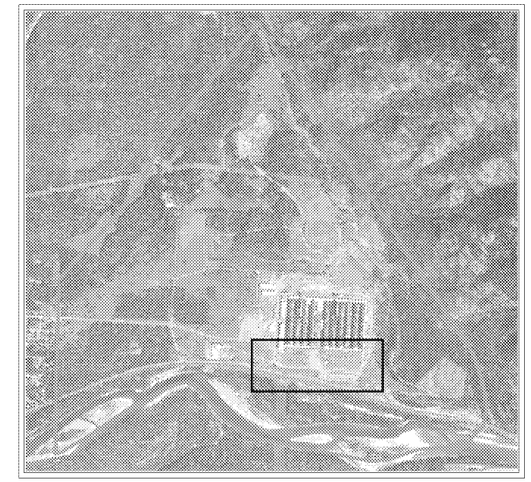

CONCENTRATION LEGEND

- ND – 1.58
- 1.58 – 15.8
- >15.8

N

NOAEL–BASED SCREENING LEVELS – BIRDS	LOAEL–BASED SCREENING LEVELS – BIRDS
1.58	15.8

NOTES

ND – NON DETECT
NOAEL – NO OBSERVED ADVERSE AFFECT LEVEL
LOAEL – LOWEST OBSERVED ADVERSE AFFECT LEVEL

1. ALL SAMPLES ARE IN PICOGRAMS PER GRAM
2. SCREENING LEVEL SOURCE: EFROYMSON ET AL. (1997) AND SAMPLE ET AL. (1996)

250 0 250 Feet

Title:
CONCENTRATIONS OF TOTAL TEQ - DIOXINS AND FURANS IN PHASE II SOIL - BIRDS

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:
COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX

Compiled by: L.J.	Date: 25JUL18	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	1
Project Mgr: M.R.	Project: 2476.0001Y006	
File: 2476.0001Y222.3.mxd		

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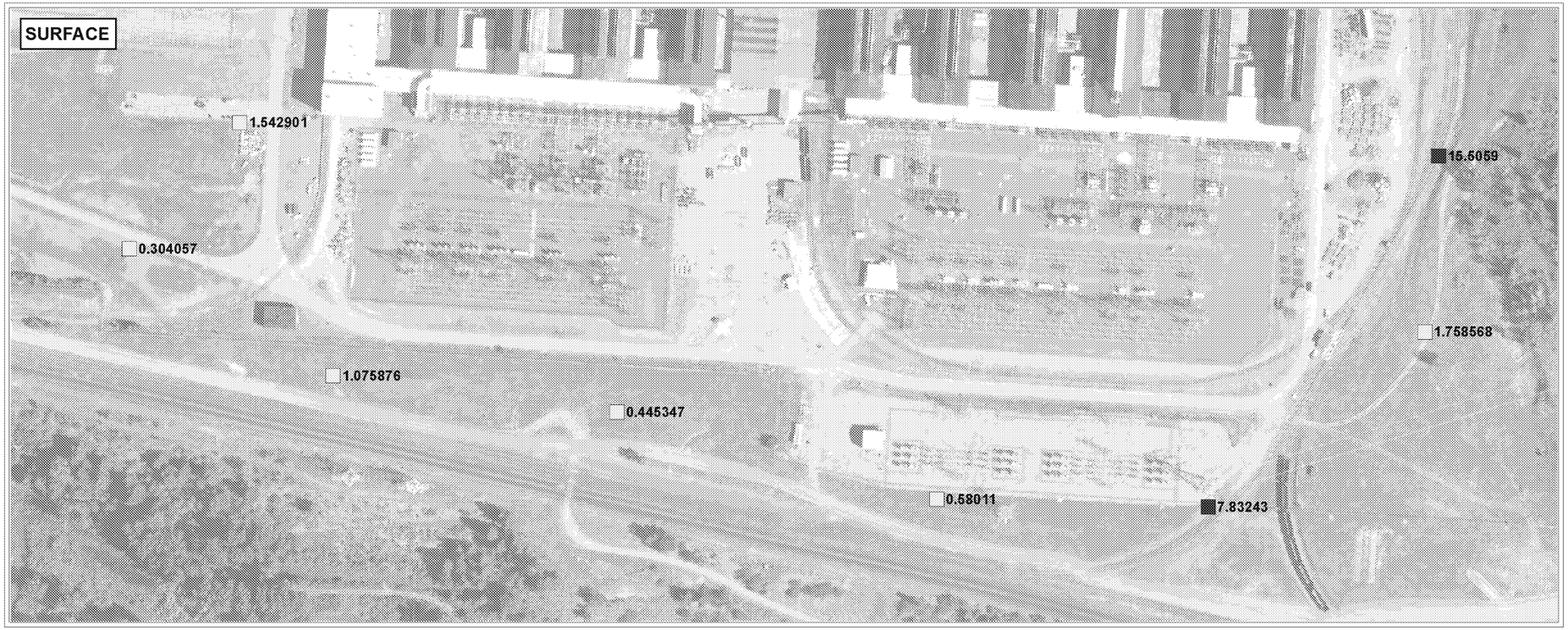

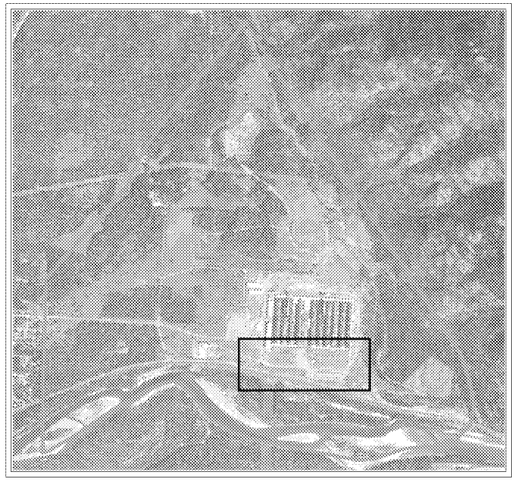

CONCENTRATION LEGEND

- ND – 0.29
- 0.29 – 1.9
- >1.9

N

NOAEL–BASED SCREENING LEVELS – MAMMALS	LOAEL–BASED SCREENING LEVELS – MAMMALS
0.29	1.9

NOTES

ND – NON DETECT
NOAEL – NO OBSERVED ADVERSE AFFECT LEVEL
LOAEL – LOWEST OBSERVED ADVERSE AFFECT LEVEL

1. ALL SAMPLES ARE IN PICOGRAMS PER GRAM
2. SCREENING LEVEL SOURCE: LOS ALAMOS NATIONAL LABORATORY (ECORISK, RELEASE 4.1)

250 0 250 Feet

Title:

CONCENTRATIONS OF TOTAL TEQ - DIOXINS AND FURANS IN PHASE II SOIL - MAMMALS

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:

COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX

Compiled by: L.J.	Date: 25JUL18	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	2
Project Mgr: M.R.	Project: 2476.0001Y006	
File: 2476.0001Y222.6.mxd		

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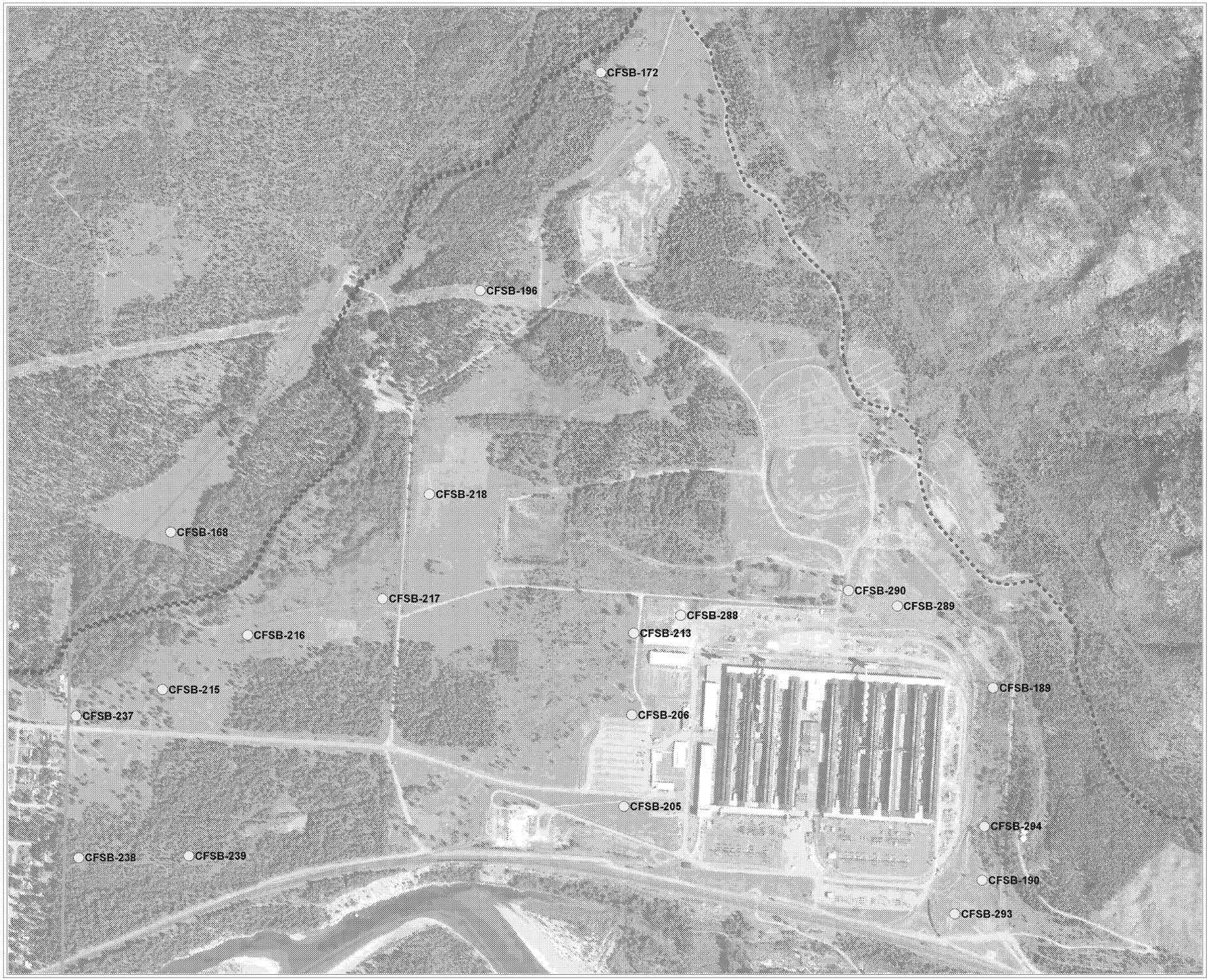

LEGEND

PHASE 2 SOIL BORING – SOIL COLLECTED TO 2 FT WITH HAND TOOLS

800 0 800 Feet

Title:

PROPOSED PHASE II SOIL BORINGS AND SOIL SAMPLING LOCATIONS FOR DIOXINS AND FURANS

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:

COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX

Compiled by: L.J.	Date: 27JUN18	FIGURE
Prepared by: M.S.R.	Scale: AS SHOWN	3
Project Mgr: M.R.	Project: 2476.0001Y006	
File: 2476.0001Y222.5.mxd		

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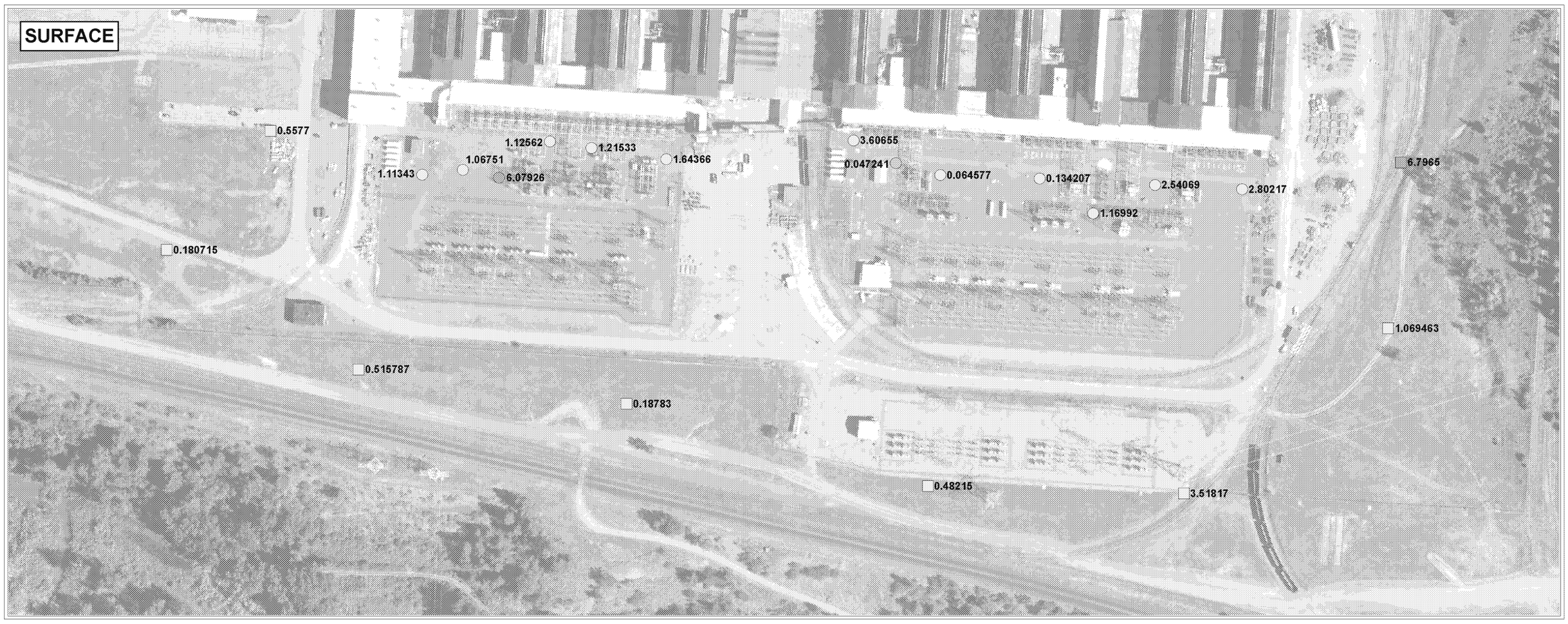
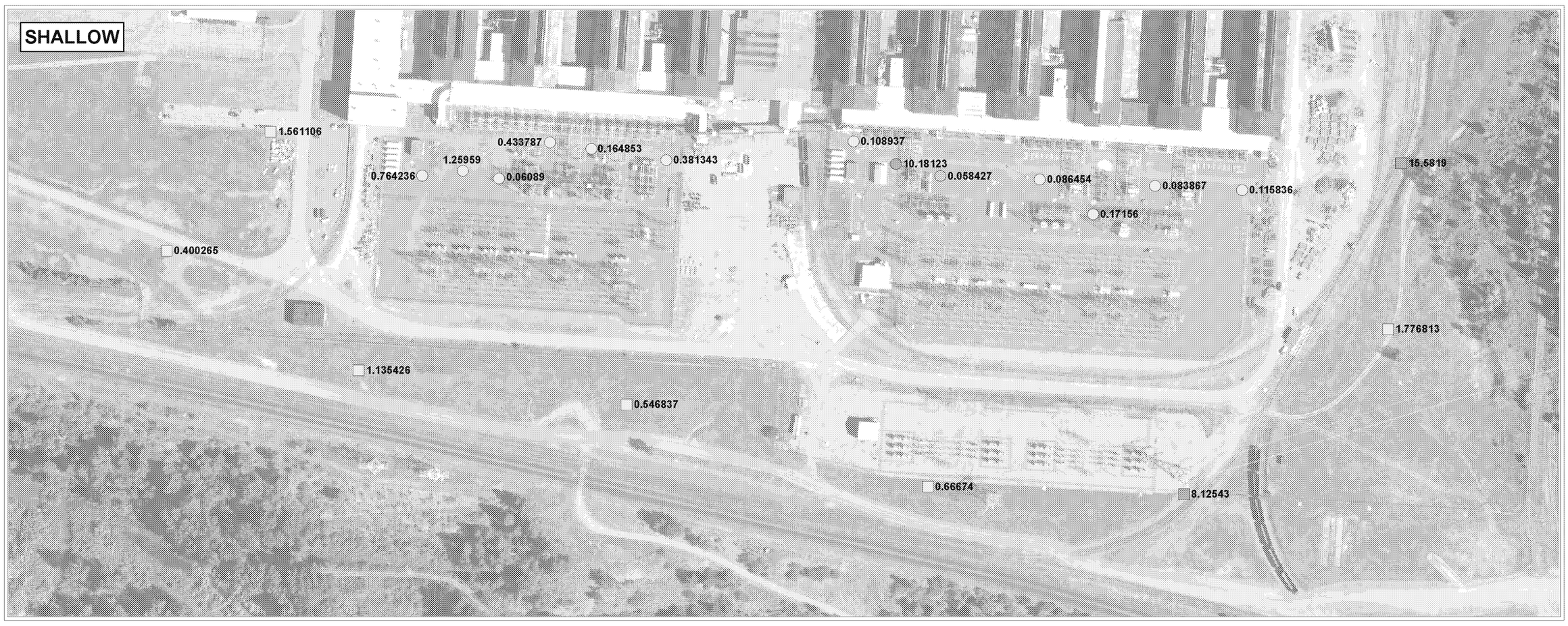




CONCENTRATION LEGEND

PHASE 1	PHASE 2	
●	■	ND – 0.059
○	□	0.059 – 4.8
●	■	4.8 – 22
●	■	>22

NOTES

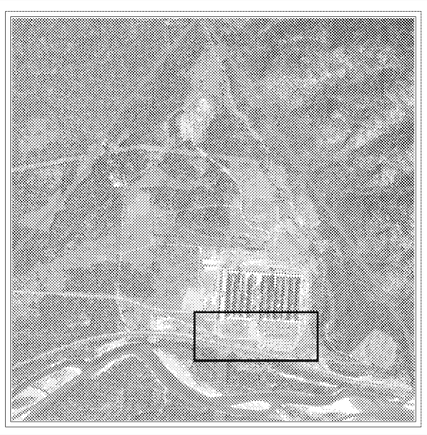
ND – NON DETECT
EPA – ENVIRONMENTAL PROTECTION AGENCY
RSL – REGIONAL SCREENING LEVELS

1. ALL SAMPLES ARE IN PICOGRAMS PER GRAM
2. SCREENING LEVEL SOURCE: USEPA RSLs, MAY 2018

CHEMICAL NAME	EPA INDUSTRIAL SOIL RSL FOR 2,3,7,8–TCDD	EPA RESIDENTIAL SOIL RSL FOR 2,3,7,8–TCDD	EPA HUMAN HEALTH PROTECTION OF GW – RISK–BASED SSL FOR 2,3,7,8–TCDD
DIOXINS AND FURANS	22	4.8	0.059

N

100 0 100 200 Feet



Title:

CONCENTRATIONS OF TOTAL TEQ - DIOXINS AND FURANS IN PHASE I AND PHASE II SOIL

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:

COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX

Compiled by: L.J.	Date: 25JUL18	PLATE
Prepared by: M.S.R.	Scale: AS SHOWN	1
Project Mgr: L.J.	Project: 2476.0001Y006	
File: 2476.0001Y222.1.mxd		

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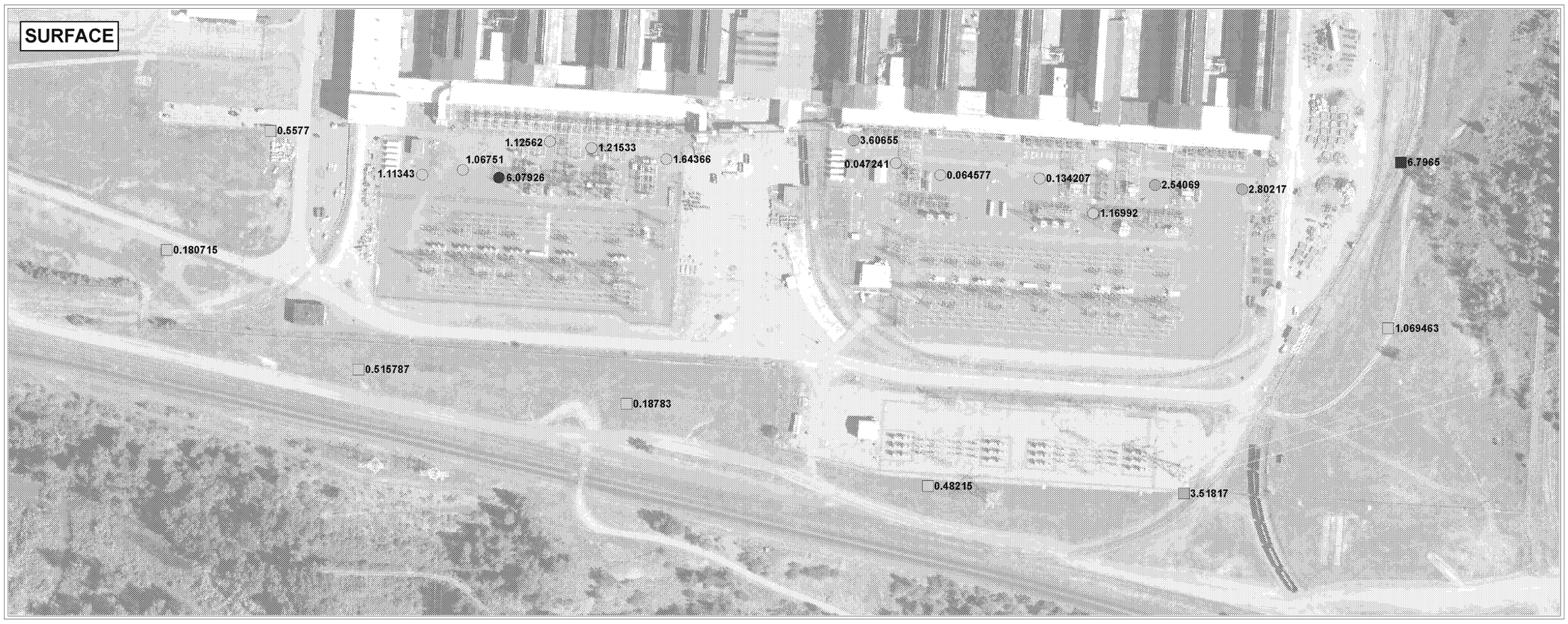
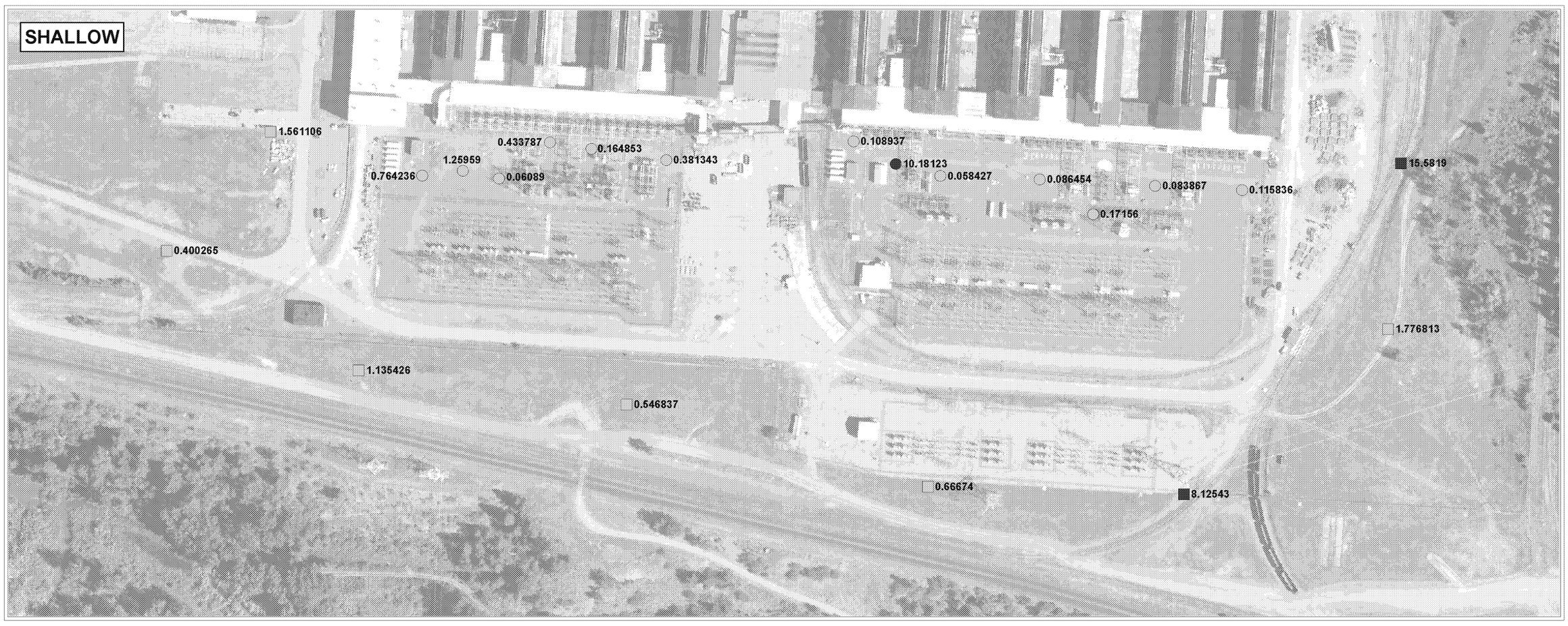




CONCENTRATION LEGEND

PHASE 1	PHASE 2	
●	■	ND – 1.817
○	□	1.817 – 2.43
●	■	2.43 – 5.84
●	■	>5.84

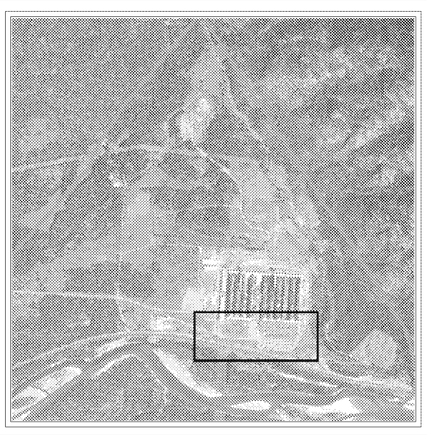
NOTES

UTL – UPPER TOLERANCE LIMIT
ND – NON DETECT
ALL SAMPLES ARE IN PICOGRAMS PER GRAM
MONTANA BACKGROUND UTLS FROM THE MDEQ MONTANA DIOXIN BACKGROUND INVESTIGATION REPORT DATED APRIL 2011.

CHEMICAL NAME	MONTANA BACKGROUND UTL (RURAL DATA)	MONTANA BACKGROUND UTL (URBAN + RURAL)	MONTANA BACKGROUND UTL (URBAN – INDUSTRIAL)
DIOXINS AND FURANS	1.817	2.43	5.84

N

100 0 100 200 Feet



Title:

CONCENTRATIONS OF TOTAL TEQ - DIOXINS AND FURANS IN PHASE I AND PHASE II SOIL

2000 ALUMINUM DRIVE
COLUMBIA FALLS, MONTANA

Prepared For:

COLUMBIA FALLS ALUMINUM COMPANY, LLC

ROUX

Compiled by: L.J.	Date: 27JUN18	PLATE
Prepared by: M.S.R.	Scale: AS SHOWN	2
Project Mgr: L.J.	Project: 2476.0001Y006	
File: 2476.0001Y222.2.mxd		

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Table 1. Sampling Analyses and MDLs for Dioxins and Furans in Soil – Human Health
Columbia Falls Aluminum Company, LLC, 2000 Aluminum Dr, Columbia Falls, MT

Analyte Group	Cas ID #	Analyte	Analytical Method	Unit	MDL Statistics				Human Health Screening Levels				
					Min MDL	Max MDL	Mean MDL	Median MDL	Residential	Industrial	Protection of GW	Minimum Standard	Maximum Standard
Dioxin Furans	35822-46-9	1,2,3,4,6,7,8-HpCDD	8290A	pg/g	0.018	11.7	0.59911	0.0860	22	4.8	0.059	0.059	22
Dioxin Furans	67562-39-4	1,2,3,4,6,7,8-HpCDF	8290A	pg/g	0.014	1.99	0.19852	0.0445	22	4.8	0.059	0.059	22
Dioxin Furans	55673-89-7	1,2,3,4,7,8,9-HpCDF	8290A	pg/g	0.016	2.42	0.24718	0.0540	22	4.8	0.059	0.059	22
Dioxin Furans	39227-28-6	1,2,3,4,7,8-HxCDD	8290A	pg/g	0.015	0.54	0.09789	0.0405	22	4.8	0.059	0.059	22
Dioxin Furans	70648-26-9	1,2,3,4,7,8-HxCDF	8290A	pg/g	0.016	1.2	0.13505	0.0525	22	4.8	0.059	0.059	22
Dioxin Furans	57653-85-7	1,2,3,6,7,8-HxCDD	8290A	pg/g	0.014	0.53	0.09023	0.0365	22	4.8	0.059	0.059	22
Dioxin Furans	57117-44-9	1,2,3,6,7,8-HxCDF	8290A	pg/g	0.014	1.09	0.12293	0.0490	22	4.8	0.059	0.059	22
Dioxin Furans	19408-74-3	1,2,3,7,8,9-HxCDD	8290A	pg/g	0.012	0.46	0.08130	0.0330	22	4.8	0.059	0.059	22
Dioxin Furans	72918-21-9	1,2,3,7,8,9-HxCDF	8290A	pg/g	0.015	1.22	0.13596	0.0550	22	4.8	0.059	0.059	22
Dioxin Furans	40321-76-4	1,2,3,7,8-PeCDD	8290A	pg/g	0.018	0.69	0.11154	0.0500	22	4.8	0.059	0.059	22
Dioxin Furans	57117-41-6	1,2,3,7,8-PeCDF	8290A	pg/g	0.015	0.48	0.08361	0.0395	22	4.8	0.059	0.059	22
Dioxin Furans	60851-34-5	2,3,4,6,7,8-HxCDF	8290A	pg/g	0.015	1.17	0.13095	0.0510	22	4.8	0.059	0.059	22
Dioxin Furans	57117-31-4	2,3,4,7,8-PeCDF	8290A	pg/g	0.015	0.49	0.08602	0.0405	22	4.8	0.059	0.059	22
Dioxin Furans	1746-01-6	2,3,7,8-TCDD	8290A	pg/g	0.012	0.58	0.08396	0.0330	22	4.8	0.059	0.059	22
Dioxin Furans	51207-31-9	2,3,7,8-TCDF	8290A	pg/g	0.0084	1.6	0.10444	0.0295	22	4.8	0.059	0.059	22
Dioxin Furans	3268-87-9	OCDD	8290A	pg/g	0.022	4.98	0.38652	0.0680	22	4.8	0.059	0.059	22
Dioxin Furans	39001-02-0	OCDF	8290A	pg/g	0.0097	0.59	0.08123	0.0295	22	4.8	0.059	0.059	22
Dioxin Furans	37871-00-4	Total HpCDD	8290A	pg/g	0.018	11.7	0.59911	0.0860	22	4.8	0.059	0.059	22
Dioxin Furans	38998-75-3	Total HpCDF	8290A	pg/g	0.015	2.2	0.22298	0.0490	22	4.8	0.059	0.059	22
Dioxin Furans	34465-46-8	Total HxCDD	8290A	pg/g	0.014	0.51	0.09077	0.0380	22	4.8	0.059	0.059	22
Dioxin Furans	55684-94-1	Total HxCDF	8290A	pg/g	0.015	1.17	0.13116	0.0515	22	4.8	0.059	0.059	22
Dioxin Furans	36088-22-9	Total PeCDD	8290A	pg/g	0.018	0.69	0.11154	0.0500	22	4.8	0.059	0.059	22
Dioxin Furans	30402-15-4	Total PeCDF	8290A	pg/g	0.015	0.48	0.08502	0.0405	22	4.8	0.059	0.059	22
Dioxin Furans	41903-57-5	Total TCDD	8290A	pg/g	0.012	0.58	0.08396	0.0330	22	4.8	0.059	0.059	22
Dioxin Furans	30402-14-3	Total TCDF	8290A	pg/g	0.0084	0.52	0.07160	0.0280	22	4.8	0.059	0.059	22

MDL - Method Detection Limit
RSL - Regional Screening Level
SSL - Soil Screening Level
Protection of GW - EPA Human Health Protection Of GW - Risk-Based SSL
Residential - EPA Residential Soil RSL
Industrial - EPA Industrial Soil RSL
pg/g - Picograms per gram

Table 2. Sampling Analyses and MDLs for Dioxins and Furans in Soil – Ecological
Columbia Falls Aluminum Company, LLC, 2000 Aluminum Dr, Columbia Falls, MT

Analyte Group	Cas ID #	Analyte	Analytical Method	Unit	MDL Statistics				Ecological Screening Levels					
					Min MDL	Max MDL	Mean MDL	Median MDL	NOAEL-Based Screening Levels - Birds	LOAEL-Based Screening Levels - Birds	NOAEL-Based Screening Levels - Mammals	LOAEL-Based Screening Levels - Mammals	Minimum ESV	Maximum ESV
Dioxin Furans	35822-46-9	1,2,3,4,6,7,8-HpCDD	8290A	pg/g	0.018	11.7	0.59911	0.0860	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	67562-39-4	1,2,3,4,6,7,8-HpCDF	8290A	pg/g	0.014	1.99	0.19852	0.0445	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	55673-89-7	1,2,3,4,7,8,9-HpCDF	8290A	pg/g	0.016	2.42	0.24718	0.0540	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	39227-28-6	1,2,3,4,7,8-HxCDD	8290A	pg/g	0.015	0.54	0.09789	0.0405	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	70648-26-9	1,2,3,4,7,8-HxCDF	8290A	pg/g	0.016	1.2	0.13505	0.0525	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	57653-85-7	1,2,3,6,7,8-HxCDD	8290A	pg/g	0.014	0.53	0.09023	0.0365	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	57117-44-9	1,2,3,6,7,8-HxCDF	8290A	pg/g	0.014	1.09	0.12293	0.0490	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	19408-74-3	1,2,3,7,8,9-HxCDD	8290A	pg/g	0.012	0.46	0.08130	0.0330	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	72918-21-9	1,2,3,7,8,9-HxCDF	8290A	pg/g	0.015	1.22	0.13596	0.0550	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	40321-76-4	1,2,3,7,8-PeCDD	8290A	pg/g	0.018	0.69	0.11154	0.0500	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	57117-41-6	1,2,3,7,8-PeCDF	8290A	pg/g	0.015	0.48	0.08361	0.0395	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	60851-34-5	2,3,4,6,7,8-HxCDF	8290A	pg/g	0.015	1.17	0.13095	0.0510	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	57117-31-4	2,3,4,7,8-PeCDF	8290A	pg/g	0.015	0.49	0.08602	0.0405	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	1746-01-6	2,3,7,8-TCDD	8290A	pg/g	0.012	0.58	0.08396	0.0330	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	51207-31-9	2,3,7,8-TCDF	8290A	pg/g	0.0084	1.6	0.10444	0.0295	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	3268-87-9	OCDD	8290A	pg/g	0.022	4.98	0.38652	0.0680	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	39001-02-0	OCDF	8290A	pg/g	0.0097	0.59	0.08123	0.0295	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	37871-00-4	Total HpCDD	8290A	pg/g	0.018	11.7	0.59911	0.0860	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	38998-75-3	Total HpCDF	8290A	pg/g	0.015	2.2	0.22298	0.0490	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	34465-46-8	Total HxCDD	8290A	pg/g	0.014	0.51	0.09077	0.0380	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	55684-94-1	Total HxCDF	8290A	pg/g	0.015	1.17	0.13116	0.0515	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	36088-22-9	Total PeCDD	8290A	pg/g	0.018	0.69	0.11154	0.0500	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	30402-15-4	Total PeCDF	8290A	pg/g	0.015	0.48	0.08502	0.0405	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	41903-57-5	Total TCDD	8290A	pg/g	0.012	0.58	0.08396	0.0330	1.58	15.8	0.29	1.9	0.29	15.8
Dioxin Furans	30402-14-3	Total TCDF	8290A	pg/g	0.0084	0.52	0.07160	0.0280	1.58	15.8	0.29	1.9	0.29	15.8

MDL - Method Detection Limit
ESV - Ecological Screening Value
Bird Screening Level Source: Efryomson et al. (1997) and sample et al. (1996)
Mammal Screening Level Source: Los Alamost National Laboratory (Ecorisk, Release 4.1)
pg/g - Picograms per gram
NOAEL - No Observed Adverse Affect Level
LOAEL - Lowest Observed Adverse Affect Level