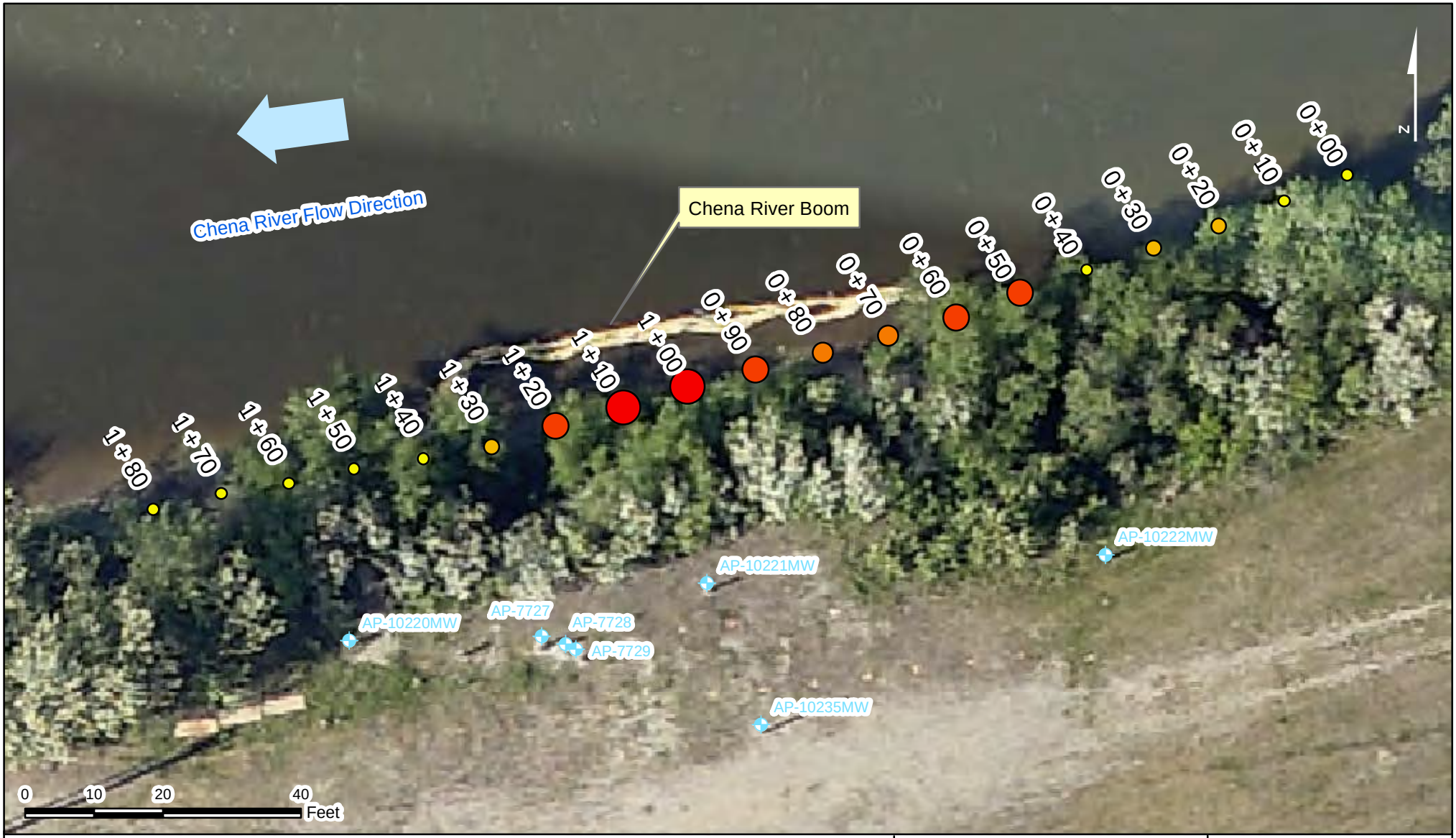


MONITORING WELL

NUMBER OF SHEEN OBSERVATIONS

- 0
- 1
- 2 - 5
- 6 - 10
- 10 - 15

NOTES:

1. Observation stations were established in 2012 and are marked at 10-foot intervals along the shoreline, starting at 0+00.
2. Number of inspections = observations with the boom attached to the supports

YEAR	INSPECTIONS	DETECTIONS	DEPLOYMENT DATES
2012	26	9	5/14 - 10/5
2013	21	8	6/19 - 10/2
2014	4	1	5/22 - 10/3
2015	11	1	5/19 - 10/21

FAIRBANKS ENVIRONMENTAL SERVICES
3538 INTERNATIONAL STREET
FAIRBANKS, ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

Chena River Sheen Observations - 2012 through 2015

2015 Monitoring Report
Operable Unit 5
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
W911KB-12-D-0001	3-3	8/16

Table 4-2 - WQFS Benzene Area Groundwater Monitoring Results

Probe/Well Number	Sample Numbers	Screened Interval (ft-bgs)	Date	Water Level (ft btoc)	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Dissolved Iron (mg/L)	Sulfate (mg/L)	ROD Contaminants of Concern							
											GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 8260C (µg/L)	EDB by 504.1 (µg/L)
ROD CLEANUP LEVELS (µg/L)											2,200	1,500	5	1,000	5	5	0.05	0.05
AP-7455S	11FW5204WG	19-24	6/15/11	19.77	434.60	0.72	-31.4	5.26	18.00	14.9	110	4,600	18	0.19 J	ND(0.5)	0.93	ND(2)	ND(0.0096)
	11FW5205WG[1]			19.77				5.22	17.60	14.5	110	4,900	17	0.24 J	ND(0.5)	ND(1.1)	ND(2)	ND(0.0097)
	12FW5B12WG		8/31/12	18.62	435.748	0.14	-86.7	7.47	17.1	14.8	62 B	2,100 QL	11 B	0.09 J	ND(0.1)	0.58	ND(0.2)	ND(0.004)
	13FW5B07WG		4/17/13	19.86	434.508	0.13	-148.2	1.88 QL	5.57 QL	40.4	150 B	6,400	19	0.26 J	ND(0.1)	1.2	ND(0.2)	NA
	14FW5B01WG		4/17/14	19.92	434.448	0.53	-83.3	4.54	20	176	140	5,200	17	0.19 J	ND(0.1)	1.1	ND(0.2)	NA
	14FWOU517WG		10/28/14	17.59	436.778	0.32	-97.6	5.25	33.7	148	210	8,600	9	0.58	0.11 J	0.67	ND(0.2)	NA
	15FWOU539WG		5/26/15	18.62	435.748	0.34	-4.2	5.62	30.4	161	220	7,400	14	0.30 J	0.18 J	1.4	ND(0.2)	NA
OU5-TW1[2]	11FW5206WG	14-19	6/15/11	16.59	NA	2.27	-78.5	2.09	108	2.79	22,000	50,000	920	2,900	13	21	ND(20)	0.0088 J
	12FW5B05WG		8/28/12	19.69	NA	0.85	-36.3	2.70	57	3.30	7,900	16,000 QL	230 QL	620 QL	2.5 QL	3.8 QL	ND(0.4)QL	NA
	13FW5B03WG		4/16/13	21.5	NA	0.11	-184	2.70 QL	8.39 QL	29.1	3,600	5,800	69 Q	99 Q	0.73 Q	2.2 Q	ND(0.2)Q	NA
AP10260MW	14FW5B02WG		4/17/14	19.71	NA	4.06	-66.5	4.85	70.1	1600	7,900	12,000	150	400	3	ND(0.3)	ND(4)	NA
	14FW5B03WG[1]							4.81	69.9	1570	8,200	13,000	160	420	3.2	4.4	ND(4)	NA
	14FWOU526WG		10/29/14	17.37	NA	0.55	-94.1	3.83	88.0	1600	4,600	30,000	230	8.7	4.1	5.8	ND(0.2)	NA
	15FWOU537WG		5/21/15	17.92	NA	0.26	-18.1	3.52	26.40	246	2,200	9,200	58	2.1	1.9	ND(0.15)	ND(0.2)	NA
OU5-TW2	11FW5207WG	14-19	6/16/11	16.08	NA	1.14	0.3	5.28	4.45	17.8	260	4,800	28	0.38 J	0.16 J	0.65	ND(2)	ND(0.0096)
	12FW5B10WG		8/28/12	18.16	NA	0.19	-50.1	4.42	15.9	16.2	170	3,500 QL	19	0.22 J	0.15 J	0.56	ND(0.2)	NA
	13FW5B04WG		4/16/13	18.95	NA	0.51	-71.6	6.62	27.9	6.66	NA	22,000	60	0.96	0.50	2.7	ND(0.2)	NA
	14FW5B11WG		4/18/14	19.01	NA	0.93	-46.4	6.13	34.9	9.45	650	15,000	43	1.00	0.26 J	0.84	ND(0.2)	NA
	14FWOU510WG		10/28/14	16.67	NA	0.61	14	3.90	17.7	13.30	NA	4,000	21	0.18 J	0.10 J	0.44 J	ND(0.2)	NA
	15FWOU526WG		5/20/15	17.2	NA	0.82	-50	6.49	38.2	9.60	NA	14,000	29	2.70	0.43 J	ND(0.15)	ND(0.2)	NA
OU5-TW3	11FW5211WG	14-19	6/16/11	16.28	NA	0.67	-51.8	8.62	48.9	1.01	160	34,000	9.9	0.58	ND(0.5)	0.65	ND(2)	ND(0.0096)
	12FW5B11WG		8/28/12	19.4	NA	0.16	-105.6	7.47 QL	49.3 QL	4.4	110 B	20,000 QL	9.7	0.66	ND(0.1)	0.62	ND(0.2)	NA
	13FW5B05WG		4/16/13	20.16	NA	0.22	-99	8.03	53.1	0.83	NA	12,000	11	1.8	ND(0.29)	ND(1.1)	ND(0.2)	NA
	14FW5B06WG		4/17/14	20.21	NA	0.34	-80.9	8.23	54.9	0.55	130	12,000	6.8	1.1	ND(0.1)	0.64	ND(0.2)	NA
	14FWOU518WG		10/28/14	17.89	NA	0.52	-70	6.60	69.8	5.50	NA	27,000	5.2	0.7	ND(0.1)	0.49 J	ND(0.2)	NA
	15FWOU540WG		5/26/15	18.87	NA	0.38	16.9	11.70	92.5	1.10	NA	25,000	4.9	1.4	ND(0.1)	0.55	ND(0.2)	NA
OU5-TW4	11FW5210WG	14-19	6/15/11	18.14	NA	1.01	14.2	9.71	0.039	18.7	72 J	10,000	7.4	0.18 J	ND(0.5)	ND(0.95)	ND(2)	ND(0.0095)
	12FW5B07WG		8/28/12	18.19	NA	0.17	53.9	11.9	0.085	16	41 J,B	4,200 QL	3.0	0.16 J	ND(0.1)	0.51	ND(0.2)	NA
	13FW5B06WG		4/16/13	19.08	NA	0.24	73	12.2	0.149	16.7	NA	3,900	2.9	0.12 J	ND(0.1)	0.66	ND(0.2)	NA
	14FW5B12WG		4/18/14	19.11	NA	4.48	35.1	12.9	0.210	18.9	42 J	4,900	2.7	0.13 J	ND(0.1)	0.66	ND(0.2)	NA
	14FWOU516WG		10/28/14	16.71	NA	0.38	2.8	4.2	0.080	33.0	NA	2,200	1.6	ND(0.1)	ND(0.1)	0.38 J	ND(0.1)	NA
	NA		WELL WAS BROKEN - SAMPLE NOT COLLECTED															

Table 4-2 - WQFS Benzene Area Groundwater Monitoring Results

Probe/Well Number	Sample Numbers	Screened Interval (ft-bgs)	Date	Water Level (ft btoc)	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Dissolved Iron (mg/L)	Sulfate (mg/L)	ROD Contaminants of Concern							
											GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 8260C (µg/L)	EDB by 504.1 (µg/L)
ROD CLEANUP LEVELS (µg/L)											**2,200**	**1,500**	**5**	**1,000**	**5**	**5**	**0.05**	**0.05**
OU5-TW5	11FW5209WG	14-19	6/15/11	19.23	NA	0.72	-15.3	5.17	27.4	9.71	540	**9,000**	3.8 QH	0.48 J, QH	ND(0.5)	ND(0.5)	ND(2)	ND(0.0096)
	12FW5B06WG		8/28/12	19.36	NA	0.29	-81.3	4.51	13.6	9.60	480	**4,700 QL**	2.4 QL	0.27 J,QL	ND(0.1)QL	0.44 J,QL	ND(0.2)QL	NA
	13FW5B08WG		4/17/13	20.15	NA	0.3	-57.1	7.46	10.1	7.9	NA	**4,600**	2.2	0.26 J	ND(0.1)	0.63	ND(0.2)	NA
	14FW5B13WG		4/18/14	20.2	NA	0.35	-30.8	8.43	14.6	10.4	660	**4,200**	2.1	0.28 J	ND(0.1)	0.44 J	ND(0.2)	NA
	14FWOU514WG		10/28/14	17.76	NA	0.62	-37.7	7.32	38.4	51.8	NA	**8,500**	2.6	0.18 J	ND(0.1)	0.53	ND(0.2)	NA
	15FWOU524WG		5/20/15	18.3	NA	0.91	-39.1	6.54 J-	42.8 J-	18.3	NA	**7,900**	1.9	0.18 J	ND(0.1)	ND(0.15)	ND(1)	NA
OU5-TW6	11FW5213WG	14-24	9/14/11	17.28	NA	2.08	-3.0	15.2	57	0.99	2,000	**22,000**	**5.9**	9.1	0.67	ND(0.94)	ND(2)	ND(0.0095)
	11FW5214WG[1]							14.7	54	0.99	2,000	**23,000**	**5.9**	9	0.71	ND(0.97)	ND(2)	ND(0.0095)
	12FW5B03WG		8/28/12	18.48	NA	0.72	3.9	14.2	59	0.97	1,900	**18,000 QL**	5.0 QL	9.6 QL	0.67 QL	ND(1.2)QL	ND(0.2)	NA
	12FW5B04WG[1]							14	58	1.17	1,900	**16,000 QL**	5.0 QL	9.6 QL	0.59 QL	ND(1.3)QL	ND(0.2)QL	NA
	13FW5B01WG		4/16/13	19.25	NA	0.25	-95	11.3	46.4	0.85 MH	1,800	**9,100**	**5.4**	7.5	1.2	ND(1.3)	ND(0.4)	NA
	13FW5B02WG[1]							11.0	44.1	0.82	1,900	**8,600**	**5.5**	7.6	1.1	ND(1.2)	ND(0.4)	NA
	14FW5B09WG		4/18/14	19.32	NA	0.93	-51.8	10.7	53.2	0.31	**2,900**	**9,800**	**7.2**	9.7	0.7	1.8	ND(0.2)	NA
	14FW5B10WG[1]							10.5	53.1	0.29	**2,800**	**9,100**	**7.2**	9.6	0.7	1.7	ND(0.2)	NA
	14FWOU528WG		10/29/14	16.95	NA	0.49	-84.6	13.6	85.0	6.40	1,800	**23,000**	**5.8**	7.3	0.5	1.3	ND(0.2)	NA
	14FWOU530WG							13.4	84.7	6.30	1,800	**25,000**	**6**	7.5	0.45 J	1.4	ND(0.2)	NA
	15FWOU534WG		5/21/15	17.49	NA	0.27	-10.7	10.5	48.5	0.13 J	**2,300**	**9,100**	**7.5**	9.2	0.8	ND(0.15)	ND(0.2)	NA
	15FWOU535WG							10.2	47.1	0.1 J	**2,300**	**8,900**	**7.4**	9.2	0.8	ND(0.15)	ND(0.2)	NA
OU5-TW7	11FW5215WG	14-24	9/14/11	17.09	NA	1.39	-9.0	1.72	15.6	18.9	210	1,500	0.49 J	1.1	ND(0.5)	0.20 J	ND(2)	ND(0.0095)
	12FW5B02WG		8/28/12	18.28	NA	0.94	3.5	1.85	12.6	18.6	89 J,B	1,300 QL	0.36 J	0.39 J	0.10 J	0.22 J	ND(0.2)	NA
	13FW5B11WG		4/18/13	19.00	NA	0.21	-73.6	1.8	8.4	21.3	NA	650 J,QL	0.33 J	0.34 J	ND(0.1)	0.29 J	ND(0.2)	NA
	14FW5B08WG		4/18/14	19.02	NA	3.75	-43.9	2.0	13.1	19.4	95	**1,900**	0.43 J	0.7	0.10 J	ND(0.15)	ND(0.2)	NA
	14FWOU508WG		10/28/14	16.69	NA	0.67	31	1.9	18.6	13.9	NA	**2,600**	0.8	0.48 J	0.10 J	0.39 J	ND(0.2)	NA
	15FWOU536WG		5/21/15	17.24	NA	0.34	17.6	2.4	9.0	14.5	NA	**1,700**	1.5	0.23 J	ND(0.1)	0.46 J	ND(0.2)	NA
OU5-TW8	11FW5218WG	13.5-23.5	9/15/11	18.50	NA	1.75	-60.7	10.7	35.9	2.32	120	**24,000**	4.4	0.72	0.46 J	0.6	ND(2)	ND(0.0097)
	12FW5B09WG		8/28/12	19.60	NA	0.88	-56.8	11.4	34.1	4.7	130 B	**19,000 QL**	4.2	0.59	ND(0.1)	0.42 J	ND(0.2)	NA
	13FW5B10WG		4/18/13	20.36	NA	0.39	-68.1	11.1	23.2	6.4	NA	**16,000 QL**	4.3	0.37 J	0.12 J	0.45 J	ND(0.2)	NA
	14FW5B05WG		4/17/14	20.40	NA	0.59	-24	11.1	20.2	5.4	240	**11,000**	3.5	0.37 J	0.21 J	0.43 J	ND(0.2)	NA
	14FWOU522WG		10/29/14	18.03	NA	0.38	38.8	10.0	60.7	4.2	NA	**27,000**	4.2	0.62	0.15 J	0.57	ND(0.2)	NA
	15FWOU541WG		5/26/15	18.95	NA	0.36	30.5	13.8	39.2	0.18 J	NA	**19,000**	**7.2**	0.62	0.45 J	ND(0.15)	ND(0.2)	NA
OU5-TW9	11FW5216WG	12.5-22.5	9/14/11	16.32	NA	1.43	3.7	3.15	10.1 MH	21.4 MH	87 J	**3,500**	1.8	0.36 J, MH, B	ND(0.5)	0.39 J	ND(2)	ND(0.0097)
	12FW5B08WG		8/28/12	17.54	NA	0.11	-30.9	3.83	10.4	34.6	88 J,B	**2,100 QL**	1.8	0.2 J	ND(0.1)	0.51	ND(0.2)	NA
	13FW5B12WG		4/18/13	18.30	NA	0.25	-63.2	5.4	18.8	20.1	NA	**4,800 QL**	2.5	0.29 J	ND(0.1)	0.84	ND(0.2)	NA
	14FW5B07WG		4/18/14	18.28	NA	2.01	-27.8	4.9	11.0	34.7	120	**2,300**	2.1	0.2 J	ND(0.1)	0.73	ND(0.2)	NA
	14FWOU512WG		10/28/14	15.95	NA	0.37	7	4.6	4.6	12.9	NA	**2,800**	1.9	0.080 J	ND(0.1)	0.5	ND(0.1)	NA
	15FWOU528WG		5/20/15	16.44	NA	0.69	-19.1	6.0	9.8	17.1	NA	**8,700**	2.4	0.12 J	ND(0.1)	0.74	ND(0.2)	NA

Table 4-2 - WQFS Benzene Area Groundwater Monitoring Results

Probe/Well Number	Sample Numbers	Screened Interval (ft-bgs)	Date	Water Level (ft btoc)	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Dissolved Iron (mg/L)	Sulfate (mg/L)	ROD Contaminants of Concern							
											GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 8260C (µg/L)	EDB by 504.1 (µg/L)
ROD CLEANUP LEVELS (µg/L)											2,200	1,500	5	1,000	5	5	0.05	0.05
OU5-TW10	11FW5217WG	14-24	9/15/11	17.47	NA	1.66	-52.8	11.40	16.4	3.24	560	**10,000**	5.0	1.4	0.59	0.54	ND(2)	0.016
	12FW5B01WG		8/27/12	18.73	NA	0.61	-41	10.3	15	2.8	500	**11,000 QL**	3.7	0.64	0.44 J	0.54	ND(0.2)	NA
	13FW5B09WG		4/18/13	19.38	NA	0.23	-52.4	6.83	7.08	5.97	NA	**3,800 QL**	3.0 QH	0.45 J,QH	0.35 J,QH	0.71,QH	ND(0.2)	NA
	14FW5B04WG		4/17/18	19.36	NA	0.51	-18.6	8.38	8.69	7.13	750	**4,400**	2.9	0.61	0.44 J	0.91	ND(0.2)	NA
	14FWOU524WG		10/29/14	17.06	NA	0.73	-3.8	14.1	36.8	0.24	NA	**34,000**	**6.3**	1.7	0.58	1.1	ND(0.2)	NA
	15FWOU538WG		5/21/15	17.59	NA	0.25	32.9	16.0	20.1	0.64	NA	**24,000**	**6.8**	3.7	0.9	ND(0.15)	ND(0.2)	NA

Notes:

Bold data is greater than the ADEC and/or ROD action levels

Yellow highlighting indicates the water level was above the well screen at the time of the sampling event, for wells not intended to be screened below the water table

[1] Sample is a Field Duplicate of the sample immediately above.

[2] OU5-TW1 was replaced by AP-10260MW in October 2013

Acronyms:

bgs - below ground surface
btoc - below top of casing
1,2-DCA - 1,2-dichloroethane
DRO - diesel range organics
EDB - 1,2-dibromoethane
ft - feet
GRO - gasoline range organics
LOD - limit of detection
LOQ - limit of quantitation
msl - mean sea level
µg/L - micrograms per liter
mg/L - milligrams per liter
mV - millivolts
NA - not analyzed or not applicable
NM - not measured
QC - quality control
ROD - Record of Decision
TOC - top of casing

Data Qualifiers

ND - Not detected at the detection limit (LOD in parentheses; LOQ in parentheses for data prior to 2012.)
B - Result is qualified as a potential high estimate due to contamination present in a blank sample
J - Result is estimated due to a QC issue or because it is less than the LOQ. If result is biased low or high, it is specified as "J-" and "J+", respectively (for 2014 data and later).
Q - Result is estimated due to a QC failure (pre-2014 data only). If direction of bias is known, it is further indicated with a "L" (low) or "H" (high).
M - Result is biased due to matrix interference (pre-2014 data only). If direction of bias is known, it is further indicated with a "L" (low) or "H" (high).

Table 4-3 - WQFS DRO Plume Groundwater Monitoring Results

Probe/Well Number	Sample Numbers	Screened Interval (ft-bgs)	Date	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Dissolved Iron (mg/L)	Sulfate (mg/L)	ROD Contaminants of Concern							
										GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 8260C (µg/L)	EDB by 504.1 (µg/L)
ROD CLEANUP LEVELS (µg/L)										2,200	1,500	5	1,000	5	5	0.05	0.05
AP-5974	11FW5203WG	13-23	6/15/11	434.75	0.78	-28.9	6.82	55.8	0.23 J	**2,600**	**15,000**	1.8 QH	7.2 QH	1.4 QH	ND(0.91)	ND(2)	0.014
	12FW5D04WG		8/31/12	435.15	0.16	-72.9	5.39	57.3	0.37	1,600	**5,200 QL**	2.0 J,QL	8.4 QL	1.0 QL	ND(0.96)QL	ND(0.2)QL	0.0079 J
	13FW5D02WG		4/17/13	433.97	0.24	-75.9	3.77	47.8	0.28	2,200	**3,900**	1.1 Q	4.3 Q	1.1 Q	0.84 Q	ND(0.2)Q	NA
	14FWOU511WG		10/28/14	436.25	0.38	-58.9	18.00	59.1	4.10	1,600	**15,000**	**7.8**	1.0	0.83	2.0	ND(0.2)	NA
	15FWOU533WG		5/21/15	435.62	0.31	22.2	9.55	60.9	0.18 J	1,500	**6,900**	3.9	3.3	1.0	ND(0.15)	ND(0.2)	NA
AP-5975	11FW5305WG	13-23	6/10/11	434.15	1.03	74.1	0.0941	ND(0.018)	51.5	40 J	**2,900**	0.23 J	0.33 J	ND(0.5)	ND(0.5)	ND(2)	NA
	12FW5D02WG		8/28/12	434.14	0.23	-20.1	1.31	2.25	15.7	230	**4,500 QL**	2.2	0.57	ND(0.1)	ND(0.15)	ND(0.2)	NA
	13FW5D09WG		4/22/13	433.41	0.2	-40.7	2.01	7.69	14.2	NA	**4,300**	2.9	0.38 J	ND(0.1)	0.27 J	ND(0.2)	NA
	14FWOU515WG		10/28/14	435.91	0.45	21.1	2.91	2.11	28.5	NA	**5,300**	2.1	0.43 J	ND(0.1)	0.24 J	ND(0.2)	NA
	15FWOU519WG		5/19/15	435.17	0.54	81.6	3.11	3.94	36.1	NA	**3,500**	1.4	0.21 J	ND(0.1)	0.16 J	ND(0.2)	NA
AP-6887	11FW5402WG	9.5-27.5	6/13/11	435.02	0.71	-28	0.491 Q	1.66 Q	25.9	ND(100)	140 J	0.070 J	0.18 J, Q	0.13 J	ND(0.5)	ND(2)	NA
	11FW5403WG[1]						1.14	6.15	26.7	ND(100)	110 J	0.070 J	0.29 J	0.15 J	ND(0.5)	ND(2)	NA
	12FW5D03WG		8/28/12	434.91	0.16	38.5	0.82	0.21	30	ND(25)	48 J,QL,ML	ND(0.1)	0.2 J	0.17 J	ND(0.15)	ND(0.2)ML	NA
	13FW5D08WG		4/22/13	434.17	0.2	72.2	0.852	0.176	31.1 MH	NA	420 J,ML	ND(0.1)	ND(0.1)	0.16 J,MH	ND(0.15)	ND(0.2)	NA
	14FWOU506WG		10/28/14	436.44	0.7	146.7	1.160	0.053	55.2	NA	**1,500**	ND(0.1)	0.080 J	0.15 J	ND(0.15)	ND(0.1)	NA
	15FWOU517WG		5/19/15	436.10	0.4	113.6	0.705	0.092	37.7	NA	86 J,B	ND(0.1)	ND(0.1)	0.13 J	ND(0.15)	ND(0.2)	NA
AP-6888	11FW5103WG	12-27.5	6/14/11	434.55	3.1	-45.4	4.27	18.1	9.86	230	**2,800**	2.1	0.29 J	ND(0.5)	ND(0.5)	ND(2)	ND(0.0096)
	12FW5D05WG		8/31/12	435.37	0.55	-76.3	4.65	20.9	6.40	390	**2,300 QL**	2.2	0.49 J,B	0.24 J	ND(0.17)	ND(0.2)	ND(0.004)
	12FW5D06WG		8/31/12	435.37	0.55	-76.3	4.77	21.1	6.30	390	**2,200 QL**	2.2	0.53 B	0.18 J	ND(0.5)	ND(0.2)	ND(0.004)
	13FW5D03WG		4/18/13	434.10	0.22	-66.4	4.39	19.7	13.1	NA	**1,900 QL**	1.7	0.22 J	0.14 J,Q	0.16 J	ND(0.2)	NA
	13FW5D04WG[1]						4.42	19.8	12.2	NA	**1,900 QL**	1.6	0.22	ND(0.1)Q	0.17 J	ND(0.2)	NA
	14FWOU502WG		10/27/14	436.16	0.54	5.4	5.38	18.1	8.2	NA	**2,200**	2.0	0.74	0.23 J	ND(0.5)	ND(0.2)	NA
	14FWOU503WG						5.40	18.4	7.6	NA	**2,400**	2.0	0.75	ND(0.25)	0.18 J	ND(0.2)	NA
	15FWOU515WG		5/18/15	436.11	0.20	3.7	4.61	22.1	16.3	NA	**2,000**	1.0 J,J-	0.11 J	ND(0.1)	ND(0.15)	ND(0.2) J-	NA
	15FWOU516WG[1]						4.64	22.2	16.5	NA	**1,600**	1.0 J,J-	0.12 J	ND(0.1)	ND(0.15)	ND(0.2) J-	NA
AP-6889	11FW5102WG	11.5-21.5	6/14/11	429.17	2.8	-19.8	1.29	6.28	21.80	26 J	140 J	0.7	0.12	ND(0.5)	ND(0.5)	ND(2)	ND(0.0095)
	12FW5D12WG		9/3/12	429.62	0.31	-68.2	1.31	7.08	21.70	26 J,B	130 J,QL	0.6	0.080 J,B	ND(0.1)	ND(0.15)	ND(0.2)	ND(0.004)
	13FW5D11WG		4/23/13	428.29	0.2	-71.5	1.43	7.63	25.4	NA	200 J	0.5	ND(0.1)	ND(0.1)	ND(0.15)	ND(0.2)	NA
	14FWOU513WG		10/28/14	430.77	0.4	-44.9	1.86	9.02	7.1	NA	170 J	0.5	0.060 J	ND(0.1)	ND(0.15)	ND(0.1)	NA
	15FWOU520WG		5/20/15	430.21	0.4	68.7	1.82	8.45	25.4	NA	200 J	0.38 J	ND(0.1)	ND(0.1)	ND(0.15)	ND(0.2)	NA
AP-7742	10FW5204WG	16-21	7/20/10	434.36	0.28	-109.80	NA	NA	NA	1,500 Y	**3,000 QL**	3.9	1.8	ND(0.5)	0.82	ND(2)	ND(0.0097)
	11FW5202WG		6/10/11	434.33	0.67	-20.50	2.53	8.89	37.5	1,800	**7,200 MH**	2.7 QH	6.1 QH	ND(0.5)	ND(0.59)	ND(2)	NA
	12FW5D01WG		8/28/12	434.34	0.2	-89.9	3.62	13.4	9.40	1,300	**4,100 QL**	2.1 QL	1.4 QL	0.29 J,QL	ND(0.59)QL	ND(0.2)QL	NA
	13FW5D10WG		4/23/13	433.72	0.3	-98.9	3.99	13.8	4.04	NA	**2,900**	1.8 Q	1.3 Q	ND(0.1)Q	0.77 Q	ND(0.2)Q	NA
	14FWOU501WG		10/27/14	435.84	0.5	23.7	3.60	9.44	76.30	NA	**4,600**	1.6	1.4	ND(0.25)	0.48 J	ND(0.2)	NA
	15FWOU513WG		5/18/15	435.40	0.3	15.5	4.78	16.8	72.90	NA	**4,200**	1.5	6.2	ND(0.1)	ND(0.15)	ND(1.0)	NA

Table 4-3 - WQFS DRO Plume Groundwater Monitoring Results

Probe/Well Number	Sample Numbers	Screened Interval (ft-bgs)	Date	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Dissolved Iron (mg/L)	Sulfate (mg/L)	ROD Contaminants of Concern							
										GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 8260C (µg/L)	EDB by 504.1 (µg/L)
ROD CLEANUP LEVELS (µg/L)										2,200	1,500	5	1,000	5	5	0.05	0.05
AP-8064		12-22	5/27/05	430.89	NA		NA	NA	NA	93.8	**18,700**	ND(0.4)	0.40 J	ND(1)	ND(0.5)	ND(1)	**0.415**
	05FWSA005WA		10/20/05	430.17	1.13		NA	NA	NA	106	**6,410**	ND(0.4)	0.350 J	ND(1)	ND(0.5)	ND(1)	ND(0.0188)
	06FWFP201WA		6/20/06	429.77	0.55		3.50	5.60	72.8	370	**7,800 Q**	0.95 J	1.2	ND(1)	0.086 J	ND(1)	0.033
	06FWFP211WA		10/5/06	429.92	0.83		4.20 J	7.30 J	9.33 J	280 Q	**8,500 Q**	**6.4 Q**	1.2 Q	ND(1) Q	0.34 Q	ND(1) Q	0.013 Q
	07FWFP201WG		5/28/07	429.33	0.81	-13.6	9.43	8.26	5.30	650	**15,000**	4.1	1.9	0.96	ND(0.5)	ND(2)	**0.05**
	07FWFP211WG		10/2/07	430.25	0.62	-60.2	7.38	10.30	2.80	770	**9,500 Q**	4.0	1.8	1.3	ND(0.5)	ND(2)	**0.05**
	08FW5206WG		5/22/08	430.34	0.72	-50.7	NA	NA	NA	530	**6,400**	2.2	1.5	1.2	ND(0.5)	ND(2)	0.016
	08FW5214WG		9/12/08	430.74	0.27	57.8	NA	NA	NA	690	**41,000**	1.5	3.3	0.53	ND(0.5)	ND(2)	**0.17**
	09FW5202WG		6/16/09	429.93	0.64	-54.7	NA	NA	NA	930	**19,000**	2.9	3.5	1.2	0.58	ND(2)	**0.05**
	09FW5208WG		9/16/09	430.42	0.61	-49.7	NA	NA	NA	1,100 Y	**9,100**	4.2	4.3	ND(1.3)	0.66	ND(2)	0.02
	10FW5202WG		7/20/10	434.60	0.73	-57.4	NA	NA	NA	1,600 Y	**8,400 QL**	3.4	4.6	0.84	0.75	ND(2)	ND(0.0097)
AP-8064	11FW5208WG	12-22	6/15/11	434.68	0.7	-22.8	9.97	33.2	2.93	1,800	**14,000**	3.7	4.1	0.66	0.78	ND(2)	0.0044 J
	12FW5D07WG		8/31/12	435.13	0.1	-93.4	7.21	43.3	0.31	1,800	**7,300 QL**	**5.4 QL**	12 QL	0.84 QL	ND(1.4)QL	ND(0.2)QL	ND(0.004)
	13FW5D01WG		4/16/13	433.94	0.1	-65.6	7.4	55.2	0.47	1,700	**9,800**	**6.4**	13	1.1	ND(1.1)	ND(0.2)	NA
	14FWOU504WG		10/27/14	436.07	0.7	-102.4	17.0	91.7	29.20	1,100	**49,000**	3.6	2.2	ND(0.5)	1.2	ND(0.2)	NA
	15FWOU532WG		5/21/15	435.75	0.2	23.1	7.8	55.0	0.30	1,700	**6,300**	**6.2**	12	0.71	ND(0.15)	ND(0.2)	NA
AP-8065	11FW5307WG	13-33	6/15/11	434.55	0.63	-31.6	6.11	68.2	3.01	980	**21,000**	3.8	2.8	0.16 J	0.28 J	ND(2)	ND(0.0095)
	12FW5D10WG		8/31/12	435.22	0.11	-88.7	5.02	60.3	6	830	**11,000 QL**	2.4 QL	2.7 QL	0.18 J,QL	ND(0.22)QL	ND(0.2)QL	ND(0.004)
	13FW5D06WG		4/22/13	434.32	0.2	-88.2	4.3	43.7	5.63	NA	**6,800**	2.6 MH,Q	3.3 MH,Q	0.19 J,MH,Q	ND(0.15)Q	ND(0.2)ML,Q	NA
	14FWOU509WG		10/28/14	436.35	0.3	-61.1	4.9	98.2	2.70	NA	**27,000**	1.8	1.5	0.23 J	ND(0.15)	ND(0.2)	NA
	15FWOU514WG		5/18/15	436.10	0.2	1.6	4.2	49.7	7.40	NA	**5,900**	1.7	1.5	ND(0.1)	0.17 J	ND(0.2)	NA
AP-8066	11FW5404WG	12.5-22.5	6/14/11	434.74	0.85	-6.60	1.90	11.3	19.6	44 J	**3,800**	0.16 J	0.21 J	0.33 J	ND(0.5)	ND(2)	ND(0.0097)
	12FW5D09WG		8/31/12	435.41	0.14	-69.30	1.77	14.1	18.2	40 J,B	**2,100 QL**	0.12 J	0.15 J,B	0.31 J	ND(0.5)	ND(0.2)	ND(0.004)
	13FW5D07WG		4/22/13	434.20	0.2	-66.2	1.74	15.3	20.5	NA	1,300	0.14 J	0.22 J	0.30 J	ND(0.15)	ND(0.2)	NA
	14FWOU505WG		10/27/14	436.38	0.5	-101.1	12.20	61.1	10.4	NA	**31,000**	0.9	1.1	0.29 J	0.12 J	ND(0.2)	NA
	15FWOU518WG		5/19/15	436.15	0.2	51.3	3.45	21.7	18.3	NA	**1,800**	0.4	0.6	0.26 J	ND(0.15)	ND(0.2)	NA
AP-10043MW[3]	11FW5405WG	13.5-23.5	6/14/11	434.57	0.53	-34.7	6.77	20.7	27.2	74 J	**25,000**	1.7	0.61	ND(0.5)	ND(0.5)	ND(2)	ND(0.0097)
	11FW5406WG-A[1,2]						6.65	20.4	25.7	72 J	**23,000**	2.0	0.70	ND(0.5)	0.2 J	ND(2)	ND(0.0094)
	12FW5D11WG		9/3/12	435.03	0.29	-77.5	6.4	23.9	9.7	45 J,B	**11,000**	1.3	0.39 J,B	ND(0.1)	0.08 J	ND(0.2)	ND(0.004)
	13FW5D05WG		4/22/13	433.82	0.17	-75.3	8.18	31.5	9.29	NA	**19,000**	1.7	0.59	ND(0.1)	0.14 J	ND(0.2)	NA
	14FWOU507WG		10/28/14	436.23	0.52	-23.5	23.3	88.2	4.8	NA	**49,000**	1.2	0.76	ND(0.1)	0.13 J	ND(0.2)	NA
	15FWOU512WG		5/18/15	435.83	0.29	23.4	12.6	50.3	69.5	NA	**13,000**	0.94	0.63	ND(0.1)	0.08 J	ND(0.2)	NA

Notes:

Bold data is greater than the ADEC and/or ROD action levels

Yellow highlighting indicates the water level was above the well screen at the time of the sampling event, for wells not intended to be screened below the water table

[1] Sample is a Field Duplicate of the sample immediately above.

[2] Sample IDs 11FW5406WG was inadvertantly duplicated. The sample ID was amended with "A" for clarification

[3] AP-10043MW replaced AP-7648 and was installed in July 2010. AP-7648 was screened from 19-24 feet bgs

Acronyms:

bgs - below ground surface
btoc - below top of casing
1,2-DCA - 1,2-dichloroethane
DRO - diesel range organics
EDB - 1,2-dibromoethane
ft - feet
GRO - gasoline range organics
LOD - limit of detection
LOQ - limit of quantitation
msl - mean sea level
µg/L - micrograms per liter
mg/L - milligrams per liter
mV - millivolts
NA - not analyzed or not applicable
NM - not measured
QC - quality control
ROD - Record of Decision
TOC - top of casing

Data Qualifiers

ND - Not detected at the detection limit (LOD in parentheses; LOQ in parentheses for data prior to 2012.)
B - Result is qualified as a potential high estimate due to contamination present in a blank sample
J - Result is estimated due to a QC issue or because it is less than the LOQ. If result is biased low or high, it is specified as J- and "J+", respectively (for 2014 data and later).
Q - Result is estimated due to a QC failure (pre-2014 data only). If direction of bias is known, it is further indicated with a L (low) or "H" (high).
M - Result is biased due to matrix interference (pre-2014 data only). If direction of bias is known, it is further indicated with a "L" (low) or "H" (high).

Table 4-4 - Chena River Wells Groundwater Monitoring Results

Probe/Well Number	Sample Numbers	Screened Interval (ft-bgs)	Date	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Dissolved Iron (mg/L)	Sulfate (mg/L)	ROD Contaminants of Concern								AWQS	
										GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 8260C (µg/L)	EDB by 504.1 (µg/L)	TAH (µg/L)	TAqH (µg/L)
ROD CLEANUP LEVELS (µg/L)										**2,200**	**1,500**	**5**	**1,000**	**5**	**5**	**0.05**	**0.05**	**10**	**15**
AP-6882	11FW5302WG	10-27	6/8/11	433.90	0.74	-58.9	0.74	0.56	23.5	48 J	660 J	0.68	0.49 J	0.29 J	0.08 J	ND(2)	ND(0.0098)	1.8	1.9
	11FW5303WG[1]						0.65	4.16	23.5	46 J	590 J	0.67	0.52	0.32 J	0.08 J	ND(2)	ND(0.0096)	1.8	1.9
	11FW5308WG		9/13/11	435.16	1.42	15.8	NA	NA	NA	40 J	950	0.56	1.8	0.26 J	ND(0.5)	ND(2)	NA	2.8	3.0
	12FW5C04WG		9/3/12	434.49	0.14	-81.3	1.5	7.62	19.7	53 J,B	840 QL	0.69	0.08 J,B	0.29 J	0.08 J	ND(0.2)	ND(0.004)	1.2	NA
	12FW5C05WG[1]						1.48	7.41	19.7	55 J,B	860 QL	0.72	0.08 J,B	0.32 J	0.08 J	ND(0.2)	ND(0.004)	1.2	NA
	13FW5C03WG		4/22/2013	433.33	0.2	9.0	1.39	6.38	21.5	NA	700 J	0.74	0.09 J	0.29 J	0.11 J,Q	ND(0.2)	NA	1.3	NA
	13FW5C04WG[1]						1.4	6.48	21.9	NA	760 J	0.8	0.08 J,B	0.25 J	ND(0.15)Q	ND(0.2)	NA	1.4	NA
	14FWOU537WG		10/30/2014	435.74	1.07	19.3	1.39	5.53	27.5	NA	840 J	0.37 J	0.13 J	0.25 J	ND(0.15)	ND(0.2)	NA	0.9	NA
	14FWOU538WG[1]						1.38	5.57	27.6	NA	870	0.36 J	0.10 J	0.24 J	ND(0.15)	ND(0.2)	NA	1.0	NA
	15FWOU522WG		5/20/2015	435.05	0.36	74.5	1.36	5.5	23.9	NA	350 J	0.30 J	0.07 J	0.30 J	ND(0.15)	ND(0.2)	NA	0.7	NA
	15FWOU523WG[1]						1.35	5.44	23.7	NA	350 J	0.31 J	ND(0.1)	0.30 J	ND(0.15)	ND(0.2)	NA	0.7	NA
AP-6892	11FW5101WG	7.5-22.5	6/8/11	433.58	3.7	186.2	0.40	1.47	20.4	ND(100)	66 J	0.11 J	0.58	ND(0.5)	ND(0.5)	ND(2)	ND(0.0096)	1.1	1.2
	11FW5104WG		9/14/11	434.91	1.4	22.1	NA	NA	NA	17 J	180 J	0.21 J	0.21 J	ND(0.5)	ND(0.5)	ND(2)	NA	0.90	0.99
	12FW5C02WG		8/31/12	434.30	0.25	49.6	1.06	0.63	20.8	19 J,B	110 J,B,QL	ND(0.1)	0.10 J,B	ND(0.1)	ND(0.15)	ND(0.2)	ND(0.004)	0.7	NA
	13FW5C06WG		4/23/13	432.92	0.46	21.1	0.74	0.4	23.2	NA	140 J	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.15)	ND(0.2)	NA	0.7	NA
	14FWOU541WG		10/30/14	435.50	0.34	29.5	0.57	0.018 J	22.2	NA	130 J	ND(0.1)	0.08 J	ND(0.1)	ND(0.15)	ND(0.2)	NA	0.7	NA
	15FWOU529WG		5/20/15	434.78	0.45	86.9	0.88	0.45	22.6	NA	180 J	0.07 J	ND(0.1)	ND(0.1)	ND(0.15)	ND(0.2)	NA	0.5	NA
AP-6893	11FW5401WG	11-28	6/9/11	433.83	2.25	-36.5	0.994	4.72	25.2	ND(100)	170 J	0.12 J	0.17 J	0.27 J	ND(0.5)	ND(2)	ND(0.0095)	1.8	2.2
	11FW5406WG-B[2]		9/13/11	435.07	1.18	16	NA	NA	NA	ND(100)	130 J, Q	0.080 J	0.31 J, Q	0.37 J	ND(0.5)	ND(2)	NA	1.5	1.8
	11FW5407WG[1]						NA	NA	NA	ND(100)	200 J	0.080 J	0.88	0.37 J	ND(0.5)	ND(2)	NA	1.5	1.8
	12FW5C03WG		9/3/12	434.42	0.18	-47.6	0.39	1.21	21.7	15 J,B	290 J,QL	0.19 J	0.06 J,B	0.36 J	ND(0.15)	ND(0.2)	ND(0.004)	0.8	NA
	13FW5C01WG		4/22/13	433.27	0.19	41.7	0.249	2.57	23.7	NA	650 J	0.19 J	0.06 J,B	0.27 J	ND(0.15)	ND(0.2)	NA	0.8	NA
	14FWOU536WG		10/30/14	435.75	0.36	-6.8	0.922	1.58	22.3	NA	130 J	ND(0.1)	0.10 J	0.40 J	ND(0.15)	ND(0.2)	NA	0.7	NA
	15FWOU521WG		5/20/15	434.85	0.55	70.5	1.37	1.86	23.9	NA	220 J	0.07 J	0.06 J	0.34 J	ND(0.15)	ND(0.2)	NA	0.4	NA
AP-7832S	11FW5304WG	32-37	6/9/11	434.02	1.16	-73.9	0.9	10.2	24.4	ND(100)	36 J	0.22 J	0.13 J	0.55	ND(0.5)	ND(2)	ND(0.0096)	0.8	0.9
	11FW5309WG		9/13/11	435.20	1.25	11.2	NA	NA	NA	ND(100)	91 J	0.22 J	4.7	0.53	ND(0.5)	ND(2)	NA	5.6	5.7
	12FW5C06WG		9/3/12	434.55	0.21	-81	0.91	3.18	21.9	14 J,B	55 J,B,QL	0.20 J	0.08 J,B	0.59	ND(0.15)	ND(0.2)	ND(0.004)	0.78	NA
	13FW5C05WG		4/22/13	433.33	0.23	-8.9	0.913	3.1	24.6	NA	270 J	0.25 J	0.06 J	0.6	ND(0.15)	ND(0.2)	NA	0.8	NA
	14FWOU539WG		10/30/14	435.79	0.3	-34.4	0.99	2.95	21.4	NA	87 J	0.17 J	0.14 J	0.51	ND(0.15)	ND(0.2)	NA	NA	NA
	15FWOU525WG		5/20/15	435.14	0.9	72.7	0.84	2.39	25.1	NA	92 J,B	0.14 J	0.07 J	0.46 J	ND(0.15)	ND(0.2)	NA	0.5	NA

Table 4-4 - Chena River Wells Groundwater Monitoring Results

Probe/Well Number	Sample Numbers	Screened Interval (ft-bgs)	Date	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Dissolved Iron (mg/L)	Sulfate (mg/L)	ROD Contaminants of Concern								AWQS	
										GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 8260C (µg/L)	EDB by 504.1 (µg/L)	TAH (µg/L)	TAqH (µg/L)
ROD CLEANUP LEVELS (µg/L)										**2,200**	**1,500**	**5**	**1,000**	**5**	**5**	**0.05**	**0.05**	**10**	**15**
AP-7838	11FW5201WG	14-24	6/8/11	433.68	1.16	105.4	0.482	0.39	27.6	16 J	190 J	0.26 J	0.55	ND(0.5)	ND(0.5)	ND(2)	ND(0.0097)	1.6	1.9
	11FW5212WG		9/14/11	435.02	1.25	11.2	NA	NA	NA	NA	NA	0.40 J	0.29 J	ND(0.5)	0.12 J	ND(2)	NA	1.4	1.8
	12FW5C01WG		8/31/12	434.39	0.77	78.2	0.611	1.74	54.0	26 J,B	230 J,QL	0.16 J	0.08 J,B	0.10 J	ND(0.15)	ND(0.2)	ND(0.004)	0.7	NA
	13FW5C02WG		4/22/13	433.08	0.35	75.2	1.66	4.78	41.1	NA	320 J	0.32 J	0.09 J	ND(0.1)	0.1 J	ND(0.2)	NA	0.9	NA
	14FWOU540WG		10/30/14	435.68	0.79	16.4	1.48	2.08	29.5	NA	270 J	0.35 J	0.12 J	ND(0.1)	ND(0.15)	ND(0.2)	NA	1.0	NA
	15FWOU527WG		5/20/15	434.88	0.35	80.8	1.13	2.93	29.7	NA	260 J	0.48 J	0.09 J	0.12 J	0.12 J	ND(0.2)	NA	0.9	NA

Notes:

Bold data is greater than the ADEC and/or ROD action levels

[1] Sample is a Field Duplicate of the sample immediately above.

[2] Sample ID 11FW5406 was inadvertantly duplicated. The sample ID was amended with "B" for clarification.

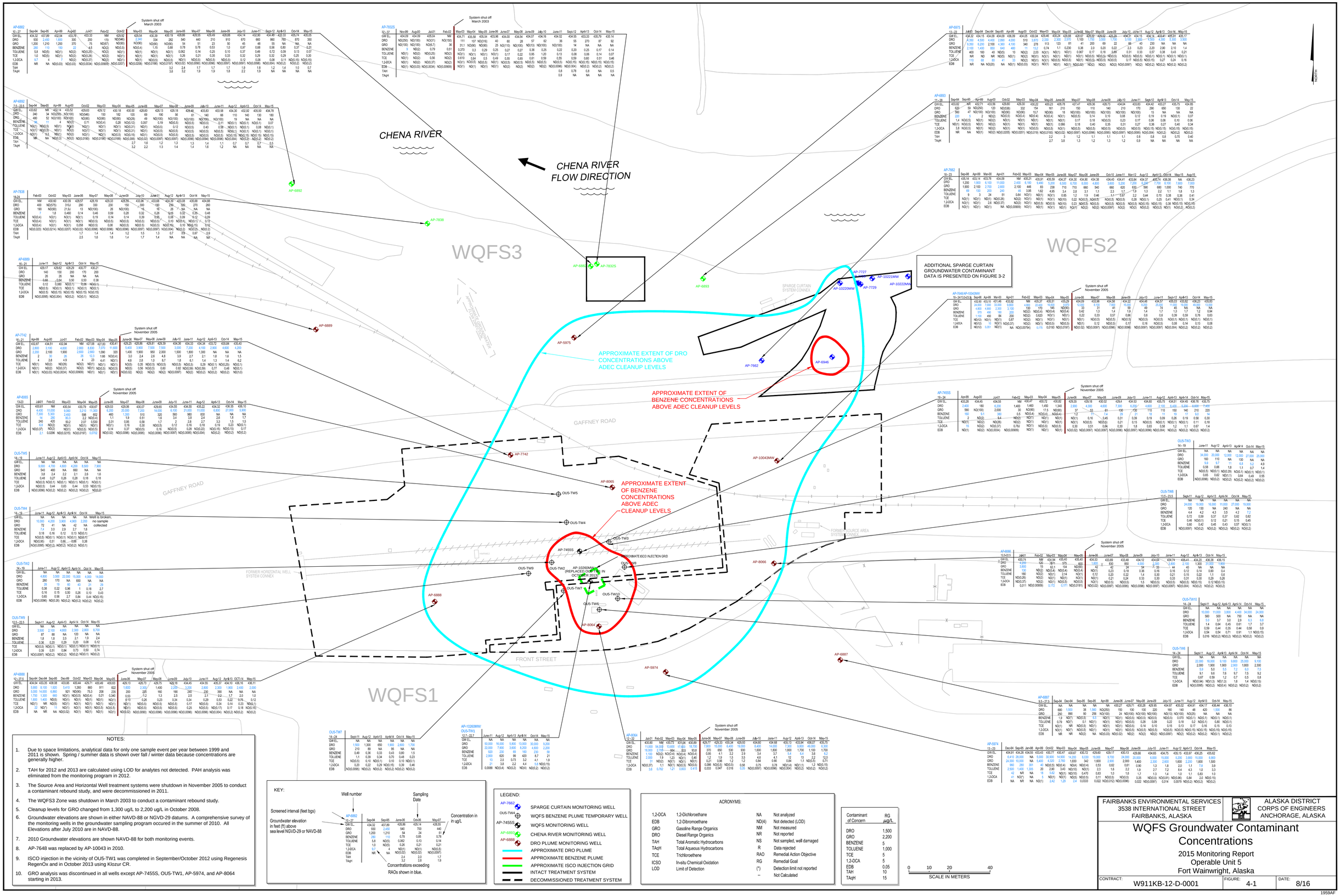
TAH and TAqH were calculated based on the sum of detections and the sum of the LOD for non-detect results. TAH is a summation of BTEX concentrations, and TAqH is a summation of BTEX and PAH compound results

Acronyms:

AWQS - Alaska Water Quality Standard
bgs - below ground surface
btoc - below top of casing
1,2-DCA - 1,2-dichloroethane
DRO - diesel range organics
EDB - 1,2-dibromoethane
ft - feet
GRO - gasoline range organics
LOD - limit of detection
LOQ - limit of quantitation
msl - mean sea level
µg/L - micrograms per liter
mg/L - milligrams per liter
mV - millivolts
NA - not analyzed or not applicable
NM - not measured
QC - quality control
ROD - Record of Decision
TAH - total aromatic hydrocarbons
TAqH - total aqueous hydrocarbons
TOC - top of casing

Data Qualifiers

ND - Not detected at the detection limit (LOD in parentheses; LOQ in parentheses for data prior to 2012.)
B - Result is qualified as a potential high estimate due to contamination present in a blank sample
J - Result is estimated due to a QC issue or because it is less than the LOQ. If result is biased low or high, it is specified as "J-" and "J+", respectively (for 2014 data and later).
Q - Result is estimated due to a QC failure (pre-2014 data only). If direction of bias is known, it is further indicated with a "L" (low) or "H" (high).
M - Result is biased due to matrix interference (pre-2014 data only). If direction of bias is known, it is further indicated with a "L" (low) or "H" (high).



NOTES:

1. Due to space limitations, analytical data for only one sample event per year between 1999 and 2011 is shown. Spring / summer data is shown over fall / winter data because concentrations are generally higher.
2. TAH for 2012 and 2013 are calculated using LOD for analytes not detected. PAH analysis was eliminated from the monitoring program in 2012.
3. The Source Area and Horizontal Well treatment systems were shutdown in November 2005 to conduct a contaminant rebound study, and were decommissioned in 2011.
4. The WQFS3 Zone was shutdown in March 2003 to conduct a contaminant rebound study.
5. Cleanup levels for GRO changed from 1,300 ug/L to 2,200 ug/L in October 2008.
6. Groundwater elevations are shown in either NAVD-88 or NGVD-29 datums. A comprehensive survey of the monitoring wells in the groundwater sampling program occured in the summer of 2010. All Elevations after July 2010 are in NAVD-88.
7. 2010 Groundwater elevations are shown NAVD-88 for both monitoring events.
8. AP-7648 was replaced by AP-10043 in 2010.
9. ISCO injection in the vicinity of OU5-TW1 was completed in September/October 2012 using Regenesis RegenOx and in October 2013 using Klozur CR.
10. GRO analysis was discontinued in all wells except AP-7455S, OU5-TW1, AP-5974, and AP-8064 starting in 2013.

KEY:

Screened interval (feet bgs)

Groundwater elevation in feet (ft) above sea level NGVD-29 or NAVD-88

Well number

Sampling Date

Concentration in in ug/L

Concentrations exceeding RAOs shown in blue.

AP-6882		
10 - 27	Sep-94	Sep-95
GW EL.	434.32	437.89
DRO	1,200	1,210
GRO	5.8	ND(5)
BENZENE	0.7	4
TOLUENE	1.0	ND(1)
TCE	NR	NA
1,2-DCA	ND(0.37)	ND(2)
EDB	2.1	0.0296
TAH		2.4
TAqH		1.9

LEGEND:

- AP-7662 — SPARGE CURTAIN MONITORING WELL
- OU5-TW4 — WQFS BENZENE PLUME TEMPORARY WELL
- AP-7455S — WQFS MONITORING WELL
- AP-6893 — CHENA RIVER MONITORING WELL
- AP-6888 — DRO PLUME MONITORING WELL
- APPROXIMATE DRO PLUME
- APPROXIMATE BENZENE PLUME
- APPROXIMATE ISCO INJECTION GRID
- INTACT TREATMENT SYSTEM
- DECOMMISSIONED TREATMENT SYSTEM

ACRONYMS:

1,2-DCA	1,2-Dichloroethane	NA	Not analyzed
EDB	1,2-Dibromoethane	ND(4)	Not detected (LOD)
GRO	Gasoline Range Organics	NM	Not measured
DRO	Diesel Range Organics	NR	Not reported
TAH	Total Aromatic Hydrocarbons	NS	Not sampled, well damaged
TAqH	Total Aqueous Hydrocarbons	R	Data rejected
TCE	Trichloroethene	RAO	Remedial Action Objective
ICSO	In-situ Chemical Oxidation	RG	Remedial Goal
LOD	Limit of Detection	(*)	Detection limit not reported
		--	Not Calculated

Contaminant of Concern	RG µg/L
DRO	1,500
GRO	2,200
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5
EDB	0.05
TAH	10
TAqH	15

FAIRBANKS ENVIRONMENTAL SERVICES
3538 INTERNATIONAL STREET
FAIRBANKS, ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

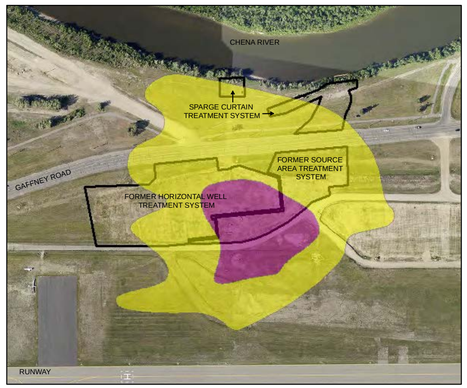
WQFS Groundwater Contaminant Concentrations

2015 Monitoring Report
Operable Unit 5
Fort Wainwright, Alaska

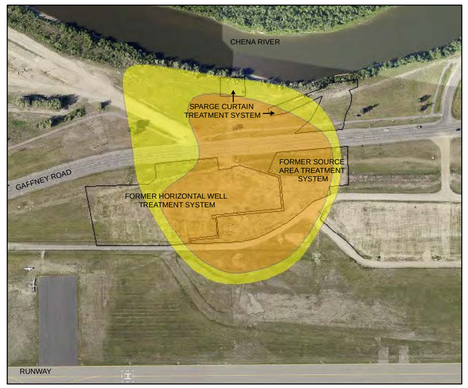
CONTRACT:	FIGURE:	DATE:
W911KB-12-D-0001	4-1	8/16

1959AF

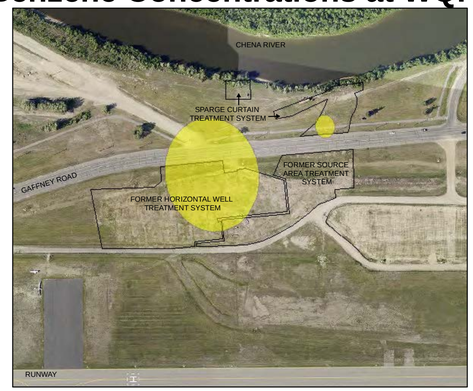
Benzene Concentrations at WQFS



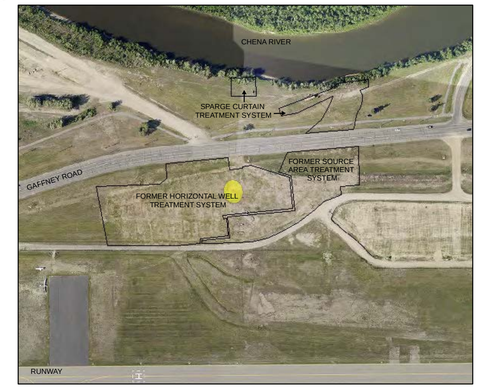
1994



1999



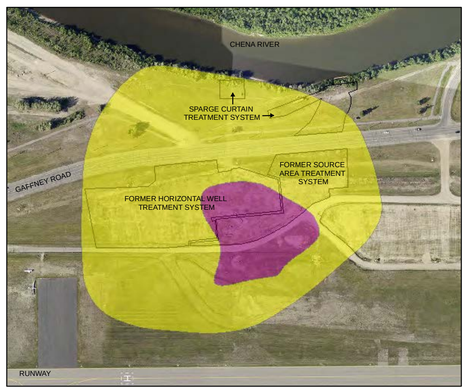
2003



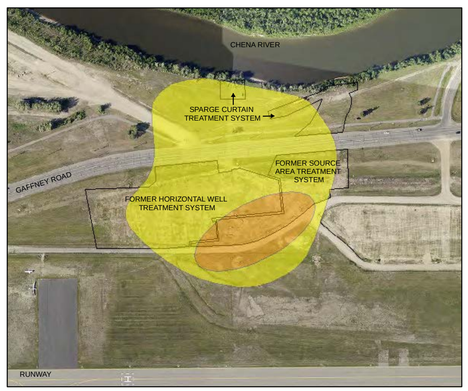
2008

2015

GRO Concentrations at WQFS



1994



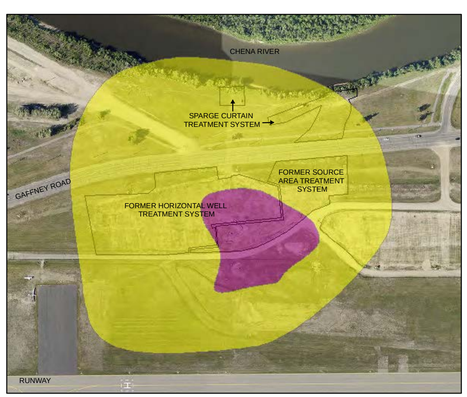
1999

2003

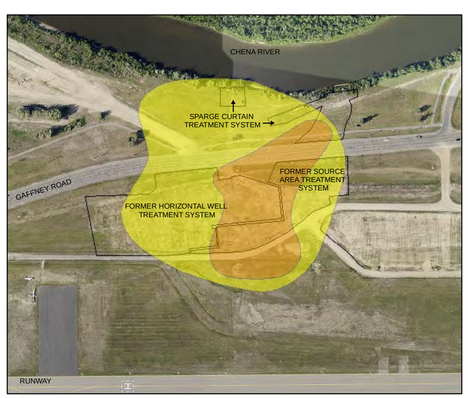
2008

2015

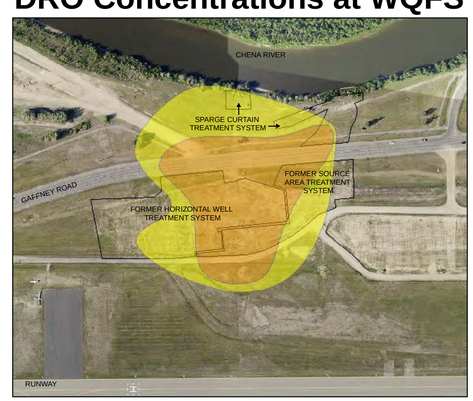
DRO Concentrations at WQFS



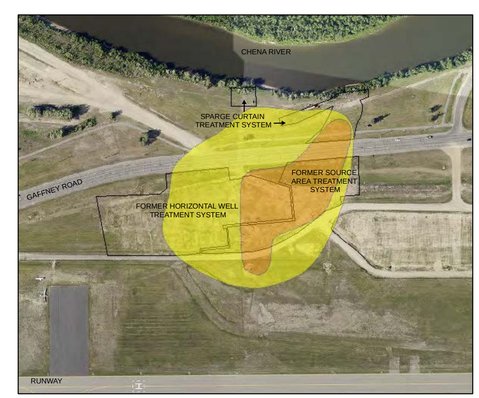
1994



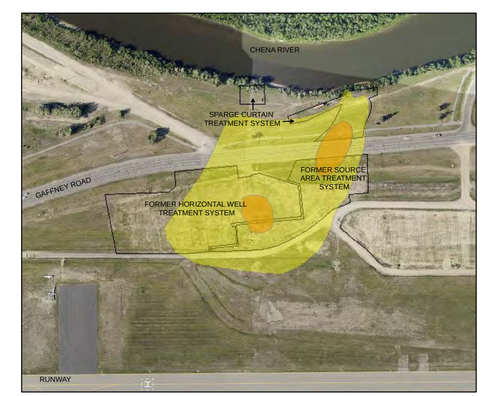
1999



2003



2008



2015

NOTES:

1. Highest yearly concentrations shown on map.
2. Previous years contaminant plumes modified based on new monitoring well points and reevaluation of past data.
3. Drawings are conceptual and are based on evaluation of available information.
4. *The remediation goal for GRO changed from 1,300 ug/L to 2,200 ug/L in 2008.
5. The change in the size of the DRO plume above 10,000 ug/L is due to the removal of F8-4 and F8-5 from the sampling program.
6. Coordinate System - Projection: World Geodetic System 1984 (WGS84) Universal Transverse Mercator (UTM), Zone 6N
7. Aerial imagery obtained from Department of Public Works (DPW) Environmental, 2012

BENZENE

- **APPROXIMATE EXTENT OF BENZENE PLUME ABOVE REMEDIATION GOAL OF 5 ug/L**
- **APPROXIMATE EXTENT OF BENZENE PLUME ABOVE REMEDIATION GOAL OF 100 ug/L**
- **APPROXIMATE EXTENT OF FREE PHASE PRODUCT**

DRO

- **APPROXIMATE EXTENT OF BENZENE PLUME ABOVE REMEDIATION GOAL OF 5 ug/L**
- **APPROXIMATE EXTENT OF DRO PLUME WITH CONCENTRATIONS ABOVE 10,000 ug/L**
- **APPROXIMATE EXTENT OF FREE PHASE PRODUCT**

GRO

- **APPROXIMATE EXTENT OF GRO PLUME ABOVE REMEDIATION GOAL * (SEE NOTES)**
- **APPROXIMATE EXTENT OF GRO PLUME WITH CONCENTRATIONS ABOVE 10,000 ug/L**
- **APPROXIMATE EXTENT OF FREE PHASE PRODUCT**

SOURCE:

1994 plume data, Harding Lawson Associates, North Airfield Groundwater Investigation, January 1995

LEGEND:

ug/L	Micrograms per Liter
DRO	Diesel Range Organics
GRO	Gasoline Range Organics

TREATMENT SYSTEM SUMMARY

	INSTALLATION	EXPANSION	SHUTDOWN	DECOMMISSIONED
SOURCE AREA	1998	2001	2005	2011
HORIZONTAL WELL	1997	2001	2005	2011
SPARGE CURTAIN	1998	2001	2012	TO BE DETERMINED

N

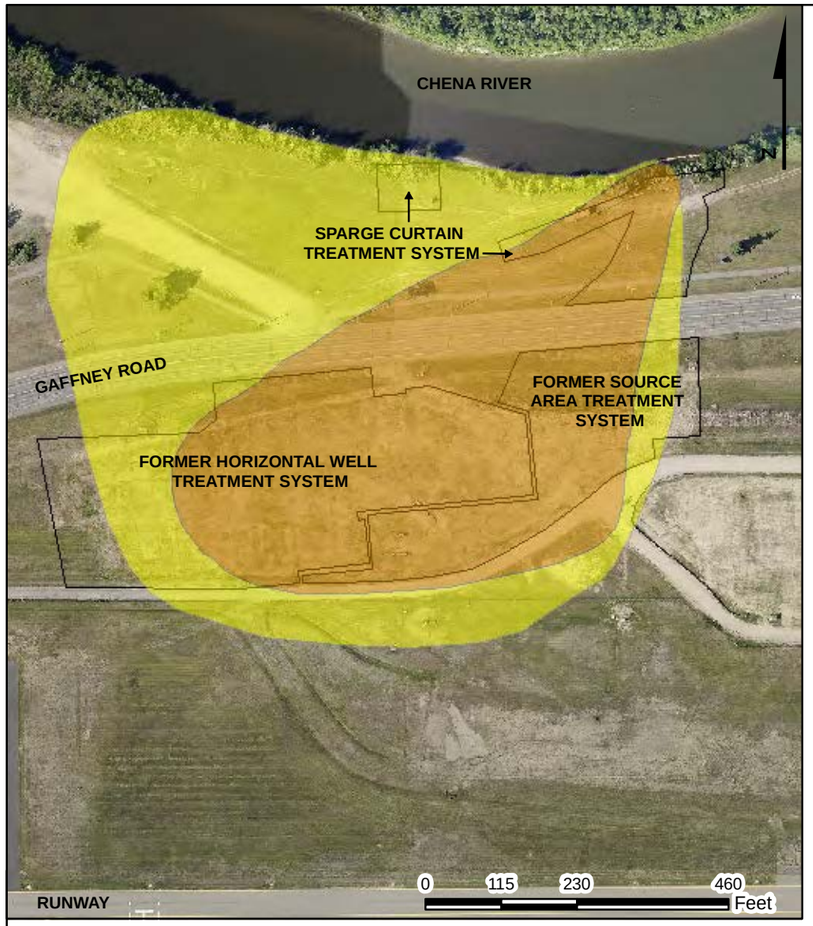
0 145 290 580 Feet

FAIRBANKS ENVIRONMENTAL SERVICES
3538 INTERNATIONAL STREET
FAIRBANKS, ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

DRO, GRO, and Benzene Contaminant Plume Changes in the WQFS
2015 Monitoring Report
Operable Unit 5
Fort Wainwright, Alaska

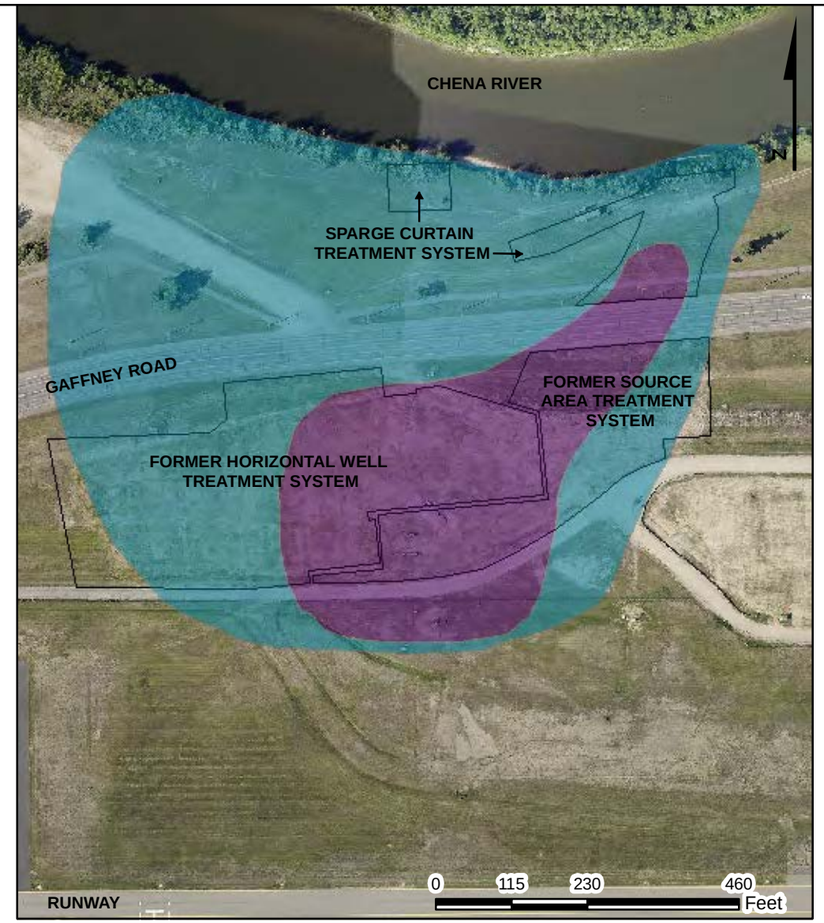
Contract: W911KB-12-D-0001 | Figure: 4-2 | Date: 8/16



2015

DISSOLVED IRON

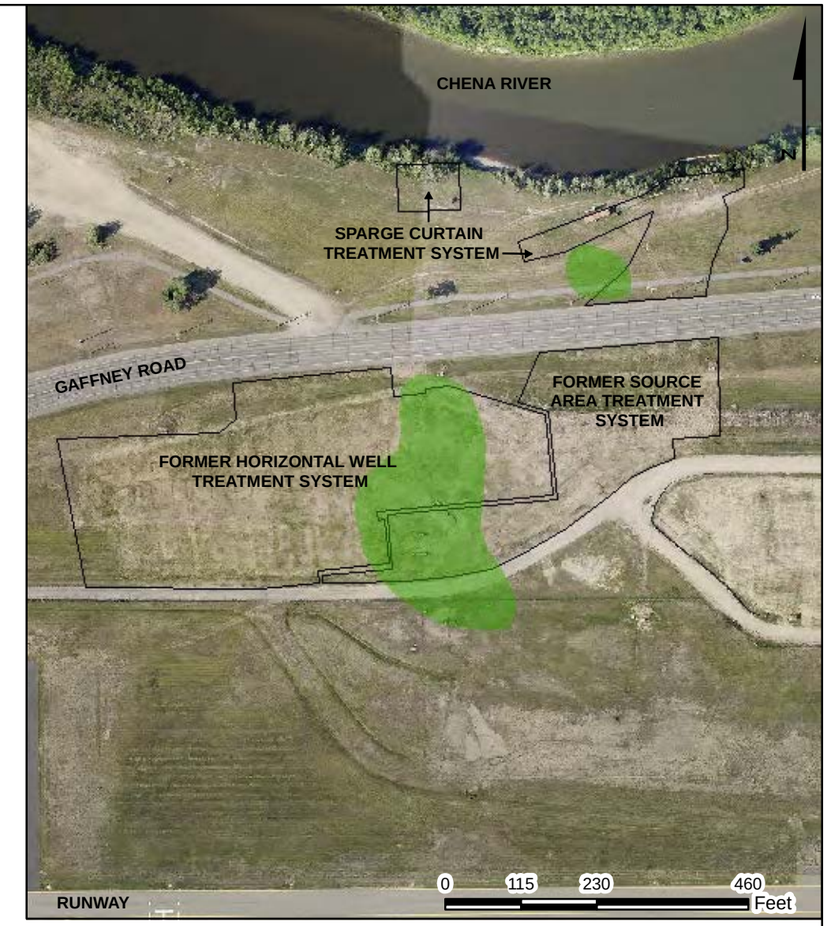
- APPROXIMATE EXTENT OF DISSOLVED IRON CONCENTRATIONS GREATER THAN 1 MG/L
- APPROXIMATE EXTENT OF DISSOLVED IRON CONCENTRATIONS GREATER THAN 10 MG/L



2015

DISSOLVED MANGANESE

- APPROXIMATE EXTENT OF DISSOLVED MANGANESE CONCENTRATIONS GREATER THAN 1 MG/L
- APPROXIMATE EXTENT OF DISSOLVED MANGANESE CONCENTRATIONS GREATER THAN 5 MG/L



2015

SULFATE

- APPROXIMATE EXTENT OF DISSOLVED SULFATE CONCENTRATIONS GREATER THAN 5 MG/L

NOTES:

1. Drawings are conceptual and are based on evaluation of available information.
2. Coordinate System - Projection: World Geodetic System 1984 (WGS84) Universal Transverse Mercator (UTM), Zone 6N
3. Aerial imagery obtained from Department of Public Works (DPW) Environmental, 2012

LEGEND:

MG/L MILLIGRAMS

Fairbanks Environmental Services
3538 International Street
Fairbanks, AK 99701

Alaska District
U.S. Army Corps of Engineers
Anchorage, AK

Estimated Extents of Iron, Manganese and Sulfate Reduction in the WQFS
2015 Monitoring Report
Operable Unit 5
Fort Wainwright, Alaska

Contract: W911KB-12-D-0001	Figure: 4-3	Date: 8/16

Tables and Charts from Final 2015 Monitoring Report (extracted from the document text)

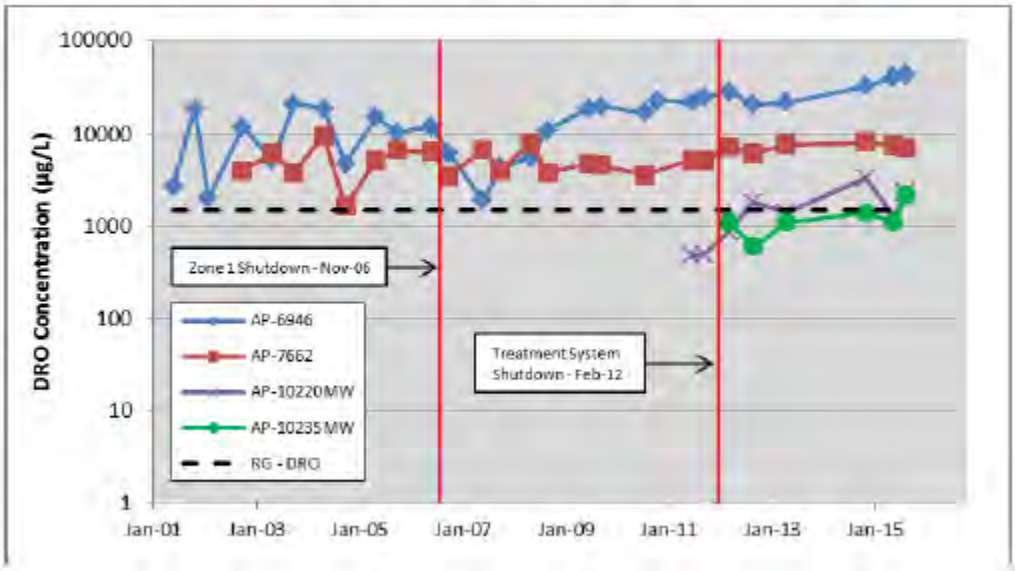
Table 3-1. Summary of 2015 Sparge Curtain Groundwater Monitoring

Wells	Screened Interval (feet bgs)	Location	Analytical Parameters
AP-6946	10 – 25	WQFS Source Area	GRO, VOCs, DRO, and Natural Attenuation Parameters[1]
AP-7662	18 – 23		
AP-7727	38 – 43		
AP-7728	30 – 35		
AP-7729	21 – 26		GRO, VOCs, EDB, DRO, PAH, and Natural Attenuation Parameters[1]
AP-10220MW	13 – 23		
AP-10221MW	13 – 23		
AP-10222MW	13 – 23		
AP-10235MW	18 – 23		

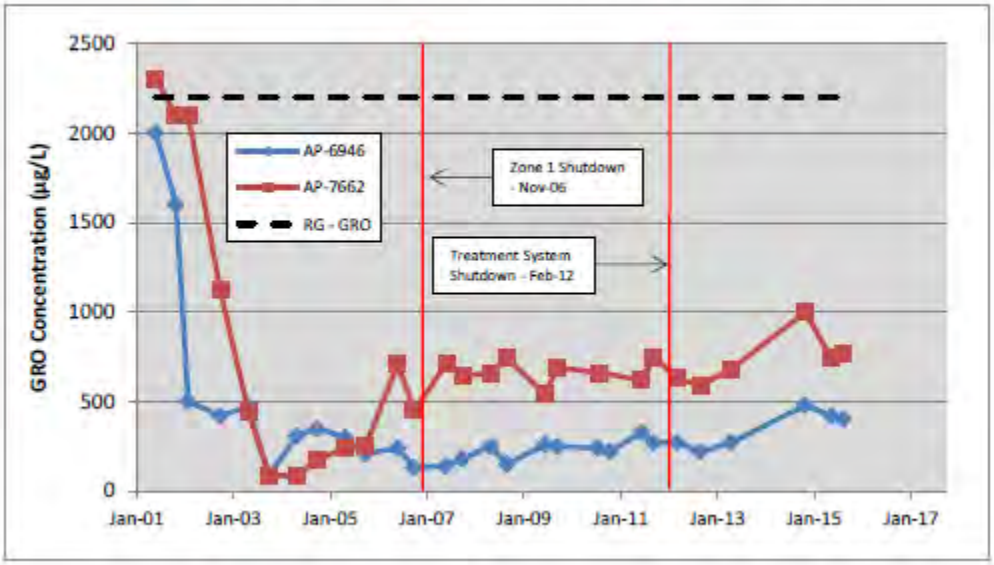
[1] Natural attenuation parameters include dissolved iron, dissolved manganese, and sulfate

bgs – below ground surface; GRO – gasoline range organics; EDB – 1,2-dibromoethane; PAH – polynuclear aromatic hydrocarbons

Graph 3-1. DRO Concentrations in Sparge Curtain Wells



Graph 3-2. GRO Concentrations in Sparge Curtain Wells



Graph 3-3. Benzene Concentrations in Sparge Curtain Wells

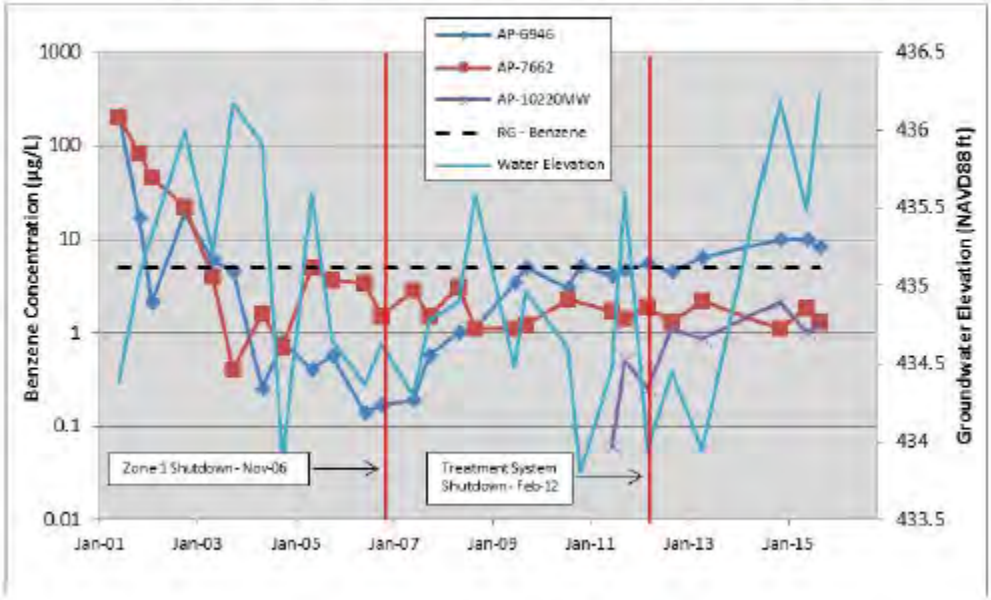


Table 3-3. TAH and TAqH Concentrations in Wells along the Chena River[1]

Well	Location	May 2015		August 2015	
		TAH (µg/L)	TAqH (µg/L)	TAH (µg/L)	TAqH (µg/L)
Alaska Water Quality Standards		**10**	**15**	**10**	**15**
AP-7729	Sparge Curtain	0.5	0.6	0.5	0.6
AP-10220MW		1.4	1.6	1.6	1.8
AP-10221MW		0.5	0.6	0.5	0.6
AP-10222MW		0.5	0.6	0.5	0.6
AP-10235MW		0.5	0.7	0.5	0.7

[1] The LOD was used for calculating TAH and TAqH concentrations for non-detected analytes (ADEC, 2012b)

Table 3-4. Contaminant Concentration Trends for Sparge Curtain Wells (2012 through 2015)[1]

Well Location	DRO	GRO	Benzene
AP-6946	**I**	I[2]	**I[2]**
AP-7662	**NT**	PI	S
AP-10220MW	**NT**	NT[2]	PI[2]
AP-10235MW	**PI[2]**	NA	NA

Wells with trends in **bold type** exceeded cleanup levels during 2015.

[1] All trends are based on Mann-Kendall analysis unless noted. The Mann-Kendall analysis typically resulted in better confidence of the trend than Linear Regression.

[2] Linear Regression trend.

NA – Not Applicable; NT – No Trend; S – Stable; I – Increasing; PI – Potentially Increasing

Table 3-6. Chena River Sheen Observations (2012 through 2015)

Station ID	Number of Sheen Observations				
	2012[1]	2013[2]	2014[3]	2015	TOTAL
0+00	0	0	0	0	0
0+10	0	0	0	0	0
0+20[5]	1[5]	0	0	0	1[5]
0+30[5]	1[5]	0	0	0	1[5]
0+40	0	0	0	0	0
0+50	**6**	0	0	**0**	**6**
0+60	**7**	0	0	**0**	**7**
0+70	**2**	0	0	**0**	**2**
0+80	**2**	**1**	0	**1**	**4**
0+90	**3**	**2**	**1**	**1**	**7**
1+00	**4**	**4**	**1**	**1**	**10**
1+10	**3**	**8**	**1**	**1**	**13**
1+20	**2**	**3**	0	**1**	**6**
1+30	0	0	0	**1**	**1**
1+40	0	0	0	0	0
1+50	0	0	0	0	0
1+60	0	0	0	0	0
1+70	0	0	0	0	0
1+80	0	0	0	0	0

BOLD indicates sheen detected during weekly inspections

Gray shading indicates the observation stations covered by the boom system

[1] A total of 26 inspections were conducted in 2012

[2] A total of 21 inspections were conducted in 2013

[3] A total of 4 inspections were conducted in 2014

[4] A total of 11 observations were conducted in 2015

[5] Sheen identified at 0+20 and 0+30 were associated with a storm water outfall and not contamination from OU5

Table 4-1. Summary of 2015 WQFS Groundwater Monitoring

Wells	Screened Interval (feet bgs)	Location	Analytical Parameters
AP-7455S	19 – 24	DRO Plume and Benzene Area	DRO, GRO, VOCs, and NA Parameters[1]
AP-10260MW[2]	14 – 19		
OU5-TW6	14 – 24		
OU5-TW2	14 – 19		DRO, VOCs, and NA Parameters[1]
OU5-TW3	14 – 19		
OU5-TW5	14 – 19		
OU5-TW7	14 – 24		
OU5-TW8	13.5 – 23.5		
OU5-TW9	12.5 – 22.5		
OU5-TW10	14 – 24		
OU5-TW4[3]	14-19		BROKEN - NO SAMPLE COLLECTED
AP-5974	13 – 23	DRO Plume	DRO, GRO, VOCs, and NA Parameters[1]
AP-8064	12 – 22		
AP-5975	13 – 23		DRO, VOCs, and NA Parameters[1]
AP-6887	9.5 – 27.5		
AP-6888	12 – 27.5		
AP-6889	11.5 – 21.5		
AP-7742	16 – 21		
AP-8065	13 – 23		
AP-8066	12.5 – 22.5		
AP-10043MW	13.5 – 23.5		
AP-6882	10 – 27	Chena River Wells	DRO, VOCs, and NA Parameters[1]
AP-6892	7.5 – 22.5		
AP-6893	11 – 28		
AP-7832S	32 – 37		
AP-7838	14 – 24		

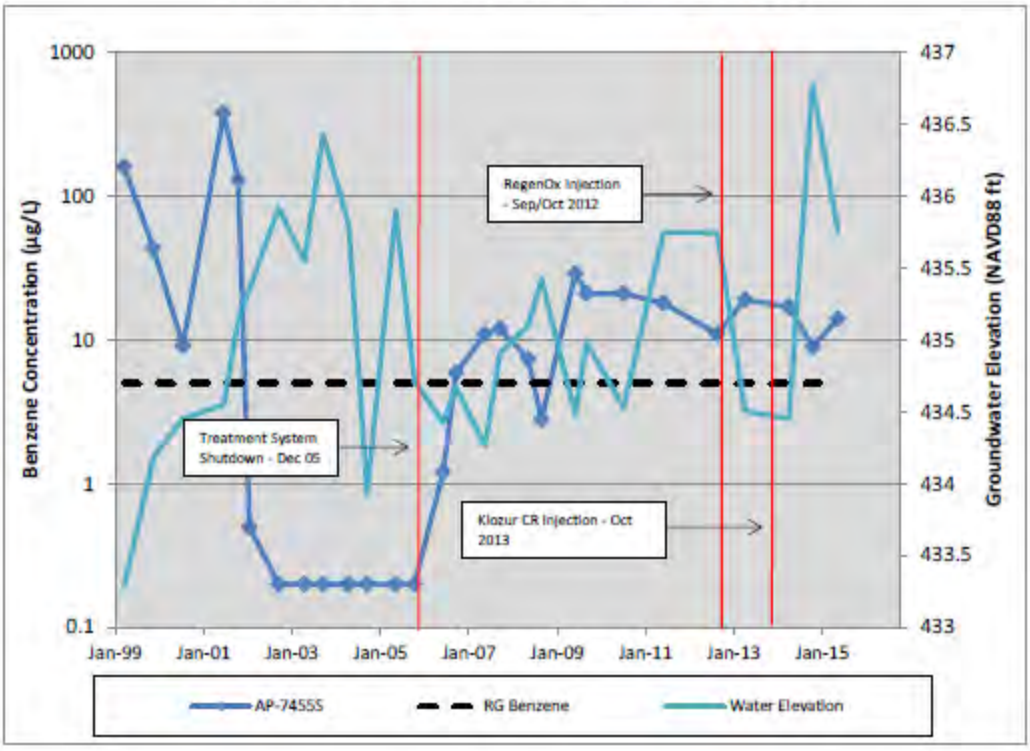
[1] NA (nnatural attenuation) parameters include dissolved iron, dissolved manganese, and sulfate

[2] AP-10260MW is a replacement well for OU5-TW1

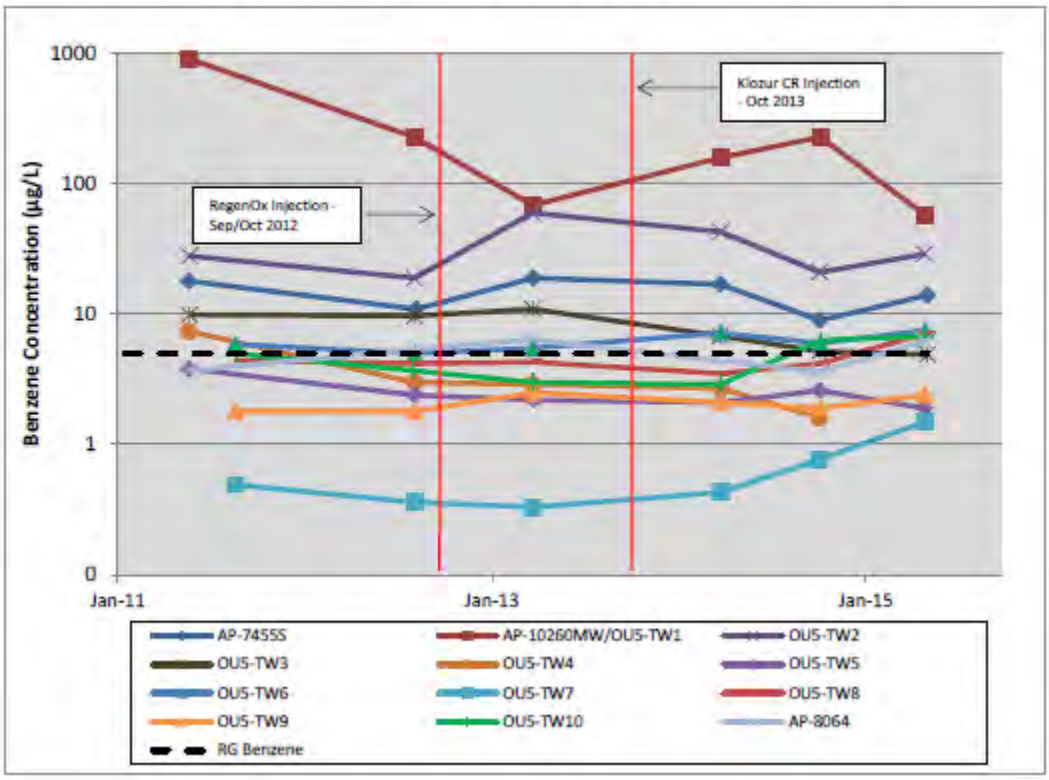
[3] OU5-TW4 could not be sampled due to a broken screen

bgs – below ground surface

Graph 4-1. Benzene Concentration in AP-7455S



Graph 4-2. Benzene Concentrations in WQFS Benzene Area Wells



Graph 4-3. DRO Concentrations in WQFS DRO Plume Wells

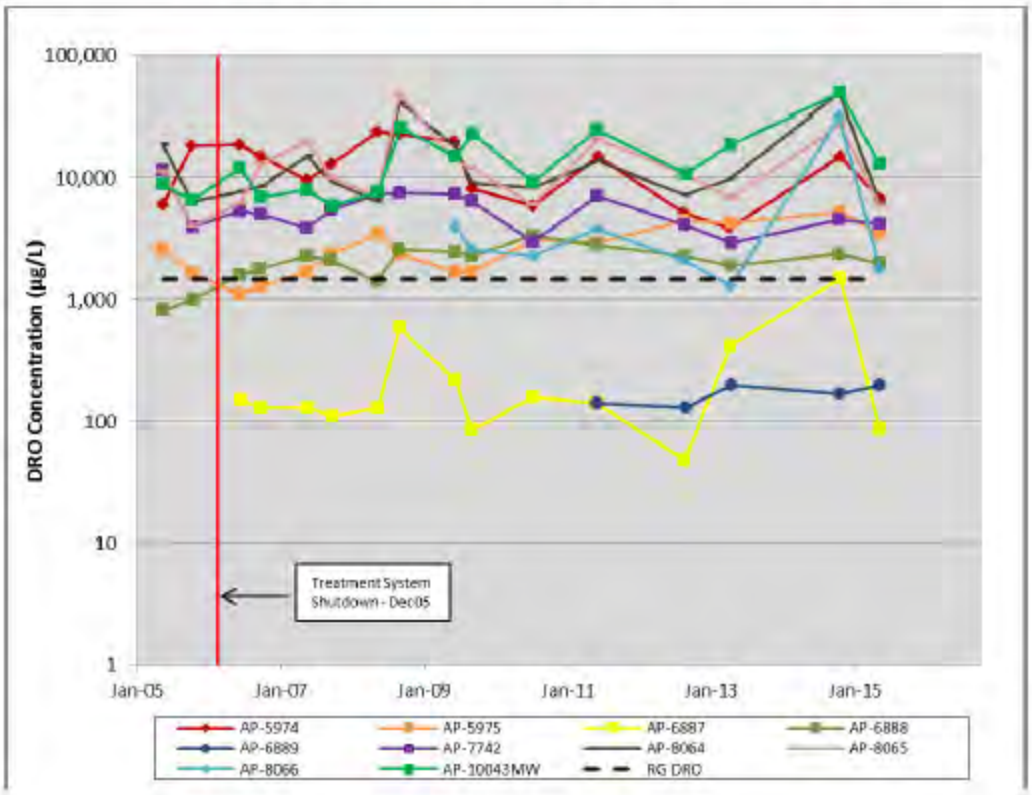


Table 4-5. TAH Concentrations in Wells Nearest the Chena River[1]

Well	October 2015
	TAH[1] (µg/L)
AWQS	**10**
AP-6882	0.7
AP-6892	0.5
AP-6893	0.4
AP-7832S	0.5
AP-7838	0.9

[1] The LOD was used for calculating TAH concentrations for non-detected analytes

Table 4-6. Contaminant Trend Analysis Results for WQFS Benzene Area Wells

Well	ISCO Treatability Study (2011 through 2015)		
	DRO	GRO	Benzene
AP-7455S	**PI (NT)**	I (NT)	**S (S)**
AP-8064	**NT (NT)**	S (PD[1])	**NT** (S)
OU5-TW1/AP-10260MW	**S (S)**	**D (PD[1])**	**PD (NT[1])**
OU5-TW2	**NT (NT[1])**	N/A (N/A)	**NT (NT[1])**
OU5-TW3	**S (D)**	N/A (N/A)	D **(PD[1])**
OU5-TW4	N/A **(D[1])**	N/A (N/A)	N/A (D)
OU5-TW5	**S (S)**	N/A (N/A)	D[1] (PD[1])
OU5-TW6	**S (S)**	**NT[1] (S)**	**PI[1] (NT)**
OU5-TW7	**NT (NT)**	N/A (N/A)	PI[1] (NT)
OU5-TW8	**S (S)**	N/A (N/A)	**NT[1]** (S)
OU5-TW9	**NT (S)**	N/A (N/A)	NT (NT)
OU5-TW10	**NT (NT)**	N/A (N/A)	**NT (I[1])**

[1] Indicates the linear regression trend was selected over the Mann-Kendall trend

BOLD indicates the analyte was above cleanup levels in the 2014 and/or 2015 sampling event

2014 result shown in parentheses

N/A – Not Applicable due to too few sampling results

NT – No Trend; S – Stable; PD – Potentially Decreasing; D – Decreasing; I – Increasing; PI – Potentially Increasing

Table 4-7. Trend Analysis Results WQFS DRO Plume Wells

Well	Pre & Active Treatment (through 2005)	Post Treatment (Fall 2007 through 2015)
	DRO	DRO
AP-5974*	**S**	**PD**
AP-5975	**D**	**I**
AP-6888	D	**S**
AP-7742*	**I**	**PD**
AP-8064	**S**	**S**
AP-8065	**S**	**S**
AP-8066	D	**NT**
AP-10043MW	**S**	**NT**

* AP-5974 is located upgradient of the Horizontal Well treatment system's influence. AP-7742 is on the downgradient edge of the Source Area system's influence.

Wells in **bold type** exceeded the cleanup level during the final year of the analysis (2005 and 2015).

AP-6887 and AP-6889 were not included as these wells only rarely exceeded the cleanup level and were outside of the treatment system influence.

NT – No Trend; S – Stable; PD – Potentially Decreasing; D – Decreasing; PI – Potentially Increasing; I – Increasing

Table 4-8. Plume Stability Analysis for WQFS Benzene Area Wells

Plume Stability Parameter	Mann-Kendall Trend Result		
	DRO	GRO	Benzene
Zeroth Moment (Dissolved Mass)	S	S	NT
First Moment (Distance from the Source to the Center of Mass)	S	D	D
Second Moment (Plume Spread)			
Parallel to Groundwater Flow	D	D	D
Perpendicular to Groundwater Flow	D	S	S

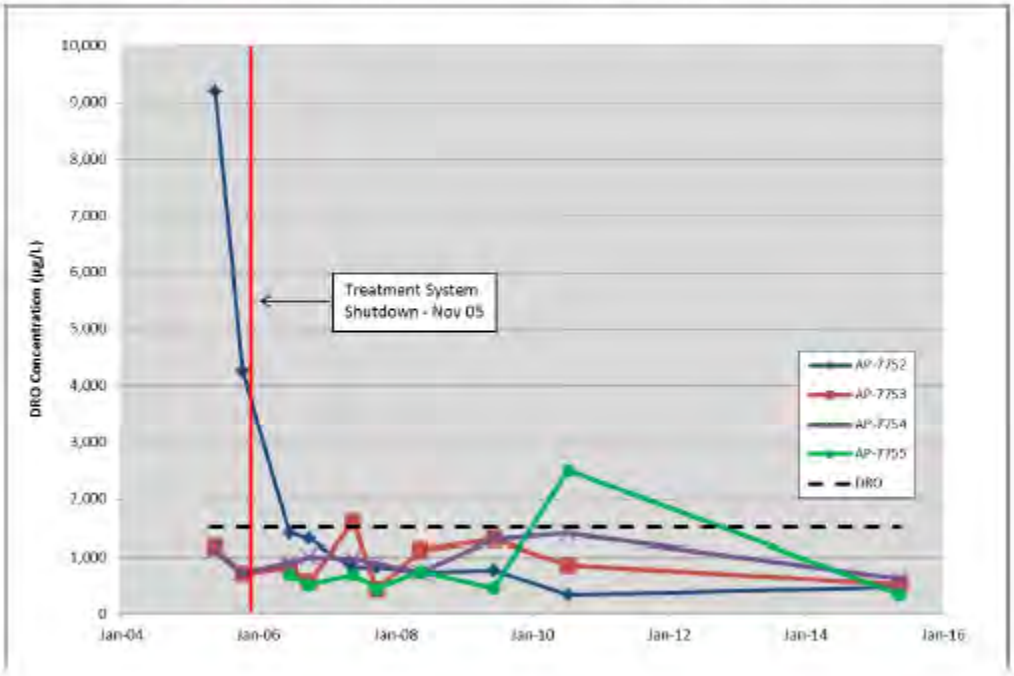
NT – No Trend; S – Stable; D – Decreasing;

Table 5-2. Summary of 2015 EQFS Flowpath D Groundwater Monitoring

Well	Distance Along Flowpath	Screened Interval (feet bgs)	Analytical Parameters
AP-7823	0	12 - 22	DRO and Natural Attenuation Parameters[1]
AP-7751	187	11.5 – 21.5	*Decommissioned in 2013 – not sampled in 2015*
AP-7752	295	11.5 – 21.5	DRO and Natural Attenuation Parameters[1]
AP-7753	357	11.5 – 21.5	
AP-7754	427	11.5 – 21.5	
AP-7755	465	11.5 – 21.5	
AP-7490	547	10 - 20	

[1]Natural attenuation parameters include dissolved iron, manganese, and sulfate.

Graph 5-1. DRO Concentrations in EQFS Flowpath D Wells



OU-5 East Quartermaster's Fueling System

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OU-5 EQFS Trend Analysis

DRO groundwater concentrations (µg/L) were subjected to the Mann-Kendall test to determine if any surveillance well shows a statistically significant upward or downward trend in concentration.

The Mann-Kendall test, described in the USEPA document: Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance (USEPA, March 2009) and USACE Engineer Manual: Environmental Quality – Environmental Statistics (USACE, May 2013), is an accepted method for identifying the presence of a significant upward trend at surveillance wells. Under this method it is assumed that no discernible linear trend exists in concentration data over time (null hypothesis). To test this hypothesis the Mann-Kendall statistic (test statistic) is determined. The test statistic is a function of the sample data which quantifies the probability associated with the relative magnitudes of the sample data for a given sample size (n). The significance of this probability is determined by comparison to the critical value, a threshold value of statistical significance. Under the normal approximation to the Mann-Kendall test, the critical value is determined based on a 95% level of confidence associated with the standard normal distribution. If the test statistic exceeds the critical value, the null hypothesis is rejected and the alternative hypothesis (concentrations are trending) accepted. For small sample sizes ($n \leq 10$) a slightly different procedure is utilized, in which the probability is calculated directly and compared to the selected level of significance (0.05 for a 95% level of confidence); in this case, the null hypothesis is rejected if the probability is less than the level of significance. Rejection of the null hypothesis is considered to be strong evidence of an upward trend; if the null hypothesis is not rejected there is insufficient evidence for identifying a significant, non-zero trend.

The results of the DRO groundwater concentration trend evaluation are presented in the following table. A downward trend was identified in wells AP 7751, 7752, 7753, 7754 and 7490. No trend was identified in wells AP 7755 and AP 7823.

WELL	SAMPLE SIZE (N)	TEST STATISTIC	CRITICAL VALUE
AP 7751	21	-2.36	-1.64
AP 7752	22	-3.72	-1.64
AP 7753	22	-3.19	-1.64
AP 7754	22	-2.20	-1.64
AP 7755	15	-1.29	-1.64
AP 7490	15	-1.78	-1.64

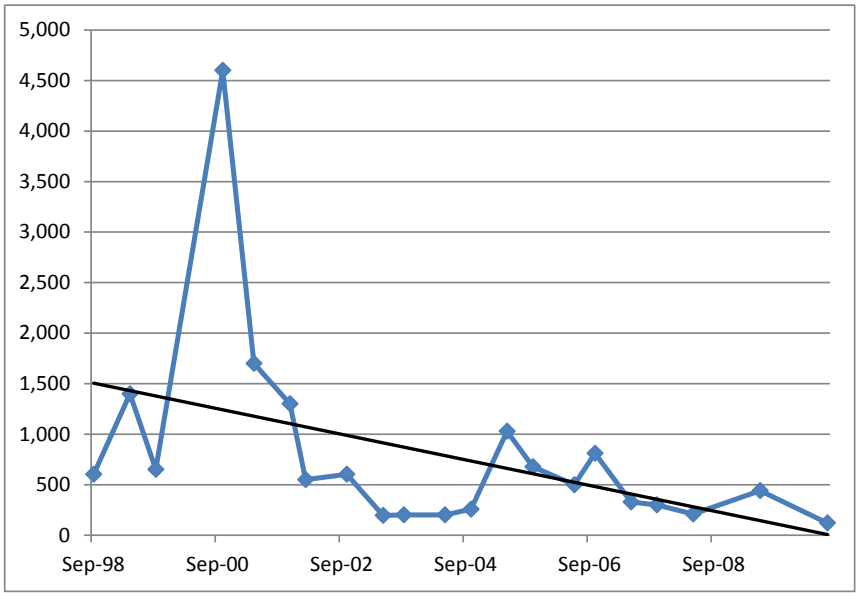
NOTE: If Test Statistic < Critical Value, there is evidence of trending.

WELL	SAMPLE SIZE (N)	TEST PROBABILITY	LEVEL OF SIGNIFICANCE
AP 7823	8	0.4	0.05

NOTE: If the Test Probability < Level of Significance, there is evidence of trending.

Well AP-7751

DRO	µg/L
Sep-98	602
Apr-99	1,400
Sep-99	650
Oct-00	4,600
Apr-01	1,700
Nov-01	1,300
Feb-02	550
Oct-02	602
May-03	197
Sep-03	200
May-04	201
Oct-04	256
May-05	1,030
Oct-05	678
Jun-06	500
Oct-06	810
May-07	330
Oct-07	300
May-08	210
Jun-09	440
Jul-10	120



Mann-Kendall Test Using Normal Approximation for Larger Samples

S	-79		
V(S)	1096	n	21
z	**-2.36**		
Z(0.9)	**-1.28**	Z(0.95)	**-1.64**

Ho: No trend

Ha: Downward Trend

Reject Ho if z< Z(0.9)

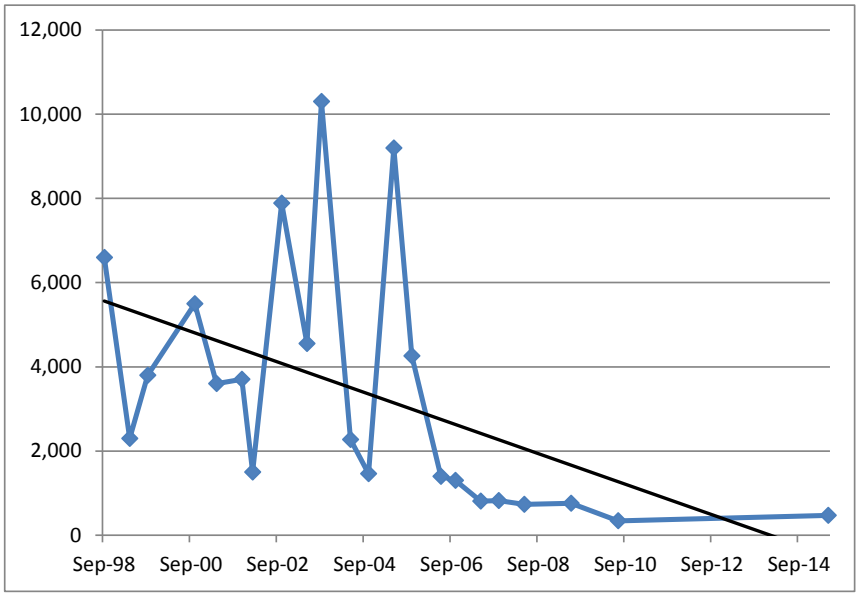
Ho is rejected, there is evidence of a downward trend at the 90% level of confidence

Reject Ho if z< Z(0.95)

Ho is rejected, there is evidence of a downward trend at the 95% level of confidence

Well AP-7752

DRO	µg/L
Sep-98	6,600
Apr-99	2,300
Sep-99	3,800
Oct-00	5,500
Apr-01	3,600
Nov-01	3,700
Feb-02	1,500
Oct-02	7,890
May-03	4,550
Sep-03	10,300
May-04	2,270
Oct-04	1,460
May-05	9,200
Oct-05	4,260
Jun-06	1,400
Oct-06	1,300
May-07	810
Oct-07	820
May-08	730
Jun-09	760
Jul-10	340
May-15	470



Mann-Kendall Test Using Normal Approximation for Larger Samples

S	-133		
V(S)	1258	n	22
z	**-3.72**		
Z(0.9)	**-1.28**	Z(0.95)	**-1.64**

Ho: No trend

Ha: Downward Trend

Reject Ho if z< Z(0.9)

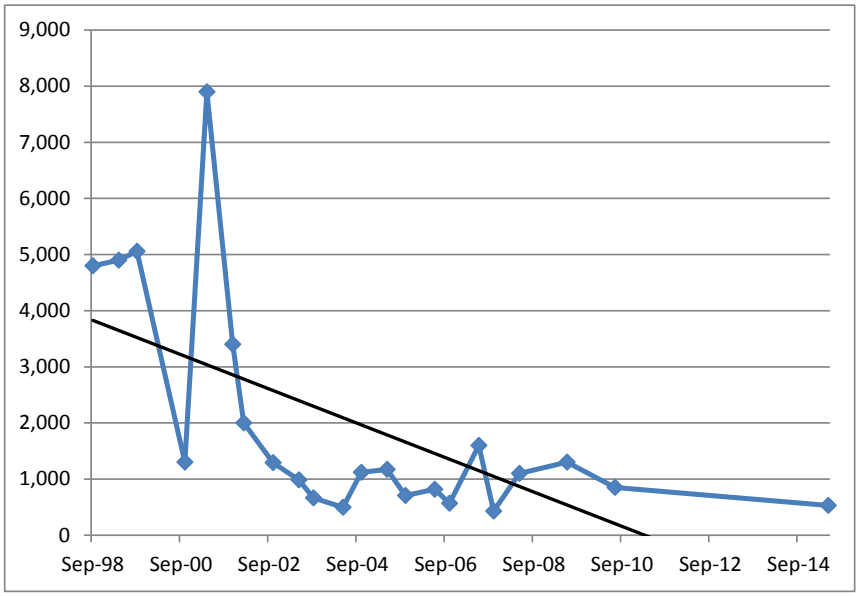
Ho is rejected, there is evidence of a downward trend at the 90% level of confidence

Reject Ho if z< Z(0.95)

Ho is rejected, there is evidence of a downward trend at the 95% level of confidence

Well AP-7753

DRO	µg/L
Sep-98	4,800
Apr-99	4,900
Sep-99	5,060
Oct-00	1,300
Apr-01	7,900
Nov-01	3,400
Feb-02	2,000
Oct-02	1,290
May-03	985
Sep-03	662
May-04	496
Oct-04	1,120
May-05	1,170
Oct-05	707
Jun-06	820
Oct-06	570
Jun-07	1,600
Oct-07	430
May-08	1,100
Jun-09	1,300
Jul-10	850
May-15	530



Mann-Kendall Test Using Normal Approximation for Larger Samples

S	-114		
V(S)	1257	n	22
z	**-3.19**		
Z(0.9)	**-1.28**	Z(0.95)	**-1.64**

Ho: No trend

Ha: Downward Trend

Reject Ho if z< Z(0.9)

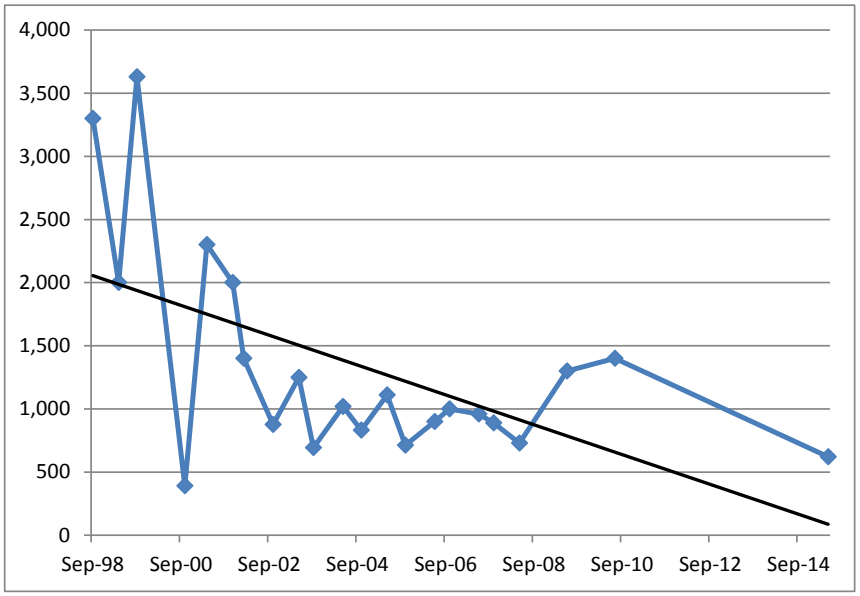
Ho is rejected, there is evidence of a downward trend at the 90% level of confidence

Reject Ho if z< Z(0.95)

Ho is rejected, there is evidence of a downward trend at the 95% level of confidence

Well AP-7754

DRO	µg/L
Sep-98	3,300
Apr-99	2,000
Sep-99	3,630
Oct-00	390
Apr-01	2,300
Nov-01	2,000
Feb-02	1,400
Oct-02	876
May-03	1,250
Sep-03	693
May-04	1,020
Oct-04	832
May-05	1,110
Oct-05	712
Jun-06	900
Oct-06	1,000
Jun-07	960
Oct-07	890
May-08	730
Jun-09	1,300
Jul-10	1,400
May-15	620



Mann-Kendall Test Using Normal Approximation for Larger Samples

S	-79		
V(S)	1256	n	22
z	**-2.20**		
Z(0.9)	**-1.28**	Z(0.95)	**-1.64**

Ho: No trend

Ha: Downward Trend

Reject Ho if z< Z(0.9)

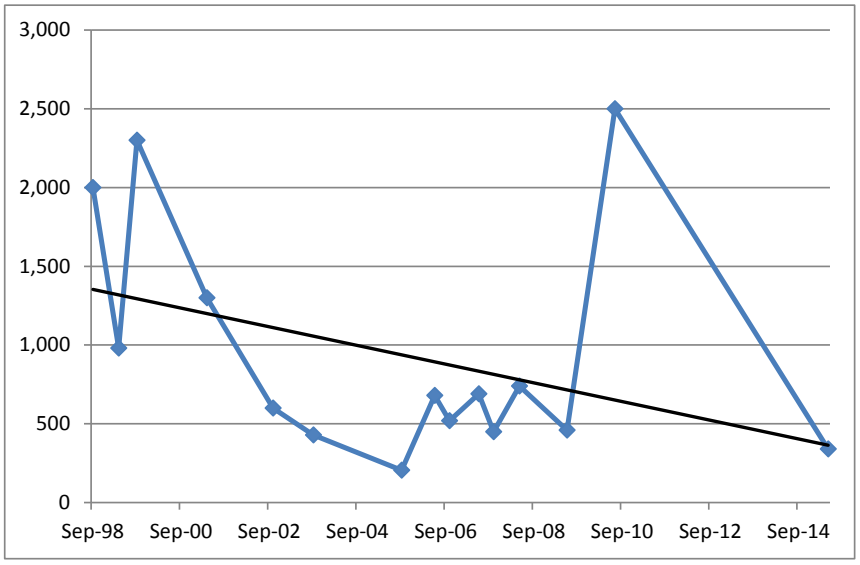
Ho is rejected, there is evidence of a downward trend at the 90% level of confidence

Reject Ho if z< Z(0.95)

Ho is rejected, there is evidence of a downward trend at the 95% level of confidence

Well AP-7755

DRO	µg/L
Sep-98	2,000
Apr-99	980
Sep-99	2,300
Apr-01	1,300
Oct-02	600
Sep-03	429
Sep-05	205
Jun-06	680
Oct-06	520
Jun-07	690
Oct-07	450
May-08	740
Jun-09	460
Jul-10	2,500
May-15	340



Mann-Kendall Test Using Normal Approximation for Larger Samples

S	-27		
V(S)	408.33	n	15
z	**-1.29**		
Z(0.9)	**-1.28**	Z(0.95)	**-1.64**

Ho: No trend

Ha: Downward Trend

Reject Ho if z< Z(0.9)

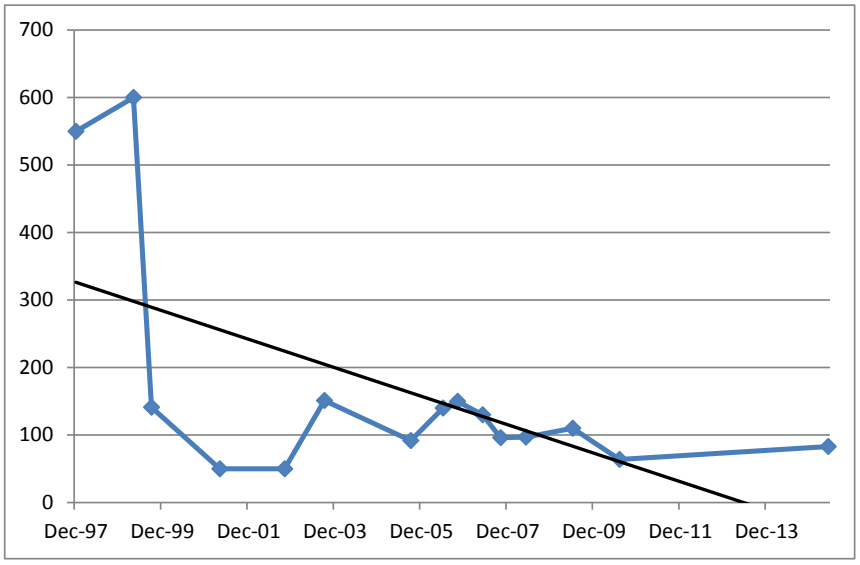
Ho is rejected, there is evidence of a downward trend at the 90% level of confidence

Reject Ho if z< Z(0.95)

Ho is not rejected, there is no evidence of a downward trend at the 95% level of confidence

Well AP-7490

DRO	µg/L
Dec-97	550
Apr-99	600
Sep-99	141
Apr-01	50
Oct-02	50
Sep-03	151
Sep-05	91.6
Jun-06	140
Oct-06	150
May-07	130
Oct-07	96
May-08	97
Jun-09	110
Jul-10	64
May-15	83



Mann-Kendall Test Using Normal Approximation for Larger Samples

S	-37		
V(S)	407.33	n	15
z	**-1.78**		
Z(0.9)	**-1.28**	Z(0.95)	**-1.64**

Ho: No trend

Ha: Downward Trend

Reject Ho if z< Z(0.9)

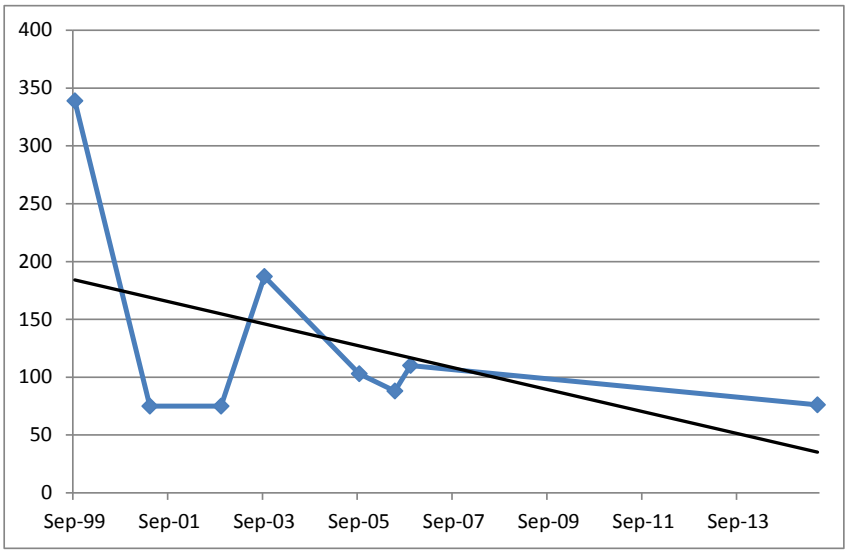
Ho is rejected, there is evidence of a downward trend at the 90% level of confidence

Reject Ho if z< Z(0.95)

Ho is rejected, there is evidence of a downward trend at the 95% level of confidence

Well AP-7823

DRO	µg/L
Sep-99	339
Apr-01	75
Oct-02	75
Sep-03	187
Sep-05	103
Jun-06	88
Oct-06	110
May-15	76



Mann-Kendall Trend Test for Small Sample Sizes (n≤10)

S	-3	
p	**0.400**	From Table B-10
n	8	

Ho: No trend

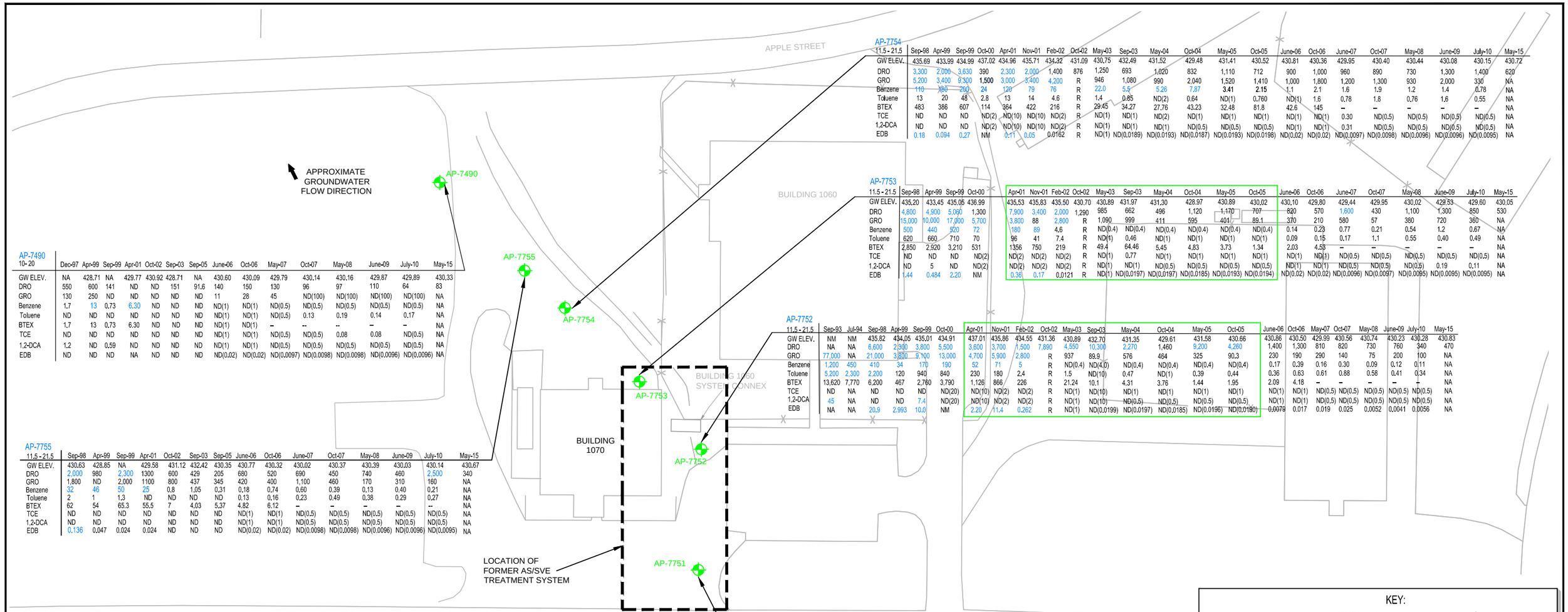
Ha: Downward Trend

Reject Ho if p< 0.1

Ho is not rejected, there is no evidence of a downward trend at the 90% level of confidence

Reject Ho if p< 0.05

Ho is not rejected, there is no evidence of a downward trend at the 95% level of confidence



AP-7754

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	June-07	Oct-07	May-08	June-09	July-10	May-15
GW ELEV.	435.69	433.99	434.99	437.02	434.96	435.71	434.32	431.09	430.75	432.49	431.52	429.48	431.41	430.52	430.81	430.36	429.95	430.40	430.44	430.08	430.15	430.72
DRO	3,300	2,000	3,630	390	2,300	2,000	1,400	876	1,250	693	1,020	832	1,110	712	900	1,000	960	890	730	1,300	1,400	620
GRO	5,200	3,400	9,300	1,500	3,000	3,400	4,200	R	946	1,080	990	2,040	1,520	1,410	1,000	1,800	1,200	1,300	930	2,000	330	NA
Benzene	110	180	200	24	120	79	76	R	22.0	5.5	5.26	7.87	3.41	2.15	1.1	2.1	1.6	1.9	1.2	1.4	0.78	NA
Toluene	13	20	48	2.8	13	14	4.6	R	1.4	0.85	ND(2)	0.64	ND(1)	0.760	ND(1)	1.6	0.78	1.8	0.76	1.6	0.55	NA
BTEX	483	386	607	114	364	422	216	R	29.45	34.27	27.76	43.23	32.48	81.8	42.6	145	–	–	–	–	–	NA
TCE	ND	ND	ND	ND(2)	ND(10)	ND(10)	ND(2)	R	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.30	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
1,2-DCA	ND	ND	ND	ND(2)	ND(10)	ND(10)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	0.31	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
EDB	0.18	0.094	0.27	NM	0.11	0.05	0.0162	R	ND(1)	ND(0.0189)	ND(0.0193)	ND(0.0187)	ND(0.0193)	ND(0.0198)	ND(0.02)	ND(0.02)	ND(0.0097)	ND(0.0098)	ND(0.0096)	ND(0.0096)	ND(0.0095)	NA

AP-7753

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	June-07	Oct-07	May-08	June-09	July-10	May-15
GW ELEV.	435.20	433.45	435.05	436.99	435.53	435.83	435.50	430.70	430.89	431.97	431.30	428.97	430.89	430.02	430.10	429.80	429.44	429.95	430.02	429.53	429.60	430.05
DRO	4,800	4,900	5,060	1,300	7,900	3,400	2,000	1,290	985	662	496	1,120	1,170	707	820	570	1,600	430	1,100	1,300	850	530
GRO	15,000	10,000	17,000	5,700	3,800	88	2,800	R	1,090	999	411	595	401	89.1	370	210	580	57	380	720	360	NA
Benzene	500	440	520	72	180	89	4.6	R	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.14	0.23	0.77	0.21	0.54	1.2	0.67	NA
Toluene	620	660	710	70	96	41	7.4	R	ND(1)	0.46	ND(1)	ND(1)	ND(1)	ND(1)	0.09	0.15	0.17	1.1	0.55	0.40	0.49	NA
BTEX	2,850	2,920	3,210	531	1356	750	219	R	49.4	64.46	5.45	4.83	3.73	1.34	2.03	4.53	–	–	–	–	–	NA
TCE	ND	ND	ND	ND(2)	ND(2)	ND(2)	ND(2)	R	ND(1)	0.77	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
1,2-DCA	ND	5	ND	ND(2)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	0.19	0.11	NA
EDB	1.44	0.484	2.20	NM	0.36	0.17	0.0121	R	ND(1)	ND(0.0197)	ND(0.0197)	ND(0.0185)	ND(0.0193)	ND(0.0194)	ND(0.02)	ND(0.02)	ND(0.0096)	ND(0.0097)	ND(0.0095)	ND(0.0095)	ND(0.0095)	NA

AP-7752

11.5 - 21.5	Sep-93	Jul-94	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	May-07	Oct-07	May-08	June-09	July-10	May-15
GW ELEV.	NM	NM	435.82	434.05	435.01	434.91	437.01	435.86	434.55	431.36	430.89	432.70	431.35	429.61	431.58	430.66	430.86	430.50	429.99	430.56	430.74	430.23	430.28	430.83
DRO	NA	NA	6,600	2,900	3,800	5,500	3,600	3,700	1,500	7,890	4,550	10,300	2,270	1,460	9,200	4,260	1,400	1,300	810	820	730	760	340	470
GRO	77,000	NA	21,000	3,800	9,100	13,000	4,700	5,900	2,800	R	937	89.9	576	464	325	90.3	230	190	290	140	75	200	100	NA
Benzene	1,200	450	410	34	170	190	52	71	5	R	ND(0.4)	ND(4.0)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.17	0.39	0.16	0.30	0.09	0.12	0.11	NA
Toluene	5,200	2,300	2,200	120	940	840	230	180	2.4	R	1.5	ND(10)	0.47	ND(1)	0.39	0.44	0.36	0.63	0.61	0.88	0.58	0.41	0.34	NA
BTEX	13,620	7,770	6,200	467	2,760	3,790	1,126	866	226	R	21.24	10.1	4.31	3.76	1.44	1.95	2.09	4.18	–	–	–	–	–	NA
TCE	ND	NA	ND	ND	ND	ND(20)	ND(10)	ND(2)	ND(2)	R	ND(1)	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
1,2-DCA	45	NA	ND	ND	7.4	ND(20)	ND(10)	ND(2)	ND(2)	R	ND(1)	ND(10)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
EDB	NA	NA	20.9	2.993	10.0	NM	2.20	11.4	0.262	R	ND(1)	ND(0.0199)	ND(0.0197)	ND(0.0185)	ND(0.0196)	ND(0.0190)	0.0079	0.017	0.019	0.025	0.0052	0.0041	0.0056	NA

AP-7490

10- 20	Dec-97	Apr-99	Sep-99	Apr-01	Oct-02	Sep-03	Sep-05	June-06	Oct-06	May-07	Oct-07	May-08	June-09	July-10	May-15
GW ELEV.	NA	428.71	NA	429.77	430.92	428.71	NA	430.60	430.09	429.79	430.14	430.16	429.87	429.89	430.33
DRO	550	600	141	ND	ND	151	91.6	140	150	130	96	97	110	64	83
GRO	130	250	ND	ND	ND	ND	ND	11	28	45	ND(100)	ND(100)	ND(100)	ND(100)	NA
Benzene	1.7	13	0.73	6.30	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
Toluene	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	0.13	0.19	0.14	0.17	NA
BTEX	1.7	13	0.73	6.30	ND	ND	ND	ND(1)	ND(1)	–	--	--	–	–	NA
TCE	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	0.08	0.08	ND(0.5)	NA
1,2-DCA	1.2	ND	0.59	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
EDB	ND	ND	ND	NA	ND	ND	ND	ND(0.02)	ND(0.02)	ND(0.0097)	ND(0.0098)	ND(0.0098)	ND(0.0096)	ND(0.0096)	NA

AP-7755

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Apr-01	Oct-02	Sep-03	Sep-05	June-06	Oct-06	June-07	Oct-07	May-08	June-09	July-10	May-15
GW ELEV.	430.63	428.85	NA	429.58	431.12	432.42	430.35	430.77	430.32	430.02	430.37	430.39	430.03	430.14	430.67
DRO	2,000	980	2,300	1300	600	429	205	680	520	690	450	740	460	2,500	340
GRO	1,800	ND	2,000	1100	800	437	345	420	400	1,100	460	170	310	160	NA
Benzene	32	46	50	25	0.8	1.05	0.31	0.18	0.74	0.60	0.39	0.13	0.40	0.21	NA
Toluene	2	1	1.3	ND	ND	ND	ND	0.13	0.16	0.23	0.49	0.38	0.29	0.27	NA
BTEX	62	54	65.3	55.5	7	4.03	5.37	4.82	6.12	–	–	–	–	–	NA
TCE	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
1,2-DCA	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	NA
EDB	0.136	0.047	0.024	0.024	ND	ND	ND	ND(0.02)	ND(0.02)	ND(0.0098)	ND(0.0098)	ND(0.0096)	ND(0.0096)	ND(0.0095)	NA

AP-7751

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	May-07	Oct-07	May-08	June-09	July-10	Aug-2012	May-15
GW ELEV.	NM	NM	NM	14.31**	16.15**	15.35**	16.54**	14.80**	15.29**	13.59**	14.55**	16.56**	14.63**	15.53**	15.37**	15.69**	16.18**	15.59**	15.60**	15.95**	15.95**	15.60**	No sample collected, well has been decommissioned
DRO	ND	1,400	650	4,600	1,700	1,300	550	ND(602)	197	200	201	256	1,030	678	500	810	330	300	210	440	120	817	
GRO	7,100	2,600	3,600	4,400	600	530	420	R	53.3	55.4	89	26.9	ND(90)	ND(90)	85	68B	180	190	20	310	50	192	
Benzene	33	13	7.2	12	2.6	0.74	0.72	R	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.12	0.25	0.14	0.20	ND(0.5)	0.22	0.09	0.15	
Toluene	880	150	110	140	11	64	6.1	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.11	0.12	0.13	0.51	0.47	0.37	0.35	ND(1)	
BTEX	2,695	516	576.2	1,109	117.7	28.54	63	R	ND(0.4)	0.86	7.85	0.8	2.09	ND(1)	3.65	3.63	–	--	–	–	–	–	
TCE	ND	ND	ND	ND(10)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.640	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	
1,2-DCA	ND	ND	ND	ND(10)	ND(2)	0.672	ND(2)	R	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	
EDB	4.89	2.56	3.60	NM	0.80	0.67	0.251	R	ND(1)	ND(0.0188)	ND(0.0197)	ND(0.0186)	ND(0.0198)	ND(0.0192)	0.0081J	ND(0.02)	0.0097	0.019	0.0067	0.0042	ND(0.0042)	ND(0.0095)	

** Indicates Depth To Groundwater, AP- 7751 Well Casing Elevation Not Available

AP-7823

12- 22	Sep-99	Apr-01	Oct-02	Sep-03	Sep-05	June-06	Oct-06	May-15
GW ELEV.	NA	429.48	430.41	438.07	435.99	436.21	435.90	436.34
DRO	339	ND	ND	187	103	88	110	76
GRO	610	130	130	ND	43.4	65	64	NA
Benzene	ND	ND	ND	ND	ND	ND(1)	ND(1)	NA
Toluene	ND	ND	ND	ND	ND	ND(1)	ND(1)	NA
BTEX	ND	ND	ND	ND	ND	ND(1)	ND(3)	NA
TCE	ND	ND	ND	ND	ND	ND(1)	ND(1)	NA
1,2-DCA	ND	ND	ND	ND	ND	ND(1)	ND(1)	NA
EDB	NA	NA	ND	ND	ND	ND(0.02)	ND(0.02)	NA

* SAMPLED FOR GEOCHEMICAL ANALYSIS BETWEEN 2007-2010

KEY:

Well number — Sampling Date

Screened interval (feet bgs) — Groundwater elevation in feet (ft) above sea level NAVD-88 — Concentration in in ug/L

AP-7490 10- 20	Dec-97	Apr-99	June-06	Oct-06
GW ELEV.	NA	428.71	430.60	430.09
DRO	550	600	140	150
GRO	130	250	11	28
Benzene	1.7	13	ND(1)	ND(1)
Toluene	ND	ND	ND(1)	ND(1)
BTEX	1.7	13	ND(1)	ND(1)
TCE	ND	ND	ND(1)	ND(1)
1,2-DCA	1.2	ND	ND(1)	ND(1)
EDB	ND	ND	ND(0.02)	ND(0.02)

Concentrations exceeding RAOs shown in blue.

LEGEND:

AP-7751	Monitoring Well
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
TCE	Trichloroethylene
1,2-DCA	1,2-Dichloroethane
EDB	1,2-Dibromoethane
ND(0.5)	Not detected (detection limit)
RAO	Remedial Action Objective
R	Data rejected
µg/L	Micrograms per Liter
–	Not Calculated
	Treatment System in Operation

NOTES:

1. Cleanup levels for GRO changed from 1,300 µg/L to 2,200 µg/L in October 2008.
2. The Building 1060 treatment system was shutdown in November 2005 and decommissioned in August 2009.
3. AP-7751 was sampled by Jacobs Engineering in August 2012 prior to well decommissioning.

Contaminant of Concern	RAO µg/L
DRO	1,500
GRO	2,200
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5

FAIRBANKS ENVIRONMENTAL SERVICES
3538 INTERNATIONAL STREET
FAIRBANKS, ALASKA

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

EQFS Groundwater Contaminant Concentrations

2015 Monitoring Report
Operable Unit 5
Fort Wainwright, Alaska

CONTRACT: W911KB-12-D-0001 | FIGURE: 5-1 | DATE: 1/16

Fig 5-1 EQFS

Table 5-1 - Flowpath D Groundwater Monitoring Results

Probe/Well Number	Distance Along Flowpath (ft)	Location	Sample Numbers	Screened Interval (feet-bgs)	Date	Water Elevation (ft-msl)	Dissolved Oxygen (mg/L)	Redox (mV)	Dissolved Manganese (mg/L)	Field Screened Manganese[1] (mg/L)	Dissolved Iron (mg/L)	Field Screened Iron[1] (mg/L)	Sulfate (mg/L)	Field Screened Sulfate[1] (mg/L)	ROD Chemicals of Concern						
															GRO (µg/L)	DRO (µg/L)	Benzene (µg/L)	Toluene (µg/L)	TCE (µg/L)	1,2-DCA (µg/L)	EDB by 504.1 (µg/L)
ROD CLEANUP LEVELS (µg/L)															2,200	1,500	5	1,000	5	5	0.05
AP-7823	0	Upgradient	07FWFPD01WG	12-22	5/31/07	435.43	0.83	7.6	1.59 Q	1.7	1.86 Q	1.8	24.6 Q	46	NA	NA	NA	NA	NA	NA	NA
			07FWFPD17WG		10/5/07	436.05	0.52	15.4	1.30	0.7	1.5	2.1	17.8	18	NA	NA	NA	NA	NA	NA	NA
			NA[2]		5/23/08	436.23	0.55	-32.1	NA	0.3	NA	1.7	NA	13	NA	NA	NA	NA	NA	NA	NA
			NA[2]		6/21/09	435.70	0.45	136.1	NA	1.8	NA	0.8	NA	21	NA	NA	NA	NA	NA	NA	NA
			10FW5D07WG		7/22/10	435.77	0.36	-42.2	1.10	0.9	2.12	2.1	25.2	22	NA	NA	NA	NA	NA	NA	NA
			15FWOU547WG		5/27/15	436.34	0.24	53.0	1.07	NA	1.83	NA	20.9	NA	NA	76 J,B	NA	NA	NA	NA	NA
AP-7751	187	Upgradient	07FWFPD02WG	11.5-21.5	5/31/07	NA	0.57	1.6	0.919 Q	0.6	1.31 Q	1.6	32.2 Q	52	180 Q	330 J,Q	0.14 J,Q	0.13 J,B,Q	ND (0.5) Q	ND (0.5) Q	ND(0.0097) Q
			07FWFPD10WG		10/5/07	NA	0.33	15.6	1.040	0.9	1.49	1.7	28.7	25	190	300 J	0.20 J	0.51	ND (0.5)	ND (0.5)	0.019
			08FW5D07WG		5/26/08	NA	0.39	65.8	NA	1.5	NA	0.9	NA	18	20 J	210 J	ND (0.5)	0.47 J	ND (0.5)	ND (0.5)	0.0067
			09FW5D04WG		6/21/09	NA	0.45	-37.3	NA	1.2	NA	1	NA	31	310	440 J	0.22 J	0.37 J	ND (0.5)	ND (0.5)	0.0042 J
			10FW5D01WG		7/22/10	NA	0.23	61.7	1.87	1.6	1.36	1.2	29.1	28	50 J	120 J	0.09 J	0.35 J, B	ND (0.5)	ND (0.5)	ND(0.0095)
			12FWA-B1060-GW-MW7751		8/31/12	NA	0.23	28.1	NA	NA	NA	NA	NA	NA	156	671	0.15 J	ND (1)	ND(1)	ND(0.5)	ND(0.0095)
			12FWA-B1060-GW-MW7751X[3]			NA									192	817	0.13 J	ND (1)	ND(1)	ND(0.5)	ND(0.0095)
AP-7752	295	Within Plume	07FWFPD03WG	11.5-21.5	5/31/07	429.99	0.63	-1.2	3.20 Q	3.7	6.48 Q	6.9	19.6 Q	39	290 Q	810 J,Q	0.16 J,Q	0.61 Q	ND (0.5) Q	ND (0.5) Q	0.019 Q
			07FWFPD11WG		10/5/07	430.56	0.41	-13.9	3.89	2.4	5.11	5.0	19.8	11	140	820	0.30 J	0.88	ND (0.5)	ND (0.5)	0.025
			08FW5D01WG		5/24/08	430.74	1.81	56.4	NA	1.2	NA	1.6	NA	22	75 J	730 J	0.09 J	0.58	ND (0.5)	ND (0.5)	0.0052 J
			09FW5D02WG		6/21/09	430.23	0.8	119	NA	1.3	NA	1.0	NA	26	200	760 J	0.12 J	0.41 J	ND (0.5)	ND (0.5)	0.0041 J
			10FW5D03WG		7/22/10	430.28	0.2	-2.9	NA	1.6	NA	2.5	NA	26	100	340 J	0.11 J	0.34 J, B	ND (0.5)	ND (0.5)	0.0056 J
			15FWOU548WG		5/27/15	430.83	0.53	64.0	1.29	NA	2.97	NA	16.4	NA	NA	470 J	NA	NA	NA	NA	NA
AP-7753	357	Within Plume	07FWFPD04WG	11.5-21.5	6/1/07	429.44	0.82	51.4	0.678 Q	2.0	1.59 Q	1.2	42.4 Q	70	580	**1,600 Q**	0.77 Q	0.17 J,B,Q	ND (0.5) Q	ND (0.5) Q	ND(0.0096) Q
			07FWFPD14WG		10/5/07	429.95	4.53	38.9	0.298	0.0	0.0614	0.1	14.3	12	57 J	430 J	0.21 J	1.1	ND (0.5)	ND (0.5)	ND (0.0097)
			08FW5D02WG		5/24/08	430.02	2.00	61.70	NA	1.9	NA	1.7	NA	16	380	1,100	0.54	0.55	ND (0.5)	ND (0.5)	ND (0.0095)
			09FW5D06WG		6/21/09	429.53	0.61	82.30	NA	4.1	NA	4.3	NA	18	720	1,300	1.2	0.40 J	ND (0.5)	0.19 J	ND (0.0095)
			10FW5D04WG		7/22/10	429.60	0.38	22.90	NA	0.7	NA	4.0	NA	30.4	360	850	0.67	0.49 J, B	ND (0.5)	0.11 J	ND (0.0095)
			15FWOU546WG		5/27/15	430.05	0.43	41.30	2.88	NA	8.58	NA	9.7	NA	NA	530 J	NA	NA	NA	NA	NA
AP-7754	427	Within Plume	07FWFPD05WG	11.5-21.5	6/1/07	429.95	1.48	1.2	1.65 Q	1.4	6.26 Q	5.1	17.1 Q	23	1,200 Q	960 Q	1.6 Q	0.78 Q	0.30 J,Q	0.31 J,Q	ND(0.0097) Q
			07FWFPD15WG		10/5/07	430.40	1.46	94	1.36	0.5	3.23	2.4	30.8	33	1,300	890	1.9	1.8	ND (0.5)	ND (0.5)	ND (0.0098)
			08FW5D04WG		5/26/08	430.44	0.79	84.8	NA	1.5	NA	1.2	NA	0	930	730 J	1.2	0.76	ND (0.5)	ND (0.5)	ND (0.0096)
			09FW5D07WG		6/21/09	430.08	1.2	-52.2	1.94	2.2	6.91	6.3	16.3	14	2,000	1,300 J	1.4	1.6	ND (0.5)	ND (0.5)	ND (0.0096)
			10FW5D05WG		7/22/10	430.15	0.89	1	1.94	2.2	6.91	2.8	16.3	18	330	1,400	0.78	0.55 B	ND (0.5)	ND (0.5)	ND (0.0095)
			15FWOU545WG		5/26/15	430.72	3.04	36.3	1.90	NA	6.89	NA	3.0	NA	NA	620 J	NA	NA	NA	NA	NA
AP-7755	465	Within Plume	07FWFPD08WG	11.5-21.5	6/1/07	430.02	1.24	-16.3	1.42 Q	1.2	5.38 Q	3.7	14.5 Q	18	1,100 Q	690 J,Q	0.60 Q	0.23 J,B,Q	ND (0.5) Q	ND (0.5) Q	ND(0.0098) Q
			07FWFPD13WG		10/5/07	430.37	1.05	89.7	0.758	0.1	0.653	0.2	25.8	20	460	450 J	0.39 J	0.49 J	ND (0.5)	ND (0.5)	ND (0.0098)
			08FW5D05WG		5/26/08	430.39	1.77	72	NA	0.6	NA	0.6	NA	24	170	740	0.13 J	0.38 J	ND (0.5)	ND (0.5)	ND (0.0096)
			09FW5D05WG		6/21/09	430.03	0.79	-20	NA	0.2	NA	1.1	NA	17.7	310	460 J	0.40 J	0.29 J	ND (0.5)	ND (0.5)	ND (0.0096)
			10FW5D06WG		7/22/10	430.14	0.51	89.9	NA	0.1	NA	2.1	NA	17.8	160	**2,500**	0.21 J	0.27 J, B	ND (0.5)	ND (0.5)	ND (0.0095)
			15FWOU543WG		5/26/15	430.67	0.74	70.1	1.64	NA	1.85	NA	16.1	NA	NA	340 J,J-	NA	NA	NA	NA	NA
			15FWOU544WG[3]						1.60	NA	1.83	NA	15.6	NA	NA	340 J,J-	NA	NA	NA	NA	NA
AP-7490	547	Downgradient	07FWFPD07WG	10-20	6/1/07	429.79	2.49	74.5	0.244 Q	0	0.0200 JBQ	0	15.8 Q	23	45 J,B,Q	130 J,Q	ND (0.5) Q	ND (0.5) Q	ND (0.5) Q	ND (0.5) Q	ND(0.0097) Q
			07FWFPD16WG		10/5/07	430.14	3.14	92.9	0.0064	0	0.0095	0	19.5	16	ND (100)	96 J,B	ND (0.5)	0.13 J	ND (0.5)	ND (0.5)	ND (0.0098)
			08FW5D06WG		5/26/08	430.16	0.63	19.7	NA	0.2	NA	0	NA	18	ND (100)	97 J	ND (0.5)	0.19 J	0.08 J	ND (0.5)	ND (0.0098)
			09FW5D01WG		6/19/09	429.87	3.58	59.5	NA	0	NA	0	NA	28	ND (13)	110 J	ND (0.5)	0.14 J	0.08 J	ND (0.5)	ND (0.0096)
			10FW5D02WG		7/22/10	429.89	2.78	93.4	NA	0	NA	0	NA	19.8	ND (100)	64 J	ND (0.5)	0.17 J, B	ND (0.5)	ND (0.5)	ND (0.0096)
			15FWOU542WG		5/26/15	430.33	0.93	68.0	0.016	NA	0.014 B	NA	26.7	NA	NA	83 J,B	NA	NA	NA	NA	NA

Notes:

[1] Natural attenuation indicator parameters were field screened with a colorimeter.

[2] No sample ID given since the sample was field screened only

[3] Sample is a Field Duplicate of the sample immediately above

Acronyms:

bgs - below ground surface.

btoc - below top of casing

DCA - 1,2-Dichloroethane

DRO - Diesel range organics.

EDB - 1,2-Dibromoethane

GRO - Gasoline range organics.

µg/L - microgram per liter.

mg/L - milligrams per liter.

msl - mean sea level

NA - Not analyzed or not applicable.

NM - Not measured.

ROD - Record of Decision.

TOC - top of casing

Data Qualifiers

ND - Not detected at the detection limit (LOD in parentheses; LOQ in parentheses for data prior to 2012.)

B - Result is qualified as a potential high estimate due to contamination present in a blank sample

J - Result is estimated due to a QC issue or because it is less than the LOQ. If result is biased low or high, it is specified as "J-" and "J+", respectively (for 2014 data and later).

Q - Result is estimated due to a QC failure (pre-2014 data only). If direction of bias is known, it is further indicated with a "L" (low) or "H" (high).

M - Result is biased due to matrix interference (pre-2014 data only). If direction of bias is known, it is further indicated with a "L" (low) or "H" (high).

ATTACHMENT 11

Open Burning/Open Detonation Area Historical Figures and Tables

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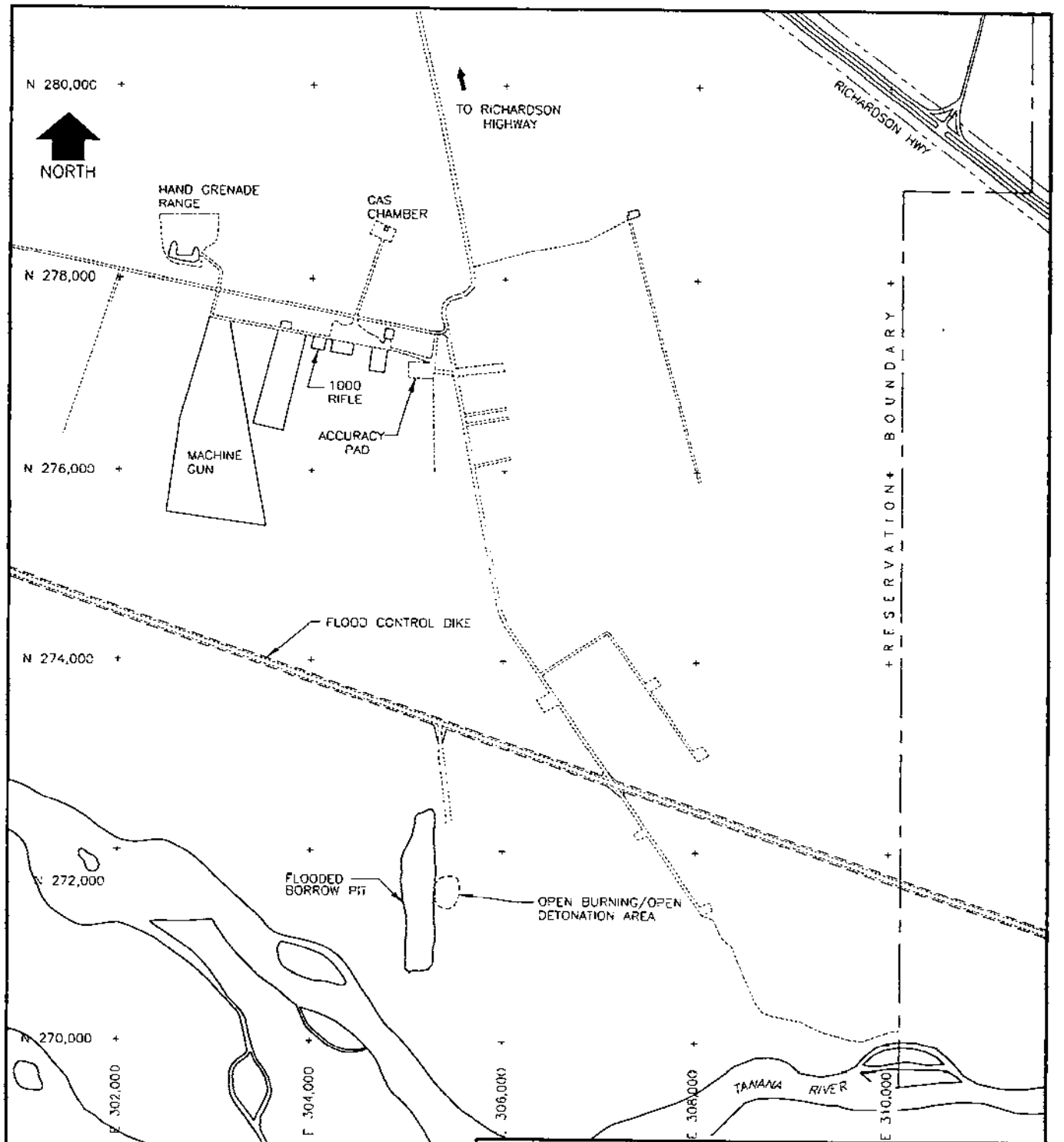

REFERENCE: DIRECTOR OF FACILITIES ENGINEERING, AS-BUILT, SQUAD LIVE FIRE ASSAULT RANGE, LOCATION AND VICINITY MAP, DATED 5/81.

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CHIEF, ARCHITECTURAL SECTION

OB/OD Area Site Plan

OU 5 Remedial Investigation
Fort Wainwright, Alaska

RECOMMENDED
CHIEF, MILITARY TECHNICAL ENGINEERING BRANCH

APPROVED
CHIEF, ENGINEERING DIVISION

DATE 3/96

SCALE NOTED

SPEC NO

FIGURE
1-11

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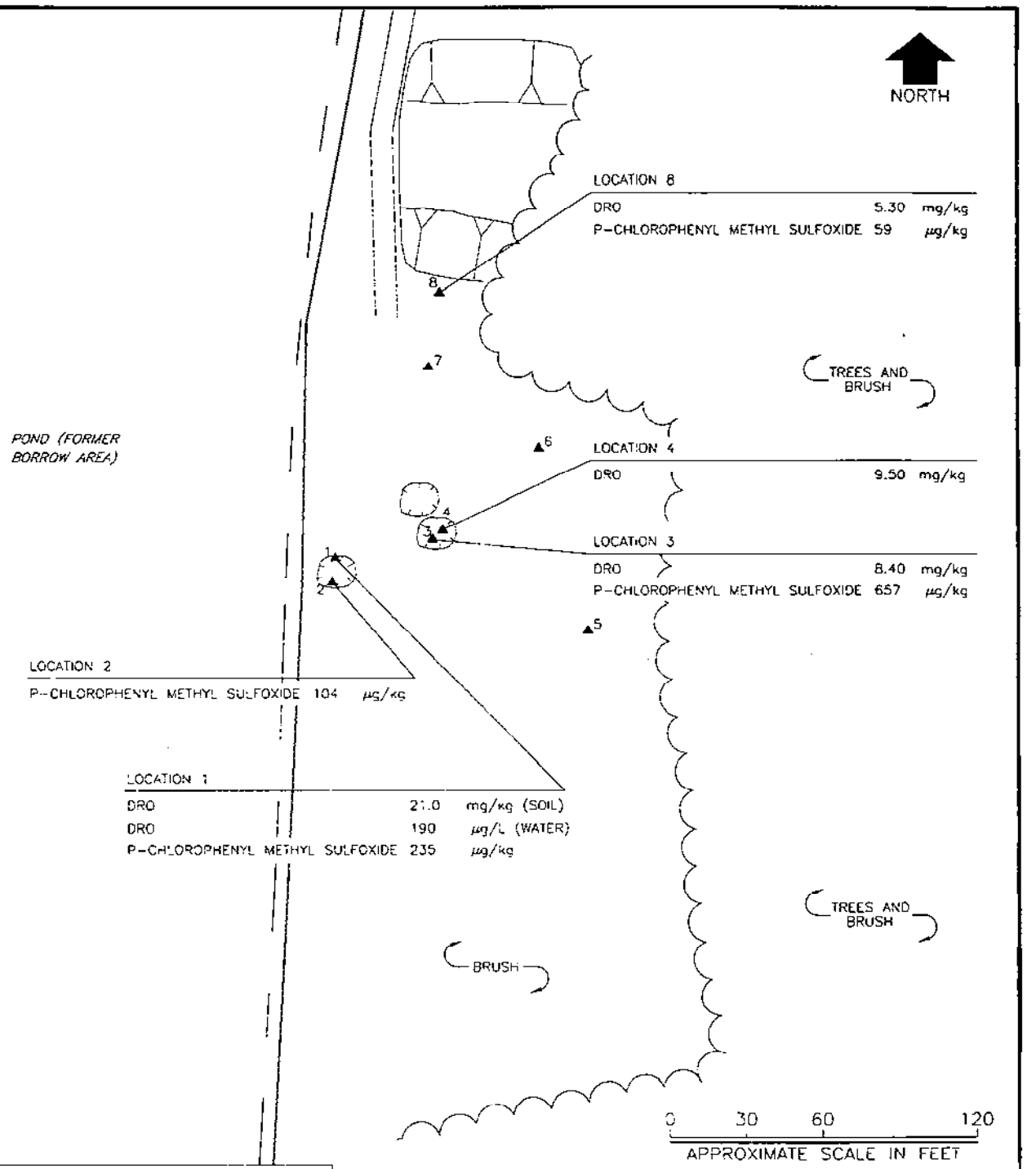

LEGEND

▲1	1994 USACE SAMPLING LOCATIONS AND NUMBERS
USACE	U.S. ARMY CORPS OF ENGINEERS
DRO	DIESEL-RANGE ORGANICS
µg/kg	MICROGRAMS PER KILOGRAM
µg/L	MICROGRAMS PER LITER
mg/kg	MILLIGRAMS PER KILOGRAM
◯	DETONATION CRATER

REFERENCE: USACE, 1994. CHEMICAL DATA REPORT, SMALL ARMS RANGE, FORT WAINWRIGHT, ALASKA, FIGURE 3, SAMPLING LOCATIONS, OCTOBER 24.

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OB/OD Area Chemical Concentrations in Soil and Water

OU 5 Remedial Investigation
Fort Wainwright, Alaska

RECOMMENDED: APPROVED: DATE: 3/96

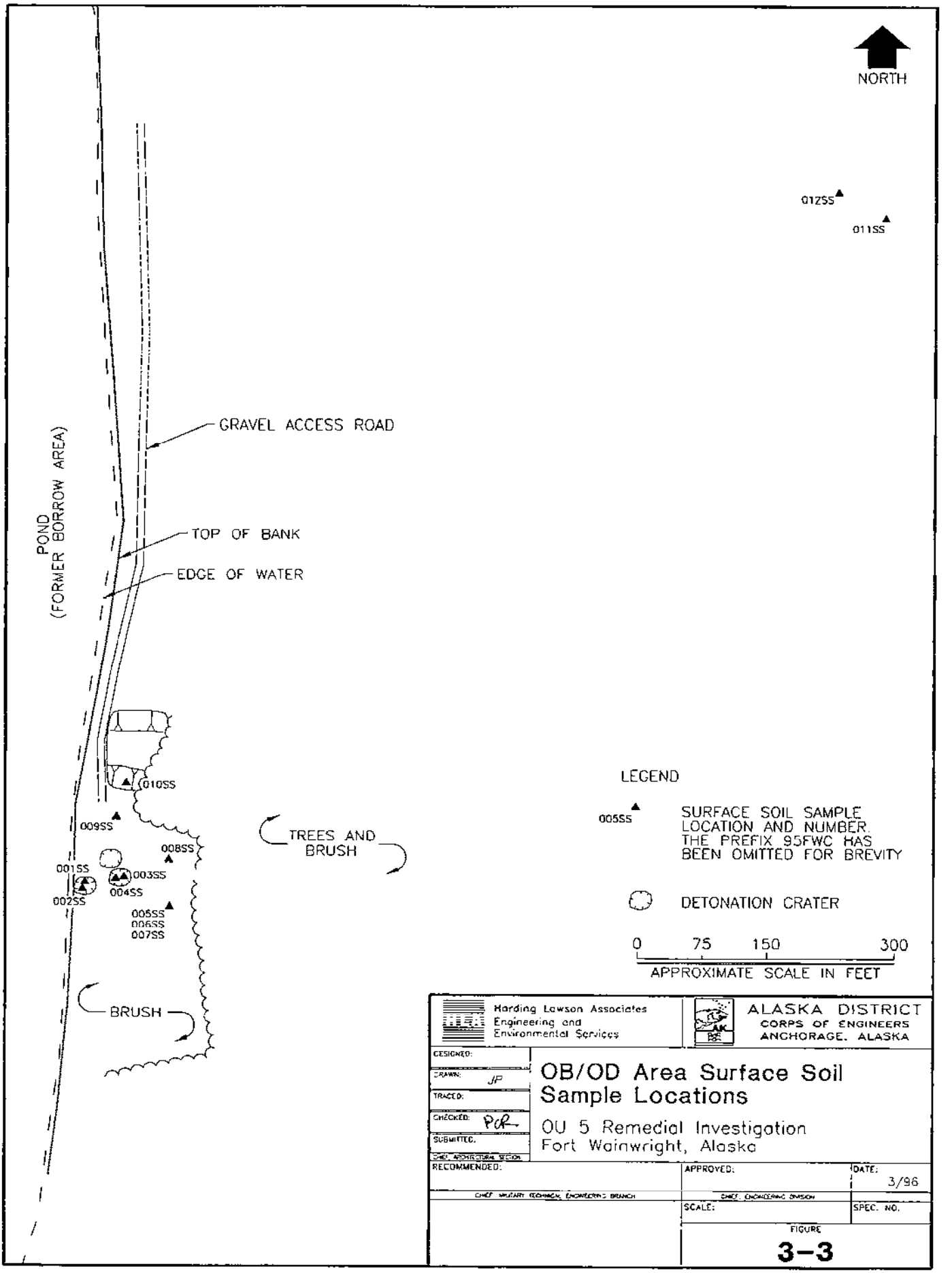
CHIEF, MILITARY TECHNICAL ENGINEERING BRANCH CHIEF, ENGINEERING DIVISION

SCALE: SPEC. NO.

FIGURE
1-12

876b

68587



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CHIEF, ARCHITECTURAL SECTION

OB/OD Area Surface Soil Sample Locations

OU 5 Remedial Investigation
Fort Wainwright, Alaska

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CHIEF, ENGINEERING DIVISION

DATE: 3/96

SCALE:

SPEC. NO.

FIGURE
3-3

876a

68620

Table 6-15. Concentration Ranges and Detection Frequencies of Analytes in Surface-Water Samples from East QFS Area

Chemicals	Units	Detection Frequency	Range of Detected Concentrations
Volatile Organic Compounds			
Acetone	µg/L	2/24	5.2 - 5.6
2-Butanone	µg/L	11/24	4 - 5.2
Semivolatile Organic Compounds			
Benzyl butyl phthalate	µg/L	3/24	0.84 - 14
Bis(2-ethylhexyl) phthalate	µg/L	1/24	4.5
Di-n-butyl phthalate	µg/L	17/24	2.7 - 46
Metals			
Arsenic, Dissolved	µg/L	1/24	0.9
Barium, Dissolved	µg/L	24/24	26 - 29
Barium, Total	µg/L	23/24	28 - 33
Cadmium, Dissolved	µg/L	4/24	0.47 - 2.8
Cadmium, Total	µg/L	1/24	0.26
Lead, Dissolved	µg/L	19/24	0.59 - 69
Lead, Total	µg/L	24/24	2.3 - 12

µg/L Micrograms per liter

Table 6-16. Concentration Ranges and Detection Frequencies of Analytes Detected in Soil Samples from OB/OD Area

Chemical	Units	Detection Frequency	Range of Detected Concentrations
Metals			
Silver	mg/kg	6/10	0.6 - 0.9
Barium	mg/kg	10/10	85 - 210
Cadmium	mg/kg	4/10	0.6 - 0.8
Chromium	mg/kg	10/10	14 - 36
Vanadium	mg/kg	10/10	27 - 60
Arsenic	mg/kg	10/10	4 - 15
Lead	mg/kg	10/10	7 - 32
Mercury	mg/kg	8/10	0.06 - 1

mg/kg Milligrams per kilogram

68679

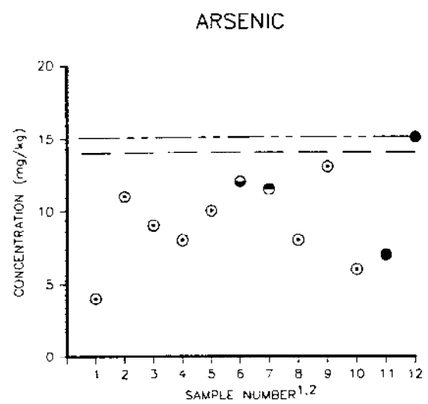
Table 7-1. Comparison of Metals Concentrations in Surface-Soil Samples at the OB/OD Area to Background Concentrations

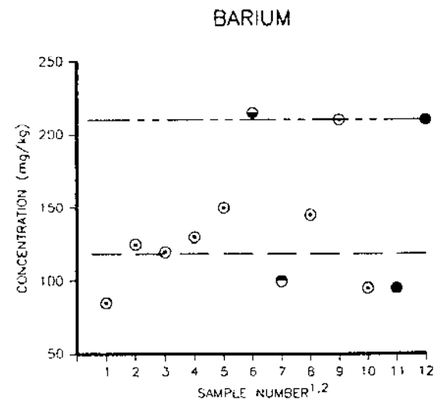
Analyte	Units	Maximum Detected Surface Soil Concentration[a]	Background Levels: Site Specific[b] Maximum	Background Levels: Fort Wainwright[c] Mean	Background Levels: Fort Wainwright[c] Maximum[d]	Exceeds Background (Y/N)
Arsenic	mg/kg	15	15	8	14	N
Barium	mg/kg	214	210	85	115	Y
Cadmium	mg/kg	0.8	ND(1)	1	1.8	N
Chromium	mg/kg	36	34	15	19	Y
Lead	mg/kg	42	15	11	26	Y
Mercury	mg/kg	1	1	NA	NA	N
Selenium	mg/kg	ND(1)	ND(1)	NA	NA	N
Silver	mg/kg	0.8	ND(2)	NA	NA	N
Vanadium	mg/kg	57	60	NA	NA	N

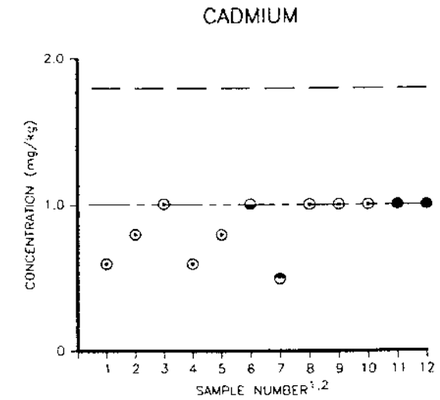
mg/kg Milligrams per kilogram
NA Not available
ND Not detected at or above method reporting limit shown in parentheses

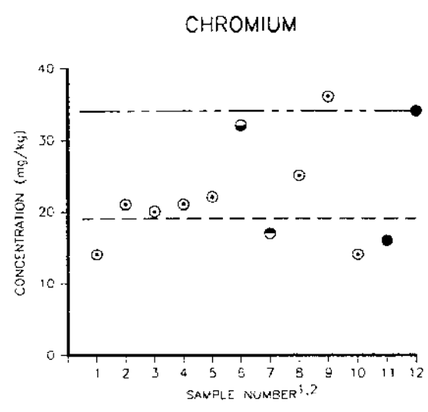
a. Does not include quality assurance (QA) sample results.
b. From background samples collected during the Operable Unit 5 Remedial Investigation.
c. USACE. 1994a. *Background data analysis for arsenic, barium, cadmium, chromium, and lead on Fort Wainwright, Alaska* (final), Table 1-9, Soil South of Chena River, March.
d. Mean plus one standard deviation.

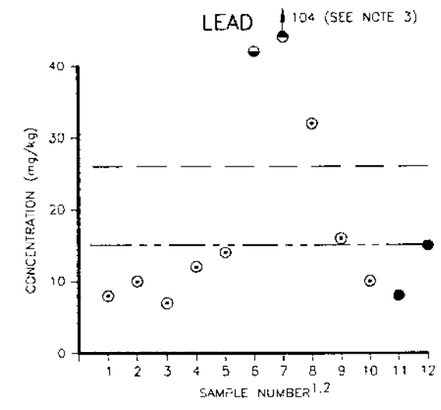
68689

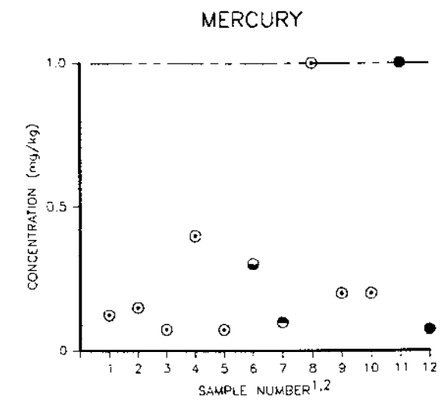


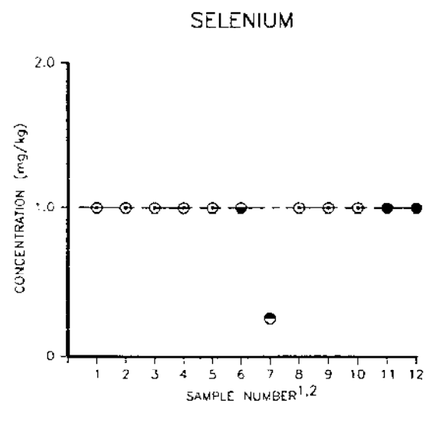


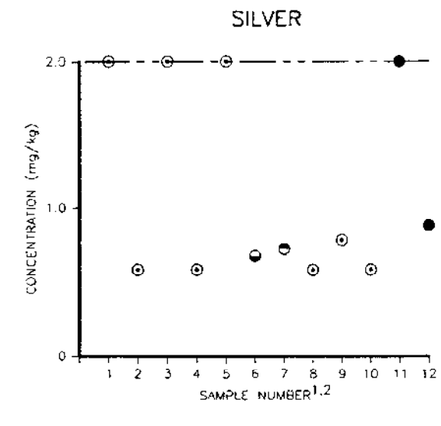


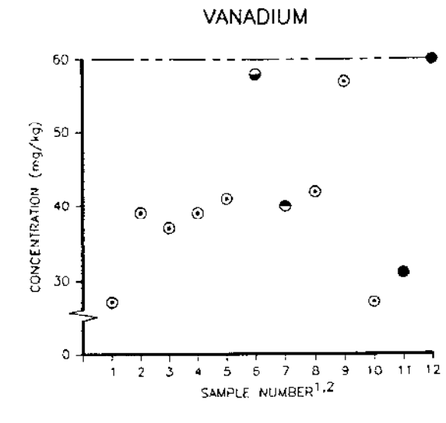












EXPLANATION

- ⊙ OB/OD SAMPLE
- ◒ OB/OD QUALITY CONTROL (QC) DUPLICATE SAMPLE
- ◓ OB/OD QUALITY ASSURANCE (QA) SAMPLE
- ● BACKGROUND SAMPLE
- — — — MAXIMUM RECOMMENDED BACKGROUND VALUES FOR FORT WAINWRIGHT, SOUTH OF CHENA RIVER (USACE, 1994)
- — - — MAXIMUM SITE-SPECIFIC BACKGROUND VALUES

NOTES

1. THE SAMPLE NUMBER PREFIX 95FWC AND SUFFIX SS HAVE BEEN OMITTED FOR BREVITY.
2. SAMPLES 6 AND 7 ARE QC AND QA DUPLICATES OF SAMPLE 5.
3. ACCORDING TO THE USACE CHEMICAL QUALITY ASSURANCE REPORT (CQAR) FOR THE OB/OD AREA SAMPLES THE TOTAL LEAD MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD) LABORATORY RECOVERIES WERE NOT CALCULABLE, SINCE THE SAMPLE CONCENTRATION WAS GREATER THAN FOUR TIMES THE SPIKE CONCENTRATION. THE CQAR STATES THAT THE QA DATA FOR TOTAL LEAD SHOULD BE CONSIDERED AN ESTIMATE "BASED ON INTERNAL LABORATORY QC FAILURE."
4. SAMPLE LOCATIONS SHOWN ON FIGURE 3-3.

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CHIEF, ARCHITECTURAL SECTION

Comparison of Metals Concentrations in Surface-Soil Samples at the OB/OD Area to Background Concentrations

OU 5 Remedial Investigation
Fort Wainwright, Alaska

RECOMMENDED
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3/96

SCALE:

SPEC NO

FIGURE
7-1

68712