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April 28, 2023

Mr. Mike Ellenbecker
Hazardous Waste Program Coordinator
Wisconsin Department of Natural Resources (WDNR)
2532 Wynfield Drive
Racine, WI 53406

RE: Remediation Variance Application
Former DuPont Barksdale Works
72315 State Highway 13
Town of Barksdale, Bayfield County, Wisconsin
FID No. 804009140
EPA ID No. WIR000133447
BRRTS No. 02-04-000156 (Open)

Dear Mr. Ellenbecker:

The Chemours Company FC, LLC (Chemours) is pleased to provide this Remediation Variance Application for the former DuPont Barksdale Works site. A Public Notice regarding the application was published in the April 28, 2023 edition of the Ashland Daily Press, which will be emailed to you separately. Per your direction, payment of the plan review fee will be made at a later date following receipt of WDNR's invoice. We would like to begin work at the site by the second week of June 2023, so an expedited review by the WDNR would be appreciated.

If you have any questions or comments, please feel free to contact me or Cary Pooler. I can be reached by telephone at (812) 406-7117 or by email at Bradley.S.Nave@chemours.com. Cary Pooler can be reached by telephone at (502) 294-0726 or by email at cary.pooler@aecom.com.

Sincerely,

Bradley S. Nave
Chemours Corporate Remediation Group

Attachments: Remediation Variance Application

Cc: Phil Richard, WDNR
Cary Pooler, AECOM
Eric Schmidt, AECOM

Remediation Variance Application

Former DuPont Barksdale Works
Barksdale, Wisconsin
WDNR BRRTS No. 02-04-000156
WDNR Facility ID No. 804009140

Submitted on behalf of:
The Chemours Company FC, LLC

Submitted by:
AECOM
500 West Jefferson St.
Suite 1600
Louisville, KY 40202

Project Number: 60660855
Date: April 28, 2023

Eric C. Schmidt, P.E.
Project Engineer

C.E. Cary Pooler, III
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Acronym and Abbreviations List

Acronym	Explanation
AH	Alkaline hydrolysis
AOC	Area of Contamination
BDAT	Best Demonstrated Available Technology
BRRTS	Bureau for Remediation and Redevelopment Tracking System
CCBPs	Coal combustion by-products
Chemours	The Chemours Company FC, LLC
DNT	Dinitrotoluene
DuPont	E. I. du Pont de Nemours and Company
EPA	U.S. Environmental Protection Agency
EPDM	Ethylene propylene diene monomer
HWRV	Hazardous Waste Remediation Variance
IRAP	Interim Remedial Action Plan
mg/m^3	Milligrams per cubic meter
NNOCs	Nitramine and nitroaromatic organic compounds
LDR	Land Disposal Restriction
NR	Wisconsin Administrative Code Chapter NR
ORCs	Operations Related Constituents (NNOCs, inorganics, etc.)
OSHA	Occupational Safety and Health Administration
RCRA	Resource Conservation and Recovery Act
RCLs	Residual Contaminant Levels
RSP	Residual Solid Product
SSRCLs	Site-Specific Residual Contaminant Levels
TCLP	Toxicity Characteristic Leaching Procedure
TNT	2,4,6-Trinitrotoluene
WDNR	Wisconsin Department of Natural Resources

1.0 Purpose of Variance Application

Under Wisconsin Administrative Code Chapter NR 670.079, The Chemours Company FC, LLC (Chemours), formerly E. I. du Pont de Nemours and Company (DuPont), is requesting that the Wisconsin Department of Natural Resources (WDNR) grant a new Hazardous Waste Remediation Variance (HWRV) for the Former DuPont Barksdale Works site located in Barksdale, Wisconsin (Figure 1). This new request has been prepared following successful completion of field scale pilot testing completed under the existing HWRV and is not a renewal request related to that permit, which expires on May 18, 2023.

In accordance with NR 670.079 and WDNR publication RR-705 *Guidance for Hazardous Waste Remediation*, Chemours requests this HWRV to allow for removal and treatment of environmental media and debris containing nitroaromatic and nitramine organic constituents (NNOCs) or other constituents triggering Resource Conservation and Recovery Act (RCRA) hazardous characteristics that are regulated by NR 661 Subchapter C and NR 668.48 (see Tables 1 and 2). This HWRV is requested for the full five-year period allowed in NR 670.079 and will include pilot cells constructed and managed under the previous HWRV and treatment cells constructed under this new HWRV. The inclusion of existing pilot cells in the HWRV will allow for the following:

- Closure of pilot cells meeting Land Disposal Restrictions (LDRs) and site-specific residual contaminant levels (SSRCLs) for direct contact, which will be submitted to WDNR for review and subsequent approval, assuming agreement, as part of the interim remedial action plan (IRAP).
- Continued treatment in the pilot cells that have been recently loaded or those requiring heated alkaline hydrolysis (AH), which was only recently successfully demonstrated.
- Continued batch treatment in the previously constructed heating cell.

Management of remediation options under a HWRV will facilitate a more sustainable remediation approach than the current United States Environmental Protection Agency (EPA) Best Demonstrated Available Technology (BDAT) of incineration and accelerate the restoration of soil and other site media containing NNOCs to appropriate health-based residual contaminant levels (RCLs).

A HWRV is the appropriate mechanism for remediation work that will be conducted under an IRAP for the following reasons:

- The applicability criteria established in NR 670.079 are met for the selected remedy.
- WDNR has indicated a new HWRV is the appropriate mechanism for implementing the IRAP.

The overarching remediation process for remediation of NNOCs associated with historical manufacturing of 2,4,6-trinitrotoluene (TNT) at the site will consist of initial AH treatment, both passive and heated, to achieve SSRCLs for direct contact. This will be augmented by concurrent natural biological degradation and phytoremediation, if necessary, as an ongoing mechanism for sustained constituent reduction to meet Wisconsin performance standards. A HWRV is necessary to address the management and treatment of hazardous waste identified during the remediation work.

2.0 Past Remedial Activities

Chemours proposed field-scale pilot testing, in cooperation with academic staff from Georgia Institute of Technology and subsequently Drexel University, to evaluate whether the predominant NNOCs can be degraded aerobically via naturally occurring microorganisms in site soil. The goal of the pilot testing was to develop more sustainable treatment options compared to the current best demonstrated available technology (BDAT), which is incineration – an unsustainable technique requiring extensive permitting, energy input, and air emissions control. The pilot work was permitted under a HWRV that was initially issued by WDNR in 2012 and amended in 2017 and 2020.

This initial testing was successful and indicated that with periodic aeration (tilling) and sufficient soil moisture microbial degradation of the primary NNOCs of concern at the site (Dinitrotoluene (DNT) isomers and TNT) occurred. However, it was also observed that elevated concentrations of TNT inhibit biodegradation processes to the point that no or very slow degradation occurs. Due to this finding, Chemours undertook benchtop testing to evaluate how pH adjustment (permitted in the HWRV) using hydrated lime could be used to reduce TNT concentrations in soil to below direct contact SSRCLs as a first treatment step or to a point that would be conducive to subsequent biodegradation or phytoremediation as a second step, if necessary.

Chemours engaged staff at the United States Army Corps of Engineers, Engineer Research and Development Center in Vicksburg, Mississippi to assist with bench-scale pH adjustment testing. The results of their work indicated that the addition of hydrated lime to site soil creates conditions that degrade TNT and other site-related constituents to concentrations below direct contact SSRCLs quite rapidly. The degradation process, known as AH, occurs in the soil pore water through dissolution of the targeted constituent.

Subsequent field testing was initiated, and AH was observed to rapidly reduce percentage level concentrations of TNT to low parts per million concentrations that are below direct contact SSRCLs. While these test results were positive, it was noted that where TNT particles are larger than sand grain-sized, are heavily weathered, or vitrified, the ability to dissolve into the aqueous phase, where hydrolysis occurs, is limited. Several techniques to reduce residual solid product (RSP) size were considered and ultimately, low temperature, thermally assisted particle size reduction was selected and successfully tested.

A pilot test conducted within a heating cell in 2021 using a mixture of unaffected soil, water, and hydrated lime showed that the soil mixture could effectively be heated to temperatures above the melt temperature of TNT (176 degrees F) while safely remaining below the TNT self-detonation temperature (approximately 450 degrees F). In 2022, the soil heating pilot tests were continued using soil containing solid pieces of TNT, hydrated lime, and water. Analytical results of samples collected before, during, and after the heating showed that heated AH was effective in rapidly reducing NNOC concentrations in soil to below direct contact SSRCLs. Furthermore, the heating was highly effective at melting larger pieces of TNT and increasing surface area so the material can be more readily solubilized in water and treated via AH.

A summary of the pilot cells constructed at the site is provided on Table 3. A statistical summary of NNOCs detected in soil samples collected from the pilot cells is provided on Table 4. Photographs of the pilot test cells are included in Appendix A.

3.0 Proposed Investigation and Remediation

Unlike more traditional approaches where site investigation typically precedes remedy implementation, a concurrent investigation and remediation approach is planned that is necessitated by the nature and distribution of the operations related constituents (ORCs) present in site media, and the presence of remnant manufacturing infrastructure in the historical TNT production areas. The proposed administrative mechanisms and technical approaches for managing materials that will be handled during the investigation and remediation under the HWRV are summarized in the following sections.

3.1 Established AOC for Site Investigation & Remedial Actions

Consistent with applicable policy, WDNR approved an Area of Contamination (AOC) at the site in 2012. A map of the AOC approved is included as Figure 2. Chemours assumes that the AOC will remain in effect for the site until case closure is granted. Activities allowed under the AOC Policy will facilitate investigation of former process areas within the AOC and allow consolidation or staging of materials prior to off-site disposal or on-site treatment under an approved HWRV. Permissible activities within the AOC that Chemours will utilize under an approved HWRV are:

- Continue ongoing investigation using field screening methods to consolidate materials affected with “like” constituent impacts. Consolidation will occur within or immediately adjacent to active unlined investigation areas and/or within clay-lined treatment cells.
- Placement into piles for approved treatment without creating a new point of hazardous waste generation or triggering LDRs.
- Application of the AOC Policy to both hazardous remediation waste and hazardous debris.
- Application of equipment or debris decontamination water back into treatment units.
- Recirculation of water associated with AH treatment (heated and unheated), decontamination of debris, and other debris cleaning and decontamination work back into treatment cells.

Chemours understands the AOC Policy only covers consolidation and in-situ waste treatment within an AOC. Ex-situ management, such as treatment activities, will only be performed after receiving approval of this HWRV request.

A key operating premise of the treatment proposed as part of this HWRV, which was confirmed in discussions WDNR, is that LDRs will not be triggered because the material handled is being placed and treated within clay-lined cells and not contacting the “ground.” LDRs will only be applicable at the time treatment is completed and final, in-place disposal in the treatment cell.

3.2 Proposed Field Screening

Media encountered during the site investigation (i.e., soil, RSP, debris, and all other material excavated or found at the surface within the AOC) will be field screened using:

- Colorimetric Expray,
- X-ray fluorescence (XRF) testing,

- Amplifying fluorescing polymer detector (FIDO®) testing, and/or,
- Visual screening.

These field screening methods will determine whether concentrations of ORCs are present that would result in a need to manage the material as contaminated and/or perform treatment by way of remediation.

3.3 Pre-Treatment Evaluation of RCRA Hazardous Characteristics

Of the targeted ORCs that may be encountered in media as part of the investigation work (Tables 1 and 2), potential RCRA hazardous characteristics and/or LDRs exists for:

- TNT (Shock Reactive- D003)
- 2,4-DNT (toxic, D030)
- Nitrobenzene (toxic, D036)
- Eight RCRA metals: arsenic (D004), barium (D005), cadmium (D006), chromium (D007) lead (D008), mercury (D009), selenium (D010) and silver (D011).

The general approaches for determining if a RCRA hazard exits in a specific media is described below:

- **Generator Knowledge** – will be applied where conservative or default positive determinations are appropriate or where a demonstrated history of analyses from previous testing supports a determination.
- **Field Screening** – will be used to segregate media in need of either cleaning, treatment within AH cells, and that which is capable of being returned to the ground as fill or used for other beneficial reuse. Media with positive field screening results for NNOCs will either be washed/re-screened (debris only), assumed to be hazardous and subject to either on-site treatment or off-site disposal, and/or sampled for laboratory analysis. Due to ease of field identification, the RCRA hazardous characteristic of reactivity for TNT will be primarily evaluated through field screening. If field screening indicates the potential presence of TNT at a concentration of greater than 12% in soil, the material will be considered reactive and wetted to 30% by weight with water.
- **Laboratory Analysis** – laboratory analysis will be collected periodically to confirm generator knowledge and the application of RCRA hazardous characteristics at the start of treatment, and post-treatment to confirm regulatory compliance before closure.

Based on the field screening and/or analytical results, soil and debris will be managed as described in Section 3.4.

3.4 Management of Media

Contaminated media expected to be encountered during the investigation and remediation work that will be subject to the requested HWRV are listed below:

- **Residual solid product** – defined as solid residual product that is reactive, can be easily segregated from affected media, and is not a candidate for on-site remediation.

- **Soil containing product** – excavated soil and/or soil like material containing concentrations of ORCs that may be reactive and/or exceed toxicity characteristic criteria.
- **Contaminated building debris** – includes all materials associated with former infrastructure on the site that may be reactive and/or exceed toxicity characteristic criteria.
- **"Other" contaminated debris and water** – all other contaminated debris and water not captured above that may be reactive and/or exceed toxicity characteristic criteria.

The approach to managing each of the above is detailed in Figures 3 to 5. For coal combustion by-products (CCBPs) the same steps as detailed for investigation soil with verified NNOC impact will be followed. The only changes to the process flow will be the addition of the eight RCRA metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver, to the initial characterization and final LDR compliance testing criteria. See Figures 5.C and 5.E for detail regarding the testing and management of investigation soil containing explosives manufacturing residuals and/or CCBPs.

4.0 Environmental Controls and Mitigation

Mitigation steps will be implemented to reduce the potential for exposure during the investigation and remediation work at the site, which are discussed in further detail below.

4.1 Ex-Situ Unheated Treatment Cell Construction

Clay-lined treatment cells that will be constructed within the AOC will be designed to serve as:

- Management areas for all impacted material encountered or generated during investigation work that will be subject to on-site treatment, including decontamination water. Material may be moved between cells prior to, during, or after treatment to more efficiently manage as needed.
- Locations in which unheated treatment (i.e., biological and/or alkaline hydrolysis) will occur.
- A repository for post heat treated materials that either meet SSRCLs or may be further treated via unheated processes.
- Final repositories of all material treated during the remediation of the former TNT production areas.

Each cell constructed will consist of two portions: the main area which will be used to hold, temporarily store, and/or treat impacted media and a surface water/sediment containment basin, which is designed to reduce the potential for water and sediment from migrating outside of the cell. Based on the pilot testing, this design is quite effective at retaining water, which is necessary for alkaline hydrolysis to occur, and reducing the potential for sediment transport.

The cell construction process will include removal of topsoil and underlying subsoil and placement of a one-foot thick layer of clay along the bottom and sidewalls of the cell and surface water/sediment trap. The clay borrow used to construct the cell will be from on-site source unaffected by historical site operations, which will be verified by analytical testing. Berms will be constructed to eliminate stormwater flow into the cells and retain media placed within. The conceptual design for the cells is included in Figure 8. The specific dimensions of the cell will vary depending on site conditions; however, the maximum cell width between the top of the berms is expected to be under 50 feet to allow for mixing of the cell contents with hydrated lime and/or other amendments, if necessary, using an excavator positioned outside the cell.

4.2 Ex-Situ Heated Treatment Cell Construction

A soil heating cell (cell C40) was constructed in 2021 within the AOC for use as low temperature, thermally assisted particle size reduction pilot testing. Continued use of the cell for batch treatment of contaminated materials (i.e., soil and entrained debris) with varying concentrations of RSP is planned under the HWRV.

Cell C40 was constructed of reinforced concrete (see as-built drawings in Appendix B). To limit the potential of cell contents leaking during treatment, a water stop was installed between the walls and floor and a waterproofing concrete admixture was used to lower the permeability of the concrete, and the joints at wall/floor interface were covered with a high temperature sealant. The concrete floor is underlain with an approximately three-

foot thick layer of foamed glass aggregate, which was placed over layers of woven geotextile and a 45-millimeter thick ethylene propylene diene monomer (EPDM) liner. The EPDM liner was installed to contain potential leaks from the cell, if any. The water level within the foamed glass aggregate layer is routinely measured when the cell is in operation to monitor for leaks from the cell. As-built drawings for cell C40 are included in Appendix B.

Three retention basins were constructed near the heating cell to manage soil and water from the batch treatment process. A soil retention basin was constructed near cell C40 to temporarily store soil that is either being prepared for treatment in cell C40 or has already undergone treatment in cell C40. The basin is split into two halves to keep the treated and untreated soil separated. Two water retention basins were also constructed. One is used to temporarily store water that was previously heated for future re-use in the heating cell. A one-foot-thick layer of clay was placed along the bottom and sidewalls of the basins. Analytical results for the water managed in the basins indicate that no NNOCs were detected at the end of treatment. The second water retention basin will be used to retain excess water from the soil retention basin. As with the other basins, a one-foot-thick layer of clay was placed along the bottom and sidewalls.

No additional heating cells are planned at this time; however, additional heating cells and associated retention basins may be constructed as part of the HWRV, if needed. It is expected that new heating cells would be of generally similar design to cell C40; however, the scale of the cell would likely be increased to expand treatment capacity.

4.3 ORC Exposure Mitigation and Security

Institutional controls are utilized to limit exposure to impacted soil, sediment, and surface water on the site. Access to the impacted areas of the site by untrained personnel is limited by:

- **Perimeter security fencing** – the site security fence encloses the northern portion of the site and prevents trespassing. This fence is periodically inspected and maintained.
- **Restricted land use** – by way of contractual agreements in place with the property owners, Bretting Development Corporation (BDC), Chemours has restricted use of portions of the site as needed and installed perimeter signage that clearly indicates these areas are access restricted. The former manufacturing areas in the northern portion of the site are subject to restricted access.

Potential migration of these media to locations outside the AOC will be controlled as it was during the pilot testing by way of the following:

- **Treatment Cell Design** – as stated above, stormwater and sediment containment basins will be integrated into the design of the ex-situ treatment cell construction to control the potential for residual solid product, water, and sediment migration outside of the cells. These basins will be inspected to determine if media has migrated from the treatment cells. If material from the cells is identified in the basin, it will be removed from the containment basins and returned to the treatment area of the cell. Inspections will be done within 24 hours of each rain event where rainfall of a half-inch or more occurs in accordance with the Wisconsin Pollutant Discharge Elimination System Construction Site Storm Water Runoff Permit (FIN 43165). Inspections will be

limited to the spring, summer, and fall seasons when the ground surface is not frozen and/or snow covered.

- **Erosion Control Measures** – will be installed to limit erosion and transport of solids from all work areas where the vegetation has been removed by project related activities, as well as solid material that has potential to be moved by stormwater flow. These measures include sediment traps, containment basins, silt fence, hay bales, and/or rock check dams as specified in the site's erosion control plan. Each of the cells is typically surrounded by fields of dense grass and other vegetation. As such, sediment would not be expected to migrate from the area. Surface water and sediment samples are taken periodically at the twelve locations, as conditions allow, where surface water leaves the site to determine whether these media are affected by operations on the site or by ongoing, naturally occurring erosion. Historical sampling has not shown that investigation and/or remediation work at the site has adversely impacted surface water or sediment at the site perimeter.
- **Nature of the Treatment Process** – alkaline hydrolysis occurs in the soil pore water when dissolved targeted ORCs interact with hydrated lime. Once dissolved, degradation of targeted ORCs is nearly instantaneous; therefore, the potential for transport of materials in solution outside of the AOC is greatly limited.
- **Environmental Fate** – it has been noted that degradation of ORCs can occur via photolysis and biodegradation. Photolysis is the primary means for DNT degradation in oxygenated water and certain isomers of DNT have been observed to degrade by as much as 89% in 24 hours and fully degraded in 72 hours (EPA, 2021). Chemours has observed significant biodegradation of ORCs in soil as part of the piloting work. Should ORCs migrate from the cells to the containment basins, these naturally occurring mechanisms would reduce the potential for migration of ORCs outside of the containment basin and outside the AOC.
- **Physical Location of Treatment Cells** – treatment cells will be generally located within the former TNT manufacturing areas, well within the boundary of the AOC. It is not expected that, nor was it observed during the pilot testing, that transport of affected media outside of the AOC would occur. This has been monitored by the annual surface water and sediment sampling discussed above.

4.4 Controls for Exposure to Media Handled

Potential routes of exposure to NNOCs during the field work may include dermal (i.e., direct) contact with residues in soil, sediment, or water; inhalation of dust or vapors; and ingestion of residues in soil or water. Each of these potential exposure routes and the mitigation steps in place to reduce the potential for exposure are discussed in further detail below.

4.4.1 Dermal Contact

Institutional controls will predominantly be used to prevent dermal exposure to impacted media exposed by variance activities. A fence (8 feet high, topped with barbed wire) is located along the site perimeter west of Highway 13 to prevent trespassing. This fence is periodically inspected and maintained. Contractual agreements are in place with the property owners, BDC, and can restrict use of various portions of the site as needed.

These agreements will continue to be maintained and enforced. Typically, the only people allowed into the work sites are project personnel wearing dedicated personal protective equipment (gloves, boots, and as needed protective suits) to prevent dermal contact. Potential migration of these media to locations outside the AOC is controlled by the stormwater and sediment containment basins previously described. These practices will continue to ensure ORCs do not migrate from the work sites.

Some supporting activities under this variance may remove vegetative cover from work areas. Erosion control measures will be implemented in work areas where ground disturbance is planned.

4.4.2 Inhalation

Air samples were collected in the breathing zone adjacent to the soil heating cell in 2022. The samples were analyzed for TNT and 2,4-DNT, and total particulates. No detections were reported in the air samples collected in 2022, which is consistent with historical sampling results. Vapors are not typically a hazard with nitroaromatic and nitramine compounds, which are semi-volatile in nature. The nitroaromatic and nitramine compounds detected on-site to date all exert vapor pressures lower than 10^{-4} atmospheres (and most are below 10^{-7} atmospheres); therefore, vapors are very unlikely to reach detectable concentrations in outdoor air.

Inhalation of dust containing NNOCs is possible in the work areas. The concentration of NNOCs in dust is dependent on both the amount of total dust in the air and the proportion of NNOCs in the dust particles. Dust is typically considered a nuisance at total concentrations of 15 milligrams per cubic meter (mg/m^3) and is generally not acceptable at greater densities. For dust at 15-mg/m^3 to contain NNOCs in excess of Occupational Safety and Health Administration (OSHA) worker time weighted average exposure thresholds, the parent material would need to contain over 3% TNT by weight (and even higher percentages would be required for other NNOCs to reach OSHA limits as dust). Since workers are unlikely to tolerate 15-mg/m^3 dust densities and since the number of areas where work will be conducted on soils exceeding 3% TNT by weight on average is few, the likelihood of worker exposure to contaminated dust is very low. Potential for dust exposure is further reduced by the fact that, typically, the soil conditions in the cells are wet, and dust generation is very low.

4.4.3 Ingestion

Contact with impacted soil, sediment, or surface water that could be ingested is addressed by the same institutional controls that prevent dermal contact.

Groundwater ingestion has been addressed by provision of alternate water (Washburn municipal water) to all residents in areas where groundwater from the Former Barksdale Works site is likely to migrate. Potable wells in these areas have been sealed and WDNR notification for future access to groundwater is required of residents in the area.

4.5 Groundwater

Historical groundwater monitoring at the site has shown that concentrations of constituents quantified in groundwater are generally stable or decreasing. This is not expected to change during the investigation and remediation work because:

- The treatment of media affected with ORCs will reduce the mass of historical source material that could serve as an ongoing source of groundwater contamination.
- Treatment will be conducted in clay-lined cells designed to contain water necessary for alkaline hydrolysis, and free water in the sediment traps, if any, will be captured and reused, where available. Therefore, the potential for a release to groundwater from infiltration outside of the cells during the remediation work is limited.
- The nature of the treatment process, as discussed above, results in nearly instantaneous degradation of ORCs that are in solution.

Offsite between Boyd Creek and Bono Creek to the north, there is no use of groundwater for any purpose (i.e., potable supply, thermoelectric, irrigation, etc.). This includes the area along Nolander Road to the north. A municipal water supply pipeline from the City of Washburn was constructed in 2004 and 2005 to supply drinking water to residents.

5.0 Treatment Completion

The purpose of remediation work in the former TNT manufacturing areas is to reduce ORCs in soil to below site-specific direct contact criteria for future recreational use and applicable alternative soil LDRs. Chemours will perform post treatment testing to verify contaminated soil alternative LDRs for the following ORCs are met prior to final placement on-site:

- Total 2,4-DNT (CAS No. 121-14-2)
- Total 2,6-DNT (CAS No. 606-20-2)
- Total Nitrobenzene (CAS No. 98-95-3)

Sampling and analysis that will be performed to demonstrate compliance with the LDRs is described below.

Final placement will occur within the cells where soil was initially treated or within a separate, consolidated cell. These areas will be a final repository for treated soil and be used for ongoing attenuation. Natural biological degradation and phytoremediation will serve as an ongoing mechanism for sustained constituent reduction in the final placement areas to meet Wisconsin performance standards, if necessary

5.1 Sampling and Analysis of Post Treatment Media

The sampling that will be conducted at each placement cell constructed as part of the remediation work (i.e., a treatment cell that has reached applicable criteria, including existing pilot cells) post-treatment is shown as Figures 6 and 7. Each placement will be retained and provided with the associated laboratory results as part of each annual progress report required for the HWRV.

Some media may contain NNOCs and/or CCBPs. The compounds subject to alternative soil LDRs for mixed NNOC and CCBP media post-treatment are:

- Total 2,4-DNT (CAS No. 121-14-2)
- Total 2,6-DNT (CAS No. 606-20-2)
- Total Nitrobenzene (CAS No. 98-95-3)
- TCLP of the eight RCRA metals: arsenic, barium, cadmium, chrome, lead, mercury, selenium, and silver.

As shown in treatment flowcharts in Figures 3 through 5, media and debris that do not meet these endpoints will either be returned to the cell for additional treatment, stabilized within the treatment cell to meet LDR criteria, or containerized and shipped to an off-site licensed treatment, storage, and disposal facility.

6.0 Reporting During Variance Period

During the five-year period of the HWRV, annual progress reports will be submitted to WDNR that include the following:

a) Documentation of the type and amount of product residuals and debris managed within treatment cells.
b) Documentation of any characterization and container storage of product residuals and debris removed from treatment cells.
c) Documentation of disposal of any product residuals and debris removed from the treatment cells including manifest copies.
d) Documentation of any management, including consolidation, of discrete areas where impacted soil is located within narrow locations such as former ditches and/or building features.
e) Documentation of the location of those areas and the amount of soil that is moved.
f) Documentation of the location of areas where the soil combined from discrete source areas is managed.
g) Documentation of any alternative treatment of large debris that facilitates management, including washing and physical resizing of large debris for off-site disposal.
h) Documentation of management of all impacted waste streams generated by these activities, including amounts and volumes of waste treated and generated.

Certified laboratory analytical testing for effectiveness, waste collection, management, and disposal associated with construction and operation of the treatment cells will be included in the progress reports. It is proposed that the progress reports will be due by May 1st of each year and combined with an annual site investigation progress report as part of IRAP implementation.

7.0 Modification to the HWRV

Changes in hazardous waste remediation activities which are not included in this request, will be managed in accordance with NR 670.042(1).

8.0 References

AECOM. June 2015. *Waste Management Progress Report No. 3 For Period May 23, 2014 to May 22, 2015, Bioremediation Pilot Test – 2014 Field Season, Former DuPont Barksdale Explosives Plant.*

AECOM. June 2016. *Waste Management Progress Report No. 4 For Period May 23, 2015 to May 22, 2016, Bioremediation Pilot Test – 2015 Field Season, Former DuPont Barksdale Explosives Plant.*

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Tables

Table 1
NNOC Target Analyte List and Applicable Hazardous Waste Standards
Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin

Nitroaromatic and Nitramine Organic Constituents (NNOCs)							
			Maximum Concentration in Dry Soil for Reactivity Characteristic[2]	NR 661.0024 Maximum Concentration for Toxicity Characteristic	NR 668.48 Universal Treatment Standards		NR 668.49(3)(a)3 Alternative LDR Treatment Standards for Contaminated Soil
Primary NNOCs of Interest		**CAS No.**	**Level (%)**	**Regulatory Level (mg/L TCLP)**	**Wastewater Standard (mg/L)**	**Nonwastewater Standard (mg/kg)**	**Nonwastewater 10x UTS (mg/kg)**
TNT	2,4,6-Trinitrotoluene	118-96-7	12	--	--	--	--
TNX	2,4,6-Trinitro-3-xylene (1,3,5-Trinitro-2,4-dimethylbenzene)	632-92-8	12	--	--	--	--
DNTs	2,4-Dinitrotoluene	121-14-2	--	0.13	0.32	140	1400
	2,6-Dinitrotoluene	606-20-2	--	--	0.55	28	280
	2,3-Dinitrotoluene[1]	602-01-7	--	--	--	--	--
	2,5-Dinitrotoluene[1]	619-15-8	--	--	--	--	--
	3,4-Dinitrotoluene[1]	610-39-9	--	--	--	--	--
	3,5-Dinitrotoluene[1]	618-85-9	--	--	--	--	--
DNXs[1]	1,2-Dimethyl-3,4-Dinitrobenzene	EVS0672	--	--	--	--	--
	1,2-Dimethyl-3,5-Dinitrobenzene	616-69-3	--	--	--	--	--
	1,2-Dimethyl-3,6-Dinitrobenzene	EVS0709	--	--	--	--	--
	1,2-Dimethyl-4,5-Dinitrobenzene	EVS0670	--	--	--	--	--
	1,3-Dimethyl-2,4-Dinitrobenzene	603-02-1	--	--	--	--	--
	1,3-Dimethyl-2,5-Dinitrobenzene	EVS0708	--	--	--	--	--
	1,4-Dimethyl-2,3-Dinitrobenzene	EVS0671	--	--	--	--	--
	1,4-Dimethyl-2,5-Dinitrobenzene	712-32-3	--	--	--	--	--
	1,4-Dimethyl-2,6-Dinitrobenzene	711-41-1	--	--	--	--	--
	1,5-Dimethyl-2,3-Dinitrobenzene	65151-56-6	--	--	--	--	--
	1,5-Dimethyl-2,4-Dinitrobenzene	616-72-8	--	--	--	--	--
Other NNOCs							
2-Amino-4,6-Dinitrotoluene		35572-78-2	--	--	--	--	--
2-Nitrotoluene		88-72-2	--	--	--	--	--
4-Amino-2,6-Dinitrotoluene		19406-51-0	--	--	--	--	--
Nitrobenzene		98-95-3	--	2.0	0.068	14	140
1,3,5-Trinitrobenzene		99-35-4	--	--	--	--	--
1,3-Dinitrobenzene		99-65-0	--	--	--	--	--
3-Nitrotoluene (1-Methyl-3-Nitrobenzene)		99-08-1	--	--	--	--	--
4-Nitrotoluene (1-Methyl-4-Nitrobenzene)		99-99-0	--	--	--	--	--
3,5-Dinitroaniline		618-87-1	--	--	--	--	--

Notes:

[1]: Site-specific constituent(s)

[2]: Reference - Testing to Determine Relationship Between Explosive Contaminated Sludge Components and Reactivity, Arthur D. Little Inc, January 1987. The concentration of TNT is used as a surrogate for TNX

CAS: Chemical Abstract Services

Table 2
Metals Target Analyte List for Coal Combustion By-Products and Applicable Hazardous Waste Standards
Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin

Metals					
		NR 661.0024 Maximum Concentration for Toxicity Characteristic	NR 668.48 Universal Treatment Standards		NR 668.49(3)(a)3 Alternative LDR Treatment Standards for Contaminated Soil
Metals	**CAS No.**	**Regulatory Level (mg/L TCLP)**	**Wastewater Standard (mg/L)**	**Nonwastewater Standard (mg/L TCLP)**	**Nonwastewater 10x UTS (mg/L TCLP)**
Arsenic	7440-38-2	5.0	1.4	5.0	50
Barium	7440-39-3	100.0	1.2	21	210
Cadmium	7440-43-9	1.0	0.69	0.11	1.1
Chromium	7440-47-3	5.0	2.77	0.60	6
Lead	7439-92-1	5.0	0.69	0.75	7.5
Mercury	7439-97-6	0.2	0.15	0.025	0.25
Selenium	7782-49-2	1.0	0.82	5.7	57
Silver	7440-22-4	5.0	0.43	0.14	1.4

Notes:

CAS: Chemical Abstract Services

Table 3
Pilot Test Cell Summary
Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin

Cell ID	Construction Date	Former Building Location or Feature Name for Source Soil	Summary of Purpose of Cell *	Volume of Contents (cubic yards)	Cell Dimensions (width x length x depth in feet)	Current Cell Status	Comparison to RCLs		
							TNT <RCL	2,4-DNT <RCL	2,6-DNT < RCL
C01	2007	Lydol House	No treatment (control).	14	10 x 30 x 1.8	Inactive	N	N	N
C02	2007		Effect of till only.	14	10 x 30 x 1.8	Inactive	Y	Y	Y
C03	2007		Effect of till + lime.	14	10 x 30 x 1.8	Inactive	Y	Y	Y
C04	2007		Effect of till + water.	14	10 x 30 x 1.8	Inactive	Y	Y	Y
C05	2008	TRV01 Sweating House	Rate in DNT 'only' soil.	433	77 x 86 x 1.8	Inactive	Y	Y	Y
C06[AH]	2008	TNT04 BiTri Nitration House	Rate in high concentration TNT 'only' clay. 10 yards of soil added from C21 after being heated in C40 in 2022.	78	28 x 37 x 1.8	Inactive	Y	Y	Y
C07	2008	TNT02 Wash House	Rate for 1:1 DNT:TNT.	189	46 x 64 x 1.8	Inactive	Y	Y	Y
C08	2009	TRV01 Nitration House	Rate w/ TNT, DNT & NT present.	115	33 x 48 x 1.8	Inactive	Y	Y	Y
C09	2009	TRV01 Box House	Rate for low concentration DNT & TNT mix. This cell was taken out of service due to achieving RCLs and planted to test Willow tree growth to contain moisture.	229	47 x 77 x 1.8	Inactive	Y	Y	Y
C10	2009	TRV02 Sweating House	Rate in DNT 'only' soil (2nd try).	393	69 x 86 x 1.8	Inactive	Y	Y	Y
C11	2009	TRV02 Nitration House	Rate w/ TNT, DNT & NT present.	244	57 x 57 x 1.8	Inactive	Y	Y	Y
C12[AH]	2009	TRV02 Wash House	Rate for 1:2 DNT:TNT at high concentration in soil. Converted to pH adjustment in 2015. However, additional cell modification is required due to the presence of residual product in the southern end of the cell.	301	85 x 95 x 1	Sampled	N	Y	Y
C13	2009	TRV03 Sweating House	Rate in DNT 'only' soil (2nd try).	369	76 x 86 x 1.8	Inactive	Y	Y	Y
C14	2009	TNT02 BiTri Nitration House	Rate for 2:1 DNT:TNT.	189	46 x 64 x 1.8	Inactive	Y	Y	Y
C15	2009	TNT02 Neutralization House	Rate in low concentration TNT 'only' clay.	469	76 x 95 x 1.8	Inactive	Y	Y	Y
C16[R]	2011	Refined TNT Ditch	Rate in high concentration TNT 'only' silt. Converted to pH adjustment in 2015. Contents of cell moved to cell C25 in 2020.	0	10 x 210 x 1.8	None	Y	Y	Y
C17[AH]	2011	Lydol Skids	Rate for DNT & DNX in silty soil.	137	40 x 54 x 1.8	Inactive	Y	Y	Y
C18	2011	Lydol Heater House	Rate for DNT & DNX in sandy soil.	57	22 x 22 x 1.8	Inactive	Y	Y	Y
C19[R]	2012	TNT08 Fort/Neut/Bi-Tri Houses	Consolidation of moderate TNT soil. Contents of cell moved to cell C25 in 2022.	0	36 x 50 x 1.5	None	Y	Y	Y
C20	2013	TNT07, TNT09, TNT10 Mono-nitration and Absorber Houses	Consolidation of early TNT process soil.	76	27 x 82 x 1	None	Y	Y	Y
C21[AH]	2012	TNT09 Neut House Ditches	Consolidation of high TNT ditch soil.	19	12 x 70 x 1.5	Mixed and sampled	N	Y	Y
C22	2012	TNX04 Fortifying, Mono/Bi Nitration and Absorber Houses	This was built in anticipation of testing consolidation of TNX process soil. Cell structure built, only loaded with 1.5 cubic yards to date.	2	20 x 50 x TBD	None	Not loaded. Not applicable.		
C23[R]	2013	TNT from Weak acid, Cell 12, TNX ditch, Lydol Skids	Initial pH test cell on variety of soil; small cells held 18 small 1/2 yard tests. Contents emptied and stored in drums pending pilot testing. Subset shipped to USACE & Haskell for testing.	0	16 x 40 x 0.8	None	Not applicable - Removed		
C24[AH]	2015	TNT07 BiTri House, Grain House, Fort House, Neut ditches; RT Wash House; temporarily stored in TNT07 BiTri prior to placement in cell	pH adjustment on soil with high TNT; test of consolidation of high TNT ditch and underlying foundation soils.	263	35 x 130 x 1.5	Sampled	N	Y	Y
C25[AH]	2015	Former contents of C16 and C19	pH adjustment on soil containing TNT. Original contents of C25 consolidated into C27 in 2019. C16 and C19 consolidated into C25 in 2020 and 2022, respectively.	443	35 x 130 x 1.5	Inactive	Y	Y	Y
C26[AH]	2016	Refined Triton East Graining House	pH adjustment on soil containing refined (i.e., purified) TNT	307	61 x 110 x 1.5	Inactive	Y	Y	Y
C27[AH]	2016	TNT07/08/09/10 area ditches, Refined Triton Wash House/ditches, TNT09 Mono/Fort ditches & TNT10 Graining House; temporarily stored in TNT09 BiTri prior to placement in cell	pH adjustment on soil containing TNT. C25 consolidated into C27 in 2019.	527	50 x 145 x 1.5	Inactive	Y	Y	Y
C28[AH]	2017	Refined Triton Wash House/ditches and Refined Triton Overflow Area	pH adjustment on soil containing refined (i.e., purified) TNT.	850	90 x 190 x 1.5	Sampled	Y	Y	Y
C29[AH]	2017	TNT07 BiTri ditch	pH adjustment on soil containing DNT and TNT.	12	8 x 60 x 3	Loaded, lime added, mixed, and sampled	TBD	N	N
C30[AH]	2017	TNT07 BiTri ditch	pH adjustment on soil containing DNT and TNT.	23	10 x 50 x 3	Loaded, lime added, mixed, and sampled	TBD	N	N
C31[AH]	2017	Refined Triton Wash House/ditches	pH adjustment on soil containing high concentrations of refined (i.e., purified) TNT.	11	10 x 42 x 1.5	Sampled	N	Y	Y
C32	2017	Not Loaded	NA	0	10 x 35 x 1.5	None	Cell not loaded; therefore, testing not initiated.		
C33[AH]	2018	Area of Refined Triton Graining and Screening Houses	pH adjustment on soil containing refined (i.e., purified) TNT.	292	40 x 180 x 3	Sampled	N	Y	Y
C34	2018	TNT08 BiTri area and Refined Triton East Graining House rail grade and Screening House area	pH adjustment on coal combustion bi-products (CCBPs) impacted with TNT.	139	40 x 180 x 3	Partially loaded	Cell not fully loaded; therefore, testing not initiated.		
C35[AH]	2019	Refined Triton Screening House and area between the East and West Graining Houses and area ditches	pH adjustment on soil containing refined (i.e., purified) TNT.	564	45 x 195 x 3	Sampled	N	Y	Y

Table 3
Pilot Test Cell Summary
Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin

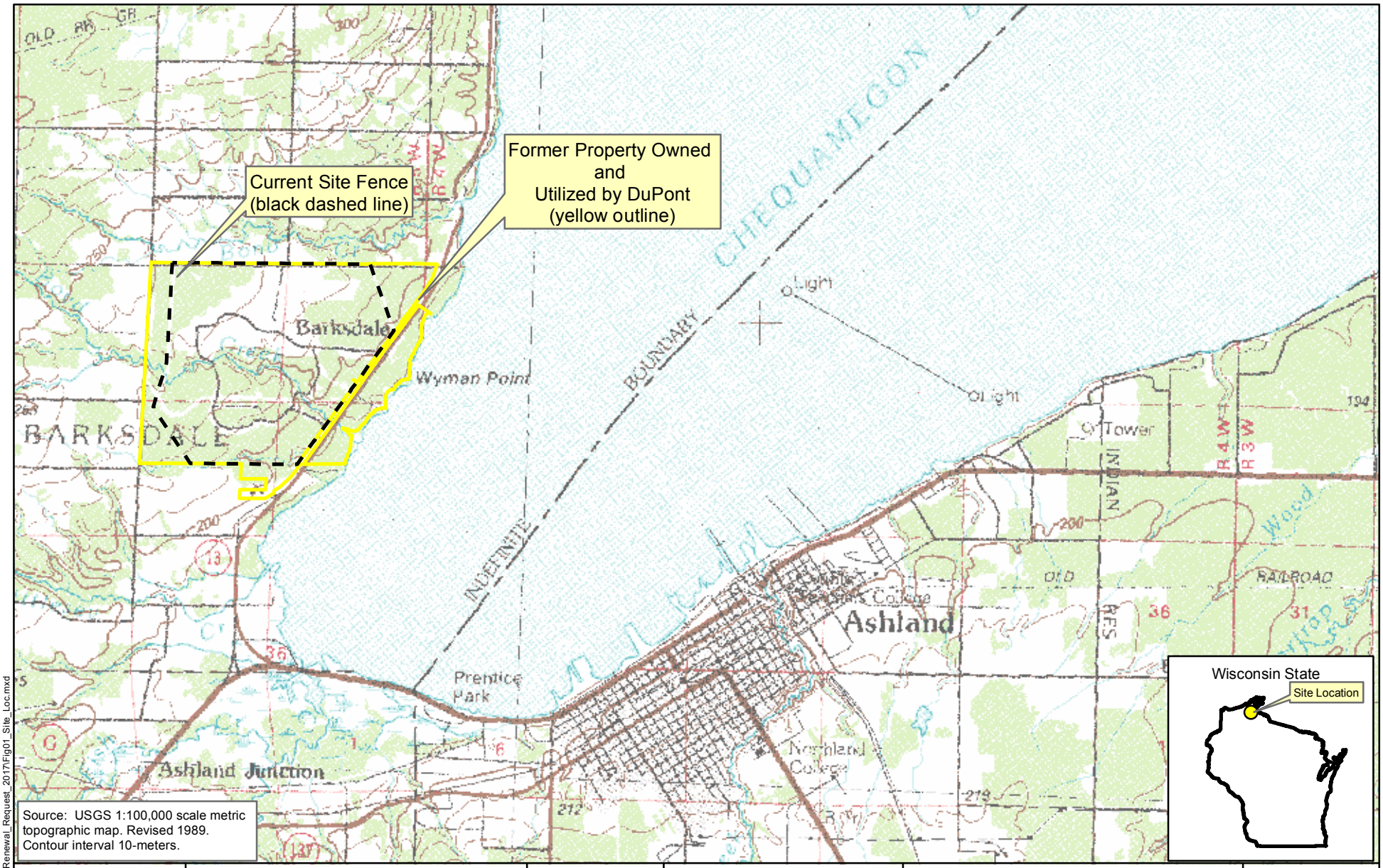
Cell ID	Construction Date	Former Building Location or Feature Name for Source Soil	Summary of Purpose of Cell *	Volume of Contents (cubic yards)	Cell Dimensions (width x length x depth in feet)	Current Cell Status	Comparison to RCLs		
							TNT <RCL	2,4-DNT <RCL	2,6-DNT < RCL
C36[AH]	2019	Refined Triton Screening House, Tank Storage Houses, and area between the East and West Graining Houses	pH adjustment on soil containing refined (i.e., purified) TNT.	578	45 x 160 x 3	Sampled	N	Y	Y
C37[AH]	2020	Refined Triton area ditches, TNT07/08 area ditches	pH adjustment on soil containing refined (i.e., purified) TNT.	447	45 x 195 x 3	Sampled	N	Y	Y
C38[AH]	2021	Refined Triton area ditches, TNT07 Neutralizer area, TNT08 BiTri/Neutralizer area, and portions of C23 base and berm that were in contact with the cell material	pH adjustment on soil containing TNT.	783	45 x 280 x 3	Loaded, lime added, mixed, and sampled	TBD	TBD	TBD
C39[AH]	2021	Area of TNT07 Neutralizer, TNT08 BiTri/Neutralizer and surrounding features	pH adjustment on soil containing TNT.	588	45 x 230 x3	Loaded, lime added, mixed, and sampled	TBD	TBD	TBD
C40[Heat]	2021	Some soil from cell C21 placed in heating cell in 2022 for testing	Heating Cell	12	10 x 24 x 5	Loaded and emptied after testing	NA		
C41[AH]	2022	TNT07 Neutralizer and surrounding features	pH adjustment on soil containing TNT.	135	45 x 230 x3	Constructed and partially loaded	Cell not fully loaded; therefore, testing not initiated.		
			Total Volume (cubic yards):	9,329					

Notes:
[AH] = Alkaline hydrolysis cell
[Heat] = Heating cell
[R] = Cell removed (excavated)
* See 2012 Variance Request for full summary of cells C01 trough C18. See annual progress reports for remainder of cells.
TNT = 2,4,6-Trinitrotoluene
DNT = Dintrotoluene
TNX = 2,4,6-Trinitro-3-xylene
RCL = Site-specific recreational direct contact RCL. Soil concentrations are considered to be below the RCL if the calculated 95% upper confidence level for the analyte is below the RCL.
Inactive: Cell not loaded, sampled, or mixed during the most recent (2022) field season
NA = Not applicable
TBD = To be determined. Additional sampling is planned to refine the statistical analysis.

Table 4
Statistical Summary of NNOCs Detected in Soil Samples Collected from Pilot Cells
Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin

Constituent	NNOC Category	CAS Number	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total Number of Detections
2,4,6-Trinitrotoluene	Primary Barksdale NNOC (TNT)	118-96-7	32	91	178	262	187	200	198	144	315	99	116	16	17	10	9	20	1894
4-Amino-2,6-Dinitrotoluene	Standard NNOC	19406-51-0	25	35	150	255	186	191	137	131	300	89	120	17	17	10	9	19	1691
2,4-Dinitrotoluene	Primary Barksdale NNOC (DNT)	121-14-2	31	96	182	253	179	194	164	136	230	61	85	8	7	2	4	15	1647
2-Amino-4,6-Dinitrotoluene	Standard NNOC	35572-78-2	21	65	140	241	187	192	116	120	261	72	113	15	14	6	8	17	1588
2,6-Dinitrotoluene	Primary Barksdale NNOC (DNT)	606-20-2	31	93	175	226	158	153	124	99	170	31	61	4	3	1	1	6	1336
3,4-Dinitrotoluene	Primary Barksdale NNOC (DNT)	610-39-9	0	0	167	208	160	149	90	55	97	19	25	1	1	0	0	3	975
2,3-Dinitrotoluene	Primary Barksdale NNOC (DNT)	602-01-7	0	0	172	210	164	148	88	48	90	21	23	1	1	0	0	2	968
1,3,5-Trinitrobenzene	Standard NNOC	99-35-4	12	26	77	162	112	117	33	47	56	0	11	0	0	0	3	1	657
1,5-Dimethyl-2,4-Dinitrobenzene	Primary Barksdale NNOC (DNX)	616-72-8	24	53	23	16	30	29	152	93	115	33	47	2	2	0	0	4	623
1,3-Dinitrobenzene	Standard NNOC	99-65-0	18	37	68	81	100	133	11	30	40	7	23	5	2	0	1	6	562
1,3-Dimethyl-2,4-Dinitrobenzene	Primary Barksdale NNOC (DNX)	603-02-1	24	44	21	15	29	23	105	82	104	25	40	1	2	0	0	2	517
2-Nitrotoluene	Standard NNOC	88-72-2	22	20	114	100	116	110	1	6	19	0	1	0	0	0	0	4	513
3,5-Dinitrotoluene	Primary Barksdale NNOC (DNT)	618-85-9	0	0	88	83	77	71	54	50	64	4	10	1	0	0	0	4	506
1,4-Dimethyl-2,3-Dinitrobenzene	Standard NNOC	EVS0671	24	41	17	15	29	23	103	66	99	26	40	2	0	0	0	2	487
2,4,6-Trinitroxylene	Primary Barksdale NNOC (TNX)	632-92-8	0	0	0	0	0	67	78	69	132	22	66	7	4	3	0	5	453
4-Nitrotoluene (1-Methyl-4-Nitrobenzene)	Standard NNOC	99-99-0	20	14	115	64	85	104	2	5	20	1	1	1	0	0	0	3	435
1,4-Dimethyl-2,6-Dinitrobenzene	Primary Barksdale NNOC (DNX)	711-41-1	24	34	13	15	21	20	73	49	83	23	33	1	1	0	0	1	391
1,2-Dimethyl-3,4-Dinitrobenzene	Primary Barksdale NNOC (DNX)	EVS0672	24	32	14	15	27	22	71	42	80	23	33	2	1	0	0	1	387
1,2-Dimethyl-3,5-Dinitrobenzene	Primary Barksdale NNOC (DNX)	616-69-3	24	38	15	15	28	23	68	41	74	21	34	1	0	0	0	1	383
1,2-Dimethyl-4,5-Dinitrobenzene	Primary Barksdale NNOC (DNX)	EVS0670	24	33	15	15	23	20	58	44	66	18	30	0	0	0	0	1	347
Nitrobenzene	Standard NNOC	98-95-3	18	17	28	28	42	133	1	1	0	1	1	0	0	0	0	1	271
1,2-Dimethyl-3,6-Dinitrobenzene	Primary Barksdale NNOC (DNX)	EVS0709	0	29	8	15	21	19	42	30	51	21	29	1	0	0	0	1	267
1,5-Dimethyl-2,3-Dinitrobenzene	Primary Barksdale NNOC (DNX)	65151-56-6	24	24	9	15	20	19	25	28	42	19	27	0	0	0	0	1	253
3,5-Dinitroaniline	Standard NNOC	618-87-1	0	0	0	0	0	0	35	45	104	5	26	6	3	0	3	7	234
3-Nitrotoluene (1-Methyl-3-Nitrobenzene)	Standard NNOC	99-08-1	15	6	55	11	45	50	0	0	2	0	0	0	0	0	0	3	187
1,4-Dimethyl-2,5-Dinitrobenzene	Primary Barksdale NNOC (DNX)	EVS1207	0	0	0	0	0	0	42	30	42	15	0	0	0	0	0	0	129
2,5-Dinitrotoluene	Primary Barksdale NNOC (DNT)	619-15-8	0	0	0	0	0	8	23	30	39	1	6	0	0	0	0	4	111
1,3-Dimethyl-2,5-Dinitrobenzene	Primary Barksdale NNOC (DNX)	EVS0708	0	0	8	4	11	10	18	21	27	1	9	0	0	0	0	0	109
RDX	Former Standard NNOC	121-82-4	0	9	14	4	2	4	0	0	0	0	0	0	0	0	0	0	33
Octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine	Former Standard NNOC	2691-41-0	0	2	2	2	5	12	0	0	0	0	0	0	0	0	0	0	23
Pentaerythritol Tetranitrate	Former Standard NNOC	78-11-5	0	0	7	3	2	0	0	0	0	0	0	0	0	0	0	0	12
Nitroglycerin	Former Standard NNOC	55-63-0	2	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	9
Tetryl	Former Standard NNOC	479-45-8	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4

Figures



Area Map (Optional)

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MAP FORMATTED FOR "A" (8.5" X 11") SIZE SHEET.
SCALE NOT VALID FOR DIFFERENT PAGE SIZE.

FILE NUMBER:	
DESIGNED BY:	NS
DRAWN BY:	KJB
DATA QUALITY CHECK BY:	CEP

AECOM
500 West Jefferson Street
Suite 1600
Louisville, Kentucky 40202

Regional Site Location

Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER:	60660855
DATE:	April 2023
FIGURE NUMBER:	1

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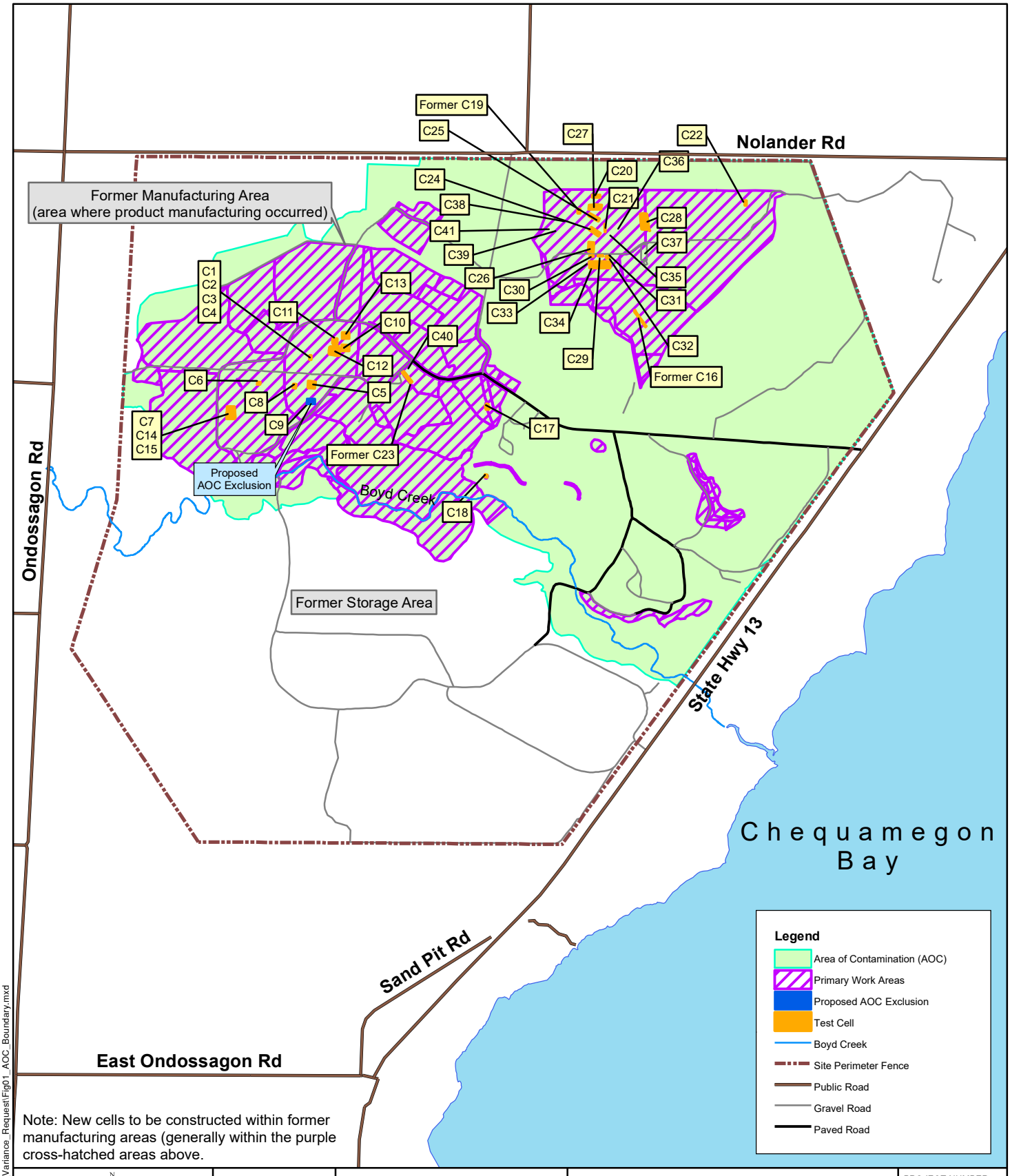

Note: New cells to be constructed within former manufacturing areas (generally within the purple cross-hatched areas above.

N
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S

0 750 1,500

Feet

1:18,000

MAP FORMATTED FOR "A" (8.5" X 11") SIZE SHEET. SCALE NOT VALID FOR DIFFERENT PAGE SIZE.

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AECOM

AECOM
500 West Jefferson Street
Suite 1600
Louisville, Kentucky 40202

Area of Contamination Boundary

Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER: 60660855

DATE: April 2023

FIGURE NUMBER: 2

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Within Currently Defined Area of Contamination (AOC) Limit – Not Currently Expected to be Modified

Residual Product (See Figure 4)

Soil with Product (See Figure 4)

- Product Easily Segregated
  - NR 668.40 / 40CFR 268.40 → Off-Site Incineration of Product
  - Soil → Unheated Alkaline Hydrolysis
    - Product unable to be treated → Heated Alkaline Hydrolysis
    - Product unable to be treated → NR 668.40 / 40CFR 268.40 → Off-Site Incineration of Product
    - NR670.079 and NR 668.44 → Placement Area for Ongoing Attenuation as a Performance Standard
    - NR670.079 and NR 668.44 → Recycle/Reuse Water
- Product Not Easily Segregated
  - NR670.079 and NR 668.44 → Unheated Alkaline Hydrolysis
  - NR670.079 and NR 668.44 → Heated Alkaline Hydrolysis
  - NR670.079 and NR 668.44 → Recycle/Reuse Water

Non-Contaminated Building Debris (See Figure 5)

- NR 502.02 / 40CFR 26.12 / 40 CFR 261.1(6) → Recycle/Reuse Concrete Metal CCBPs
- NR 668.40 / 40CFR 268.40 → Off-Site Disposal Asbestos

Contaminated Building Debris (See Figure 5)

- NR 668.45 / 40 CFR 268.45 → Wash Concrete Metal
  - NR 502.02 / 40CFR 26.12 / 40 CFR 261.1(6) → Recycle/Reuse Concrete Metal
  - NR670.079 and NR 668.44 → Recycle/Reuse Wash Water
- Off-Site Disposal Asbestos Clay Pipes Wood
  - Asbestos only wash → Recycle/Reuse Wash Water
- NR670.079 and NR 668.44 → On-Site Cells CCBPs

Other Contaminated Items

- NR 668.45 / 40 CFR 268.45 → Wash PPE Tools Equipment
  - NR 502.02 / 40CFR 26.12 → Recycle/Reuse PPE Tools/Equipment
  - NR670.079 and NR 668.44 → Recycle/Reuse Wash Water
- NR 668.40 / 40CFR 268.40 → Off-Site Disposal Disposable PPE Tarps Drums

Legend

Subject to the Approved Variance

WDNR Variance Granted Under NR670.079 and NR668.44

Applicable Waste Related Regulations

Disposal as Hazardous or Land Disposal Restricted Waste: WDNR NR 668.40 / EPA 40CFR 268.40

Debris Washing: WDNR NR 668.45 Table 1 / EPA 40CFR 268.45 Table 1

Recycle/Reuse or Solid Waste Disposal: WDNR NR 502.02 / EPA 40CFR 261.12 Scrap Metal Recycling Exclusion: EPA 40CFR 261.1(6)

TASK NUMBER:	22001
DESIGNED BY:	E. SCHMIDT
DRAWN BY:	E. SCHMIDT
DATA QUALITY CHECK BY:	E. BISHOP

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Suite 1600
Louisville, Kentucky 40202

INVESTIGATION MEDIA MANAGEMENT CONCEPTUAL PLAN - TNT MANUFACTURING AREAS

Hazardous Waste Remediation Variance Request.
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER:	60660855
DATE:	April 2023
FIGURE NUMBER:	3

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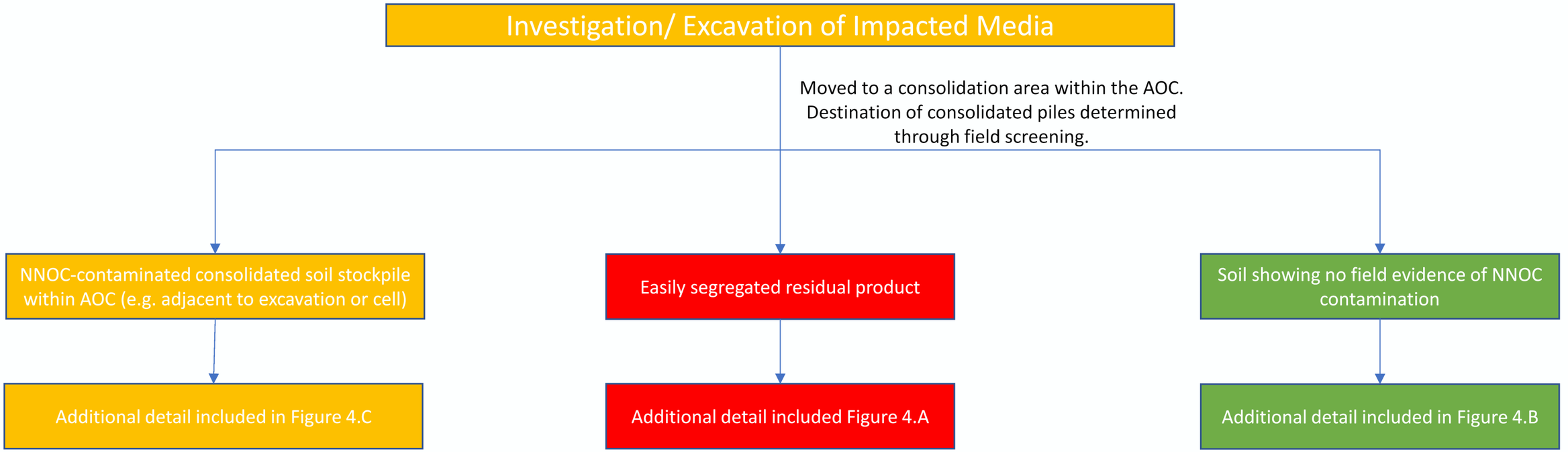

Legend

- Not subject to RCRA
- AOC policy operations
- Segregated hazardous waste

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TASK NUMBER:	22001
DESIGNED BY:	E. SCHMIDT
DRAWN BY:	E. SCHMIDT
DATA QUALITY CHECK BY:	E. BISHOP

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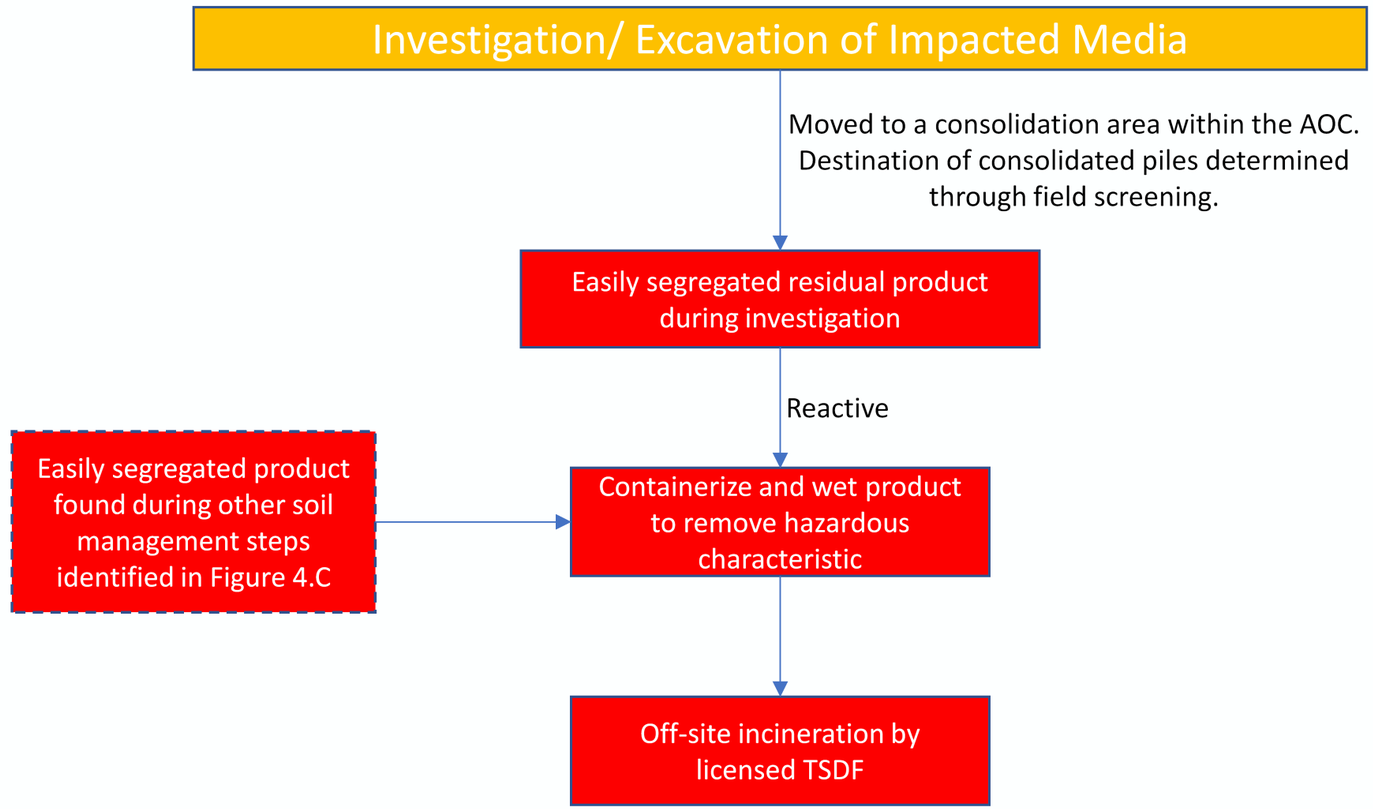
SOIL AND RESIDUAL SOLID PRODUCT MANAGEMENT CONCEPTUAL PLAN

Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER:	60660855
DATE:	April 2023
FIGURE NUMBER:	4



Legend

- AOC policy operations
- Segregated hazardous waste

	TASK NUMBER: 22001 DESIGNED BY: E. SCHMIDT DRAWN BY: E. SCHMIDT DATA QUALITY CHECK BY: E. BISHOP	AECOM 500 W Jefferson Street Suite 1600 Louisville, Kentucky 40202	EASILY SEGREGATED RESIDUAL PRODUCT Hazardous Waste Remediation Variance Request Former DuPont Barksdale Works Barksdale, Wisconsin 54806	PROJECT NUMBER: 60660855 DATE: April 2023 FIGURE NUMBER: 4.A

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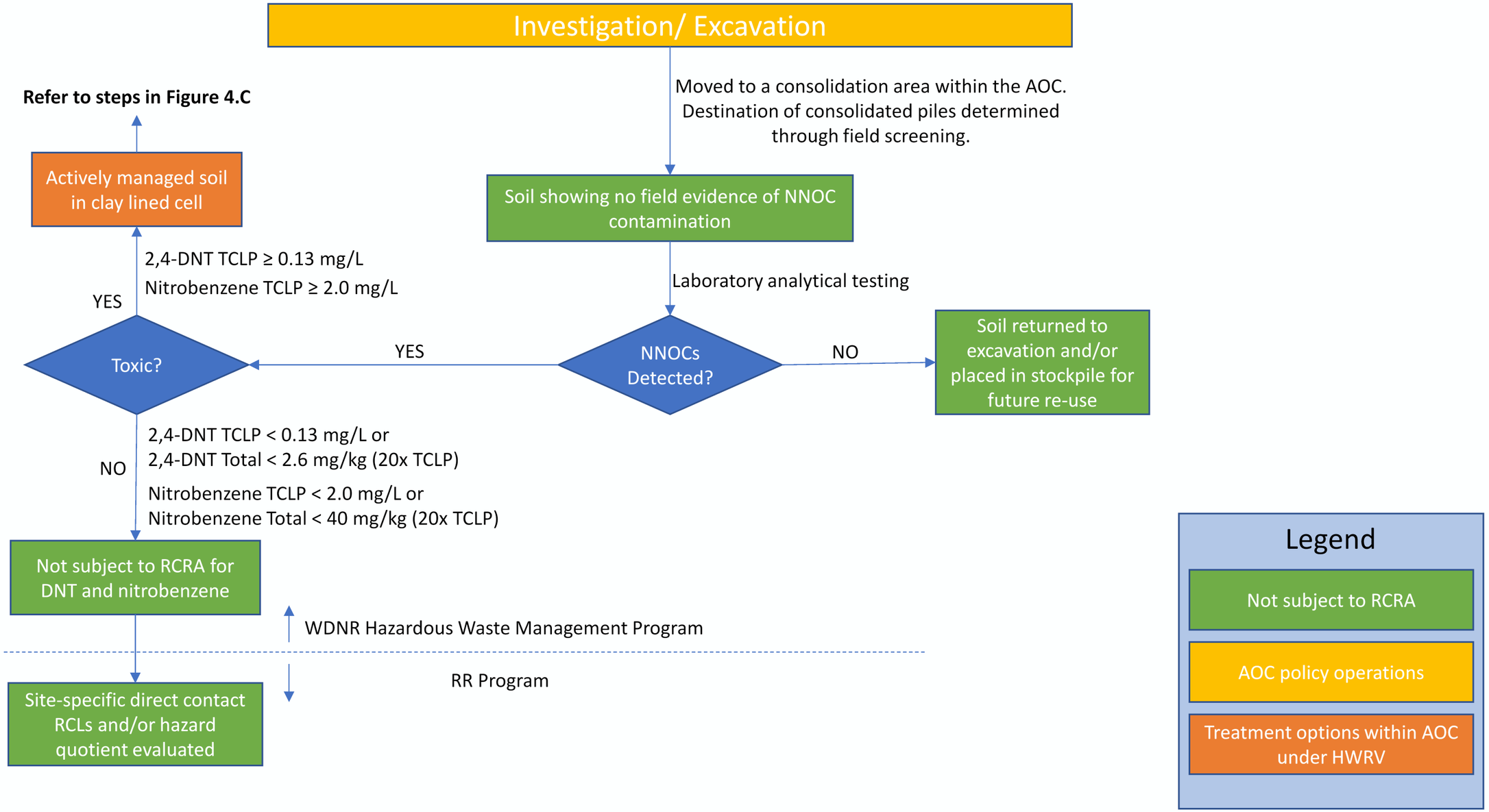

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	TASK NUMBER: 22001 DESIGNED BY: E. SCHMIDT DRAWN BY: E. SCHMIDT DATA QUALITY CHECK BY: E. BISHOP	AECOM 500 W Jefferson Street Suite 1600 Louisville, Kentucky 40202	SOIL SHOWING NO FIELD EVIDENCE OF NNOC CONTAMINATION Hazardous Waste Remediation Variance Request Former DuPont Barksdale Works Barksdale, Wisconsin 54806	PROJECT NUMBER: 60660855 DATE: April 2023 FIGURE NUMBER: 4.B

Investigation/ Excavation of Impacted Media

NNOC-contaminated consolidated soil stockpile within AOC (e.g. adjacent to excavation or in cell)

Reactive?

YES
>12% TNT in soil

Wet soil to remove reactive characteristic

NO
<12% TNT in soil

Not subject to RCRA for reactivity

Toxic?

YES
2,4-DNT TCLP ≥ 0.13 mg/L
Nitrobenzene TCLP ≥ 2.0 mg/L

Actively managed soil in clay lined cell

Mix with lime and water

Hydrolysis

NO
2,4-DNT TCLP < 0.13 mg/L or
2,4-DNT Total < 2.6 mg/kg (20x TCLP)
Nitrobenzene TCLP < 2.0 mg/L or
Nitrobenzene Total < 40 mg/kg (20x TCLP)

Not subject to RCRA for DNT and Nitrobenzene

LDR determination made after treatment

LDRs?

YES
2,4-DNT ≥ 1,400 mg/kg
2,6-DNT ≥ 280 mg/kg
Nitrobenzene ≥ 140 mg/kg

If after continued hydrolysis, soil still shows DNT concentrations exceeding 10x alternative soil LDRs, ship for off-site disposal by licensed TSDF.

NO
2,4-DNT < 1,400 mg/kg
2,6-DNT < 280 mg/kg
Nitrobenzene < 140 mg/kg

LDRs met

WDNR Hazardous Waste Management Program

RR Program

Site-specific direct contact RCLs and/or hazard quotient evaluated

Legend

- Not subject to RCRA
- AOC policy operations
- Treatment options within AOC under HWRV
- Material that exceeds 10x alternative soil LDRs after repeated treatment

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TASK NUMBER:	22001
DESIGNED BY:	E. SCHMIDT
DRAWN BY:	E. SCHMIDT
DATA QUALITY CHECK BY:	E. BISHOP

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NNOC CONTAMINATED SOIL

Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER:	60660855
DATE:	April 2023
FIGURE NUMBER:	4.C

Investigation/ Excavation

Moved to a consolidation area within the AOC. Destination of consolidated piles determined through field screening.

NNOC-contaminated consolidated debris within AOC (e.g. adjacent to excavation or cell)

- Concrete
- Metal
- Clay Pipes
- Wood
- Asbestos
- Coal Combustion By-Products

Additional detail included in Figure 5.A

Additional detail included in Figure 5.B

Additional detail included in Figure 5.D

Additional detail included in Figure 5.C

Debris showing no field evidence of NNOC contamination

- Concrete
- Metal
- Clay Pipes
- Wood
- Asbestos
- Coal Combustion By-Products

Additional detail included in Figure 5.E

Legend

- Not subject to RCRA
- AOC policy operations

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TASK NUMBER:	22001
DESIGNED BY:	E. SCHMIDT
DRAWN BY:	E. SCHMIDT
DATA QUALITY CHECK BY:	E. BISHOP

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500 W Jefferson Street
Suite 1600
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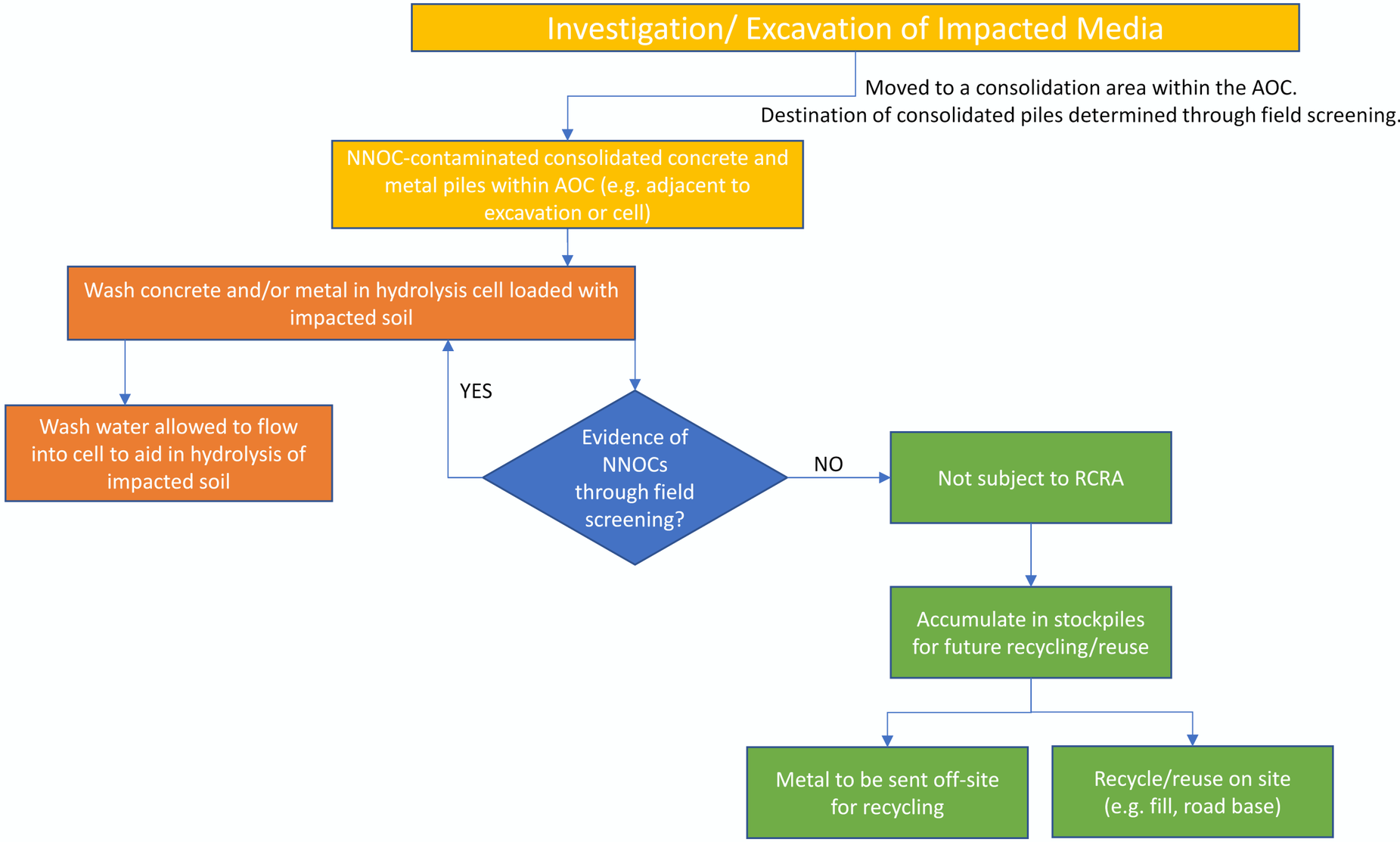
BUILDING DEBRIS MANAGEMENT CONCEPTUAL PLAN

Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER:	60660855
DATE:	April 2023
FIGURE NUMBER:	5



Legend

- Not subject to RCRA
- AOC policy operations
- Treatment options within AOC under HWRV

TASK NUMBER: 22001 DESIGNED BY: E. SCHMIDT DRAWN BY: E. SCHMIDT DATA QUALITY CHECK BY: E. BISHOP	AECOM 500 W Jefferson Street Suite 1600 Louisville, Kentucky 40202	NNOC CONTAMINATED CONCRETE AND METAL Hazardous Waste Remediation Variance Request Former DuPont Barksdale Works Barksdale, Wisconsin 54806	PROJECT NUMBER: 60660855 DATE: April 2023 FIGURE NUMBER: 5.A	

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Investigation/ Excavation of Impacted Media

Moved to a consolidation area within the AOC.
Destination of consolidated piles determined through field screening.

NNOC-contaminated consolidated wood and clay pipe piles within AOC (e.g. adjacent to excavation or cell)

Assume Hazardous Waste?

YES

Move to hazardous waste roll-off within AOC

Off-site incineration by licensed TSDF

NO

Collect a representative sample for waste characterization

Toxic?

YES

2,4-DNT TCLP ≥ 0.13 mg/L
Nitrobenzene TCLP ≥ 2.0 mg/L

NO

2,4-DNT TCLP < 0.13 mg/L or
2,4-DNT Total < 2.6 mg/kg (20x TCLP)
Nitrobenzene TCLP < 2.0 mg/L or
Nitrobenzene Total < 40 mg/kg (20x TCLP)

Off-site disposal at a licensed landfill

Legend

- Not subject to RCRA
- AOC policy operations
- Treatment options within AOC under HWRV

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TASK NUMBER:	22001
DESIGNED BY:	E. SCHMIDT
DRAWN BY:	E. SCHMIDT
DATA QUALITY CHECK BY:	E. BISHOP

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NNOC CONTAMINATED WOOD AND CLAY PIPE

Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER:	60660855
DATE:	April 2023
FIGURE NUMBER:	5.B

Investigation/ Excavation of Impacted Media

Moved to a consolidation area within the AOC.
Destination of consolidated piles determined through field screening.

NNOC-contaminated consolidated coal combustion by-products stockpile within AOC (e.g. adjacent to excavation or in cell)

Reactive?

YES
>12% TNT in soil

Wet to remove reactive characteristic

NO
<12% TNT in soil

Not subject to RCRA for reactivity

Toxic?

YES
2,4-DNT TCLP ≥ 0.13 mg/L
Nitrobenzene TCLP ≥ 2.0 mg/L
Metals ≥ TCLP limits

Actively managed soil in clay lined cell

Mix with lime and water

Hydrolysis and/or stabilization/ solidification for metals

LDR determination made after treatment

LDRs?

YES
2,4-DNT ≥ 1,400 mg/kg
2,6-DNT ≥ 280 mg/kg
Nitrobenzene ≥ 140 mg/kg
Metals ≥ 10x UTS

If after continued hydrolysis, soil still shows NNOC concentrations exceeding 10x alternative soil LDRs, ship for off-site disposal by licensed TSDF.

NO
2,4-DNT TCLP < 0.13 mg/L or
2,4-DNT Total < 2.6 mg/kg (20x TCLP)
Nitrobenzene TCLP < 2.0 mg/L or
Nitrobenzene Total < 40 mg/kg (20x TCLP)
Metals < TCLP limits
Metals Total < 20x TCLP

Not subject to RCRA

LDRs met
2,4-DNT < 1,400 mg/kg
2,6-DNT < 280 mg/kg
Nitrobenzene < 140 mg/kg
Metals < 10x UTS

WDNR Hazardous Waste Management Program

RR Program

Site-specific direct contact RCLs and/or hazard quotient evaluated

Legend

- Not subject to RCRA
- AOC policy operations
- Treatment options within AOC under HWRV
- Material that exceeds 10x alternative soil LDRs after repeated treatment

TASK NUMBER:	22001
DESIGNED BY:	E. SCHMIDT
DRAWN BY:	E. SCHMIDT
DATA QUALITY CHECK BY:	E. BISHOP

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500 W Jefferson Street
Suite 1600
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NNOC CONTAMINATED COAL COMBUSTION BY-PRODUCTS

Hazardous Waste Remediation Variance Request
Former DuPont Barksdale Works
Barksdale, Wisconsin 54806

PROJECT NUMBER:	60660855
DATE:	April 2023
FIGURE NUMBER:	5.C

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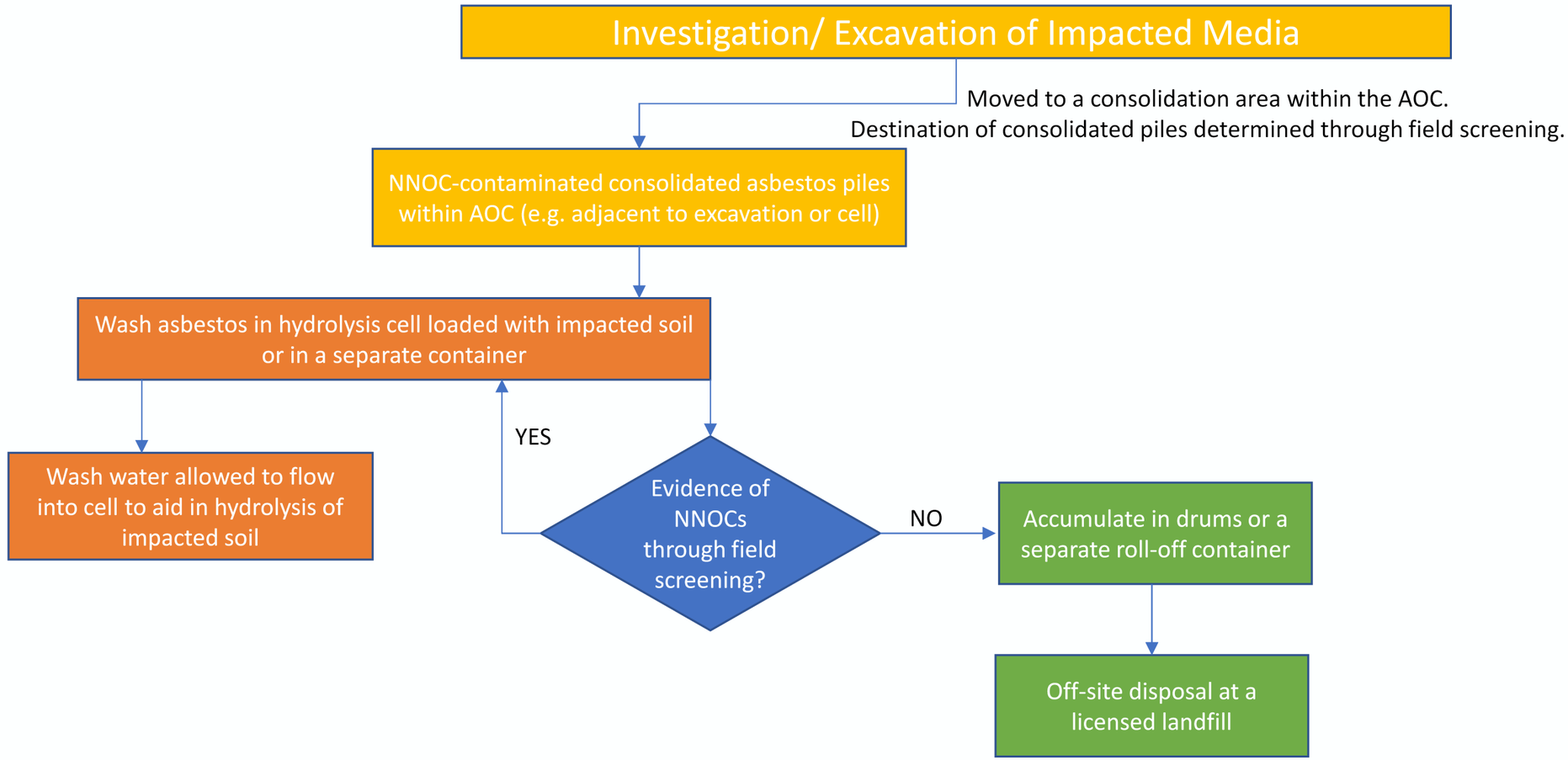

Legend

- Not subject to RCRA
- AOC policy operations
- Treatment options within AOC under HWRV

TASK NUMBER: 22001 DESIGNED BY: E. SCHMIDT DRAWN BY: E. SCHMIDT DATA QUALITY CHECK BY: E. BISHOP	AECOM 500 W Jefferson Street Suite 1600 Louisville, Kentucky 40202	NNOC CONTAMINATED ASBESTOS Hazardous Waste Remediation Variance Request Former DuPont Barksdale Works Barksdale, Wisconsin 54806	PROJECT NUMBER: 60660855 DATE: April 2023 FIGURE NUMBER: 5.D	

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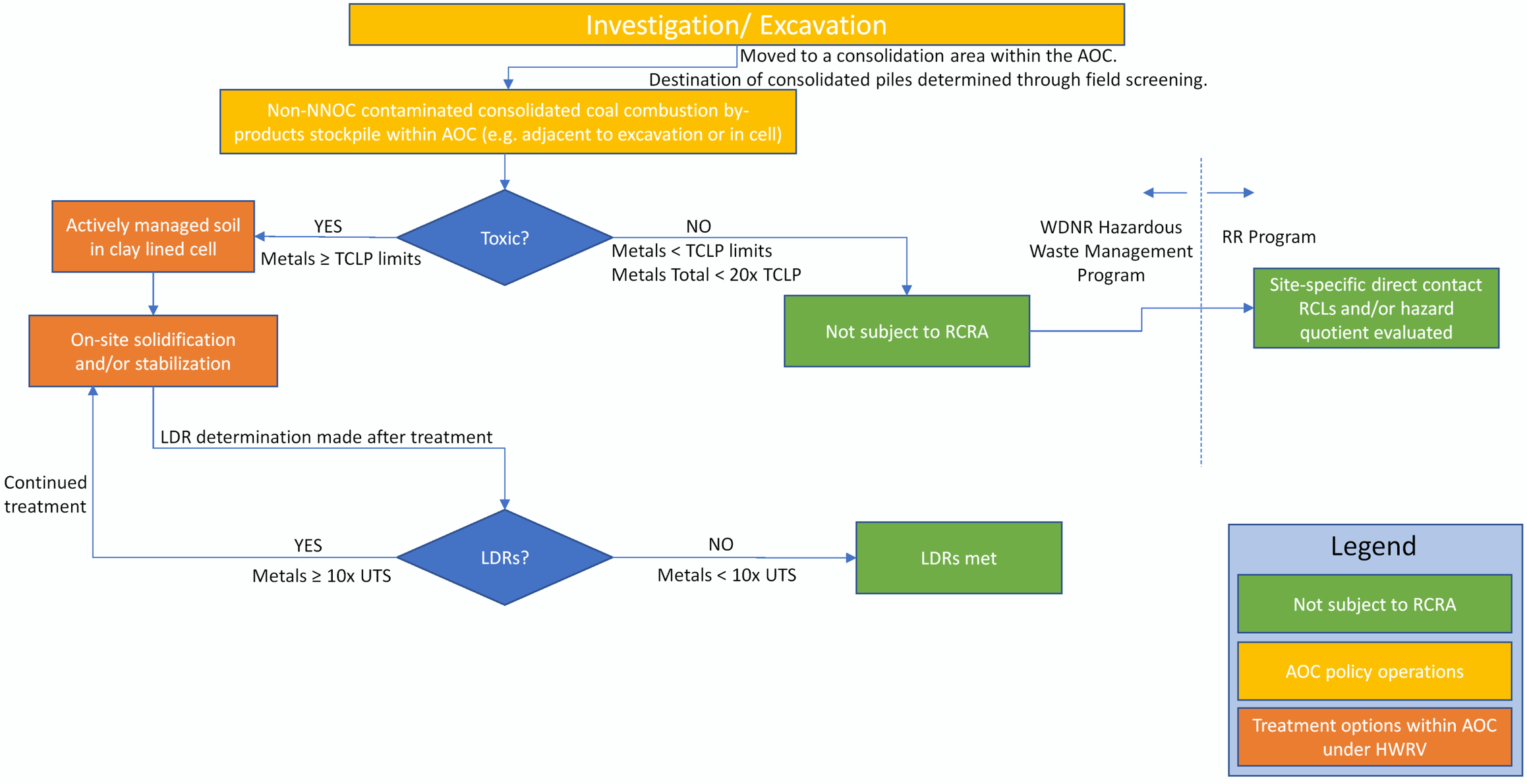

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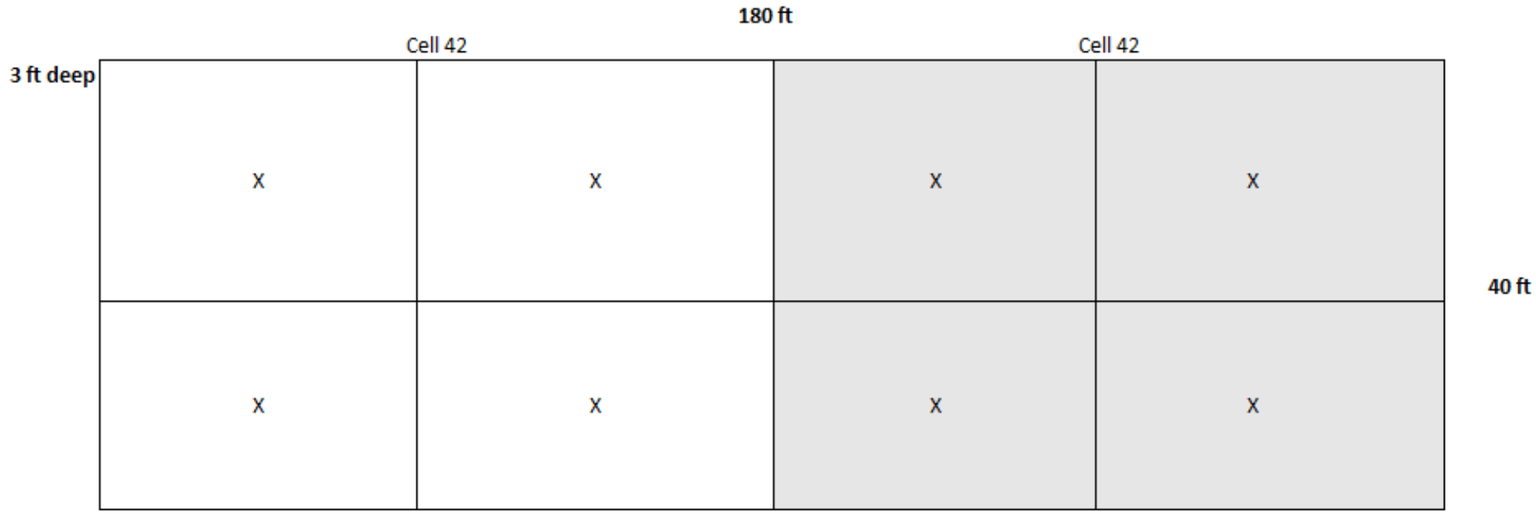
	TASK NUMBER: 22001 DESIGNED BY: E. SCHMIDT DRAWN BY: E. SCHMIDT DATA QUALITY CHECK BY: E. BISHOP	AECOM 500 W Jefferson Street Suite 1600 Louisville, Kentucky 40202	NON-NNOC CONTAMINATED COAL COMBUSTION BY-PRODUCTS Hazardous Waste Remediation Variance Request Former DuPont Barksdale Works Barksdale, Wisconsin 54806	PROJECT NUMBER: 60660855 DATE: April 2023 FIGURE NUMBER: 5.E

Sampling Diagram:
Chemours Former Barksdale Works

800 Cubic Yard Typical Cell Diagram



Sampling Purpose:
Verify that Land Disposal Restrictions have been met for site-specific NNOCs present due to historical Trinitrotoluene (TNT) manufacturing.

Waste Generation Process:
Post treatment confirmation samples for Land Disposal Restriction (LDR) compliance

Sampling Approach:
Collect one composite soil sample for laboratory analysis for every 400 cubic yards of material in the cell. The sample will be composited in the field from four discrete grab samples for every 400 cubic yards of material in the cell as shown in the diagram above. Composite samples will be analyzed for NNOC target compounds.

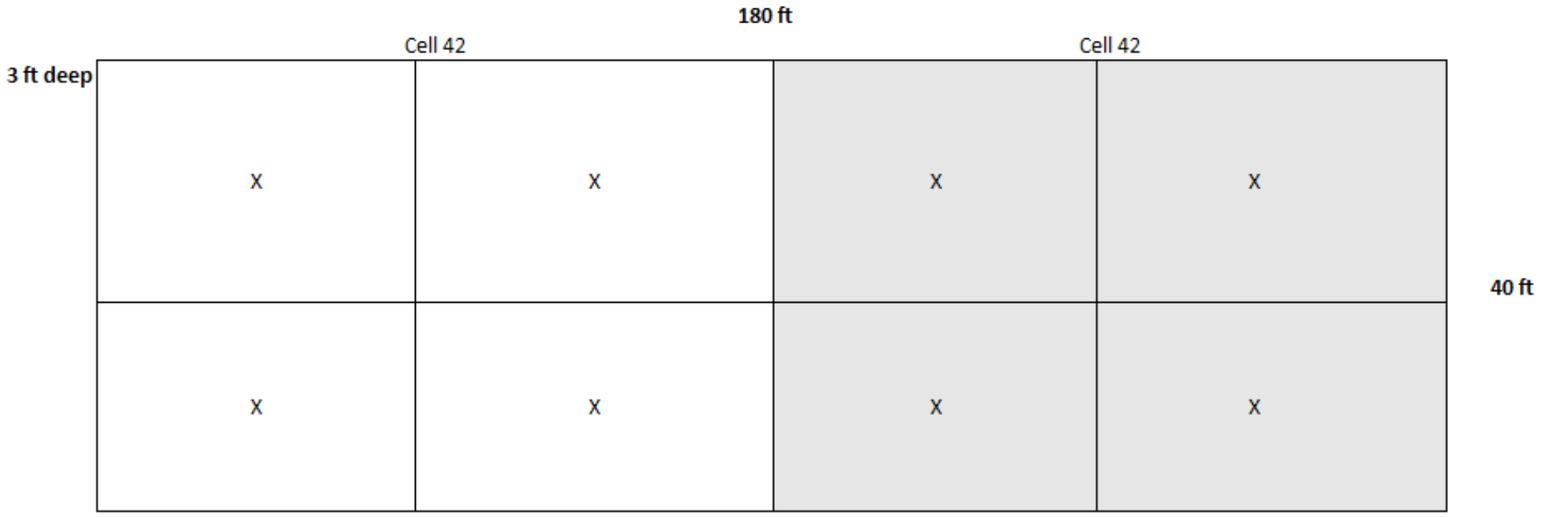
	H-hold, G-grab, C-composite																		
			Sample Type				TCLP					Totals							
Location ID	Samples IDs	Number of Bottles	FS	DUP	MS	MSD	Metals	SVOC	VOC	Herbicides	Pesticides	Herbicides	Pesticides	PCB	Appendix IX Metals	Appendix IX VOC	NNOCs by 8270	Ignitability	Corrosivity	paint filter
C42	RA-YYMMDD-C42A-0-3	1	x														C			
C42	RA-YYMMDD-C42B-0-3	1	x														C			

*A list of individual NNOC is included in Table 1 of the HWRV request.

TASK NUMBER: 22001 DESIGNED BY: L. BRODIN DRAWN BY: L. BRODIN DATA QUALITY CHECK BY: E. BISHOP	AECOM 500 W Jefferson Street Suite 1600 Louisville, Kentucky 40202	NNOC IMPACTED POST-TREATMENT SAMPLING PLAN FOR LDR COMPLIANCE Hazardous Waste Remediation Variance Request Former DuPont Barksdale Works Barksdale, Wisconsin 54806	PROJECT NUMBER: 60660855 DATE: April 2023 FIGURE NUMBER: 6

Sampling Diagram:
Chemours Former Barksdale Works

800 Cubic Yard Typical Cell Diagram



Sampling Purpose:
Verify that Land Disposal Restrictions have been met for site-specific NNOCs present due to historical Trinitrotoluene (TNT) manufacturing and metals from CCBPs

Waste Generation Process:
Post treatment confirmation samples for Land Disposal Restriction (LDR) compliance

Sampling Approach:
Collect one composite soil sample for laboratory analysis for every 400 cubic yards of material in the cell. The sample will be composited in the field from four discrete grab samples for every 400 cubic yards of material in the cell as shown on the diagram above. Composite samples will be analyzed for NNOC target compounds and the eight RCRA metals.

	H-hold, G-grab, C-composite																			
			Sample Type				TCLP					Totals								
Location ID	Samples IDs	Number of Bottles	FS	DUP	MS	MSD	Metals	SVOC	VOC	Herbicides	Pesticides	Herbicides	Pesticides	PCB	Appendix IX Metals	Appendix IX VOC	NNOCs by 8270	Ignitability	Corrosivity	paint filter
C42	RA-YYMMDD-C42A-0-2	2	x				C										C			
C42	RA-YYMMDD-C42B-0-2	2	x				C										C			

*A list of individual NNOC is included in Table 1 of the HWRV request.

TASK NUMBER: 22001 DESIGNED BY: L. BRODIN DRAWN BY: L. BRODIN DATA QUALITY CHECK BY: E. BISHOP	AECOM 500 W Jefferson Street Suite 1600 Louisville, Kentucky 40202	NNOC AND CCBP IMPACTED POST TREATMENT SAMPLING PLAN FOR LDR COMPLIANCE Hazardous Waste Remediation Variance Request Former DuPont Barksdale Works Barksdale, Wisconsin 54806	PROJECT NUMBER: 60660855 DATE: April 2023 FIGURE NUMBER: 7

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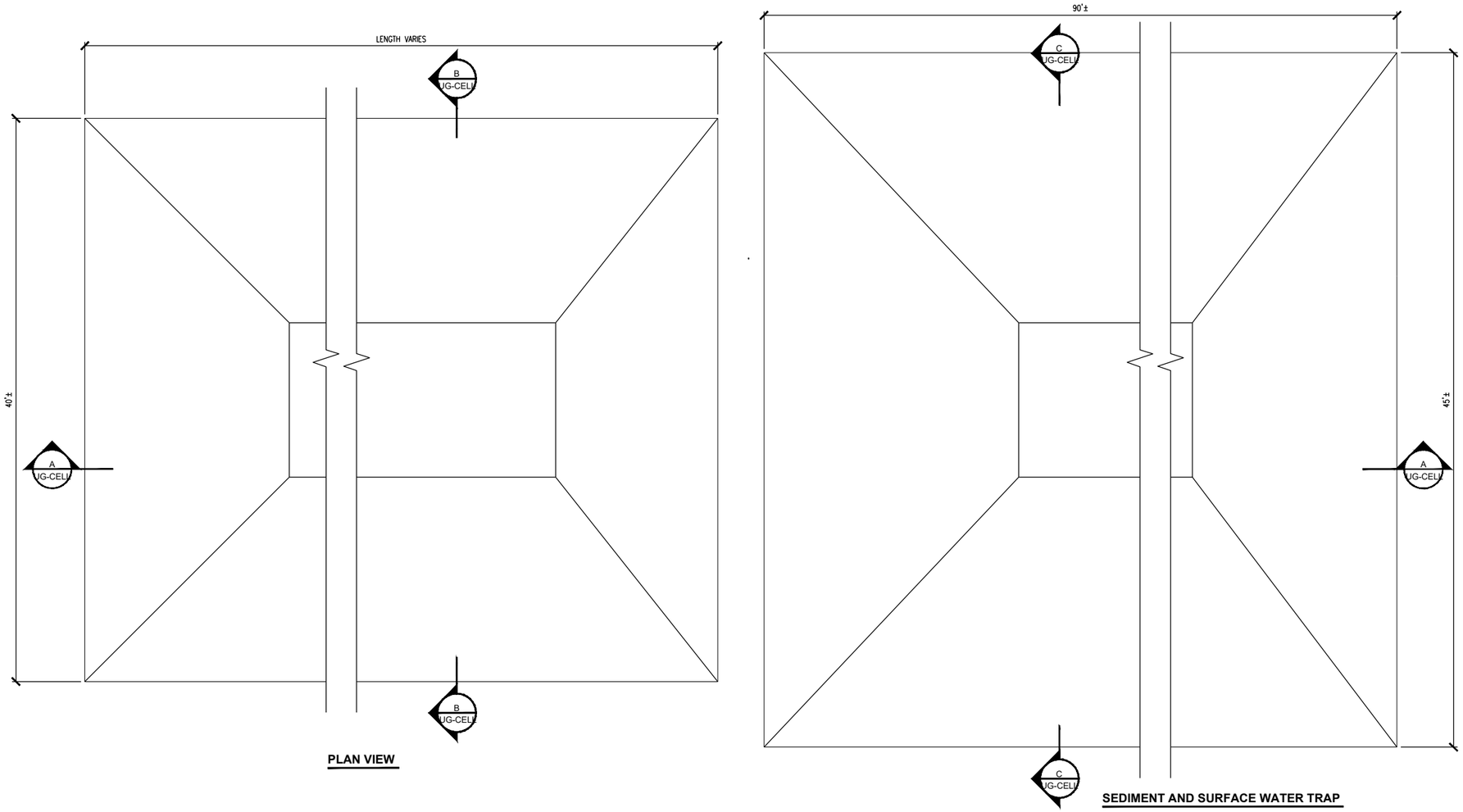
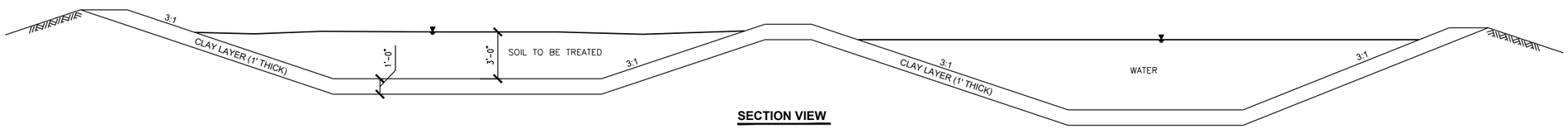


PLAN VIEW

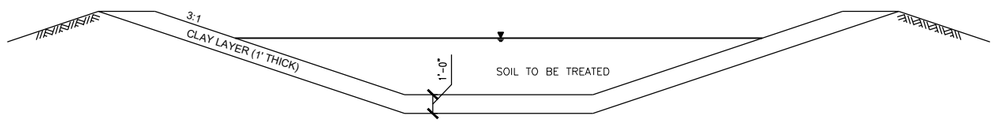
SEDIMENT AND SURFACE WATER TRAP



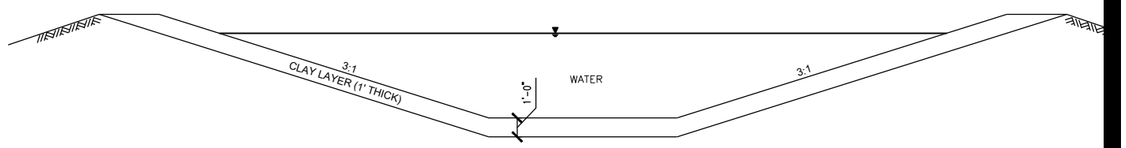
SECTION VIEW

SEDIMENT AND SURFACE WATER TRAP

A UG-CELL | UNHEATED HYDROLYSIS CELL SECTION
1/4" = 1'-0"



B UG-CELL | UNHEATED HYDROLYSIS CELL SECTION
1/4" = 1'-0"



C UG-CELL | SEDIMENT AND SURFACE WATER TRAP SECTION
1/4" = 1'-0"

AECOM

PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

CLIENT

CHEMOURS FORMER BARKSDALE WORKS

72315 HIGHWAY 13
ASHLAND, WISCONSIN 54806

CONSULTANT

AECOM

AECOM
500 W. JEFFERSON ST.
LOUISVILLE, KENTUCKY 40202

www.aecom.com

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	03/28/23	ADD UNHEATED HYD. CELL

KEY PLAN

PROJECT NUMBER

60660855

SHEET TITLE

UNHEATED HYDROLYSIS CELL - CONCEPTUAL DESIGN

SHEET NUMBER

FIGURE 8

Appendices

Appendix A

Photographs of Pilot Test Cells

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 1 / Date: 10/24/2022		
Direction Photo Taken: Northwest		
Description: Cells C01 – 04		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 2 / Date: 10/24/2022		
Direction Photo Taken: South		
Description: Cell C05		

Client Name: Chemours		Site Location: Barksdale, WI	Project No. 60663958
Photo No. 3	**Date:** 10/24/2022		
Direction Photo Taken: Northwest			
Description: Cell C06			

Client Name: Chemours		Site Location: Barksdale, WI	Project No. 60663958
Photo No. 4	**Date:** 10/24/2022		
Direction Photo Taken: Panorama (West-South)			
Description: Cells C07, C14, & C15			

Client Name: Chemours		Site Location: Barksdale, WI	Project No. 60663958
Photo No. 5	**Date:** 10/24/2022		
Direction Photo Taken: South			
Description: Cell C08			

Client Name: Chemours		Site Location: Barksdale, WI	Project No. 60663958
Photo No. 6	**Date:** 10/24/2022		
Direction Photo Taken: West			
Description: Cell C09			

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 7 / Date: 10/24/2022		
Direction Photo Taken: Southeast		
Description: Cell C10		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 8 / Date: 10/24/2022		
Direction Photo Taken: West		
Description: Cell C11		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 9 / Date: 10/24/2022		
Direction Photo Taken: Southwest		
Description: Cell C12		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 10 / Date: 10/24/2022		
Direction Photo Taken: East		
Description: Cell C13		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 11 / Date: 10/24/2022		
Direction Photo Taken: West		
Description: Cell C17		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 12 / Date: 10/24/2022		
Direction Photo Taken: North		
Description: Area of former Cell C19, which was removed in 2022.		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 13 / Date: 10/24/2022		
Direction Photo Taken: Northeast		
Description: Cell C20		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 14 / Date: 10/24/2022		
Direction Photo Taken: Southeast		
Description: Cell C21		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 15 / **Date:** 10/24/2022		
Direction Photo Taken: North		
Description: Cell C22		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 16 / **Date:** 10/24/2022		
Direction Photo Taken: East		
Description: Cell C24		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 17 / Date: 10/24/2022		
Direction Photo Taken: East		
Description: Cell C25		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 18 / Date: 11/1/2022		
Direction Photo Taken: Down		
Description: Aerial photo of Cell C26.		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 19 / Date: 10/24/2022		
Direction Photo Taken: East		
Description: Cell C27		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 20 / Date: 10/24/2022		
Direction Photo Taken: Panorama (East-South)		
Description: Cell C28		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 21 / Date: 10/24/2022		
Direction Photo Taken: East		
Description: Cell C29		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 22 / Date: 10/24/2022		
Direction Photo Taken: Southwest		
Description: Cell C30		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 23 / **Date:** 10/24/2022		
Direction Photo Taken: East		
Description: Cell C31		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 24 / **Date:** 10/24/2022		
Direction Photo Taken: East		
Description: Cell C32		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 25 / Date: 10/24/2022		
Direction Photo Taken: Southwest		
Description: Cell C33		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 26 / Date: 10/24/2022		
Direction Photo Taken: Southeast		
Description: Cell C34		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 27 / Date: 10/24/2022		
Direction Photo Taken: South		
Description: Cell C35		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 28 / Date: 10/24/2022		
Direction Photo Taken: South		
Description: Cell C36		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 29 / Date: 10/24/2022		
Direction Photo Taken: South		
Description: Cell C37		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 28 / Date: 10/24/2022		
Direction Photo Taken: South		
Description: Cell C38		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 29 / Date: 10/24/2022		
Direction Photo Taken: South		
Description: Cell C39		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 30 / Date: 10/04/2022		
Direction Photo Taken: Down		
Description: Aerial view of Pilot Heating Cell C40 area.		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 31 / Date: 10/24/2022		
Direction Photo Taken: South		
Description: Cell C41		

Client Name: Chemours	Site Location: Barksdale, WI	Project No. 60663958
Photo No. 32 / Date: 10/19/2022		
Direction Photo Taken: West		
Description: Aerial view of Use Area PAH.		

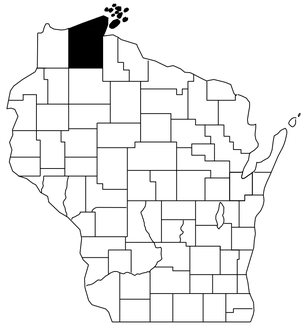
Appendix B

Heated Cell C40 As-Built Drawings

FORMER BARKSDALE WORKS

TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

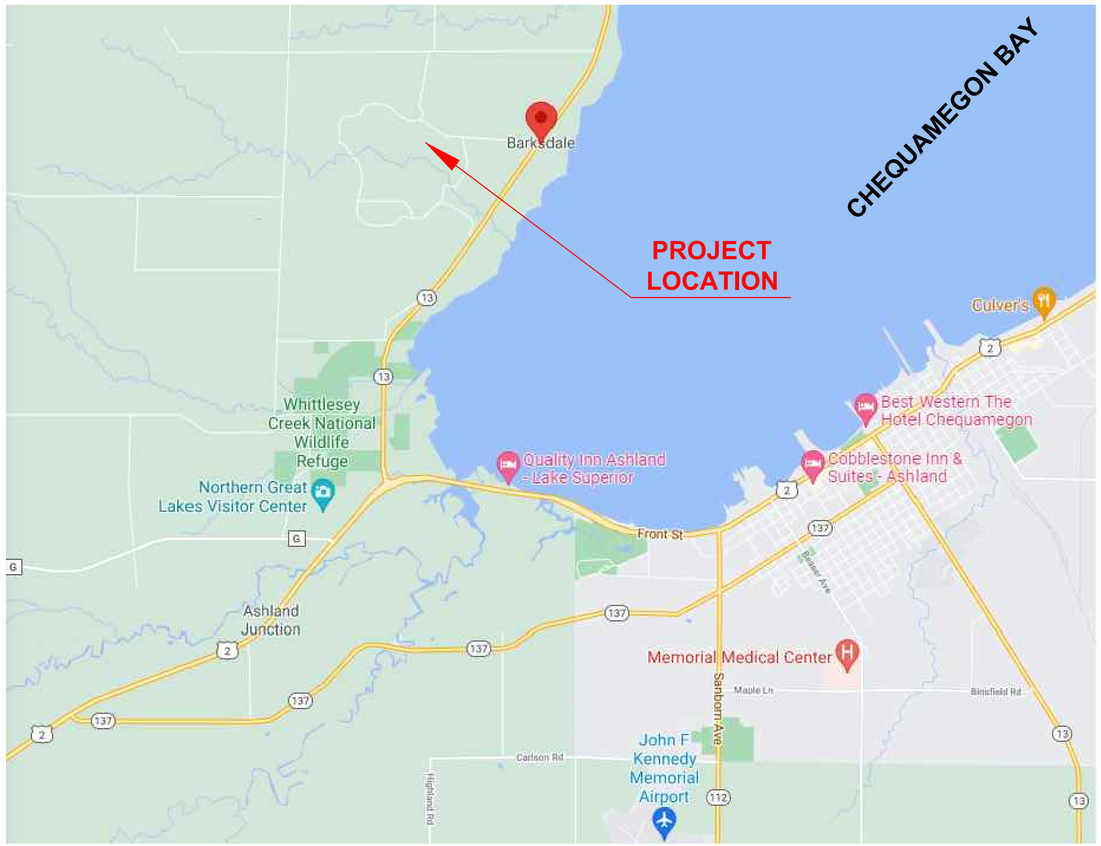
AS-BUILT SET
MAY 5, 2022



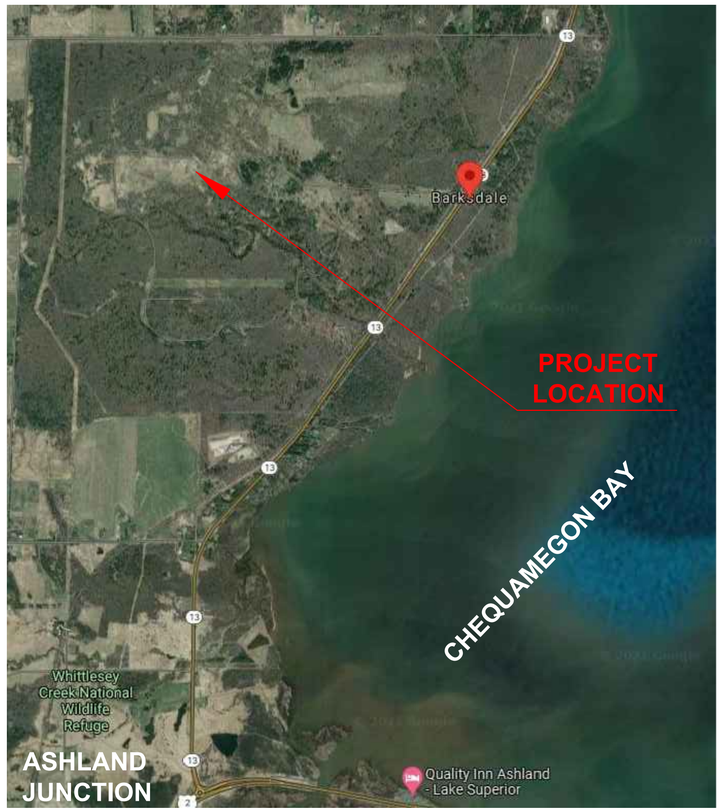
FORMER BARKSDALE WORKS
72315 HIGHWAY 13
Ashland, WI 54806

INDEX OF DRAWINGS

REVISION	NAME	DESCRIPTION
8	G-1	TITLE SHEET, INDEX OF DRAWING AND PROJECT LOCATION MAP
~~5~~	~~P-1 REMOVED~~	~~HEATER CAN LAYOUT PLAN & SECTIONS~~
8	P-1 ALTERNATE	HEATER CAN LAYOUT PLAN & SECTIONS
5	P-2	WATER DELIVERY, PASSIVE VENTING AND ACTIVE STEAM EXTRACTION PIPING
5	P-3	HEATER CAN AND PRESSURE WATER FEED SUPPORT & STEEL PLATE PLANS
5	S-1	STRUCTURAL PLANS & DETAILS
4	S-2	STRUCTURAL PLANS & DETAILS
5	S-3	STRUCTURAL PLANS & DETAILS
5	S-4	STRUCTURAL PLANS & DETAILS
4	S-5	STEEL PLATE & HEATER CAN SUPPORT PLANS & DETAILS



VICINITY MAP



AERIAL LOCATION MAP

AECOM

PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

CLIENT

CHEMOURS FORMER BARKSDALE WORKS

72315 HIGHWAY 13
ASHLAND, WISCONSIN 54806

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REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION
8	03/01/22	THERMOCOUPLES ADDED
7	12/14/21	AS-BUILT REVISIONS
6	10/15/21	AS-BUILT SET
5	09/23/21	ADDED REV 5 BLOCK TO COVER
4	09/17/21	ADDED REV 4 BLOCK TO COVER
3	08/23/21	ADDED REV 3 BLOCK TO COVER
2	08/20/21	ADDED REV 2 BLOCK TO COVER
1	08/17/21	ISSUED FOR CONSTRUCTION

KEY PLAN

PROJECT NUMBER

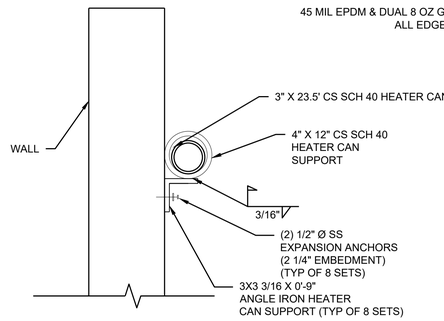
60650614

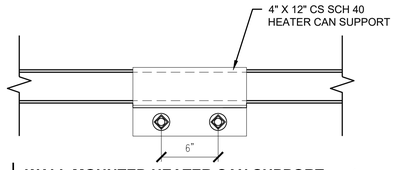
SHEET TITLE

TITLE SHEET, INDEX OF DRAWINGS AND PROJECT LOCATION MAP

SHEET NUMBER

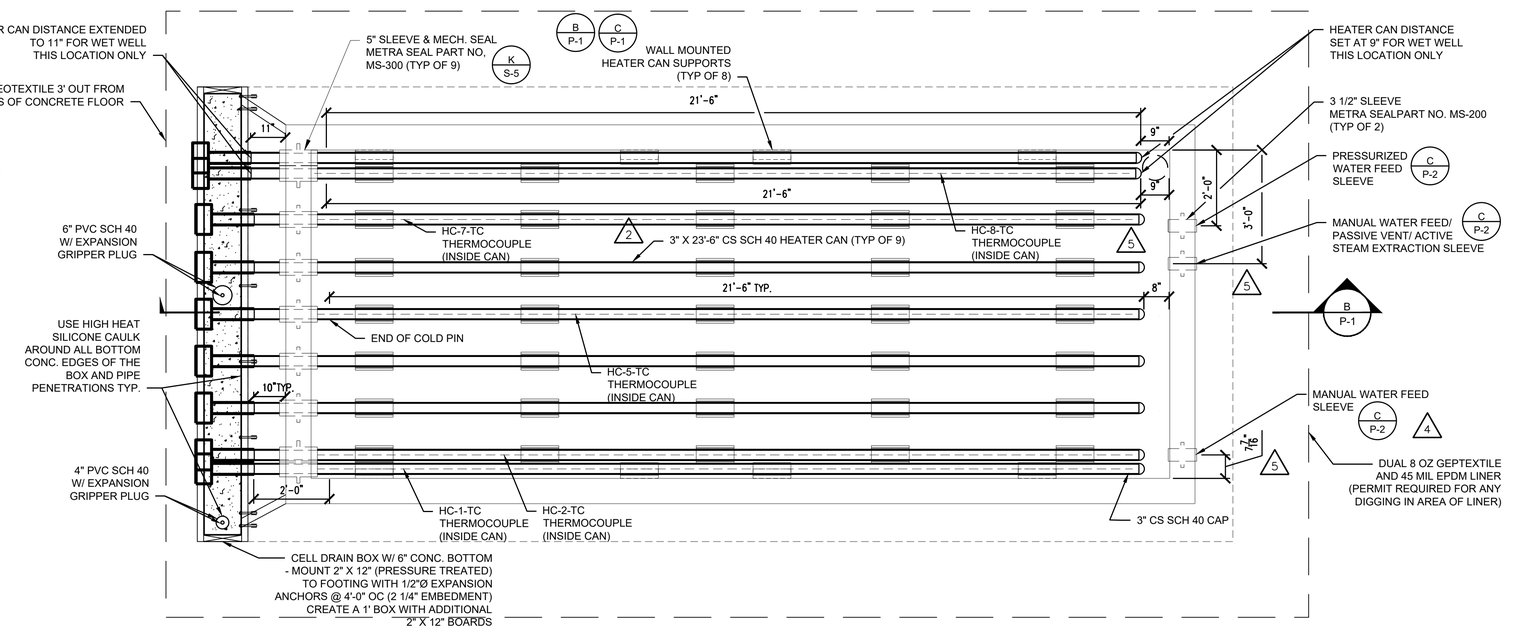
G-1





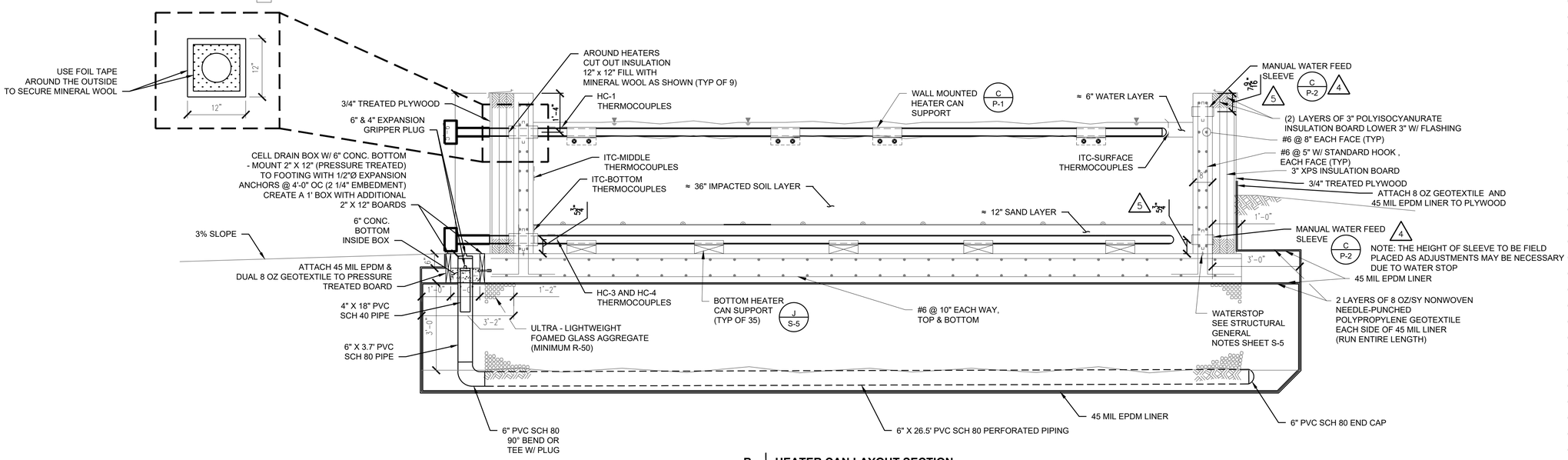
C | WALL MOUNTED HEATER CAN SUPPORT (P-1) — 1 1/2" = 1'-0" (3)

1 1/2 0 1 1/2
SCALE: 1 1/2" = 1'-0"



A | HEATER CAN LAYOUT PLAN (P-1) — 1/2" = 1'-0"

1 0 1 2 3 4 5
SCALE: 1/2" = 1'-0" (3)



B | HEATER CAN LAYOUT SECTION (P-1) — 1/2" = 1'-0"

1 0 1 2 3 4 5
SCALE: 1/2" = 1'-0" (3)

NOTE: ALL MATERIALS AND EQUIPMENT (TANKS ETC.) CAN BE REPLACED WITH EQUIVALENT MATERIALS AND EQUIPMENT, ONCE APPROVED BY ENGINEER.

6 7 8

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PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

CLIENT

CHEMOURS FORMER BARKSDALE WORKS

72315 HIGHWAY 13
ASHLAND, WISCONSIN 54806

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I/R	DATE	DESCRIPTION
8	03/01/22	THERMOCOUPLES ADDED
7	12/14/21	AS-BUILT REVISIONS
6	10/15/21	AS-BUILT SET
5	09/23/21	SLEEVE DIM. ADDED
4	09/17/21	ADD / ADJUST TOP PIPE SLEEVE
3	08/23/21	ADD SCALE BARS
2	08/20/21	REV HEATER CAN PIPE LENGTH
1	08/17/21	ISSUED FOR CONSTRUCTION

KEY PLAN

PROJECT NUMBER

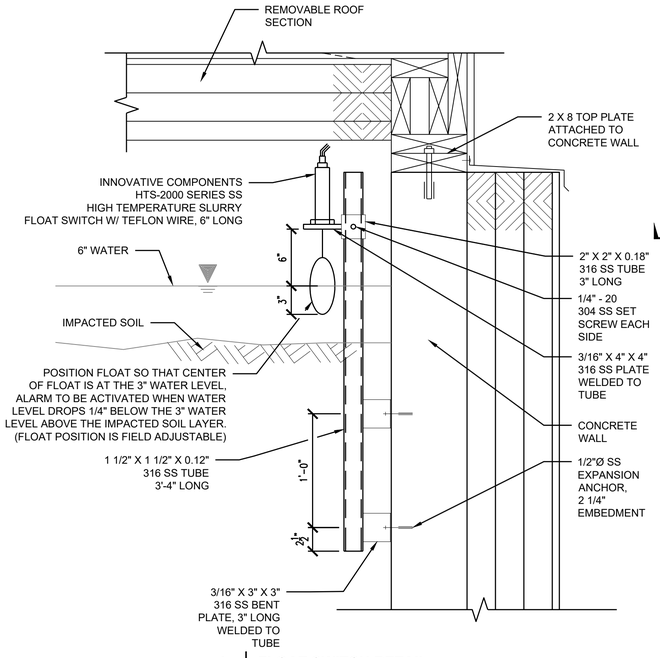
60650614

SHEET TITLE

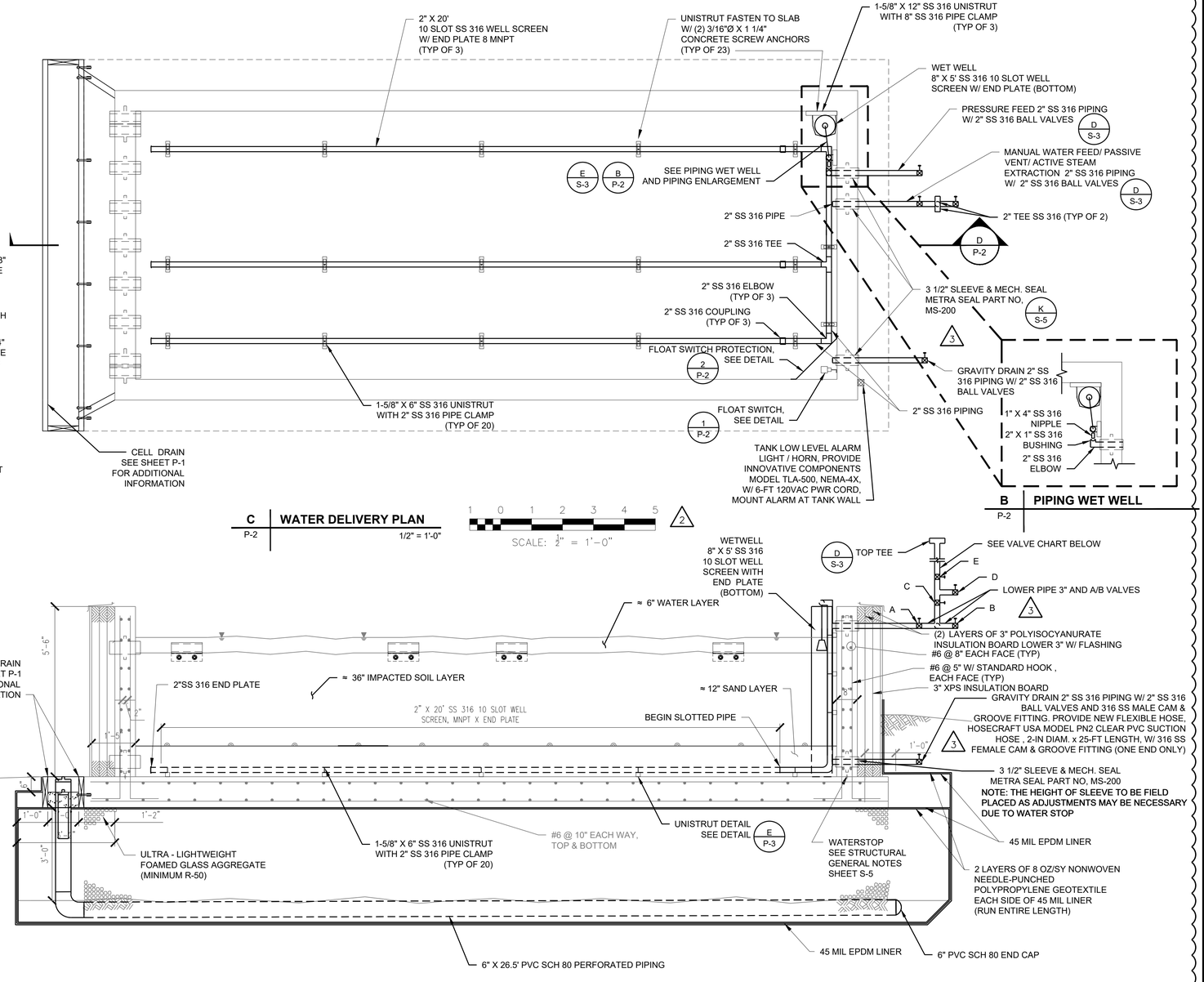
HEATER CAN LAYOUT PLAN & SECTIONS

SHEET NUMBER

P-1 ALTERNATE



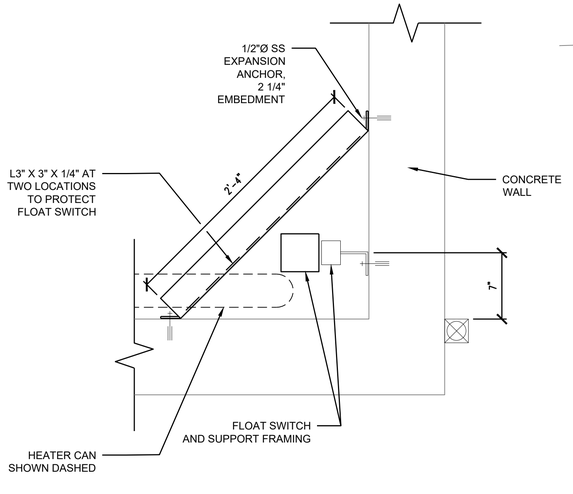
1 | FLOAT SWITCH DETAIL
P-2 — 1-1/2" = 1'-0"



B | PIPING WET WELL
P-2

C | WATER DELIVERY PLAN
P-2 — 1/2" = 1'-0"

SCALE: ½" = 1'–0"



2 | FLOAT SWITCH PROTECTION
P-2 — 1-1/2" = 1'-0"

D | PRESSURE WATER FEED LAYOUT SECTION
P-2 — 1/2" = 1'-0"

SCALE: ½" = 1'–0"

MANUAL VALVE POSITION FOR MANUAL WATER FEED/ PASSIVE VENT/ ACTIVE STEAM EXTRACTION

VALVE	A	B	C	D	E
MANUAL WATER FEED	O	O	C	C	C
PASSIVE VENT	O	C	O	C	O
ACTIVE STEAM COLLECTOR	O	C	O	O	C

O = OPEN C = CLOSED

VALVE CHART

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PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

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REGISTRATION

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5	12/14/21	AS-BUILT REVISIONS
4	10/15/21	AS-BUILT SET
3	09/17/21	ADD GRV. DRN. / LOW WW PIPING
2	08/23/21	ADD SCALE BARS
1	08/17/21	ISSUED FOR CONSTRUCTION
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

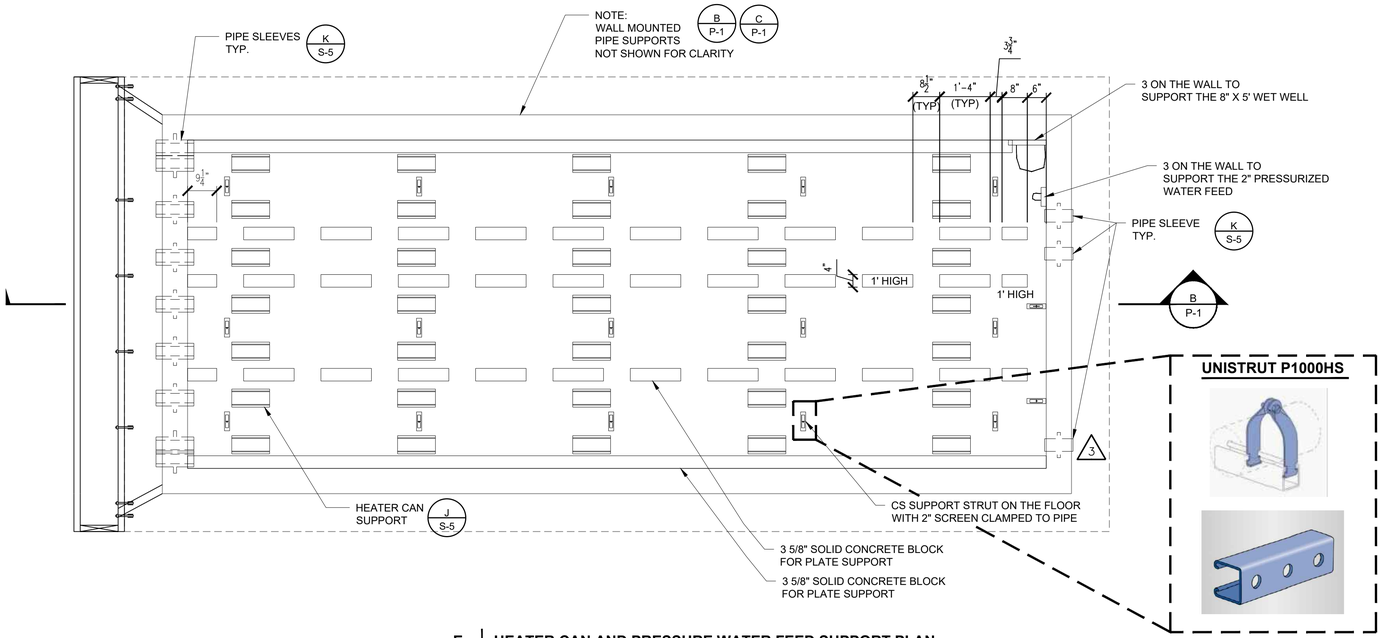
60650614

SHEET TITLE

WATER DELIVERY, PASSIVE VENTING AND ACTIVE STEAM EXTRACTION PIPING

SHEET NUMBER

P-2



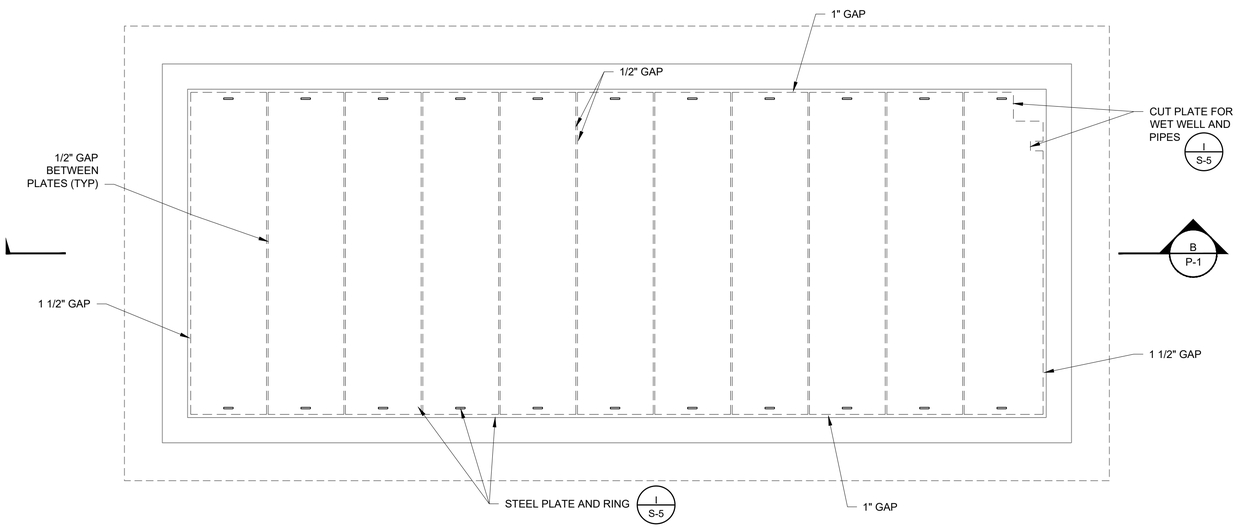
E P-3 **HEATER CAN AND PRESSURE WATER FEED SUPPORT PLAN**

1/2" = 1'-0"

1 0 1 2 3 4 5

SCALE: ½" = 1'-0"

2



F P-3 **STEEL PLATE PLAN**

1/2" = 1'-0"

1 0 1 2 3 4 5

SCALE: ½" = 1'-0"

2

4 5

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5	12/14/21	AS-BUILT REVISIONS
4	10/15/21	AS-BUILT SET
3	09/17/21	ADD PIPE SLEEVE
2	08/23/21	ADD SCALE BARS
1	08/17/21	ISSUED FOR CONSTRUCTION
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

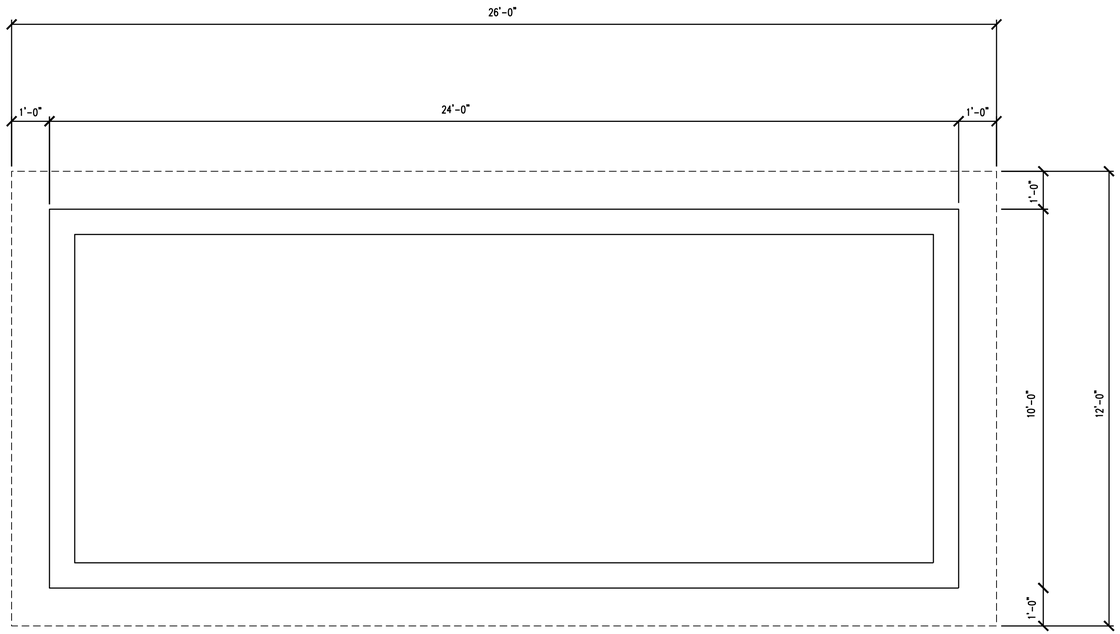
60650614

SHEET TITLE

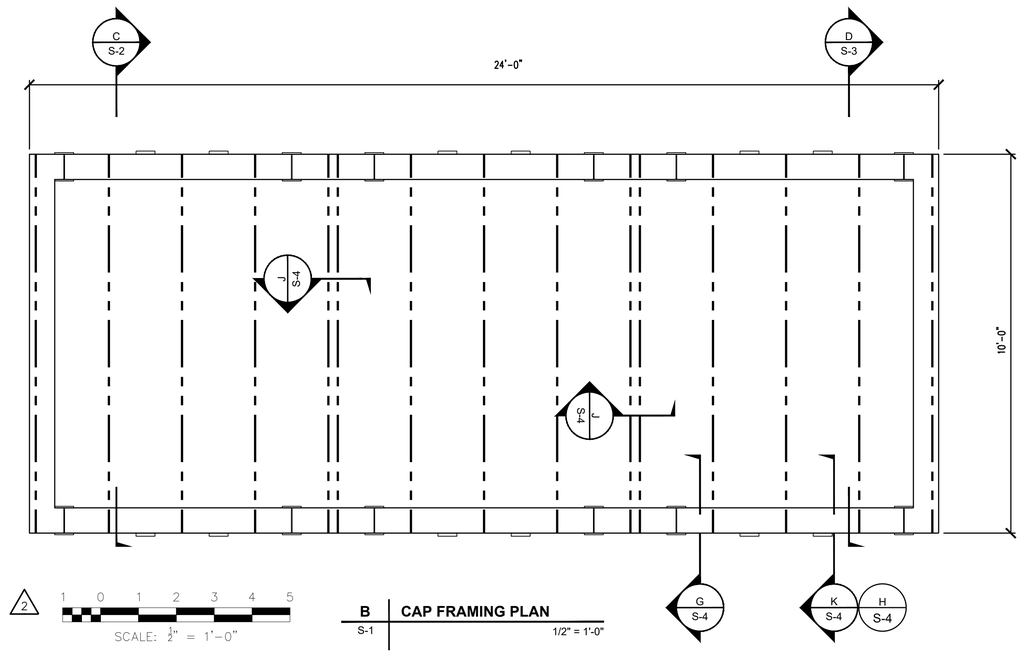
HEATER CAN AND PRESSURE WATER FEED SUPPORT & STEEL PLATE PLANS

SHEET NUMBER

P-3



A | **FOUNDATION PLAN** (S-1) — 1/2" = 1'-0"



B | **CAP FRAMING PLAN** (S-1) — 1/2" = 1'-0"

3 4 5

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5	MAY 2022	AS-BUILT REVISIONS
4	12/14/21	AS-BUILT REVISIONS
3	10/15/21	AS-BUILT SET
2	08/23/21	ADD SCALE BARS
1	08/17/21	ISSUED FOR CONSTRUCTION

KEY PLAN

PROJECT NUMBER

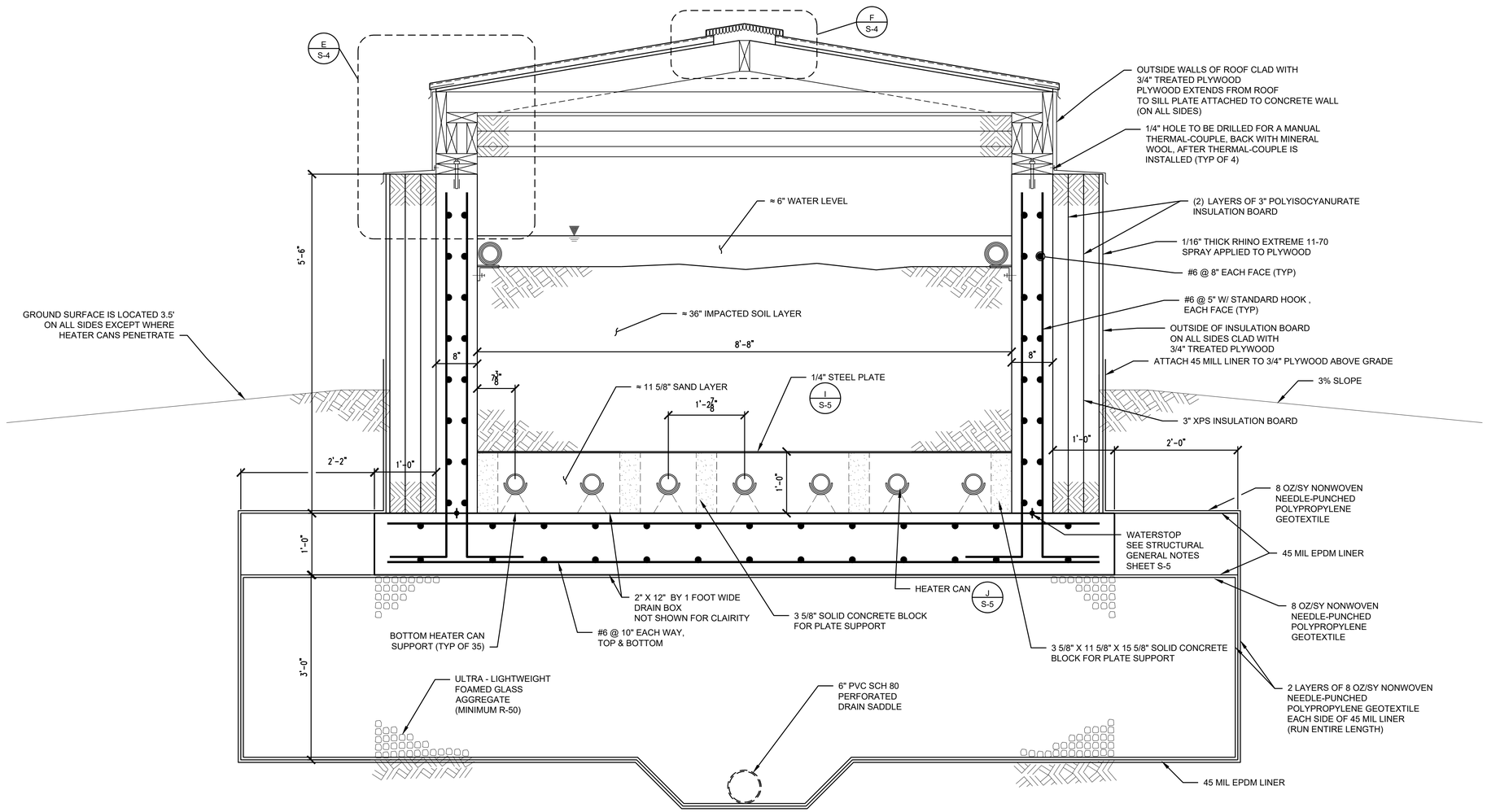
60650614

SHEET TITLE

STRUCTURAL PLANS & DETAILS

SHEET NUMBER

S-1



AERO AGGREGATES - UL-FGA G15 R VALUES			
Thickness	**As-Received**	**Submerged**	**Drained**
36 in	92.88	51.48	84.6

C S-2 **CROSS SECTION** 1" = 1'-0"

1 0 1 2
SCALE: 1" = 1'-0"

2 3 4

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PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

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3	10/15/21	AS-BUILT SET
2	08/23/21	ADD SCALE BARS
1	08/17/21	ISSUED FOR CONSTRUCTION
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

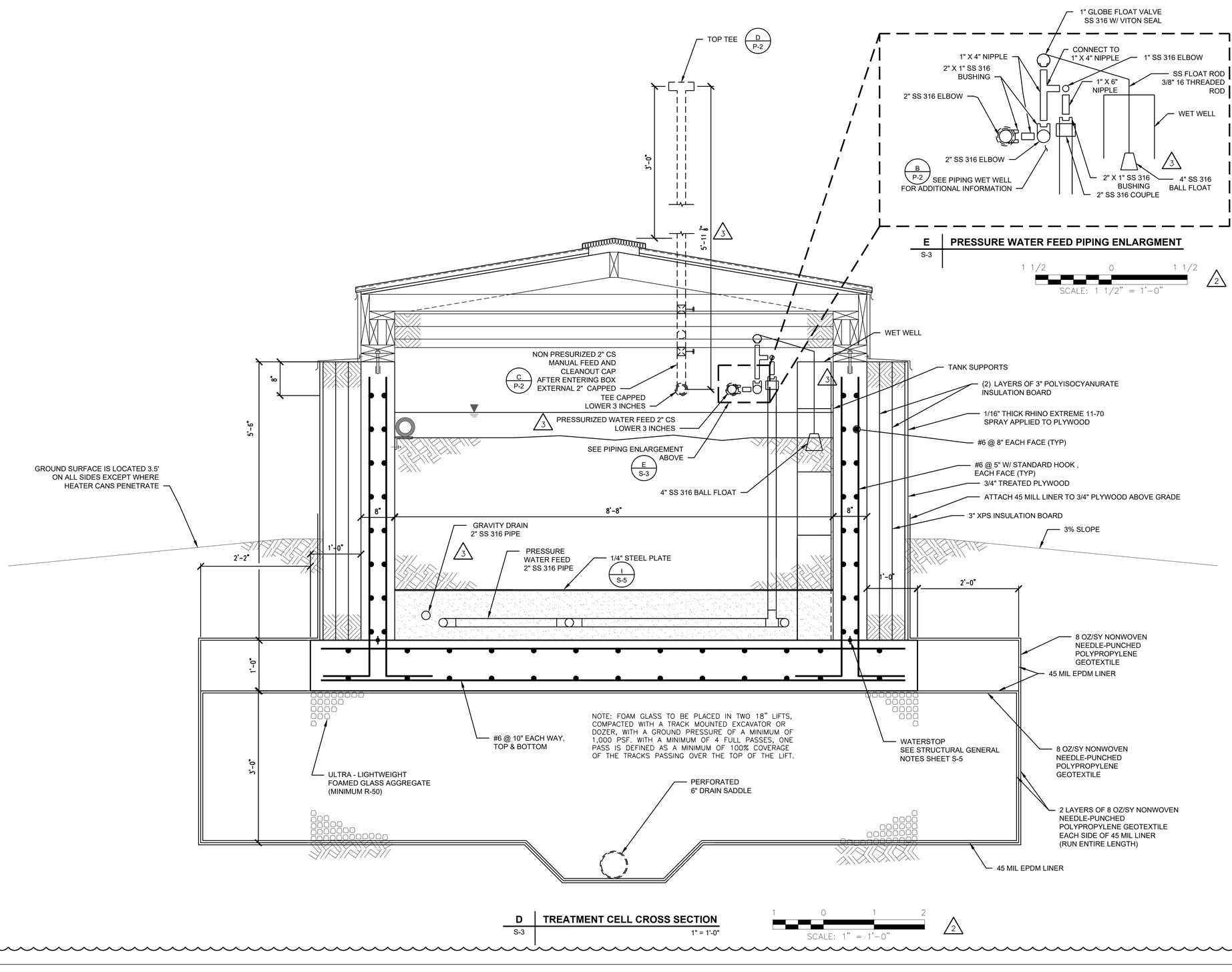
60650614

SHEET TITLE

STRUCTURAL PLANS & DETAILS

SHEET NUMBER

S-2



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Last Plotted: 2022-07-26
Last saved by: LAHAYEC
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FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

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ISSUE/REVISION

5	12/12/21	AS-BUILT REVISIONS
4	10/15/21	AS-BUILT SET
3	09/07/21	LOWER WET WELL TOP 3"
2	08/23/21	ADD SCALE BARS
1	08/17/21	ISSUED FOR CONSTRUCTION
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

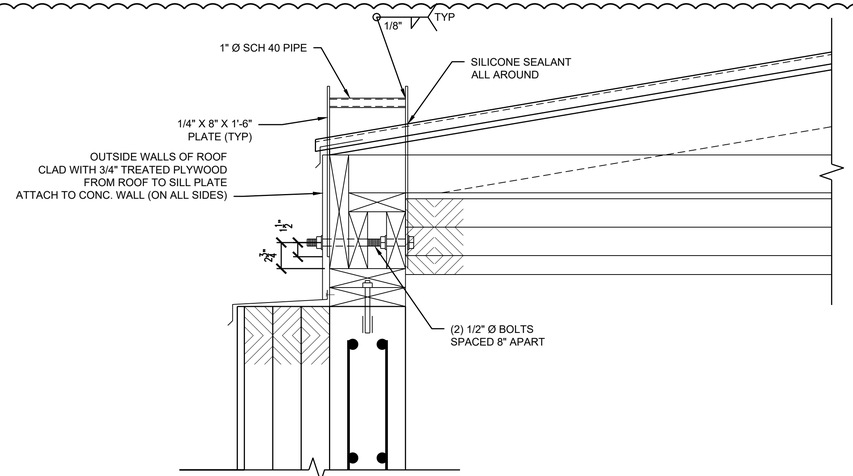
60650614

SHEET TITLE

STRUCTURAL PLANS & DETAILS

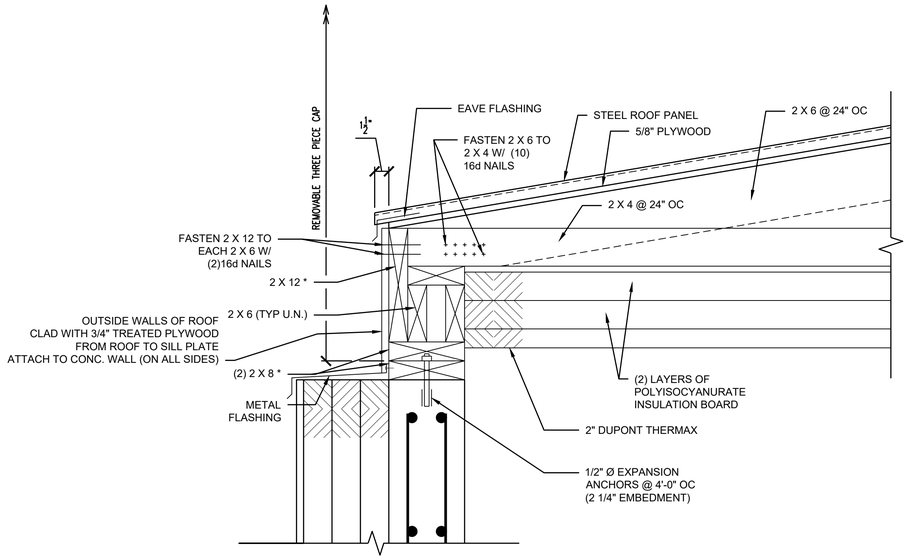
SHEET NUMBER

S-3



G | **DETAIL AT LIFTING DEVICE** — S-4 — 1 1/2" = 1'-0"

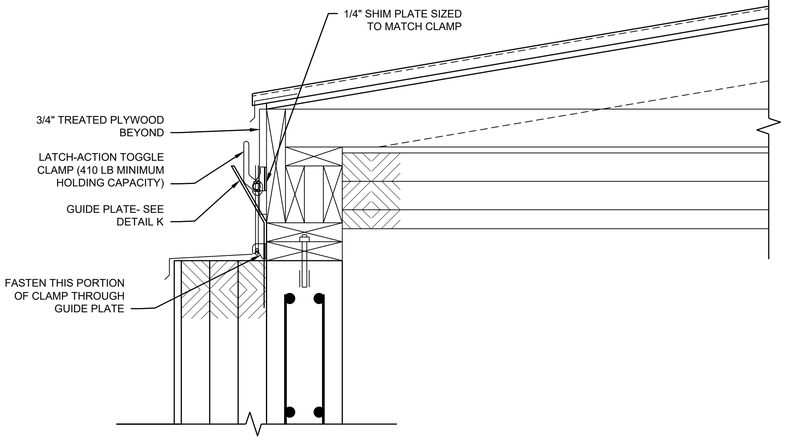
SCALE: 1 1/2" = 1'-0" (2)



* PRESSURE TREATED

E | **EAVE DETAIL** — S-4 — 1 1/2" = 1'-0"

SCALE: 1 1/2" = 1'-0" (2)

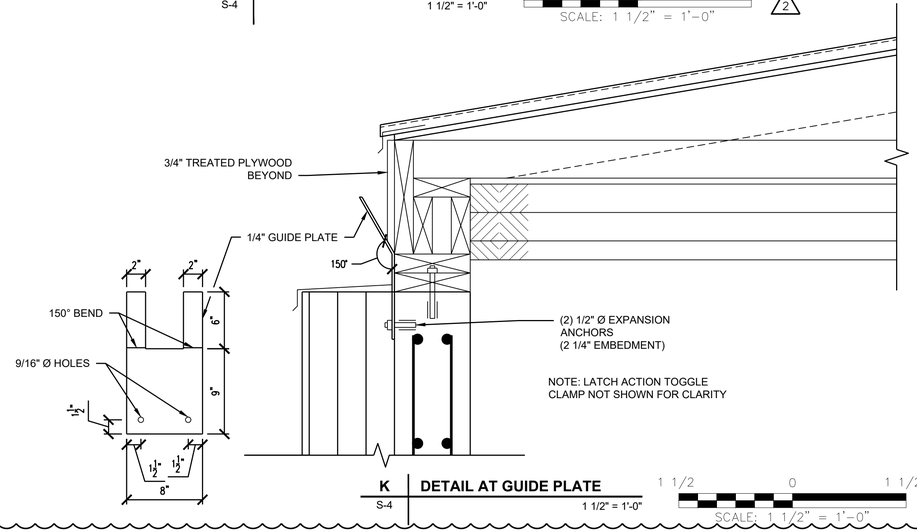


H | **DETAIL AT TIE-DOWN** — S-4 — 1 1/2" = 1'-0"

SCALE: 1 1/2" = 1'-0" (2)

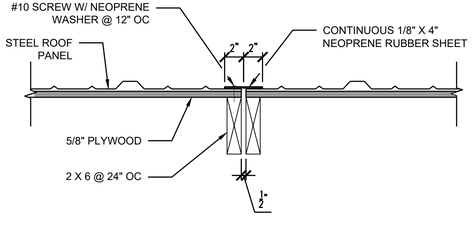
F | **RIDGE DETAIL** — S-4 — 1 1/2" = 1'-0"

SCALE: 1 1/2" = 1'-0" (2)



K | **DETAIL AT GUIDE PLATE** — S-4 — 1 1/2" = 1'-0"

SCALE: 1 1/2" = 1'-0"



J | **DETAIL AT CAP JOINT** — S-4 — 1 1/2" = 1'-0"

SCALE: 1 1/2" = 1'-0" (2) (3) (4) (5)

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PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

CLIENT

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3	10/15/21	AS-BUILT SET
2	08/23/21	ADD SCALE BARS
1	08/17/21	ISSUED FOR CONSTRUCTION
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

60650614

SHEET TITLE

STRUCTURAL PLANS & DETAILS

SHEET NUMBER

S-4

STRUCTURAL GENERAL NOTES

GENERAL

1. THE STRUCTURAL GENERAL NOTES APPLY TO THE ENTIRE PROJECT UNLESS SPECIFICALLY STATED OTHERWISE.

DESIGN CRITERIA

1. DESIGN AND CONSTRUCT IN CONFORMANCE WITH THE WISCONSIN COMMERCIAL BUILDING CODE, LATEST EDITION
2. SUPERIMPOSED DESIGN LOADS:
   - A. ROOF SNOW LOAD:
     - 1. GROUND SNOW LOAD, Pg 60 PSF
     - 2. FLAT ROOF SNOW LOAD, Pf 41 PSF
     - 3. SNOW EXPOSURE FACTOR, Ce 1.0
     - 4. IMPORTANCE FACTOR, I 0.8
     - 5. THERMAL FACTOR, Ct 1.2
   - B. WIND LOAD:
     - 1. BASIC WIND SPEED, V 105 MPH, ASCE 7-10
     - 3. WIND EXPOSURE C
     - 4. INTERNAL PRESSURE COEFF, GCpi +/- 0.18
3. SEISMIC DE11111IGN DATA:
   - A. ZIP CODE 54806
   - B. IMPORTANCE FACTOR, I 1.0
   - C. MAPPED SPECTRAL RESPONSE ACCELERATIONS:
     - 1. Ss 0.05
     - 2. S1 0.02
   - D. SITE CLASS D
   - E. SPECTRAL RESPONSE COEFFICIENTS:
     - 1. SDS

F. SEISMIC DESIGN CATEGORY A

FOUNDATIONS

1. NET SOIL BEARING CAPACITY 2000 PSF ASSUMED
2. TO MINIMIZE LATERAL FORCES AGAINST THE STRUCTURE DUE TO WEDGING ACTION OF THE SOIL, BEGIN COMPACTION OF EACH LAYER AT THE STRUCTURE WALL.

CONCRETE

1. REINFORCING STEEL:
   - A. DEFORMED BARS ASTM A615-GRADE 60
   - B. WELDED WIRE REINFORCEMENT (WWR) ASTM A185
2. UNLESS OTHERWISE SHOWN PROVIDE COVER FOR REINFORCEMENT AS FOLLOWS:
   - A. CAST AGAINST:
     - 1. EARTH 3 INCHES
     - 2. MUD SLAB 2 INCHES
   - B. EXPOSED TO EARTH, WEATHER OR WATER:
     - 1. WALLS 2 INCHES
     - 2. FOOTING/BASE SLAB:
       - FORMED SURFACES 2 INCHES
       - TOP OF FOOTING/BASE SLAB 2 INCHES
3. PLACE DOWELS BEFORE PLACING CONCRETE.
4. DO NOT WELD OR FIELD BEND REINFORCING BARS, EXCEPT AS APPROVED BY ENGINEER.
5. CONCRETE:
   - A. REQUIRED 28 DAY COMPRESSIVE STRENGTH: F'C=4,500 PSI
   - B. REQUIRED SLUMP: 4 INCHES
     - REQUIRED SLUMP (WITH WATER REDUCER): 6 INCHES
     - REQUIRED SLUMP (WITH HIGH RANGE WATER REDUCER): 8 INCHES
   - C. REQUIRED AIR CONTENT: 6 +/- 1-1/2 PERCENT
   - D. USE WATER REDUCER OR HIGH RANGE WATER REDUCER IN CONCRETE FOR WALLS.
   - E. VIBRATE CONCRETE TO PREVENT HONEYCOMBING.
   - F. PROVIDE CONCRETE MIX DESIGNS WITH LABORATORY 7-DAY AND 28-DAY COMPRESSIVE TESTS.
   - G. RECORD TRUCK AND LOAD NUMBER FROM THE DELIVERY BATCH TICKET, THE CONCRETE PLACEMENT LOCATION OF EACH SPECIMEN, THE DATE, CONCRETE STRENGTH, SLUMP, AIR CONTENT AND TEMPERATURE.
   - H. CAST A MINIMUM OF ONE SET OF 4 TEST SPECIMENS, EACH A 4 INCH DIAMETER BY 8 INCH LONG CYLINDER, FOR EACH 50 CUBIC YARDS OF CONCRETE PLACED, BUT NOT LESS THAN ONE SET PER DAY.
   - I. TEST ONE CYLINDER AT 7 DAYS FOR INFORMATION, TEST 2 CYLINDERS AT 28 DAYS FOR ACCEPTANCE, AND HOLD ONE RESERVE CYLINDER FOR VERIFICATION. STRENGTH ACCEPTANCE WILL BE BASED ON THE AVERAGE STRENGTH OF THE 2 CYLINDERS TESTED AT 28 DAYS.
6. WATERSTOPS SHALL BE EXTRUDED FROM A THERMOPLASTIC VULCANIZATE (TPV) COMPOUND AND SHALL BE FLAT RIBBED TYPE, 6 INCHES WIDE AND 3/8-INCHES THICK.
7. UNLESS OTHERWISE NOTED, CONSTRUCTION JOINTS SHOWN ARE OPTIONAL. CONSTRUCTION JOINTS NOT SHOWN ON THE DRAWINGS SHALL BE APPROVED BY ENGINEER.
8. BEFORE CONCRETE IS PLACED, CONSTRUCTION JOINTS SHALL BE CLEANED AND LAITANCE REMOVED AND SURFACE WETTED. STANDING WATER SHALL BE REMOVED.
9. CHAMFER EXPOSED EDGES OF CONCRETE 3/4" UNLESS OTHERWISE NOTED.

METALS

1. STRUCTURAL STEEL SHAPES:
   - A. L SHAPES ASTM A36
   - B. PLATES AND BARS ASTM A36
2. CONNECTION BOLTS FOR WOOD MEMBERS ASTM A307, GALVANIZED
3. WELD STRUCTURAL STEEL WITH E70 ELECTRODES IN ACCORDANCE WITH A.W.S. REQUIREMENTS.

MetraSeal Selection Charts

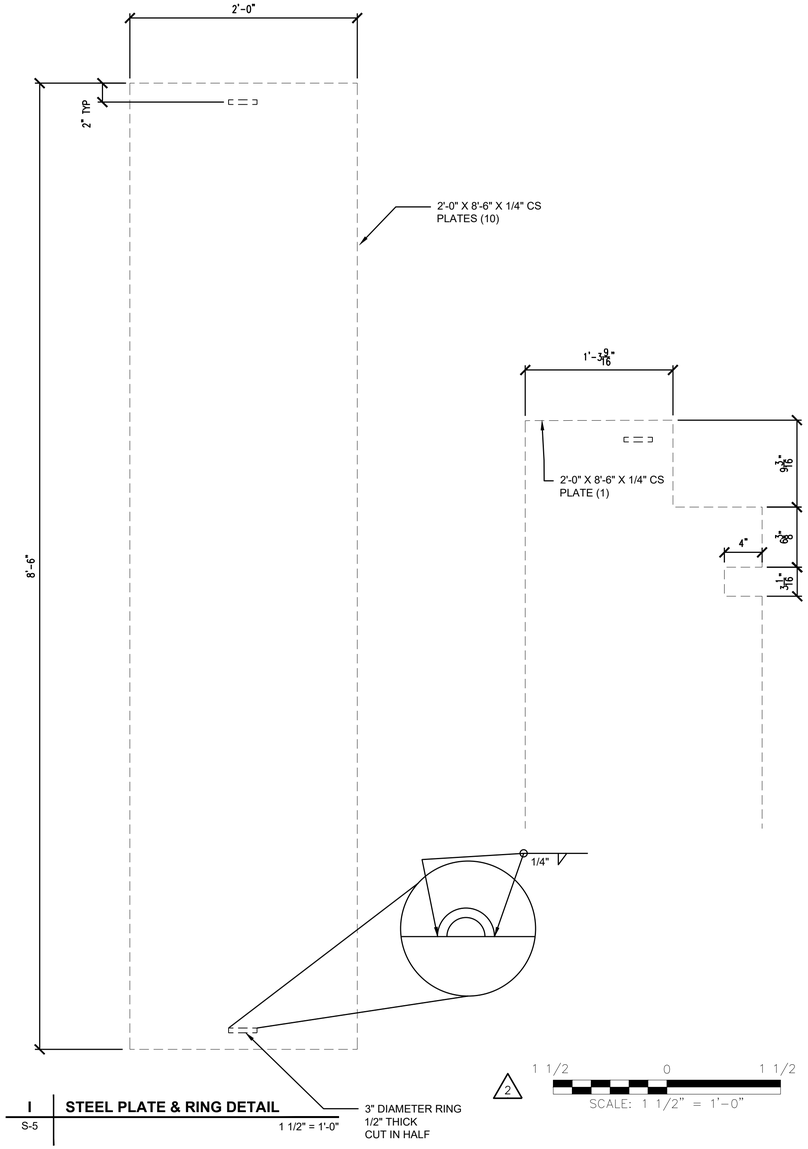
Sizing for Steel PVC and CPVC pipe

Nominal Pipe Size	Actual Pipe O.D.	Standard Weight Steel or PVC Pipe Sleeve*				Cast or core bit drilled hole*		
		Sleeve Nominal Pipe Size	Sleeve Actual I.D.	MetraSeal Model no.	Number of links required	Hole I.D.	MetraSeal Model no.	Number of links required
1/2"	0.840"	2"	2.067"	MS-200	4	2.0"	MS-200	4
3/4"	1.050"	2-1/2"	2.469"	MS-275	6	2.5"	MS-275	6
1"	1.315"	2-1/2"	2.469"	MS-200	5	3.0"	MS-315	4
1-1/4"	1.660"	3"	3.068"	MS-275	8	3.0"	MS-275	8
1-1/2"	1.900"	3"	3.068"	MS-200	7	3.5"	MS-300	5
2"	2.375"	3-1/2"	3.548"	MS-200	8	4.0"	MS-300	6
2-1/2"	2.875"	4"	4.026"	MS-200	9	4.0"	MS-200	9
3"	3.500"	5"	5.047"	MS-300	8	5.0"	MS-300	8
3-1/2"	4.000"	6"	6.065"	MS-315	10	6.0"	MS-315	10
4"	4.500"	6"	6.065"	MS-300	10	6.0"	MS-300	10
5"	5.563"	8"	7.981"	MS-340	13	8.0"	MS-340	13
6"	6.625"	10"	10.02"	MS-475	10	10.0"	MS-475	10
8"	8.625"	12"	12.00"	MS-475	12	12.0"	MS-475	12
10"	10.750"	14"	13.25"	MS-425	10	14.0"	MS-475	14
12"	12.750"	16"	15.25"	MS-425	12	16.0"	MS-475	17
14"	14.000"	18"	17.25"	MS-475	18	18.0"	MS-575	16
16"	16.000"	20"	19.25"	MS-475	21	20.0"	MS-575	18
18"	18.000"	22"	21.25"	MS-475	23	22.0"	MS-575	20
20"	20.000"	24"	23.25"	MS-475	25	24.0"	MS-575	22
22"	22.000"	26"	25.25"	MS-475	28	26.0"	MS-575	24
24"	24.000"	28"	27.25"	MS-475	30	28.0"	MS-575	26
26"	26.000"	30"	29.25"	MS-475	33	30.0"	MS-575	28
28"	28.000"	32"	31.25"	MS-475	35	32.0"	MS-575	30
30"	30.000"	34"	33.25"	MS-475	37	34.0"	MS-575	32
32"	32.000"	36"	35.25"	MS-475	40	36.0"	MS-575	34
34"	34.000"	40"	39.25"	MS-500	29	38.0"	MS-575	36
36"	36.000"	42"	41.25"	MS-500	31	40.0"	MS-575	38
42"	42.000"	48"	47.25"	MS-500	36	46.0"	MS-575	44
48"	48.000"	54"	53.25"	MS-500	41	52.0"	MS-575	50

*Minimum recommended sleeve length or wall thickness is 4" for MetraSeal model 325 and smaller and 6" for models 400 and larger.

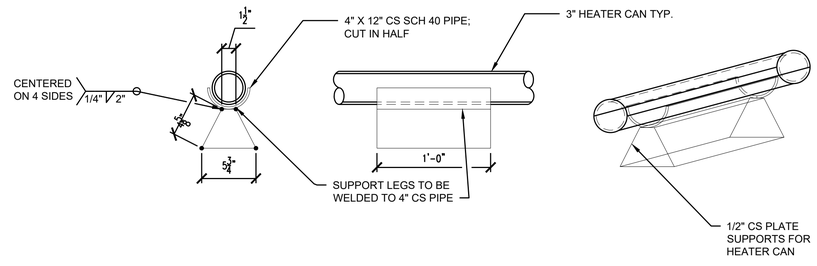
If you do not see your pipe/hole combination, see page 10 or the web seal calculator at http://www.metraflex.com/metraseal

K S-5 **PIPING SLEEVES**



I S-5 **STEEL PLATE & RING DETAIL** 1 1/2" = 1'-0"

2 1 1/2 0 1 1/2 SCALE: 1 1/2" = 1'-0"



2 1 1/2 0 1 1/2 SCALE: 1 1/2" = 1'-0"

J S-5 **BOTTOM HEATER CAN SUPPORT DETAIL** 1 1/2" = 1'-0"

3 4

AECOM

PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

CLIENT

CHEMOURS FORMER BARKSDALE WORKS

72315 HIGHWAY 13
ASHLAND, WISCONSIN 54806

CONSULTANT

AECOM

AECOM
500 W. JEFFERSON ST.
LOUISVILLE, KENTUCKY 40202

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REGISTRATION

ISSUE/REVISION

4	12/14/21	AS-BUILT REVISIONS
3	10/15/21	AS-BUILT SET
2	08/23/21	ADD SCALE BARS
1	08/17/21	ISSUED FOR CONSTRUCTION
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

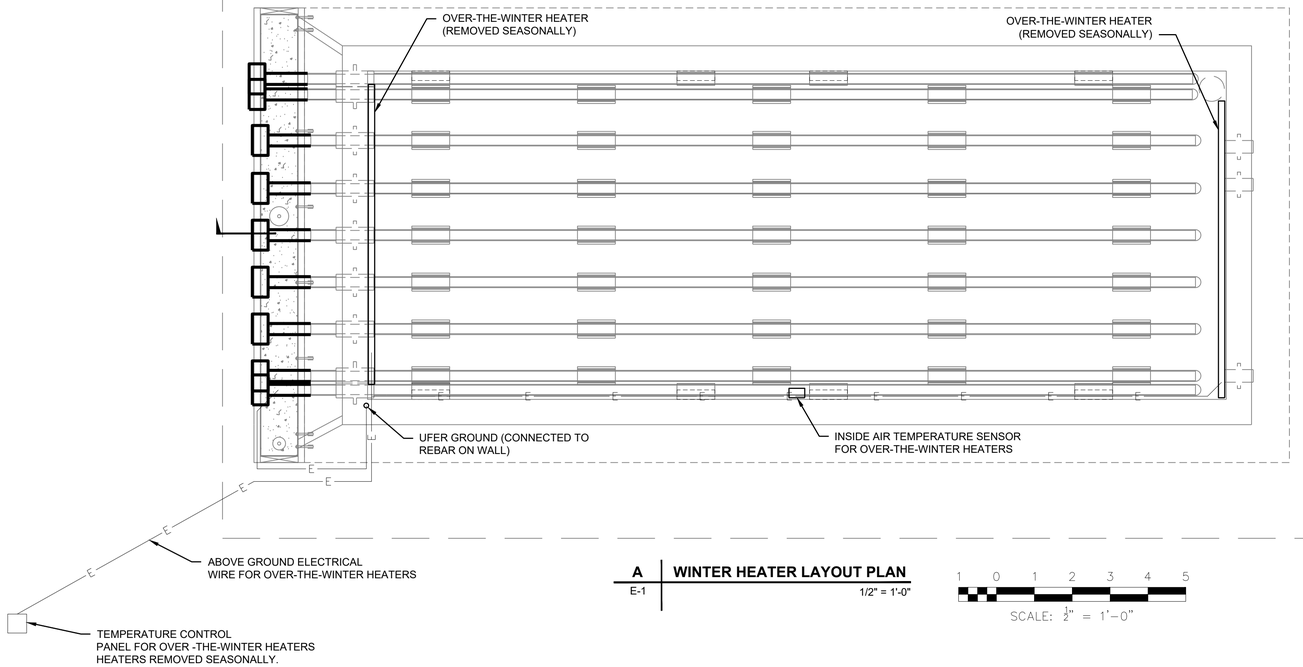
60650614

SHEET TITLE

STEEL PLATE & HEATER CAN SUPPORT PLANS & DETAILS

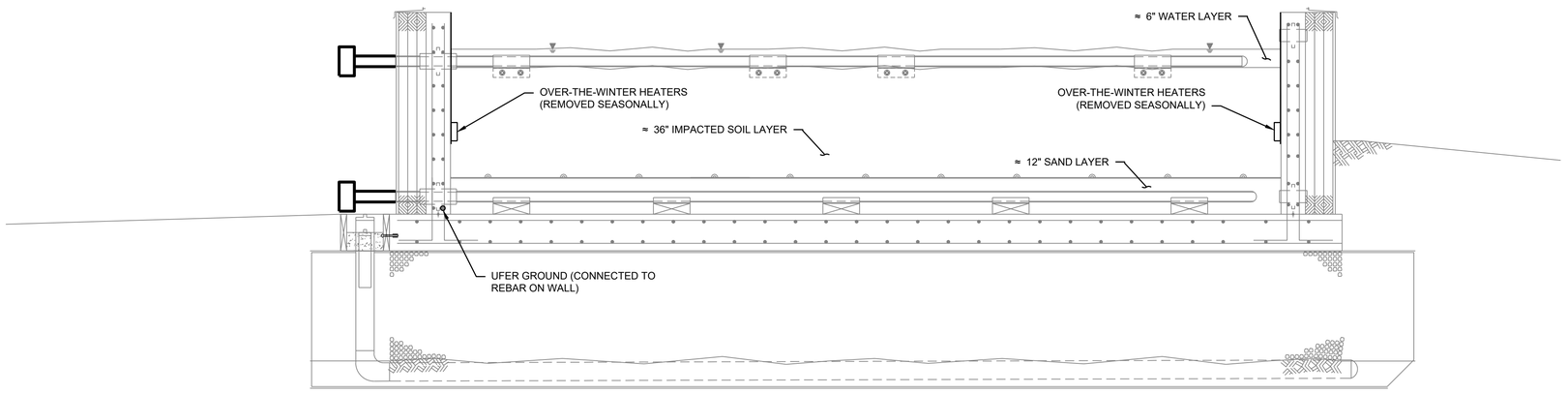
SHEET NUMBER

S-5



A | **WINTER HEATER LAYOUT PLAN**
E-1 | 1/2" = 1'-0"

1 0 1 2 3 4 5
SCALE: 1/2" = 1'-0"



B | **WINTER HEATER LAYOUT SECTION**
E-1 | 1/2" = 1'-0"

1 0 1 2 3 4 5
SCALE: 1/2" = 1'-0"

1

AECOM

PROJECT

FORMER BARKSDALE WORKS
TOWN OF BARKSDALE, BAYFIELD COUNTY, WISCONSIN

CLIENT

CHEMOURS FORMER BARKSDALE WORKS

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REGISTRATION

ISSUE/REVISION

1	04/15/22	ADDED ELECTRICAL SHEET
I/R	DATE	DESCRIPTION

KEY PLAN

PROJECT NUMBER

60650614

SHEET TITLE

ELECTRICAL CONNECTION DETAILS FOR HEATER CAN LAYOUT PLAN & SECTIONS

SHEET NUMBER

E-1