



DEPARTMENT OF THE ARMY
CAMP STANLEY STORAGE ACTIVITY, MCAPP
25800 RALPH FAIR ROAD, BOERNE, TX 78015-4800

June 21, 2021

U-027-21

SUBJECT: Annual Status Report (June 2020 to May 2021) of the AOC-65 Class V Remediation Infiltration Galleries and Injection Wells at Camp Stanley Storage Activity, Boerne, Texas, TCEQ Authorization No. 5X2600645; IHWCA#69026; CN602728206/RN100662840

Mr. Bryan Smith
Texas Commission on Environmental Quality
Underground Injection Control Permits Section
Radioactive Materials Division
MC233
PO Box 13087
Austin, Texas 78711-3087
(512) 239-3150

Dear Mr. Smith:

The Camp Stanley Storage Activity (CSSA), McAlester Army Ammunition Plant, U.S. Army Field Support Command, Army Materiel Command, U.S. Army, is submitting this annual report summarizing the injection activities performed at the on-post Area of Concern (AOC) 65 site. Injection activities performed are part of the AOC-65 In-Situ Chemical Oxidation (ISCO) remedial approach for treatment of chlorinated compounds in groundwater. This annual letter provides a summary of activities for the months of June 2020 through May 2021 and includes a report of injection and associated ISCO activities conducted at AOC-65 during the past year as specified by the Texas Commission on Environmental Quality (TCEQ) Underground Injection Control (UIC) permit.

ISCO injection activities associated with the Class V Injection Well Authorization No. 5X2600645 (amended November 13, 2017) during this reporting period have included the sustained release of chemical oxidants from 30 oxidant infused paraffin wax cylinders that were installed in June 2020. These 30 cylinders are installed within ten (10) wells (**Table 1**) at AOC-65. Groundwater monitoring was also performed during the reporting period.

The oxidant cylinders (RemOx[®] SR+) deployed at AOC-65 consist of potassium permanganate and sodium persulfate, infused within a paraffin wax matrix in a ratio of 38:38:24. The cylinders are 18 inches long and either 2.5 inches or 1.35 inches in diameter. The 2.5-inch cylinders weigh 5.75 pounds each and the 1.35-inch cylinders weigh 2.875 pounds each. This passive oxidant application approach allows the continued release of ISCO chemicals into groundwater to occur under varying hydrologic conditions throughout the year.

Groundwater samples were collected from existing monitoring wells, injection wells, and infiltration galleries for analysis of volatile organic compounds (VOCs), metals,

and anions (chloride and sulfate) to track the progress of current ISCO applications. Additionally, water quality parameters (pH, DO, ORP, and conductivity) were also collected at monitoring wells. Sampling events were conducted in June and September 2019, and March 2020. Sampling events will continue semi-annually, with the next event scheduled to take place in September 2021. Quarterly monitoring including the collection of field parameters and ISCO cylinder adjustments will continue, most recently in June, with the next event scheduled to coincide with September 2021 sampling.

Analytical results from the September 2020 and March 2021 sampling events indicate sustained VOC concentrations within some of the cylinder-installed wells. As a result, a supplemental injection of ISCO solution, RemOx[®] L (sodium permanganate), is planned for a selection of permitted infiltration cells and ISCO injection wells (IIWs) in the next reporting period. Planned injection locations are provided in the attached Figure 1. The injection will include the distribution of 2,104 gallons of 5% RemOx[®] L solution among injection locations. The exact volumes at each location are to be determined, however, it is anticipated that the majority of ISCO solution injected will be within the North, Middle, and South infiltration cells (Figure 1). No new injection wells or infiltration cells are planned at this time.

If you have any questions regarding the specific ISCO application activities at CSSA, please feel free to contact me at 210-295-7416 or Adrien Lindley, Parsons at 512-719-6052, adrien.lindley@parsons.com.

Sincerely,



Glen Moore
Installation Manager

cc: Gabe Moreno-Fergusson, CSSA Environmental Manager
Greg Lyssy, USEPA Region 6
Julie Burdey, Parsons – Austin
Ken Rice, Parsons – Austin
File: 640149.0012.105A

Table 1
Analytical Summary Data

Table 1

Camp Stanley Storage Activity AOC-65 ISCO Injection Summary

Phase I through Phase V Injections
 Injections Performed: May 2012 - June 2020

May 2012 - Ancillary Phase I Injections **216 ft³ Sulfur Hexafluoride (SF₆)**

Injection Location	Gaseous SF ₆ (ft ³)
SIW-01	46
Trench - Middle Zone	170

August 2012 - Phase I Injections **19,800 lbs Sodium Persulfate**
 Oxidant - 10,500 gallons 20% persulfate solution
 Activator - 4,500 gallons 25% sodium hydroxide

Injection Location	Persulfate Solution (gal)	Activator (gal)
Trench - Upper Zone	1,500	640
Trench - Middle Zone	5,400	2,310
Trench - Lower Zone	3,500	1,500
SIW-01	100	50

May 2013 - Phase II Injections **44,000 lbs Sodium Persulfate**
 Oxidant - 25,365 gallons 20% persulfate solution
 Activator - 8,500 gallons 25% sodium hydroxide

Injection Location	Persulfate Solution (gal)	Activator (gal)
Trench - Upper Zone	5,407	1,770
Trench - Middle Zone	10,770	3,520
Trench - Lower Zone	8,088	2,645
IIW-01	250	80
IIW-02	250	80
IIW-03	250	80
IIW-04	250	80
SIW-01	100	32

Sept. - Nov. 2014 - Phase III Injections **145,400 lbs Sodium Persulfate**
 Oxidant - 76,265 gallons 20% persulfate solution
 Activator - 27,000 gallons 25% sodium hydroxide

Injection Location	Persulfate Solution (gal)	Activator (gal)
Trench - Upper Zone	16,170	5,717
Trench - Middle Zone	32,340	11,433
Trench - Lower Zone	24,255	8,574
IIW-01	925	325
IIW-02	925	325
IIW-03	925	325
IIW-04	665	240
SIW-01	60	25

Table 1 (cont.)

Camp Stanley Storage Activity AOC-65 ISCO Injection Summary

Phase I through Phase V Injections
 Injections Performed: May 2012 - June 2020

July 2015 - Ancillary Phase IV Injections		Dye Tracers
Injection Location	<1 lb powdered dye in water (gal)	
VEW-15 - Eosine	1	
VEW-32 - Fluorescein	1	
VEW-27 - Rhodamine WT	1	

August 2015 Phase IVa Injections 3,500 gallons Sodium Permanganate
 Oxidant - 3,500 gallons Sodium Permanganate (0.44 mg/L)

Injection Location	Permanganate Solution (gal)
Northern Infiltration Cell (NIC)	1,000
Middle Infiltration Cell (MIC)	1,000
Southern Infiltration Cell (SIC)	1,000
Interior Vault Cell (eastern and western)	500 (250 each)

November 2015 Phase IVb Injections 7,000 gallons Sodium Permanganate
 Oxidant - 7,000 gallons Sodium Permanganate (0.9 mg/L)

Injection Location	Permanganate Solution (gal)
Northern Infiltration Cell (NIC)	3,750
Middle Infiltration Cell (MIC)	1,250
Southern Infiltration Cell (SIC)	925
Interior Vault Cell (eastern and western)	1075 (537.5 each)

December 2016 Phase V Injections 12 Oxidant-Infused Cylinders
 Oxidant - Sodium Persulfate/Potassium Permanganate in paraffin wax (38:38:24)
 2.5-inch or 1.35-inch diameter

Injection Location	Cylinders	
	lbs each oxidant/cylinder	total lbs oxidant
VEW-19 - 2.5-inch x2	2.185	8.74
VEW-27 - 1.35-inch x2	1.0925	4.37
VEW-32 - 2.5-inch x2	2.185	8.74
SIW-01 - 1.35-inch x2	1.0925	4.37
TSW-01 - 2.5-inch x2	2.185	8.74
TSW-05 - 1.35-inch x2	1.0925	4.37

November 2017 Phase V Injections (cont.) 6 additional Oxidant-Infused Cylinders
 Oxidant - Sodium Persulfate/Potassium Permanganate in paraffin wax (38:38:24)
 1.35-inch diameter
 Previously installed cylinders remain in wells

Injection Location	Cylinders	
	lbs each oxidant/cylinder	total lbs oxidant
VEW-19 - 1.35-inch (2.5-inch x2 prev.)	1.0925	2.185
VEW-27 - 1.35-inch (1.35-inch x2 prev.)	1.0925	2.185
VEW-32 - 1.35-inch (2.5-inch x2 prev.)	1.0925	2.185
SIW-01 - 1.35-inch (1.35-inch x2 prev.)	1.0925	2.185
TSW-01 - 1.35-inch (2.5-inch x2 prev.)	1.0925	2.185
TSW-05 - 1.35-inch (1.35-inch x2 prev.)	1.0925	2.185

Table 1 (cont.)

Camp Stanley Storage Activity AOC-65 ISCO Injection Summary

Phase I through Phase V Injections
 Injections Performed: May 2012 - June 2020

October 2018 Phase V Injections (cont.) **18 Oxidant-infused Cylinders**
(replace old spent cylinders)

Oxidant - Sodium Persulfate/Potassium Permanganate in paraffin wax (38:38:24)
 1.35-inch diameter and 2.5-inch diameter
Previously installed cylinders removed/replaced

Injection Location	Cylinders	
	lbs each oxidant/cylinder	total lbs oxidant (3 cylinders)
VEW-19 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-27 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-32 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
SIW-01 - 3x 1.35-inch	1.0925	6.555
TSW-01 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
TSW-05 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925

November 2018 Phase V Injections (cont.) **12 Oxidant-infused Cylinders**
(install cylinders at 4 new locations)

Oxidant - Sodium Persulfate/Potassium Permanganate in paraffin wax (38:38:24)
 1.35-inch diameter and 2.5-inch diameter

VEW-15 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-18 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-29 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-31 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925

January 2019 Phase IVc Injections **600 gallons Sodium Permanganate**
 Oxidant - 600 gallons Sodium Permanganate (6.6% solution)

Injection Location	Permanganate Solution (gal)
Northern Infiltration Cell (NIC)	250
Middle Infiltration Cell (MIC)	250
IIW-01	50
IIW-02	25
IIW-04	25

June 2020 Phase V Injections (cont.) **30 Oxidant-infused Cylinders**
(replace old spent cylinders)

Oxidant - Sodium Persulfate/Potassium Permanganate in paraffin wax (38:38:24)
 1.35-inch diameter and 2.5-inch diameter
Previously installed cylinders removed/replaced

Injection Location	Cylinders	
	lbs each oxidant/cylinder	total lbs oxidant (3 cylinders)
VEW-19 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-27 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-32 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
SIW-01 - 3x 1.35-inch	1.0925	6.555
TSW-01 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
TSW-05 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-15 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-18 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-29 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925
VEW-31 - 1x 1.35-inch and 2x 2.5-inch	1.0925 / 2x 2.185	10.925

Figure 1
Oxidant Application Locations

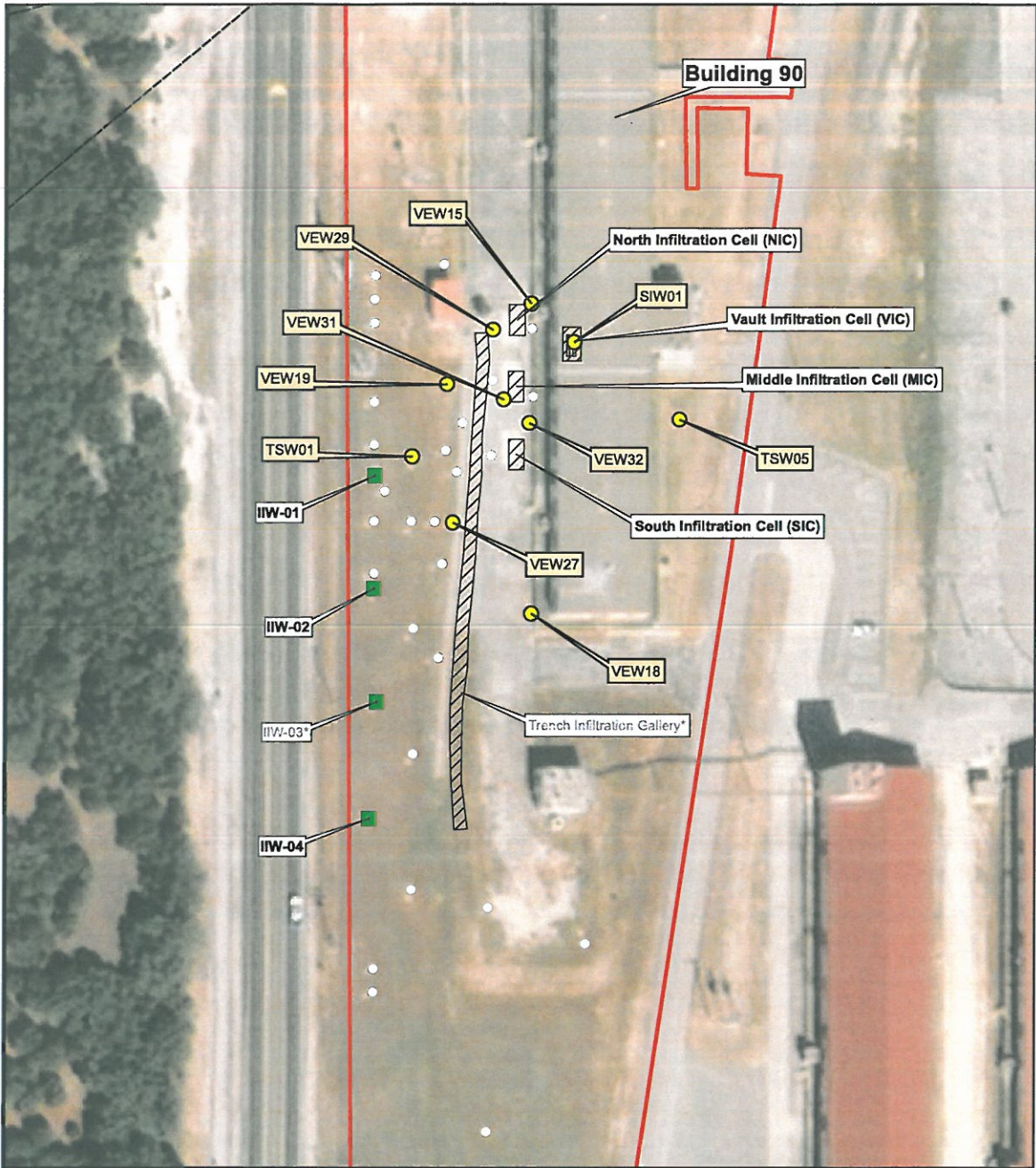


Figure 1
AOC-65
ISCO Injection Locations
Camp Stanley Storage Activity

PARSONS

	<ul style="list-style-type: none"> ■ ISCO Injection Wells ● Cylinder-Installed Wells ○ Monitoring Locations --- Faults ISCO Infiltration Trench/Infiltration Cells AOC-65
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* Indicates location not proposed for planned injection

0 60 120 180 240
 Feet

Field Forms

ISCO Sampling AOC-65

Personnel: Elliott, Dietert

Bold = Performance Monitoring Samples
candles installed

Well ID	TD / pump depth	Water Level (BTOC)	Sample Date	Sample Time	Temp. (°C)	Cond. (ns/cm²)	DO	pH	ORP
AOC65-VEW13-LGR	41	35.85	6/10/20	1115	23.11	0.707	0.75	6.81	-40.3
AOC65-VEW14-LGR	61	60.02	↓		22.88	0.852	5.84	6.90	255.7
AOC65-VEW15-UGR	13	8.24	6/15/20	1245	23.55	11.44	1.48	5.98	818.9
AOC65-VEW16-LGR	41	29.45	6/10/20	1305	23.08	0.616	0.54	6.11	166.0
AOC65-VEW17-LGR	52.5	51.43	↓		23.02	0.722	5.70	6.82	267.5
AOC65-VEW18-LGR	56	46.90	6/15/20	1445	23.91	2.641	1.97	6.90	578.6
AOC65-VEW19-UGR	26	11.54	6/16/20	1345	22.78	15.97	4.29	7.25	719.4
AOC65-VEW20	25.7	14.12	6/16/20	1140	22.22	0.655	1.04	7.24	261.9
AOC65-VEW21	27	13.89	↓	0820	22.11	0.661	5.68	7.16	439.0
AOC65-VEW22	50.5	49.88	↓		22.57	0.584	6.13	6.81	405.8
AOC65-VEW23	21	21.02	↓	0850	dry				
AOC65-VEW24	50	dry	↓						
AOC65-VEW25	21.5	17.77	↓	0910	22.11	7.776	1.86	7.22	910.8
AOC65-VEW26	50	48.55	↓		22.80	4.942	2.010	6.87	257.5
AOC65-VEW27	21	10.00	6/16/20	1415	23.07	27.75	1.09	6.14	768.3
AOC65-VEW28A	120	113.46	6/10/20	1330	25.42	0.655	5.86	6.80	488.6
AOC65-VEW28B	179	117.10	↓	1340	24.33	0.685	5.79	6.26	470.5
AOC65-VEW29	40	30.55	6/15/20	1300	23.47	10.76	1.14	5.99	740.9
AOC65-VEW30	24.5	24.22	6/10/20						
AOC65-VEW31	40	31.00	6/15/20	1420	24.07	11.12	1.02	5.98	751.2
AOC65-VEW32	24	10.12	6/15/20	1400	22.48	3.791	1.17	6.31	699.1
AOC65-VEW33	24.5	24.26	6/10/20						
AOC65-PZ01-LGR	132.35	118.81	↓	0835	21.80	0.572	6.99	7.13	393.5
AOC65-PZ02-LGR	50.26	44.75	↓	1000	22.45	2.217	4.13	6.95	493.2
AOC65-PZ03-LGR	134.2	127.82	↓		21.40	0.523	6.55	6.93	455.8
AOC65-PZ04-LGR	43.1	36.42	↓		23.01	0.653	3.08	6.76	518.3
AOC65-PZ05-LGR	126.87	102.75	↓	1005	21.89	0.921	5.93	6.87	435.3
AOC65-PZ06-LGR	43.64	36.39	↓	0825	22.76	0.594	3.41	6.81	443.2
AOC65-TSW-01	40	32.70	6/16/20	1400	23.56	18.46	6.58	5.90	788.8
AOC65-TSW-02	40	31.30	6/10/20	1100	22.84	3.133	0.78	6.53	-4.8
AOC65-TSW-03	40	28.60	↓	1040	22.93	12.94	0.28	6.54	-32.3
AOC65-TSW-04	40	28.51	↓	1630	22.53	22.02	0.74	6.44	-31.60
AOC65-TSW-05	40	30.65	6/16/20	1245	22.93	8.395	1.41	6.05	715.1
AOC65-TSW-06	51	25.90	6/10/20	1430	22.99	0.707	0.74	6.18	341.0
AOC65-TSW-07	40	28.15	↓	1420	22.35	5.053	0.10	6.53	276.1
AOC65-SIW-01	25	13.17	6/16/20	1305	22.67	82.37	4.44	8.73	102.9
AOC65-SIW-02	25.4	19.57	6/10/20		22.68	0.935	1.21	6.95	244.2
AOC65-North-IC	4.2	dry	↓						
AOC65-Middle-IC	9.65	7.60	↓	1315	24.50	8.999	8.95	6.68	1638.5
AOC65-South-IC	11.77	8.36	↓	1400	23.76	16.42	4.62	6.85	628.9
IIW-01	116	113.91	↓	0855	22.07	1.267	8.01	7.00	450.3
IIW-02	125	111.71	↓	0920	22.10	7.624	8.07	6.93	536.2
IIW-03	125	55.41	↓	0935	21.99	4.430	8.22	7.25	507.2
IIW-04	125	105.58	↓	0945	21.80	7.066	8.13	7.03	575.3

reddish-brown
brown/white
light pink
purple

* new candles installed

ISCO Permanganate Candle Placement
AOC-65

Personnel: Elliott & Dietert

Well ID	TD / pump depth	Water Level (BTOC)	Date	Time	Top of Candle 1 (ft. BTOC)	Top of Candle 2 (ft. BTOC)	Top of Candle 3 (ft. BTOC)
AOC65-VEW15-UGR	13		6/15/20		8	9.5	11
AOC65-VEW18-LGR	56		6/15/20		46	49	54.4
AOC65-VEW19-U'GR	26	12.07	6/24/20		12.4	17.8	24
AOC65-VEW27	21	10.45	↓		10.5	14	18.5
AOC65-VEW29	40		6/15/20		30.5	34	38
AOC65-VEW31	40		↓		31	34.5	38.4
AOC65-VEW32	24		↓		11	16.5	22.4
AOC65-TSW-01	40	32.68	6/24/20		32.3	35.3	38
AOC65-TSW-05	40		6/14/20		30.2	34.3	38.4
AOC65-SIW-01	25		↓		13	18	23

* New candles installed!

ISCO Sampling AOC-65

Personnel: Elliott + Dietert

Bold = Performance Monitoring Samples
candles installed

Well ID	TD / pump depth	Water Level (BTOC)	Sample Date	Sample Time	Temp. (°C)	Cond. (ms/cm ²)	DO	pH	ORP
AOC65-VEW13-LGR	41	32.54	9/16/20	115	22.93	0.601	1.40	6.77	-37.3
AOC65-VEW14-LGR	61	60.51	↓						
AOC65-VEW15-UGR	13	8.21	9/17/20	0900	26.53	32.05	1.85	5.99	641.8
AOC65-VEW16-LGR	41	29.95	↓	0820	22.90	0.609	0.23	6.49	422.0
AOC65-VEW17-LGR	52.5	51.60	9/16/20		22.89	0.724	2.53	6.42	-11.1
AOC65-VEW18-LGR	56	44.33	9/17/20	1040	23.22	10.32	3.57	6.81	621.7
AOC65-VEW19-UGR	26	10.63	↓	1135	26.14	3.675	4.13	7.71	554.2
AOC65-VEW20	25.7	14.60	9/16/20	1135	23.18	0.630	0.23	6.89	-50.2
AOC65-VEW21	27	13.45	9/16/20	0800	22.72	0.602	0.35	7.00	-91.9
AOC65-VEW22	50.5	49.61			22.73	0.594	4.50	6.67	-38.6
AOC65-VEW23	21	20.83							
AOC65-VEW24	50	50.03	↓						
AOC65-VEW25	21.5	17.12	9/16/20	0900	23.06	7.726	0.27	7.22	-63.1
AOC65-VEW26	50	48.75	↓		22.87	4.350	3.03	6.77	39.3
AOC65-VEW27	21	9.00	9/17/20	1200	24.04	29.33	1.05	6.15	704.4
AOC65-VEW28A	120	114.18		0915	22.62	0.638	6.28	6.65	216.3
AOC65-VEW28B	179	118.62		0930	22.55	0.667	5.54	6.73	196.0
AOC65-VEW29	40	36.50		0830	23.61	14.26	1.00	6.07	660.8
AOC65-VEW30	24.5	24.28							
AOC65-VEW31	40	31.00		0900	23.01	15.57	0.79	6.02	653.8
AOC65-VEW32	24	8.54		1230	23.61	9.259	0.71	6.34	660.6
AOC65-VEW33	24.5	24.24	↓						
AOC65-PZ01-LGR	132.35	119.40	9/16/20	0820	22.61	0.352	8.18	7.16	-38.6
AOC65-PZ02-LGR	50.26	41.13	9/16/20	1005	22.50	2.311	4.71	6.83	217.4
AOC65-PZ03-LGR	134.2	128.04			22.22	0.503	6.45	6.87	-34.0
AOC65-PZ04-LGR	43.1	36.44	↓		22.91	0.662	2.50	6.67	-64.5
AOC65-PZ05-LGR	126.87	96.80	↓	1615	23.05	0.703	8.30	6.84	166.3
AOC65-PZ06-LGR	43.64	36.47	9/16/20	0810	22.67	0.555	4.36	6.72	-30.5
AOC65-TSW-01	40	32.62	9/17/20	1145	23.16	26.45	1.43	5.95	725.5
AOC65-TSW-02	40	31.35	9/16/20	1105	23.05	2.950	0.68	6.57	-61.8
AOC65-TSW-03	40	28.59		1650	22.94	11.36	0.51	6.55	-63.7
AOC65-TSW-04	40	28.50	↓	1640	22.51	14.39	0.67	6.48	-57.8
AOC65-TSW-05	40	30.50	9/17/20	1115	22.88	14.96	1.55	6.10	712.3
AOC65-TSW-06	51	35.78	↓	1100	22.85	0.695	0.30	6.72	387.4
AOC65-TSW-07	40	28.15	9/16/20	1025	22.35	4.523	0.15	6.51	112.8
AOC65-SIW-01	25	13.28	9/17/20	1215	23.62	77.13	2.23	8.78	529.0
AOC65-SIW-02	25.4	19.01	9/16/20		23.16	0.863	0.18	6.91	-68.5
AOC65-North-IC	4.2	DRY	9/17/20						
AOC65-Middle-IC	9.65	7.30	↓	0845	27.50	5.872	8.21	6.81	589.2
AOC65-South-IC	11.77	8.14	↓	1020	26.90	3.076	3.07	7.01	557.9
I1W-01	116	114.44	9/16/20	0845	22.59	1.254	8.50	6.88	16.2
I1W-02	125	112.48		0910	22.49	6.363	8.51	6.44	-39.8
I1W-03	125	~56		0940	22.68	3.946	4.78	7.13	117.6
I1W-04	125	106.77	↓	0950	22.59	6.841	8.78	7.39	468.2

brown, thick
light pink

	<u>T</u>	<u>m</u>	<u>θ</u>
VEW-15	7.5	9.2	11
VEW-29	30	33.5	38
VEW-31	30.4	33.6	37.7
VEW-30			
VEW-18	44.3	49	54.5
TSW-05	30.5	35	39
VEW-19	11	16.7	25
TSW-01	31.7	35.3	38.5
VEW-27	9.3	14.1	18.2
SIW-01	12.7	17.8	23
VEW-32	8.5	15	21

	<u>WL</u>	<u>Time</u>	<u>WL</u>	<u>Time</u>	<u>WL</u>	<u>Time</u>
VEW-32	9.58'	0937	9.30'	0948	9.13	1002
	9.48'	0938	9.29'	0949	9.12	1003
	9.43'	0939	9.28'	0950	9.11	1004
	9.41'	0939	9.27'	0951	9.10	1005
	9.40'	0940	9.26'	0951	9.09	1006
	9.38'	0942	9.26	0952	9.08	1007
	9.37'	0943	9.25	0953	9.07	1008
	9.36'	0943	9.24	0953	9.06	1009
	9.35'	0944	9.23	0954	9.05	1010
	9.34'	0944	9.22	0955	9.04	1011
	9.33'	0945	9.22	0956	9.03	1012
	9.32'	0946	9.21	0956	9.02	1013
	9.31'	0947	9.20	0956	9.01	1014
			9.19	0957	9.00	1014
			9.18	0958	8.90	1025
			9.17	0959	8.70	1049
			9.16	1000	8.64	1103
		9.15	1001	8.58	1121	
		9.14	1002	8.54	1220	

ISCO Sampling AOC-65

Personnel: Elliott + D. Otey

Bold = Performance Monitoring Samples
candles installed

Well ID	TD / pump depth	Water Level ('BTOC)	Sample Date	Sample Time	Temp. (°C)	Cond. (ms/cm ²)	DO	pH	ORP
AOC65-VEW13-LGR	41	35.70	3/15/21	1340	24.25	0.763	8.79	6.61	466.8
AOC65-VEW14-LGR	61	60.55	↓						
AOC65-VEW15-UGR	13	8.37	3/16/21	1410	20.51	16.18	9.12	6.00	737.6
AOC65-VEW16-LGR	41	29.8 29.8	3/15/21	1355	23.84	0.643	7.94	6.69	418.4
AOC65-VEW17-LGR	52.5	51.44	↓		23.36	0.853	2.68	6.64	376.0
AOC65-VEW18-LGR	56	47.50	3/16/21	1345	23.28	2.282	8.70	7.00	590.3
AOC65-VEW19-UGR	26	14.10	3/17/21	0910	20.43	7.756	6.95	7.53	667.3
AOC65-VEW20	25.7	15.61	3/15/21	1345	21.00	0.641	2.80	7.21	655.1
AOC65-VEW21	27	13.87		0935	21.66	0.675	7.91	7.38	421.6
AOC65-VEW22	50.5	DRY							
AOC65-VEW23	21	21.16							
AOC65-VEW24	50	DRY							
AOC65-VEW25	21.5	18.45	↓	1010	20.36	8.797	2.35	7.41	477.3
AOC65-VEW26	50	48.70	↓		23.40	4.742	3.20	6.45	358.7
AOC65-VEW27	21	11.10	3/17/21	0835	19.98	18.21	7.58	6.36	802.0
AOC65-VEW28A	120	115.02	3/15/21	1420	23.58	0.421	10.03	6.83	524.6
AOC65-VEW28B	179	134.92	↓	1420	23.82	0.447	10.60	6.57	506.4
AOC65-VEW29	40	30.54	3/16/21	1430	21.89	4.869	7.16	6.27	734.1
AOC65-VEW30	24.5	24.32	3/15/21						
AOC65-VEW31	40	31.05	3/17/21	0820	21.56	8.080	6.79	6.19	783.1
AOC65-VEW32	24	10.55	3/16/21	1315	22.71	0.755	9.64	6.86	620.2
AOC65-VEW33	24.5	24.25	3/15/21						
AOC65-PZ01-LGR	132.35	130.32		0945	21.47	0.522	7.38	7.47	383.7
AOC65-PZ02-LGR	50.26	46.94		1110	21.70	2.283	5.56	6.74	512.0
AOC65-PZ03-LGR	134.2	128.52			20.56	0.576	6.32	7.00	506.7
AOC65-PZ04-LGR	43.1	31.45			22.25	0.761	6.76	6.90	483.4
AOC65-PZ05-LGR	126.87	114.30		1120	22.29	0.400	9.14	6.94	458.2
AOC65-PZ06-LGR	43.64	36.38	↓	0940	22.05	0.677	7.45	6.84	420.0
AOC65-TSW-01	40	32.85	3/17/21	0850	21.59	15.40	6.68	6.03	777.6
AOC65-TSW-02	40	33.30	3/15/21	1320	23.32	1.492	9.78	6.77	470.0
AOC65-TSW-03	40	28.59		1310	23.03	2.066	6.93	7.28	470.1
AOC65-TSW-04	40	28.63	↓	1320	23.28	3.249	4.24	9.40	287.1
AOC65-TSW-05	40	30.66	3/16/21	1250	25.14	2.379	8.31	6.44	675.3
AOC65-TSW-06	51	35.92	3/15/21	1450	23.80	0.716	4.35	6.57	517.7
AOC65-TSW-07	40	28.40	↓	1250	23.07	2.421	8.95	7.12	368.8
AOC65-SIW-01	25	13.56	3/17/21	0930	21.57	5.634	4.33	7.30	757.7
AOC65-SIW-02	25.4								
AOC65-North-IC	4.2	DRY	3/15/21						
AOC65-Middle-IC	9.65	7.81		1405	22.68	1.105	10.09	6.88	633.2
AOC65-South-IC	11.77	7.60		1440	22.10	0.729	10.11	6.82	616.7
IIW-01	116	115.50		1000	21.72	0.666	7.61	7.07	551.5
IIW-02	125	115.26		1050	couldn't get sample full of mud				
IIW-03	125	~81.96		1050	23.07	4.613	8.67	7.33	370.5
IIW-04	125	~107.27	↓	1100	20.64	4.412	9.18	7.69	568.7

M/S/D

FD

ISCO Permanganate Candle Placement
AOC-65

Personnel: Elliott + Dietert

split samples and sampling experiment

Well ID	TD / pump depth	Water Level ('BTOC)	Date	Time	Top of Candle 1 (ft. BTOC)	Top of Candle 2 (ft. BTOC)	Top of Candle 3 (ft. BTOC)	Initial sample color in bailer	Sample color after put in ascorbic acid
AOC65-VEW15-UGR	13	8.37	3/16/21		7.7	9.3	10.8	dark purple	dark purple
AOC65-VEW18-LGR	56	47.50	3/16/21		46.50	51	54.5	light purple 2-day = same	light brown - clear same
AOC65-VEW19-UGR	26	14.10	3/17/21		13.1	16.6	23.5	dark purple	dark purple
AOC65-VEW27	21	11.10	3/17/21		10.1	14	18	dark purple	dark purple
AOC65-VEW29	40	30.54	3/16/21		30	33.6	38	dark purple	dark purple
AOC65-VEW31	40	31.05	3/17/21		30.1	33.4	37.6	dark purple	dark purple
* AOC65-VEW32	24	10.55	3/16/21		9	15.1	21	medium purple 2-day = same	brown same
AOC65-TSW-01	40	32.85	3/17/21		31.8	35.7	38.6	dark purple	dark purple
AOC65-TSW-05	40	30.66	3/14/21		30	35	39	dark purple 2-day = same	dark purple same
AOC65-SIW-01	25	13.50	3/17/21		13	18	23.2	dark purple	dark purple

* VEW-32 - we collected the ms/SD on this well, it took multiple bailer trips to fill vials, some vials stayed purple some turned brown/clear after adding to Ascorbic Acid

	<u>Baker</u>	<u>VOA</u>
IIW-01	muddy pink	clear - silty
IIW-04	dark purple	dark purple
Middle-IC	dark purple	dark purple
South-IC	dark purple	dark purple