

MEMORANDUM

TO: Richard Elliott/Austin Hofmeister
FROM: Carol Northern/Mary Ann Brookshire
DATE: August 5, 2020
SUBJECT: OU1/OU2 Soil Sampling Work Plan Addendum
Kerr-McGee Chemical Corp – Navassa Superfund Site

This addendum to the OU1/OU2 Soil Sampling Work Plan dated May 2020, Revised August 2020 (the Work Plan) presents the approach for conducting a background study at the Kerr-McGee Chemical Corp – Navassa Superfund Site (the Site) in Navassa, North Carolina. The objective of the study is to collect composite surface soil samples from the OU1 boundary area and the Eastern Uplands Area to assess concentrations of dioxin and furans in surface soils associated with anthropogenic sources unrelated to former operations at the Site. This data will be used to develop an understanding of the potential influence of background sources on dioxin and furan concentrations detected, if any, in OU1/OU2 surface soils.

Sample Collection and Analysis

Field activities will be conducted in general accordance with the most recent USEPA Region 4 Science and Ecosystem Support Division (SESD) operating procedures (USEPA, 2020), and other procedures described in the Supplemental Remedial Investigation (SRI) Work Plans dated September 2015 (CH2M Hill, 2015) and December 2016 (EarthCon, 2016).

The background study will consist of the collection of ten 5-point composite surface soil samples. Five of the samples will be collected from previously sampled OU1 boundary locations and the remaining five samples will be collected from locations in the Eastern Upland Area. The sample locations are shown on Figure 1.

The boundary area composite soil samples will be collected to replicate the previous aliquot sample locations. The Eastern Upland Area composite soil samples will be collected from parcels no more than ¼-acre in size. One 5-point composite sample will be collected from each parcel. The composites will include one aliquot from the center of the parcel, along with four aliquots collected in each of the four compass directions (N, S, E, W).

The composite surface soil samples will be collected at a depth of 0 to 1-foot below ground surface (bgs) using a hand auger from each composite aliquot location and placing the soil in a stainless-steel bowl. Once the five aliquots have been collected, the soil will be homogenized using a stainless-steel spoon. A sample of the homogenized soil will be collected and placed into laboratory-supplied containers for analysis. The samples will be analyzed for pentachlorophenol (PCP) and polynuclear aromatic hydrocarbons (PAHs) by SW-846 Method 8270 selective ion

monitoring (SIM), and dioxins and furans by SW-846 Method 8290A. A summary of the soil samples and laboratory analyses is provided in Table 1 and the sample coordinate locations are provided in Table 2. The laboratory detection and reporting limits are provided in Table 3.

A description of the field quality control samples is provided in Section 4.5 of the Work Plan. Investigation-derived waste will be managed as described in Section 4.6 of the Work Plan (EarthCon, 2020).

Clearing and Surveying

Access to the composite surface soil sample locations may require removal of vegetation. To facilitate access to potential sampling locations, underbrush will be cleared from the OU1 Boundary Area and the Eastern Upland Area, as needed. The cutting and clearing of trees larger than 3 inches in diameter will be avoided. Existing roadways and/or paths will be used as much as possible to reduce the amount of clearing needed to access the sampling locations. The sample locations may be adjusted in the field to ensure that no composite sample aliquot is collected from an area where there is visible evidence of disturbance or anthropogenic use.

The composite sample aliquot locations will be generated using Geographic Information System (GIS) software. To facilitate field activities, the coordinate locations (attached Table 2) will be staked in the field using a hand-held GIS. A North Carolina-licensed surveyor will provide updated coordinates based on the staked locations.

Data Evaluation/Reporting

The laboratory analytical data will be validated as described in the Work Plan. For polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), the background surface composite results will be converted to dioxin toxic equivalents (TEQ) using 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) as the index compound. TCDD TEQ values will be calculated by computing the sum across congeners of the product of a congener-specific concentration and its toxicity equivalence factor (TEF) (USEPA, 2010). TEFs have been established by the USEPA for the seventeen 2,3,7,8-substituted PCDD/PCDF congeners. TCDD TEQ will be calculated using the 2005 World Health Organization's TEFs with non-detect results included at one-half the method detection limit (Van den Berg, et al., 2006). An appropriate upper tolerance limit (UTL) that characterizes the entire background range will be computed using USEPA's ProUCL 5.1 software (USEPA, 2015). The calculated UTL will then be used to estimate the background threshold value (BTV). The BTV represents an upper threshold parameter (e.g., 95th) of the background population, and will be used to perform background comparisons.

The results of the background study will be presented in a technical memorandum that will be included as an appendix to the OU1 and OU2 Technical Memoranda.

References

- CH2M Hill, 2015. Supplemental Remedial Investigation Work Plan, Kerr-McGee Chemical Corporation Site – Navassa, NC, CH2M Hill, September 2015.
- EarthCon 2016. Supplemental Remedial Investigation Work Plan Addendum No. 3, Kerr-McGee Chemical Corporation Site – Navassa, NC, EarthCon Consultants of North Carolina, P.C., December 2016.
- EarthCon, 2020. OU1/OU2 Soil Sampling Work Plan, Kerr-McGee Chemical Corporation – Navassa Superfund Site, EarthCon Consultants of North Carolina, P.C., May 2020 (Revised July 2020).
- USEPA, 2010. Recommended Toxicity Equivalence Factors (TEFs) for Human Health Risk Assessments of 2,3,7,8-Tetrachlorodibenzo-p-dioxin and Dioxin-Like Compounds, EPA/100/R 10/005 December 2010.
- USEPA, 2015. ProUCL Version 5.1 Technical Guide, Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations, EPA/600/R-07/041, October 2015.
- USEPA, 2020. Field Branches Quality System and Technical Procedures, Region 4: Laboratory and Field Operations. Standard Operating Procedures available online:
<http://www.epa.gov/region4/sesd/fbgstp/>.
- Van den Berg, M; Birnbaum, LS; Denison, M; et al., 2006. The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. *Toxicol Sci* 93(2):223-241, October 2006.

Table 1: Proposed Laboratory Methods and Sample Summary
Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

Sample Type		Analysis	Method	No. Samples	Field Duplicates	Rinsate Blanks	Trip Blanks	MS	MSD	Field Blank	Total No. Samples
1	Background Composite Soil Samples	PCP and PAH	EPA 8270D SIM	10	1	1	--	1	1	1	15
		Dioxins/Furans	EPA 8290A	10	1	1	--	1	1	1	15

PAH - polynuclear aromatic hydrocarbons
 PCP - pentachlorophenol
 SIM- selective ion monitoring

Prepared by: MAB 7/23/20
 Checked by: CDN 7/30/20

Table 2: Soil Sample Location Coordinates
Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

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August 2020

Location Name	Northing	Easting	Location Name	Northing	Easting
Boundary Area Samples			Eastern Upland Area Samples		
CS-BK01-1	185893.92000	2304068.82000	CS-BK06-A	185678.64557	2304645.27367
CS-BK01-2	185871.64905	2304037.65543	CS-BK06-B	185715.54051	2304645.27367
CS-BK01-3	185842.18907	2304004.91120	CS-BK06-C	185678.64557	2304682.16894
CS-BK01-4	185808.77469	2303975.13005	CS-BK06-D	185641.75030	2304645.27367
CS-BK01-5	185771.85000	2303947.53000	CS-BK06-E	185678.64557	2304608.37873
CS-BK02-1	185495.57000	2303857.45000	CS-BK07-A	185382.53986	2303968.36000
CS-BK02-2	185449.94500	2303842.59000	CS-BK07-B	185419.43513	2303968.36000
CS-BK02-3	185404.32000	2303827.73000	CS-BK07-C	185382.53986	2304005.25527
CS-BK02-4	185358.69500	2303812.87000	CS-BK07-D	185345.64492	2303968.36000
CS-BK02-5	185313.07000	2303798.01000	CS-BK07-E	185382.53986	2303931.46473
CS-BK03-1	184626.41246	2303569.61222	CS-BK08-A	184788.17458	2304403.01923
CS-BK03-2	184578.49750	2303555.32390	CS-BK08-B	184825.06952	2304403.01923
CS-BK03-3	184530.58253	2303541.03558	CS-BK08-C	184788.17458	2304439.91450
CS-BK03-4	184482.66757	2303526.74725	CS-BK08-D	184751.27931	2304403.01923
CS-BK03-5	184434.75261	2303512.45893	CS-BK08-E	184788.17458	2304366.12397
CS-BK04-1	184170.77004	2303384.15932	CS-BK09-A	184599.96006	2304020.77984
CS-BK04-2	184123.04326	2303369.25447	CS-BK09-B	184636.85500	2304020.77984
CS-BK04-3	184075.31649	2303354.34962	CS-BK09-C	184599.96006	2304057.67511
CS-BK04-4	184027.58971	2303339.44476	CS-BK09-D	184563.06480	2304020.77984
CS-BK04-5	183979.86293	2303324.53991	CS-BK09-E	184599.96006	2303983.88490
CS-BK05-1	183559.65057	2303462.76979	CS-BK10-A	183928.36232	2304045.28570
CS-BK05-2	183513.56880	2303482.17264	CS-BK10-B	183965.25726	2304045.28570
CS-BK05-3	183467.48703	2303501.57549	CS-BK10-C	183928.36232	2304082.18064
CS-BK05-4	183421.40526	2303520.97834	CS-BK10-D	183890.93458	2304044.41759
CS-BK05-5	183375.32349	2303540.38119	CS-BK10-E	183928.36232	2304008.39043

Prepared by: HVP 8/4/20
 Checked by: CDN 8/5/20

**Table 3: Soil Target Parameters, Analytical Methods, and Project Minimum Reporting Limits
Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina**

OU1/OU2 Soil Sampling Work Plan Addendum
August 2020

Parameter	CAS Number	Method	Units	Lab Method Detection Limit	Lab Reporting Limit
PAHs					
1-Methylnaphthalene	90-12-0	8270D SIM	mg/kg	0.027	0.067
2-Methylnaphthalene	91-57-6	8270D SIM	mg/kg	0.027	0.067
Acenaphthene	83-32-9	8270D SIM	mg/kg	0.027	0.067
Acenaphthylene	208-96-8	8270D SIM	mg/kg	0.027	0.067
Anthracene	120-12-7	8270D SIM	mg/kg	0.017	0.067
Benzo(a)anthracene	56-55-3	8270D SIM	mg/kg	0.0033	0.013
Benzo(a)pyrene	50-32-8	8270D SIM	mg/kg	0.0033	0.013
Benzo(b)fluoranthene	205-99-2	8270D SIM	mg/kg	0.0033	0.013
Benzo(g,h,i)perylene	191-24-2	8270D SIM	mg/kg	0.0033	0.013
Benzo(k)fluoranthene	207-08-9	8270D SIM	mg/kg	0.0033	0.013
Chrysene	218-01-9	8270D SIM	mg/kg	0.0033	0.013
Dibenz(a,h)anthracene	53-70-3	8270D SIM	mg/kg	0.0033	0.013
Fluoranthene	206-44-0	8270D SIM	mg/kg	0.017	0.067
Fluorene	86-73-7	8270D SIM	mg/kg	0.027	0.067
Indeno(1,2,3-cd)pyrene	193-39-5	8270D SIM	mg/kg	0.0033	0.013
Naphthalene	91-20-3	8270D SIM	mg/kg	0.027	0.067
Phenanthrene	85-01-8	8270D SIM	mg/kg	0.017	0.067
Pyrene	129-00-0	8270D SIM	mg/kg	0.017	0.067
Semi-Volatile Organic Compounds					
Pentachlorophenol	87-86-5	8270D SIM	mg/kg	0.017	0.13
Dioxins					
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	1746-01-6	8290A	pg/g	0.5	0.5
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	40321-76-4	8290A	pg/g	1.25	2.5
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	39227-28-6	8290A	pg/g	1.25	2.5
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	57653-85-7	8290A	pg/g	2.5	2.5
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	19408-74-3	8290A	pg/g	1.25	2.5
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	35822-46-9	8290A	pg/g	1.25	2.5
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	3268-87-9	8290A	pg/g	5	5

**Table 3: Soil Target Parameters, Analytical Methods, and Project Minimum Reporting Limits
Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina**

OU1/OU2 Soil Sampling Work Plan Addendum
August 2020

Parameter	CAS Number	Method	Units	Lab Method Detection Limit	Lab Reporting Limit
Furans					
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	51207-31-9	8290A	pg/g	0.25	0.5
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	57117-41-6	8290A	pg/g	1.3	2.5
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	57117-31-4	8290A	pg/g	2.5	2.5
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	70648-26-9	8290A	pg/g	1.3	2.5
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	57117-44-9	8290A	pg/g	1.3	2.5
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	60851-34-5	8290A	pg/g	1.3	2.5
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	72918-21-9	8290A	pg/g	1.3	2.5
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	67562-39-4	8290A	pg/g	1.3	2.5
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	55673-89-7	8290A	pg/g	1.3	2.5
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	39001-02-0	8290A	pg/g	2.5	5

Notes:

The method reporting limits are sufficient to achieve the project target levels of 11 mg/kg BaP TEQ and 50 pg/g dioxins/furans TEQ.

CAS - Chemical Abstracts Service

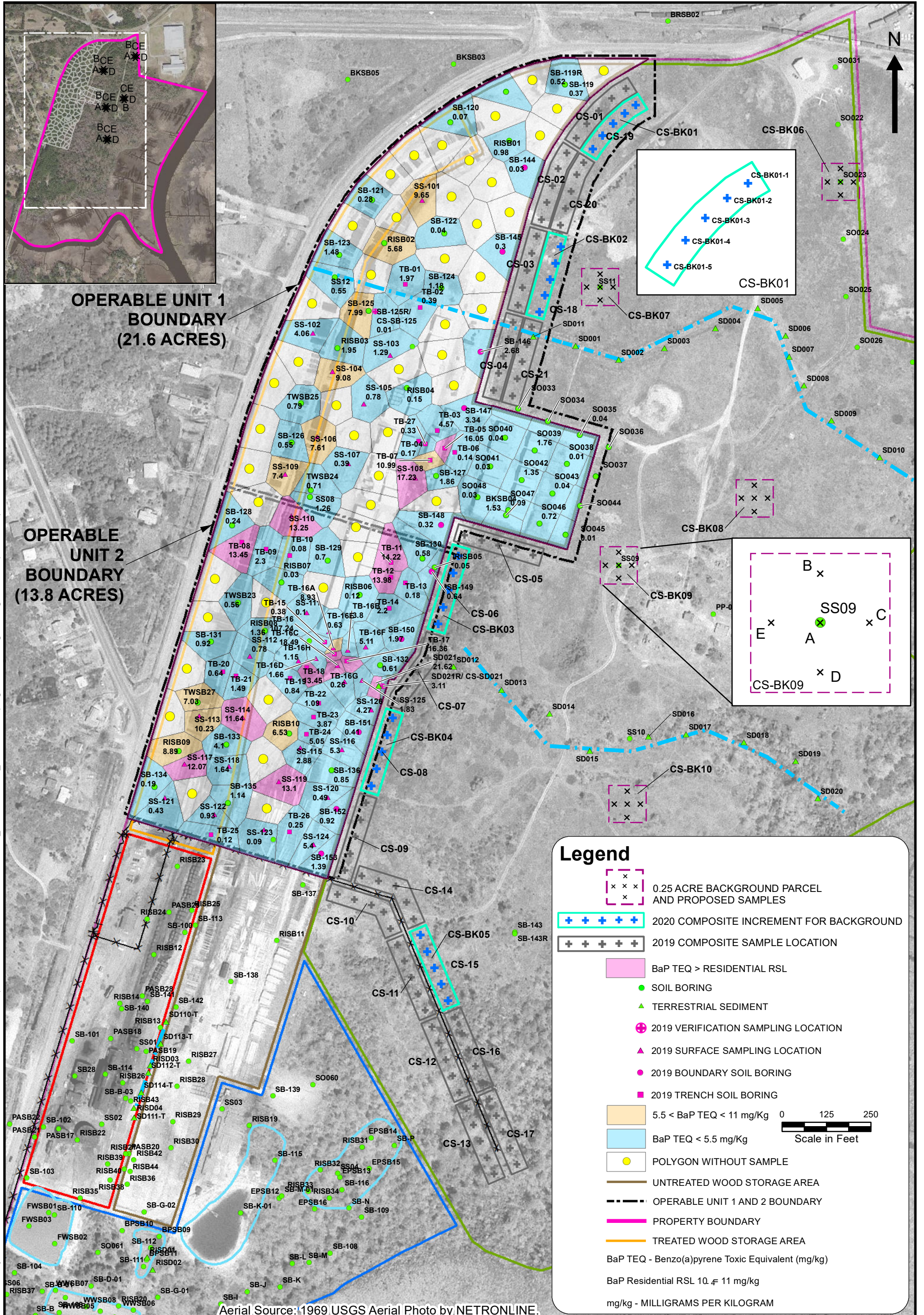
mg/kg - milligrams per kilogram

pg/g - picogram per gram (1 nanogram per kilogram or 1 part per trillion)

Prepared by: MAB 7/30/20

Checked by: CDN 7/30/20

S:\Premier\Projects\Greenfield Environmental Multistate Trust\KMC Navassa NC Superfund Site\CAD GIS Data\EARTHCON_GIS\IMXD\OU1_OU2 Soil Sampling Work Plan\Fig 1 Background Composite Sample Locations RV1.mxd 8/4/2020 6:39:01 PM



OPERABLE UNIT 1 BOUNDARY (21.6 ACRES)

OPERABLE UNIT 2 BOUNDARY (13.8 ACRES)

Legend

- 0.25 ACRE BACKGROUND PARCEL AND PROPOSED SAMPLES
 - 2020 COMPOSITE INCREMENT FOR BACKGROUND
 - 2019 COMPOSITE SAMPLE LOCATION
 - BaP TEQ > RESIDENTIAL RSL
 - SOIL BORING
 - TERRESTRIAL SEDIMENT
 - 2019 VERIFICATION SAMPLING LOCATION
 - 2019 SURFACE SAMPLING LOCATION
 - 2019 BOUNDARY SOIL BORING
 - 2019 TRENCH SOIL BORING
 - 5.5 < BaP TEQ < 11 mg/kg
 - BaP TEQ < 5.5 mg/kg
 - POLYGON WITHOUT SAMPLE
 - UNTREATED WOOD STORAGE AREA
 - OPERABLE UNIT 1 AND 2 BOUNDARY
 - PROPERTY BOUNDARY
 - TREATED WOOD STORAGE AREA
- BaP TEQ - Benzo(a)pyrene Toxic Equivalent (mg/kg)
 BaP Residential RSL 10.4 mg/kg
 mg/kg - MILLIGRAMS PER KILOGRAM
- Scale in Feet: 0, 125, 250

Aerial Source: 1969 USGS Aerial Photo by NETRONLINE.



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PREPARED BY:



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BACKGROUND COMPOSITE SAMPLE LOCATIONS
OU1/OU2 Soil Sampling Work Plan Addendum
Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

DRAWN	CHECKED	DATE	FIGURE
HVP	CDN	JULY 2020	1