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Memorandum

155 Grand Avenue, Suite 800
Oakland, CA 94612
United States
T +1.510.251.2888
F +1.510.622.9000
www.jacobs.com

Subject: **Comparative Analysis: XRF and Dioxin/Furan Quantitative Screening Analyses**
Soil Non-Time Critical Removal Action (NTCRA)
PG&E Topock Compressor Station, Needles, California

To: Pacific Gas and Electric Company (PG&E) and the U.S. Department of Interior (DOI)

From: Jacobs

Date: December 2022

In October 2021, the U.S. Department of the Interior (DOI) issued an Action Memorandum titled "*Request for a Non-Time-Critical Soil Removal Action at Areas of Concern and Solid Waste Management Units, Pacific Gas and Electric Topock Compressor Station*" (DOI 2021) directing Pacific Gas and Electric Company (PG&E) to implement a Soil Non-Time-Critical Removal Action (NTCRA) at the Topock Compressor Station (TCS) in Needles, California. The Soil NTCRA is intended to address the release or substantial threat of a release of hazardous substances from the TCS to the Havasu National Wildlife Refuge (HNWR) or adjacent areas.

As described in the Final Soil NTCRA Work Plan (Work Plan) (Jacobs 2022), removal activities are guided by a phased approach to screening and confirmation laboratory analysis. Screening level and laboratory level confirmation sample data are compared to the numerical removal action goals (RAGs) referenced in the Action Memorandum (DOI 2021). The phased approach is summarized as follows:

1. Excavation is conducted within the target action areas (TAA) boundaries
2. Soil samples are collected for screening and confirmation laboratory analysis.
3. Field screening of metals using a field-portable X-ray fluorescence (XRF) analyzer is performed. If screening level results indicate metal concentrations exceed the numerical RAGs, then removal will continue in accordance with the removal approach described in the Work Plan.
4. When field screening level results indicate metals concentrations are less than the numerical RAGs, a portion of the sample will then be segregated for quantitative analytical screening for dioxin/furans (D/F) using method SW4025 and confirmation laboratory analysis of metals by methods SW6010/7199/7471A and D/F by method SW8290. Method SW4025 is an immunoassay process capable of providing accurate quantitative results for D/F toxicity equivalent (TEQ) within approximately 48 hours. If screening or confirmation results indicate metals and/or D/F concentrations exceed the numerical RAGs, then removal will continue in accordance with the removal approach described in the Work Plan.
5. Removal is complete when numerical RAGs have been achieved or when further excavation is deemed unsafe or undesirable based on TAA-specific limiting criteria presented in the Work Plan.

If additional removal activities are required for a given area based on this process, the screening process will restart with the collection of a new soil sample from the freshly exposed surface.

This memorandum presents a comparative analysis of screening methods to confirmation laboratory analysis for metals and D/F. Results from the XRF field analyzer and analytical methods for metals (SW6010B and SW7471A) are compared and evaluated. D/F TEQ results from the immunoassay method

SW4025 and standard analytical method SW8290 are also compared and evaluated. The objective of the memorandum is to confirm that results from quantitative screening level analyses (XRF and SW4025) are suitable to guide Soil NTCRA removal activities. Based on the findings of this comparative study, an adjustment to how XRF measurements are used in the screening process is warranted. An approach for how XRF results are to be used is presented below.

1. Metals

Soil samples collected during the Soil NTCRA are analyzed for the following metals for which numerical RAGs have been established:

- Chromium (both total and hexavalent)
- Copper
- Lead
- Mercury
- Molybdenum
- Zinc

Screening level samples are analyzed in the field with a ThermoFisher Scientific Niton XL5 handheld XRF analyzer. For increased accuracy, the manufacturer recommends a scan time of 2 minutes. Each soil sample will be scanned three times for 2 minutes each time. The three individual results will be averaged to provide the final XRF results. The XRF analyzer only measures total chromium and does not discern hexavalent chromium concentrations; therefore hexavalent chromium data is not presented in this memorandum. XRF results are reported in parts per million (ppm).

If XRF screening results are less than the numerical RAG, then split samples are submitted to Asset Laboratories in Las Vegas, Nevada, for analysis via analytical methods SW6010B/7199/SW7471A. While the Asset Laboratory can provide a 48-hour turnaround time (TAT) on metals analysis, the ability to obtain near real-time results via the XRF analyzer of the presence or absence of metals at concentrations exceeding the numerical RAGs is helpful and efficient.

Laboratory analyses follow standard method protocols and are validated according to the *Quality Assurance Project Plan Addendum for the RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station* (Jacobs 2019).

2. Dioxins/Furans

Quantitative analytical screening samples for D/F using immunoassay method SW4025 are submitted to Cape Technologies in South Portland, Maine. This initial D/F immunoassay analysis provides quantitative analytical screening results with an expedited TAT of approximately 48 hours. Method SW4025 has been approved for screening purposes; however, it is not an approved analytical method in California. Split samples are also submitted to Pace Analytical in Minneapolis, Minnesota, for analysis via standard analytical method SW8290, which is a State of California approved method. If metals (via SW6010B and SW7471) and D/F (via SW4025) results are less than the numerical RAG, then the sample will be analyzed for D/F using SW8290.

The TAT for D/F analysis via SW8290 is between 3 to 6 weeks. A TAT of 3 to 6 weeks is a concern for the Soil NTCRA because excavations would need to stay open and not be backfilled until confirmation soil sample results are returned. Open excavations are a safety concern for workers, hikers, all-terrain vehicle (ATV) riders, and wildlife, and because of the potential for them to fill with water during rain events. In addition, several TAAs are in areas that would result in access issues for Topock facility operations and other active construction and remediation projects if excavations were left open for an extended period of time.

The SW4025 immunoassay method provides a single total TEQ result. Method SW8290 provides results for individual congeners. The D/F TEQ is calculated by summation of individual congeners multiplied by their toxicity factors. For this comparative study, the immunoassay method total TEQ results are compared to the SW8290 TEQ (human) results.

3. Data Set Used for Comparative Study

Nine samples were collected in July 2022 prior to the start of Soil NTCRA activities from TAAs: four samples from Bat Cave Wash, four samples from East Ravine, and one sample from Area of Concern (AOC) 11. Approximately 44 metals results and 34 D/F TEQ results are also available for the study from Soil NTCRA confirmation soil sampling from AOC 10, AOC 11, and Solid Waste Management Unit (SWMU) 1, collected between July 28 and October 13, 2022.

4. Metals Correlation Results

Table 1 provides the metal concentrations as reported by the XRF analyzer and those reported from Asset Laboratories using SW6010B. The table includes relative percent difference (RPD) values for individual sample results for each metal as well as average RPD values for each metal across all of the sample results. Mercury was not reported, as it was not detected with either the XRF analyzer or SW7471. Molybdenum is also not reported, as it was infrequently detected with the XRF analyzer and via SW6010B.

Figures 1 and 2 provide scatter plots of the available metals data via XRF and analytical methods. Figure 1 is a scatter plot of chromium concentrations. Figure 2 combines the lead, copper, and zinc data. A trend line with squared correlation coefficient (R^2) value has been added to each plot. A summary of the tabulated data and scatter plots trends identifies the following:

- The chromium data have an R^2 value of 0.9138, indicating a strong trend between the XRF results and the analytical results; 73 percent of the XRF chromium results were greater than the analytical results. The average RPD between XRF and analytical results is 98 percent.
- The copper, lead, and zinc data have R^2 values of 0.4563, 0.797, and 0.2594, respectively, indicating medium to weak trends between the XRF results and the analytical results. The data show 55 percent, 94 percent, and 83 percent of the XRF copper, lead, and zinc results were greater than the analytical results, respectively. The average RPDs between XRF and analytical results are 46 percent, 70 percent, and 40 percent for copper, lead, and zinc, respectively.

While R^2 values between the XRF results and the analytical results did not always indicate a statistically strong trend, the XRF correctly identified when total chromium concentrations were above the RAG or below the RAG in 45 out of 53 samples, or 85 percent of the time (see Table 2). Discrepancies between XRF and analytical data for total chromium are primarily at low concentrations just above or below the 145 mg/kg RAG (Figures 3 and 4). If a threshold value of 500 ppm is used, the predictive accuracy increases significantly to 98 percent. For example, only one sample (AOC11TAA1-CW3-6) had an XRF result for chromium greater than 500 ppm while the analytical result was below the 145 mg/kg RAG. Table 2 provides the individual sample ratio of XRF result to analytical result for total chromium. The average ratio across all of the samples is 2.2, indicating that XRF results are on average about 2 times greater than the analytical results.

Based on the predictive accuracy of XRF data for assessing when metals concentrations are well above the RAGs, the XRF is useful in aiding removal activities. Therefore, an adjustment to the phased approach for screening and confirmation laboratory analysis is warranted when using XRF data to determine the need for additional excavation; a threshold value of 500 ppm chromium is recommended.

The XRF correctly predicted copper, lead, and zinc were above or below the RAGs 96 percent, 98 percent, and 94 percent of the time, respectively. Therefore, no adjustments to their threshold values are warranted. Furthermore, copper, lead, and zinc at concentrations greater than their numerical RAGs have only been observed in samples with total chromium greater than the numerical RAG.

5. Dioxins/Furans Correlation Results

Table 3 provides the TEQ concentrations as reported by the immunoassay method SW4025 and calculated TEQ (human) concentrations from the standard analytical method SW8290. The table includes RPD for individual sample results and average RPD for all sample results. Figure 5 provides a scatter plot of the available SW4025 and SW8290 data, including a trend line with R^2 value. A summary of the tabulated data and scatter plots trends identifies the following:

- The TEQ data have an R^2 value of 0.3988, indicating a low to medium-strength trend between the SW4025 and SW8290 results. The average RPD between the SW4025 and SW8290 results is 92 percent.
- The data show 62 percent of the SW4025 results were greater than the SW8290 results.

While the R^2 value does not indicate a strong trend, the SW4025 method correctly identified when TEQ concentrations were above or below the RAG in 30 out of 33 samples, or 91 percent of the time (Figure 6, Table 3). The SW4025 data are suitable for determining if D/F concentrations are above or below the RAG and are therefore useful in aiding removal activities, including the decision cease removal activities and begin to backfill. As noted in the Work Plan, if subsequent confirmation results using SW8290 indicate that TEQ concentrations significantly exceed the numerical RAG, and average confirmation sample concentrations are above the RAG, then DOI will be consulted, and continued removal may be required, including backfilled areas.

6. References

Jacobs Engineering Group Inc. (Jacobs). 2019. *Quality Assurance Project Plan Addendum for the RCRA Facility Investigation/Remedial Investigation for Soil at the Topock Compressor Station*. July.

Jacobs Engineering Group Inc. (Jacobs). 2022. *Work Plan for Soil Non-Time-Critical Removal Action, PG&E Topock Compressor Station, Needles, California*. June.

U.S. Department of the Interior (DOI). 2021. *Request for a Non-Time-Critical Soil Removal Action at Areas of Concern and Solid Waste Management Units, Pacific Gas and Electric Topock Compressor Station*. October.

Tables

Table 1
Metals Results via XRF and SW6010B
Soil NonTime Critical Removal Action
Topock Compressor Station, Needles, California

	Chromium			Copper			Lead			Zinc		
Sample ID	XRF (ppm)	SW6010B (mg/kg)	RPD	XRF (ppm)	SW6010B (mg/kg)	RPD	XRF (ppm)	SW6010B (mg/kg)	RPD	XRF (ppm)	SW6010B (mg/kg)	RPD
RAG (mg/kg)	145			145			36			1,050		
AOC10TAA2-PRE-1-1	55	62	11%	33	35	7%	31	23	30%	104	90	15%
AOC10TAA2-PRE-2-2	172	200	15%	48	52	8%	38	27	35%	90	85	5%
AOC10TAA4-PRE-1-2	0	31	200%	22	23	3%	27	19	36%	74	56	28%
AOC10TAA1-PRE-1-1	9374	6000	44%	20	18	11%	9	9	1%	83	98	17%
AOC11TAA1-PRE-1-1	17	200	168%	14	17	22%	11	9	15%	50	49	3%
AOC1TAA1-PRE-1-2	59	28	71%	11	14	27%	10	8	27%	50	41	20%
AOC1TAA2-PRE-1-2	1007	150	148%	15	18	18%	12	2	154%	98	23	124%
AOC1TAA3-PRE-1-1	745	360	70%	21	18	15%	12	4	98%	142	85	50%
SWMU1TAA1-PRE-1-2	236	140	51%	11	13	14%	10	4	97%	55	44	23%
AOC11TAA1-CF-1-7.5	0	29	200%	26	18	38%	7	4	64%	63	58	9%
AOC11TAA1-CF-2-7.5	25	46	58%	24	23	6%	8	4	77%	78	64	20%
AOC11TAA1-CF-2-7.5FD	35	37	5%	24	17	34%	8	3	77%	95	58	48%
AOC11TAA1-CF-3-10	45	33	30%	23	14	47%	9	4	89%	100	54	60%
AOC11TAA1-CW1-3	442	92	131%	56	34	49%	13	5	86%	252	75	108%
AOC11TAA1-CW3-6	1660	29	193%	385	14	186%	36	11	106%	1195	70	178%
AOC11TAA1-CW5-6	321	100	105%	111	53	71%	16	14	15%	549	200	93%
AOC11TAA1-CW6-3	0	54	200%	3	27	160%	12	10	15%	47	82	54%
AOC11TAA1-CW7-3	2098	160	172%	1110	78	174%	31	9	107%	4324	330	172%
AOC11TAA1-CW8-3	42	18	80%	7	9	24%	12	10	18%	32	29	10%
AOC10TAA2-CW1-4	11612	5600	70%	664	450	38%	248	110	77%	670	600	11%
AOC10TAA2-CW2-3	9325	6700	33%	254	180	34%	118	75	45%	412	320	25%
AOC10TAA2-CW3-4	5404	4300	23%	395	380	4%	120	85	34%	388	390	1%
AOC10TAA2-CW4-4	6094	7000	14%	378	640	51%	106	170	46%	533	600	12%
AOC10TAA2-CW5-4	15442	6500	82%	798	590	30%	101	88	14%	1782	790	77%
AOC11TAA1-CW6a-4	47	31	41%	25	14	56%	11	3.2	110%	106	53	67%
AOC11TAA1-CW6a-4FD	0	27	200%	24	16	40%	4	3.4	16%	84	56	40%
AOC11TAA1-CW11a-4	87	25	111%	19	12	45%	9	2.5	113%	57	40	35%
AOC11TAA1-CF4-7	38	20	62%	4	10	85%	7	3.4	69%	36	36	0%
AOC11TAA1-CF5-7	36	20	57%	8	7	13%	15	5.4	94%	35	27	26%
AOC11TAA1-CF6-7	71	19	116%	14	10	33%	9	3.1	98%	66	37	56%
AOC11TAA1-CF7-7	80	21	117%	12	16	29%	7	2.9	83%	51	40	24%
AOC11TAA1-CW5a-4	36	26	32%	6	8	27%	9	6.1	38%	45	52	14%
AOC11TAA1-CW7a-4	160	35	128%	11	8	28%	14	12	15%	37	31	18%
AOC11TAA1-CW9a-4	73	25	98%	10	11	10%	11	2.9	117%	37	29	24%
AOC10TAA2-CW6-4	16043	9700	49%	253	290	14%	163	160	2%	339	340	0%
AOC10TAA2-CW6-4FD	16043	9600	50%	253	310	20%	163	180	10%	339	410	19%
AOC10TAA2-CW2a-4	130	61	72%	15	14	7%	9	4.0	77%	73	47	43%
AOC10TAA2-CW7-4	85	30	96%	28	11	87%	11	3.0	114%	88	38	79%
AOC10TAA2-CW7-4FD	85	17	133%	28	9	102%	11	2.7	121%	88	34	89%
AOC10TAA2-CW8-4	49	16	102%	9	10	9%	5	2.1	82%	50	34	38%
AOC10TAA2-CW9-5	0	22	200%	10	12	18%	7	2.8	86%	49	40	20%
AOC10TAA2-CW10-5	116	64	58%	9	11	20%	10	4.2	82%	50	42	17%
AOC10TAA2-CW11-4	228	100	78%	60	16	116%	9	2.7	108%	63	58	8%
SWMU1TAA1-CF1-10	0	17	200%	22	11	67%	9	5.4	50%	121	65	60%
SWMU1TAA1-CF2-10	159	49	106%	11	15	31%	7	1.4	133%	201	100	67%
SWMU1TAA1-CF3-10	6363	1800	112%	48	9	134%	8	2.2	114%	279	150	60%
SWMU1TAA1-CF4-10	1275	560	78%	24	15	46%	0	3.1	200%	173	150	14%
SWMU1TAA1-CW1-5	79	25	104%	12	12	0%	8	4.0	67%	49	39	23%
SWMU1TAA1-CW1-5FD	79	43	59%	12	13	8%	8	4.9	48%	49	46	6%
SWMU1TAA1-CW2-5	4701	1800	89%	12	12	0%	8	3.4	81%	468	250	61%
SWMU1TAA1-CW3-5	3573	1900	61%	27	12	77%	12	5.3	77%	99	83	18%
SWMU1TAA1-CW4-5	0	26	200%	14	11	24%	3	2.2	31%	47	44	7%
SWMU1TAA1-CW5-5	0	16	200%	0	12	200%	4	1.3	102%	49	32	42%
Average RPD			98%			46%			70%			40%

Notes:
mg/kg = milligrams per kilogram
ppm = parts per million
RPD = relative percent difference
XRF = x-ray florescence
RAG = Removal Action Goal
Sample Depth can be determined from the last digits of the sample ID, in feet below ground surface
Pre-investigation samples (identified with "PRE" in the sample ID) were collected on July 14 and 19, 2022
Soil NTCRA confirmation samples (identified with a "CF" or "CW" in the sample ID) were collected between July 28 and October 13, 2022

Table 2
Metals Results Comparison and Correction Factor
Soil NonTime Critical Removal Action
Topock Compressor Station, Needles, California

Sample ID	Chromium		Copper	Lead	Zinc
	Methods Agree?*	Correction Factor	Methods Agree?*	Methods Agree?*	Methods Agree?*
RAG (mg/kg)	145		145	36	1050
AOC10TAA2-PRE-1-1	Y	0.89	Y	Y	Y
AOC10TAA2-PRE-2-2	Y	0.86	Y	N	Y
AOC10TAA4-PRE-1-2	Y	0.00	Y	Y	Y
AOC10TAA1-PRE-1-1	Y	1.56	Y	Y	Y
AOC11TAA1-PRE-1-1	N	0.09	Y	Y	Y
AOC1TAA1-PRE-1-2	Y	2.11	Y	Y	Y
AOC1TAA2-PRE-1-2	Y	6.72	Y	Y	Y
AOC1TAA3-PRE-1-1	Y	2.07	Y	Y	Y
SWMU1TAA1-PRE-1-2	N	1.69	Y	Y	Y
AOC11TAA1-CF-1-7.5	Y	0.00	Y	Y	Y
AOC11TAA1-CF-2-7.5	Y	0.55	Y	Y	Y
AOC11TAA1-CF-2-7.5FD	Y	0.95	Y	Y	Y
AOC11TAA1-CF-3-10	Y	1.35	Y	Y	Y
AOC11TAA1-CW1-3	N	4.80	Y	Y	Y
AOC11TAA1-CW3-6	N	--**	N	Y	N
AOC11TAA1-CW5-6	N	3.21	Y	Y	Y
AOC11TAA1-CW6-3	Y	0.00	Y	Y	Y
AOC11TAA1-CW7-3	Y	13.11	N	Y	N
AOC11TAA1-CW8-3	Y	2.33	Y	Y	Y
AOC10TAA2-CW1-4	Y	2.07	Y	Y	Y
AOC10TAA2-CW2-3	Y	1.39	Y	Y	Y
AOC10TAA2-CW3-4	Y	1.26	Y	Y	Y
AOC10TAA2-CW4-4	Y	0.87	Y	Y	Y
AOC10TAA2-CW5-4	Y	2.38	Y	Y	N
AOC11TAA1-CW6a-4	Y	1.52	Y	Y	Y
AOC11TAA1-CW6a-4FD	Y	0.00	Y	Y	Y
AOC11TAA1-CW11a-4	Y	3.48	Y	Y	Y
AOC11TAA1-CF4-7	Y	1.90	Y	Y	Y
AOC11TAA1-CF5-7	Y	1.80	Y	Y	Y
AOC11TAA1-CF6-7	Y	3.74	Y	Y	Y
AOC11TAA1-CF7-7	Y	3.81	Y	Y	Y
AOC11TAA1-CW5a-4	Y	1.38	Y	Y	Y
AOC11TAA1-CW7a-4	N	4.57	Y	Y	Y
AOC11TAA1-CW9a-4	Y	2.92	Y	Y	Y
AOC10TAA2-CW6-4	Y	1.65	Y	Y	Y
AOC10TAA2-CW6-4FD	Y	1.67	Y	Y	Y
AOC10TAA2-CW2a-4	Y	2.13	Y	Y	Y
AOC10TAA2-CW7-4	Y	2.83	Y	Y	Y
AOC10TAA2-CW7-4FD	Y	5.00	Y	Y	Y
AOC10TAA2-CW8-4	Y	3.06	Y	Y	Y
AOC10TAA2-CW9-5	Y	0.00	Y	Y	Y
AOC10TAA2-CW10-5	Y	1.81	Y	Y	Y
AOC10TAA2-CW11-4	N	2.28	Y	Y	Y
SWMU1TAA1-CF1-10	Y	0.00	Y	Y	Y
SWMU1TAA1-CF2-10	N	3.24	Y	Y	Y
SWMU1TAA1-CF3-10	Y	3.54	Y	Y	Y

Table 2
Metals Results Comparison and Correction Factor
Soil NonTime Critical Removal Action
Topock Compressor Station, Needles, California

Sample ID	Chromium		Copper	Lead	Zinc
	Methods Agree?*	Correction Factor	Methods Agree?*	Methods Agree?*	Methods Agree?*
RAG (mg/kg)	145		145	36	1050
SWMU1TAA1-CF4-10	Y	2.28	Y	Y	Y
SWMU1TAA1-CW1-5	Y	3.16	Y	Y	Y
SWMU1TAA1-CW1-5FD	Y	1.84	Y	Y	Y
SWMU1TAA1-CW2-5	Y	2.61	Y	Y	Y
SWMU1TAA1-CW3-5	Y	1.88	Y	Y	Y
SWMU1TAA1-CW4-5	Y	0.00	Y	Y	Y
SWMU1TAA1-CW5-5	Y	0.00	Y	Y	Y
Percent of Method Agreement	74%		96%	98%	94%
Average Correction Factor		2.20			

Notes:
mg/kg = milligrams per kilogram
XRF = x-ray florescence
RAG = Removal Action Goal
Sample Depth can be determined from the last digits of the sample ID, in feet below ground surface
Pre-investigation samples (identified with "PRE" in the sample ID) were collected on July 14 and 19, 2022
Soil NTCRA confirmation samples (identified with a "CF" or "CW" in the sample ID) were collected between July 28 and October 13, 2022
* Methods agree if both XRF and SW6010B results are above or below the RAG
** Outlier value not used for calculating average.

Table 3
Dioxins/Furans (TEQ) Results via SW4025 and SW8290
Soil NonTime Critical Removal Action
Topock Compressor Station, Needles, California

	Dioxins/Furans (TEQ)			
Sample ID	SW4025 (ng/kg)	SW8290 (ng/kg)	Methods Agree? *	RPD
RAG	0 - 2 ft BGS = 100 ng/kg 2 - 10 ft BGS = 190 ng/kg			
AOC10TAA2-PRE-1-1	212	358	Y	51%
AOC10TAA2-PRE-2-2	285	222	Y	25%
AOC10TAA4-PRE-1-2	176	28	N	145%
AOC10TAA1-PRE-1-1	38	1	Y	190%
AOC11TAA1-PRE-1-1	202	184	Y	9%
AOC1TAA1-PRE-1-2	53	9	Y	140%
AOC1TAA2-PRE-1-2	124	186	Y	40%
AOC1TAA3-PRE-1-1	209	119	Y	55%
SWMU1TAA1-PRE-1-2	71	16	Y	126%
AOC11TAA1-CF-1-7.5	33	18	Y	59%
AOC11TAA1-CF-2-7.5	62	68	Y	9%
AOC11TAA1-CF-2-7.5FD	50	80	Y	46%
AOC11TAA1-CF-3-10	53	90	Y	51%
AOC11TAA1-CW3	62	83	Y	29%
AOC11TAA1-CW8-3	24	3	Y	154%
AOC11TAA1-CW6a-4	68	136	Y	67%
AOC11TAA1-CW6a-4FD	66	214	N	106%
AOC11TAA1-CW11a-4	19	4.60	Y	122%
AOC11TAA1-CF4-7	81	129	Y	46%
AOC11TAA1-CF5-7	16	0.88	Y	179%
AOC11TAA1-CF6-7	50	96	Y	63%
AOC11TAA1-CF7-7	35	24	Y	37%
AOC11TAA1-CW5a-4	60	62	Y	4%
AOC11TAA1-CW7a-4	59	14	Y	122%
AOC11TAA1-CW9a-4	41	17	Y	83%
AOC10TAA2-CW6-4	NA	1110	Y	NA
AOC10TAA2-CW6-4FD	183	779	N	124%
AOC10TAA2-CW2a-4	44	19	Y	79%
AOC10TAA2-CW7-4	11	0.65	Y	178%
AOC10TAA2-CW7-4FD	9.0	0.66	Y	173%
AOC10TAA2-CW8-4	14	1.27	Y	167%
AOC10TAA2-CW9-5	8.0	2.02	Y	119%
AOC10TAA2-CW10-5	15	4.49	Y	108%
AOC10TAA2-CW11-4	11	3.00	Y	114%
Percent of Method Agreement			**91%**	
Average RPD				**92%**

Notes:
ng/kg = nanograms per kilogram
RPD = relative percent difference
TEQ = toxic equivalents
NA = Not Applicable, as SW4025 value not quantified
Sample Depth can be determined from the last digits of the sample ID, in feet below ground surface (BGS)
Pre-investigation samples (identified with "PRE" in the sample ID) were collected on July 14 and 19, 2022
Soil NTCRA samples (identified with a "CF" or "CW" in the sample ID) were collected between July 28 and October 13, 2022
* Methods agree if both method results are above or below the RAG. 100 ng/kg is used for samples collected between 0-2 ft bgs; 190 ng/kg is used for samples collected between 2-10 ft bgs.

Figures

Figure 1
XRF vs. Analyical Results, Chromium

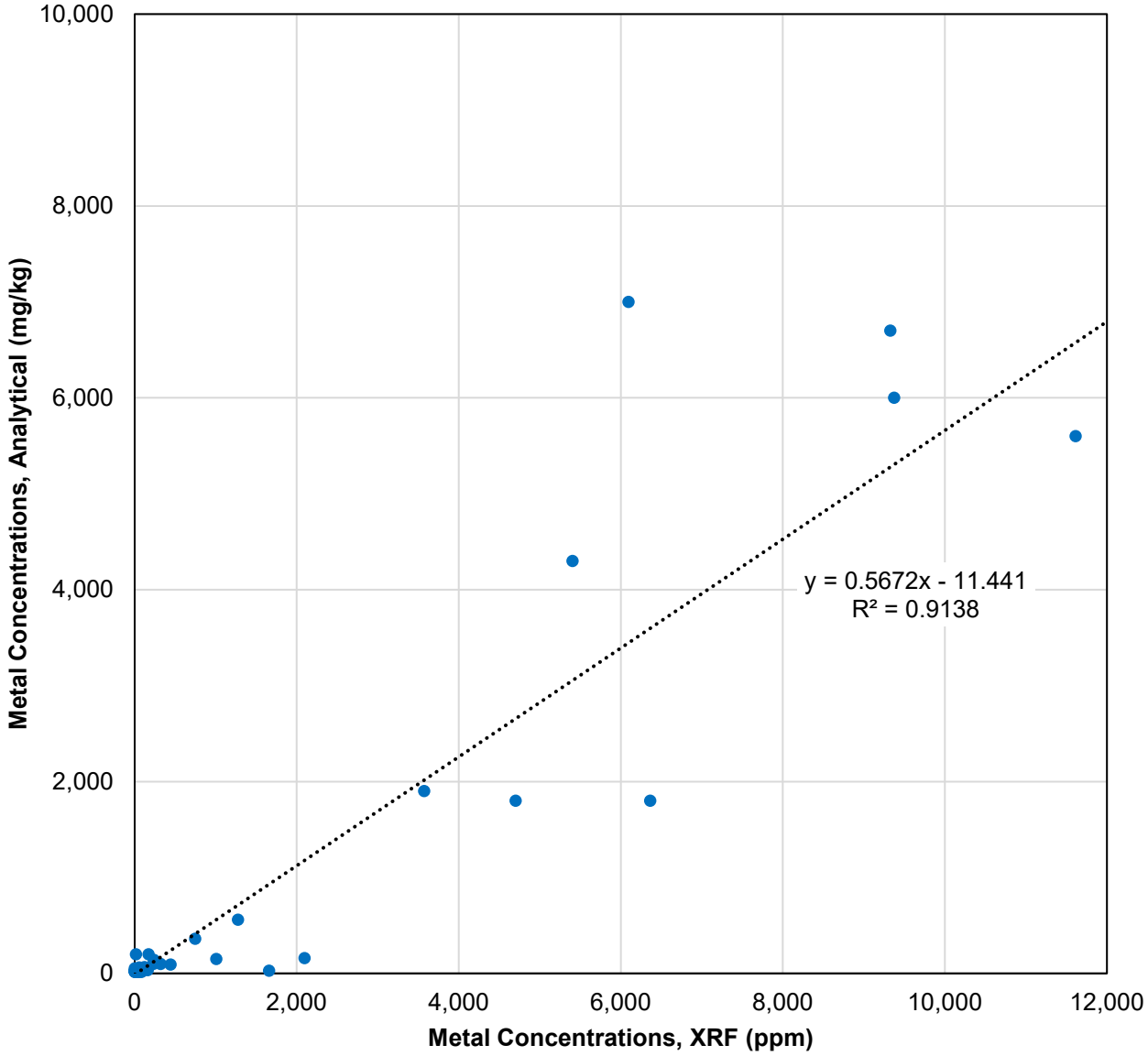

Figure 2
XRF vs. Analyical Results

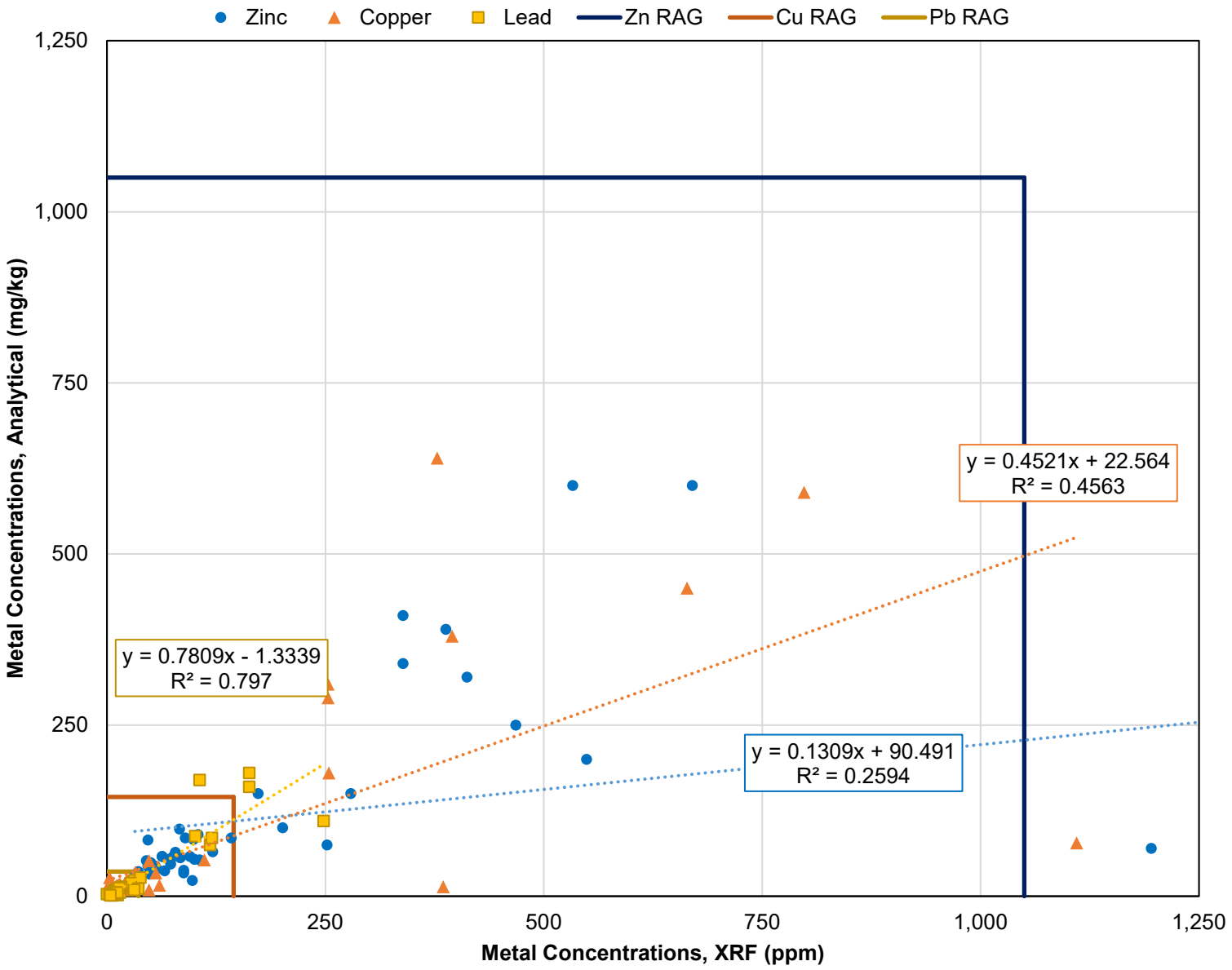

Figure 3
Chromium XRF vs. SW6010B
Concentrations Accurately Predicted Above/Below RAG

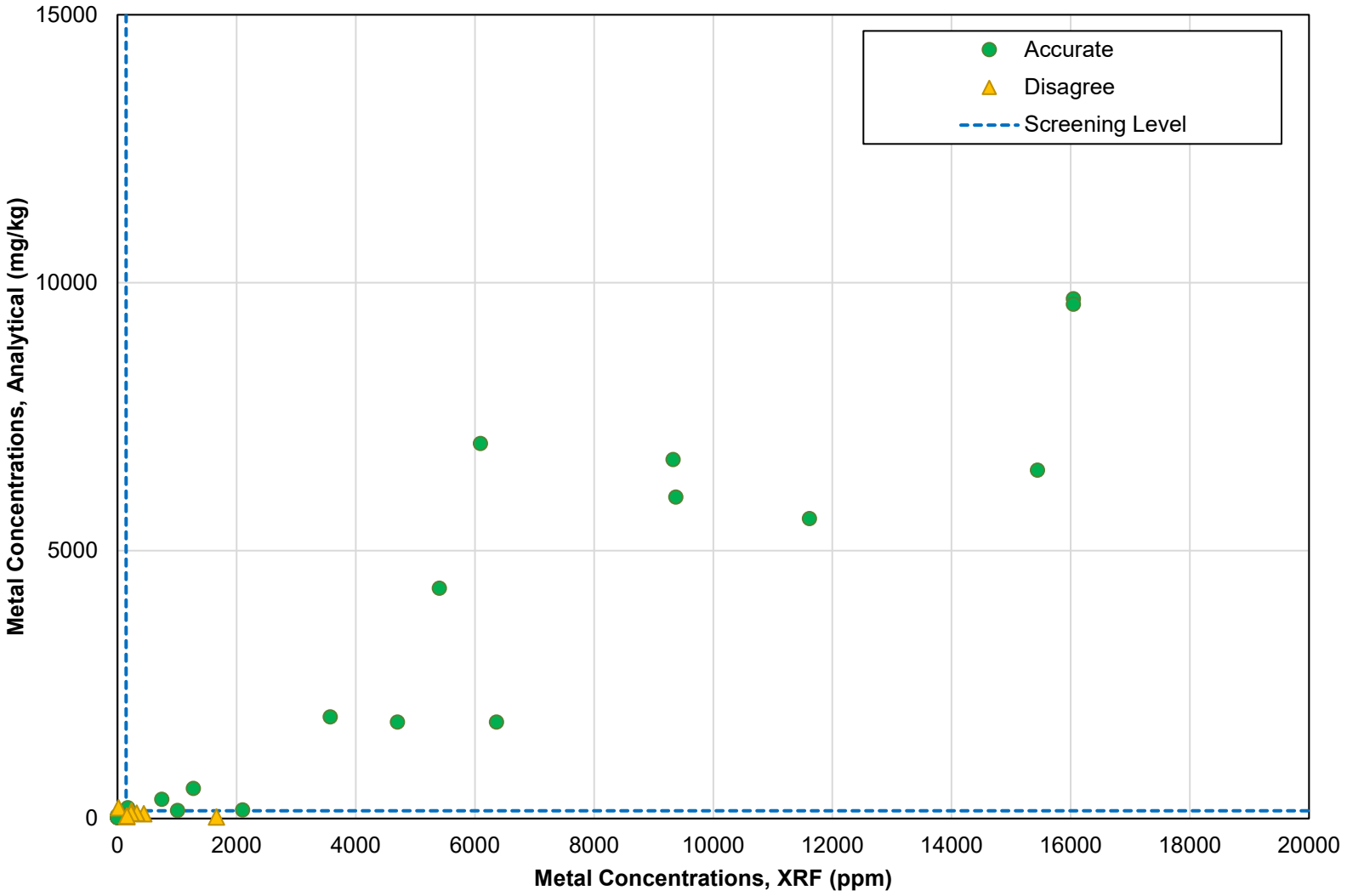

Figure 4
Chromium XRF vs. SW6010B
Concentrations Accurately Predicted Above/Below RAG
Zoomed View

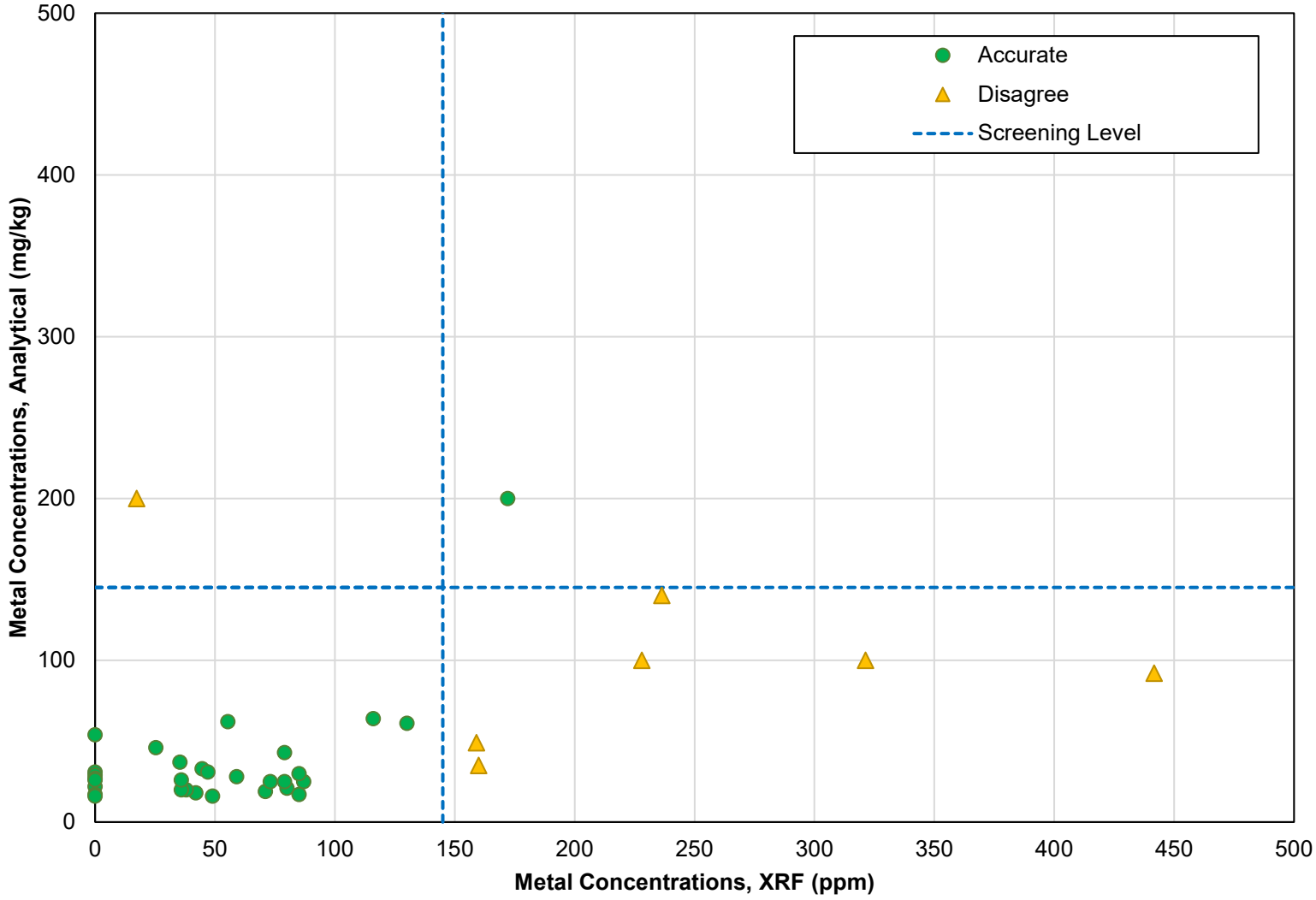

Figure 5
TEQ Concentrations SW4025 vs SW8290

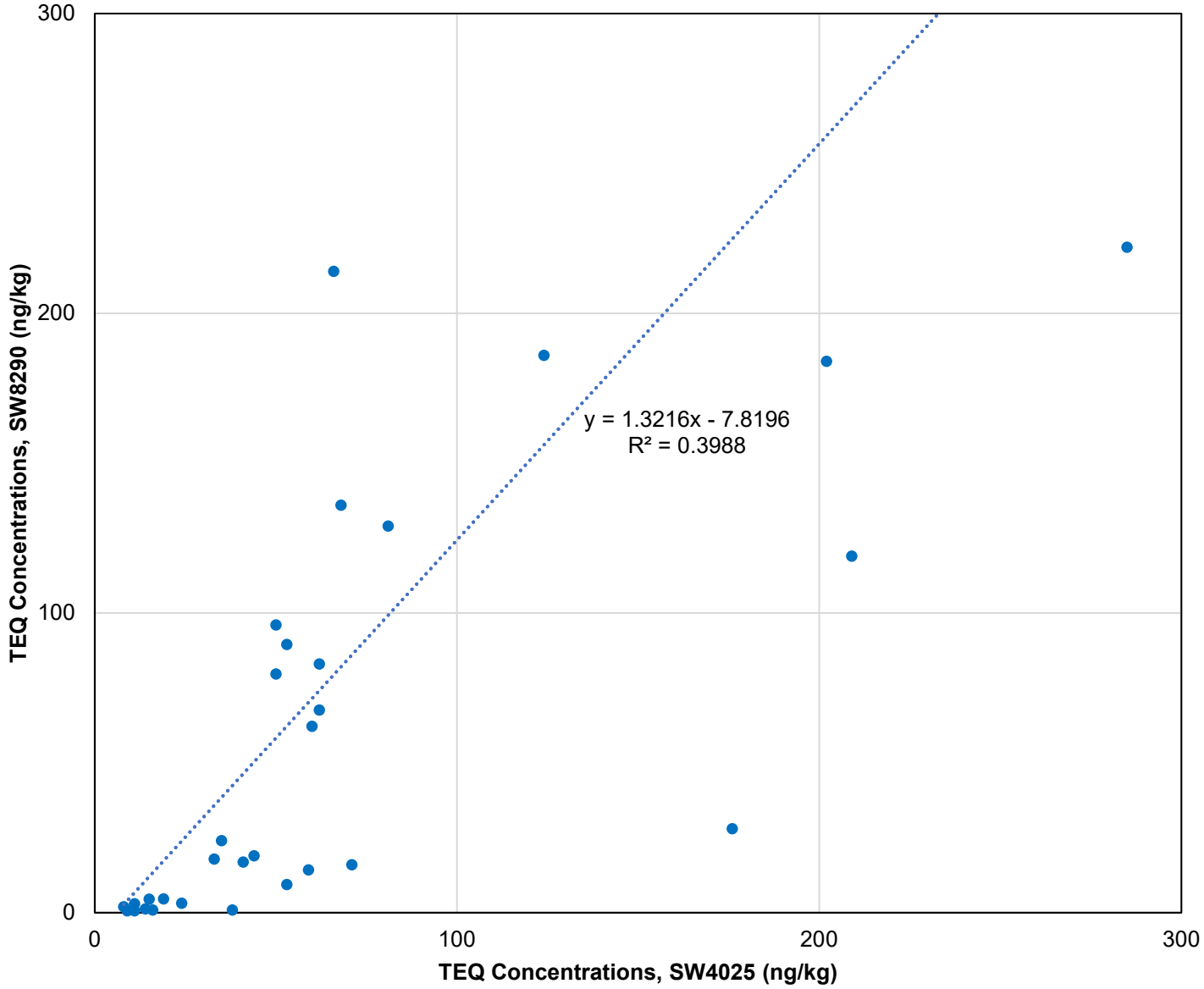

Figure 6
Dioxin/Furans SW4025 vs. SW8290
Concentrations Accurately Predicted Above/Below RAG