the project-specific DQOs.

3.4.2 Acceptance Criteria

Procedures should be in place for establishing acceptance criteria for field activities described in the QAPjP. Acceptance criteria may be qualitative or quantitative. Field events or data that fall outside of established acceptance criteria may indicate a problem with the sampling process that should be investigated.

3.4.3 Deviations

All deviations from plan should be documented as to the extent of, and reason for, the deviation. Any activity not performed in accordance with procedures or QAPjPs is considered a deviation from plan. Deviations from plan may or may not affect data quality.

3.4.4 Corrective Action

Errors, deficiencies, deviations, certain field events, or data that fall outside established acceptance criteria should be investigated. In some instances, corrective action may be needed to resolve the problem and restore proper functioning to the system. The investigation of the problem and any subsequent corrective action taken should be documented.

3.4.5 Data Handling

All field measurement data should be reduced according to protocols described or referenced in the QAPjP. Computer programs used for data reduction should be validated before use and verified on a regular basis. All information used in the calculations should be recorded to enable reconstruction of the final result at a later date.

levels in the laboratory. Guidelines should be in place for accepting or rejecting data based on the level of contamination in the blank.

Procedures should be in place for documenting the effect of the matrix on method performance. When appropriate for the method, there should be at least one matrix spike and either one matrix duplicate or one matrix spike duplicate per analytical batch. Additional control samples may be necessary to assure data quality to meet the project-specific DQOs.

Matrix-Specific Bias -- Procedures should be in place for determining the bias of the method due to the matrix. These procedures should include preparation and analysis of matrix spikes, selection and use of surrogates for organic methods, and the method of standard additions for metal and inorganic methods. When the concentration of the analyte in the sample is greater than 0.1%, no spike is necessary.

Matrix-Specific Precision -- Procedures should be in place for determining the precision of the method for a specific matrix. These procedures should include analysis of matrix duplicates and/or matrix spike duplicates. The frequency of use of these techniques should be based on the DQO for the data collection activity.

Matrix-Specific Detection Limit -- Procedures should be in place for determining the MDL for a specific matrix type (e.g., wastewater treatment sludge, contaminated soil, etc).

4.4.4 Deviations

Any activity not performed in accordance with laboratory procedures or QAPjPs is considered a deviation from plan. All deviations from plan should be documented as to the extent of, and reason for, the deviation.

4.4.5 Corrective Action

Errors, deficiencies, deviations, or laboratory events or data that fall outside of established acceptance criteria should be investigated. In some instances, corrective action may be needed to resolve the problem and restore proper functioning to the analytical system. The investigation of the problem and any subsequent corrective action taken should be documented.

4.4.6 Data Handling

Data resulting from the analyses of samples should be reduced according to protocols described in the laboratory procedures. Computer programs used for data reduction should be validated before use and verified on a regular basis. All information used in the calculations (e.g., raw data, calibration files, tuning records, results of standard additions, interference check results, and blank- or background-correction protocols) should be recorded in order to enable reconstruction of the final result at a later date. Information on the preparation of the sample (e.g., weight or volume of sample used, percent dry

samples and Section 4.4.3 for laboratory samples). For QC purposes, if the number of samples in a group is greater than 20, then each group of 20 samples or less will all be handled as a separate batch.

BIAS: The deviation due to matrix effects of the measured value (x_s - x_u) from a known spiked amount. Bias can be assessed by comparing a measured value to an accepted reference value in a sample of known concentration or by determining the recovery of a known amount of contaminant spiked into a sample (matrix spike). Thus, the bias (B) due to matrix effects based on a matrix spike is calculated as:

$$B = (x_s - x_u) - K$$

where:

x_s = measured value for spiked sample,
x_u = measured value for unspiked sample, and
K = known value of the spike in the sample.

Using the following equation yields the percent recovery (%R).

$$\%R = 100\ (x_s - x_u)/\ K$$

BLANK: see Equipment Rinsate, Method Blank, Trip Blank.

CONTROL SAMPLE: A QC sample introduced into a process to monitor the performance of the system.

DATA QUALITY OBJECTIVES (DQOs): A statement of the overall level of uncertainty that a decision-maker is willing to accept in results derived from environmental data (see reference 2, EPA/QAMS, July 16, 1986). This is qualitatively distinct from quality measurements such as precision, bias, and detection limit.

DATA VALIDATION: The process of evaluating the available data against the project DQOs to make sure that the objectives are met. Data validation may be very rigorous, or cursory, depending on project DQOs. The available data reviewed will include analytical results, field QC data and lab QC data, and may also include field records.

DUPLICATE: see Matrix Duplicate, Field Duplicate, Matrix Spike Duplicate.

EQUIPMENT BLANK: see Equipment Rinsate.

EQUIPMENT RINSATE: A sample of analyte-free media which has been used to

rinse the sampling equipment. It is collected after completion of decontamination and prior to sampling. This blank is useful in documenting adequate decontamination of sampling equipment.

ESTIMATED QUANTITATION LIMIT (EQL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The EQL is generally 5 to 10 times the MDL. However, it may be nominally chosen within these guidelines to simplify data reporting. For many analytes the EQL analyte concentration is selected as the lowest non-zero standard in the calibration curve. Sample EQLs are highly matrix-dependent. The EQLs in SW-846 are provided for guidance and may not always be achievable.

FIELD DUPLICATES: Independent samples which are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

LABORATORY CONTROL SAMPLE: A known matrix spiked with compound(s) representative of the target analytes. This is used to document laboratory performance.

MATRIX: The component or substrate (e.g., surface water, drinking water) which contains the analyte of interest.

MATRIX DUPLICATE: An intralaboratory split sample which is used to document the precision of a method in a given sample matrix.

MATRIX SPIKE: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

MATRIX SPIKE DUPLICATES: Intralaboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.

METHOD BLANK: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

without assumption of knowledge of the true value. Precision is estimated by means of duplicate/replicate analyses. These samples should contain concentrations of analyte above the MDL, and may involve the use of matrix spikes. The most commonly used estimates of precision are the relative standard deviation (RSD) or the coefficient of variation (CV),

$$RSD = CV = 100\ S/\bar{x},$$

where:
$\bar{x}$ = the arithmetic mean of the x_i measurements, and S = variance; and the relative percent difference (RPD) when only two samples are available.

$$RPD = 100\ [(x_1 - x_2)/\{(x_1 + x_2)/2\}].$$

PROJECT: Single or multiple data collection activities that are related through the same planning sequence.

QUALITY ASSURANCE PROJECT PLAN (QAPjP): An orderly assemblage of detailed procedures designed to produce data of sufficient quality to meet the data quality objectives for a specific data collection activity.

RCRA: The Resource Conservation and Recovery Act.

REAGENT BLANK: See Method Blank.

REAGENT GRADE: Analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.

REAGENT WATER: Water that has been generated by any method which would achieve the performance specifications for ASTM Type II water. For organic analyses, see the definition of organic-free reagent water.

REFERENCE MATERIAL: A material containing known quantities of target analytes in solution or in a homogeneous matrix. It is used to document the bias of the analytical process.

SPLIT SAMPLES: Aliquots of sample taken from the same container and analyzed independently. In cases where aliquots of samples are impossible to obtain, field duplicate samples should be taken for the matrix duplicate analysis. These are usually taken after mixing or compositing and are used to document intra- or interlaboratory precision.

ATTACHMENT 5
CHEMISTRY REVIEW PROCESS

Chemistry Review Processes

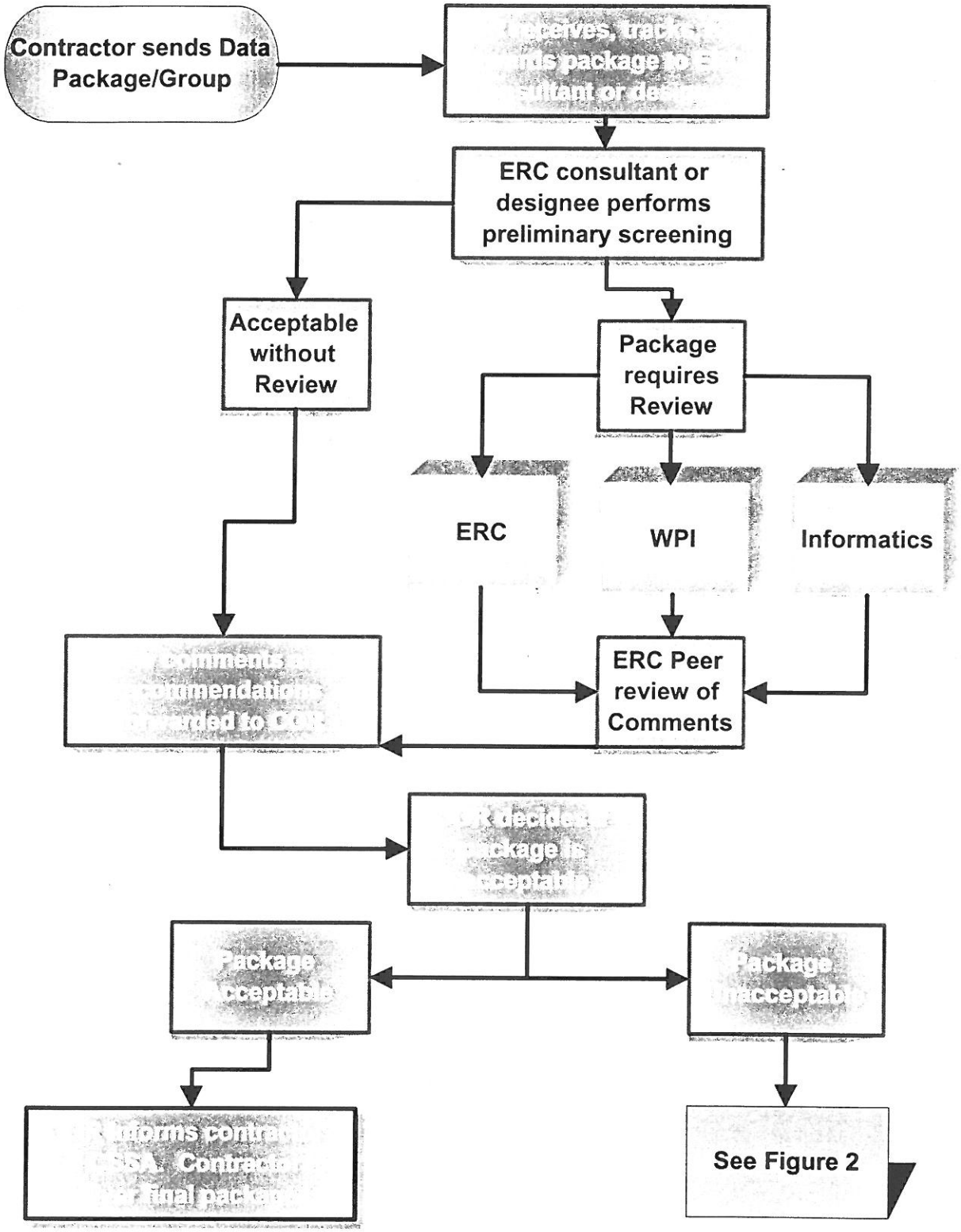

Figure 1

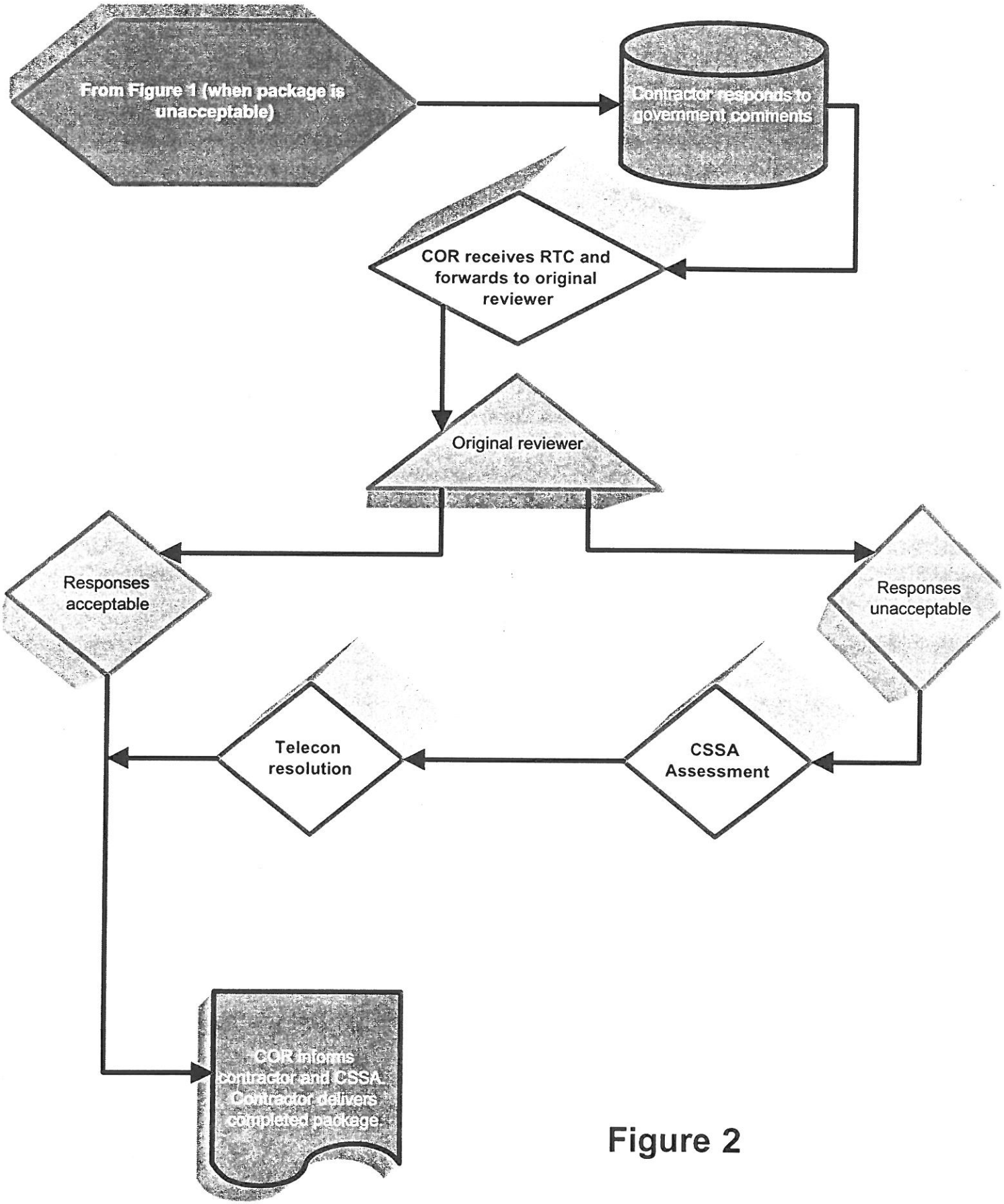
From Figure 1 (when package is unacceptable)
Contractor responds to government comments
COR receives RTC and forwards to original reviewer
Original reviewer
Responses acceptable
Responses unacceptable
Telecon resolution
CSSA Assessment
COR informs contractor and CSSA. Contractor delivers completed package.

Figure 2