# OU1/OU2 Soil Sampling Work Plan

# Kerr-McGee Chemical Corp – Navassa Superfund Site

# Navassa, North Carolina

EPA ID #NCD980557805

**Prepared for:**

Greenfield Environmental Multistate Trust LLC
Trustee of the Multistate Environmental Response Trust

Prepared By:

EARTHCON®
Environmental Challenges
BUSINESS SOLUTIONS®

**May 2020**
**Revised July 2020**

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## TABLES



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## APPENDIX

# Acronyms and Abbreviations

| | |
|---|---|
| BaP | benzo(a)pyrene |
| bgs | below ground surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act of 1980 |
| HHRA | Human Health Risk Assessment |
| mg/kg | milligrams per kilogram |
| NAD | North American Datum |
| NAVD | North American Vertical Datum |
| NC DEQ | North Carolina Department of Environmental Quality |
| OU1 | Operable Unit 1 |
| OU2 | Operable Unit 2 |
| PAH | polynuclear aromatic hydrocarbon |
| PCP | pentachlorophenol |
| PPE | Personal protective equipment |
| PPT | parts per trillion |
| RSL | Regional Screening Level |
| SESD | Science and Ecosystem Support Division |
| SIM | Selective Ion Monitoring |
| SRI | Supplemental Remedial Investigation |
| TEQ | toxic equivalent concentration |
| ug/kg | micrograms per kilogram |
| USEPA | U.S. Environmental Protection Agency |

## 1.0 INTRODUCTION

This 2020 OU1/OU2 Soil Sampling Work Plan presents the technical approach for collection of additional Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) site characterization data to support a remedial alternative evaluation at the Kerr-McGee Chemical Corp – Navassa Superfund Site [U.S. Environmental Protection Agency (USEPA) ID# NCD980557805], referred to herein as the Site, located in Navassa, North Carolina (Figure 1). This Work Plan is being submitted by EarthCon Consultants of North Carolina, P.C. on behalf of Greenfield Environmental Multistate Trust LLC, not individually but solely in its representative capacity as Trustee of the Multistate Environmental Response Trust (the Multistate Trust).

The Site operated as a creosote-based wood treating facility from 1936 to 1974. A Site plan showing the property boundary, Process Area, Wood Storage Areas and other prominent Site features is provided as Figure 2. Previous investigations have indicated that soil, groundwater, surface water and sediment were impacted by historical Site operations. The objectives of this 2020 soil investigation are to collect additional data to refine the remedial/risk management decisions for Operable Unit 1 (OU1) and Operable Unit 2 (OU2) which consist of approximately 21.6 and 13.8 acres, respectively, as shown on Figure 3.

The area for OU1 is as defined in the 2019 OU1 Proposed Plan (USEPA, 2019). In response to Proposed Plan Public Comments, OU1 has tentatively been redefined to include the areas that are likely to meet residential criteria with no remedial action, and OU2 has been identified as the areas that may need remedial action to meet residential criteria. The Town of Navassa has expressed a preference for OU1 to be available for future residential redevelopment. No land use preferences regarding OU2 have been provided by the Town of Navassa. However, the sampling strategy proposed herein will assume sampling to meet future residential use criteria for each OU.

In an email dated March 3, 2020, the North Carolina Department of Environmental Quality (NC DEQ) provided guidance on additional sampling that would be required to demonstrate that surface soils do not pose an unacceptable risk to future residential receptors. In an email dated March 3, 2020, the USEPA indicated that NC DEQ's guidance was acceptable.

Pentachlorophenol (PCP) was not identified as a chemical of concern for soils in either the April 2019 Human Health Risk Assessment (HHRA) or the August 2019 HHRA Addendum. PCP has been detected in groundwater; however, the groundwater detections may be the result of laboratory error or other data quality issues. After further consideration, and out of an abundance of caution, USEPA, NC DEQ, and the Multistate Trust have agreed to include analysis of the soil samples for PCP and analysis of a subset of the soil samples for dioxins and furans (a common impurity associated with PCP) to

ensure adequate characterization of these constituents. This Work Plan has been revised to add PCP and dioxins and furans to the analytical suite.

As part of the characterization and evaluation of the dioxin and furan concentrations in OU1 and OU2 soils, a limited number of soil samples will be collected from the eastern portion of the Site where no activity associated with the former wood treatment facility is known to have taken place. These samples will support an understanding of whether sources unrelated to the former facility (anthropogenic background) may be contributing to any observed presence of dioxins and furans in OU1 and OU2 soils. The scope of this background sample collection (number of samples, locations, etc.) will be addressed in an addendum to this work plan.

## 2.0 SAMPLING STRATEGY

A sampling strategy was developed for both OU1 and OU2 to evaluate whether the surface soils pose an unacceptable risk to future residential receptors that may require remedial actions. In accordance with NC DEQ requirements, OU1 and OU2 have been divided into parcels with a maximum size of 1/4-acre using the Thiessen polygon methodology. As shown on Figure 3, there are a total of 172 “1/4-acre polygons” or parcels, 91 in OU1 and 81 in OU2.

The following sections describe the strategy that was developed to address both parcels containing an existing surface soil sample and parcels without a surface soil sample. The approved sampling strategy is provided as Appendix A.

### 2.1 Parcels Without a Surface Soil Sample

There are 47 parcels without a surface soil sample, 34 in OU1 and 13 in OU2. For each of these parcels, a 5-point composite surface soil sample will be collected, and the resulting data will be used to calculate the benzo(a)pyrene toxic equivalent concentration (BaP TEQ) for that parcel. If the BaP TEQ is less than the residential Regional Screening Level (RSL) at 1E-04 of 11 milligrams per kilogram (mg/kg) [11,000 micrograms per kilogram (µg/kg)] for BaP, no further evaluation is necessary for that parcel.

If the BaP TEQ is greater than the residential RSL at 1E-04, the parcel will be further delineated by dividing the parcel into 5 subareas or smaller polygons each associated with one of the 5-point composite aliquot locations and collecting a grab surface soil sample from each of the 5-point composite aliquot locations. The BaP TEQ will then be calculated for each of the grab surface soil samples.

If the BaP TEQ is less than the residential RSL at 1E-04, no further action is required for that area of the polygon. If the BaP TEQ is greater than the residential RSL of 1E-04, this area of the polygon will be identified for remedial action.

## 2.2 Parcels With a Surface Soil Sample

There are 125 1/4-acre parcels with existing surface soil samples, 57 in OU1 and 68 in OU2. For each of these samples, the BaP TEQ was calculated using the existing data and compared to the residential RSL at 1E-04 of 11 mg/kg for BaP.

For parcels with BaP TEQ concentrations less than 5.5 mg/kg (1/2 of the residential RSL at 1E-04 for BaP), no further evaluation is required. As shown on Figure 3, there are 99 parcels that fall into this category (48 in OU1 and 51 in OU2).

### 2.2.1 Parcels with BaP TEQ Greater than 5.5 but less than 11 mg/kg

There are 12 1/4-acre parcels with existing surface soil samples with BaP TEQ concentrations greater than 5.5 but less than 11 mg/kg, seven in OU1 and five in OU2. For each of these parcels, a 5-point composite surface soil sample will be collected, and the resulting data will be used to calculate the BaP TEQ for that parcel. Grab surface soil samples will also be collected at each of the 5-point composite locations and held pending composite sample results.

If the BaP TEQ is less than the residential RSL at 1E-04 of 11 mg/kg, no further evaluation is necessary for that parcel. If the BaP TEQ for a parcel is greater than 11 mg/kg, the grab samples collected from that parcel will be analyzed.

The resulting data for each grab sample will be used to calculate the BaP TEQ which will then be compared to the residential RSL at 1E-04 of 11 mg/kg. If the BaP TEQ for a grab sample is below 11 mg/kg, no further action is required for that area of the polygon. If the BaP TEQ for the grab sample exceeds 11 mg/kg, this area of the polygon will be identified for potential remedial action.

### 2.2.2 Parcels with BaP TEQ Greater than 11 mg/kg

There are 14 1/4-acre parcels with existing surface soil samples with BaP TEQ concentrations greater than 11 mg/kg, two in OU1 and 12 in OU2. Six of the 14 parcels have been identified for a remedial action for the entire parcel based on previous field observations and the relatively small size of the parcel, one in OU1 and five in OU2. The post excavation confirmation samples will serve as delineation samples for remedial action of these parcels.

1) Parcels TB-05 (OU1) and SD021 (OU2) were identified for a remedial action based on the presence of creosote timbers.
2) Parcels TB-16, TB-16C, TB-17 and TB-18 (OU2) were identified for remedial actions based on the presence of “asphalt-like” material at the surface.

Eight of the 14 parcels have been identified for additional sampling to delineate the parcel, one in OU1 (parcel SS-108) and seven in OU2 (parcels TB-08, TB-11, TB-12, SS-110, SS-114, SS-117, SS-119). The parcels will be divided into 4 equal quadrants and one grab surface soil sample will be collected from each quadrant.

The resulting data for each grab sample will be used to calculate the BaP TEQ which will then be compared to the residential RSL at 1E-04 of 11 mg/kg. If the BaP TEQ for a grab sample is below 11 mg/kg, no further action is required for that area of the polygon. If the BaP TEQ for the grab sample exceeds 11 mg/kg, this area of the polygon will be identified for remedial action

## 3.0 PROPOSED DATA COLLECTION ACTIVITIES

This section provides a summary of the proposed data collection activities associated with OU1 and OU2. The data collection activities include collection of composite and grab surface soil samples. A summary of the proposed samples for each parcel type is provided in Table 1.

### 3.1 Composite Soil Sampling - Parcels Without a Surface Soil Sample

A total of 47 composite surface soil samples will be collected (34 from OU1 and 13 from OU2) from the parcels without a surface soil sample. Proposed sample locations are shown on Figure 4.

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. The composite surface soil samples will be analyzed for polynuclear aromatic hydrocarbons (PAHs) by SW-846 Method 8270D, PCP by SW-846 Method 8270D selective ion monitoring (SIM), and dioxins and furans by SW-846 Method 8290A.

If the resulting data for any composite surface soil sample indicate the BaP TEQ concentration for that parcel is greater than 11 mg/kg, grab samples will be collected from that parcel as described in Section 3.3.

### 3.2 Composite Soil Sampling – Parcels with a Surface Soil Sample

A total of 12 composite surface soil samples will be collected (7 from OU1 and 5 from OU2) from the parcels with a surface soil sample with a BaP TEQ concentration greater than 5.5 but less than 11 mg/kg. Proposed sample locations are shown on Figure 5.

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 bgs using a hand auger. The composite surface soil samples will be analyzed for PAHs by SW-846 Method 8270D, PCP by SW-846 Method 8270D SIM, and dioxins and furans by SW-846 Method 8290A. Grab surface soil samples will also be collected from these parcels as described in Section 3.3.

### 3.3 Grab Surface Soil Samples

Grab surface soil samples will be collected at a depth 0 to 1-foot bgs using a stainless-steel hand auger and analyzed for PAHs by SW-846 Method 8270D and PCP by SW-846 Method 8270D SIM. A split from each sample will also be archived in the analytical laboratory for future analysis of dioxins and furans by SW-846 Method 8290A based on the analytical results for PCP. Grab surface soil samples will be collected as follows:

- **Parcels without Surface Soil Samples**: If the composite soil samples results indicated a BaP TEQ concentration greater than 11 mg/kg for any parcel, one grab surface soil sample will be collected from each composite soil sample aliquot location in that parcel. For the purposes of scoping the field activities, it is assumed that grab surface soil samples will be collected from 10 percent of these parcels for a total of 25 grab surface soil samples. This number will be refined based on the actual analytical results for the composite soil samples.

- **Parcels with BaP TEQ concentrations greater than 5.5 but less than 11 mg/kg**: One grab surface soil sample will be collected from each composite soil sample aliquot location for a total of 60 grab surface soil samples. The samples will be sent to the analytical laboratory and held pending receipt of composite soil sample analytical results and calculation of the BaP TEQ. If the composite soil analytical results indicate a BaP TEQ greater than 11 mg/kg, the 5 grab samples associated with that parcel will be analyzed. If the BaP TEQ is less than 11 mg/kg, the grab samples associated with that parcel will not be analyzed.

- **Parcels with BaP TEQ concentrations greater than 11 mg/kg**: A total of 32 grab surface soil samples will be collected from parcels with BaP TEQ greater than 11 mg/kg. Each parcel will be divided into four quadrants and one grab surface soil sample will be collected from each quadrant as shown on Figure 6.

### 3.4 Vegetation Clearing

Access to the composite and grab surface soil sample locations may require removal of vegetation. To facilitate access to potential sampling locations, underbrush will be cleared from those portions of the Treated and Untreated Wood Storage Areas located north of

the existing fence, 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.

### 3.5 Surveying

Once the vegetation clearing is complete, a North Carolina-licensed surveyor will stake the sampling locations using the coordinates provided in Table 2. If the selected sampling locations must be modified in the field due to surface obstructions (large trees, debris piles, etc.), the surveyor will provide updated coordinates.

## 4.0 FIELD AND LABORATORY PROCEDURES

Field and laboratory procedures are described in the following sections.

### 4.1 Field Procedures

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).

Composite soil sampling will be conducted by collecting soil samples from 0 to 1-foot bgs from each proposed composite increment location and placing the soil in a stainless-steel bowl. Once the five increments 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.

Grab soil sampling will be conducted by collecting soil from 0 to 1-foot bgs from each proposed grab surface soil sample location and placing the soil in a stainless-steel bowl. 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.

### 4.2 Surveying

Horizontal data will be reported on the North American Datum of 1983 (NAD83) and in the North Carolina State Plane Coordinate System. Vertical data will be reported on the North American Vertical Datum of 1988 (NAVD 88). Data will be delivered in United States Survey Feet.

### 4.3 Equipment Decontamination

Reusable sampling equipment will be decontaminated before and immediately after each use as described in SESDPROC-205. Solids and liquids generated by decontamination

operations will be containerized in 55-gallon drums and disposed off-Site in accordance with the SRI Waste Management Plan dated September 2015 (CH2M Hill, 2015).

### 4.4 Soil Sample Analysis

A total of 59 composite soil samples and 92 grab surface soil samples will be collected from OU1 and OU2 at the locations identified in Figures 4, 5 and 6. Pending results of the composite soil samples, additional grab surface soil samples may be collected. As described in Section 3.3, it is assumed that an additional 25 grab surface soil samples will be collected. The soil samples will be analyzed for PAHs by SW-846 Method 8270D and PCP by SW-846 Method 8270D SIM. The fifty-nine composite soil samples will also be analyzed for dioxins and furans by SW-846 Method 8290A. A split from each of the grab soil samples will be archived in the analytical laboratory for future analysis of dioxins and furans by SW-846 Method 8290A based on the analytical results for PCP.

A summary of the soil samples and laboratory analyses is provided in Table 1. A summary of the regulatory criteria and laboratory detection limits is provided in Table 3.

### 4.5 Quality Control

Field quality control samples will be collected as follows:

- Field duplicates will be collected at a rate of 1 per 10 samples
- Matrix spike/matrix spike duplicates will be collected at a rate of 1 per 20 samples
- Field blanks will be collected at a rate of one per week
- Equipment blanks will be collected at a rate of one blank per reusable equipment (stainless steel trowels, hand augers, etc.) per media, per 20 samples collected; or one per week, whichever is more frequent.

Laboratory analyses and reporting will be conducted in accordance with the SRI Quality Assurance Project Plan dated September 2015 (CH2M Hill, 2015). Table 1 provides a summary of the QC samples to be collected. A Level III (EPA Stage 2A) validation of 90 percent of the data and a Level IV validation (EPA Stage 4) of 10 percent of the laboratory data will be performed as described in the SRI Quality Assurance Plan (CH2M Hill, 2015).

### 4.6 Investigation-derived Waste Sampling and Management

The following waste streams may be generated during this investigation:

- Used personal protective equipment (PPE), trash, and sampling materials; and,
- Decontamination fluids.

Used PPE, trash, and sampling materials will be placed in a 55-gallon drum pending off-Site disposal. Investigation-derived waste will be managed in accordance with the SRI Waste Management Plan dated September 2015 (CH2M Hill, 2015).

## 5.0 REPORTING

A technical memorandum will be submitted for each OU to document the soil sampling activities, the results of the BaP TEQ evaluation, the PCP analytical results compared to the residential RSL at a 1E-04 target cancer risk level of 100 mg/kg for PCP, and the dioxins and furans analytical results compared to a dioxin and furan TEQ concentration of 50 parts per trillion (ppt).[1] The sampling and analytical results for the background sampling will also be provided. The technical memorandum for OU2 will also identify the parcels or areas of polygons for potential remedial action.

[1] Calculated based on default residential exposure parameters and a target noncancer hazard index of 1 in accordance with EPA guidance for the development of site-specific risk-based cleanup levels at Superfund sites (https://www.epa.gov/superfund/risk-assessment-dioxin-superfund-sites).

## 6.0 IMPLEMENTATION SCHEDULE

The following presents a summary of the approximate duration and constraints for implementation of field activities scheduled for July and August 2020:

| Task Name | Estimated Duration | Notes |
|---|---|---|
| **Site Preparation** | | |
| Vegetation Clearing | 10 days | Conducted concurrent with surveying |
| Surveying | 10 days | Conducted concurrent with vegetation clearing |
| Site Setup | 1 day | |
| Soil Sampling | 10 days | |
| Preliminary Results of the BaP TEQ comparison for distribution to USEPA and NC DEQ | 7 days | Estimated date of preliminary results to USEPA and NC DEQ is 10/1/20 pending receipt of laboratory data within 10 days of sampling and data validation within 15 days of receipt of laboratory data assuming field activities commence 8/3/20 |
| Draft Technical Memorandum | 25 days | Estimated date of draft submittal to the USEPA and NC DEQ is 10/5/20 assuming field activities commence 8/3/20 |

## 7.0 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.

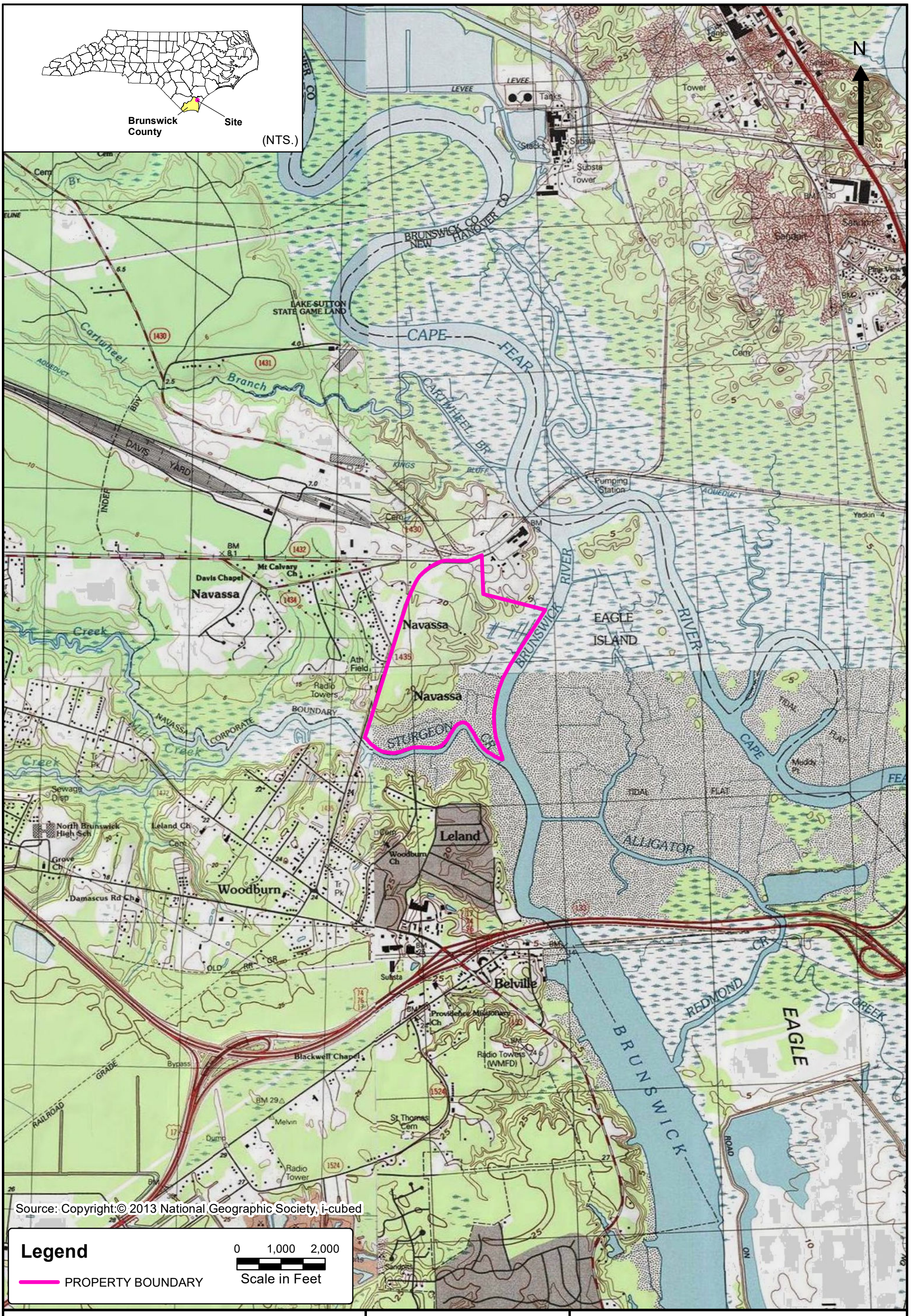
EarthCon, 2019a. Human Health Risk Assessment, Kerr-McGee Chemical Corp – Navassa Superfund Site, Navassa, North Carolina, EarthCon Consultants of North Carolina, P.C., April 2019.

EarthCon, 2019b. Human Health Risk Assessment Addendum, Kerr-McGee Chemical Corp – Navassa Superfund Site, Navassa, North Carolina, EarthCon Consultants of North Carolina, P.C., August 2019.

USEPA, 2019. Proposed Plan, Kerr-McGee Chemical Corp – Navassa Superfund Site, Operable Unit 1, United States Environmental Protection Agency; October 2019.

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/fbqstp/.

# FIGURES




S:\Premier\Projects\Greenfield Environmental Multistate Trust\KMCC Navassa NC Superfund Site\CAD GIS Data\EARTHCON_GIS\MXDs\OU1_OU2 Soil Sampling Work Plan\Fig 1 Navassa Site Location.mxd

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# SITE LOCATION
## OU1/OU2 Soil Sampling Work Plan

Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

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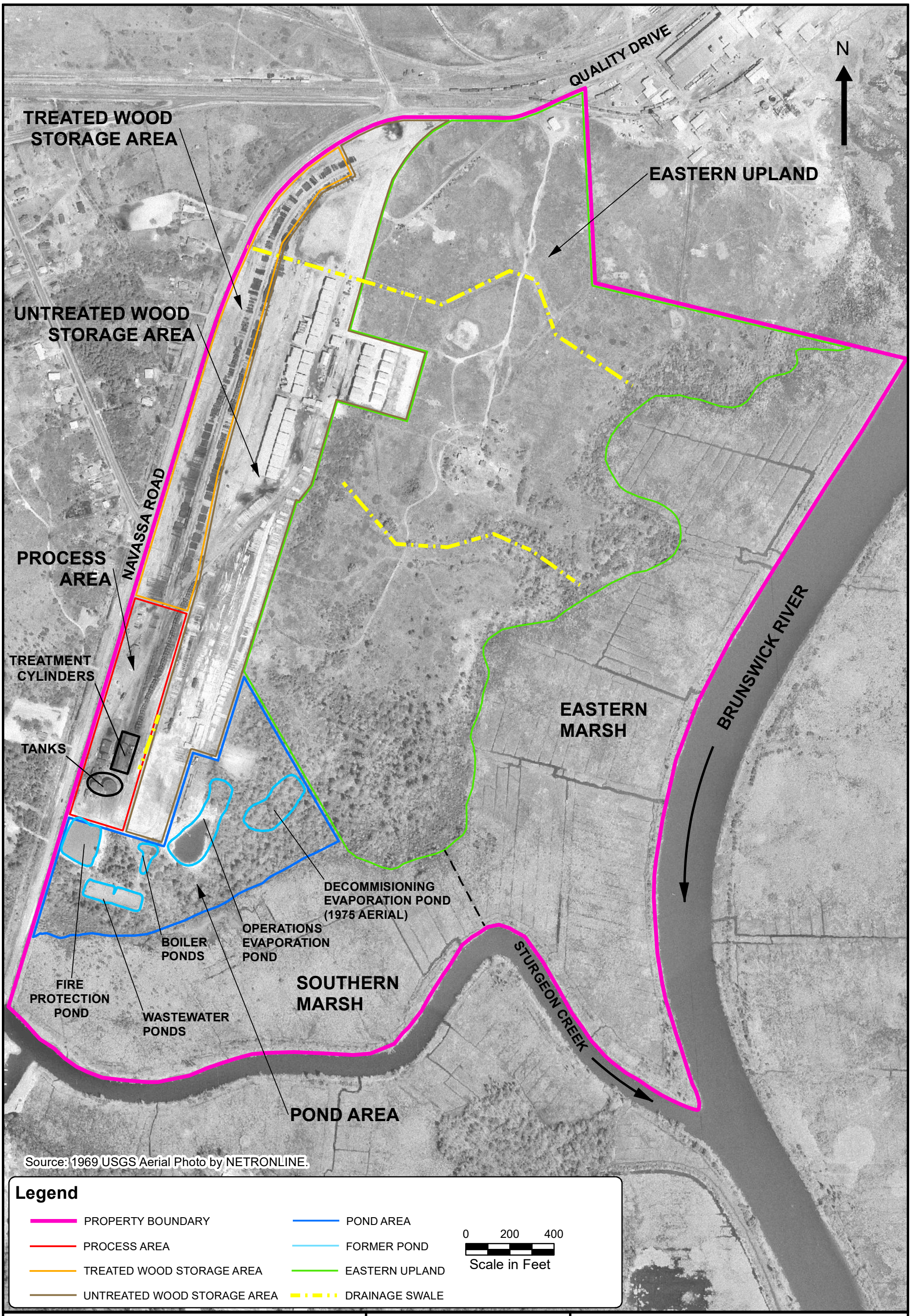


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# HISTORICAL SITE PLAN
## OU1/OU2 Soil Sampling Work Plan

Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

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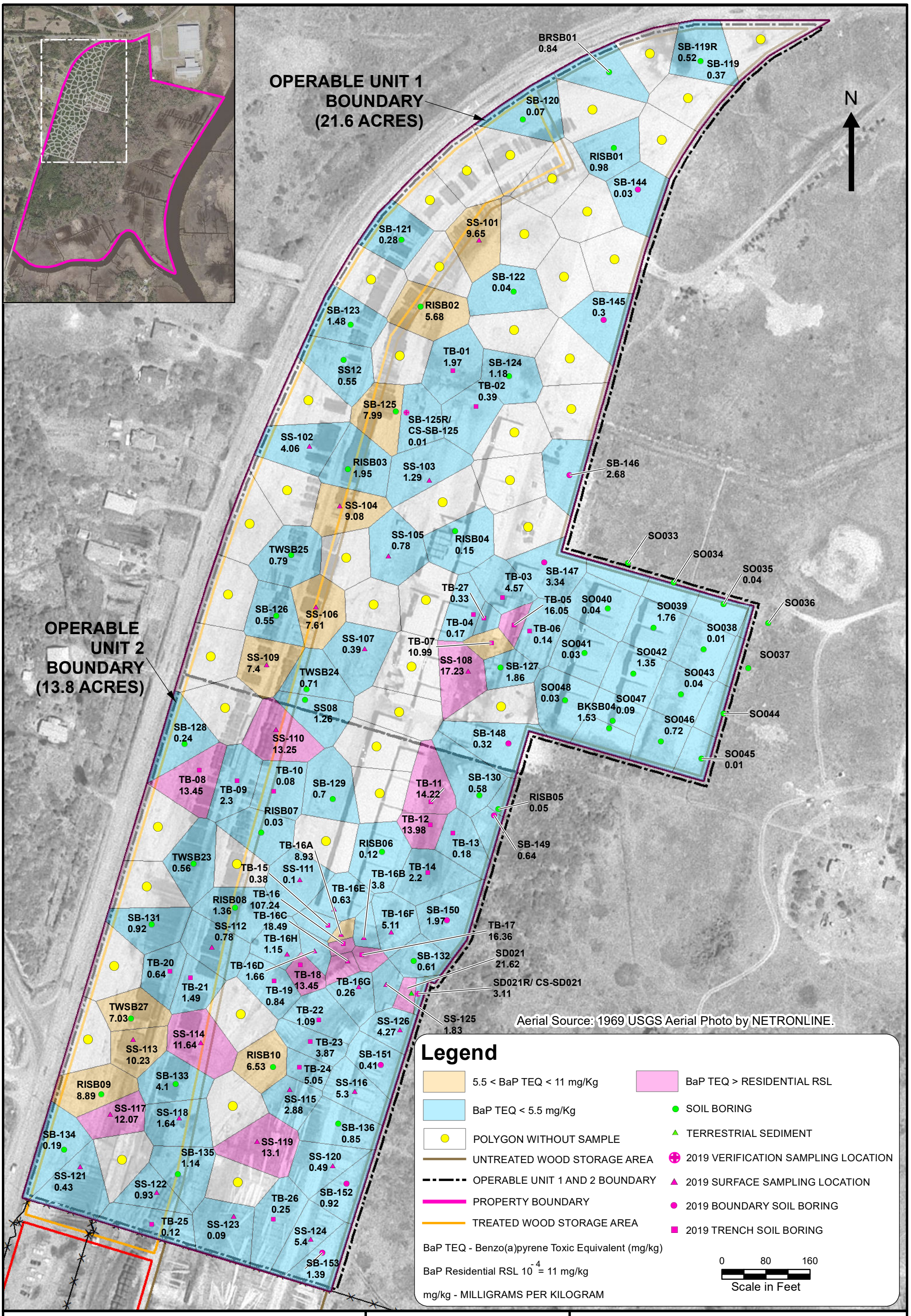


S:\Premier\Projects\Greenfield Environmental Multistate Trust\KMCC Navassa NC Superfund Site\CAD GIS Data\EARTHCON_GIS\MXDs\OU1_OU2 Soil Sampling Work Plan\Fig 3 Soil Sampling Cells vs BaP TEQ with proposed sample points.mxd 5/7/2020 4:48:42 AM

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# 1/4 ACRE THIESSEN POLYGONS and BaP TEQ RESULTS

## OU1/OU2 Soil Sampling Work Plan

Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

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OPERABLE UNIT 1 BOUNDARY (21.6 ACRES)

OPERABLE UNIT 2 BOUNDARY (13.8 ACRES)

N

INSET (NTS)

Aerial Source: 1969 USGS Aerial Photo by NETRONLINE.

## Legend

- 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 > RESIDENTIAL RSL
- SOIL ALIQUOT LOCATION
- SOIL BORING
- TERRESTRIAL SEDIMENT
- 2019 VERIFICATION SAMPLING LOCATION
- 2019 SURFACE SAMPLING LOCATION
- 2019 BOUNDARY SOIL BORING
- 2019 TRENCH SOIL BORING

BaP TEQ - Benzo(a)pyrene Toxic Equivalent (mg/kg)

BaP Residential RSL $10^{-4}$ = 11 mg/kg

mg/kg - MILLIGRAMS PER KILOGRAM

0 80 160

Scale in Feet

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# PROPOSED SAMPLE LOCATIONS PARCELS WITHOUT SAMPLES

## OU1/OU2 Soil Sampling Work Plan

Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

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S:\Premier\Projects\Greenfield Environmental Multistate Trust\KMCC Navassa NC Superfund Site\CAD GIS Data\EARTHCON_GIS\MXDs\OU1_OU2 Soil Sampling Work Plan\Fig 4 Proposed Sample Locations -- Parcels Without Samples.mxd 5/7/2020 4:57:35 AM

OPERABLE UNIT 1 BOUNDARY (21.6 ACRES)

OPERABLE UNIT 2 BOUNDARY (13.8 ACRES)

N

INSET (NTS)

Aerial Source: 1969 USGS Aerial Photo by NETRONLINE.

## Legend

- 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 RML $10^{-4}$ = 11 mg/kg
- mg/kg - MILLIGRAMS PER KILOGRAM
- BaP TEQ > RESIDENTIAL RML
- COMBINED COMPOSITE SOIL ALIQUOT AND GRAB SOIL SAMPLE LOCATION
- SOIL BORING
- TERRESTRIAL SEDIMENT
- 2019 VERIFICATION SAMPLING LOCATION
- 2019 SURFACE SAMPLING LOCATION
- 2019 BOUNDARY SOIL BORING
- 2019 TRENCH SOIL BORING

0 80 160
Scale in Feet

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# PROPOSED SAMPLE LOCATIONS
# PARCELS With 5 < BaP TEQ < 11 mg/kg
## OU1/OU2 Soil Sampling Work Plan
Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

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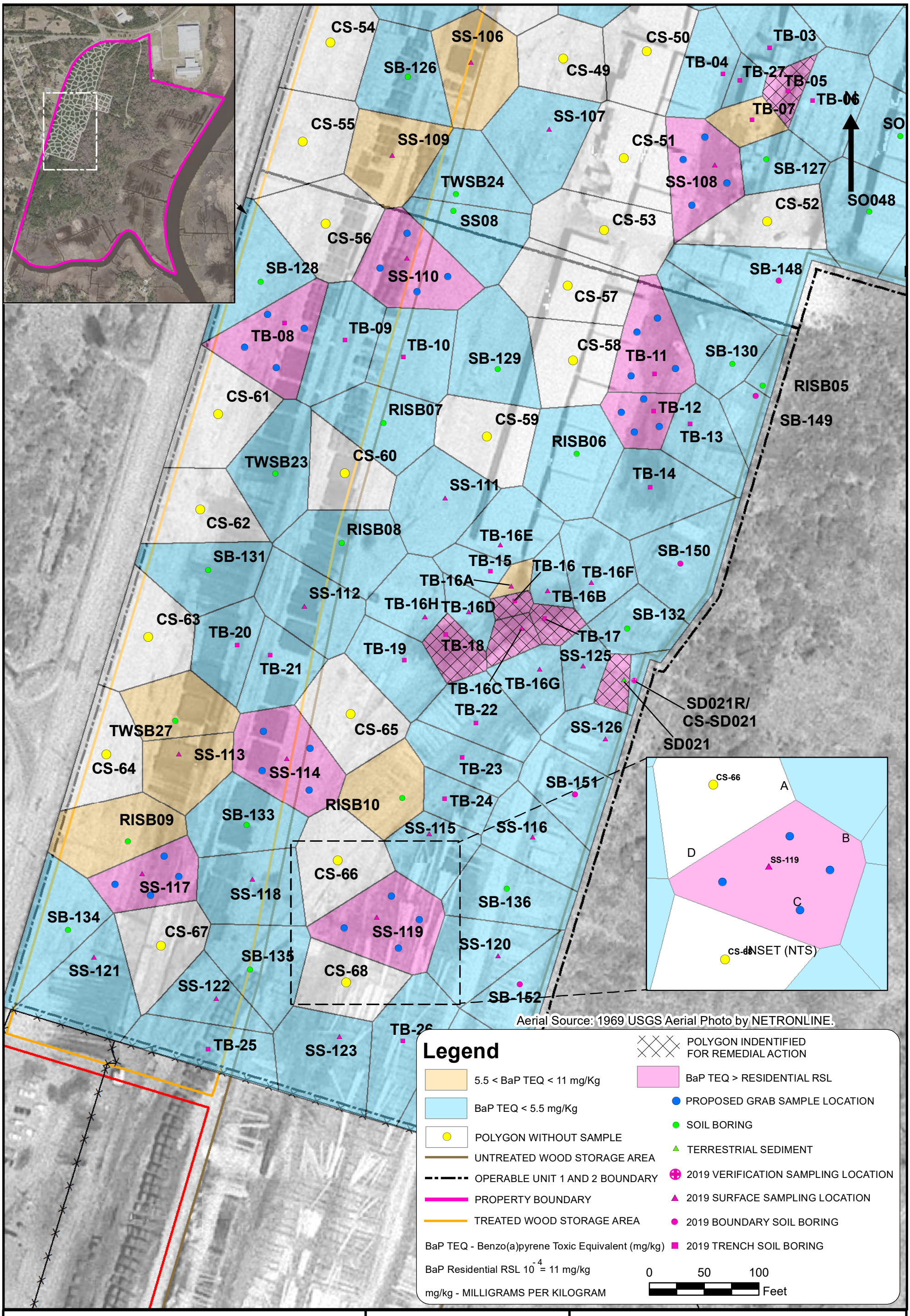
S:\Premier\Projects\Greenfield Environmental Multistate Trust\KMCC Navassa NC Superfund Site\CAD GIS Data\EARTHCON_GIS\MXDs\OU1_OU2 Soil Sampling Work Plan\Fig 5 Proposed Sample Locations – Parcels with 5 - BaP TEQ - 11 mg per kg.mxd 5/7/2020 5:07:04 AM




S:\Premier\Projects\Greenfield Environmental Multistate Trust\KMCC Navassa NC Superfund Site\CAD GIS Data\EARTHCON_GISMXDs\OU1_OU2 Soil Sampling Work Plan\Fig 6 Proposed Sample Locations -- Parcels with BaP TEQ greater than 11 mg per kg.mxd 5/7/2020 5:15:04 AM

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# PROPOSED SAMPLE LOCATIONS
# PARCELS With BaP TEQ >11 mg/kg
## OU1/OU2 Soil Sampling Work Plan
Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

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# TABLES

**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 | Composite Surface Soil Samples from parcels with no samples | PAHs | EPA 8270D | 47 | 5 | 2 | -- | 3 | 3 | 1 | 61 |
| | | PCP | EPA 8270D SIM | 47 | 5 | 2 | -- | 3 | 3 | 1 | 61 |
| | | Dioxins/Furans | EPA 8290A | 47 | 5 | 2 | -- | 3 | 3 | 1 | 61 |
| 2 | Composite Surface Soil Samples from parcels with previous samples | PAHs | EPA 8270D | 12 | 1 | 1 | -- | 1 | 1 | 1 | 17 |
| | | PCP | EPA 8270D SIM | 12 | 1 | 1 | -- | 1 | 1 | 1 | 17 |
| | | Dioxins/Furans | EPA 8290A | 12 | 1 | 1 | -- | 1 | 1 | 1 | 17 |
| 3 | Grab Surface Soil Samples | PAHs | EPA 8270D | 92 | 9 | 4 | -- | 4 | 4 | 1 | 114 |
| | | PCP | EPA 8270D SIM | 92 | 9 | 4 | -- | 4 | 4 | 1 | 114 |
| | | Dioxins/Furans* | EPA 8290A | 92 | 9 | 4 | -- | 4 | 4 | 1 | 114 |
| 4 | Potential Grab Surface Soil Samples - estimated to be collected from 10 percent of the composite surface soil sample locations from parcels with no samples | PAHs | EPA 8270D | 25 | 3 | 2 | -- | 2 | 2 | 1 | 35 |
| | | PCP | EPA 8270D SIM | 25 | 3 | 2 | -- | 2 | 2 | 1 | 35 |
| | | Dioxins/Furans * | EPA 8290A | 25 | 3 | 2 | -- | 2 | 2 | 1 | 35 |

* Archive samples for potential future analysis
PAHs - polynuclear aromatic hydrocarbons
PCP - pentachlorophenol

Prepared by: MAB 7/23/20
Checked by: CDN 7/27/20

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

| Location Name | Northing | Easting | Location Name | Northing | Easting | Location Name | Northing | Easting |
|---|---|---|---|---|---|---|---|---|
| **Parcels Without a Sample - Composite Sample Aliquot Locations** | | | | | | | | |
| CS-22-A | 185990.984 | 2303978.647 | CS-38-A | 185463.305 | 2303530.951 | CS-54-A | 184984.119 | 2303012.085 |
| CS-22-B | 186008.629 | 2303978.647 | CS-38-B | 185480.595 | 2303530.951 | CS-54-B | 185014.798 | 2303012.085 |
| CS-22-C | 185990.984 | 2304010.003 | CS-38-C | 185463.305 | 2303564.232 | CS-54-C | 184984.119 | 2303034.135 |
| CS-22-D | 185973.338 | 2303978.647 | CS-38-D | 185446.014 | 2303530.951 | CS-54-D | 184953.440 | 2303012.085 |
| CS-22-E | 185990.984 | 2303947.291 | CS-38-E | 185463.305 | 2303497.670 | CS-54-E | 184984.119 | 2302990.035 |
| CS-23-A | 185965.577 | 2303777.670 | CS-39-A | 185412.060 | 2303632.289 | CS-55-A | 184871.656 | 2302980.727 |
| CS-23-B | 185987.964 | 2303777.670 | CS-39-B | 185434.808 | 2303632.289 | CS-55-B | 184896.099 | 2302980.727 |
| CS-23-C | 185965.577 | 2303798.126 | CS-39-C | 185412.060 | 2303663.862 | CS-55-C | 184871.656 | 2303003.926 |
| CS-23-D | 185943.190 | 2303777.670 | CS-39-D | 185389.311 | 2303632.289 | CS-55-D | 184847.214 | 2302980.727 |
| CS-23-E | 185965.577 | 2303757.215 | CS-39-E | 185412.060 | 2303600.716 | CS-55-E | 184871.656 | 2302957.527 |
| CS-24-A | 185884.157 | 2303847.015 | CS-40-A | 185320.621 | 2303635.196 | CS-56-A | 184777.866 | 2303006.847 |
| CS-24-B | 185903.884 | 2303847.015 | CS-40-B | 185343.668 | 2303635.196 | CS-56-B | 184804.077 | 2303006.847 |
| CS-24-C | 185884.157 | 2303878.954 | CS-40-C | 185320.621 | 2303661.395 | CS-56-C | 184777.866 | 2303036.397 |
| CS-24-D | 185864.429 | 2303847.015 | CS-40-D | 185297.573 | 2303635.196 | CS-56-D | 184751.655 | 2303006.847 |
| CS-24-E | 185884.157 | 2303815.075 | CS-40-E | 185320.621 | 2303608.997 | CS-56-E | 184777.866 | 2302977.296 |
| CS-25-A | 185809.310 | 2303799.689 | CS-41-A | 185278.102 | 2303531.885 | CS-57-A | 184707.593 | 2303281.400 |
| CS-25-B | 185835.332 | 2303799.689 | CS-41-B | 185298.742 | 2303531.885 | CS-57-B | 184727.103 | 2303281.400 |
| CS-25-C | 185809.310 | 2303820.572 | CS-41-C | 185278.102 | 2303558.128 | CS-57-C | 184707.593 | 2303319.798 |
| CS-25-D | 185783.289 | 2303799.689 | CS-41-D | 185257.463 | 2303531.885 | CS-57-D | 184688.083 | 2303281.400 |
| CS-25-E | 185809.310 | 2303778.806 | CS-41-E | 185278.102 | 2303505.643 | CS-57-E | 184707.593 | 2303243.002 |
| CS-26-A | 185863.727 | 2303673.547 | CS-42-A | 185191.325 | 2303523.760 | CS-58-A | 184623.143 | 2303287.190 |
| CS-26-B | 185883.653 | 2303673.547 | CS-42-B | 185213.615 | 2303523.760 | CS-58-B | 184645.590 | 2303287.190 |
| CS-26-C | 185863.727 | 2303702.845 | CS-42-C | 185191.325 | 2303554.058 | CS-58-C | 184623.143 | 2303309.569 |
| CS-26-D | 185843.800 | 2303673.547 | CS-42-D | 185169.036 | 2303523.760 | CS-58-D | 184600.697 | 2303287.190 |
| CS-26-E | 185863.727 | 2303644.250 | CS-42-E | 185191.325 | 2303493.462 | CS-58-E | 184623.143 | 2303264.813 |
| CS-27-A | 185781.303 | 2303523.984 | CS-43-A | 185106.960 | 2303556.860 | CS-59-A | 184536.339 | 2303189.660 |
| CS-27-B | 185802.073 | 2303523.984 | CS-43-B | 185128.289 | 2303556.860 | CS-59-B | 184557.054 | 2303189.660 |
| CS-27-C | 185781.303 | 2303546.619 | CS-43-C | 185106.960 | 2303588.450 | CS-59-C | 184536.339 | 2303215.978 |
| CS-27-D | 185760.534 | 2303523.984 | CS-43-D | 185085.631 | 2303556.860 | CS-59-D | 184515.625 | 2303189.660 |
| CS-27-E | 185781.303 | 2303501.349 | CS-43-E | 185106.960 | 2303525.270 | CS-59-E | 184536.339 | 2303163.342 |
| CS-28-A | 185738.812 | 2303600.355 | CS-44-A | 185151.309 | 2303401.565 | CS-60-A | 184495.200 | 2303028.237 |
| CS-28-B | 185770.197 | 2303600.355 | CS-44-B | 185171.694 | 2303401.565 | CS-60-B | 184515.957 | 2303028.237 |
| CS-28-C | 185738.812 | 2303626.503 | CS-44-C | 185151.309 | 2303438.958 | CS-60-C | 184474.443 | 2303028.237 |
| CS-28-D | 185707.428 | 2303600.355 | CS-44-D | 185130.924 | 2303401.565 | CS-60-C | 184495.200 | 2303048.532 |
| CS-28-E | 185738.812 | 2303574.207 | CS-44-E | 185151.309 | 2303364.171 | CS-60-D | 184495.200 | 2303007.943 |
| CS-29-A | 185678.507 | 2303664.020 | CS-45-A | 185336.404 | 2303157.843 | CS-61-A | 184562.156 | 2302884.792 |
| CS-29-B | 185703.705 | 2303664.020 | CS-45-B | 185357.655 | 2303157.843 | CS-61-B | 184592.878 | 2302884.792 |
| CS-29-C | 185678.507 | 2303691.413 | CS-45-C | 185336.404 | 2303185.349 | CS-61-C | 184562.156 | 2302906.689 |
| CS-29-D | 185653.310 | 2303664.020 | CS-45-D | 185315.153 | 2303157.843 | CS-61-D | 184531.434 | 2302884.792 |
| CS-29-E | 185678.507 | 2303636.626 | CS-45-E | 185336.404 | 2303130.055 | CS-61-E | 184562.156 | 2302862.896 |
| CS-30-A | 185592.062 | 2303713.431 | CS-46-A | 185172.688 | 2303119.642 | CS-62-A | 184453.877 | 2302864.479 |
| CS-30-B | 185619.414 | 2303713.431 | CS-46-B | 185194.940 | 2303119.642 | CS-62-B | 184472.556 | 2302864.479 |
| CS-30-C | 185592.062 | 2303738.488 | CS-46-C | 185172.688 | 2303142.596 | CS-62-C | 184453.877 | 2302892.544 |
| CS-30-D | 185564.711 | 2303713.431 | CS-46-D | 185150.437 | 2303119.642 | CS-62-D | 184435.198 | 2302864.479 |
| CS-30-E | 185592.062 | 2303688.374 | CS-46-E | 185172.688 | 2303096.688 | CS-62-E | 184453.877 | 2302836.414 |

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

| Location Name | Northing | Easting | Location Name | Northing | Easting | Location Name | Northing | Easting |
|---|---|---|---|---|---|---|---|---|
| CS-31-A | 185560.621 | 2303621.879 | CS-47-A | 185112.672 | 2303050.886 | CS-63-A | 184309.157 | 2302805.293 |
| CS-31-B | 185595.135 | 2303621.879 | CS-47-B | 185148.590 | 2303050.886 | CS-63-B | 184335.136 | 2302805.293 |
| CS-31-C | 185560.621 | 2303645.600 | CS-47-C | 185112.672 | 2303070.777 | CS-63-C | 184309.157 | 2302825.584 |
| CS-31-D | 185526.107 | 2303621.879 | CS-47-D | 185076.754 | 2303050.886 | CS-63-D | 184283.178 | 2302805.293 |
| CS-31-E | 185560.621 | 2303598.159 | CS-47-E | 185112.672 | 2303030.995 | CS-63-E | 184309.157 | 2302785.001 |
| CS-32-A | 185637.770 | 2303549.979 | CS-48-A | 185050.919 | 2303226.370 | CS-64-A | 184175.866 | 2302757.847 |
| CS-32-B | 185665.616 | 2303549.979 | CS-48-B | 185074.506 | 2303226.370 | CS-64-B | 184201.862 | 2302757.847 |
| CS-32-C | 185637.770 | 2303572.030 | CS-48-C | 185050.919 | 2303247.643 | CS-64-C | 184175.866 | 2302774.512 |
| CS-32-D | 185609.924 | 2303549.979 | CS-48-D | 185027.333 | 2303226.370 | CS-64-D | 184149.871 | 2302757.847 |
| CS-32-E | 185637.770 | 2303527.927 | CS-48-E | 185050.919 | 2303205.097 | CS-64-E | 184175.866 | 2302741.182 |
| CS-33-A | 185753.408 | 2303445.320 | CS-49-A | 184965.629 | 2303276.341 | CS-65-A | 184221.955 | 2303035.064 |
| CS-33-B | 185787.285 | 2303445.320 | CS-49-B | 184986.155 | 2303276.341 | CS-65-B | 184252.699 | 2303035.064 |
| CS-33-C | 185753.408 | 2303468.179 | CS-49-C | 184965.629 | 2303300.247 | CS-65-C | 184221.955 | 2303063.037 |
| CS-33-D | 185719.530 | 2303445.320 | CS-49-D | 184945.102 | 2303276.341 | CS-65-D | 184191.212 | 2303035.064 |
| CS-33-E | 185753.408 | 2303422.460 | CS-49-E | 184965.629 | 2303252.435 | CS-65-E | 184221.955 | 2303007.092 |
| CS-34-A | 185699.650 | 2303378.545 | CS-50-A | 184974.000 | 2303370.923 | CS-66-A | 184055.515 | 2303020.539 |
| CS-34-B | 185724.767 | 2303378.545 | CS-50-B | 185007.520 | 2303370.923 | CS-66-B | 184081.696 | 2303020.539 |
| CS-34-C | 185699.650 | 2303405.189 | CS-50-C | 184974.000 | 2303392.775 | CS-66-C | 184055.515 | 2303043.556 |
| CS-34-D | 185674.533 | 2303378.545 | CS-50-D | 184940.480 | 2303370.923 | CS-66-D | 184029.334 | 2303020.539 |
| CS-34-E | 185699.650 | 2303351.901 | CS-50-E | 184974.000 | 2303349.072 | CS-66-E | 184055.515 | 2302997.521 |
| CS-35-A | 185579.182 | 2303395.622 | CS-51-A | 184852.638 | 2303345.000 | CS-67-A | 183958.406 | 2302819.886 |
| CS-35-B | 185599.958 | 2303395.622 | CS-51-B | 184877.722 | 2303345.000 | CS-67-B | 183981.429 | 2302819.886 |
| CS-35-C | 185579.182 | 2303417.723 | CS-51-C | 184852.638 | 2303369.817 | CS-67-C | 183958.406 | 2302841.636 |
| CS-35-D | 185558.406 | 2303395.622 | CS-51-D | 184827.555 | 2303345.000 | CS-67-D | 183935.382 | 2302819.886 |
| CS-35-E | 185579.182 | 2303373.522 | CS-51-E | 184852.638 | 2303320.183 | CS-67-E | 183958.406 | 2302798.137 |
| CS-36-A | 185555.184 | 2303271.874 | CS-52-A | 184780.966 | 2303507.719 | CS-68-A | 183916.937 | 2303029.927 |
| CS-36-B | 185581.159 | 2303271.874 | CS-52-B | 184795.540 | 2303507.719 | CS-68-B | 183935.446 | 2303029.927 |
| CS-36-C | 185555.184 | 2303304.450 | CS-52-C | 184780.966 | 2303539.609 | CS-68-C | 183916.937 | 2303056.700 |
| CS-36-D | 185529.210 | 2303271.874 | CS-52-D | 184766.392 | 2303507.719 | CS-68-D | 183898.429 | 2303029.927 |
| CS-36-E | 185555.184 | 2303239.298 | CS-52-E | 184780.966 | 2303475.828 | CS-68-E | 183916.937 | 2303003.154 |
| CS-37-A | 185417.339 | 2303323.616 | CS-53-A | 184770.675 | 2303322.588 | | | |
| CS-37-B | 185442.685 | 2303323.616 | CS-53-B | 184789.165 | 2303322.588 | | | |
| CS-37-C | 185417.339 | 2303348.962 | CS-53-C | 184770.675 | 2303361.540 | | | |
| CS-37-D | 185391.994 | 2303323.616 | CS-53-D | 184752.184 | 2303322.588 | | | |
| CS-37-E | 185417.339 | 2303298.270 | CS-53-E | 184770.675 | 2303283.635 | | | |
| **Parcels with Existing Samples >5.5 mg/kg<11 mg/kg - Composite Sample Aliquot & Grab Sample Locations** | | | | | | | | |
| RISB02-A | 185498.834 | 2303376.054 | SS-101-A | 185631.016 | 2303465.112 | SS-113-A | 184160.045 | 2302848.388 |
| RISB02-B | 185523.834 | 2303376.054 | SS-101-B | 185671.066 | 2303465.112 | SS-113-B | 184185.045 | 2302848.388 |
| RISB02-C | 185498.834 | 2303416.054 | SS-101-C | 185631.053 | 2303490.112 | SS-113-C | 184160.045 | 2302888.388 |
| RISB02-D | 185473.834 | 2303376.054 | SS-101-D | 185591.066 | 2303465.112 | SS-113-D | 184135.045 | 2302848.388 |
| RISB02-E | 185498.834 | 2303336.054 | SS-101-E | 185631.029 | 2303440.112 | SS-113-E | 184160.045 | 2302808.388 |
| RISB09-A | 184087.493 | 2302766.535 | SS-104-A | 185137.406 | 2303226.475 | TB-07-A | 184894.660 | 2303485.110 |
| RISB09-B | 184112.492 | 2302766.535 | SS-104-B | 185162.406 | 2303226.475 | TB-07-B | 184914.659 | 2303485.110 |
| RISB09-C | 184087.492 | 2302806.535 | SS-104-C | 185137.406 | 2303266.475 | TB-07-C | 184894.659 | 2303515.110 |
| RISB09-D | 184062.492 | 2302766.535 | SS-104-D | 185112.406 | 2303226.475 | TB-07-D | 184874.659 | 2303485.110 |
| RISB09-E | 184087.492 | 2302726.535 | SS-104-E | 185137.406 | 2303186.475 | TB-07-E | 184894.659 | 2303455.110 |
| RISB10-A | 184135.709 | 2303074.988 | SS-106-A | 184955.605 | 2303177.179 | TB-16A-A | 184374.421 | 2303221.183 |
| RISB10-B | 184165.709 | 2303074.988 | SS-106-B | 184995.605 | 2303177.179 | TB-16A-B | 184389.421 | 2303221.183 |

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

| Location Name | Northing | Easting | Location Name | Northing | Easting | Location Name | Northing | Easting |
|---|---|---|---|---|---|---|---|---|
| RISB10-C | 184135.709 | 2303104.988 | SS-106-C | 184955.605 | 2303202.179 | TB-16A-C | 184374.421 | 2303236.183 |
| RISB10-D | 184105.709 | 2303074.988 | SS-106-D | 184915.605 | 2303177.179 | TB-16A-D | 184359.421 | 2303221.183 |
| RISB10-E | 184135.709 | 2303044.988 | SS-106-E | 184955.605 | 2303152.179 | TB-16A-E | 184374.421 | 2303206.183 |
| SB-125-A | 185310.248 | 2303288.199 | SS-109-A | 184856.472 | 2303081.993 | TWSB27-A | 184228.259 | 2302840.547 |
| SB-125-B | 185350.248 | 2303288.199 | SS-109-B | 184886.472 | 2303081.993 | TWSB27-B | 184253.259 | 2302840.547 |
| SB-125-C | 185310.248 | 2303313.199 | SS-109-C | 184856.472 | 2303111.993 | TWSB27-C | 184228.259 | 2302880.547 |
| SB-125-D | 185270.248 | 2303288.199 | SS-109-D | 184826.472 | 2303081.993 | TWSB27-D | 184203.259 | 2302840.547 |
| SB-125-E | 185310.248 | 2303263.199 | SS-109-E | 184856.472 | 2303051.993 | TWSB27-E | 184228.259 | 2302800.547 |
| **Parcels with Existing Samples >11 mg/kg - Grab Sample Locations** | | | | | | | | |
| SS-108-A | 184876.245 | 2303437.087 | SS-117-A | 184060.289 | 2302823.425 | TB-11-A | 184671.104 | 2303383.301 |
| SS-108-B | 184824.411 | 2303461.882 | SS-117-B | 184036.698 | 2302840.121 | TB-11-B | 184613.764 | 2303403.655 |
| SS-108-C | 184799.080 | 2303422.461 | SS-117-C | 184015.781 | 2302808.251 | TB-11-C | 184605.281 | 2303353.382 |
| SS-108-D | 184850.977 | 2303412.438 | SS-117-D | 184028.314 | 2302767.653 | TB-11-D | 184655.068 | 2303360.076 |
| SS-110-A | 184767.211 | 2303099.011 | SS-119-A | 184014.771 | 2303081.296 | TB-12-A | 184579.149 | 2303367.815 |
| SS-110-B | 184718.006 | 2303145.411 | SS-119-B | 183987.930 | 2303113.208 | TB-12-B | 184547.680 | 2303385.293 |
| SS-110-C | 184701.040 | 2303110.300 | SS-119-C | 183955.889 | 2303089.287 | TB-12-C | 184541.472 | 2303357.164 |
| SS-110-D | 184727.770 | 2303068.294 | SS-119-D | 183978.413 | 2303027.695 | TB-12-D | 184563.901 | 2303342.456 |
| SS-114-A | 184182.628 | 2302988.965 | TB-08-A | 184674.952 | 2302940.652 | | | |
| SS-114-B | 184135.293 | 2302988.215 | TB-08-B | 184659.194 | 2302982.256 | | | |
| SS-114-C | 184157.145 | 2302934.708 | TB-08-C | 184614.807 | 2302950.691 | | | |
| SS-114-D | 184201.939 | 2302935.935 | TB-08-D | 184637.911 | 2302914.896 | | | |

Prepared by: CDN 5/1/20
Checked by: MAB 5/1/20

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

| Parameter | CAS Number | Method | Units | Lab Method Detection Limit | Lab Reporting Limit |
|---|---|---|---|---|---|
| **PAHs** | | | | | |
| 1-Methylnaphthalene | 90-12-0 | 8270D | mg/kg | 0.017 | 0.17 |
| 2-Methylnaphthalene | 91-57-6 | 8270D | mg/kg | 0.017 | 0.17 |
| Acenaphthene | 83-32-9 | 8270D | mg/kg | 0.018 | 0.17 |
| Acenaphthylene | 208-96-8 | 8270D | mg/kg | 0.017 | 0.17 |
| Anthracene | 120-12-7 | 8270D | mg/kg | 0.019 | 0.17 |
| Benzo(a)anthracene | 56-55-3 | 8270D | mg/kg | 0.017 | 0.17 |
| Benzo(a)pyrene | 50-32-8 | 8270D | mg/kg | 0.02 | 0.17 |
| Benzo(b)fluoranthene | 205-99-2 | 8270D | mg/kg | 0.018 | 0.17 |
| Benzo(g,h,i)perylene | 191-24-2 | 8270D | mg/kg | 0.017 | 0.17 |
| Benzo(k)fluoranthene | 207-08-9 | 8270D | mg/kg | 0.022 | 0.17 |
| Chrysene | 218-01-9 | 8270D | mg/kg | 0.017 | 0.17 |
| Dibenz(a,h)anthracene | 53-70-3 | 8270D | mg/kg | 0.021 | 0.17 |
| Fluoranthene | 206-44-0 | 8270D | mg/kg | 0.017 | 0.17 |
| Fluorene | 86-73-7 | 8270D | mg/kg | 0.018 | 0.17 |
| Indeno(1,2,3-cd)pyrene | 193-39-5 | 8270D | mg/kg | 0.02 | 0.17 |
| Naphthalene | 91-20-3 | 8270D | mg/kg | 0.017 | 0.17 |
| Phenanthrene | 85-01-8 | 8270D | mg/kg | 0.017 | 0.17 |
| Pyrene | 129-00-0 | 8270D | mg/kg | 0.019 | 0.17 |
| **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 |
| **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-Hexchlorodibenzofuran (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 5.5 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

# APPENDIX A

OU1 and OU2 Sampling Strategy

**OU1 and OU2 Sampling Strategy**
**Kerr-McGee Chemical Corp - Navassa Superfund Site**
**May 14, 2020**

Operable Unit 1 (OU1) and Operable Unit 2 (OU2) of the Kerr-McGee Chemical Corp – Navassa Superfund Site (the Site) consist of approximately 21.6 and 13.8 acres, respectively as shown on Figure 1. The area for OU1 is as defined in the 2019 OU1 Proposed Plan. The US Environmental Protection Agency (EPA) is currently evaluating how to respond to Proposed Plan Public Comments. This may result in a redefinition of OU1 and the resultant OU2. The Town of Navassa has expressed a preference for OU1 to be available for future residential redevelopment. No land use preferences regarding OU2 have been provided by the Town of Navassa. However, the sampling strategy will assume sampling to meet future residential use criteria for each OU.

In an email dated March 3, 2020, the North Carolina Department of Environmental Quality (NC DEQ) provided guidance on additional sampling that would be required to demonstrate that surface soils do not pose an unacceptable risk to future residential receptors. In an email dated March 3, 2020, the EPA indicated that NC DEQ's guidance was acceptable.

In accordance with NC DEQ requirements, OU1 and OU2 have been divided into parcels with a maximum size of 1/4-acre using the Thiessen polygon methodology. As shown on Figure 1, there are a total of 172 "1/4-acre polygons" or parcels, 91 in OU1 and 81 in OU2.

The following sampling strategy was developed for both OU1 and OU2 to evaluate whether the surface soils pose an unacceptable risk to future residential receptors that may require remedial actions.

**Parcels without a surface soil sample**

There are 47 parcels without a surface soil sample, 34 in OU1 and 13 in OU2. For each of these parcels, collect a 5-point composite surface soil sample. Analyze each composite sample for polynuclear aromatic hydrocarbons (PAHs) using SW-846 Method 8270D and use the resulting data to calculate the benzo(a)pyrene toxic equivalent concentration (BaP TEQ).

1) If the BaP TEQ is less than the residential RSL at 1E-04 (11,000 µg/kg), no further evaluation is necessary.
2) If the BaP TEQ is greater than the residential RSL at 1E-04, delineate the parcel as described below.
    i) Collect a grab surface soil sample from each of the 5-point composite aliquot locations and analyze the samples for PAHs using SW-846 Method 8270D. The grab samples will be collected after the BaP TEQ evaluation for the composite sample is conducted.
    ii) Calculate the BaP TEQ for each sample and compare to the residential RSL at 1E-04.
        (1) If the BaP TEQ is less than the residential RSL at 1E-04, no further action is required for that area of the polygon.

(2) If the BaP TEQ is greater than the residential RSL at 1E-04, identify this area of the polygon for remedial action.

**Parcels with a surface soil sample**

There are 125 parcels with surface soil samples, 57 in OU1 and 68 in OU2. For each of these samples, the BaP TEQ was calculated using the existing data and compared to the residential RSL at 1E-04 of 11,000 µg/kg (11 mg/kg) for BaP as shown on Figure 1.

- **Parcels with BaP TEQ concentration less than half the residential RSL (5,500 µg/kg):** No further evaluation is necessary. A total of 99 parcels fall into this category (48 in OU1 and 51 in OU2).

- **Parcels with BaP TEQ greater than 5,500 µg/kg but less than 11,000 µg/kg:** Twelve parcels fall into this category, seven in OU1 and five in OU2. For each of these parcels, collect a 5-point composite sample. Grab surface soil samples will also be collected at each of the 5-point composite locations and held pending composite sample results. Analyze each composite sample for PAHs using SW-846 Method 8270D and calculate the BaP TEQ.
    1) If the BaP TEQ is less than the residential RSL at 1E-04, no further evaluation is necessary.
    2) If the BaP TEQ is greater than the residential RSL at 1E-04, analyze the grab samples for PAHs using SW-846 Method 8270D and calculate the BaP TEQ for each sample. Compare the BaP TEQ for each grab sample to the residential RSL of 1E-04.
        a. If the BaP TEQ is below the residential RSL at 1E-04, no further action is required for that area of the polygon.
        b. If the BaP TEQ exceeds the residential RSL at 1E-04, identify this area of the polygon for remedial action.

- **Parcels with BaP TEQ greater than 11,000 µg/kg:** Fourteen parcels fall into this category, two in OU1 and 12 in OU2. Collect grab samples to delineate each parcel to define the area exceeding the residential RSL or consider the parcel for remedial action. The decisions were made based on the parcel size and/or previous field observations. Parcels identified for remedial actions and additional sampling are described below.

  Six of the 14 parcels have been identified for a remedial action for the entire parcel based on previous field observations and the relatively small size of the parcel, one in OU1 and five in OU2. The post excavation confirmation samples will serve as delineation samples for remedial action of these parcels.
    1) Parcels TB-05 (OU1) and SD021 (OU2) were identified for a remedial action based on the presence of creosote timbers.
    2) Parcels TB-16, TB-16C, TB-17 and TB-18 (OU2) were identified for remedial actions based on the presence of “asphalt-like” material at the surface.

Eight of the 14 parcels have been identified for additional sampling to delineate the parcel, one in OU1 (parcel SS-108) and seven in OU2 (parcels TB-08, TB-11, TB-12, SS-110, SS-114, SS-117, SS-119). Grab samples will be collected from each parcel as described below.

1) Divide each parcel into four equal quadrants, collect one grab surface soil sample from each quadrant, then analyze each sample for PAHs using SW-846 Method 8270D.
2) Calculate the BaP TEQ for each sample and compare to the residential RSL at 1E-04.
    a. If the BaP TEQ is below the residential RSL at 1E-04, no further action is required for that area of the polygon.
    b. If the BaP TEQ exceeds the residential RSL at 1E-04, identify this area of the polygon for remedial action.

OPERABLE UNIT 1 BOUNDARY (21.6 ACRES)

OPERABLE UNIT 2 BOUNDARY (13.8 ACRES)

N

BRSB01 0.84
SB-119R 0.52
SB-119 0.37
SB-120 0.07
RISB01 0.98
SB-144 0.03
SS-101 9.65
SB-121 0.28
SB-122 0.04
SB-145 0.3
RISB02 5.68
SB-123 1.48
TB-01 1.97
SB-124 1.18
SS12 0.55
TB-02 0.39
SB-125 7.99
SB-125R/ CS-SB-125 0.01
SS-102 4.06
RISB03 1.95
SS-103 1.29
SB-146 2.68
SS-104 9.08
SS-105 0.78
RISB04 0.15
TWSB25 0.79
SO033
SO034
SO035 0.04
SO036
SB-147 3.34
TB-03 4.57
TB-27 0.33
TB-05 16.05
SO040 0.04
SO039 1.76
SB-126 0.55
SS-106 7.61
TB-04 0.17
TB-06 0.14
SO038 0.01
SS-107 0.39
TB-07 10.99
SO041 0.03
SO042 1.35
SO037
SS-109 7.4
SS-108 17.23
SB-127 1.86
SO043 0.04
TWSB24 0.71
SO048 0.03
SO047 0.09
BKSB04 1.53
SO044
SS08 1.26
SO046 0.72
SB-128 0.24
SS-110 13.25
SB-148 0.32
SO045 0.01
TB-10 0.08
SB-130 0.58
TB-08 13.45
TB-09 2.3
SB-129 0.7
TB-11 14.22
RISB05 0.05
RISB07 0.03
TB-12 13.98
SB-149 0.64
TB-16A 8.93
RISB06 0.12
TB-13 0.18
TWSB23 0.56
TB-15 0.38
SS-111 0.1
TB-14 2.2
TB-16B 3.8
TB-16E 0.63
RISB08 1.36
TB-16 107.24
TB-16C 18.49
SB-150 1.97
TB-16F 5.11
SB-131 0.92
SS-112 0.78
TB-17 16.36
TB-16H 1.15
SB-132 0.61
SD021 21.62
TB-20 0.64
TB-16D 1.66
TB-18 13.45
TB-16G 0.26
SD021R/ CS-SD021 3.11
TB-21 1.49
TB-19 0.84
TWSB27 7.03
TB-22 1.09
SS-125 1.83
SS-126 4.27
SS-114 11.64
TB-23 3.87
SS-113 10.23
RISB10 6.53
SB-151 0.41
TB-24 5.05
SB-133 4.1
SS-116 5.3
RISB09 8.89
SS-115 2.88
SS-117 12.07
SS-118 1.64
SB-136 0.85
SB-134 0.19
SS-119 13.1
SB-135 1.14
SS-120 0.49
SS-121 0.43
SS-122 0.93
SB-152 0.92
TB-26 0.25
TB-25 0.12
SS-123 0.09
SS-124 5.4
SB-153 1.39

Aerial Source: 1969 USGS Aerial Photo by NETRONLINE.

## Legend

- 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 > RESIDENTIAL RML
- SOIL BORING
- TERRESTRIAL SEDIMENT
- 2019 VERIFICATION SAMPLING LOCATION
- 2019 SURFACE SAMPLING LOCATION
- 2019 BOUNDARY SOIL BORING
- 2019 TRENCH SOIL BORING

BaP TEQ - Benzo(a)pyrene Toxic Equivalent (mg/kg)

BaP Residential RML $10^{-4}$ = 11 mg/kg

mg/kg - MILLIGRAMS PER KILOGRAM

0 80 160
Scale in Feet

S:\Premier\Projects\Greenfield Environmental Multistate Trust\KMCC Navassa NC Superfund Site\CAD GIS Data\EARTHCON_GIS\MXDs\OU1\Proposed Plan OU1\Fig 9 Soil Sampling Cells vs BaP TEQ with proposed sample points.mxd 5/14/2020 12:55:02 PM

**Greenfield Environmental Multistate Trust LLC**
**Trustee of the Multistate Environmental Response Trust**

PREPARED BY:
EARTHCON®
EARTHCON CONSULTANTS OF NORTH CAROLINA, P.C.

# 1/4 ACRE THIESSEN POLYGONS and BaP TEQ RESULTS

## Operable Unit 1 and 2

Kerr-McGee Chemical Corp - Navassa Superfund Site
Navassa, North Carolina

| DRAWN | CHECKED | DATE | FIGURE |
|---|---|---|---|
| HVP | CDN | FEB 2020 | 1 |