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May 29, 2020

Christopher Smith
Remedial Project Manager
EPA Region 1
5 Post Office Square, Suite 100
Mail Code OSRR 07-4
Boston, MA 02109-3912

Subject: Nuclear Metals, Inc. Site, Concord, MA
Groundwater Non-Time-Critical Removal Action
Revised Construction Completion and Final Report

Dear Mr. Smith:

Enclosed for your approval, please find the revised Construction Completion and Final Report for the Groundwater Non-Time-Critical Removal Action (NTCRA). This report is submitted pursuant to paragraph 42 of the Administrative Settlement Agreement and Order on Consent (AOC) for Groundwater NTCRA, US EPA Region 1, Docket No. CERCLA-01-2015-0008, paragraph 4.3(d) of the Statement of Work provided as Appendix C to the AOC, and your March 16, 2020 approval of the Revised Treatment System Optimization Report.

Responses to comments are attached, and addressed in the revised report.

Please contact me at (860) 298-0541 if you have any questions.

Sincerely,

Bruce Thompson
Project Coordinator

Enclosure

cc: Garry Waldeck, MassDEP
Andy Schkuta, AECOM
Respondents

Responses to Comments
Dated May 28, 2020

Comment 1 - Section 7.2, Page 14. Please add a short discussion explaining the April 2019 data showing an increase in 1,4-dioxane concentration from the MIDV point to the EFF point. EPA notes that this increase occurred across the GAC units and was corrected by a GAC changeout. Please briefly outline the corrective measures that were put in place to prevent this from occurring again. Section 3.ii of the 2019 Annual Treatment System Monitoring Report provided additional detail regarding the steps taken to modify/optimize the treatment system which may be useful to add here.

Response: Text was added to Section 7.3 to discuss the April 2019 data and corrective measures.

Comment 2 - Appendix B, Process Flow Diagram. This drawing does not show the wall-mounted caustic feed system that was added to the GWTP during construction ('1400 Skid' on as-built P&IDs). Please update the PFD to reflect the final design.

Response: An updated PFD has been incorporated into the revised Construction Completion and Final Report.

NUCLEAR METALS, INC. SUPERFUND SITE

CONCORD, MASSACHUSETTS

Groundwater Non-Time-Critical Removal Action

Construction Completion and Final Report

de maximis, inc.

200 Day Hill Road, Suite 200
Windsor, CT 06095

May 2020

Remedy Component Certification

To the best of my knowledge, after thorough investigation, I undersigned certify that the construction of the Groundwater Non-Time-Critical Removal Action at the Nuclear Metals, Inc. Site in Concord, Massachusetts is complete, and the system is functioning properly and as designed.

Bennie Underwood, PE
de maximis, inc.
Removal Design Engineer of Record
Professional Engineer #20451 (Indiana)

To the best of my knowledge, after thorough investigation, I undersigned certify that the construction of the Groundwater Non-Time-Critical Removal Action at the Nuclear Metals, Inc. Site in Concord, Massachusetts is complete, and the system is functioning properly and as designed.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Bruce Thompson
de maximis, inc.
Project Coordinator

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FIGURES

1 INTRODUCTION

This Construction Completion and Final Report (CC & FR) has been prepared pursuant to Paragraph 42 of the Administrative Settlement Agreement and Order on Consent (AOC) for Groundwater Non-Time-Critical Removal Action (NTCRA), US EPA Region 1, Docket No. CERCLA-01-2015-0008 for the Nuclear Metals, Inc. (NMI) Superfund Site in Concord, Massachusetts (the Site), and Paragraph 4.3(d) of the Statement of Work (SOW) provided as Appendix C to the AOC. The site location is shown on Figure 1.

The AOC became effective in July 2016 and requires performance of a NTCRA for groundwater in the downgradient area of the Site. The NTCRA work requires designing, constructing, and operating a groundwater treatment system to extract overburden and bedrock groundwater and treat 1,4-dioxane and volatile organic compounds (VOCs) ex-situ in that water prior to discharge.

On October 17, 2019, the United States Environmental Protection Agency (EPA) lodged a Consent Decree (CD) with the United States District Court for the District of Massachusetts in connection with Civil Action No. 1-19-cv-12097-RGS. The CD was entered by the Court on December 6, 2019. The CD and its accompanying Statement of Work (SOW) describe the Remedial Design/Remedial Action (RD/RA) activities to be performed for the NMI Site. Pursuant to paragraph 10.c of the RD/RA CD, a summary of on-going tasks under the Groundwater NTCRA AOC was submitted on December 11, 2019. Upon EPA's approval of this CC & FR and issuance of a Notice of Completion of Work pursuant to Paragraph 125 of the Groundwater NTCRA AOC, Operations, Maintenance and Monitoring (OM&M) and all other continuing obligations under the Groundwater NTCRA AOC are to be performed pursuant to the RD/RA CD.

This CC & FR summarizes the design, installation, and functionality of the groundwater extraction and treatment system, and includes the following (as required by SOW Paragraph 4.3(d):

- statements by a registered professional engineer and by Respondents' Project Coordinator that construction of the system is complete, and that the system is functioning properly and as designed,
- a demonstration, and supporting documentation, that construction of the system is complete, and that the system is functioning properly and as designed,
- as-built drawings signed and stamped by a registered professional engineer; and
- certification signed by Respondents' Project Coordinator.

In addition, as required by Paragraph 42 of the AOC, the CC & FR contains the following:

- a good faith estimate of total costs or a statement of actual costs incurred in complying with the AOC,
- A listing of quantities and types of materials removed off-Site or handled on-site,
- a discussion of removal and disposal options considered for those materials, and

- a presentation of the analytical results of all sampling and analyses performed (analytical data has been submitted with each monthly progress report. Key data showing that the system is functioning properly and as designed is included within this CC & FR.)

Paragraph 42 states that accompanying appendices should contain all relevant documentation generated during the removal action (e.g., manifests, invoices, bills, contracts, and permits). All contractors engaged on the project are listed in the statement of project costs provided in Appendix A. As discussed with the Remedial Project Manager, the remaining information is summarized herein, but not packaged with the CC & FR. It is part of our retained records, and available upon EPA request.

Paragraph 42 states that the FR shall conform with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and OSWER Directive 9320.2-22 "Close Out Procedures for National Priorities List Sites" (May 2011). Section 300.165 of the NCP requires a complete report on the removal operation and the actions taken. The OSC report "shall record the situation as it developed, the actions taken, the resources committed, and the problems encountered." This report is formatted to include the content in Exhibit 2-5 of the OSWER Directive, which provides "Recommended Remedial Action Report Contents".

2 BACKGROUND

The Remedial Investigation/Feasibility Study (RI/FS) delineated the extent of contaminants in soil, sediment, and groundwater between 2004 and 2014. During this work, the risk-based target concentrations for 1,4-dioxane in groundwater decreased from 6.1 µg/L (RI phase) to 0.67 µg/L (FS phase).

In October 2014, EPA issued the Proposed Plan that specified a 1,4-dioxane clean up level of 0.46 µg/L and sought comment on accelerating the extraction and ex-situ treatment of groundwater impacted by 1,4-dioxane and VOCs portion of the remedy as a NTCRA. This accelerated response was proposed because of concerns regarding potential impacts to the Assabet wellfield, one of the public water supply wellfields for Acton, could result without timely action.

Supplementary plume delineation was implemented under the RI/FS AOC after release of the Proposed Plan in order to complete the delineation of 1,4-dioxane in groundwater to the target cleanup level. The initial phase of delineation was detailed in a Groundwater Investigation Work Plan (Geosyntec, August 20, 2015). Work during this phase included groundwater profiling from ground surface into bedrock, with the installation of 22 additional monitoring wells at 8 locations (most wells were installed in clusters that monitor multiple depths). Target well depths were selected based on the highest 1,4-dioxane concentrations in screening samples, or in the highest conductivity media (if 1,4-dioxane and VOCs were non-detect).

Groundwater elevations were monitored at all available monitoring wells during a March 2016 shutdown and re-start of the Assabet 1A and 2A municipal supply wells, in order to better establish their area of influence. The shut down monitoring concluded that the deep overburden and shallow bedrock are hydraulically connected, and that deep

overburden pumping would have a hydraulic impact on bedrock. This is important because the ability to pump shallow bedrock is extremely limited, as indicated by the low recharge rates in bedrock wells

An Extraction Well Installation and Pump Test Work Plan (Geosyntec, June 21, 2016) was developed under the RI/FS AOC and approved by EPA on July 12, 2016. The Fall 2015 groundwater investigation and the March 2016 shutdown test results were summarized in the Extraction Well Installation and Pump Test Work Plan Work Plan.

Based on these investigation results, the NTCRA extraction well was proposed to be located on the Acton side of the Assabet River on property located at 16 Knox Trail. This property was formerly a gravel pit and is currently owned by the Acton Water District (AWD). Access to the AWD property was provided through a July 2016 agreement which was replaced by a long-term lease in May 2017.

EPA issued the Action Memorandum for Groundwater NTCRA in September 2015 as Appendix F to the Record of Decision (ROD). The AOC became effective on July 11, 2016.

2.1 Pre-Design Investigation

After the AOC became effective, EPA was requested to approve the Extraction Well Installation and Pump Test Work Plan as the Pre-Design Investigation Work Plan (PDI WP) required under the SOW and did so on July 15, 2016. The activities outlined in the PDI WP were conducted between August and November 2016, and results were presented in the PDI Report submitted to USEPA on December 21, 2016.

In addition to the extraction well, an additional 5 monitoring wells were proposed in the PDI WP and installed to complete the delineation of the extent of NMI-related 1,4-dioxane and VOCs in groundwater on the Knox Trail property. The pre-pumping overburden groundwater elevations and 1,4-dioxane contours are shown on Figures 2 and 3, respectively.

Based on significant silt zones found at pilot drilling locations (which would result in unacceptably low pumping rates), the location for extraction well EW-1 was moved east from the planned location. It was installed along the axis of the highest concentrations of 1,4-dioxane in the deeper overburden. Cross-sections through EW-1 along the axis of the plume, and perpendicular to axis, are provided in Figures 4 and 5, respectively. These cross-sections also illustrate the complex stratigraphy.

The constant rate pump test provided data to allow assessment of the area of influence and drawdown created by the pumping, estimates of aquifer transmissivity, and analytical results of pumped groundwater. These data were provided in the PDI Report. The measured plume width at the EW-1 location was 330 feet. The transmissivity data was used to perform a mathematical calculation that estimated that pumping EW-1 at a flow rate of 19.6 gallons per minute (gpm) would create a capture zone 558 feet wide, therefore adequate to capture the upgradient NMI-related 1,4-dioxane plume. This analytical estimate was confirmed by the groundwater elevations measured during the pump test, which were mapped to depict the groundwater drawdown contours, as

shown on Figure 6. Observed drawdown in bedrock monitoring wells confirmed that pumping from EW-1 induces some flow from bedrock. The PDI Report therefore concluded that pumping EW-1 at 19.6 gpm would adequately contain the NMI-related contamination in deep overburden groundwater.

Groundwater samples were collected at the end of the pump test and submitted for laboratory analysis. These results were compared to NPDES Remediation General Permit (RGP) criteria as "permit equivalency" treatment requirements for discharge to the Assabet River. The RGP limit for 1,4-dioxane is 200 µg/L. The 1,4-dioxane concentration during EW-1 development was 19.9 µg/L, which dropped to 14.4 µg/L at the end of the pump test. Of all the analytical results, only two VOC compounds (trichloroethene [TCE] and 1,1-dichloroethene [1,1-DCE]) were detected in EW-1 groundwater at levels exceeding the RGP limits. TCE was detected at 7.5 µg/L, above the RGP limit of 5.0 µg/L, and 1,1-DCE was detected at 3.3 µg/L, above the RGP limit of 3.2 µg/L. No metals were detected in excess of the draft RGP effluent limits at the end of the pumping period.

117,000 gallons of water from the step and pump-test were shipped for off-site disposal at Global Cycle, Inc. in East Taunton, MA. This was the most expedient and cost-effective option to manage this waste stream of non-hazardous water.

2.2 Groundwater Model

A scope of work for Groundwater Modeling was submitted on March 31, 2016. EPA comments were received on June 6, 2016. Responses to those comments and a Modeling Work Plan were submitted on June 13, 2016. Groundwater modeling was proposed to further evaluate the influence of the Assabet Municipal Wells on capture of the NMI-related 1,4-dioxane and VOC plume under a variety of potential pumping conditions. In addition, the model would be useful to optimize pumping rates and locations of additional extraction wells, if any were needed. This plan proposed to combine the existing groundwater flow models that were previously developed for the W.R. Grace Site in Acton, MA and the NMI Site into a new model that could be used to support the Groundwater NTCRA process.

A draft model report was submitted in July 2017; however, it did not adequately represent the W.R. Grace site. A comprehensive round of water levels was obtained at all available monitoring wells in August 2017. This new data was used by both the NMI and W.R. Grace teams to adjust and calibrate the existing model, resulting in a "Joint Regional Model" which was documented in a final Groundwater Model Report submitted on May 6, 2019. EPA did not formally approve the model but agreed in August 2019 that the model was appropriate for the intended uses.

Particle tracking to evaluate the capture zone of EW-1 was performed as recommended in EPA's guidance "A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems" (EPA/600/R-08/003), January 2008. The capture zone and particle tracks are shown on Figure 7.

2.3 Temporary Treatment System

In November 2016, EPA approved installation of a temporary groundwater treatment system that would use the existing pumping well (EW-1) and perform treatment using bag filters and granular activated carbon (GAC) adsorption (equipment repurposed from the Building NTCRA), with the addition of a pH adjustment step for discharge to the Assabet River. The purpose of the temporary treatment approach was to rapidly implement 1,4-dioxane and VOC plume containment during the interim period while the technology for the permanent treatment system was evaluated and selected, then that system was designed, procured, and installed.

A 100% RD for Temporary Treatment System was submitted on January 26, 2017. The system was assembled in January and February 2017. An outfall for the system to discharge to the Assabet River was installed in March and April 2017. The temporary system started operating on May 23, 2017 and provided containment of the plume until start up of the final treatment system in April 2019.

The Temporary Treatment System adopted the RGP levels as “permit equivalency” discharge limits. GAC provided adequate treatment of TCE and 1,1-DCE to meet RGP limits. The influent concentration of 1,4-dioxane at the time the temporary system started operating was 17 µg/L, well below the 200 µg/L RGP limit, so 1,4-dioxane was a “monitor only” parameter for the temporary system.

2.4 Treatability Study

The ROD established cleanup criteria for groundwater but did not address discharge limits for ex-situ groundwater treatment. The 1990 revised National Contingency Plan (see 55 FR 8721) establishes a guideline that treatment as part of CERCLA remedies should generally achieve reductions of 90 to 99 percent in the concentration or mobility of individual contaminants of concern. EPA’s Guidance on Conducting Treatability Studies (EPA 540-R-92-071a, October 1992) states that “if no cleanup criteria have been established for the site, a 90 percent reduction in the contaminant concentrations will generally be an appropriate performance goal”.

At EPA’s request, a Treatability Study Work Plan (TSWP) was developed to identify the Best Demonstrated / Best Available Technology (BDT/BACT) for ex-situ 1,4-dioxane treatment. The TSWP proposed use of criteria of effectiveness, implementability, and cost; as well as environmental footprint metrics such as material usage, waste generation, and energy, air and water impacts (Treatability Study Work Plan, Geosyntec and O&M, Inc., May 1, 2017).

The TSWP documents a review of potentially applicable technologies and vendors, screening of those technologies and vendors against site requirements, and a detailed evaluation of vendor responses against the request for proposal. The TSWP recommended a field pilot test of an innovative Advanced Oxidation technology to test treatment effectiveness at various oxidant dosing rates and UV lamp modes. This study was performed between June and September 2017 and summarized in the Treatability Study Report submitted on April 20, 2018. (Treatability Study Report, ***de maximis, inc***. and O&M, Inc., April 20, 2018).

The results of the field pilot study were presented to EPA and MassDEP on September 26, 2017. EPA and MassDEP concurred with the recommendation to proceed with the design of the final treatment system that would use the Vanox™ oxidation technology that was successfully demonstrated in the field pilot study.

The Vanox™ technology was selected because it was a destructive technology, with minimal residuals created for off-site disposal (only iron/manganese hydroxide sludge from metals pre-treatment), and because of its' demonstrated ability to treat 1,4-dioxane and VOCs to very low or non-detectable levels.

2.5 Removal Design

The NTCRA was implemented as a "design/build" project using a performance based contracting approach. ***de maximis, inc.*** acted as the General Contractor and retained major sub-contractors to provide the treatment system equipment, building, and treatment system assembly and operation. Other sub-contractors provided hydrogeologic support and modeling, laboratory analysis, data validation and management, off-site disposal of pump-test water, survey, and legal services (contract and AWD lease negotiation). A complete list of NTCRA vendors and actual costs expended is provided in Appendix A.

The selected 1,4-dioxane treatment technology is a proprietary process provided by Evoqua Water Technologies, LLC (Evoqua). Evoqua was also selected to provide the remainder of the treatment system components. The treatment building was selected as a prefabricated unit, sized appropriately to contain the system, and competitively procured. O&M, Inc. was retained to develop the design, perform system assembly, and start up and operate the system. In order to expedite the process, the removal design (RD) process was split to address the treatment system and treatment system building separately.

The treatment system design is based on key criteria that include the following:

- Remove metals (primarily iron and manganese) to protect reaction chambers
- Remove VOCs to meet Remediation General Permit discharge limits for VOCs,
- Remove at least 95% of 1,4-dioxane, measured as an annual average,
- Raise the pH of the effluent water to between 6.9 and 7.9 standard units, and
- Allow for adequate treatment flow rate, including potential to add extraction wells. of system. Assume up to 30 gpm total (for potential future expansion) and a nominal, constant, flow rate of 20 gpm

These performance-based requirements resulted in a series of unit processes to meet the criteria that include:

- Iron and manganese pre-treatment. This step uses triplex filters containing DMI-65 media. Sodium hypochlorite is added to the influent to aid in precipitation and removal within the DMI-65 Media. Bag filtration follows to remove any suspended solids in the DMI-65 effluent. A backwash system is used to periodically remove suspended solids from the DMI-65 media. Those solids are thickened and sent to a filter press, and the filter cake is collected for off-site

disposal.

- 1,4-dioxane and VOCs are removed using the Vanox™ process. This process step consists of 6 reactor vessels, each containing a medium-pressure UV lamp. An oxidant is mixed into the influent water and activated by the UV light, generating a variety of reactive species that destroy the organic compounds.
- pH adjustment prior to discharge to Assabet River.
- Liquid GAC to absorb any residual chlorine (associated with the sodium hypochlorite used in the metals pre-treatment process).
- An ion-exchange system was installed, based on the potential to create perchlorate from reaction of the oxidant with other compounds in the influent water.
- Appropriate tanks, pumps, sensors, and piping to safely convey the water through the treatment processes.

The treatment system RD was addressed in the following submittals:

- 90% Removal Design (RD) submitted January 12, 2018.
- Agency comments on the 90% RD were incorporated into the 95% RD submitted April 17, 2018.
- Agency comments on the 95% RD were incorporated into the 100% RD submitted July 30, 2018.
- Agency comments on the 100% RD were addressed in a final 100% RD submitted on November 28, 2018.
- EPA approved the 100% RD for Treatment System on December 12, 2018.

The treatment system building was specified based on the necessary footprint needed to house the treatment system. It was specified with overall building dimensions of 60 feet by 75 feet and have a ceiling height of 24 feet. The building foundation and slab were designed to:

- Adequately support the proposed equipment.
- Act as a secondary containment via the concrete wall foundation wall around the building, with raised curbing at the entrance ways, and a slight slope toward a central trench drain and sump.
- Have a central floor drain located through the center of the equipment area and include one (1) sump. Water collected in the sump will be pumped to the feed water tank for on-site treatment.
- The building was designed as a pre-engineered steel structure with the following features:
    - Interior insulation.

- Air circulation vents.
- Propane heaters.
- Office, lab bench, and lavatory spaces.
- Three (3) bay doors.
- Two (2) personnel doors.
- Safety shower / eyewash station. And,
- Security system.

The treatment system building RD was addressed in the following submittals:

- A 100% RD for Treatment System Building was submitted August 21, 2018. (EPA approved starting work on the building on August 29, 2018.)
- Agency comments were incorporated into a revised 100% RD submitted on October 23, 2018.
- EPA approved the 100% RD for Treatment Building on November 11, 2018.

3 Construction Activities, Start Up, and Optimization

Building foundation work started in September 2018. The steel frame was completed in early October, along with most of the walls and potable water service to the building. Wall panels, insulation, the roof, and overhead and man-doors were completed in November. The slab concrete work was completed in December, along with build out of the office and bathroom, and rough electrical and plumbing. Propane service and split heaters were installed in January 2019. Final electrical and plumbing was completed in January 2019. In May 2019, the roof panels were replaced, at cost of the building vendor, due to improper installation during the initial building fabrication. Eversource provided the power service to the building in February 2019. The building sub-contractor replaced the roof and one access ramp under warranty in April 2019.

Treatment system components and assembly of the permanent system began in January 2019. Installation and assembly were completed with reference to the design Piping and Instrumentation Diagram (P&ID), Process Flow Diagram (PFD), and site layout. Major system components were placed in the building, and wiring of systems and plumbing also started in January 2019. All tanks were installed, and electrical installation was completed in February. EW-1 was piped into the building and connection to the outfall made in March 2019 (note that the outfall was completed in April 2017 for the temporary treatment system). Programmable logic controller (PLC) programming, including setting of system alarm set points, occurring in April 2019. The startup checklist was completed on April 24, 2019, at which system start up occurred and day one samples were taken.

The system PFD and layout are provided in Appendix B.

3.1 Start Up and Modifications

Some issues were noted during start up, which included some setpoints needing adjustment, inadequate manganese removal, and high temperature alarms in reactors associated with gas bubble accumulation. The system manufacturer, Evoqua, revised the necessary set points.

Cartridge filters were added in-line as a temporary measure to remove manganese downstream of the Vanox™ system, pending a design modification. The Vanox™ reactors were cleaned with a citric acid solution in August 2019. The effluent from that cleaning was containerized and disposed off-site, along with water collected from redevelopment of EW-1. 15,000 gallons of non-hazardous wastewater were shipped for disposal at Global Cycle, Inc. in East Taunton, MA.

Manual bleeding of gases from the reactors was implemented on a routine basis pending design and installation of automated valves. Automated bleed valves were installed on December 23, 2019.

A design modification was submitted to EPA on June 14, 2019 to add a pH adjustment step (NaOH dosing pump) prior to the DMI-65 multi-media filters, as evaluation with Evoqua determined that increasing pH to the range of 8 to 8.5 standard units prior to the DMI-65 triplex filters would optimize the removal of manganese. EPA approved the design modification on June 19, 2019. Installation of the pH adjustment equipment was completed October 18, 2019. Subsequent testing showed effective removal of manganese.

3.2 Treatment System Optimization

An Optimization Plan was submitted to EPA on May 23, 2019. The goal of optimization was to adjust the key variables (UV lamp power and oxidant dosing rate) to levels that would reliably achieve discharge limits while minimizing long-term operational costs. EPA approved this plan on July 2, 2019. However, implementation of the plan was delayed pending resolution of the manganese removal process discussed in Section 3.1.

The optimization study was performed in December 2019 and January 2020 and documented in an Optimization Report submitted February 13, 2020. EPA approved the revised report on March 16, 2019. The Optimization Report documents that the metals pre-treatment and Vanox™ (1,4-dioxane and VOCs treatment) processes are functioning properly and as designed. The Optimization Report is provided as Appendix C.

4 Construction Quality Control

NTCRA construction work was monitored closely. Daily observation sheets were completed to track and document construction activities, and record photo documentation. Building completion steps were inspected, tracked, and documented from the foundation up though the building interior.

During construction of the treatment system, all construction was completed and tracked with refence to the system P&ID. A paper copy of the document was marked using a highlighter to check off component and piping placement. During mark ups, final component completion sheets were made for all major equipment, including placement, photo documentation, inlet and outlet piping paths, and on pipe equipment.

Building and system construction oversite documentation is provided in Appendix D.

5 Inspections & Certifications

The building was inspected by ***de maximis, inc***. on January 17, 2019. Two issues were identified for the sub-contractor to correct. First, the north east concrete ramp was thinner than specified, meaning it would not support design loadings. This ramp was removed and replaced on May 9, 2019. Second, leaks in the roof had been noted during spring storms. The entire roof was removed and replaced the week of May 6, 2019. Final building inspection documentation, including stamped as-builts and a final construction control document prepared in accordance with the Massachusetts State Building Code, 780 CMR, Section 107 are provided in Appendix E.

A review of the treatment system was conducted by ***de maximis, inc***. and Evoqua's field engineer on April 24, 2019. As discussed in Section 3.1, issues were identified with several control set points, inadequate manganese removal, and high temperature alarms in reactors associated with gas bubble accumulation. Corrections were made, and the functionality of all alarms and setpoints were checked on May 29, 2019. Errors were still found on five alarms, that were then remedied on July 19, 2019. A final check was conducted on July 22, 2019 which confirm that all alarms worked correctly. Final treatment system inspection documentation, including stamped as-built drawings are provided in Appendix F.

An inspection of the constructed NTCRA was performed with EPA and MassDEP representatives on June 20, 2019, as required by SOW Paragraph 4.3(b). The "punch list" of actions items from this inspection is provided in Appendix G. All these action items were subsequently addressed.

6 Chronology of Events

A chronology of key events under the Groundwater NTCRA AOC is provided in Appendix H, covering the period from July 2016 to March 2020.

7 Performance Standards

The 100% Removal Design for Temporary System established three performance objectives to determine the overall success of the system, which were carried over to the 100% Removal Design Final Treatment System. These objectives include:

- Hydraulic Capture
- Decreasing Concentration Trends
- Treatment System Effectiveness

These objectives are consistent with those recommended in “Methods for Monitoring Pump-and-Treat Performance” (EPA/600/R-94/123), June 1994, and “A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems” (EPA/600/R-08/003), January 2008. Measurement and attainment of these objectives is discussed further below.

7.1 Performance Objective 1 – Hydraulic Capture

The primary objective of the NTCRA is to provide hydraulic capture of the NMI-related plume of 1,4-dioxane and VOCs in overburden and shallow bedrock groundwater in the area between the Assabet River and Assabet 1A supply well. Hydraulic capture analysis is a weight-of-evidence approach that combines interpretation of calculated flow rates to achieve required capture zone widths, ground-water elevation measurements (including drawdown from pumping well(s)), and/or modeling (numerical or analytical) to simulate heads in conjunction with particle tracking.

All three methods were used at the NMI Site and provide similar conclusions. All three methods confirm that a flow rate of ~20 gpm from EW-1 is enough to capture the NMI-related plume. On-going confirmation of hydraulic capture is determined by maintaining the pumping rate at EW-1 at ~20 gpm, and monthly drawdown measurements at target wells near EW-1. The specific capacity of EW-1 is evaluated to trigger redevelopment before the flow rate drops below the target level.

Hydraulic capture over time is evaluated by tracking the “up time” (time when pumping and treating is occurring) for the system. The temporary system operated from May 2017 to April 2019, with ~96% up time. The final treatment system started in April 2019 and continues to operate. Through the end of February 2020, it has operated with 91% up time. This metric is expected to improve, now that automatic gas bleed valves are in place on the reaction chambers, which will reduce or eliminate the number and duration of high temperature shutdowns.

Groundwater migration rates between the EW-1 capture zone and the Assabet 1A supply well are very slow, because the hydraulic conductivity of the silt deposits is low. As a result, even a multi-day shutdown would not materially affect the 1,4-dioxane concentrations in this area.

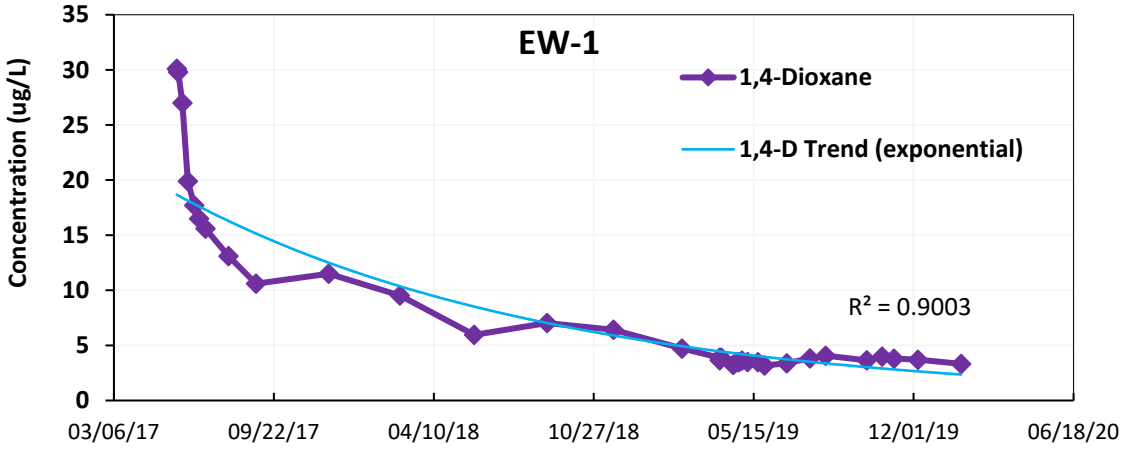
7.2 Performance Objective 2 – Decreasing Concentration Trends

The second objective is to decrease the 1,4-dioxane concentrations in Assabet 1A and in wells located between EW-1 and Assabet 1A. EW-1 has operated at ~20 gpm since startup of the temporary system in May 2017, with minimal shutdown associated with well redevelopment, system maintenance, and power outages.

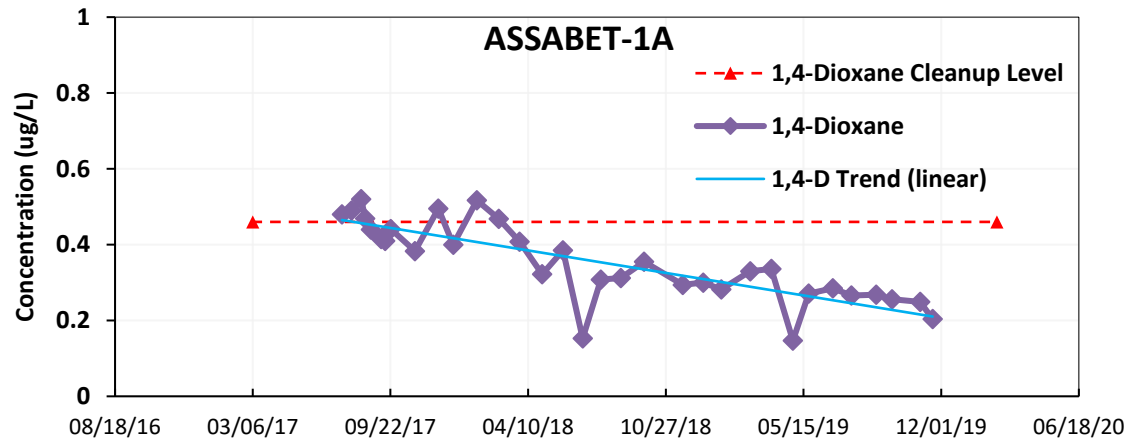
The temporary system pumped and treated 17 million gallons of groundwater through April 2019. The final system pumped and treated 7.7 million gallons of groundwater between April 2019 and February 2020.

The 1,4-dioxane concentration in the influent from EW-1 declined during operation. There was a significant decline over the first six months of operation, from 30.1 µg/L at startup in May 2017 to ~ 11.5 µg/L in November 2017. The influent 1,4-dioxane

concentration further declined to less than 4.0 µg/L in April 2019 and has remained between 3.0 and 4.0 µg/L since April 2019. Influent concentrations are shown in the following trend graph.



Coincident with the declines in EW-1 influent concentration are decreasing concentration trends at the Assabet 1A production well and monitoring wells closest to EW-1. Assabet 1A data are shown in the following trend graph



A routine groundwater monitoring program started when the temporary treatment system started operating. Trend graphs of 1,4-dioxane concentrations at NTCRA monitoring locations are provided in Appendix I.

Figure 8 shows the overburden groundwater elevation and 1,4-dioxane concentration contours in November 2019. Comparing the November 2019 information to the September 2016 pre-pumping results shown on Figures 2 and 3 illustrates the effectiveness of hydraulic containment in terms of both drawdown and reduced 1,4-dioxane concentrations.

7.3 Performance Objective 3 – Water Treatment Effectiveness

The third objective is to treat extracted groundwater to concentrations below discharge limits summarized in a site-specific "Permit Equivalency", which is based on limits

established in the National Pollution Elimination System (NPDES) Remediation General Permit (RGP).

For the Assabet River, the lowest seven-day average flow expected once every 10 years (7Q10) at the closest USGS gauging station (#01097000, Maynard, MA, ~1.6 miles upstream of the NMI discharge), is 15.1 cubic feet per second (cfs). The median flow is 163 cfs. The NTCRA flow rate is 20 gallons per minute, or 0.045 cfs. Therefore, the NTCRA discharge contributes ~0.3% of the 7Q10 flow, and 0.03% of the median flow in the river. Viewed as dilution ratios, there is a 337 to 1 dilution of the discharge at 7Q10 flow, and a 3,623 to 1 dilution of the discharge at median flow.

For 1,4-dioxane the 100% RD proposed a target annual average removal rate of greater than or equal to 95%. At the point in time when this limit was proposed, extracted water was ~10 µg/L 1,4-dioxane. 95% removal would result in an effluent concentration of 0.5 µg/L, above the laboratory Reporting Limit RL) of ~0.144 µg/L. Since completion of the shakedown period, the treatment system is routinely achieving “non-detect” concentrations for 1,4-dioxane.

A “non-detect” result is reported by the laboratory with a numeric result equal to the Practical Quantitation Limit (PQL), which for this project is also the RL. These limits establish data which is quantified with statistical rigor, typically 3x or more above the lowest point on the instrument calibration curve.

Recent 1,4-dioxane analysis resulted in PQLs between 0.139 and 0.163 µg/L. The PQL/RL is more than an order of magnitude higher than the Method Detection Limit (MDL), which is the lowest level signal measured with the analytical instrument. Recent 1,4-dioxane analysis resulted in MDLs between 0.0314 and 0.075 µg/L.

The PQL is the appropriate value to use when calculating percent removal, as it represents a defensible value supported by the instrument calibration process. For example, the January 29, 2020 influent 1,4-dioxane result was 3.32 µg/L. The effluent result was non-detect, with a PQL of 0.139 µg/L and an MDL of 0.0314 µg/L. Using the PQL for the calculation results in 95.8% removal. Using the MDL results in 99.1% removal – but is not a defensible calculation.

The 95% removal criteria may need revision as influent concentrations continue to decline, as meeting the criteria will not be mathematically possible. Regardless of the calculated percent removal, 1.4-dioxane is being adequately treated in the system, particularly when compared to the 200 µg/L NPDES RGP value. The final treatment system effectiveness at treating 1,4-dioxane is summarized in the following table.

1,4-Dioxane Summary (ug/L)						
Date	INF	MIDV	EFF	MID Destruction	EFF Destruction	
4/24/2019	3.48	0.144	1.59	95.9%	54.3%	*
4/26/2019	3.48	0.147	1.32	95.8%	62.1%	*
4/30/2010	3.63	0.092	0.981	97.5%	73.0%	*
5/7/2019	3.49		0.610		82.5%	

1,4-Dioxane Summary (ug/L)						
Date	INF	MIDV	EFF	MID Destruction	EFF Destruction	
5/20/2019	3.48		0.144		95.9%	
5/28/2019	3.17		0.139		95.6%	
6/25/2019	3.38		0.144		95.7%	
7/24/2019	3.83		0.356		90.7%	
10/3/2019	3.65		0.150		95.9%	
10/22/2019	3.99		0.061		98.5%	
11/6/2019	3.80		0.111		97.1%	
1/29/2020	3.32		0.139		95.8%	
				Average Removal	**95.2%**	**

* MIDV represents post Vanox treatment, EFF is post-GAC. April 2019 EFF data was prior to GAC change out.
** Using mid-point (post Vanox, pre-GAC) data for April 2019)

Non-Detect - number represents laboratory Practical Quantitation Limit (PQL)

The April 2019 data showed an increase in 1,4-dioxane concentration after Vanox™ treatment ("MIDV") and the point of discharge ("EFF"). The process step between these two sampling locations is GAC. The final system was started up using GAC that had already been used in the temporary system, and the increase in 1,4-dioxane concentrations is attributed to desorption from the GAC. The GAC was replaced, which eliminated this issue. Adequate 1,4-dioxane treatment using Vanox™ will eliminate 1,4-dioxane sorption to GAC, and subsequent desorption.

VOCs are also being treated to non-detect levels, as summarized in the following table.

VOCs Summary (µg/L)						
Date	PCE		TCE		1,1-DCE	
	INF	EFF	INF	EFF	INF	EFF
4/24/2019	0.2	0.5	1.8	0.5	0.75	0.5
4/26/2019	0.5	0.5	1.7	0.5	0.76	0.5
4/30/2010	0.5	0.5	1.8	0.5	0.75	0.5
5/7/2019	0.5	0.5	1.5	0.5	0.62	0.5
5/20/2019	0.5	0.5	1.5	0.5	0.57	0.5
5/28/2019	0.5	0.5	1.5	0.5	0.68	0.5
6/25/2019	0.5	0.5	1.4	0.5	0.59	0.5
7/24/2019	0.5	0.5	1.5	0.5	0.58	0.5
10/3/2019	0.5	0.5	1.3	0.5	0.62	0.5
1/29/2020	0.5	0.5	1.7	0.5	0.6	0.5

Non-Detect - number represents laboratory Practical Quantitation Limit (PQL)

Accordingly, the treatment system is achieving design treatment goals for 1,4-dioxane and VOCs.

Sulfate is present in both the influent to the system and as a breakdown product of the oxidant used in the treatment system. Sulfate has a secondary Maximum Contaminant Level (MCL) of 250 mg/L, associated with creating a salty taste in the produced water. Effluent from the treatment system is discharged to the Assabet River. At the point of discharge, the Assabet River is not a source of drinking water.

The NTCRA system added ~62 mg/L sulfate prior to optimization. Post-optimization (which reduced oxidant loading), the added sulfate dropped to 30 mg/L. In all cases, the total effluent sulfate was below the SMCL value, as shown in the following table.

Sulfate Summary (mg/L)			
Date	INF	EFF	
4/24/2019	86.4	142.0	
5/7/2019	80.7	140.0	
5/28/2019	86.0	148.0	
6/25/2019	78.1	149.0	
7/24/2019	75.6	135.0	
10/22/2019	82.3	147.0	
1/29/2020	70.1	99.8	*

*post optimization, reduced oxidizer dosage

During finalization of the design, Evoqua informed us that some advanced oxidation systems had produced perchlorate in the treated water. To address this potential, vessels containing an ion-exchange resin were incorporated as the final treatment process step prior to discharge. MassDEP has established a MCL for perchlorate of 2 ug/L. As shown in the following table, perchlorate is generated, then removed to non-detectable levels during treatment.

Perchlorate Summary (ug/L)			
Date	INF	MIDV	EFF
4/24/2019	0.021	2.44	0.013
5/7/2019	0.013	2.78	0.065
5/28/2019	0.013	2.7	0.013
6/25/2019	0.013	3.28	0.013
7/24/2019	0.013	3.04	0.013
10/22/2019	0.013	3.17	0.013
1/29/2020	0.013	2.6	0.013

Non-Detect - number represents laboratory Practical Quantitation Limit (PQL)

8 Operation, Monitoring, and Maintenance Activities

EPA approved the Operations and Maintenance Plan (O&M Plan) for the NTCRA on July 22, 2019. The O&M Plan describes the operations, maintenance, monitoring, and reporting of the NTCRA groundwater containment and ex-situ treatment system, and includes descriptions of inspections and operations to be performed to maintain the system and effectively meet the cleanup requirements through the Removal Action.

The O&M Plan includes an O&M Manual that documents the procedures to setup, prepare the system for operation, operate, and optimize system performance.

The O&M Plan addresses the work in sections. First is general operations. Due to the nature of the operations of a treatment system, coupled with the length of time this project is anticipated to operate, the goal is to record the most critical and useful data on a routine basis. Because of this, not every task is necessary to be recorded. To record critical information, the operator uses a site logbook to record dates of operational procedures. The following list includes examples of the type of items that fall into this category:

- Filter bag changeouts
- Chemical delivery
- Dosing adjustments
- Filter press operations
- Cleaning and maintenance of equipment
- Media changeout
- Troubleshooting operations, etc.

This list is not meant to limit what the operator records but gives examples of the type of information that will be retained. Additional information will be recorded in the site logbook and kept for operator use.

The second is maintenance, broken up into monthly and yearly items. Specific maintenance items are from the O&M Manual. Monthly items include function tests for tanks, transfer pumps, and chemical pumps. It also addresses calibration of sensors and inspections of safety equipment.

The last is equipment service tracking, which is monitored through completion of an Equipment Service Record, that records non-routine equipment maintenance. The chart includes date, the equipment piece, maintenance complete, and comments. The most important aspect of this tracking is to project UV lamp life duration from new bulb change to when it is changed out.

In addition to tracking system equipment maintenance, the specific capacity of EW-1 is routinely calculated. When the specific capacity of EW-1 drops below a re-development threshold, re-development of EW-1 is triggered. To date, re-development has been needed approximately every six months.

The O&M Plan will be updated as needed, particularly after the first year of O&M, when significant experience in operating the system will be gained.

9 Contact Information

Organization	Role	Contact Information
USEPA	Lead regulatory agency overseeing the RD/RA	Christopher Smith Remedial Project Manager (RPM) USEPA Region 1 5 Post Office Square MC OSRR07-4 Boston, MA 02109 (617) 918-1339 Smith.christopher@epa.gov
MassDEP	State regulatory agency involved in project review and providing support to USEPA	Garry Waldeck Environmental Engineer MassDEP-BWSC 1 Winter Street Boston, MA 02108 (617) 348-4017 garry.waldeck@state.ma.us
AECOM	EPA oversight contractor	Andrew Schkuta 250 Apollo Drive Chelmsford, MA 01824 (978) 905-3180 – Voice andrew.schkuta@aecom.com
Respondents	Signatories to the AOC, responsible for overall performance of NTCRA	c/o Bruce Thompson (see below)
de maximis, inc.	General and Supervising Contractor	Project Coordinator Bruce Thompson ***de maximis, inc.*** 200 Day Hill Road, Suite 200 Windsor, CT 06095 (860) 298-0541 brucet@demaximis.com

Organization	Role	Contact Information
de maximis Data Management Services, Inc. (ddms)	Subcontractor for data management services, data validation, and maintenance of www.nmisite.org	Polly Newbold ddms 186 Center Street, Suite 290 Clinton, NJ 08809 pnewbold@ddmsinc.com
O&M, Inc	Subcontractor for general work at the Site, Groundwater Treatment System O&M	David Fuerst O&M, Inc. 450 Montbrook Lane Knoxville, Tennessee 37919-2705 dfuerst@oandm-inc.com

10 References

de maximis, et. al., 2014 Remedial Investigation/Feasibility Study Report, Nuclear Metals, Inc. Superfund Site, Concord, MA, October 2014

de maximis, inc. and O&M, Inc., 2018, Treatability Study Evaluation Report, Nuclear Metals, Inc. Site, April 2018

Geosyntec, 2015, Groundwater Investigation Work Plan, Nuclear Metals Superfund Site, August 2015.

Geosyntec, 2016, Extraction Well Installation and Pump Test Work Plan, Nuclear Metals Inc. Superfund Site, June 2016.

Geosyntec, 2017, Pre-Design Investigation Report, Nuclear Metals Inc. Superfund Site, April 2017.

Geosyntec, 2017b, 100% Removal Design Report, Temporary Treatment System, Nuclear Metals, Inc. Superfund Site, June 2017.

Geosyntec and O&M, Inc., 2017, Treatability Study Work Plan, Nuclear Metals, Inc. Superfund Site, April 2017.

Geosyntec, 2019, Groundwater Model Report, Nuclear Metals, Inc. Superfund Site, Concord, MA, May 2019

O&M, Inc., 2018, 100% Removal Design Water Treatment System Building, Nuclear Metals, Inc. Superfund Site, Concord, MA, October 2018

O&M, Inc., 2018, 100% Removal Design Final Treatment System, Nuclear Metals, Inc. Superfund Site, Concord, MA, November 2018

U.S. Environmental Protection Agency (EPA), 1992. Guidance for Conducting Treatability Studies under CERCLA, EPA 540-R-92-071a, October.

U.S. Environmental Protection Agency (EPA), 1993. Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA, EPA 540-R-93-057, August.

U.S. Environmental Protection Agency (USEPA), 1994, Methods for Monitoring Pump-and-Treat Performance, EPA/600/R-94/123, June 1994

U.S. Environmental Protection Agency (USEPA), 2008, A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, EPA/600/R-08/003, January 2008

U.S. Environmental Protection Agency (USEPA), 2014, Proposed Plan, Nuclear Metals, Inc. Superfund Site, Concord, MA, October 2014.

U.S. Environmental Protection Agency (USEPA), 2015, Record of Decision (ROD), Nuclear Metals, Inc. Superfund Site, Concord, MA, September 2015.

U.S. Environmental Protection Agency (USEPA), 2016a, Non-Time Critical Removal Action for Groundwater, Statement of Work, Nuclear Metals, Inc. Superfund Site, Concord, MA, EPA Region 1, 2016.

U.S. Environmental Protection Agency (USEPA), 2016b, Memorandum: Groundwater NTCRA, From Melissa Taylor, Project Manager, Massachusetts Superfund to Bruce Thompson, Project Coordinator, de maximis, inc.,15 July 2016.

Figures

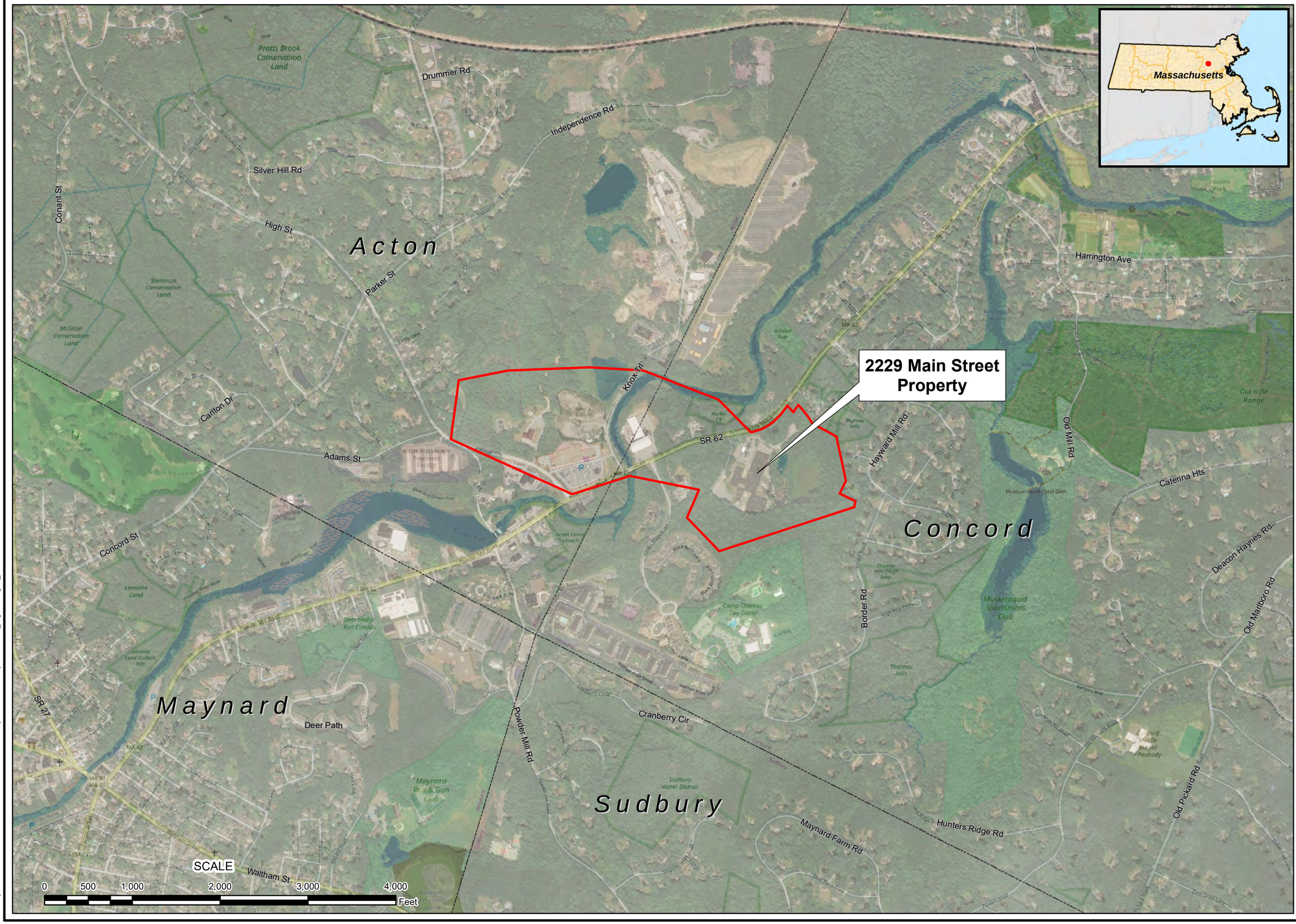


Figure 1

Site Location Map

Nuclear Metals, Inc. Site
Remedial Design Work Plan

Concord, Massachusetts

Description:

2229 Main Street Property

Map Legend:

Site Boundary

Spatial Projection:

Coordinate System:
MA State Plane Mainland
FIPS Zone: 2001
Units: US Survey Feet
Datum: NAD83

Plot Info:

File: Fig01_SiteLoc.mxd
Project No.: 3252
Plot Date: 11/20/2019
Arc Operator: LS
Reviewed by: HG

ddms
www.ddmsinc.com

de maximis, inc.

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N

ASSABET IIA

400-ft Zone 1 Boundary for Assabet 1A

ASSABET IA

B-06(123.26)
AR-02(125.62)
A-2E
PZ-2A(120.24)
9-78(124.44)
CLF-1
CLF-2A
CLF-2C
CLF-2B
CLF-101
CLF-107
CLF-103
LF-18D
LF-20D(123.52)
CLF-3A
CLF-3B
CLF-3C
CLF-104
CLF-106
CLF-105
MW-S38(120.33)
MW-SD38(120.48)
PZ-1A(115.75)
AR-01(127.52)
MW-SD41(122.03)
MW-SD44(121.85)
MW-SD45(123.32)
MW-SD42A(122.29)
MW-S40(123.32)
MW-SD40(123.34)
PT-03P(121.84)
MW-S37(120.32)
MW-SD37(120.71)
EW-1(123.34)
MW-SD43(121.87)
PT-10(123.45)
PT-09(123.61)
AR-PHS(123.6)
PT-04
MW-S39(120.51)
MW-SD39(120.11)
MW-S36(123.44)
MW-SD36(123.21)
MW-S32(123.63)
MW-SD32(123.67)
MW-SD34(123.67)
PT-11(123.75)
MW-S26(124.27)
MW-SD26(123.72)
MW-S15(124.87)
OW-1(127.67)
MW-1(126.95)
OW-2(128.33)
OW-3(126.26)
ASBRV-D2
P-1
P-1A
GZW-8-1(118.91)
P-2
P-2A
P-3A
P-3
P-4
SW-1
ML-1-1
ML-1-2
ML-3-1
MW-2
MW-S17
GZW-11-1
MW-S01
MW-SD01
MW-S27
MW-SD27
MW-SD17(130.18)
MW-S28(127.42)
MW-S29
MW-SD29
MW-S06
MW-SD06
MW-S07
MW-S30
MW-SD30
BLDG D
MW-S02
MW-SD02
MW-10
GZW-6-2
GZW-10-1
MW-SD13
MW-S14(127.29)
MW-S35(124.33)
MW-SD35(125.53)
ASBRV-U2(124.56)

Assabet River

Assabet River

Route 62 (Main Street)

Route 62 (Main Street)

Skating Rink

Shopping Plaza

Legend

- Monitoring Well
- Extraction Well
- Active Public Water Supply Well
- Assabet River Stage Elevation
- Surface Water
- Site Boundary
- Wetlands
- Groundwater Elevation Contour in Overburden (ft NGVD)
- Estimated Groundwater Elevation Contour in Overburden (ft NGVD)
- (121.8) Ground Water Elevation in Overburden (ft NGVD) (26 September 2016)

Notes:
1: Water levels were collected on September 26, 2016 within a 4 hour period.
2: The average flow rate at Assabet 1A for the two days prior to the water level gauging was 265 gpm.
3: Where multi-level overburden wells exist at a single location, data from the deeper well was prioritized in drafting contours.
4: Equipotentials were estimated by kriging the water elevations using Surfer 9. Kriging is a weighted moving average interpolation (extrapolation) method that minimizes the estimated variance of a predicted point (node) with the weighted average of its neighbors. The contours were further adjusted using professional judgement,
5: Groundwater elevation contours are interpreted and may not represent actual flow directions or gradients.

0 100 200 400 Feet

Groundwater Elevation Contours in Overburden (Prior to EW-1 Pump Test) September 26, 2016

Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts

Geosyntec consultants

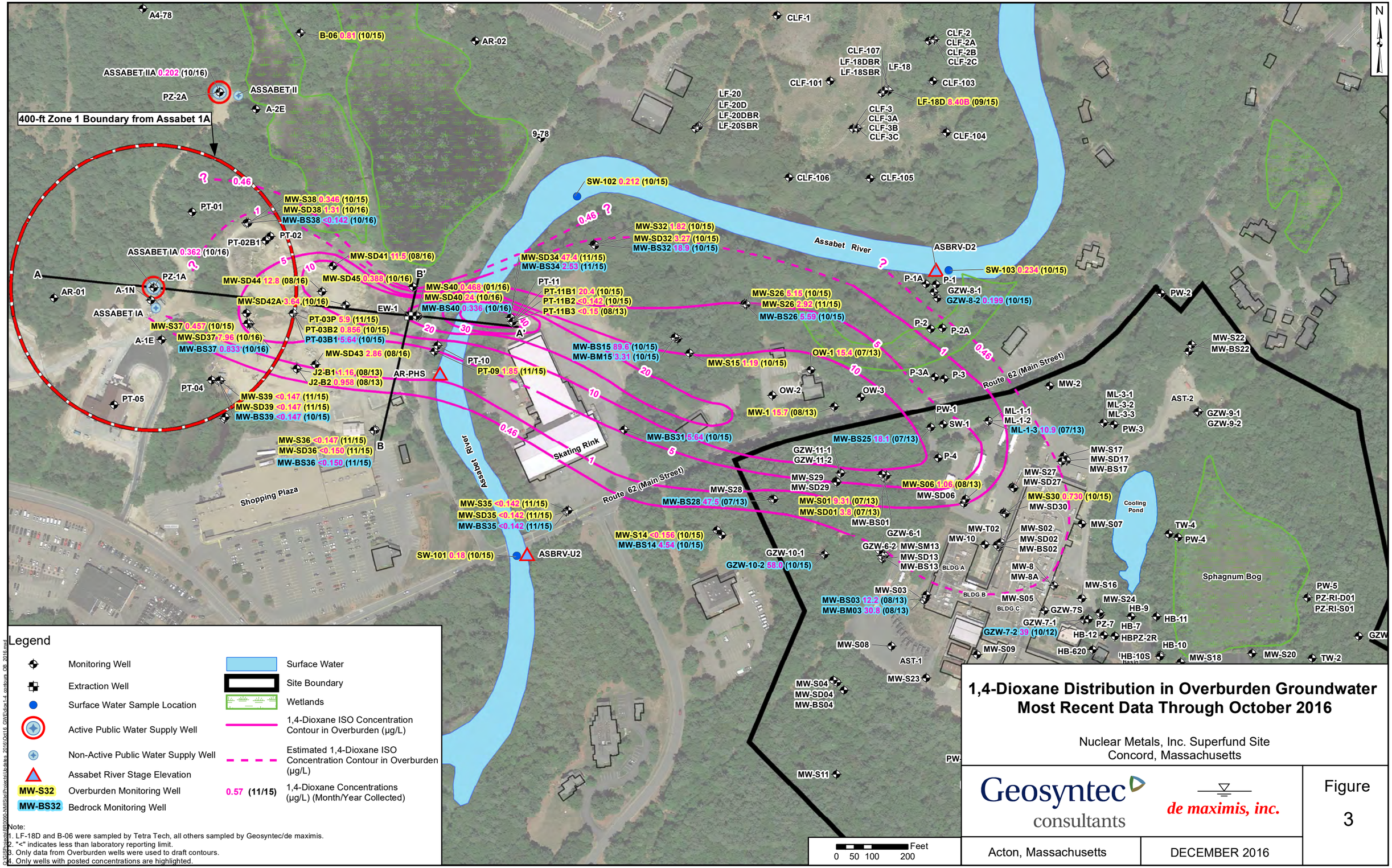
de maximis, inc.

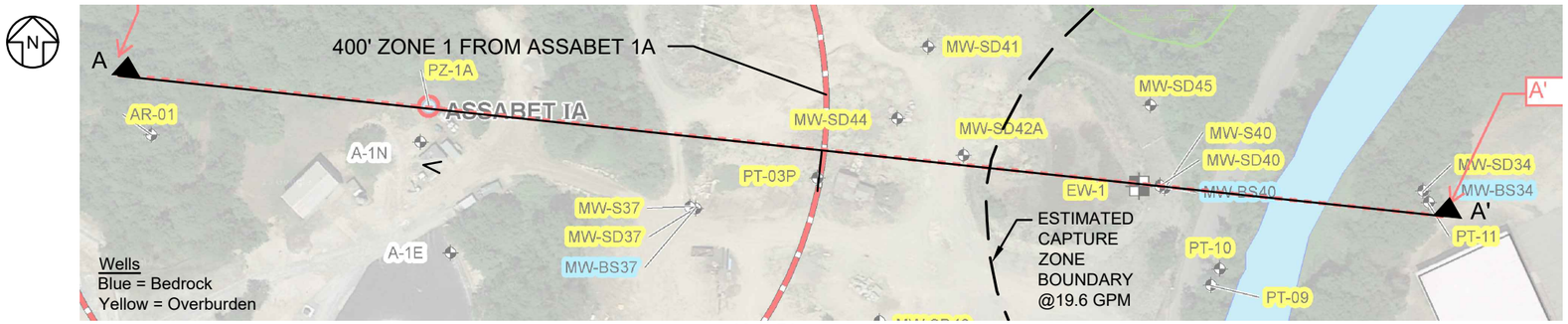
Acton, Massachusetts

DECEMBER 2016

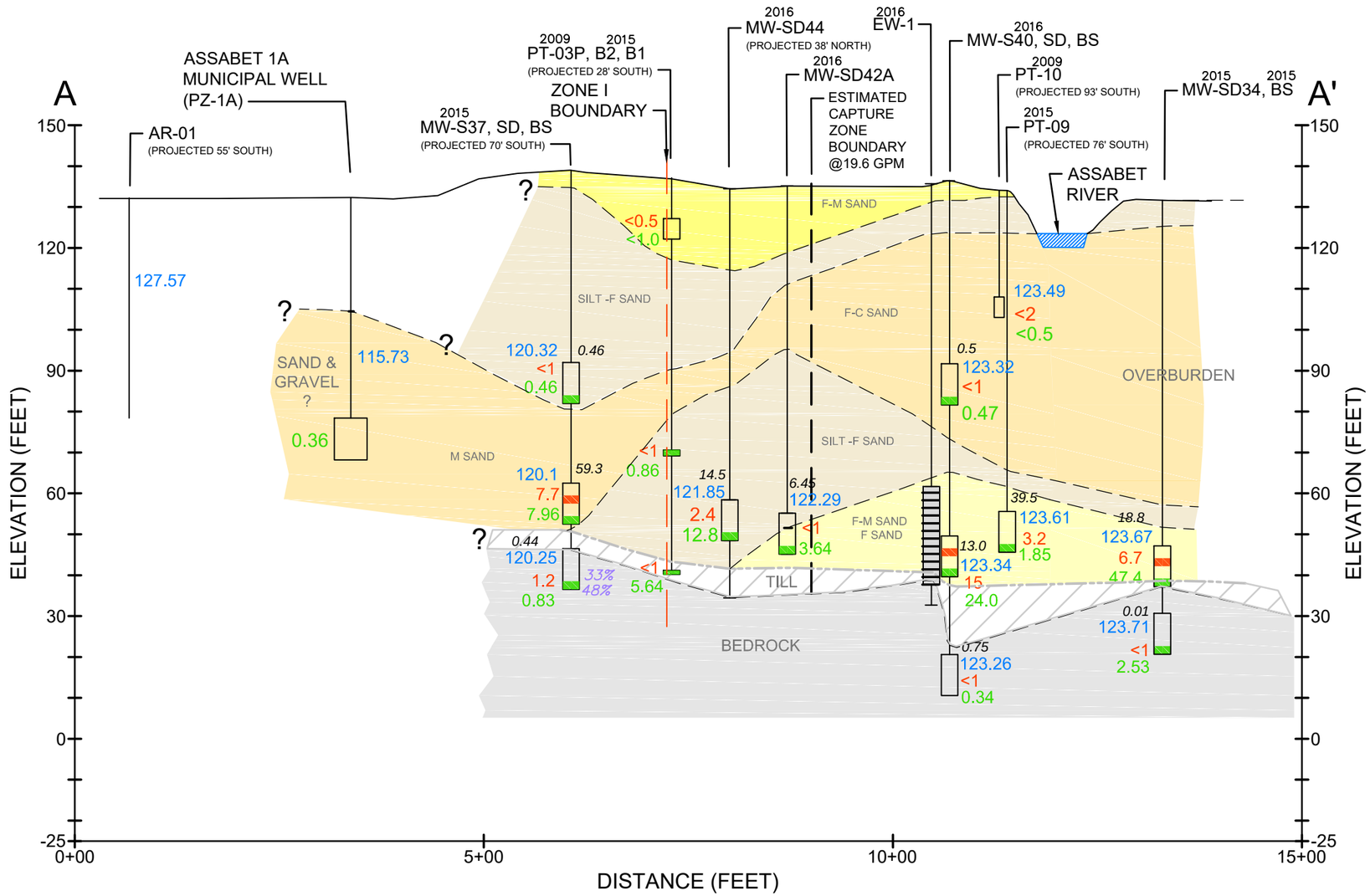
Figure 2

Q:\GIS\Projects\BRO090-NMI\Site\Projects\Updates_2016\Oct16_GWE\GWE_OB_sept26.mxd


A4-78
B-06 0.81 (10/15)
AR-02
CLF-1
CLF-2
CLF-2A
CLF-2B
CLF-2C
CLF-107
LF-18DBR
LF-18SBR
LF-18
CLF-101
CLF-103
LF-18D 8.40B (09/15)
ASSABET IIA 0.202 (10/16)
ASSABET II
PZ-2A
A-2E
400-ft Zone 1 Boundary from Assabet 1A
LF-20
LF-20D
LF-20DBR
LF-20SBR
CLF-3
CLF-3A
CLF-3B
CLF-3C
CLF-104
9-78
CLF-106
CLF-105
SW-102 0.212 (10/15)
Assabet River
ASBRV-D2
SW-103 0.234 (10/15)
P-1A
P-1
GZW-8-1
GZW-8-2 0.199 (10/15)
PT-01
MW-S38 0.346 (10/15)
MW-SD38 1.31 (10/16)
MW-BS38 <0.142 (10/16)
PT-02B1
PT-02
MW-S32 1.82 (10/15)
MW-SD32 3.27 (10/15)
MW-BS32 18.9 (10/15)
ASSABET IA 0.362 (10/16)
MW-SD41 11.5 (08/16)
MW-SD34 47.4 (11/15)
MW-BS34 2.53 (11/15)
A
PZ-1A
MW-SD44 12.8 (08/16)
MW-SD45 0.388 (10/16)
B'
PT-11
MW-S40 0.468 (01/16)
MW-SD40 24 (10/16)
PT-11B1 20.4 (10/15)
PT-11B2 <0.142 (10/15)
PT-11B3 <0.15 (08/13)
MW-S26 5.15 (10/15)
MW-S26 2.92 (11/15)
MW-BS26 5.59 (10/15)
AR-01
A-1N
MW-SD42A 3.64 (10/16)
EW-1
MW-BS40 0.336 (10/16)
A'
PW-2
ASSABET IA
MW-S37 0.457 (10/15)
PT-03P 5.9 (11/15)
PT-03B2 0.856 (10/15)
PT-03B1 5.64 (10/15)
MW-SD37 7.96 (10/16)
MW-BS37 0.833 (10/16)
A-1E
MW-BS15 89.6 (10/15)
MW-BM15 3.31 (10/15)
MW-S15 1.19 (10/15)
OW-1 15.4 (07/13)
P-2
P-2A
MW-S22
MW-BS22
MW-SD43 2.86 (08/16)
PT-10
PT-09 1.85 (11/15)
J2-B1 1.16 (08/13)
J2-B2 0.958 (08/13)
AR-PHS
P-3A
P-3
Route 62 (Main Street)
MW-2
PT-04
PT-05
OW-2
OW-3
MW-1 15.7 (08/13)
PW-1
SW-1
ML-3-1
ML-3-2
ML-3-3
PW-3
AST-2
GZW-9-1
GZW-9-2
MW-S39 <0.147 (11/15)
MW-SD39 <0.147 (11/15)
MW-BS39 <0.147 (10/15)
ML-1-1
ML-1-2
ML-1-3 10.9 (07/13)
MW-BS31 5.64 (10/15)
MW-BS25 18.1 (07/13)
MW-S17
MW-SD17
MW-BS17
B
GZW-11-1
GZW-11-2
P-4
MW-S36 <0.147 (11/15)
MW-SD36 <0.150 (11/15)
MW-BS36 <0.150 (11/15)
Skating Rink
Assabet River
MW-S29
MW-SD29
MW-S28
MW-BS28 47.5 (07/13)
MW-S06 1.06 (08/13)
MW-SD06
MW-S27
MW-SD27
MW-S30 0.730 (10/15)
MW-SD30
MW-S01 9.31 (07/13)
MW-SD01 3.8 (07/13)
MW-BS01
Cooling Pond
MW-S07
TW-4
PW-4
Shopping Plaza
MW-S35 <0.142 (11/15)
MW-SD35 <0.142 (11/15)
MW-BS35 <0.142 (11/15)
MW-S14 <0.156 (10/15)
MW-BS14 4.54 (10/15)
GZW-6-1
MW-T02
MW-10
MW-S02
MW-SD02
MW-BS02
SW-101 0.18 (10/15)
ASBRV-U2
GZW-10-1
GZW-10-2 58.0 (10/15)
GZW-6-2
MW-SM13
MW-SD13
MW-BS13
BLDG A
MW-8
MW-8A
Sphagnum Bog
PW-5
PZ-RI-D01
PZ-RI-S01
MW-S03
MW-BS03 12.2 (08/13)
MW-BM03 30.8 (08/13)
BLDG B
MW-S05
BLDG C
MW-S16
MW-S24
GZW-7S
HB-9
HB-11
GZW-7-1
PZ-7
HB-7
GZW-7-2 39 (10/12)
HB-12
HBPZ-2R
HB-10
MW-S08
MW-S09
HB-620
HB-10S
MW-S18
MW-S20
TW-2
AST-1
MW-S23
MW-S04
MW-SD04
MW-BS04
MW-S11
Legend
Monitoring Well
Extraction Well
Surface Water Sample Location
Active Public Water Supply Well
Non-Active Public Water Supply Well
Assabet River Stage Elevation
MW-S32 Overburden Monitoring Well
MW-BS32 Bedrock Monitoring Well
Surface Water
Site Boundary
Wetlands
1,4-Dioxane ISO Concentration Contour in Overburden (µg/L)
Estimated 1,4-Dioxane ISO Concentration Contour in Overburden (µg/L)
0.57 (11/15) 1,4-Dioxane Concentrations (µg/L) (Month/Year Collected)
Note:
1. LF-18D and B-06 were sampled by Tetra Tech, all others sampled by Geosyntec/de maximis.
2. "<" indicates less than laboratory reporting limit.
3. Only data from Overburden wells were used to draft contours.
4. Only wells with posted concentrations are highlighted.
Feet
0 50 100 200
N
1,4-Dioxane Distribution in Overburden Groundwater
Most Recent Data Through October 2016
Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts
Geosyntec consultants
de maximis, inc.
Figure 3
Acton, Massachusetts
DECEMBER 2016



Key Plan
1" = 150'



LEGEND

- EXISTING GROUND SURFACE
- TOP OF TILL
- TOP OF BEDROCK

MONITORING WELL

SCREENED INTERVAL

BARCAD SAMPLER

- 0.46 HYDRAULIC CONDUCTIVITY (FT/DAY)
- 120.25 GROUNDWATER ELEVATION
- 2.4 TCE (ug/L)
- 12.8 1,4-DIOXANE (ug/L)
- 50% ROCK QUALITY DESIGNATION (RQD)

ROD CLEANUP LEVELS	
MCLs ug/L	
TCE	5
RISK BASED ug/L	
1,4-DIOXANE	0.46

- OVERBURDEN
- GLACIAL TILL
- BEDROCK

EXTRACTION WELL

NOTES:

1. J = ESTIMATED VALUE: COMPOUND IS DETECTED, BUT BELOW THE SAMPLE QUANTITATION LIMIT.
2. MCL = MAXIMUM CONTAMINANT LIMIT. ROD = RECORD OF DECISION, SEPTEMBER 2015.
3. DEPTHS TO TOP OF BEDROCK AND WELL SCREENS ARE APPROXIMATE.
4. WELL NAME DESIGNATIONS FROM LEFT TO RIGHT INDICATE THE SHALLOWEST TO THE DEEPEST AT THAT LOCATION.
5. WELL SCREEN COLORED WHEN COMPOUND EXCEEDS ROD CLEANUP LEVEL.
6. ASSUMED GROUND SURFACE AT ASSABET 1A = 132.25 BASED ON GROUND SURFACE ELEVATION FROM 1970.
7. AT THE TIME OF WATER LEVEL MEASUREMENTS, ASSABET 1A WAS PUMPING AT AN AVERAGE RATE OF 263 GPM.
8. WATER LEVEL MEASUREMENTS TAKEN 26 SEPTEMBER 2016.
9. 1,4-DIOXANE & TCE DATA FROM SAMPLES COLLECTED BETWEEN OCT. 2015 & OCT. 2016 EXCEPT FOR PT-10 AND PT-03P SAMPLED IN 2009. MOST RECENT DATA IS SHOWN FOR EACH ANALYTE.

Approximate Scale
Horizontal 1" = 150'
Vertical 1" = 30'

VOCs and 1,4-Dioxane Distribution in Cross-Section A - A', Data through October 2016

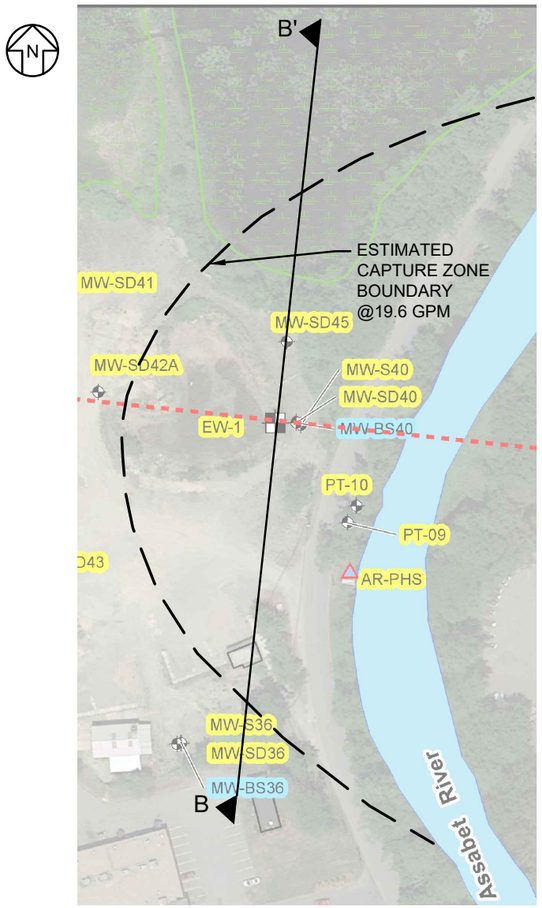
Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts

Geosyntec consultants

ACTON, MA | DECEMBER 2016

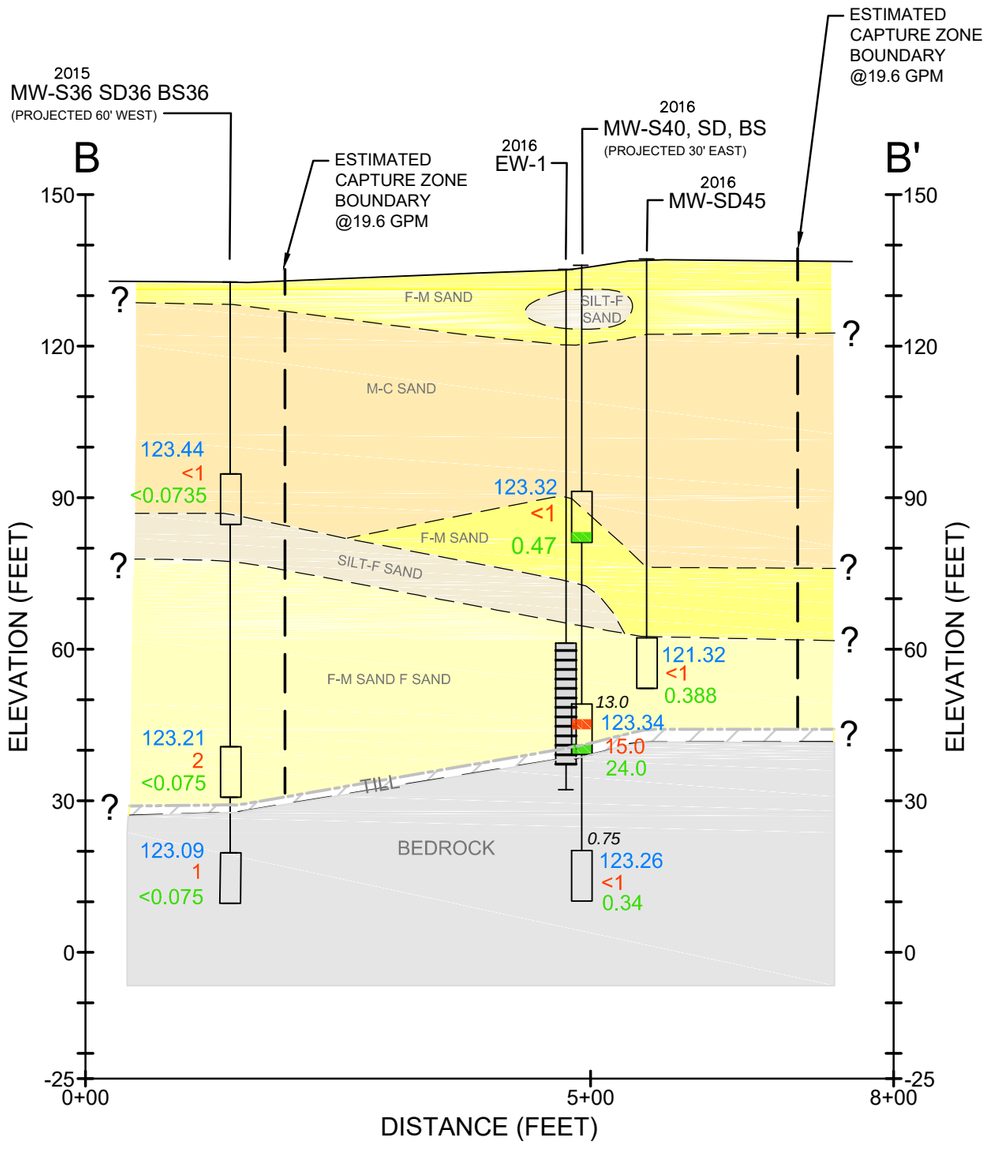
FIGURE 4

T:\PROJECTS_CADD\N\NMI (NUCLEAR METALS SUPERFUND SITE)\FIGURES\2016-12 EXT SYS RPT\BR0090B-F07 (SECT A_B)



Key Plan
1" = 150'

Wells
Blue = Bedrock
Yellow = Overburden



LEGEND

- EXISTING GROUND SURFACE
- TOP OF TILL
- TOP OF BEDROCK

MONITORING WELL
SCREENED INTERVAL
BARCAD SAMPLER
0.46 HYDRAULIC CONDUCTIVITY (FT/DAY)
120.25 GROUNDWATER ELEVATION
2.4 TCE (ug/L)
12.8 1,4-DIOXANE (ug/L)
50% ROCK QUALITY DESIGNATION (RQD)

ROD CLEANUP LEVELS
MCLs ug/L
TCE 5
RISK BASED ug/L
1,4-DIOXANE 0.46

- OVERBURDEN
- GLACIAL TILL
- BEDROCK
- EXTRACTION WELL

NOTES:

1. J = ESTIMATED VALUE: COMPOUND IS DETECTED, BUT BELOW THE SAMPLE QUANTITATION LIMIT.
2. MCL = MAXIMUM CONTAMINANT LIMIT. ROD = RECORD OF DECISION, SEPTEMBER 2015.
3. DEPTHS TO TOP OF BEDROCK AND WELL SCREENS ARE APPROXIMATE.
4. WELL NAME DESIGNATIONS FROM LEFT TO RIGHT INDICATE THE SHALLOWEST TO THE DEEPEST AT THAT LOCATION.
5. WELL SCREEN COLORED WHEN COMPOUND EXCEEDS ROD CLEANUP LEVEL.
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9. 1,4-DIOXANE & TCE DATA FROM SAMPLES COLLECTED BETWEEN OCT. 2015 & OCT. 2016 EXCEPT FOR PT-10 AND PT-03P SAMPLED IN 2009. MOST RECENT DATA IS SHOWN FOR EACH ANALYTE.

Approximate Scale
Horizontal 1" = 150'
Vertical 1" = 30'

VOCs and 1,4-Dioxane Distribution in Cross-Section B - B', Data through October 2016
Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts

Geosyntec consultants

ACTON, MA | DECEMBER 2016

FIGURE
5

T:\PROJECTS_CADD\N\NMI (NUCLEAR METALS SUPERFUND SITE)\FIGURES\2016-12 EXT SYS RPT\BR0090B-F07 (SECT A_B)

ASSABET III

ASSABET IIA

ASSABET IA

400-ft Zone 1 Boundary from Assabet 1A

A4-78
B-06 (0.01)
AR-02
PZ-2A (0.02)
A-2E
9-78 (0.03)
PT-01
MW-S38
MW-SD38 (0.07)
MW-BS38 (0.11)
PZ-1A (0.07)
AR-01
MW-SD41 (0.51)
MW-SD44 (0.48)
MW-SD42A (0.60)
MW-SD45 (0.73)
252 ft
343 ft²/day
81 ft
792 ft²/day
21 ft
944 ft²/day
MW-S40 (0.14)
MW-SD40* (1.55)
MW-BS40 (0.72)
179 ft
235 ft²/day
EW-1 (55.92)
MW-S37 (0.10)
MW-SD37 (0.15)
MW-BS37 (0.14)
PT-03P (0.08)
A-1E
123 ft
960 ft²/day
294 ft
383 ft²/day
PT-10 (0.09)
PT-09* (0.53)
MW-SD43 (0.31)
334 ft
1,090 ft²/day
AR-PHS (0.038)
MW-S39 (0.05)
MW-SD39 (0.07)
MW-BS39 (0.10)
PT-04
PT-05
J3-B1
J3-B2
MW-S36 (0.04)
MW-SD36* (0.23)
MW-BS36 (0.23)
MW-SD34 (0.15)
MW-BS34 (0.20)
PT-11 (-0.01)
MW-S32 (0.04)
MW-SD32 (0.05)
MW-BS32 (0.08)
Assabet River
Assabet River
Skating Rink
Shopping Plaza
Route 62 (Main Street)
Route 62 (Main Street)
ASBRV-U2
ARSBV-D2
P-1A
P-1
GZW-8-2
GZW-8-1 (-0.07)
MW-S26 (-0.08)
MW-SD26 (-0.06)
MW-BS26 (0.04)
MW-BM15 (0.04)
MW-BS15 (0.05)
MW-S15 (-0.04)
P-2
P-2A
OW-1 (-0.05)
P-3A
P-3
OW-2 (-0.01)
OW-3 (-0.03)
MW-1 (-0.04)
PW-1
SW-1 (0.0102)
MW-BS31 (0.1092)
MW-BS25 (0.012)
P-4
MW-2
ML-3-2
ML-3-1
ML-3-3
ML-1-1
ML-1-2
ML-1-3
ML-2-1
ML-2-2
ML-2-3
MW-S17
MW-SD17 (-0.
MW-BS17 (0.01)
MW-S27
MW-SD27
MW-S30
MW-SD30
MW-S07
MW-T02
BLDG D
MW-10
MW-S02
MW-S01
MW-SD01
MW-BS01
MW-S06
MW-SD06
GZW-11-1
GZW-11-2
MW-S29
MW-SD29
MW-S28 (-0.02)
MW-BS28 (0.01)
MW-S35 (-0.05)
MW-SD35 (0.03)
MW-BS35 (0.01)
MW-S14 (-0.02)
MW-BS14 (0.02)
GZW-6-1
GZW-6-2
GZW-6-3
GZW-10-1
GZW-10-2
MW-SD13
MW-SM13
CLF-1
CLF-2
CLF-2A
CLF-2B
CLF-2C
LF-18D
LF-18SBR
LF-18DBR
CLF-103
CLF-101
CLF-107
LF-18
LF-20
LF-20SBR (0.21)
LF-20DBR (-0.01)
LF-20D (0.04)
CLF-3A
CLF-3B
CLF-3C
CLF-3
CLF-104
CLF-106
CLF-105
0
0.25
0.5
1
1.25
0.75
0.25
0.5
0
0.25

N

0 100 200 400 Feet

Legend

- Monitoring Well
- Extraction Well
- Active Public Water Supply Well
- Assabet River Stage Elevation
- Surface Water
- Site Boundary
- Maximum Drawdown Contour (feet)
- Estimated Maximum Drawdown Contour (feet)
- 21 / 943 — Linear distance from EW-1 (feet) / Transmissivity (square feet per day)
- MW-S32 (0.31) — Maximum Drawdown Observed at Monitoring Well
- MW-S32 — Overburden Monitoring Well
- MW-BS32 — Bedrock Monitoring Well

Notes:
1: * Indicates an individual well used for transmissivity estimates.
2: Where multi-level overburden wells exist at a single location the deeper was used in drafting maximum drawdown contours
3. Drawdown contours represent maximum observed drawdown during EW-1 pump test, which was pumped at a rate of approximately 19.6 gpm for 3 days.
4. Assabet municipal well IA was pumping at an average rate of 263 gpm during the EW-1 pump test.
5. Transmissivity estimates were derived by performing curve matching on time vs. drawdown data.

Q:\GIS\Projects\BRK090-NM\Site\Projects\Updates 2016\Oct16 GW\E3-Day Constant Rate Pump Test.mxd

EW-1, 3-Day Constant Rate Pump Test: Drawdown Contours

Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts

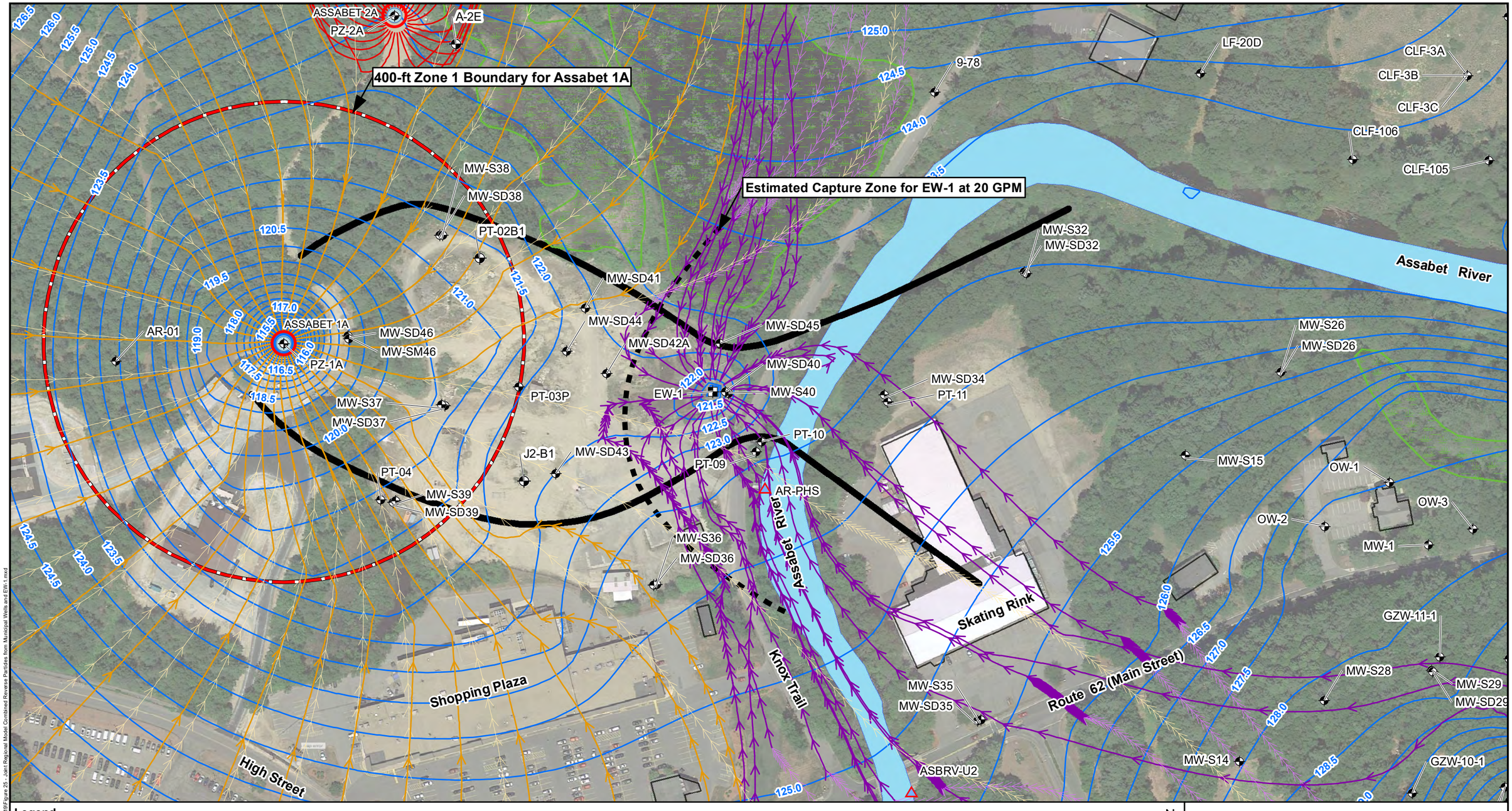
Geosyntec consultants

de maximis, inc.

Figure 6

Acton, Massachusetts

OCTOBER 2016



Legend

- Monitoring Well
- Extraction Well
- Active Public Water Supply Well
- Assabet River Stage Elevation
- Wetlands
- Overburden Equipotential Contour (ft)
- 1,4 Dioxane Extent (August, 2017)

Combined Particles from Municiapal Wells and EW-1

- Assabet 1A, Bedrock
- Assabet 1A, Overburden
- Assabet 2A, Overburden
- EW-1, Bedrock
- EW-1, Overburden

Notes:
1. Assabet 1A was simulated to pump at 311 gpm, Assabet 2A was simulated to pump at 135 gpm, and EW-1 was simulated to pump at 20 gpm.
2. The estimates capture zone and stagnation points were estimated graphically from pumping groundwater elevation contours and analytically from transmissivity estimates and non-pumping gradients.
3. Equipotentials represent heads in the overburden and were exported from model layer 2.
4. Particle Pathline arrows are posted at 180 day intervals.
5. Reverse particles originate in a 20 ft radius around screened interval of the wells in the model. The reverse particles travel upgradient from the point of origin.
6. Particle Pathlines presented are from all layers with longer travel paths from layers representing till and bedrock.

N

0 100 200 400 Feet

Joint Regional Model Combined Reverse Particles from Municipal Wells and EW-1

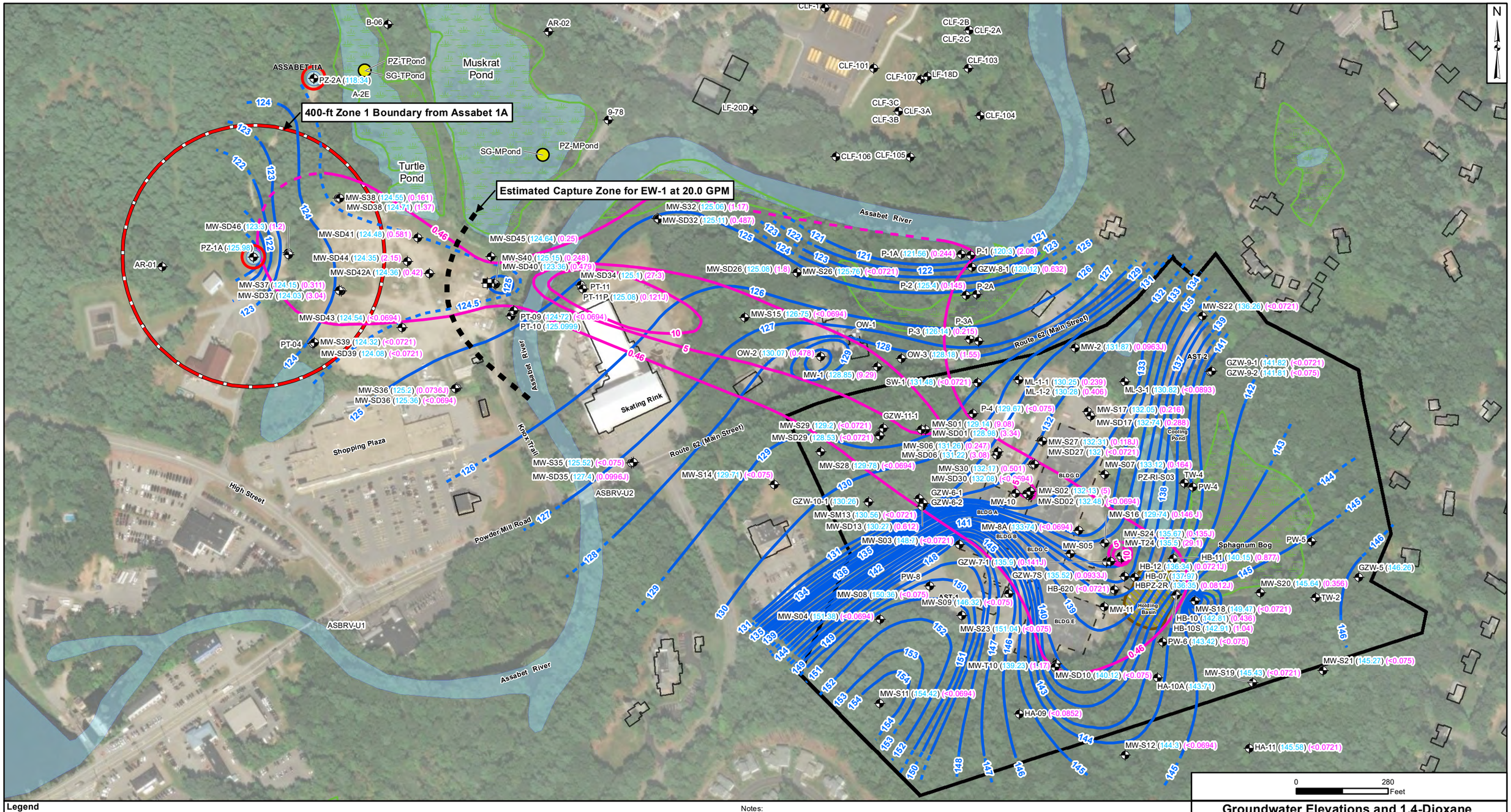
Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts

Geosyntec consultants

Acton, Massachusetts | April 2019

Figure 7

Q:\GIS\Projects\BR0090-NMS\Site\Projects\Model_Domain\2019\Figure 25 - Joint Regional Model Combined Reverse Particles from Municipal Wells and EW-1.mxd



Legend

- Extraction Well
- Monitoring Well
- Abandoned Monitoring Well
- Staff Gauge and Drive Point Piezometer Locations
- Active Public Water Supply Well
- Wetlands
- Surface Water
- Site Boundary
- Former Building Concrete Foundation
- Building Outline
- (123.83) Groundwater Elevation November 10, 2019 (ft NGVD)
- (2.15) 1,4-Dioxane Concentration November 11-19 2019 (µg/L)
- Groundwater Elevation Contour in Overburden (ft NGVD) - November 2019
- Estimated Groundwater Elevation Contour in Overburden (ft NGVD) - November 2019
- 1,4-Dioxane Isoconcentration Contour in Overburden (µg/L) November 2019
- Estimated 1,4-Dioxane Isoconcentration Contour in Overburden (µg/L) November 2019

DRAFT

Notes:
1: Water levels were collected on November 10, 2019.
2: The average pumping rate at municipal well Assabet 1A, for the 24-hour period prior to the water level round was 198 gpm, and for Assabet IIA was 116 gpm.
3: Where multi-level overburden wells exist at a single location, data from the most appropriate well was prioritized in drafting contours. In general, contours represent deeper overburden.
4: Equipotentials were estimated by kriging the water elevations using Surfer 9. Kriging is a weighted moving average interpolation (extrapolation) method that minimizes the estimated variance of a predicted point (node) with the weighted average of its neighbors. The contours were further adjusted using professional judgement.
5: Groundwater elevation contours are interpreted and may not represent actual flow directions or gradients.
6: EW-1 was pumping at a rate of 20 gpm since June 6 2017. The average pumping rate at EW-1 during the 24-hour period prior to the water level round was approximately 10.8 gpm due to an 11-hour shutdown on 9 November 2019.
7: The dashed 124.5 contour was added in the Assabet well field is used to assist in evaluating EW-1 capture.
8: The November 2019 MW-S16 Depth to Water was adjusted using a limited water level round conducted on 23 January 2020.
9. 1,4-dioxane data from monitoring wells were collected on November 11-19, 2019.
10. < = less than laboratory method detection limit. J = estimated detection below method quantitation limit.

Groundwater Elevations and 1,4-Dioxane Distribution in Overburden Groundwater - November 2019

Nuclear Metals, Inc. Superfund Site
Concord, Massachusetts

Geosyntec consultants | de maximis, inc.

Acton, Massachusetts | April 2020

Figure 8

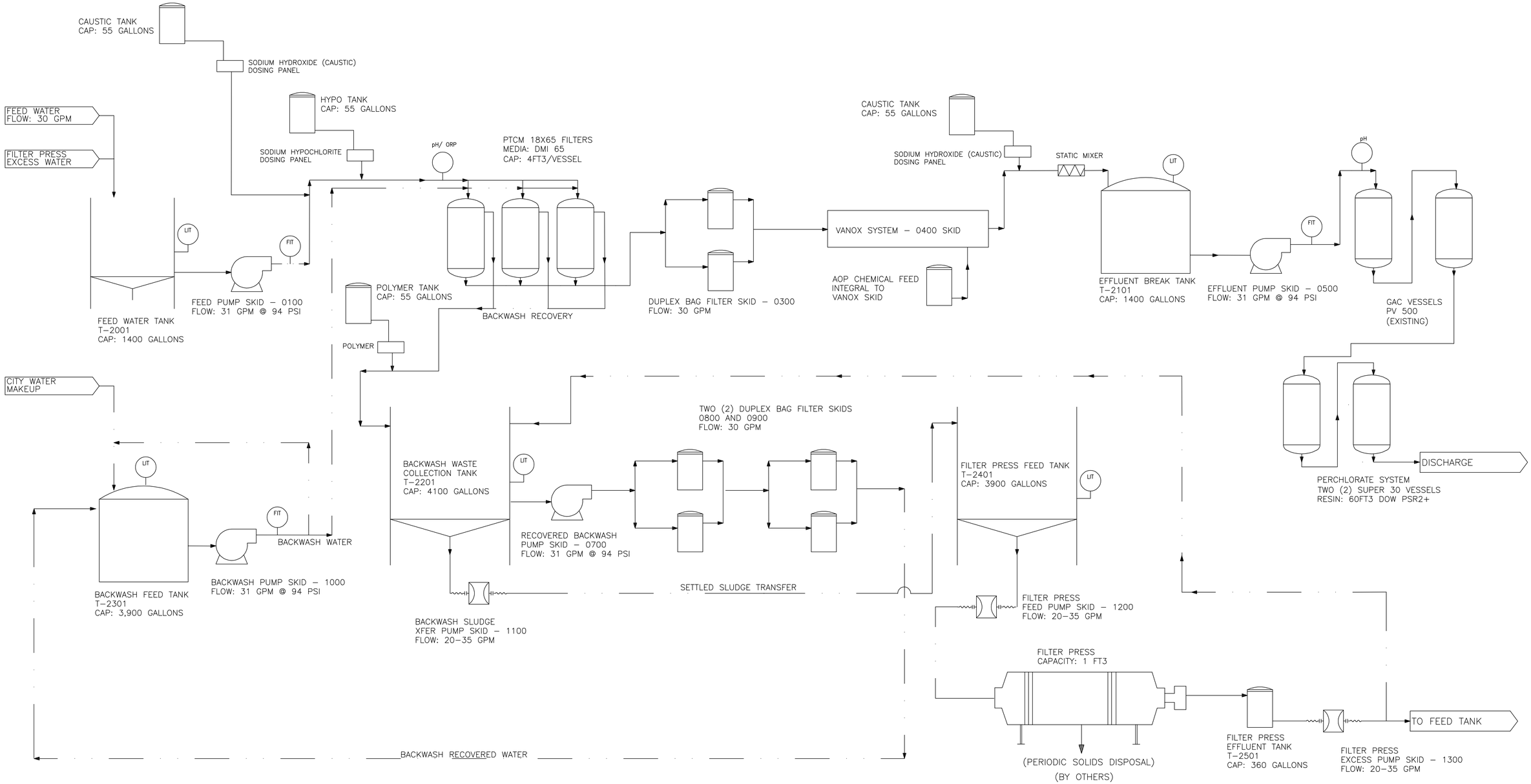
Q:\GISProjects\BR0090-NMISite\Projects\Updates_2020\Demaximis_Request\Figure 1 - Groundwater Elevations and 1,4-Dioxane Distribution in Overburden Groundwater – November 2019.mxd 4/2/2020 10:32:36 PM

Appendix A

Statement of Actual Costs Incurred and Project Vendors (through end of January 2020)

Subcontractor / Vendor	Purpose	Total Paid
Acton Water District	Property Lease	$ 24,515.33
Black Lab Alarm	Security Alarm	$ 1,512.00
Cascade	Drilling	$ 64,154.00
Colliers	Property Appraisal	$ 2,000.00
Commonwealth of Mass	Disposal Fee	$ 482.00
ddms	Data Validation / Management / website maintenance	$ 222,841.63
de maximis, inc.	Project Management	$ 2,068,076.57
EPA	Oversight	$ 226,182.53
EQ	Water Disposal	$ 47,515.00
Evoqua	Treatment System Equipment	$ 953,342.47
GEL	Lab Analysis	$ 3,170.02
Geosyntec	Hydrogeological Support / Modeling	$ 747,127.31
Hancock Survey Assc.	Survey and Tight Tank	$ 10,895.43
Hinckley Allen	Legal - Trust Review	$ 2,000.00
IRS	Taxes on Trust Earnings	$ 152.00
O&M	Labor (includes lab analysis, electrical and plumbing subcontractors)	$ 1,711,303.17
Orsi Arone	Legal - Contract and Lease Negotiation	$ 10,022.81
Senate	Treatment Building	$ 549,313.32
UHY	Trust Accounting	$ 4,150.00
US Bank	Trust Management	$ 26,500.00
Totals		**$ 6,675,255.59**

Appendix B
Treatment System Process Flow Diagram and Lay Out



NOTE:
1. INSTRUMENTATION AND PIPING INTEGRAL TO THE SKID NOT SHOWN
2. ALL INTERCONNECTING PIPING BETWEEN EVOQUA SUPPLIED EQUIPMENT, BY CUSTOMER.

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
1	UPDATED, AS-BUILT	05/29/20	ASB	AP	KB	
0	RELEASE FOR INFORMATION	07/17/18	ASB	AP	KB	

		DATE
DESIGNER	ASB	07/17/18
CHECKER	AP	07/17/18
ENGINEER	ASB	07/17/18
MANAGER	KB	07/17/18

FILE: 1200_000999-9101_0.dwg
SCALE: NONE

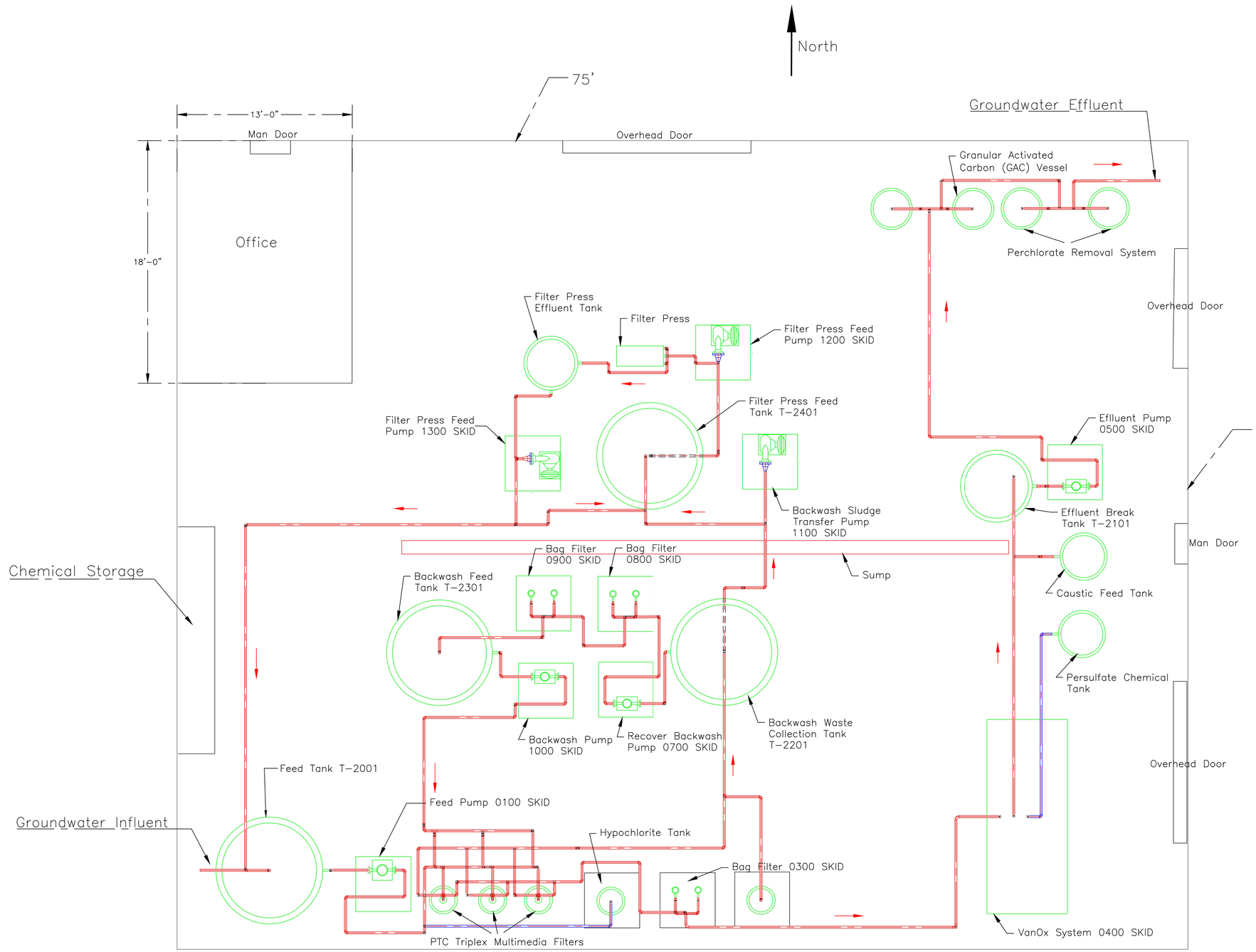
TITLE: PROCESS FLOW DIAGRAM
1,4 DIOXANE REMOVAL SYSTEM

CLIENT: *de maximis*
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		7-2 PFD	1 OF 1	1

STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE



General Notes

Prepared For

de maximis, inc.

200 Day Hill Road
Suite 200
Windsor, CT 06095

O&M, Inc.
Environmental Solutions

No.	Revision/Issue	Date

Drawing Name

System Layout

Project Name and Address

Nuclear Metals
Superfund Site

Concord, Massachusetts

Area	Stamp
Drawing Number: Figure 7.3	
Author: Ncarabillo	

C:\Users\Ncarabillo\Desktop\Ncarabillo\NMI NTCRA Groundwater\Section 00 de maximis\Designs\NMI autoCAD\Orthos\DWGs\testortho.dwg

Appendix C
Optimization Report

de maximis, inc.
200 Day Hill Road
Suite 200
Windsor, CT 06095
(860) 298-0541
(860) 298-0561 FAX

March 16, 2020

Christopher Smith
Remedial Project Manager
EPA Region 1
5 Post Office Square, Suite 100
Mail Code OSRR 07-4
Boston, MA 02109-3912

Subject: Nuclear Metals, Inc. Site, Concord, MA
Remedial Design / Remedial Action
Responses to Comments and Revised Treatment System Optimization

Dear Mr. Smith:

This letter responds to EPA's comments received on February 25, 2020 for the "Treatment System Optimization Plan Report" submitted to the Agencies on February 13, 2020. The following sections reiterate the Agency's comments and responds to each to provide clarity as needed. Attachment 1 to this letter provides the revised Treatment System Optimization Report.

Agency Comments:

1. *In Section 4, the proposed operational settings list 19 ml/min for the persulfate, while Table 3 and the last paragraph list 18 ml/min. It is assumed the "19" is a typo and should be corrected.*

   ***Response*:** Correct, the proposed operational settings included a sodium persulfate dose rate of 18mL/min. The text has been updated to properly report the actual dose rate.

2. *The decreasing % activation with decreasing persulfate concentration, as listed in Table 2, seems counterintuitive. It would be expected that excess persulfate with increasing concentrations would result in a lower overall percent activation. Please provide additional explanation for why this is not what the data show.*

   ***Response*:** The above assumption would be correct if the reactant was being added to a concentrated solution of reagents. However, especially in low concentrations, an increase in reactant concentration (sodium persulfate) increases the reaction rate ("Activation %" is a function of reaction rate). Reaction rate is a non-linear function, and in low concentrations, any increase in

concentration increases the possible *reaction sites* within the solution allowing for a higher probability a reaction will occur.

Reaction rate is defined as $\Delta concentration/\Delta time$. The most effective way to measure it is to monitor the change in products from the reaction. For the Vanox system, the molecule we measure is SO_4. For discussion purposes, assume the travel time through the Vanox Reactor is 5 seconds. Based on the values observed during the study, we can identify the reaction rates at varying concentrations:

Theoretical Reaction Rate at 13mL/min: $100ppm - 76ppm/\ 5\ seconds$
= 4.8 ppm/s

Theoretical Reaction Rate at 9mL/min: $88.7ppm - 76ppm/\ 5seconds$
= 2.54 ppm/s

This increase in reaction rate allows more reagents to react in the same period of time, resulting in a higher "Activation %".

3. *Because the system doesn't appear to have a way of measuring the degree of coating occurring on the lamps during routine operation, please add a short discussion regarding whether the proposed settings would be capable of meeting the treatment goal at the point where the sediment has broken through the VanOx so that it is observable in the sight tube of the effluent storage tank and/or a discussion of how the manganese removal pre- treatment system mitigates the potential for this issue to arise.*

***Response*:** The inclusion of the additional NaOH dosing skid, prior to the DMI-65 media is the most important piece in reducing the chance of sediment build up within the reactors. Since this piece was put in place, we have seen minimal effect on the reactors and are confident that sediment build up within the reactors will not be as abundant as it was during early operations. In addition, we have included additional operational methods that will even further increase the ability to maintain proper treatment. These include:

- During the Optimization Testing, the "optimal settings" were identified to be 55% UV intensity and 15.14mL/min dose rate. However, we have decided to operate at 65% UV intensity and 18mL/min dose rate as a conservative operational procedure to reduce the likelihood of inadequate treatment.
- In addition, the maintenance procedures for the system include a bi-annual cleaning of the Vanox Reactors, which has been implemented since the approval of the O&M Plan. Based on the minimal sediment build up since inclusion of the NaOH dosing skid, semi-annual cleaning is considered adequate to control minimal accumulation.
- The system includes light intensity monitoring that is tracked in the operator's inspection log that is completed each day on site. A significant decrease in light

intensity will be interpreted as coating build up, which would trigger immediate attention.

Please contact me at (860) 298-0541 if you have any questions.

Sincerely,

Bruce Thompson
Project Coordinator

Enclosure

cc: Garry Waldeck, MassDEP
Andy Schkuta, AECOM
Respondents

Attachment 1
Revised Treatment System Optimization Report

Introduction

The purpose of this NMI Vanox Optimization Report is to summarize and present the findings of the optimization study completed in accordance with the Treatment System Optimization Plan (Revision 1) (*Optimization Plan*) approved by the United States Environmental Protection Agency (EPA) on July 2, 2019. The Optimization Plan was designed to test variable settings on the Groundwater Treatment System (system) with the goal of optimizing operations to the extent possible for long-term efficiency. The Optimization Plan's intent was to adjust the UV lamp power and sodium persulfate dosing rates and monitor the system's ability to treat 1,4-dioxane throughout the varying conditions. Identification of minimal UV lamp intensities and sodium persulfate dosing rates would result in optimal settings for long term labor and cost savings.

Project Background

The NMI extraction well (EW-1) has been in operation since May 2017, resulting in hydraulic containment of the 1,4-dioxane plume originating at the site. The flowrate of ~20 gallons per minute (gpm) has been effective at maintaining the capture zone and cutting off the path for upgradient contaminants to migrate towards the Assabet 1A supply well. Between May 2017- April 2019 the extracted groundwater was treated through a Temporary Groundwater Treatment System (TGTS) utilizing granulated activated carbon (GAC) for treatment of VOCs (TCE) while having minimal effect on 1,4-dioxane.

Since April 24, 2019, the final groundwater treatment system has been in operation. This system uses an advanced oxidation process (AOP) and pairs sodium persulfate with UV light to destroy the 1,4-dioxane and VOCs in extracted groundwater. Early operations resulted in manganese deposition within the Vanox Reactors negatively affecting the treatment of 1,4-dioxane. To remedy this, an additional sodium hydroxide (NaOH) dosing pump was installed on October 18, 2019 upstream from the DMI-65 Media filters. Raising the pH by adding NaOH results in removal of manganese within the DMI-65 filters.

Results from startup sampling and compliance sampling have indicated that this system is effective at treating 1,4-dioxane to required discharge levels (>95% average removal rate). Initial operations were based on conservative settings the system manufacturer was confident would result in adequate 1,4-dioxane treatment. After the system's ability to treat 1,4-dioxane was demonstrated, the NMI Vanox Optimization Plan was developed to find the long-term optimal settings for the system. Testing pursuant to this plan began on December 6, 2019 and concluded December 16, 2019. Additional samples were collected in early 2020 to confirm the findings from the study. Test methods and findings are presented in Sections 3 and 4.

Methodology and Results

As presented in the Optimization Plan, the testing procedures included two separate

rounds of sample collection, with the second round of settings being dependent on results observed during Round 1. The following sections summarize the samples collected and resulting observations made throughout the optimization testing:

Round 1 Testing:
The initial Round 1 testing was completed on December 6, 2019. This round of sampling included operating the system for a minimum of 1-hour at the Initial Operational Settings and the "Theoretical 100% Activation" settings prior to sample collection. During set up, it was noted that for labor and efficiency purposes, it would be practical to collect an additional sample to help confirm result. This additional sample used a 65% lamp intensity and a 26.9 ml/min sodium persulfate injection rate. Table 1 presents the systems settings for each Round 1 sample and the corresponding results:

Table 1- Round 1 System Settings and Results

		Settings			Analytical Results			Calculations		
	Sample ID	Lamp Setting (%)	Sodium Persulfate Injection Rate (ml/min)	Sodium Persulfate Injection Rate (ppm)	Effluent 1,4-Dioxane (ppb)	Feed SO_4 (ppm)	Effluent SO_4 (ppm)	SO_4 Increase (ppm)	S_2O_8 Added (ppm)	Activation (%)
Initial Settings	MIDV-R175	75	26.9	81	<0.139	76	139	63	65.3	96.4
Additional Sample	MIDV-R165	65	26.9	81	<0.144	76	136	60	65.3	91.8
Theoretical 100% Activation	MIDV-R155	55	15.1	45.6	<0.139	76	104	28	36.8	76.1

Round 1 analysis indicated that non-detect concentrations of 1,4-dioxane were observed, however effluent sulfate concentrations were not observed at predicted levels. The work plan indicated that 117 ppm was the 100% activation threshold, but this did not consider sulfate concentrations in influent groundwater. When factored in, the effluent sulfate concentrations resulting directly from the Treatment System resulted in concentrations <117 ppm. These results indicated that the second round of testing would comply with "Result 4 Testing" and monitor the efficiency of the system while operating at 55% light intensity through lower dosing rates of sodium persulfate.

Round 2 Testing:
Round 2 testing was completed on December 16, 2019 and included operating the system at 55% light intensity and reducing the persulfate dose rate to less than original rates. Table 2 presents the system settings for each Round 2 sample and the corresponding results:

Table 2- Round 2 System Settings and Results

	Settings			Analytical Results			Calculations		
Sample ID	Lamp Setting (%)	Sodium Persulfate Injection Rate (ml/min)	Sodium Persulfate Injection Rate (ppm)	Effluent 1,4-Dioxane (ppb)	Feed SO_4 (ppm)	Effluent SO_4 (ppm)	SO_4 Increase (ppm)	S_2O_8 Added (ppm)	Activation (%)

Table 2- Round 2 System Settings and Results									
	Settings			Analytical Results			Calculations		
MIDV-R2T1	55	13	39.2	0.11	76	100	24	31.6	75.9
MIDV-R2T2	55	11	33.2	0.151	76	92.6	16.6	26.8	62.0
MIDV-R2T3	55	9	27.2	0.227	76	88.7	12.7	21.9	58.0

Round 2 analyses indicated that the lamp settings of 55% light intensities coupled with lower sodium persulfate dose rates did not increase the activation percentage. Optimization sampling confirmed that the Theoretical 100% Activation settings were the most conservative settings that still resulted in non-detect concentrations of 1,4-dioxane.

Recommended Settings

Based on the first eight months of operations it became evident that operation of the Treatment System results in sediment build up in the Vanox reactors. Due to this occasional deposition of sediment, it is recommended that a conservative approach be used for the operational settings. Though sampling indicates that settings of 55% light intensity and 15.14ml/min sodium persulfate dosing result in the optimal conditions for cost savings, the settings going forward have been selected to be slightly conservative. Based on these results, the operational settings will continue at 65% light intensity and a 18ml/min dose rate of sodium persulfate. An additional round of confirmation sampling was completed to confirm the efficacy of these settings. Table 3 presents the system settings for the confirmation sample and the corresponding results.

Table 3- Confirmation Sampling Results									
	Settings			Analytical Results			Calculations		
Sample ID	Lamp Setting (%)	Sodium Persulfate Injection Rate (ml/min)	Sodium Persulfate Injection Rate (ppm)	Effluent 1,4-Dioxane (ppb)	Feed SO4 (ppm)	Effluent SO4 (ppm)	SO4 Increase (ppm)	S2O8 Added (ppm)	Activation (%)
MIDV-01142020	55	15.14	45.6	0.439	-	-	-	-	-
MIDV55-02052020	55	15.14	45.6	<0.0326*	-	-	-	-	-
MIDV-65-02052020	65	18	54.2	<0.0326*	-	-	-	-	-

- Sulfate samples were not collected, as previous sampling had indicated sulfate values within acceptable ranges and 1,4-dioxane treatment to non-detect concentrations is the systems priority.
* Results are not yet validated

As evident in Table 3, the first round of confirmation sampling was completed while the Vanox reactors contained manganese sediment deposition resulting from routine system maintenance upstream of the reactors. Operational procedures have since been put in place to reduce the likelihood of manganese reaching the Vanox Reactors. Cleaning of the Vanox reactors was performed and an additional round of confirmation sampling including the more conservative settings was completed on February 5, 2020 with results that indicate adequate 1,4-dioxane treatment.

In conclusion, the optimization study was effective at identifying optimal settings to achieve proper treatment and reduce long-term operational costs. However, through the process it was identified that optimal settings may not be the most practical operational settings. The final settings (65% Lamp Intensity, 18mL/min sodium persulfate dose) do result in a reduction of electrical and chemical costs when compared to the Initial System Settings, however, include the conservative measures to ensure irregularities in January 10, 2020

Appendix D
Building Construction Field Oversight Documentation

NMI GW NTCRA Building Critical Completion Steps (Task, Constraint, Date/Time Completed, Notes)

Building Component	Part Constraint	Date Completed	Notes
Foundation			
Soil Review /Testing (Yankee)	W/ Nuclear Density Gauge	9/13/2018	
Foundation Footers	Correct Depth & location (4')	9/13/2018	
Rebar Placed	As Specified in Fundation Rebar Layout	9/13/2018	
Concrete Pour Monitor (Yankee)	Slump/Air/Rebar	9/13/2018	
Concrete Cylinder Compression Tests	Record Quantity (Yankee)	9/13/2018	Actual Quantity: 5
Pipe Penetrations (sleeve locations)	Location: one new inlet/outlet pipes	9/13/2018	Sleeves placed on new inlet and outlet pipes
Foundation Wall	6" above grade (100' 6")	9/21/2018	
Rebar placed	As Specified in Fundation Rebar Layout	9/19/2018	
Concrete Pour Monitor (Yankee)	Slump/Air/Rebar	9/19/2018	
Concrete Cylinder Compression Tests	Record Quantity (Yankee)	9/19/2018	Actual Quantity:5
Pipe Penetrations (sleeve locations)	Correct Location (TBT)	9/19/2018	2 for bathroom and 1 for electrical
Column Piers	Correct locations & Type (A/B/C)	9/21/2018	
Concrete Slab/Rebar	With Specified slope(100' to 99' 8")	12/17/2018	
Trench Section	Depth and Location (1' wide)	11/29/2018	
Reinforced Pads	Location and Size (all ~6" height)	12/21/2018	
VanOx	6' x 14'	12/21/2018	
Filter Press	5' x 2'-8"	12/26/2018	
2001	9' x 9'	12/21/2018	
2101	6'-4" x 6'-4"	12/21/2018	
2201	9' x 9'	12/21/2018	
2301	9' x 9'	12/21/2018	
2401	9' x 9'	12/21/2018	
Exterior Concrete Ramps	12" to 6" thick	12/17/2018	
*Concrete Ramp for 10x14 Door Redo	12" to 6" thick	5/9/2019	
Building			
Steel Frame	Cross sections at correct frame lines	10/2/2018	
Roof Bracing	see design	10/8/2018	
Bolts	Correctly Torqued	10/2/2018	
Side Pannels	Placed with insulation	11/9/2018	
Mechanical Doors	Placed	11/26/2018	
Man Doors	Placed	11/14/2018	
Roof Pannels	Placed with insulation	11/7/2018	
Building Trim	Placed	11/18/2018	
Electrical Outlets (Office)	Placed	1/3/2019	
Office Drywall	Placed	1/9/2019	
Overhead Lights	Placed	1/7/2019	
*Roof Pannels Redo	Placed	5/6/2019	

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/06/2018**

Representative Photographs taken 09/06/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)?	Sunny, 90 F
	If yes, provide further details	No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Nashoba paving	Contracted to dig the Foundation
Yankee Engineering	Arrived on site to take soil samples

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			Averaged around 0.035-0.05
Site Secured at end of day	X			
Any reported Health and Safety Incidents?			X	

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

Morning Pre-dig Discussions

Air Monitors set up in field

Inside view of Air Monitor with field notebook

Part of the foundation dig completed

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/07/2018**

Representative Photographs taken 09/07/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 70 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Nashoba paving	Contracted to dig the Foundation, Finished around 1pm

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			Averaged around 0.01-0.03
Site Secured at end of day	X			
Any reported Health and Safety Incidents?			X	

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View of side walls

View of foundation hole

Working on digging the foundation

Working on digging the foundation

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/10/2018**

Representative Photographs taken 09/10/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)?	Cloudy & afternoon Rain, 60 F
	If yes, provide further details	No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Hancock Survey	Visited site to mark building corners in foundation hole

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			Averaged around 0.005-0.02
Site Secured at end of day	X			
Any reported Health and Safety Incidents?			X	

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View of foundation hole

View of foundation hole

View of foundation hole with foundation lumber

Senate mobile office, Stan and Ken discussing inside

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/11/2018**

Representative Photographs taken 09/11/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy & Rain, 65 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring		X		Light Rain all day, cause them to not be needed
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A due to no use Check for Critical Completion Step: N/A The foundation crew was delayed due to finishing work on another project. So, Ken and Nicholas placed pipe in locations for the building inlet & outlet.

 View of existing water pipe	View of existing water pipe, and new pipes that will connect to building
View of foundation hole with foundation lumber	Senate mobile office, Stan and Ken discussing inside

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/13/2018**

Representative Photographs taken 09/13/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy & spotty drizzles, 70 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Finished foundation form, and assisted in pouring concrete

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: Before concrete pouring Yankee engineering did a soil compaction review. All Parts of Foundation Footers were also completed, including: Rebar placed correctly, concrete cylinder compression tests (Yankee engineering), concrete pour monitor (Yankee engineering), and pipe penetrations denoted and sleeves placed.

View of 4’ footing with rebar setup

View of Foundation forms with Rebar

View of concrete test cylinders

View of Samson placing concrete in foundation form

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/14/2018**

Representative Photographs taken 09/14/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 75 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Removed foundation form
Watjus electrical	Placed in Grounding wire to building foundation

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View of foundation with form still on

View of foundation with rebar

View of foundation with concrete solid

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/17/2018**

Representative Photographs taken 09/17/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 80 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Worked on setting foundation wall form
Watjus electrical	Discussed grounding and electrical system in building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View of foundation wall forms

Samson placing concrete wall forms

Samson setting up concrete wall forms

Samson setting up concrete wall forms

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/18/2018**

Representative Photographs taken 09/18/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain & Thunder, 70 F Yes, Concrete was not pored today as originally planned

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	No work done on site today due to weather
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A Parts for butler building were delivered in the morning.

 View of Building Delivery	NA
NA	NA

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/19/2018**

Representative Photographs taken 09/19/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 75 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Worked on foundation wall form
Yankee Engineering	On site to preform compaction test, review rebar, and take concrete samples (5)

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	Light sprinkles throughout day, and no soil movement, so need removed
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: All Parts of Foundation wall were also completed, including: Rebar placed correctly, concrete cylinder compression tests (Yankee engineering), concrete pour monitor (Yankee engineering), and pipe penetrations denoted and sleeves placed.

View of Samson finishing wall forms

View of rebar in foundation wall forms

Final View of foundation wall forms

View of concrete being poured into foundation wall forms

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/20/2018**

Representative Photographs taken 09/20/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 65 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Worked on small section of foundation
Yankee Engineering	On site to preform review rebar, concrete observation, and take concrete samples (5)
Nashoba Valley Paving	On site to dig out last part of the foundation

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			Air monitoring was conducted during foundation digging
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View of bathroom pipe sleeves

View of foundation wall out of forms

View of Nashoba digging final section of foundation

View of Complete foundation without forms

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/21/2018**

Representative Photographs taken 09/21/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy w/ scattered rain, 70 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Set forms for foundation wall and poured concrete
Yankee Engineering	On site to preform review rebar, concrete observation, and take concrete samples (5)

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

Settled concrete from day before

Concrete pouring of foundation wall

View of current foundation wall

View of Site, concrete pour, and foundation insulation

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/24/2018**

Representative Photographs taken 09/24/2018		
Initial when complete:	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy w/ wind, 60 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Senate Construction Corp	Placed foundation insulation

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View of Foundation with insulation

View of Foundation with insulation

View of Foundation with insulation

View of Foundation with insulation

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/25/2018**

Representative Photographs taken 09/25/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy w/ Rain, 65 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A No work was done today we were waiting 5 days for concrete to set before backfilling.

View of site (no work done today)

View of site (no work done today)

View of site (no work done today)

View of site (no work done today)

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/26/2018**

Representative Photographs taken 09/26/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 80 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Nashoba Valley Paving	Onsite to start backfilling the foundation

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			Air monitoring was complete due to moving dirt
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View contractors planning backfill

View of Nashoba beginning backfill and compaction

View of Nashoba beginning backfill and compaction

View of backfilled and compacted areas

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/27/2018**

Representative Photographs taken 09/27/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 70 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Nashoba Valley Paving	Onsite to continue/finish backfilling the foundation

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			Air monitoring was complete due to moving dirt
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A

View contractors conducting backfill

View of backfilled and compacted areas

View of backfilled and compacted areas

View of Nashoba backfilling and compacting around foundation

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:09/28/2018**

Representative Photographs taken 09/28/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain, 60 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Nashoba Valley Paving	Onsite to clean up site and move some equipment

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring	X			Air monitoring was complete due to moving dirt
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: All Devices were calibrated in the morning before use. Check for Critical Completion Step: N/A Equipment for building erection was delivered today.

View of site (no work done today)

View of site (no work done today)

View of site (no work done today)

View of site (no work done today)

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/01/2018**

Representative Photographs taken 10/01/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 60 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to begin erecting GW building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View foundation w/ layed out parts

View building erection

View building erection

View of steal and support cables

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/02/2018**

Representative Photographs taken 10/02/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy & Rain, 60 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continues erecting GW building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View builders starting roof steel

View builders starting roof steel

View builders continuing roof steel

View builders continuing roof steel

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/03/2018**

Representative Photographs taken 10/03/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 65 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View builders adding roof panels

View of builders adding roof supports

View of builders adding roof crossbeams

View of builders continuing roof crossbeams

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/04/2018**

Representative Photographs taken 10/04/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 70 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, work on building trim

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View building roof progress

View of builders adding wall supports

View of building trim

View of builders adding wall supports

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/05/2018**

Representative Photographs taken 10/05/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 60 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

 View of building progress	 View of building progress
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/05/2018**

Representative Photographs taken 10/05/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 55 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Builders were not onsite to work due to conflict with another job

N/A	N/A
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/09/2018**

Representative Photographs taken 10/09/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Sunny, 70 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing interior structural trim

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of building roof progress

View of building progress

View of building progress

View of trim progress

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/10/2018**

Representative Photographs taken 10/10/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)?	Sunny, 80 F
	If yes, provide further details	No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of building interior structure

View of caulking trim pieces

Setting up wall panels with blue foam separators

Placings of insulation and wall panels

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/11/2018**

Representative Photographs taken 10/11/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy/Rain, 60 F No

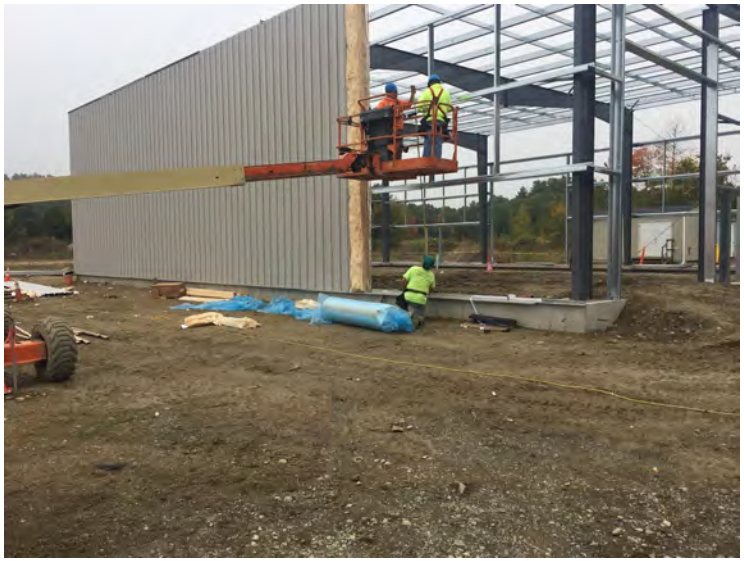
Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of insulation, panel wall

View of insulation, panel wall



View of measurements before placing insulation/panel

Inside view of insulation wall

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/12/2018**

Representative Photographs taken 10/12/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 70 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of insulation, panel wall

View of caulk being added to trim

View of measurements before placing insulation/panel

View of insulation, panel wall corner

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/23/2018**

Representative Photographs taken 10/23/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 50 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Builders were on site all day, but did not begin work until noon due to missing safety equipment (hardhat).

View of insulation, panel wall

View of Panel wall

View of insulation/panels being placed

View of insulation/panels being placed

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/24/2018**

Representative Photographs taken 10/24/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Light Rain, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels
Onyx	Onsite to dig trench for new building town water line

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Air monitoring was not used onsite for digging due to light rain all day

View of prep work for more panels

View of completed section of the wall

View of trench for domestic water line

View of side wall prep for panels

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/25/2018**

Representative Photographs taken 10/25/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels
Onyx	Onsite to fill in domestic water line trench

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of filled in water line trench

View of completed section of the wall

View of east wall with trim

View of east wall with panel prep

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/26/2018**

Representative Photographs taken 10/26/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloud/Light Rain, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Builders did not show up today, so no work was completed on the site.

N/A	N/A
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/29/2018**

Representative Photographs taken 10/29/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Sunny/Light Rain, 55 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Builders arrived at 11 am today.

View of complete walls

View of walls to be completed

De maximis and Senate discussing project

Working on panel walls

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/30/2018**

Representative Photographs taken 10/30/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A New crew from Regional Builders arrived today

View of panels being placed

View of panels being placed

View of panels being placed

View of new panels

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:10/31/2018**

Representative Photographs taken 10/31/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 50 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of panels being placed

View of building corner

View of panels being placed

N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/01/2018**

Representative Photographs taken 11/01/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Scattered Rain, 55 F Yes, see below

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Regional Builders left around 12 due to rain, cannot hang insulations in rain as it ruins product.

 View of panels being placed	 View of building corner
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/02/2018**

Representative Photographs taken 11/02/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain, 50 F Yes, see below

Contractors On-Site and Summary of Work Completed	

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Regional Builders did not work today due to rain all day

N/A	N/A
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/05/2018**

Representative Photographs taken 11/05/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 50 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall & roof panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Regional Builders worked 10hr day, until dark

Regional Builders crane to work on roof

Crew working on north wall panels

Crew working on identifying building parts

View of complete roof and wall work

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/07/2018**

Representative Photographs taken 11/07/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 60 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall & roof panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Regional Builders worked 10hr day, until dark

Crew working on roof

View of inside of building, and nearly completed north wall

Crew working on north wall panels

View East wall to begin being paneled tomorrow, 11/8/18

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/08/2018**

Representative Photographs taken 11/08/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 55 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing wall & roof panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of roof progress

View of inside of building, and completed north wall

Crew prepping insulation for east wall panels

View of wall corner trim work

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/09/2018**

Representative Photographs taken 11/09/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 50 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing temporary trim for coming rain

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View construction of east wall panels

View construction of east wall panels

View of temporary trim on wall corner

View of temporary trim on roof

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/12/2018**

Representative Photographs taken 11/12/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically placing temporary trim for coming rain
Nashoba Valley Paving	Onsite to excavation small section for building plumbing

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of exterior exaction for plumbing

Prepping interior excavation work

View of temporary trim on south wall

View of exterior excavation in roped off area

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/13/2018**

Representative Photographs taken 11/13/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain, 50 F Yes, see below

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Electric Company	Onsite to place temporary lighting in building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Regional builders did not work today due to rain.

 View temporary indoor lighting	 View temporary indoor lighting
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/14/2018**

Representative Photographs taken 11/14/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically building trim (1 person today)

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of indoor plumbing excavation

View prep work for man door installation

View of inside building with temporary lights

View of installed man door

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/15/2018**

Representative Photographs taken 11/15/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 30 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Regional Builders	Onsite to continue erecting GW building, specifically building trim (1 person today)
Plumbing Company	Onsite to begin laying underground piping in excavated sections

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of Regional placing roof trim

View of completed east wall, and initial trim

View of new telephone pole for permanent electricity

N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/16/2018**

Representative Photographs taken 11/16/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain/Snow, 35 F Yes, see below

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Due to weather Regional builders, and other contractors did not complete any work onsite today

View of bathroom piping paced by plumber the day prior

Pile of insulation, panels, trim, and piping inside building

View site covered with snow and rain

View of building surrounded by snow and rain

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/19/2018**

Representative Photographs taken 11/19/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to place conduit for Tight Tank
Plumbing Company	Onsite to finish placing underground piping for office and bathroom
Regional Builders (3)	Onsite to continue placing outside trim on building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of trim pieces being placed

Underground plumbing for building office

View trim inside being prepared

View of trim pieces being placed

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/20/2018**

Representative Photographs taken 11/20/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Snow, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Frommelt	Onsite to deliver parts for mechanical doors
Nashoba Valley Paving	Onsite to fill in underground plumbing and excavate for trench drain
Regional Builders (1)	Onsite to continue placing outside trim on building

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View Nashoba unpacking equipment

Underground plumbing for building office

Nashoba filling in plumbing

View of trench dug by Nashoba

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/21/2018**

Representative Photographs taken 11/21/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Frommelt	Onsite to build mechanical doors
Nashoba Valley Paving	Onsite to excavate for trench drain
Samson Concrete	Onsite to pour trench drain foundation

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Eversource was on site today to begin setting up electricity and will return Friday to finish outside the property.

View of Frommelt building mechanical doors

View of Eversource working on new electrical pole

View of Samson Pouring concrete

View of Samson Pouring concrete

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/26/2018**

Representative Photographs taken 11/26/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Frommelt	Onsite to build mechanical doors
Watjus Electric	Onsite to make adjustment to temporary power

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of Outside Building

View of Outside Building

View of Frommelt building mechanical doors

View of Frommelt building mechanical doors

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/27/2018**

Representative Photographs taken 11/27/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Onyx	Onsite to connect site waterline to road line
Watjus Electric	Onsite to make adjustment to temporary power
Frommelt	Onsite to build mechanical doors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of Frommelt working on mechanical doors

View of Onyx working on public water line

View of diesel heater to temporarily heat the interior of the building

View of Onyx's protection of site work

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/28/2018**

Representative Photographs taken 11/28/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Onyx	Onsite to connect site waterline to road line
Watjus Electric	Onsite to make adjustment to temporary power

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A The trench drain was delivered to the site today, to be installed tomorrow

View of Electric work

View of Onyx new asphalt and fence

View of North Mechanical door

View of how temporary heat will enter building

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/29/2018**

Representative Photographs taken 11/29/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Trench Drain Plumbers	Onsite to install trench drain

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A It was noted while I was on site today that the trench drain is fragile and cannot take any weight or pressure.

View of Electric work

View of Onyx new asphalt and fence

View of North Mechanical door

View of how temporary heat will enter building

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:11/30/2018**

Representative Photographs taken 11/30/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Site was empty today as no one came to work on building

N/A	N/A
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/03/2018**

Representative Photographs taken 12/03/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Nashoba Paving	Onsite to grade for building slab

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Nashoba show up around noon today due to finishing at another job

View of Grading work inside building

View of Grading work inside building

View of Grading work inside building

View of Grading work inside building

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/04/2018**

Representative Photographs taken 12/04/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Nashoba Paving	Onsite to grade for building slab

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

 View of completed grading work	 View of completed grading work
N/A	N/A

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/05/2018**

Representative Photographs taken 12/05/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 30 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to begin setting rebar for concrete ramps

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

Samson unpacking rebar mesh

Framing of Door Ramps

Framing of Door Ramps

Framing of Office foundation

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/06/2018**

Representative Photographs taken 12/06/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to continue setting rebar for concrete ramps

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

Framing of office slab

Mesh rebar in concrete ramp frames

Mesh rebar in concrete ramp frames

Mesh rebar in concrete ramp frames

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/07/2018**

Representative Photographs taken 12/07/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to continue setting rebar for concrete ramps and pour concrete
Regional builders	Onsite to place building drainage system

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of fully framed concrete ramp

View of Concrete slab prep

View of Concrete in ramp form

View of Concrete in ramp form

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/10/2018**

Representative Photographs taken 12/10/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to continue setting rebar for concrete ramps and pour concrete

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of trench Drain supports

View of trench drain supports

View of Concrete in ramp form

View of placing redar

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/11/2018**

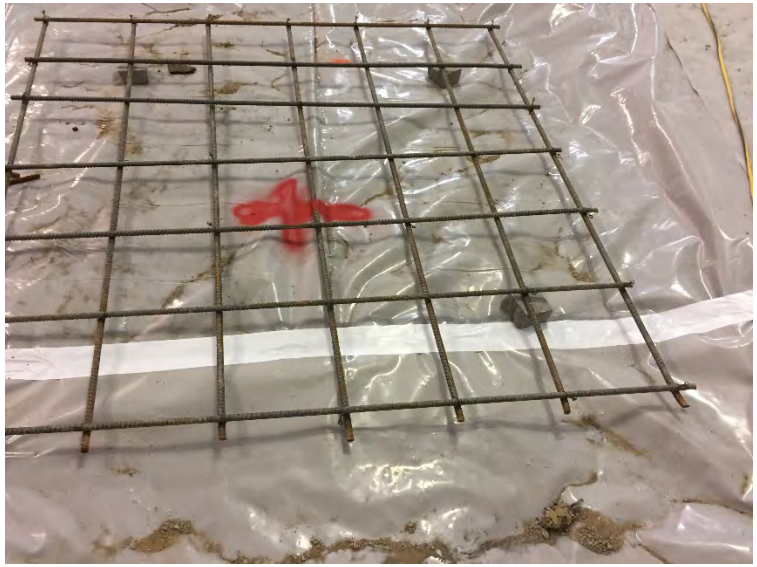
Representative Photographs taken 12/11/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to continue setting rebar for concrete ramps and pour concrete

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

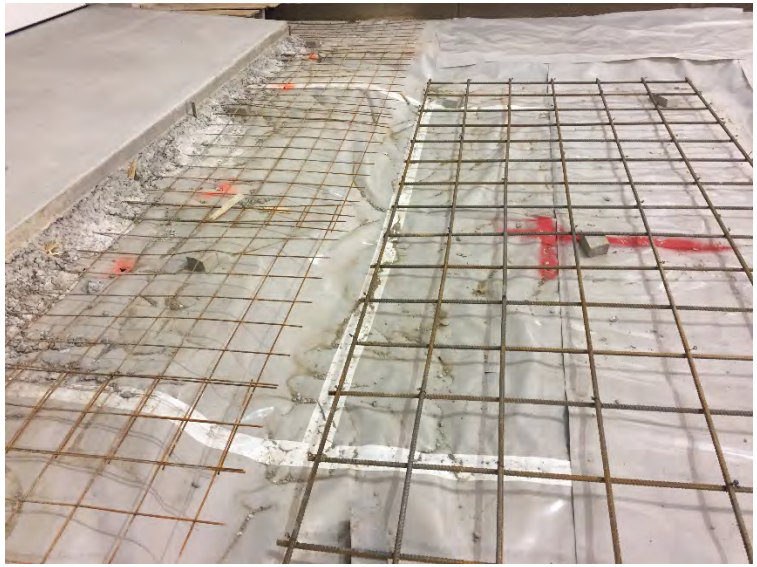
Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Only on site for half day today

View of cured ramp sides



View of tied rebar

View of tied rebar



View of tied rebar

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/12/2018**

Representative Photographs taken 12/12/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 30 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to continue setting rebar for Slab

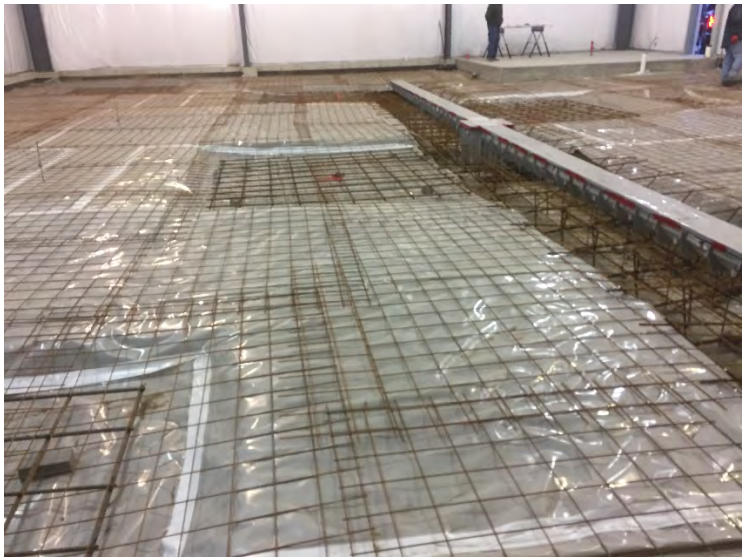
Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of pad rebar

View of tied rebar in trench drain

View of tied rebar



View of wire mesh

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/13/2018**

Representative Photographs taken 12/13/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
JP Partitions	Onsite to begin framing the office

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of wire mesh

View of tied rebar in trench drain

View office framing

View office framing

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/14/2018**

Representative Photographs taken 12/14/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
JP Partitions	Onsite to continue framing the office

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Only onsite for a half day

 View of office framing	 View of slab pore equipment
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/17/2018**

Representative Photographs taken 12/17/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to Pour Concrete slab
Yankee Engineer	Onsite to take concrete samples for testing
Other Concrete Company	Onsite to work with concrete pump for slab pour

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of Concrete slab pour

View concrete pump

View of Concrete slab pour

View of Concrete slab pour

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/18/2018**

Representative Photographs taken 12/18/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 30 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to work on concrete slab and mark expansion joints
Regional Buildings	Onsite to finish building trim
Watjus electric	Onsite to connect electric from building to pole

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of Concrete slab

View electric line from building to pole

Electrician working on building wiring

View of Concrete slab pour for air compressor

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/19/2018**

Representative Photographs taken 12/19/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

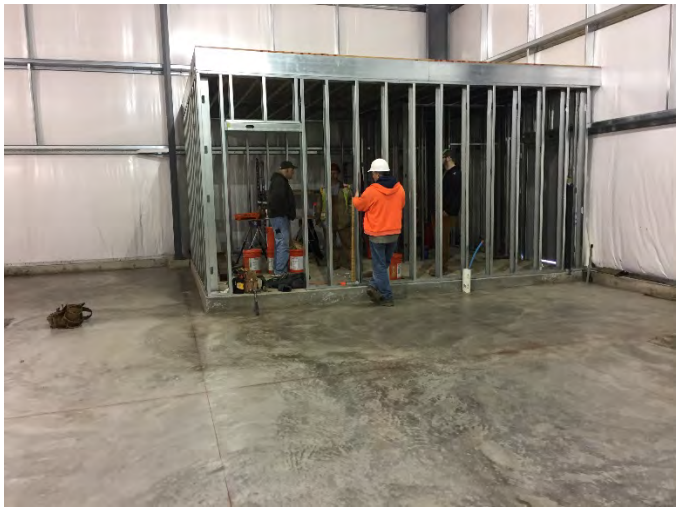
Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to cut expansion joints

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

Expansion joint lines

Expansion joint lines



Discussion of electric work in office

View of expansion joins being cut

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

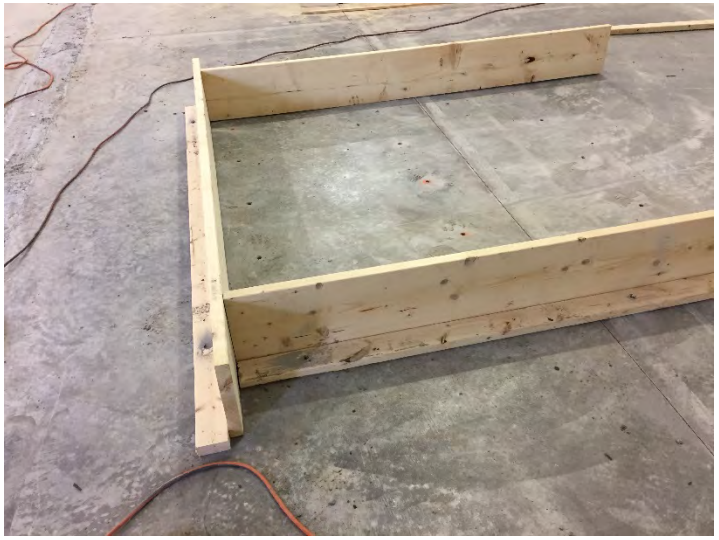
Prepared By: Nicholas Carabillo **Date:12/20/2018**

Representative Photographs taken 12/20/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Cloudy, 45 F No

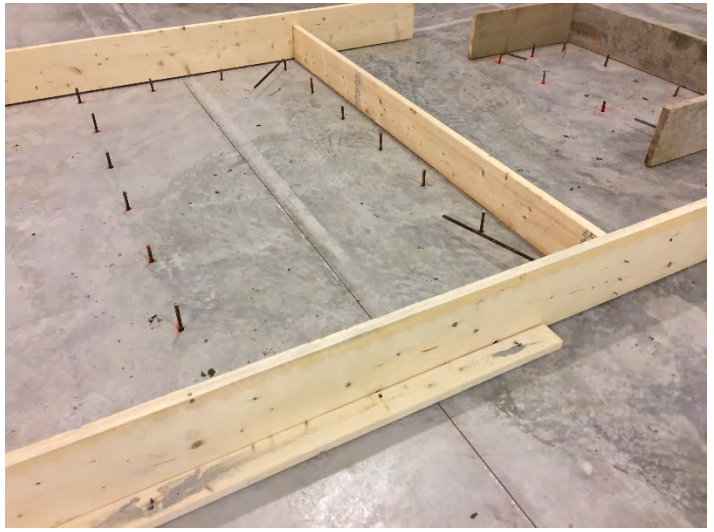
Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to form concrete pads

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A



View of riser pad forms



View of riser pad forms

View of riser pad forms

View of riser pad forms

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

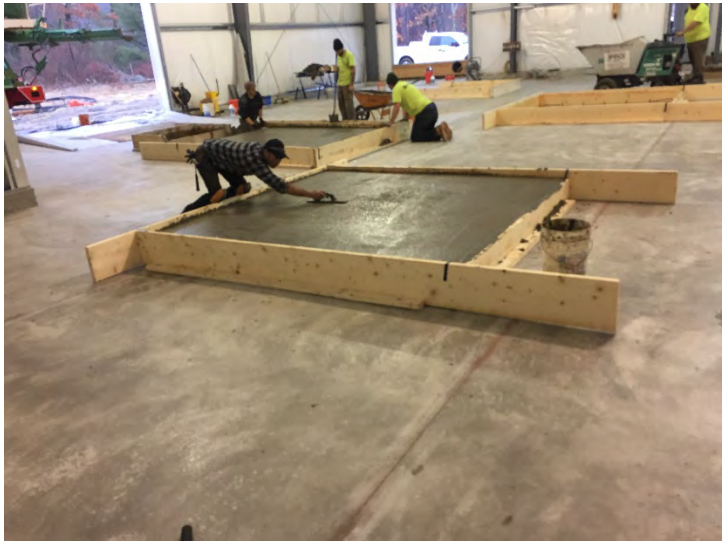
Prepared By: Nicholas Carabillo **Date:12/21/2018**

Representative Photographs taken 12/21/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain, 55 F Yes/No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Samson Concrete	Onsite to pour concrete pads

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

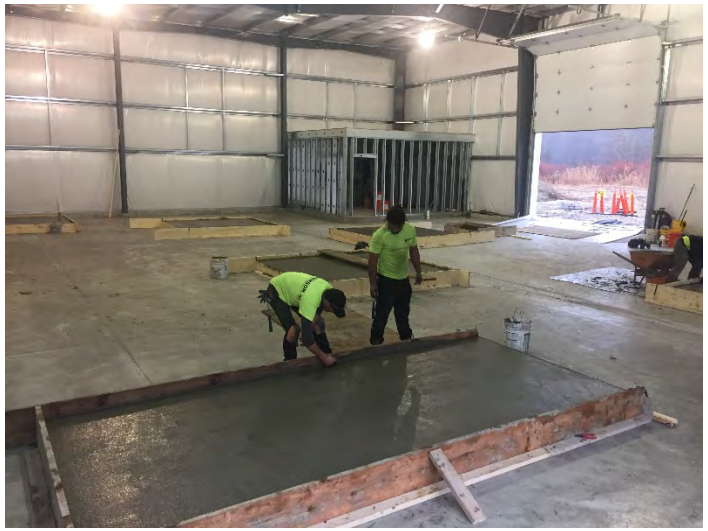
Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Not able to pour outside ramp wings today due to rain



View of riser pad filled

View of riser pad filled

View of riser pad filled



View of riser pad filled

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/26/2018**

Representative Photographs taken 12/26/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F \No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A No one was onsite today, senate left early

N/A	N/A
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/27/2018**

Representative Photographs taken 12/27/2018		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F \No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to begin wiring the new building
Samson Concrete	Onsite to pour ramp wings and last equipment pad

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of electrical work in building office

View of electrical work in building

View of electrical work in building

View of concrete work outside building

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/28/2018**

Representative Photographs taken 12/28/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 50 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to continue wiring the new building
Samson Concrete	Onsite to continue sealing indoor concrete

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

N/A	N/A
N/A	N/A

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:12/31/2018**

Representative Photographs taken 12/31/2018		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to continue wiring the new building
Samson Concrete	Onsite to finish sealing office floor

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A All onsite for half day.

N/A	N/A
N/A	N/A

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/02/2019**

Representative Photographs taken 01/02/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to continue wiring the new building
Plumbing company	Onsite to begin placing copper piping in office

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of preliminary office electrical

View of preliminary office electrical

View of preliminary office electrical

View of system switch gear panel

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

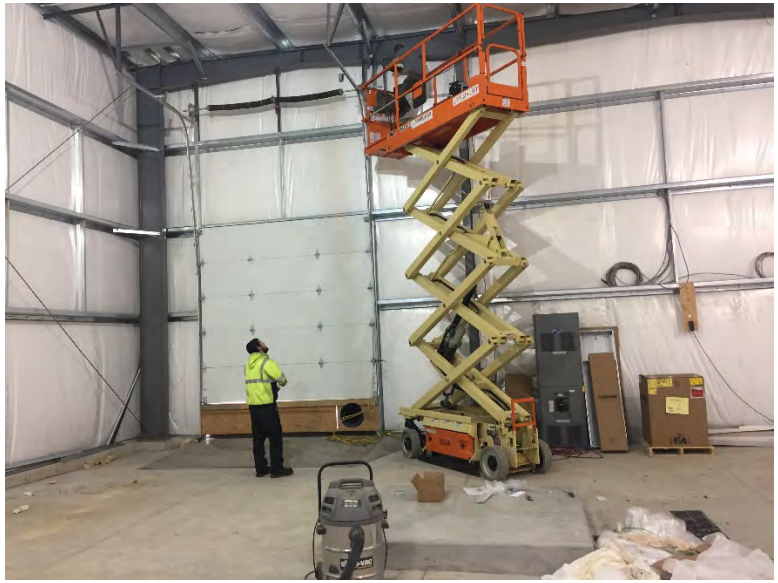
Prepared By: Nicholas Carabillo **Date:01/03/2019**

Representative Photographs taken 01/03/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Frommelt	Onsite to place motors for overhead doors
Plumbing company	Onsite to begin placing copper piping in office

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A



Frommelt attaching overhead door motors

View plumbing in office

View plumbing in office

View plumbing in office

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/04/2019**

Representative Photographs taken 01/04/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 45 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to work on building electric
Plumbing company	Onsite to begin placing copper piping in office

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A O&M begin setting equipment today

View of plumbing insulation

View plumbing in office

View plumbing outside of office

View of first tank placed

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/07/2019**

Representative Photographs taken 01/07/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 25 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Breen/Sullivan Mechanical	Onsite install office split system

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of AC piping in office

View of AC piping in office

View of AC in box

N/A

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/08/2019**

Representative Photographs taken 01/08/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Bursaw Propane	Onsite to place propane tank, connect piping and wire electric

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View Propane Tank

View of trench from propane tank to building

View of trench from propane tank to building

View Propane Tank

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/09/2019**

Representative Photographs taken 01/09/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
JP Partitions	Onsite to insulate and drywall office walls
Watjus	Onsite to set up switch gear panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of insulation in office walls

View of treatment system equipment in building

View of drywall on office

View of treatment system equipment in building

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/10/2019**

Representative Photographs taken 01/10/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
JP Partitions	Onsite to work on office drywall
Watjus	Onsite to set up switch gear panels
Breen/Sullivan	Onsite to place indoor heaters

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of electrical panel installation

View of treatment system parts

View of building heaters

View of office air conditioner

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/11/2019**

Representative Photographs taken 01/11/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 25 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
JP Partitions	Onsite to work on office drywall
Watjus	Onsite to work on electrical switch gear panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of installed office doors

View of drywall on office

View of treatment system components

View of treatment system components

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/14/2019**

Representative Photographs taken 01/14/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 30 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Cole Panting	Onsite to paint office walls
Watjus Electric	Onsite to work on electrical switch gear panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

N/A	N/A
N/A	N/A

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/15/2019**

Representative Photographs taken 01/15/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Cole Panting	Onsite to paint office walls
Watjus Electric	Onsite to work on electrical switch gear panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A Vanox system arrived on site today

View of office painting

View of office painting

View of Vanox system bring brought into the building

View of Vanox system bring brought into the building

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/16/2019**

Representative Photographs taken 01/16/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Jet Plumbing	Onsite to finish plumbing bathroom, slop sink, and water heater. Begin running gas piping for heaters
Watjus Electric	Onsite to work on electrical switch gear panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of system overhead piping to tank

View of electrician wiring Vanox unit

View of slop sink, and hot water heater

View of multimedia filters and piping frame

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/17/2019**

Representative Photographs taken 01/17/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 25F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Jet Plumbing	Onsite to continue plumbing gas piping for heaters
Watjus Electric	Onsite to work on electrical switch gear panels

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of overhead propane lines for heaters

View of overhead propane lines for heaters

View of overhead propane lines for heaters

View of overhead propane lines for heaters

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/21/2019**

Representative Photographs taken 01/21/2019		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Jet Plumbing	Onsite to continue plumbing gas piping for heaters

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of overhead propane lines to heater

View of bathroom appliances

View of water entrance and water meter

View of system components and overhead gas/water lines

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/21/2019**

Representative Photographs taken 01/21/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 5 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Breen/Sullivan	Onsite to install exhausts for heaters
Watjus Electric	Onsite to work on system electric

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View TPC Multimedia Filters and Tree system

View of Watjus working on system electrical

View of heaters and vents

View of heaters and vents

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/22/2019**

Representative Photographs taken 01/22/2019		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 20 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Jet Plumbing	Onsite to send propane lines to exterior of building
Watjus Electric	Onsite to work on system electric
Frommelt	Onsite to test mechanical function of overhead doors
Bursaw	Onsite to connect propane stub of building and stub from tank line

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of propane line exiting building

View of ground and building propane stubs

View of Frommelt working on overhead doors

View of continued additions to treatment system

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/23/2019**

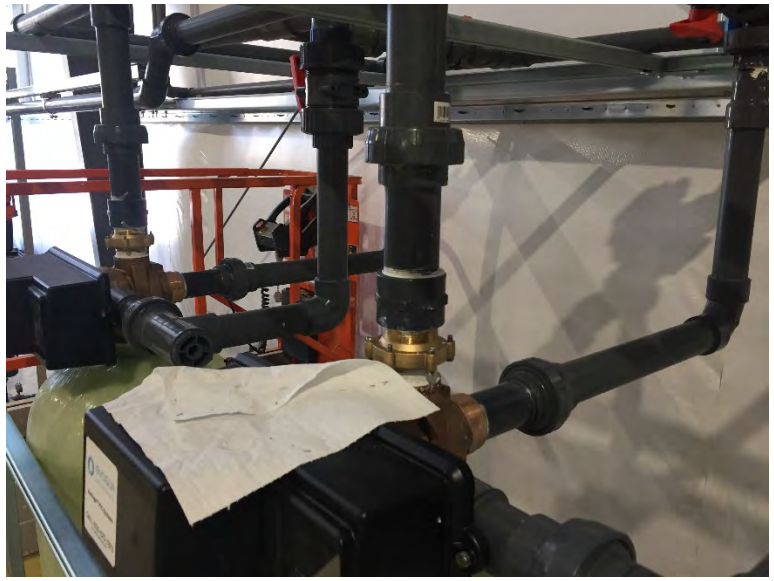
Representative Photographs taken 01/23/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 40 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to work on system electric

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A

View of continued additions to treatment system



View of continued additions to treatment system

View of Electrical Layout for Vanox system

View of continued additions to treatment system

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/24/2019**

Representative Photographs taken 01/24/2019		
Initial when complete: **NJC**	Did weather impede project progress (Yes/No)? If yes, provide further details	Rain & Wind, 55 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to work on system electric
Frommelt	Onsite to finish testing mechanical doors

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A It Rain hard for the first time today, due to such we notice the building roof leaks badly. We too immediate action to notify Senate. Also to note during this day was the 8 hour HASWOPER training so there was less presence on the site during the day.

View of building roof leaking

View of building roof leaking

View of building roof leaking

View of heater controls installed on Tuesday

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Daily Observations and Photographic Documentation

Prepared By: Nicholas Carabillo **Date:01/25/2019**

Representative Photographs taken 01/25/2019		
Initial when complete: NJC	Did weather impede project progress (Yes/No)? If yes, provide further details	Partly Cloudy, 35 F No

Contractors On-Site and Summary of Work Completed	
Senate Construction Corp	Main Building Construction Contractor, Oversee Sub Contractors
Watjus Electric	Onsite to work on system electric

Daily Observations				
Activity	**Yes**	**No**	**N/A**	**Notes**
Tailgate Safety Meeting			X	
Perimeter Air Monitoring			X	
Site Secured at end of day	X			
Any reported Health and Safety Incidents?		X		

Additional Notes
Check Air monitoring devices: N/A Check for Critical Completion Step: N/A AECOM onsite to check in on project

View of treatment system progress

View of treatment system progress

View of pump branch and AECOM rep.

View of hanging pipe installation

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Filter Press	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Filter Press Feed Pump
Outlet				Filter Press Effluent Tank T-2501

Electrical Wiring Summary	
Electrical Component	**Destination**

Location	Check
Leveled	Check
Fastened	Check

Additional Notes

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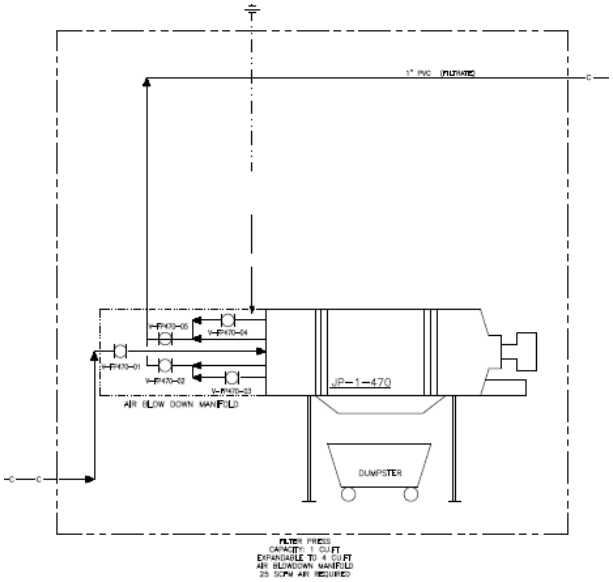
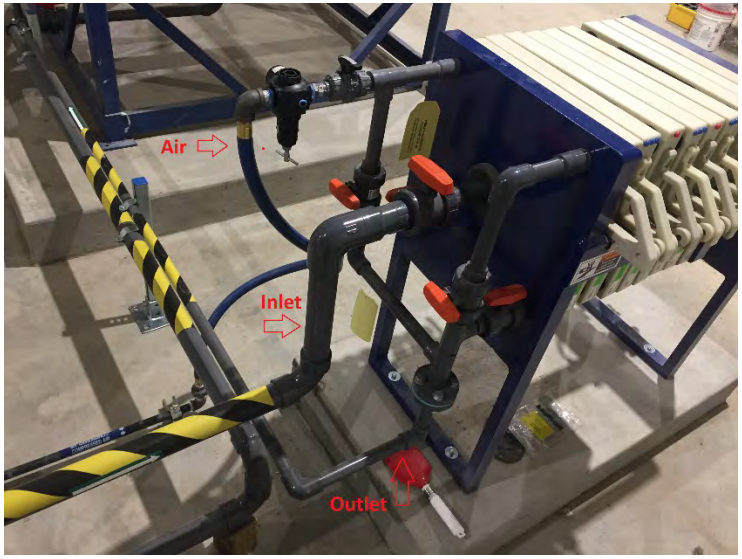
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Isometric Picture



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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 03/25/2019**

Initial when complete: **NJC**	**Component:** GAC Vessels	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Effluent Pump SKID 0500
Outlet				Super 30 Tanks

Electrical Wiring Summary	
Electrical Component	**Destination**

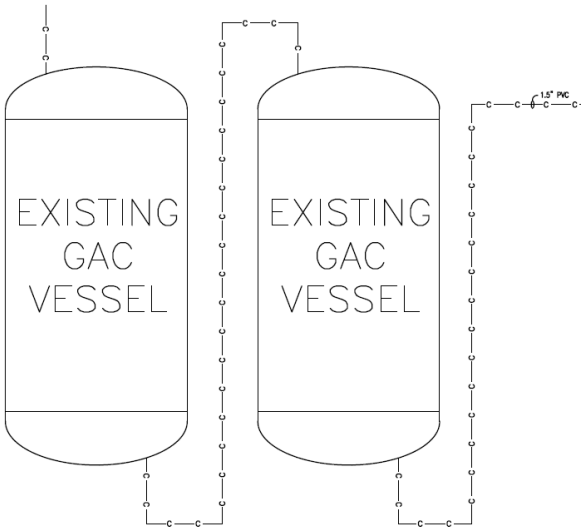
Location	Check
Leveled	Check
Fastened	Check

Additional Notes

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Front Picture

Side Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** PTC Triplex Multimedia Filters	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet Feed	Pressure Gauge	Ball Valves (3)	Three Way Valve (3)	Feed Pump (SKID 0100)
Inlet Backwash	Ball Valve (3)	Three Way Valve (3)	Pressure Gauge (3)	Backwash Pump (SKID 1000)
Outlet Feed	Pressure Gauge (3)	Pressure Gauge		Bag Filter (SKID 0300)
Outlet Backwash				Backwash Collection Tank (T-2201)

Electrical Wiring Summary	
Electrical Component	**Destination**
Power	

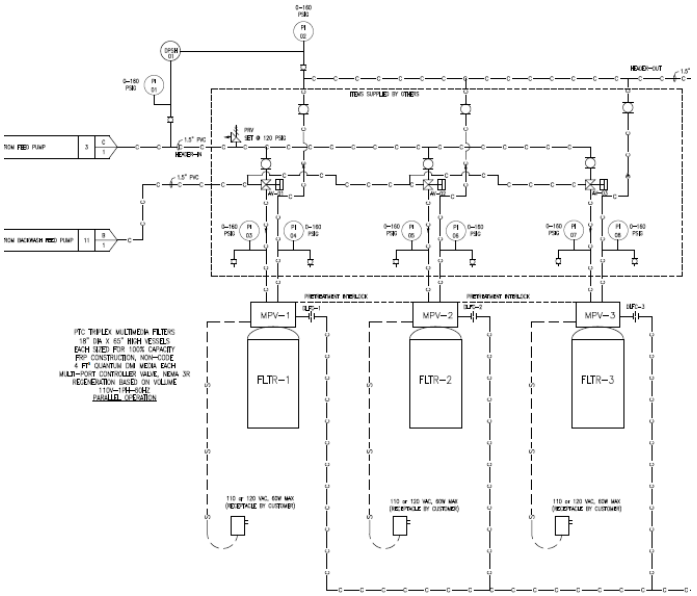
Location	Check
Leveled	Check
Fastened	N/A

Additional Notes

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



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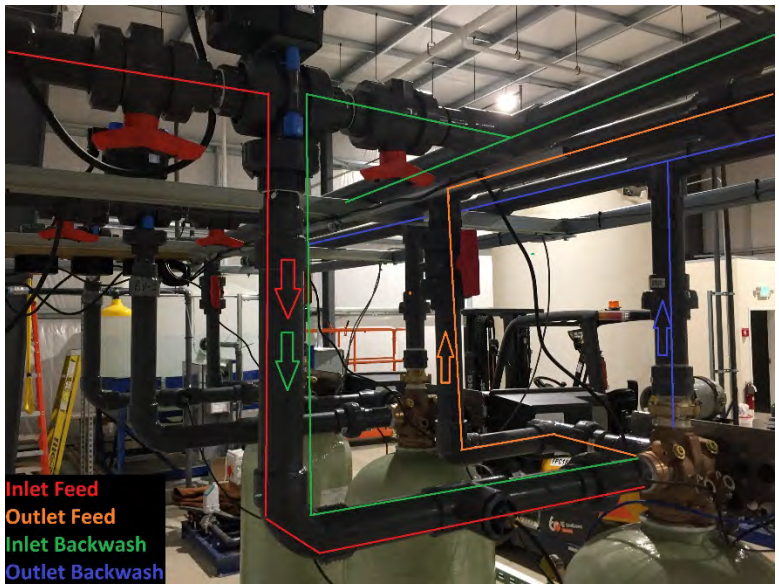
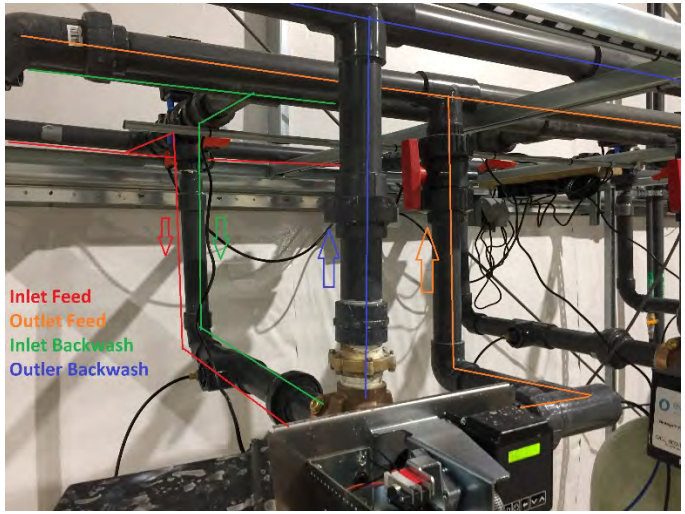


Front Picture

Isometric Picture



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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Feed Pump SKID 0100	

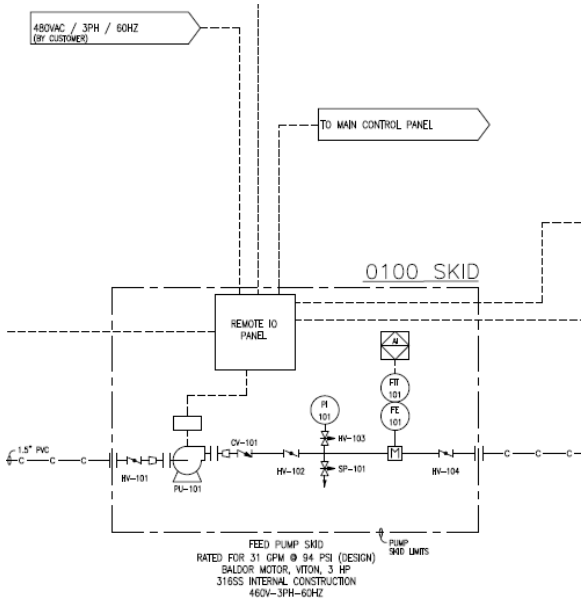
Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Tank T-2001
Outlet	Hypochlorite Inject	ORP Sensor		Multimedia Filters

Electrical Wiring Summary	
Electrical Component	**Destination**
Power in	Power
Control out	Main Control Panel
Control in	Feed Interlock signal
Control in	Ultrasonic Sensor
Control in	Ph/ORP Sensor
Control in	Nema 4X Junction Box

Location	Check
Leveled	Check
Fastened	Check

Additional Notes

P&ID



Side Picture

Side Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Wall Mounted Sodium Hypochlorite Feed System SKID 0200	

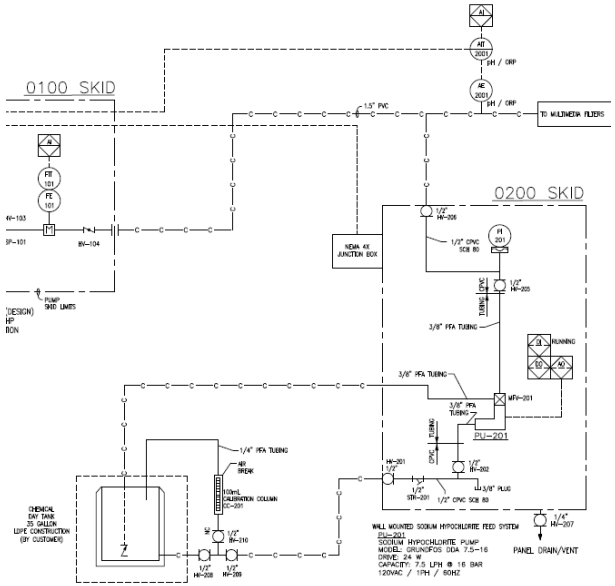
Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Feed to Flow	Ph/ORP meter			T in Main stream after pump 0100

Electrical Wiring Summary	
Electrical Component	**Destination**
Control out	Remote IO Panel (0100 SKID)

Location	Check
Leveled	Check
Fastened	Check

Additional Notes

P&ID



Side Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Bag Filter Skid 0300	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Multimedia Filter
Outlet				Vanox Unit (SKID 0500)
Drain				Drain

Electrical Wiring Summary	
Electrical Component	**Destination**
Signal	To 0100 RIO Panel

Location	Check
Leveled	Check
Fastened	Check

Additional Notes

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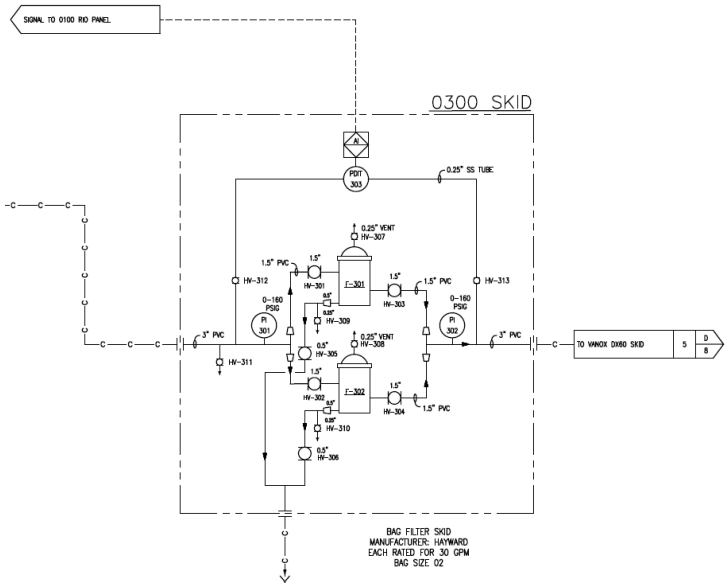
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Side Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: NJC	**Component:** Vanox SKID 0400	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Feed Inlet				Bag Filter (SKID 0300)
Feed Outlet				Effluent Break Tank (T-2101)
Rinse Inlet				Public Water Supply
Drain				Drain

Electrical Wiring Summary	
Electrical Component	**Destination**
Electrical Supply (Mid Panel)	Power Supply
Electrical Supply (left Panel)	Power Supply
Electrical Supply (Right Panel)	Power Supply

Location	Check
Leveled	Check
Fastened	Check

Additional Notes

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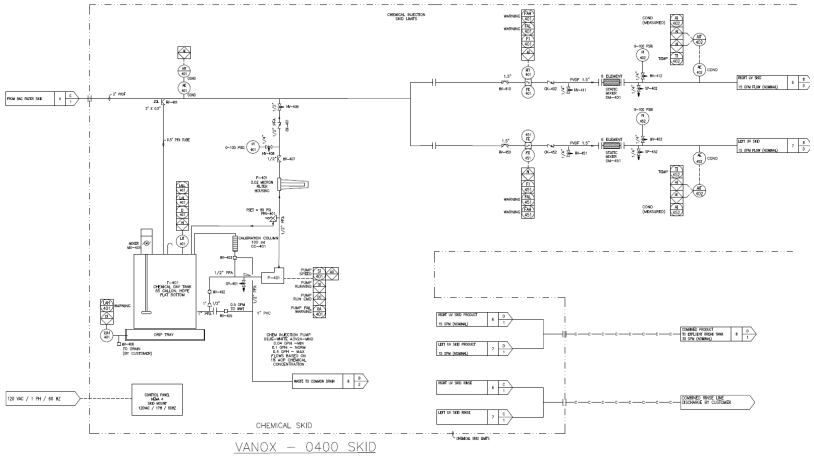
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Side Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: NJC	**Component:** Effluent Pump Skid 0500	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Effluent Break Tank T-2101
Outlet	Flow Control Valve	Hypochlorite Inject		GAC Vessels

Electrical Wiring Summary	
Electrical Component	**Destination**
Power in	Power
Control out	Main Control Panel
Control in	Ultrasonic Sensor
Control in	Ph/ORP Sensor
Control in	Nema 4X Junction Box

Location	Check
Leveled	Check
Fastened	Check

Additional Notes
** Flow Control Valve added during construction suggested by Evoqua field service engineer. Not on P&ID

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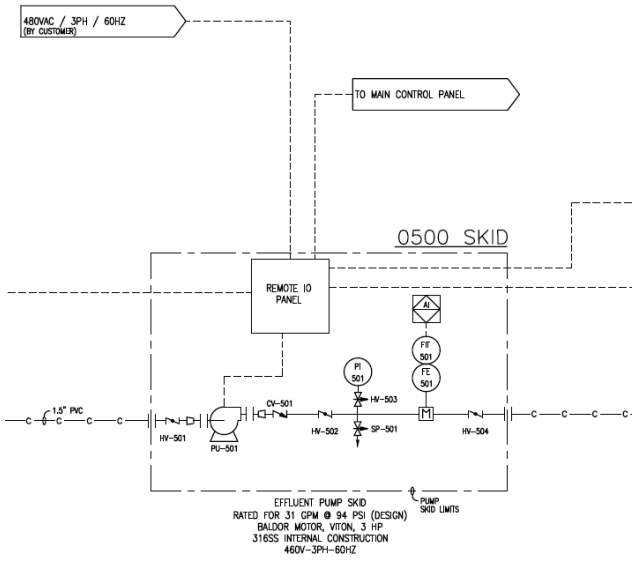
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



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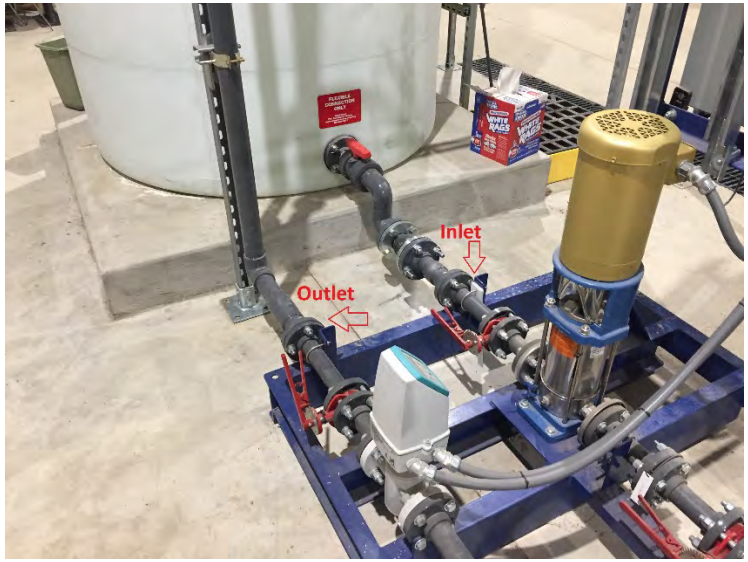

Side View

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Wall Mounted Caustic Feed System Skid 0600	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Outlet	Ph meter			T in Main stream after pump 0500

Electrical Wiring Summary	
Electrical Component	**Destination**
Control Out	Remote IO Panel (SKID 0500)

Location	Check
Leveled	Check
Fastened	Check

Additional Notes
pH meter is further down pipe flow to allow caustic to mix though static mixer before taking pH.

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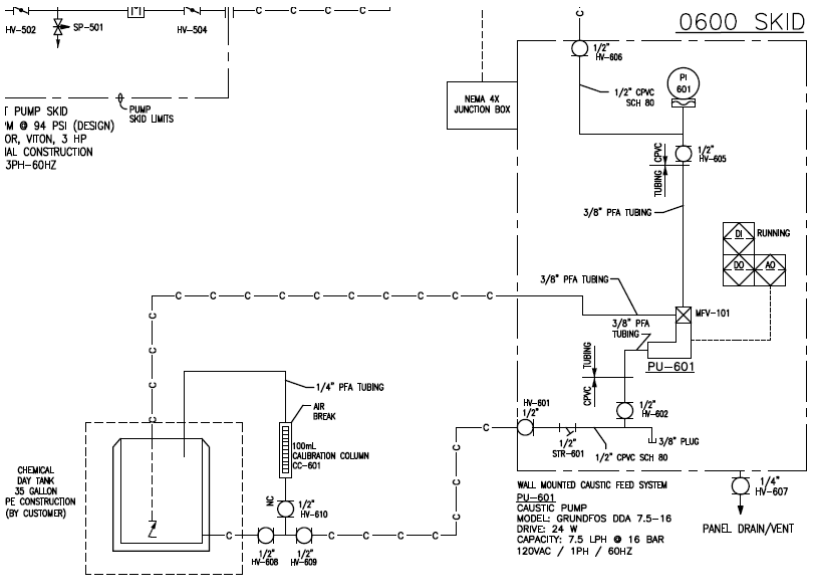
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Side Picture

Additional Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Effluent Pump Skid 0700	

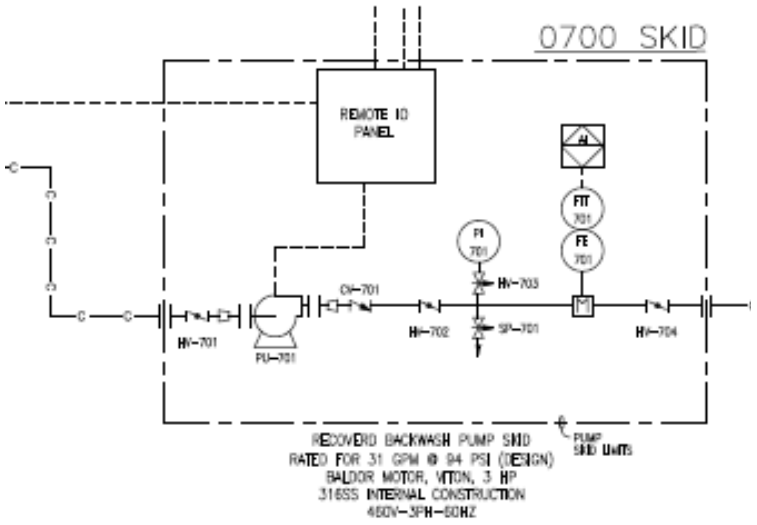
Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Effluent Break Tank T-2201
Outlet				Bag Filter (SKID 0800)

Electrical Wiring Summary	
Electrical Component	**Destination**
Power in	Power
Control out	Main Control Panel
Control in	Ultrasonic Sensor
Control in	Pressure differential indicator

Location	Check
Leveled	Check
Fastened	Check

Additional Notes

P&ID



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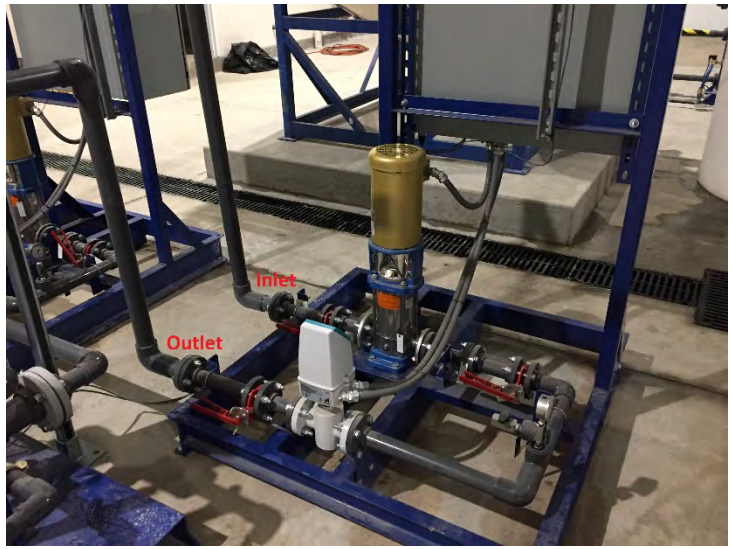

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Bag Filter Skid 0800	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Recovery Backwash Pump (SKID 0700)
Flow Outlet				Bag Filter (SKID 0900)
Drain Outlet				Drain

Electrical Wiring Summary	
Electrical Component	**Destination**
Control out	Pressure differential indicator (0700)

Location	Check
Leveled	Check
Fastened	Check

Additional Notes

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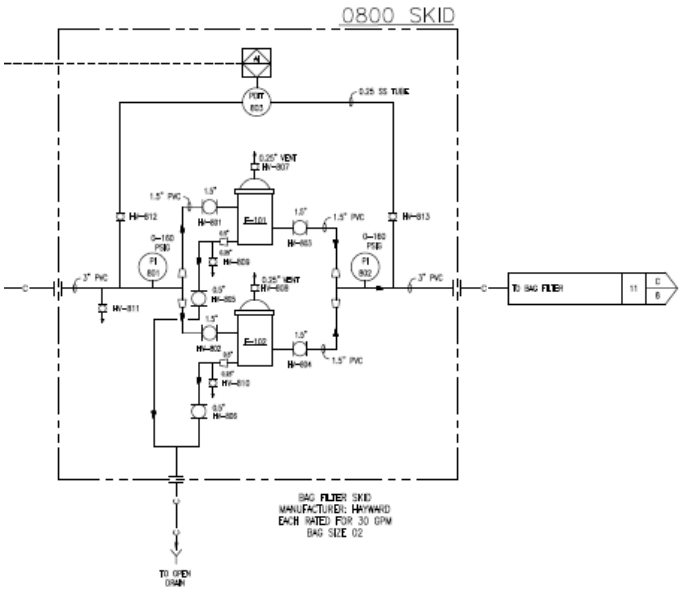
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Isometric Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: NJC	**Component:** Bag Filter Skid 0900	

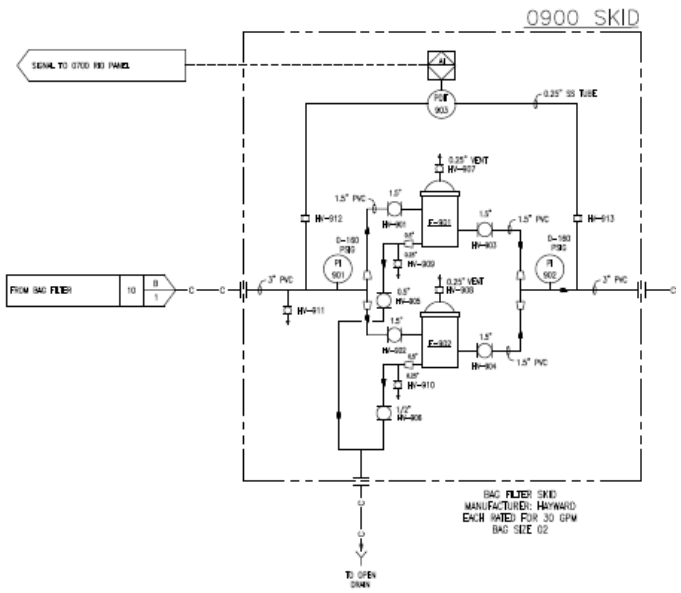
Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Bag Filter (SKID 0800)
Flow Outlet	Flow Control Valve			Backwash Feed Tank T-2301
Drain Outlet				Drain

Electrical Wiring Summary	
Electrical Component	**Destination**
Control out	Pressure differential indicator (0700)

Location	Check
Leveled	Check
Fastened	Check

Additional Notes
** Flow Control Valve added during construction suggested by Evoqua field service engineer. Not on P&ID

P&ID



Side Picture

Side Picture

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Effluent Pump Skid 1000	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Backwash Feed Tank T-2301
Outlet	Flow Control Valve	PRV Connection		Multimedia Filters

Electrical Wiring Summary	
Electrical Component	**Destination**
Power in	Power
Control out	Main Control Panel
Control in	Ultrasonic Sensor
Control in	City Water Valve

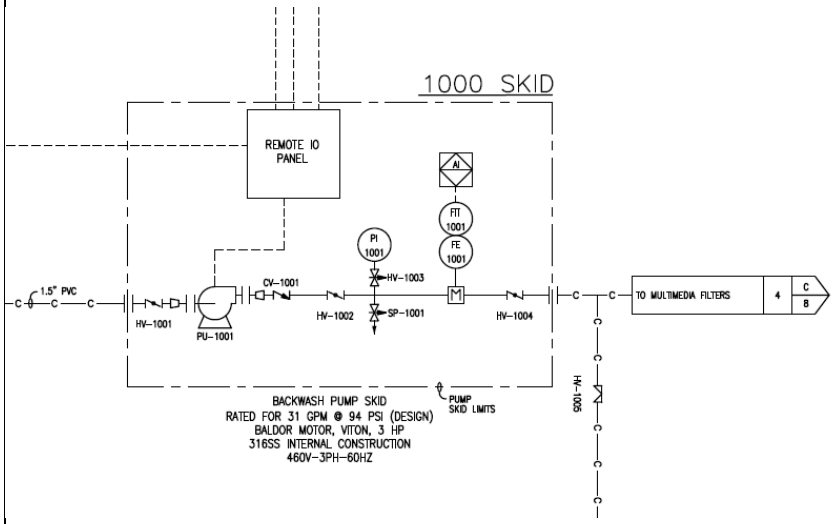
Location	Check
Leveled	Check
Fastened	Check

Additional Notes
** Flow Control Valve added during construction suggested by Evoqua field service engineer. Not on P&ID

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



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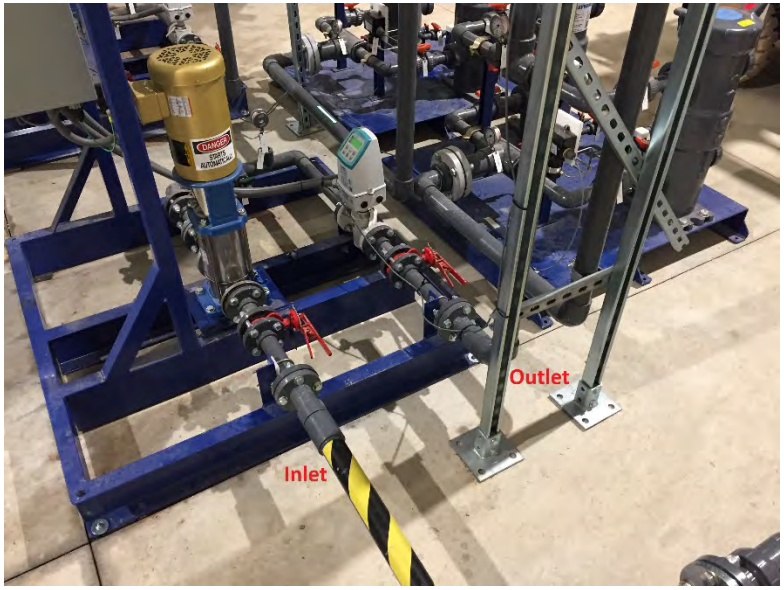

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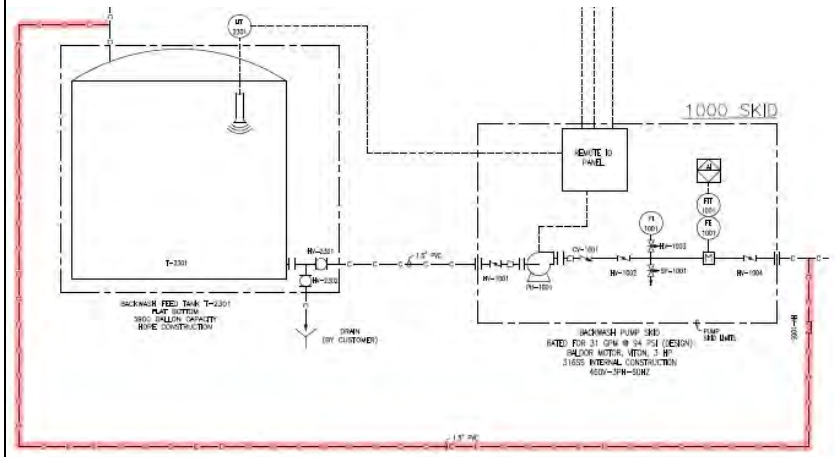

Side Picture

	Side View 

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Effluent Pump Skid 1100	

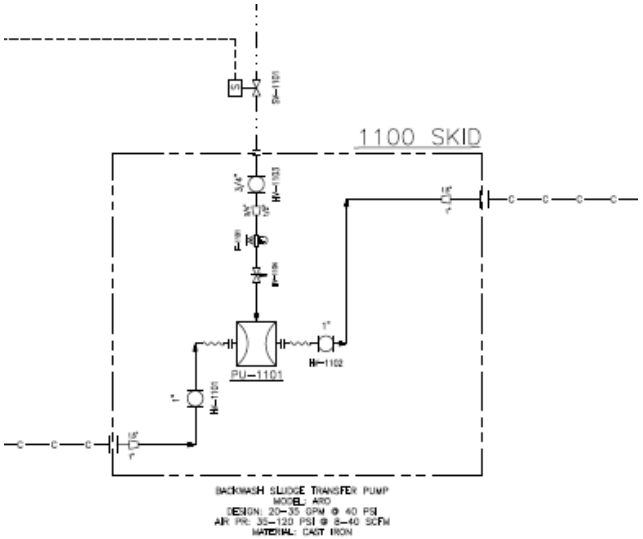
Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Backwash Waste Collection Tank T-2201
Outlet				Filter Press Feed Tank T-2401

Electrical Wiring Summary	
Electrical Component	**Destination**

Location	Check
Leveled	Check
Fastened	Check

Additional Notes
*Air Pressure Connection

P&ID



Side Picture

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Effluent Pump Skid 1200	

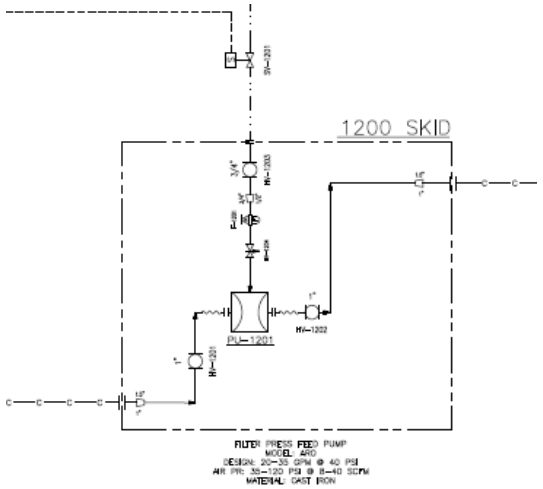
Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Filter Press Feed Tank T-2401
Outlet				Filter Press

Electrical Wiring Summary	
Electrical Component	**Destination**

Location	Check
Leveled	Check
Fastened	Check

Additional Notes
*Air Pressure Connection

P&ID



Side Picture

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Effluent Pump Skid 1300	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				Filter Press Effluent Tank T-2501
Outlet	T Split Connection			Backwash Collection Tank/ System Feed

Electrical Wiring Summary	
Electrical Component	**Destination**

Location	Check
Leveled	Check
Fastened	Check

Additional Notes
*Air Pressure Connection

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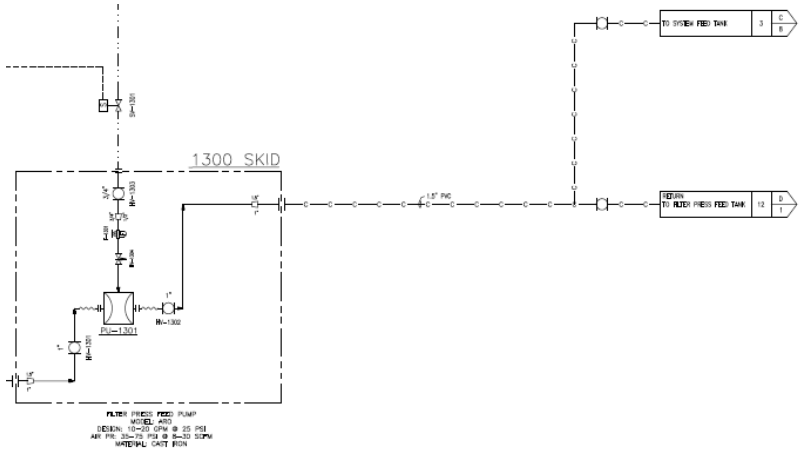
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



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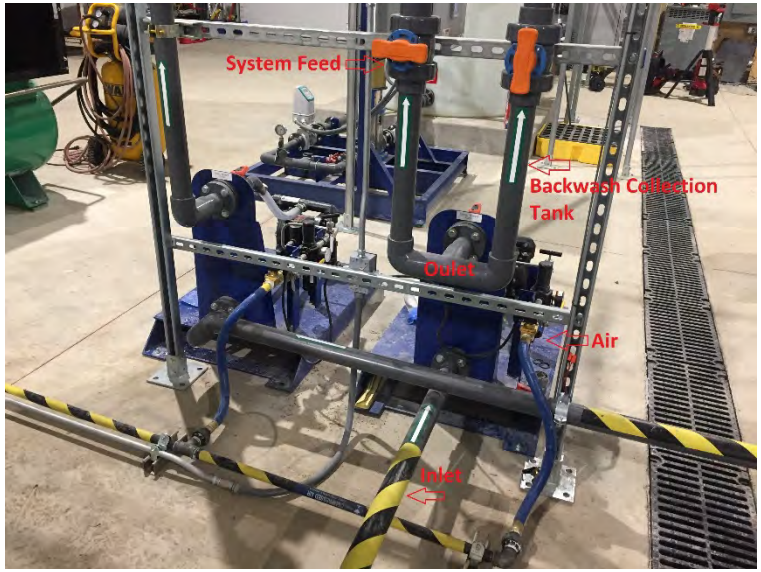

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

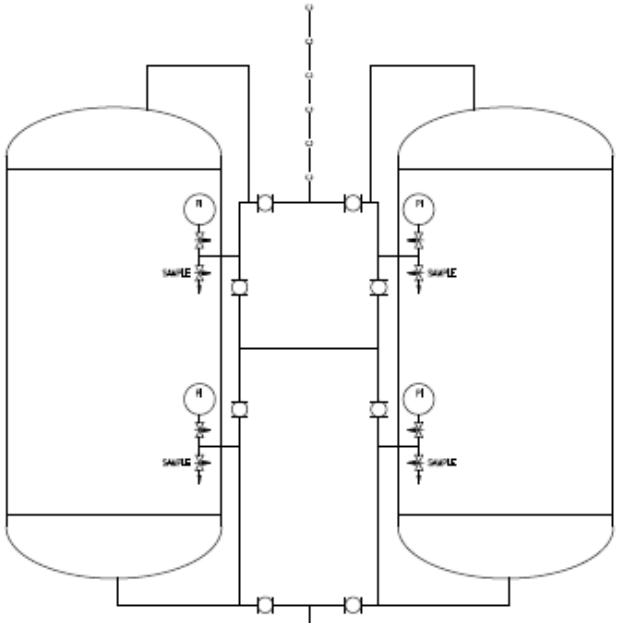
Initial when complete: **NJC**	**Component:** Super 30 Tanks	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet				GAC Vessels
Outlet				Discharge to River

Electrical Wiring Summary	
Electrical Component	**Destination**

Location	Check
Leveled	Check
Fastened	N/A

Additional Notes

P&ID 	Isometric Picture 
Side Picture	Isometric Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Feed Tank T-2001	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet	Butterfly Valve			Feed/Filter Presses Excess Water
Outlet	Ball Valve			0100 SKID
Drain discharge	Ball Valve			Drain

Electrical Wiring Summary	
Electrical Component	**Destination**
Ultrasonic Sensor	Remote IO Panel (0100 SKID)

Location	Check
Leveled	Check
Fastened	Check
Tank Vented	Check

Additional Notes

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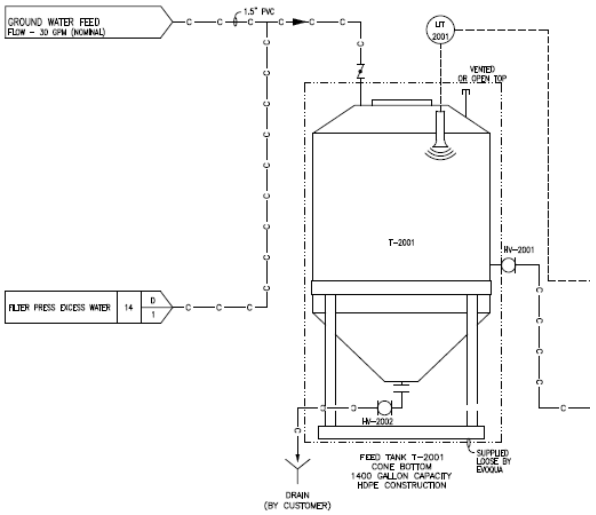
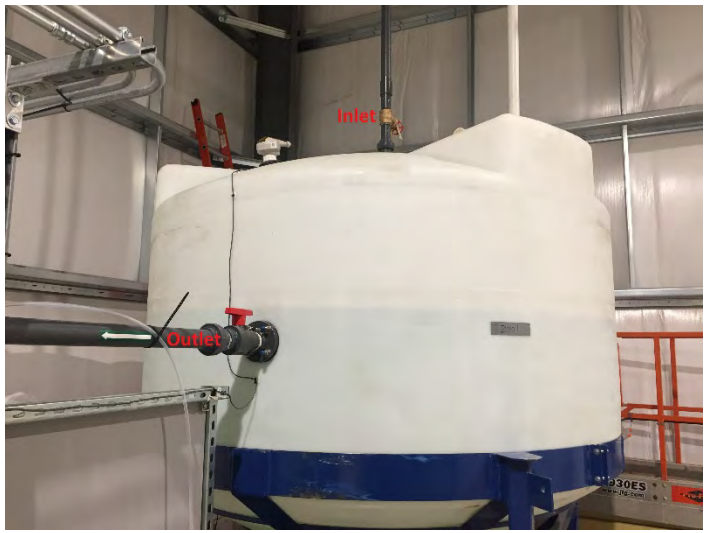
Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Top Picture



Side Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Tank T-2101	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet Feed				Vanox Unit (SKID 0400)
Outlet Feed	Ball Valve			Effluent Pump (SKID 0500)
Drain Discharge	Ball Valve			Drain

Electrical Wiring Summary	
Electrical Component	**Destination**
Ultrasonic Sensor	Remote IO Panel (SKID 0500)

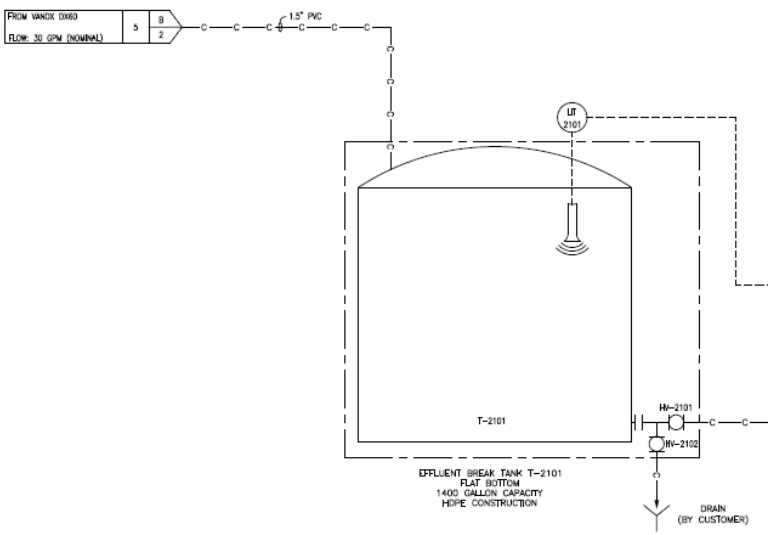
Location	Check
Leveled	Check
Fastened	Check
Tank Vented	Check

Additional Notes

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Top Picture

Side Picture

Isometric Picture

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Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Backwash Collection Tank T-2201	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet Feed	Polyblend System			Multimedia Filter/Filter Press Effluent Tank
Outlet Feed	Ball Valve			Removal Backwash Pump (SKID 0700)
Drain Discharge	Ball Valve			Drain
Sludge Discharge	Ball Valve			Sludge Transfer Pump (SKID 1100)

Electrical Wiring Summary	
Electrical Component	**Destination**
Ultrasonic Sensor	Remote IO Panel (SKID 0700)

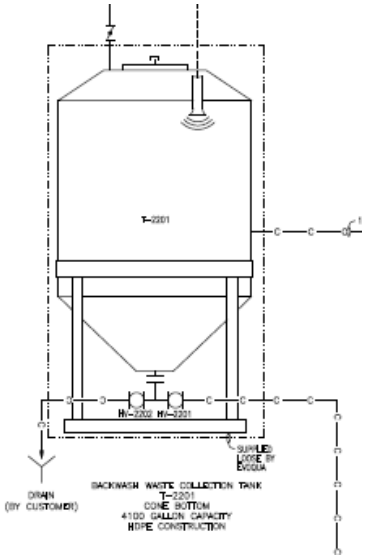
Location	Check
Leveled	Check
Fastened	Check
Tank Vented	Check

Additional Notes
Polyblend System Inject point occurs right after multimedia filters, to allow for mixing before reaching the Backwash Collection Tank

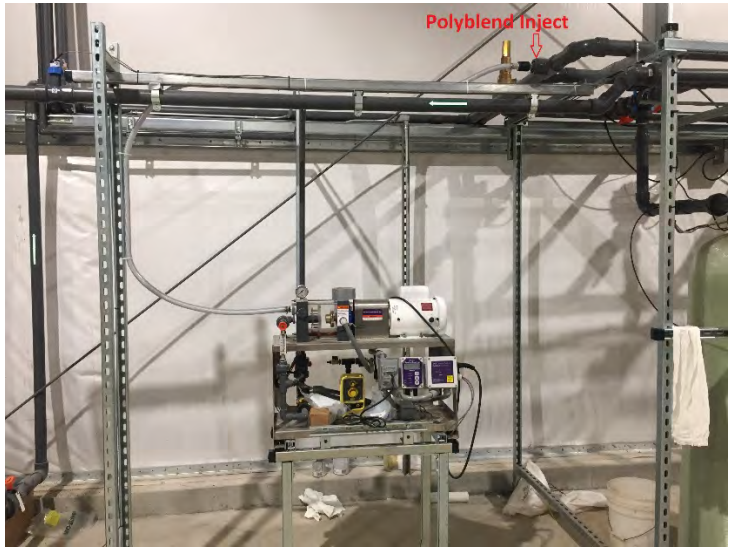
de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID

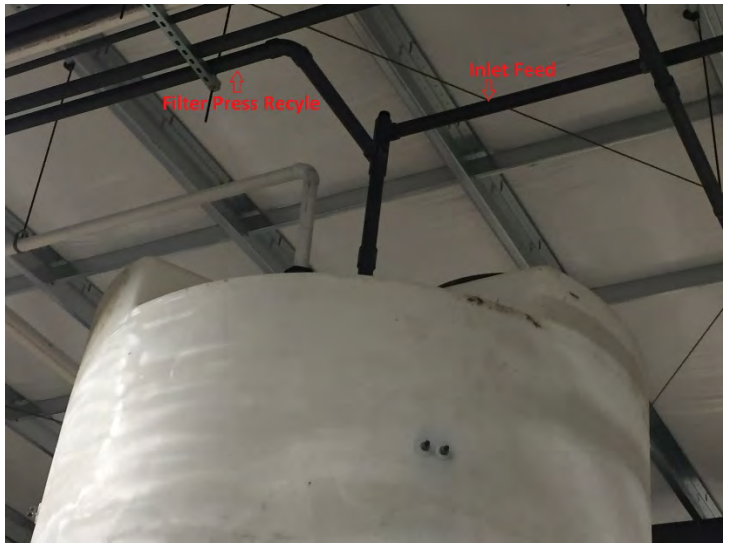


Additional Picture



Side Picture

Top Picture



de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Backwash Feed Tank T-2301	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet Feed	City Water			Bag Filter (SKID 0900)
Outlet Feed	Ball Valve			Backwash Pump (SKID 1000)

Electrical Wiring Summary	
Electrical Component	**Destination**
Ultrasonic Sensor	Remote IO Panel (SKID 0700)

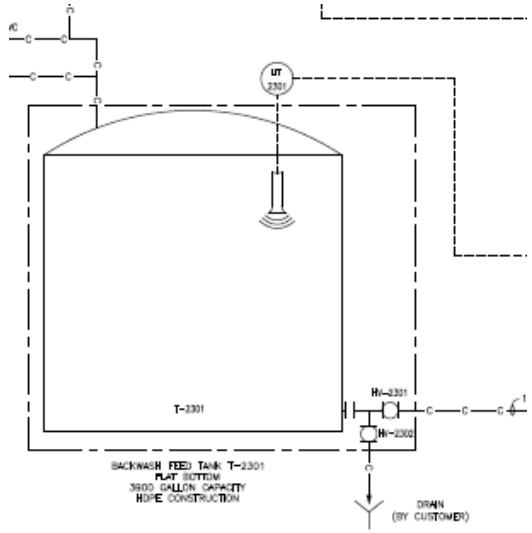
Location	Check
Leveled	Check
Fastened	Check
Tank Vented	Check

Additional Notes

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Top Picture

Side Picture

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

Initial when complete: **NJC**	**Component:** Backwash Feed Tank T-2401	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet Feed				Backwash sludge Transfer Pump (SKID 1100)
Outlet Feed	Ball Valve			Filter Press Feed Pump (SKID 1200)

Electrical Wiring Summary	
Electrical Component	**Destination**
Ultrasonic Sensor	Remote IO Panel (SKID 0700)

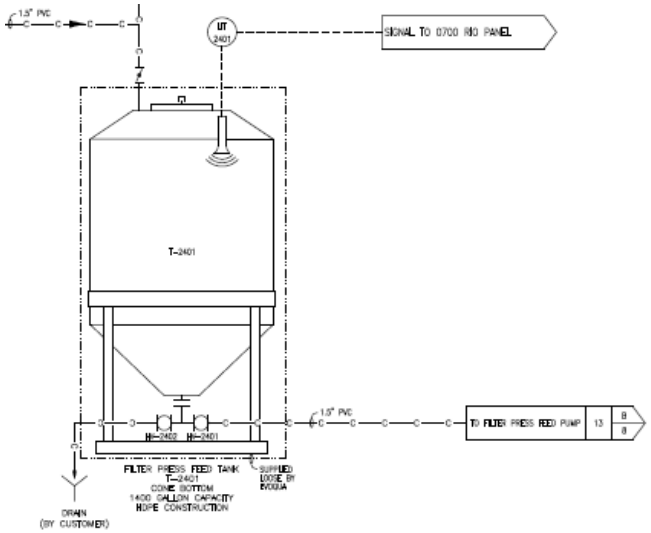
Location	Check
Leveled	Check
Fastened	Check
Tank Vented	Check

Additional Notes

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

P&ID



Top Picture

Side Picture

de maximis, inc.

Nuclear Metals, Inc. (NMI) Superfund Site – Concord, MA
GW NTCRA Treatment System Construction
Technical Component Placement and Photographic Documentation

Prepared By: Nicholas Carabillo **Date Completed: 01/25/2019**

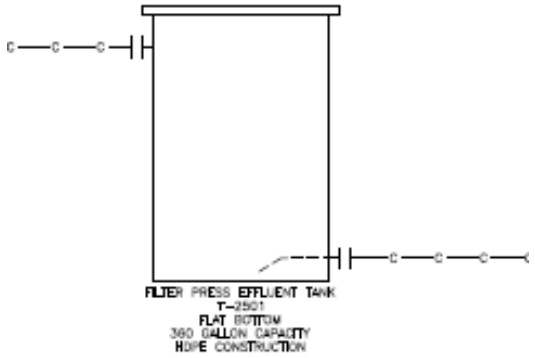
Initial when complete: **NJC**	**Component:** Backwash Feed Tank T-2501	

Component Piping Summary				
Connection Point Description	**Pipe Component 1**	**Pipe Component 2**	**Pipe Component 3**	**Destination/Origin**
Inlet Feed				Filter Press
Outlet Feed	Ball Valve			Filter Press Feed Pump (SKID 1300)

Electrical Wiring Summary	
Electrical Component	**Destination**

Location	Check
Leveled	Check
Fastened	N/A

Additional Notes

P&ID	Isometric Picture
	

Appendix E
As-Built Drawings and Construction Control Document
Treatment Building

GENERAL NOTES

ALL WORK SHALL CONFORM TO THE 2015 INTERNATIONAL BUILDING CODE (IBC) WITH MASSACHUSETTS AMENDMENTS

THE OWNER SHALL RETAIN THE SERVICES OF AN INDEPENDENT TESTING AGENCY TO PERFORM STRUCTURAL INSPECTIONS AS INDICATED ON THE DRAWINGS AND AS REQUIRED/INDICATED BY THE PROGRAM OF STRUCTURAL TESTS AND INSPECTIONS.

THE CONTRACTOR SHALL EXAMINE ARCHITECTURAL, MECHANICAL, PLUMBING AND ELECTRICAL DRAWINGS FOR VERIFICATION, LOCATION AND DIMENSIONS OF CHASES, INSERTS, OPENINGS, SLEEVES, DEPRESSIONS AND OTHER PROJECT REQUIREMENTS NOT SHOWN ON THE STRUCTURAL/FOUNDATION DRAWINGS.

THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS IN THE FIELD AND WITH THE ARCHITECTURAL DRAWINGS AND SHALL NOTIFY THE OWNER/ARCHITECT/ENGINEER OF ANY DISCREPANCY BEFORE PROCEEDING WITH THE WORK. EXISTING CONDITIONS SHOWN ARE NOT GUARANTEED.

THE CONTRACTOR SHALL PROVIDE ALL NECESSARY BRACING & SHORING UNTIL ALL STRUCTURAL WORK IS COMPLETE.

SHOP DRAWINGS, IN ADDITION TO THE SUBMITTALS REQUIRED BY THE PROJECT SPECIFICATIONS, SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND COMMENTS PRIOR TO FABRICATION FOR THE FOLLOWING:

1) CONCRETE MIX & CURING METHOD
2) METAL BUILDING FRAMING & CALCS W/PE STAMP
3) REINFORCING STEEL
4) STRUCTURAL FILL & COMPACTION METHOD
5) EXPANSION BOLTS AND ADHESIVE ANCHORS

PROVIDE SEALANT AT ALL CONTROL JOINTS.

PROVIDE RIGID INSULATION PER THE ARCHITECTURAL DRAWINGS.

STRUCTURAL DESIGN NOTES

DESIGN LOADS:

SNOW DESIGN DATA
- GROUND SNOW LOAD, Pg = 50 PSF (+DRIFTING)
- SNOW EXPOSURE FACTOR Ce = 1.0
- SNOW IMPORTANCE FACTOR I = 1.0
- THERMAL FACTOR Ct – 1.0
- FLAT ROOF SNOW LOAD Pf = 35 PSF

WIND LOAD DESIGN DATA
- BASIC WIND SPEED V = 96.5 MPH
- IMPORTANCE FACTOR I = .701
- EXPOSURE CATEGORY = B
- BASIC WIND PRESSURE = 15.24 psf

SEISMIC DESIGN DATA:
- BUILDING OCCUPANCY CATEGORY = II
- SEISMIC IMPORTANCE FACTOR, I = 1.0
- MAPPED SPECTRAL RESPONSE ACCELERATION – SS: 21.30%g & S1: 7.00%g
- SITE CLASS = D
- SPECTRAL RESPONSE COEFFICIENTS – SDS: .2272 & SD1: .1120
- SEISMIC DESIGN CATEGORY = B
- DESIGN BASE SHEAR = .0757xW (TRANSVERSE) .1069xW (LONGITUDINAL)
- RESPONSE MODIFICATION FACTOR, R = 3
- ANALYSIS PROCEDURE UTILIZED: "EQUIVALENT LATERAL FORCE METHOD"

STRUCTURAL INSPECTIONS

INSPECTION AND TESTING WILL BE PERFORMED PER CHAPTER 17 OF THE IBC 2015. THE OWNER WILL EMPLOY A TESTING AGENCY (SELECTED BY THE ENGINEER/OWNER) TO PERFORM STRUCTURAL TESTS AND INSPECTIONS AS INDICATED ON THIS SHEET. TEST REPORTS SHALL BE ADDRESSED TO MCBRIE, LLC & SENT DIRECTLY FROM THE TESTING AGENCY.

THE CONTRACTOR SHALL COORDINATE WITH, NOTIFY, AND PROVIDE ACCESS AND A SAFE WORKING ENVIRONMENT FOR THE OWNER'S TESTING AGENCY BOTH IN THE SHOP AND IN THE FIELD.

ALL FILL INSTALLATION, CONCRETE REINFORCING, CONCRETE PLACEMENT AND STRUCTURAL STEEL INSTALLATIONS SHALL BE INSPECTED/OBSERVED BY THE SER OR AN INDEPENDENT TESTING AGENCY. ANY WORK COMPLETED WITHOUT INSPECTIONS SHALL BE CONSIDERED AS UNACCEPTABLE AND SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.

AT A MINIMUM, THE FOLLOWING WILL BE INSPECTED:

1. EXCAVATION OF BUILDING FOOTPRINT AND CONTROLLED FILL AREAS
2. PROOF ROLLING OF SUBGRADES
3. REBAR PLACEMENT
4. CONCRETE PLACEMENT
5. MASONRY CONSTRUCTION
6. PRE-FAB METAL BUILDING

GEOTECHNICAL/FOUNDATION DESIGN

FOUNDATION/FOOTING DESIGN IS BASED UPON BEARING CAPACITIES PER THE GEOTECHNICAL REPORT PREPARED BY YANKEE ENGINEERING DATED AUGUST 3rd 2018. BOTTOM ELEVATION OF FOOTING SHALL BE ADJUSTED UPON APPROVAL FROM STRUCTURAL ENGINEER OF RECORD, IF NECESSARY, TO BEAR ON ENGINEERED FILL OVER FIRM MATERIAL MATERIAL CAPABLE OF SUPPORTING A MINIMUM SOIL BEARING CAPACITY OF 4,000 PSF.

ALL FOOTINGS SHALL BEAR ON A MINIMUM OF 1 FOOT LIFT OF STRUCTURAL FILL OVER EXISTING BEDROCK. (IF ENCOUNTERED)
GEOTECHNICAL ENGINEER SHALL APPROVE ALL SUBGRADE SOILS PRIOR TO INSTALLATION OF FOOTING FORMS.

CONCRETE & REINFORCING

ALL CONCRETE WORK SHALL CONFORM TO THE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE (ACI 318-05)" AND "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" (ACI 301).

ALL CONCRETE IN FOUNDATION WALLS AND FOOTINGS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS. ALL CONCRETE IN SLABS-ON-GRADE AND ELEVATED SLABS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. NO CONCRETE SHALL BE CAST IN WATER OR ON FROZEN GROUND.

DOWELS SHALL BE PROVIDED IN CONCRETE FOUNDATION WALLS AS INDICATED ON THE DRAWINGS. THE CONTRACTOR SHALL COORDINATE THE LOCATION OF THE DOWELS WITH THE PROPOSED CMU WALL VERTICAL REINFORCING WHERE APPLICABLE. ALL DOWELS ARE TO BE EPOXY GROUTED INTO EXISTING SLABS/FOUNDATIONS WITH HILTI HIT HY20 EPOXY OR APPROVED EQUAL.

FOUNDATION WALLS SHALL HAVE CONSTRUCTION JOINTS AS DETAILED. REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS AS INDICATED ON THE DRAWINGS.

BACKFILL AGAINST WALLS SHALL BE PLACED ALTERNATELY ON EACH SIDE IN 12" MAXIMUM LIFTS. WALLS WITH UNBALANCED FILL AND WHERE TOP OF WALL IS SUPPORTED BY THE FLOOR FRAMING SHALL BE TEMPORARILY BRACED OR SHORED IF BACKFILLED BEFORE FRAMING IS COMPLETE.

REINFORCING STEEL SHALL CONFORM TO THE FOLLOWING:
- (A) ATSM 615, GRADE 60 FOR DEFORMED BARS (Fy = 60,000 P.S.I.)
- (B) WELDED WIRE FABRIC (WWF) REINFORCEMENT: ASTM A185

WELDED WIRE FABRIC (WWF) SHALL BE LAPPED 6" OR ONE SPACE, WHICHEVER IS LARGER, AND SHALL BE WIRED TOGETHER.

PREFABRICATED METAL BUILDING

METAL BUILDING DESIGN IS BY OTHERS. THE METAL BUILDING DESIGN SHALL BE PER THE LATEST EDITION OF THE MASSACHUSETTS BUILDING CODE OR ADOPTIVE CODE AS REQUIRED. CONTRACTOR SHALL FOLLOW BUTLER BUILDINGS SPECIFICATIONS

CONSTRUCTION AS-BUILTS
5/20/19

NO.	DATE	REVISIONS

PREPARED FOR:
SENATE CONSTRUCTION CORP.
SHIRLEY, MA

NUCLEAR METALS

ACTON, MA

McBRIE JOB # 18-173

DRWN BY: DH
CHK'D BY: BJK
DATE: 7/18/18

McBrie, LLC
Structural Design & Sales
160 SYLVAN STREET
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DANVERS, MA 01923
TEL 978-646-0097
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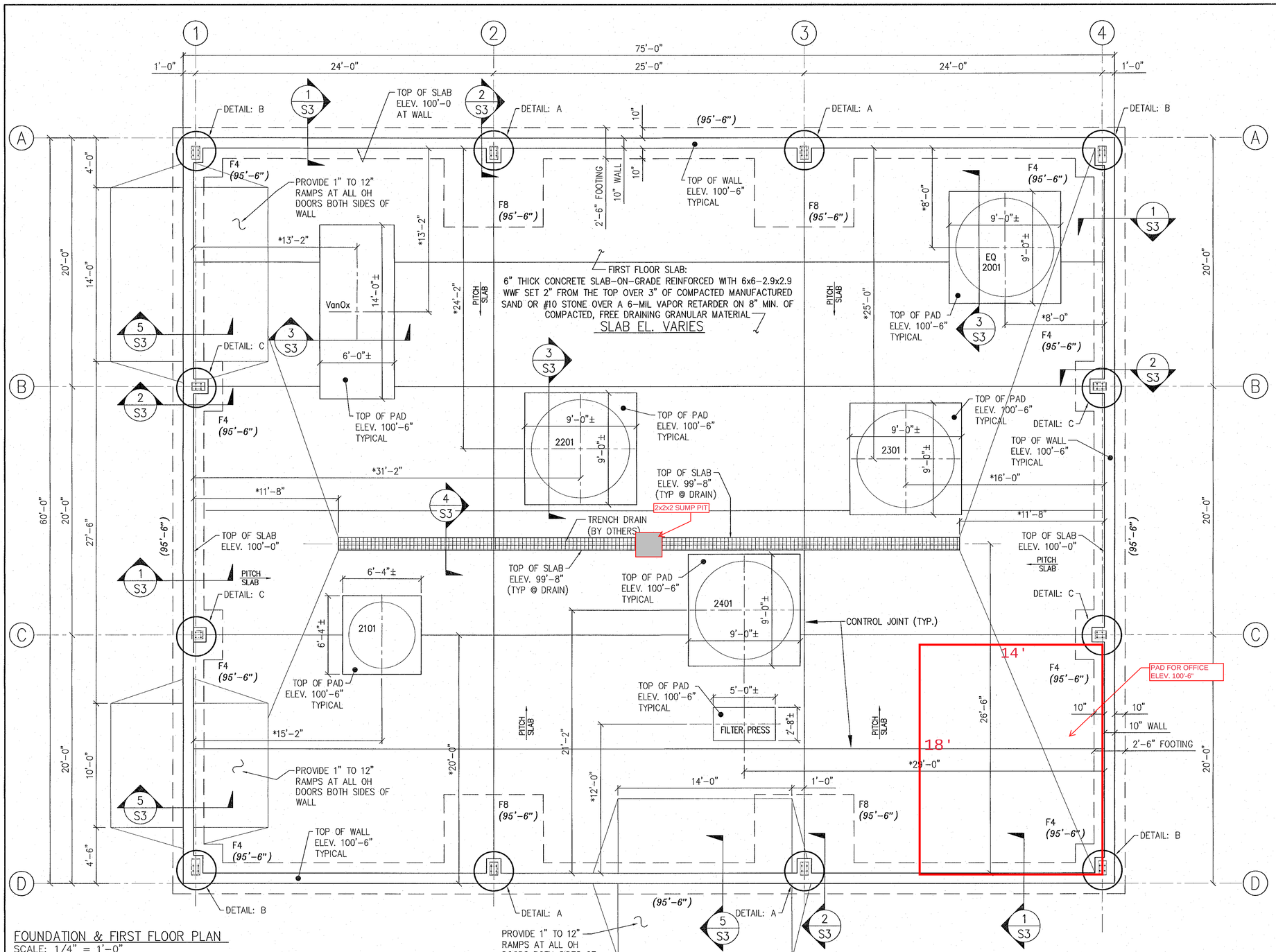
SEAL

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED
PROFESSIONAL ENGINEER

NOTES

SCALE: AS NOTED

S1



FOUNDATION & FIRST FLOOR PLAN

SCALE: 1/4" = 1'-0"

FINISH FLOOR ELEVATION = VARIE (SEE PLAN)

TOP OF FOUNDATION WALL ELEVATION = 100'-6"

ELEVATIONS NOTED AS *(XX.X)* INDICATE THE BOTTOM OF FOOTING ELEVATION. PREPARATION OF SUBGRADE SHALL CONFORM TO THE SPECIFICATIONS PRESENTED IN THE GEOTECHNICAL INVESTIGATION PREPARED BY YANKEE ENGINEERING , DATED AUGUST 3rd 2018

SEE SHEET S1 FOR GENERAL NOTES, DETAILS AND SECTIONS NOT SHOWN ON THIS SHEET.

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS INDICATED WITH THE ARCHITECTURAL DRAWINGS BEFORE COMMENCEMENT OF WORK.

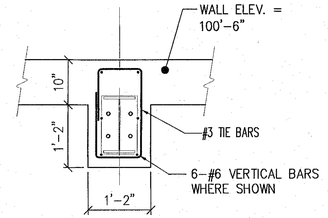
REFER TO BUTLER BLDG DRAWINGS FOR ANCHOR BOLT PLACEMENT

FOOTING SCHEDULE

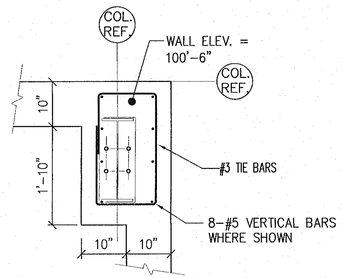
MARK	PLAN SIZE	DEPTH	REINFORCING
F4	4'-0" x 4'-0"	12"	5 - #5 BOTTOM E.W.
F8	8'-0" x 8'-0"	12"	7 - #5 BOTTOM E.W.

ANCHOR BOLT SCHEDULE
ASTM F1554 A36 ANCHOR BOLTS

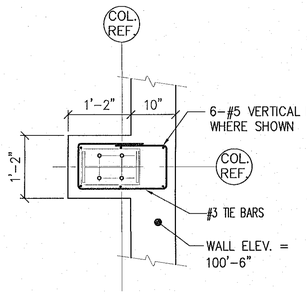
MARK	BOLT LENGTH	DIAMETER	PROJECTION	3" BEND OR NUT
	1'-6"	3/4"	4"	WELDED NUT



DETAIL A: COLUMN PIER



DETAIL B: COLUMN PIER



DETAIL C: COLUMN PIER

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STRUCTURAL
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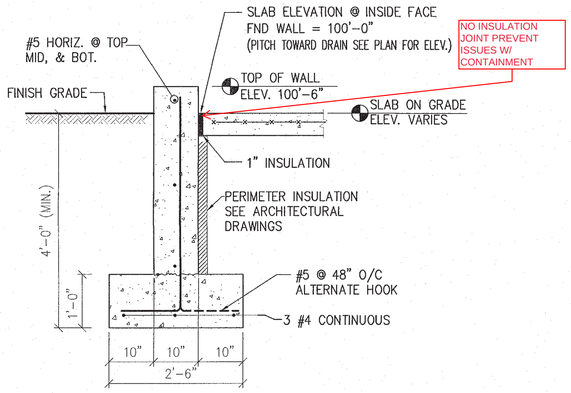
REGISTERED PROFESSIONAL ENGINEER

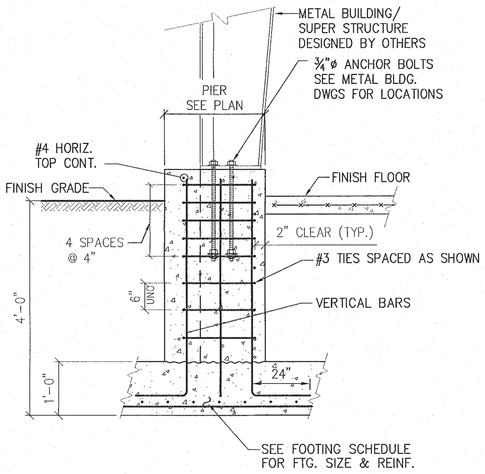
FOUNDATION PLAN

SCALE: AS NOTED

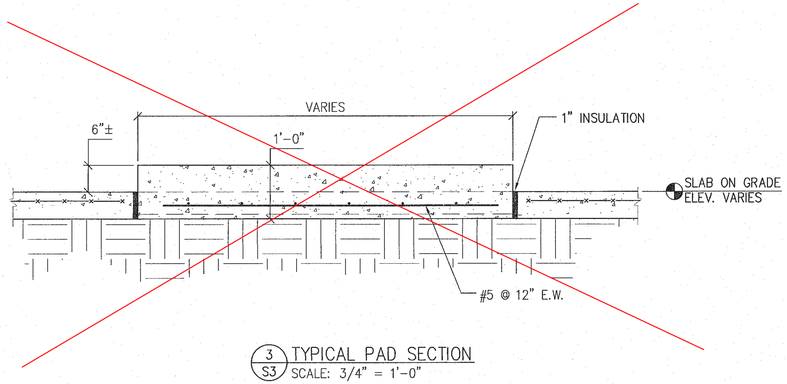
S2



1 S2 FOUNDATION WALL SECTION
SCALE: 3/4" = 1'-0"

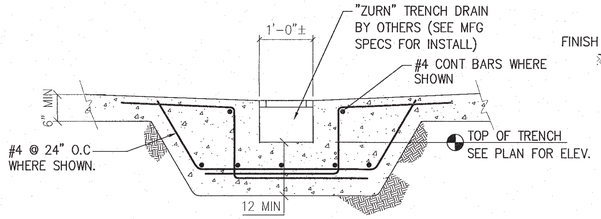


2 S3 TYPICAL PIER SECTION AT COLUMNS
SCALE: 3/4" = 1'-0"

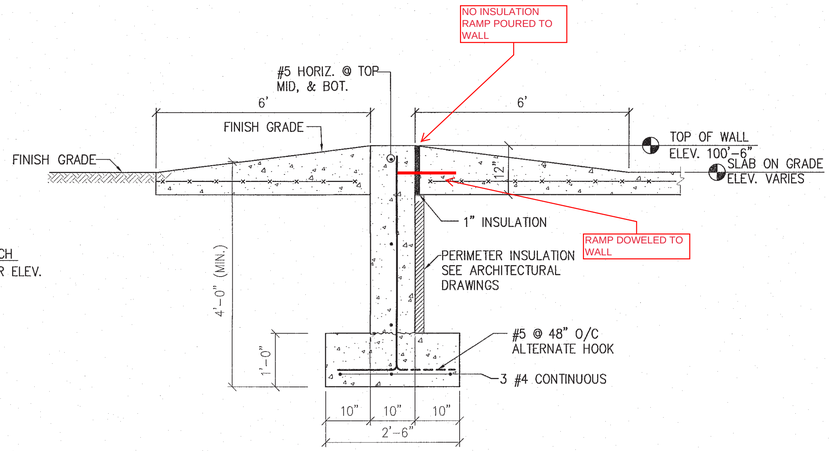


3 S3 TYPICAL PAD SECTION
SCALE: 3/4" = 1'-0"

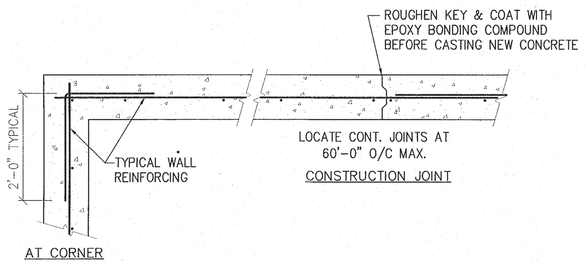
FOR 3/S3, REFER TO SK-1 DATED 11/27/18



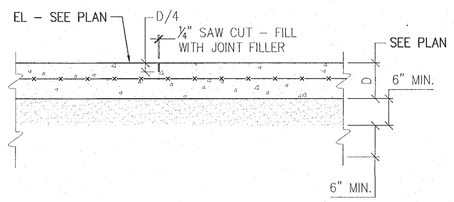
4 S2 TRENCH SECTION
SCALE: 3/4" = 1'-0"



5 S2 FOUNDATION WALL SECTION @ OPENINGS
SCALE: 3/4" = 1'-0"



– S3 FOUNDATION WALL REINFORCING DETAILS
SCALE: 3/4" = 1'-0"



SLAB ON GRADE CONTROL JOINT DETAIL
SCALE: NONE

CONSTRUCTION AS-BUILTS
5/20/19

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FOUNDATION SECTIONS
SCALE: AS NOTED

S3

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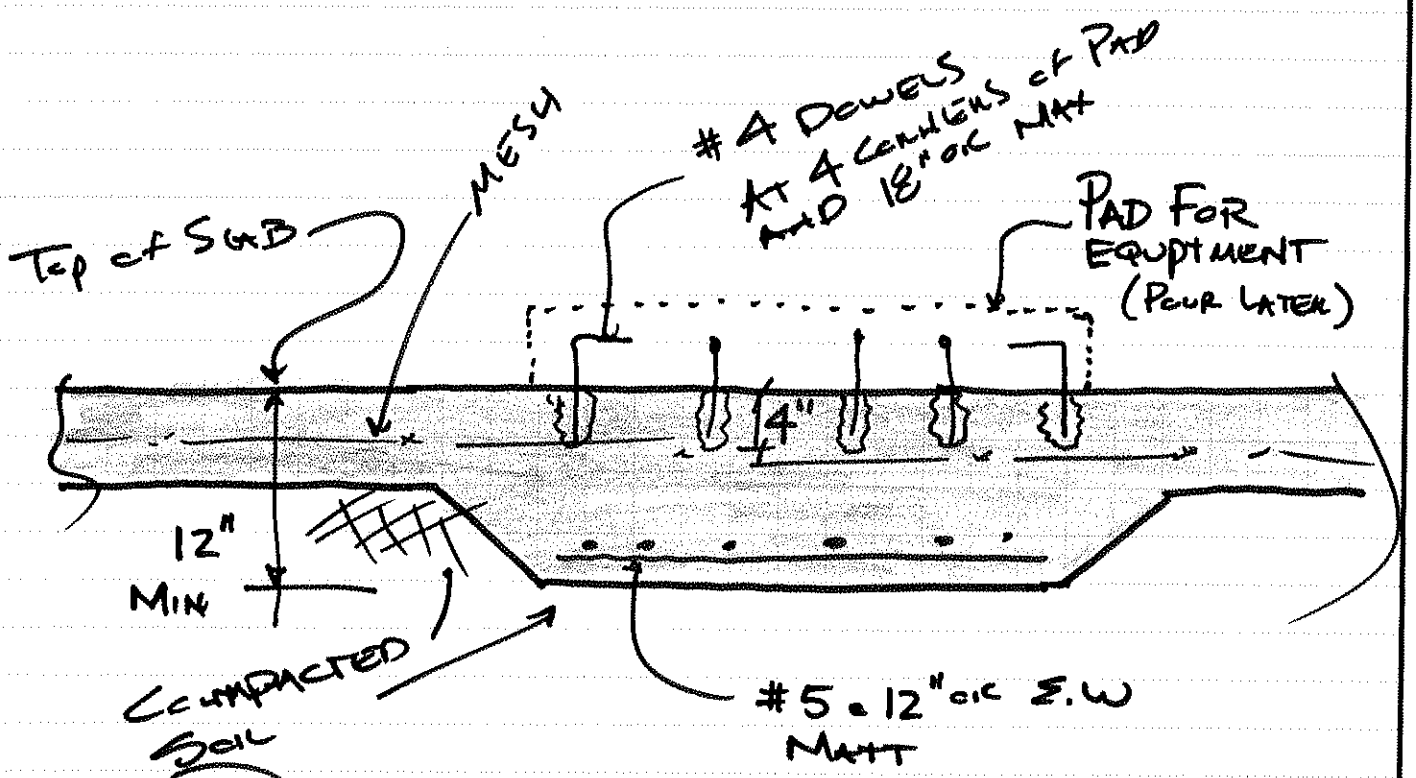
www.mcbrie.com

JOB NUCLEAR METALS
SHEET NO. SK1 OF 1
CALCULATED BY BJK DATE 11/27/18
CHECKED BY DATE
SCALE

CONSTRUCTION AS-BUILTS 5/20/19



3/S3 HAUNCH FOOTING DETAIL

REVISED DETAIL USE IN LIEU of

3/S3

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PROFESSIONAL ENGINEER

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DRAWING INDEX

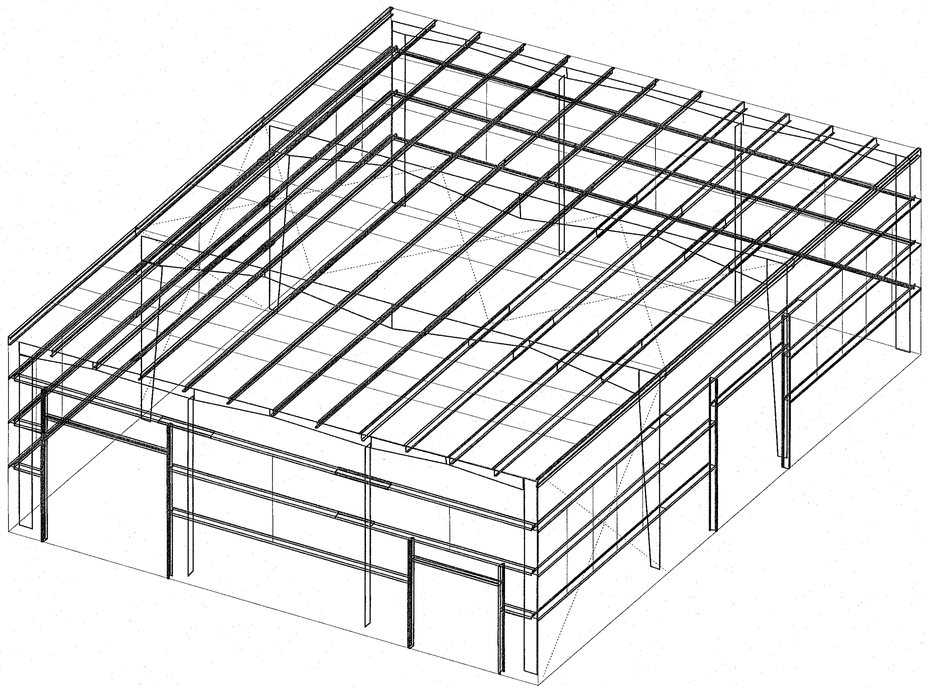
DRAWING TITLE	PAGES
COVER SHEET	1
CODES AND LOADS	2
NOTES	3
ANCHOR ROD PLAN	4
PRIMARY STRUCTURAL	5-10
SECONDARY STRUCTURAL	11-19
COVERING	20-26
SPECIAL DRAWINGS	
STANDARD ERECTION DETAILS	
PLANOGRAPH DETAILS	

DRAWING RELEASE HISTORY

TYPE	DATE	DESCRIPTION
Anchor rods	7/31/18	FOR CONSTRUCTION
Permit drawings	7/31/18	PERMIT SET- For Building Dept. Approval
Final erection drawings rev00	8/9/18	FOR CONSTRUCTION

Erection guides:
Basic Building Structural System Installation Guide (3586)
MR-24 Roof Installation Guide (4797)

CONSTRUCTION AS-BUILTS
5/20/19



GENERAL NOTES

MATERIALS

	ASTM DESIGNATION	
3 PLATE WELDED SECTIONS	A529, A572, A1011, A1018	GRADE 55
COLD FORMED LIGHT GAGE SHAPES	A653, A1011	GRADE 60
BRACE RODS	A572, A510	GRADE 50
HOT ROLLED MILL SHAPES	A36, A529, A572, A588, A992	GRADE 36 OR 50
HOT ROLLED ANGLES	A529, A572, A588, A992	GRADE 50
HOLLOW STRUCTURAL SECTION (HSS)	A500	GRADE B
CLADDING	A653, A792	GRADE 50 OR GRADE 80

HIGH STRENGTH BOLT TIGHTENING REQUIREMENTS

IT IS THE RESPONSIBILITY OF THE ERECTOR TO ENSURE PROPER BOLT TIGHTNESS IN ACCORDANCE WITH APPLICABLE REGULATIONS. SEE RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH STRENGTH BOLTS FOR MORE INFORMATION.
SEE ERECTION GUIDE FOR BOLT TIGHTENING INSTRUCTIONS. THE FOLLOWING CRITERIA MAY BE USED TO DETERMINE THE BOLT TIGHTNESS (I.E.-SNUG TIGHT OR PRE-TENSION) UNLESS REQUIRED OTHERWISE BY LOCAL JURISDICTION OR CONTRACT.

ALL A490 BOLTS SHALL BE "PRE-TENSIONED". A325 BOLTS IN PRIMARY FRAMING AND BRACING CONNECTIONS MAY BE "SNUG-TIGHT" EXCEPT AS FOLLOWS;

PRE-TENSION A325 BOLTS IF BUILDING SUPPORTS A CRANE GREATER THAN 5 TON CAPACITY.

PRE-TENSION A325 BOLTS IF BUILDING SUPPORTS MACHINERY THAT CREATES VIBRATION, IMPACT, OR STRESS REVERSALS ON CONNECTIONS.

PRE-TENSION A325 BOLTS IF LOCATED IN HIGH SEISMIC AREAS. FOR IBC BASED CODES; HIGH SEISMIC IS DESIGN CATEGORY D, E OR F. SEE CODES AND LOADS SECTION BELOW FOR DETAILS.

PRE-TENSION ANY CONNECTION WITH DESIGNATION A325-SC. SLIP CRITICAL (SC) CONNECTIONS MUST BE FREE OF PAINT, OIL OR OTHER MATERIALS THAT REDUCE FRICTION AT CONTACT SURFACES. GALVANIZED OR LIGHTLY RUSTED SURFACES ARE ACCEPTABLE.

IN CANADA, ALL A325 AND A490 BOLTS SHALL BE "PRE-TENSIONED", EXCEPT FOR SECONDARY MEMBERS AND FLANGE BRACES.

SECONDARY MEMBERS AND FLANGE BRACE CONNECTIONS ARE ALWAYS "SNUG TIGHT", UNLESS INDICATED OTHERWISE IN ERECTION DRAWING DETAILS.

INSPECTION AND TESTING

SPECIAL INSPECTIONS AND TESTING REQUIRED BY AUTHORITY HAVING JURISDICTION (AHJ) DURING CONSTRUCTION AND/OR STEEL FABRICATION IS THE RESPONSIBILITY OF THE OWNER OR OWNERS AUTHORIZED AGENT. WHEN REQUIRED, THE OWNER SHALL EMPLOY A QUALITY ASSURANCE AGENCY (QAA) APPROVED BY THE AHJ. THE BUILDER IS RESPONSIBLE TO COORDINATE BETWEEN THE QAA FIRM AND BBNA FABRICATION FACILITIES. THE TYPE AND EXTENT OF SPECIAL INSPECTIONS AND NDT WELD TESTING MUST BE SPECIFICALLY STIPULATED IN CONTRACT DOCUMENTS OR BBNA WILL ASSUME SPECIAL INSPECTIONS AND/OR NDT TESTING ARE WAIVED AS PERMITTED BY THE BUILDING CODE BASED ON BBNA FACILITIES IAS AC472 ACCREDITATION.

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED PROFESSIONAL ENGINEER

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

COVER SHEET

BUILDER:	Senate Construction
CUSTOMER:	
LOCATION:	Acton, Massachusetts
PROJECT:	Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#:	18-036146-01

Butler Manufacturing
VPC VERSION: 2018.1c

JOB #:	18-036146-01
DATE:	8/9/18
DRAWN/CHECK:	DRR /
PAGE:	1

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Codes and Loads
WHEN MULTIPLE BUILDINGS ARE INVOLVED, SPECIFIC LOAD FACTORS FOR DIFFERING OCCUPANCIES, BUILDING DIMENSIONS, HEIGHTS, FRAMING SYSTEMS, ROOF SLOPES, ETC., MAY RESULT IN DIFFERENT LOAD APPLICATION FACTORS THAN INDICATED BELOW. SEE CALCULATIONS FOR FURTHER DETAILS. WIND LOADS ARE APPLIED TO OVERALL BUILDING ENVELOPE. COMMON WALLS BETWEEN CONNECTED SHAPES ARE NOT SUBJECT TO EXTERNAL WIND LOADS.
City: Acton County: Middlesex State: Massachusetts Country: United States

Building Code
Building Code: Massachusetts State Building Code (780 CMR), 9th Edition
Based on Building Code: Massachusetts State Building Code (780 CMR), 9th Edition
Building Risk/Occupancy Category: II (Standard Occupancy Structure)
Structural: 05AISC - ASD Rainfall: I: 5.00 inches per hour
Cold Form: 07AISI - ASD f'c: 3000.00 psi Concrete

Dead and Collateral Loads
Collateral Gravity:5.00 psf
Collateral Uplift: 0.00 psf

Material Dead Weight
Roof Covering + Second. Dead Load: 2.20 psf
Frame Weight (assumed for seismic):2.50 psf

Roof Live Load
Roof Live Load: 20.00 psf Not Reducible

Wind Load
Wind Speed: 96.05 mph
The 'Envelope Procedure' is Used
Wind Exposure: B - Kz: 0.701
Parts Wind Exposure Factor: 0.701
Wind Enclosure: Enclosed
Wind Importance Factor: Iw: 1.000
Topographic Factor: Kzt: 1.0000

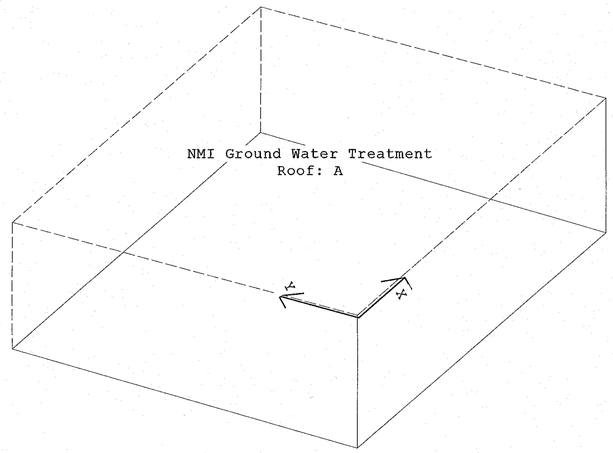
NOT Windborne Debris Region
Base Elevation: 0/0/0
Primary Zone Strip Width: 2a: 12/0/0
Parts / Portions Zone Strip Width: a: 6/0/0
Basic Wind Pressure: q: 14.06 psf

Snow Load
Ground Snow Load: pg: 50.00 psf
Flat Roof Snow: pf: 35.00 psf
Design Snow (Sloped): ps: 35.00 psf
Rain Surcharge: 0.00
Exposure Factor: 2 Partially Exposed - Ce: 1.00
Snow Importance: Is: 1.000
Thermal Factor: Heated - Ct: 1.00
Ground / Roof Conversion: 0.70
Obstructed or Not Slippery

Seismic Load
Lateral Force Resisting Systems using Equivalent Force Procedure
Mapped MCE Acceleration: Ss: 21.60 %g
Mapped MCE Acceleration: S1: 7.00 %g
Site Class: Stiff soil (D)
Seismic Importance: Ie: 1.000
System NOT detailed for Seismic
Design Acceleration Parameter: Sds: 0.2304
Design Acceleration Parameter: Sd1: 0.1120
Seismic Design Category: B
Seismic Snow Load: 7.00 psf
% Snow Used in Seismic: 20.00
Fundamental Period Height Used: 22/6/0

Transverse Direction Parameters
System NOT detailed for Seismic
Redundancy Factor: Rho: 1.00
Fundamental Period: Ta: 0.3380
R-Factor: 3.00
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.0768 x W

Longitudinal Direction Parameters
System NOT detailed for Seismic
Redundancy Factor: Rho: 1.00
Fundamental Period: Ta: 0.2066
R-Factor: 3.00
Overstrength Factor: Omega: 2.50
Deflection Amplification Factor: Cd: 3.00
Base Shear: V: 0.0768 x W



CONSTRUCTION AS-BUILTS
5/20/19

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
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C | BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

CODES AND LOADS

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
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Butler Manufacturing
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DRAWING BY: CAD
PAGE: 2

BUILDER/CONTRACTOR RESPONSIBILITIES

Butler Mfg. follows the guidelines as outlined in the AISC and MBMA Codes of Standard Practice. Butler Mfg. standard product specifications, design, fabrication, quality criteria shall govern all work unless stipulated otherwise in the contract documents. In case of discrepancies between Butler Mfg. structural plans and plans for other trades, Butler Mfg. structural plans shall govern.

It is the responsibility of the Builder to obtain approvals and permits from all governing agencies and jurisdictions as required. Approval of Butler Mfg drawings constitutes the builders acceptance of Butler interpretation of the contract purchase order. Unless specific design criteria concerning interface design and details are furnished as part of the contract, Butler Mfg. design assumptions shall govern.

Butler engineers are not Project Engineers or Engineer of Record for the overall project. Butler engineering supply sealed engineering design data and drawings for Butler supplied material as part of the overall project for use by others to obtain permits, approvals, and coordinate with other trades. All interface and/or compatibility of any materials not furnished by Butler are to be considered and coordinated by the builder or A/E firm.

CONSTRUCTION & ERECTION RESPONSIBILITY

The Builder is responsible for construction in strict accordance with Butler Mfg. "FOR CONSTRUCTION" drawings and all applicable product installation guides. Butler is not responsible for work done from any other Butler drawings that are not marked "FOR CONSTRUCTION", nor any drawings prepared by others.

As erected field assemblies of members shall be as specified in MBMA Code of Standard Practice (in Canada - CSA S16), which require L/500 tolerance of installed members. Occasional field work including shimming, cutting, coping, and drilling for final fit-up are considered part of erection. Specified field work and field welding conditions indicated on these drawings shall also be included in the erectors scope of work. See Erection Guide for shimming procedure. For building with top riding bridge cranes see Crane Data drawing for column plumb tolerance.

The building erector shall be properly licensed and experienced in erecting metal building systems. The Builder is responsible for having knowledge of, and shall comply with, all OSHA requirements and all other governing site safety criteria. The builder is responsible for designing, supplying, locating and installing temporary supports and bracing during erection of the building. Butler bracing is designed for code required loads after building completion and shall not be considered as adequate erection bracing. See Erection Guide.

EXISTING STRUCTURES

Butler must be advised of any structure that is within 20 ft. of Butler's building. Load effects from snow drifting, wind effects, and seismic separation must be considered for both the new and existing structures. Butler has designed the new Butler building for these effects. The owner/builder are responsible for employing a Professional Engineer to review and verify the existing structure for all load effects from the adjacent Butler building.

BRACING

Tension brace rods work in pairs to balance forces caused by initial tensioning. Care must be taken while tightening brace rods so as not to cause accidental or misalignment of components. All rods must be installed loose and then tightened. Rods should not exhibit excessive sag. For long or heavy rods, or angles it may be necessary to support the rods at mid-bay by suspending them from secondary members.

Bracing for seismic or wind loading of objects or equipment that are not a part of the Butler structure must be designed by a qualified professional to deliver lateral loads to primary frames and rod bracing struts. Equipment bracing and suspension connections must not impose torsion or minor axis loads, or cause local distortion in any Butler components. Butler accepts no responsibility for design or installation of bracing systems not furnished by Butler.

FIELD WELDING

All field welding shall be done at the direction of a design professional, and done in accordance with governing requirements (AWS in USA, CWB in Canada) by welders qualified to perform the welding as directed by the applicable welding procedure specification (WPS). A WPS shall be prepared by the contractor for each welding variation specified. The contractor is responsible for any special welding inspection as required by local jurisdiction. Filler metal shall be 70 ksi (480 MPa) tensile strength. For welds in high seismic force resisting system (Seismic Cat D, E or F), minimum Charpy V-Notch toughness shall meet AISC-341 criteria (20 ft-lbs min @ 0Deg F). Interpass temperatures shall not exceed 550Deg F (300Deg C).

SIGNAGE

The Builder is responsible for furnishing signs as required by Code and the Building Department, including but not limited to, exits, occupancy limits, floor loading limits, and bulk storage limits. Floor loading signs shall clearly indicate maximum floor live load permitted. Bulk storage facilities shall have signs clearly posted on all loaded walls indicating the type of commodity stored and the maximum storage height. Signs shall be clearly visible when building is fully loaded to design level. Overloading of floors or walls may result in failure.

DELIVERIES

It is the responsibility of the builder to have adequate equipment available at the job site to unload trucks in a safe and timely manner. The Builder will be responsible for all retention charges from carriers as a result of job site unloading delays.

Claims for damage or shorts MUST be noted on the Bill-of-Lading or delivery receipt and filed against the carrier by the consignee as per Butler's Terms of Sales (F.O.B. Plant) under the Uniform Commercial Code. It is critical that damages or shorts be noted on the Bill-of-Lading or you have little recourse with the carrier. Immediately upon delivery of material, material quantities are verified by the Builder against quantities billed on the shipping document. Neither the Manufacturer nor the carrier is responsible for material shortages against quantities billed on the shipping document if such shortages are not noted on the shipping documents upon delivery of material and acknowledged by the carriers agent. For materials concealed in bundles, boxes, or crates, shortages must be reported immediately upon unpacking. Should products get wet, bundled and crated materials must be unpacked and unbundled immediately to provide drainage of trapped moisture. See Erection Guide for proper job site storage procedure.

SEALANTS

Sealants shall be applied in strict accordance with Butler details or weather tightness will be compromised. Sealant must be applied in temperatures and weather conditions consistent with labeling.

INDEPENDENT MEZZANINES

Independent mezzanines must be designed by a professional engineer. The engineer must ensure that proper isolation from the Butler building has been provided to avoid structural damage due to differential movements, or inadvertently apply loads to the Butler structure. Butler accepts no responsibility for the design of the independent mezzanine.

FIRE CODE COMPLIANCE

It is the responsibility of the project design professional and builder to comply with local fire code regulations including consideration of, but not limited to, building use and occupancy, all building construction materials, separation requirements, egress requirements, fire protection systems, etc. Builder shall advise Butler of any special requirements to be furnished by Butler.

FIELD MODIFICATIONS

Modifications to this building from details and instructions contained on these drawings must be approved in writing by Butler Mfg. engineers, or other licensed structural engineer. This includes, but is not limited to, removal of roof or wall cladding, removing or moving any flange braces or rod braces, cutting of openings for doors, windows or RTU's, correction of fabrication errors, etc. The owner shall not impose loads to this structure beyond what is specified for this building in the contract documents. Butler Mfg. accepts no responsibility for the consequences of any unauthorized additions, alterations, or added loads to this structure.

If the builder intends to invoice Butler Mfg. for modifications in excess of $1000, The builder must notify Butler Mfg. immediately, and obtain a Work Authorization from Butler Mfg prior to proceeding. All final claims must be submitted to Butler Mfg with all supporting documentation within 30 days of the building completion. Claims submitted without work authorizations, or after 30 days will not be accepted. Correction of minor misfits, shimming and plumbing, moderate amount of reaming, drilling, chipping / cutting and minor welding are considered by Code of Standard Practice to be part of erection are not subject to claim reimbursement.

CONCRETE/MASONRY/CONVENTIONAL STUD WALLS

The engineer responsible for the design of the wall system is responsible for coordinating with, or specifying to Butler Mfg, any wall to steel compatiblity issues such as drift and deflection compatibility, special base details, and wall to Butler steel connections. All fasteners, sealant and counter flashing of wall systems are to be provided by contractor. The engineer responsible for the wall shall design the anchorage to Butler supporting elements consistent with Code required forces.

PANELS

Oil canning is an inherent characteristic of cold formed steel panels. It is the result of several factors that include induced stresses in the raw material delivered to Butler, fabrication methods, installation procedures, and post installation thermal forces. Thru fastened panels will exhibit some dimpling when installed, especially when insulation is installed between panels and secondary supports. Dimpling can be minimized by careful installation, taking care not to over drive fasteners.

Roof rumble is a phenomenon that is caused by wind gusts lifting up on the roof panels and then springing back into place. All panels experience this action to some degree, especially with concealed clip Standing Seam panels. Roof rumble noise may be minimized by providing a layer of blanket insulation between the panels and any hard support surface such as steel secondary members, substrates such as plywood, steel decking, or rigid board insulation. A minimum of 3 inch thick blanket is recommended over steel secondary members, or 2 inch over substrates.

Oil canning, dimpling, and roof rumble do not affect the structural integrity or weather tightness of the panels and is not grounds for rejection of panels.

The Standing Seam joint detail is designed with an interlocking feature for ease of installation. However, it is imperative that installed Standing Seam panels be secured to the secondary structural members and properly seamed prior to departure from the job site each day.

SKYLIGHTS

Local building departments may require added fall restraint due to conditions that may affect the skylight structural integrity. It is the responsibility of the builder to determine and provide any added fall restraint under the skylight as may be required by your building department.

RAIN WATER RUNOFF

Drainage systems must be designed by the project professional to comply with code requirements. Butler is not responsible for drainage designs, overflow scuppers, down piping, etc. The project professional and contractor are responsible to ensure that primary drains and overflow devices such as scuppers and auxiliary drains are provided as required for the required rain intensity at the building perimeter and at valley conditions to prevent ponding.

STEEL SHOP COAT

The purpose of Butler's shop coat is to provide protection for the steel members during transportation, during temporary job site storage and during erection. Standard shop formulation is not designed to perform as a finish coat when exposed to environmental conditions. Members shall be kept free of the ground and properly drained during job site storage. It is the Builder's responsibility to ensure that if a finish coat is being applied over Butler shop coat that the painting contractor verifies compatibility between his finish coat and Butler's shop coat.

BUTLER MFG. ACCREDITATIONS AND APPROVALS

Fabricator Approvals

IAS AC472 Approvals: (www.iasonline.org/Metal_Building_Systems/MB.html)
Listed under BlueScope Buildings North America, Inc.
City of Los Angeles, CA #FB00031; City of Houston, TX 767;
City of Phoenix, AZ C19-02008; Clark County, NV 43 & 833, San Bernardino County, CA 289,
State of Utah, City of Richmond, Ca.

Design Approvals

IAS AC472 Approvals: (www.iasonline.org/Metal_Building_Systems/MB.html)
Listed under Butler Manufacturing, a Division of BlueScope Buildings North America, Inc.

Canadian CSA A660 Certifications

(http:/eng.cwbgroup.org/Certification/Pages/CertifiedCompanySearch.aspx)
Listed under BlueScope Buildings North America, Inc.

Engineering Certifications of Authorization

USA--AR#576; FL#30427; ID#C-2470; IL#184-002649; KS#E-29; MS#E-0592;
MO#E-2010007736; NC#F-0998; OK#CA4170PE; SD#C-1787; TX#F4828; WV#C03059-00;
CAN--AB#P08900; NS#30123; ON#100148796; and YT#PP134

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED PROFESSIONAL ENGINEER

THE BUTLER MFG. ENGINEER'S SEAL APPLIES ONLY TO THE WORK PRODUCT OF BUTLER MFG. AND DESIGN AND PERFORMANCE REQUIREMENTS SPECIFIED BY BUTLER. THE BUTLER MFG. ENGINEER'S SEAL DOES NOT APPLY TO THE PERFORMANCE OR DESIGN OF ANY OTHER PRODUCT OR COMPONENT FURNISHED BY BUTLER EXCEPT TO ANY DESIGN OR PERFORMANCE REQUIREMENTS SPECIFIED BY BUTLER.

THE GENERAL CONTRACTOR AND/OR ERECTOR IS SOLELY RESPONSIBLE FOR ACCURATE GOOD QUALITY WORKMANSHIP IN ERECTING THIS BUILDING IN ACCORDANCE WITH THIS DRAWING, DETAILS REFERENCED IN THIS DRAWING, ALL APPLICABLE BUTLER MFG. ERECTION GUIDES, AND INDUSTRY STANDARDS PERTAINING TO PROPER ERECTION, INCLUDING THE CORRECT USE OF TEMPORARY BRACING.

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1540 GENESSEE ST. KANSAS CITY, MO 64102

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DRAWING SCALE: NTS

ERECTION NOTES

BUILDER: Senate Construction
CUSTOMER:
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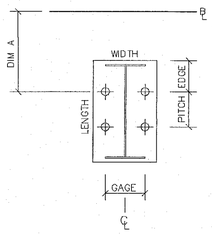
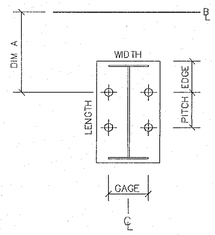
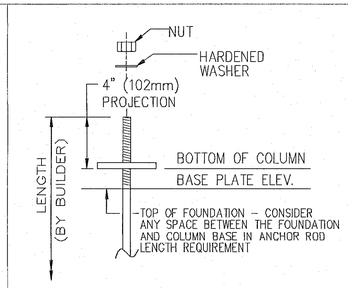


D1 (4)3/4" Dia. GR36 Anchor Rods
Plate W=8" L=1'-7"
Dim: A=1'-3"
Gage=5" Pitch=5" Edge Out=7"
Elev.=100'-6"

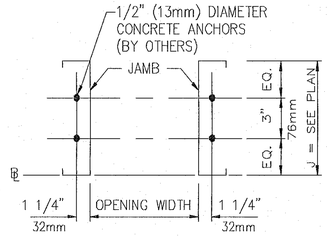


D2 (4)3/4" Dia. GR36 Anchor Rods
Plate W=8" L=1'-1"
Dim: A=1'-0"
Gage=5" Pitch=5" Edge Out=4"
Elev.=100'-6"



THE 4" PROJECTION ABOVE THE BOTTOM OF THE BASE PLATE IS A SUGGESTED MINIMUM TO ENSURE ADEQUATE ANCHOR ROD LENGTH. A DIFFERENT PROJECTION MAY BE REQUIRED BY THE FOUNDATION DESIGNER.
THE ANCHOR ROD PROJECTION MAY NEED TO BE CUT OFF IF THERE IS INTERFERENCE WITH OTHER PARTS.

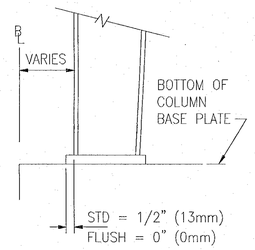
SUGGESTED ANCHOR ROD PROJECTION



NOTE: 1" (25mm) PROJECTION ABOVE BOTTOM OF JAMB CLIP
SEE PLAN FOR JAMB SIZES : J = SIZE

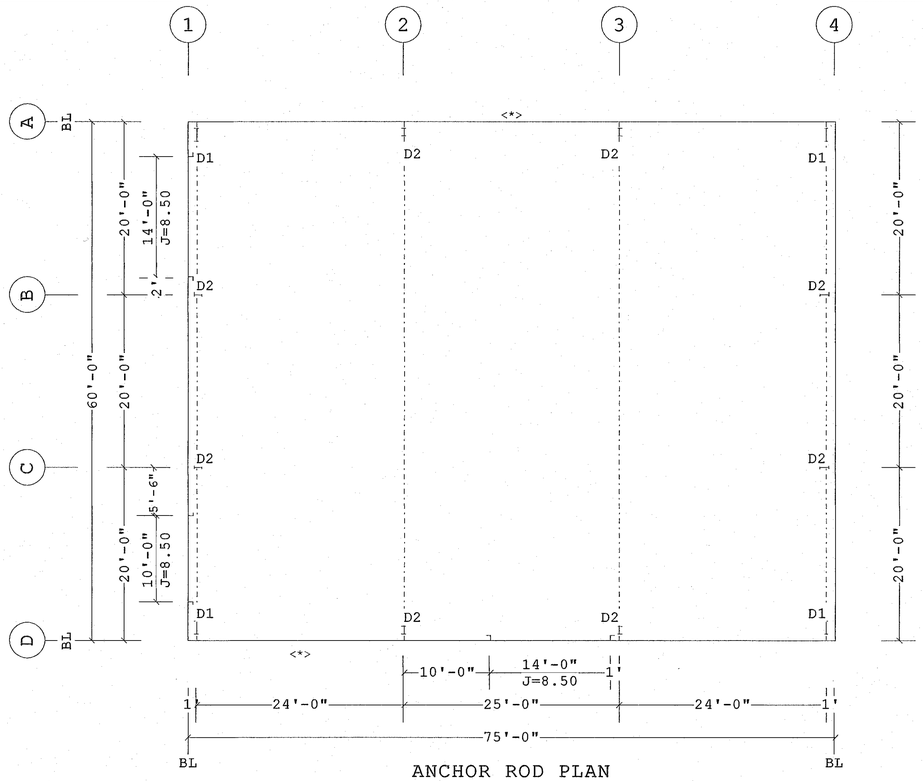
JAMB 'EQ.' VALUES:
7 EQ = 2" 51mm, 8.5 EQ = 2 3/4" 70mm
10 EQ = 3 1/2" 89mm, 11.5 EQ = 4 1/4" 108mm

FRAMED OPENING DETAIL



TYPICAL COLUMN BASE PLATE DETAIL

1. ANCHOR RODS, NUTS, HARDENED WASHERS AND ANY OTHER EMBEDDED ITEMS ARE TO BE FURNISHED BY CONTRACTOR.
2. ANCHOR ROD DIAMETERS WERE DETERMINED BY ALLOWABLE SHEAR AND TENSION PER AISC SPECIFICATIONS (FY=36KSI). (ASTM F1554 GRADE 36) ANCHOR ROD LENGTH, EFFECTS OF EMBEDDED ANCHOR ROD EDGE DIMENSIONS AND METHOD OF TRANSFERRING FORCES FROM ANCHOR RODS TO FOOTINGS ARE TO BE DETERMINED BY OTHERS.
3. UNLESS OTHERWISE SPECIFIED, ANCHOR RODS ARE DESIGNED AND DETAILED AS "CAST-IN-PLACE" ANCHOR RODS WITH "SNUG TIGHT" CONNECTIONS.
4. FOUNDATION MUST BE LEVEL, SQUARE AND SMOOTH. ANCHOR RODS MUST BE ACCURATELY PLACED AS SHOWN ON THIS DRAWING OR STEEL WILL NOT FIT. THE BUILDER IS RESPONSIBLE FOR ACCURATE SETTING OF ANCHOR RODS PER AISC CODE OF STANDARD PRACTICE, SEC 7.5
   VARIATIONS ARE SUMMARIZED BELOW;
   a. CENTERS OF ANY TWO AR'S WITHIN A COLUMN BASE GROUP; +-1/8"
   b. CENTERS OF ADJACENT AR GROUPS; +-1/4"
   c. TOPS OF AR'S; +-1/2"
   d. ACCUMULATED DIM BETWEEN CENTERS OF AR GROUPS ALONG COLUMN LINE; +-1/4" PER 100FT., NOT TO EXCEED 1" TOTAL.
   e. DIM FROM CENTER OF ANY AR GROUP FROM COLUMN LINE; +-1/4"
5. DESIGN LOADS AND REACTIONS ARE FURNISHED IN THE REACTIONS REPORT.



ANCHOR ROD PLAN

Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)

<*> THE BUILDING IS DESIGNED WITH BRACING DIAGONALS IN THE DESIGNATED BAYS. COLUMN BASE REACTIONS, BASE PLATES AND ANCHOR RODS ARE AFFECTED BY THIS BRACING AND DIAGONALS MAY NOT BE RELOCATED WITHOUT CONSULTING THE BUILDING SUPPLIERS ENGINEER.

THE GENERAL CONTRACTOR AND/OR ERECTOR IS SOLELY RESPONSIBLE FOR ACCURATE GOOD QUALITY WORKMANSHIP IN ERECTING THIS BUILDING IN ACCORDANCE WITH THIS DRAWING, DETAILS REFERENCED IN THIS DRAWING, ALL APPLICABLE BUTLER MFG. ERECTION GUIDES, AND INDUSTRY STANDARDS PERTAINING TO PROPER ERECTION, INCLUDING THE CORRECT USE OF TEMPORARY BRACING.

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BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

7/31/2018 14:47:50

ANCHOR ROD PLAN

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
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BUILDERS PO#: 18-036146-01

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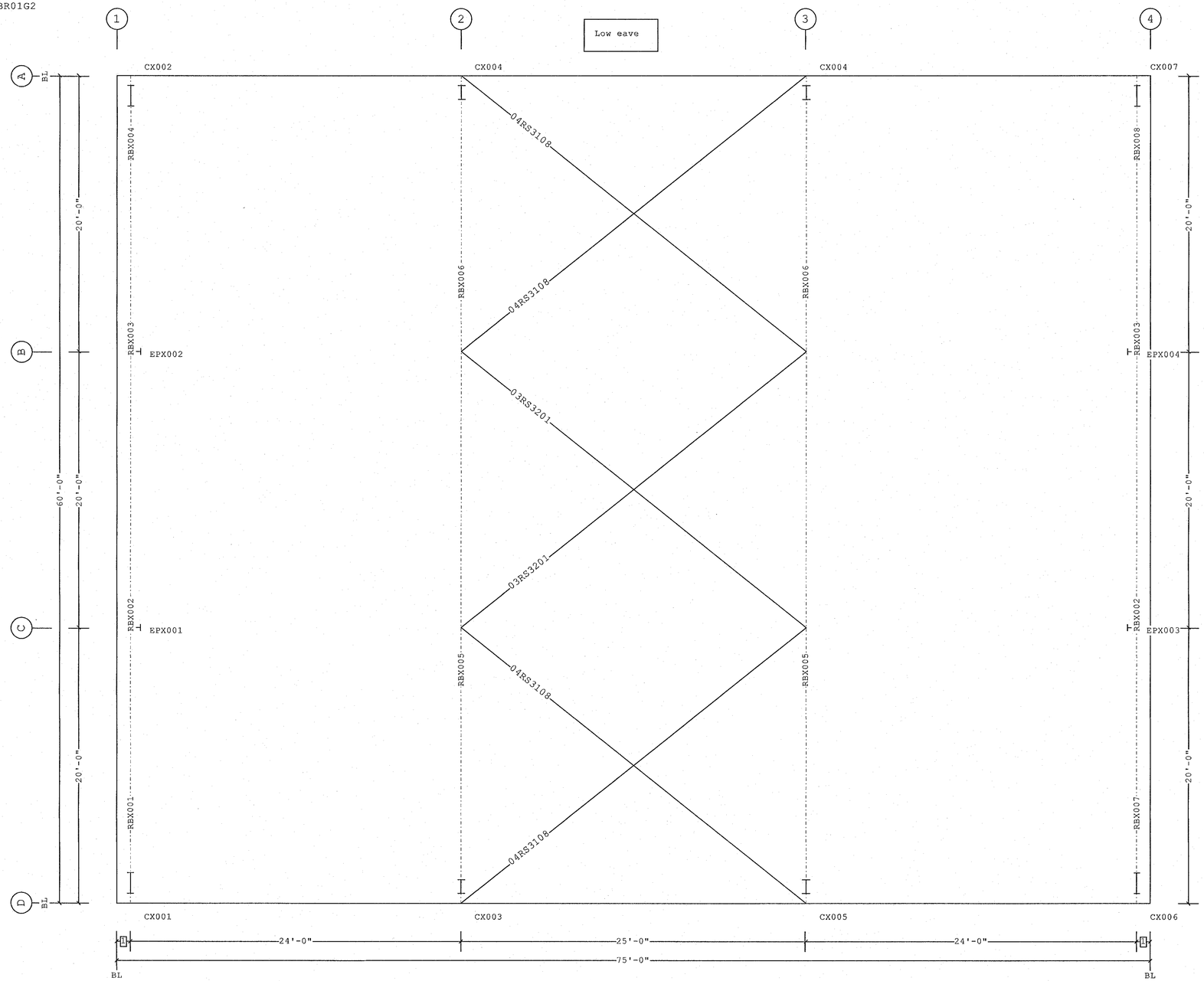
Bracing Part Schedule

Part	Qty	Length	Detail
04RS3108	4	31'-8"	BR01G2
03RS3201	2	32'-1"	BR01G2



1 1'-0"
Dimension Key

High eave

PRIMARY AND ROOF BRACING PLAN

BRIAN J. KAVANAUGH STRUCTURAL No. 41142 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

CONSTRUCTION AS-BUILTS
5/20/19

1. USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS, SECONDARY CLIP CONNECTIONS, AND FLANGE BRACE CONNECTIONS, UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

Shape Name = NMI Ground Water Treatment

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VPC FILENAME: 18-036146-01
0/7/2018 11:33:07
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Frame Member Schedule

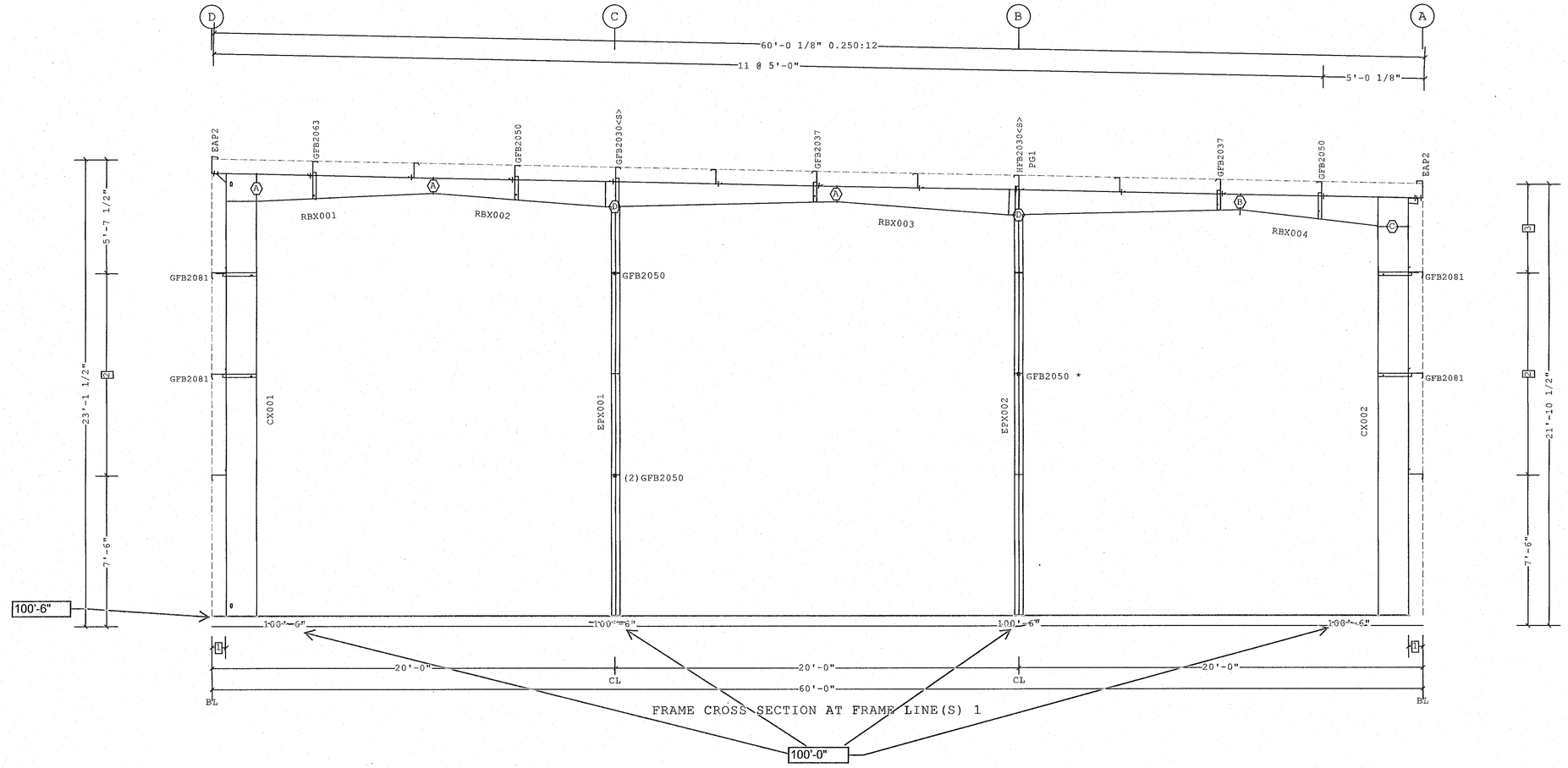
Part	Mem	Width	Thick	WebThk.	Depth1	Depth2	Approx.Lgth	Approx.Weight	Detail
CX001	1	5.0000	.1345	.1644	1'-6"	1'-6"	21'-10 13/16"	358#	
RBX001	2	5.0000	.1345	.1345	1'-4"	9"	8'-9 1/16"	106#	
RBX002	3	5.0000	.1345	.1644	9"	1'-3"	20'-0"	241#	
	4	5.0000	.1345	.1644	1'-3"	9"			
RBX003	5	5.0000	.1345	.1644	9"	1'-3"	20'-0"	243#	
	6	5.0000	.1345	.1644	1'-3"	9"			
RBX004	7	5.0000	.1875	.1345	9"	1'-5"	9'-0 1/16"	133#	
CX002	8	5.0000	.1875	.1345	1'-6"	1'-6"	19'-3 3/8"	309#	
EPX001	9	5.0000	.1345	.1644	1'-0"	1'-0"	20'-3 5/16"	115#	BR25A3
EPX002	10	5.0000	.1345	.1345	1'-0"	1'-0"	19'-10 5/16"	113#	BR25A3

⬡Bolt Connection & Plate Schedule

Id	Qty	Grade	Bolt Dia.	Bolt Length	Plate Thick.	Rows Out	Rows In	PartNo
A	4	A325	3/4"	2 1/2"	3/8"	1	1	0097284
B	6	A325	3/4"	2 1/2"	3/8"	1	2	0097284
C	6	A325	3/4"	2 1/2"	3/8"	2	1	0097284
D	4	A325	1/2"	1 1/2"	3/8"	1	1	49080

<S> - (2) Washers (095872) req'd at Flange Brace to Secondary.

Frame Clearances
Horiz. Clearance between members 1(CX001) and 8(CX002): 55'-7"
Vert. Clearance at member 1(CX001): 20'-11 15/16"
Vert. Clearance at member 8(CX002): 19'-9 3/8"
Vert. Clearance at member 9(EPX001): 20'-9 1/4"
Vert. Clearance at member 10(EPX002): 20'-4 1/4"
Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)



3 4'-4 1/2"
2 2 @ 5'-0"
1 8 1/2"
Dimension Key

NOTE: * Please locate GFB opposite side from door.
Frame not designed as expandable.

CONSTRUCTION AS-BUILTS
5/20/19

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED
PROFESSIONAL ENGINEER

Shape Name = NMI Ground Water Treatment Wall 4, Frame 1

1. USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS, SECONDARY CLIP CONNECTIONS, AND FLANGE BRACE CONNECTIONS, UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV.	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

FRAME CROSS SECTION AT FRAME LINE(S) 1

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S FOR: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 6

VPC FILENAME: 18-036146-01
8/7/2018 11:33:08

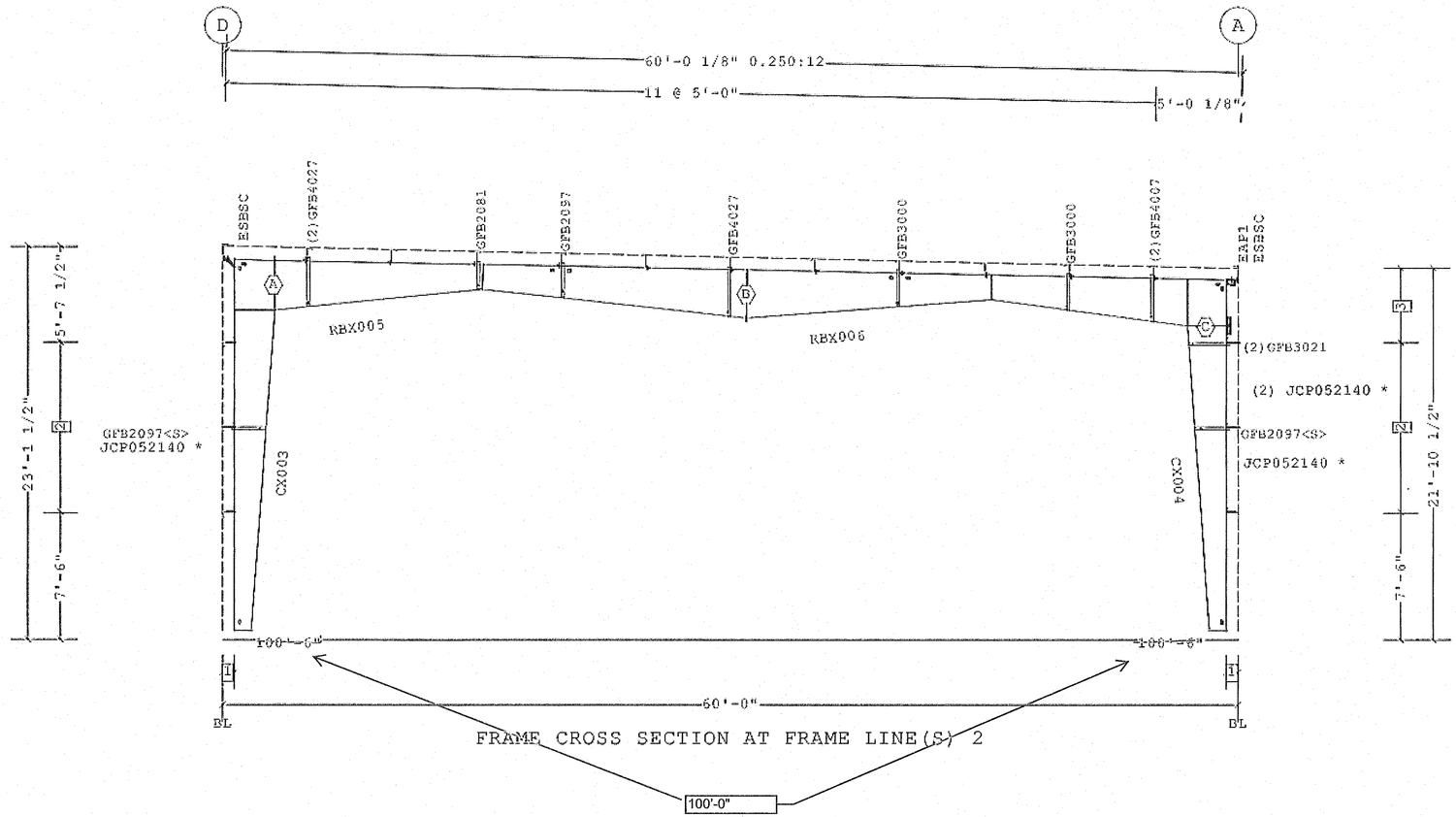
Frame Member Schedule

Part	Mem	Width	Thick	WebThk.	Depth1	Depth2	Approx.Lgth	Approx.Weight
CX003	1	6.0000	.5000	.1875	1'-0"	2'-4"	21'-10 13/16"	809#
RBX005	2	5.0000	.3750	.2500	2'-11"	10"	27'-11 5/16"	922#
	3	5.0000	.3750	.2500	10"	2'-10"		
RBX006	4	5.0000	.3750	.1644	2'-10"	10"	29'-0 1/16"	906#
	5	5.0000	.3125	.2500	10"	2'-9"		
CX004	6	6.0000	.5000	.1644	1'-0"	2'-4"	17'-11 9/16"	598#

Bolt Connection & Plate Schedule

Id	Qty	Grade	Bolt Dia.	Bolt Length	Plate Thick.	Rows Out	Rows In	PartNo
A	8	A325	3/4"	2 1/2"	1/2"	4	1	0097284
B	6	A325	3/4"	2 1/2"	3/8"	1	3	0097284
C	12	A325	3/4"	2 1/2"	1/2"	4	3	0097284

Frame Clearances
Horiz. Clearance between members 1(CX003) and 6(CX004): 53'-11"
Vert. Clearance at member 1(CX003): 19'-4 3/4"
Vert. Clearance at member 6(CX004): 18'-5 9/16"
Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)



3 4'-4 1/2"
2 2 @ 5'-0"
1 8 1/2"
Dimension Key

NOTE: * Please refer to SED BR25DH for JCP connection.

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED PROFESSIONAL ENGINEER

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment Wall 4, Frame 2

1. USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS, SECONDARY CLIP CONNECTIONS, AND FLANGE BRACE CONNECTIONS, UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV.	DATE:	BY:	DESCRIPTION:
1	8/15/18	DRR	designers request rafter dimensions

DRAWING SCALE: NTS

FRAME CROSS SECTION AT FRAME LINE(S) 2

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
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PAGE: 7

VPC FILENAME: 18-036146-01
8/7/2018 11:33:10

Frame Member Schedule

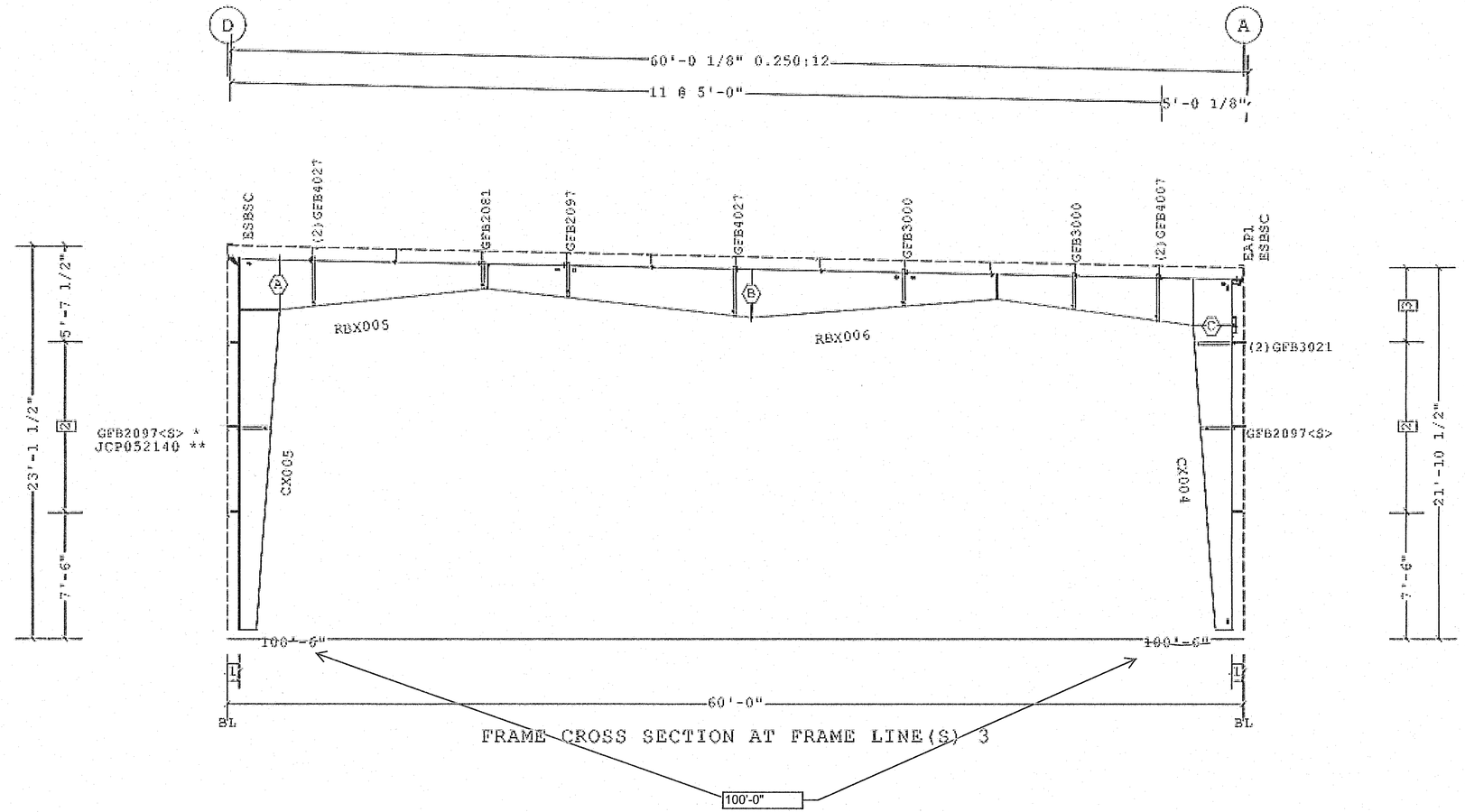
Part	Mem	Width	Thick	WebThk.	Depth1	Depth2	Approx.Lgth	Approx.Weight
CX005	1	6.0000	.5000	.1875	1'-0"	2'-4"	21'-10 13/16"	809#
RBX005	2	5.0000	.3750	.2500	2'-11"	10"	27'-11 5/16"	922#
	3	5.0000	.3750	.2500	10"	2'-10"		
RBX006	4	5.0000	.3750	.1644	2'-10"	10"	29'-0 1/16"	906#
	5	5.0000	.3125	.2500	10"	2'-9"		
CX004	6	6.0000	.5000	.1644	1'-0"	2'-4"	17'-11 9/16"	598#

⬡Bolt Connection & Plate Schedule

Id	Qty	Grade	Bolt Dia.	Bolt Length	Plate Thick.	Rows Out	Rows In	PartNo
A	8	A325	3/4"	2 1/2"	1/2"	4	1	0097284
B	6	A325	3/4"	2 1/2"	3/8"	1	3	0097284
C	12	A325	3/4"	2 1/2"	1/2"	4	3	0097284

<S> - (2) Washers (095872) req'd at Flange Brace to Secondary.

Frame Clearances
Horiz. Clearance between members 1(CX005) and 6(CX004): 53'-11"
Vert. Clearance at member 1(CX005): 19'-4 3/4"
Vert. Clearance at member 6(CX004): 18'-5 9/16"
Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)



NOTE: * Please locate GFB opposite side from door.
** Please refer to SED BR25DH for JCP connection.

3 4'-4 1/2"
2 2 @ 5'-0"
1 8 1/2"
Dimension Key

BRIAN J. KAVANAUGH STRUCTURAL No. 41142 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment Wall 4, Frame 3

1. USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS, SECONDARY CLIP CONNECTIONS, AND FLANGE BRACE CONNECTIONS, UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:
1	8/15/18	DRR	designers request rafter dimensions

DRAWING SCALE: NTS

FRAME CROSS SECTION AT FRAME LINE(S) 3

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 8

VPC FILENAME: 18-036146-01

Frame Member Schedule

Part	Mem	Width	Thick	WebThk.	Depth1	Depth2	Approx.Lgth	Approx.Weight	Detail
CX006	1	5.0000	.1875	.1345	1'-6"	1'-6"	21'-10 13/16"	358#	
RBX007	2	5.0000	.1345	.1644	1'-4"	9"	8'-9 1/8"	116#	
RBX002	3	5.0000	.1345	.1644	9"	1'-3"	20'-0"	241#	
	4	5.0000	.1345	.1644	1'-3"	9"			
RBX003	5	5.0000	.1345	.1644	9"	1'-3"	20'-0"	243#	
	6	5.0000	.1345	.1644	1'-3"	9"			
RBX008	7	5.0000	.1875	.1345	9"	1'-2"	9'-0 1/16"	124#	
CX007	8	5.0000	.1875	.1345	1'-6"	1'-6"	19'-6 3/8"	313#	
EPX003	9	5.0000	.1345	.1644	1'-0"	1'-0"	20'-3 5/16"	115#	BR25A3
EPX004	10	5.0000	.1345	.1345	1'-0"	1'-0"	19'-10 5/16"	113#	BR25A3

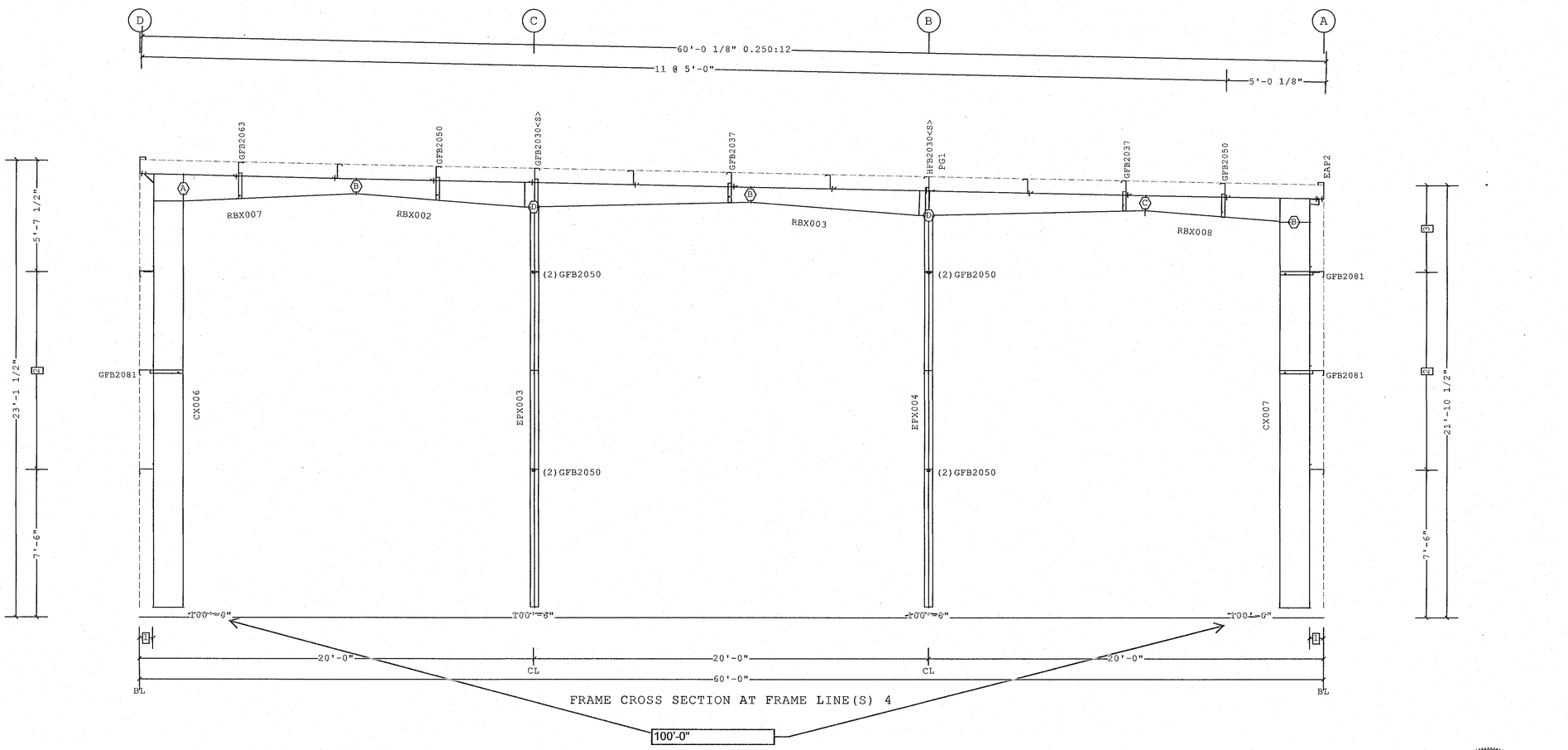
Bolt Connection & Plate Schedule

Id	Qty	Grade	Bolt Dia.	Bolt Length	Plate Thick.	Rows Out	Rows In	PartNo
A	6	A325	3/4"	2 1/2"	3/8"	2	1	0097284
B	4	A325	3/4"	2 1/2"	3/8"	1	1	0097284
C	6	A325	3/4"	2 1/2"	3/8"	1	2	0097284
D	4	A325	1/2"	1 1/2"	3/8"	1	1	49080

<S> - (2) Washers (095872) req'd at Flange Brace to Secondary.

Frame Clearances

Horiz. Clearance between members 1(CX006) and 8(CX007): 55'-7"
Vert. Clearance at member 1(CX006): 20'-11 15/16"
Vert. Clearance at member 8(CX007): 20'-0 3/8"
Vert. Clearance at member 9(EPX003): 20'-9 1/4"
Vert. Clearance at member 10(EPX004): 20'-4 1/4"
Finished Floor Elevation = 100'-0" (Unless Noted Otherwise)



FRAME CROSS SECTION AT FRAME LINE(S) 4

3 4'-4 1/2"
2 2 @ 5'-0"
1 8 1/2"
Dimension Key

NOTE: Frame not designed as expandable.

BRIAN J. KAVANAUGH STRUCTURAL No. 41142 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment Wall 4, Frame 4

1. USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS, SECONDARY CLIP CONNECTIONS, AND FLANGE BRACE CONNECTIONS, UNLESS NOTED OTHERWISE.
2. SLOT REINFORCEMENT PLATES NEED NOT BE LOCATED ON THE SAME SIDE OF THE WEB AS THE HILLSIDE WASHER.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

FRAME CROSS SECTION AT FRAME LINE(S) 4

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

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Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
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VPC FILENAME: 18-036146-01
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Secondary Part Schedule

Mark	Part	Thick.	Depth	Lap	Detail
E1	10H2411411ADB30	0.1130	10"		BR09W2
E2	10E2411414ADB30	0.0790	10"		RS12PF,RS12PE,RS12PJ
E3	10H2411411DDB30	0.1130	10"		BR09W2
E4	10E2411414DDB30	0.0790	10"		RS12PE,RS12PJ
P1	08Z2811411A5B3	0.1130	8 1/2"	3'-10 1/2"	RS02T1,RS01T1
P2	08Z2811412A5B3	0.0980	8 1/2"	3'-10 1/2"	RS02T1,RS01T1
P3	08Z321141555B2	0.0730	8 1/2"	3'-10 1/2"	RS01T1
P4	08Z321141455B2	0.0790	8 1/2"	3'-10 1/2"	RS01T1

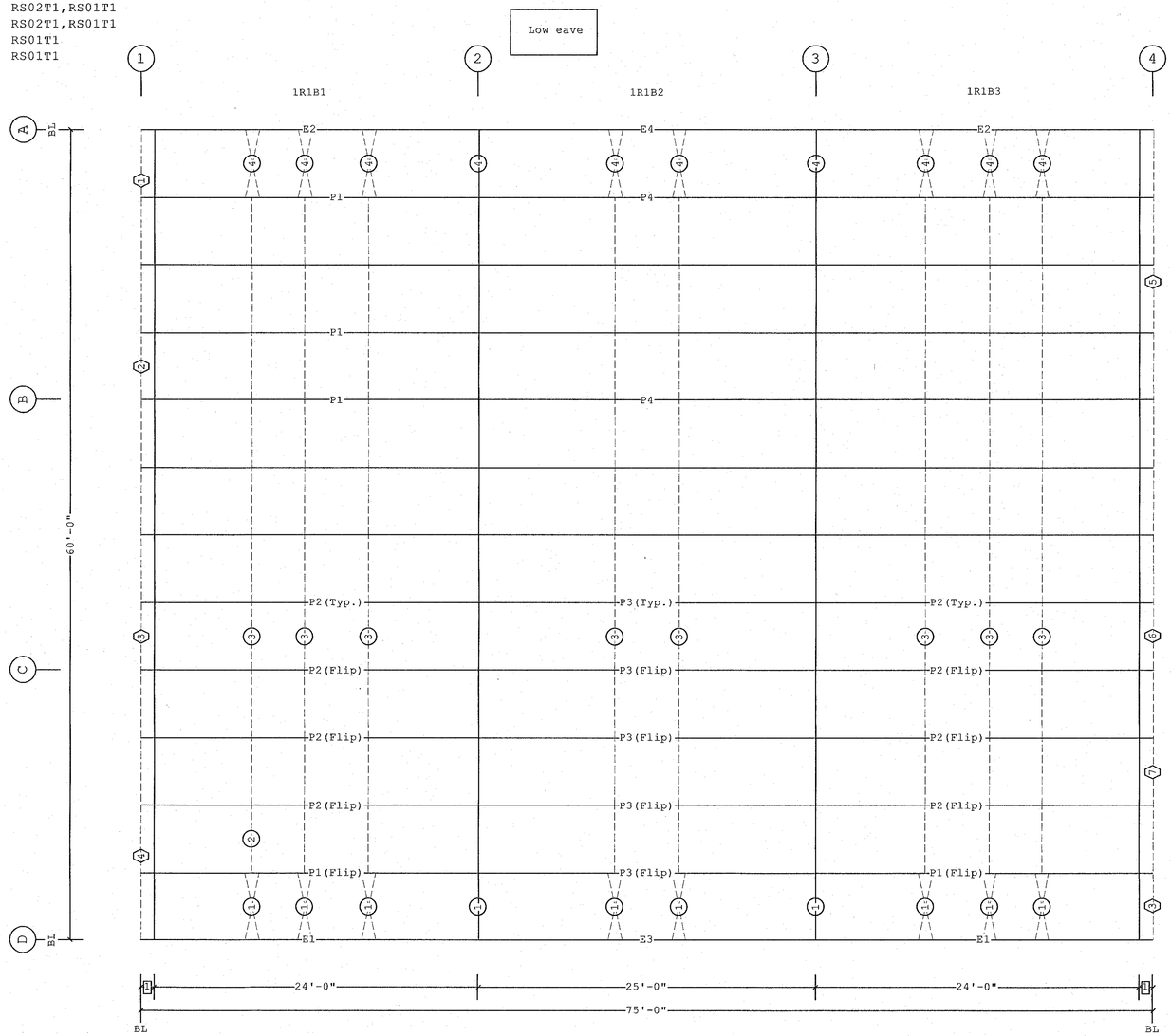
◯ Secondary Bracing Schedule

Id	Qty	Mark No	Spacing
1	18	PBA0503	5'-0"
2	72	CPBB050108(Typ.)	5'-0"
3	8	CPBC050306	5'-0"
4	18	PBA0504	5'-0 1/8"

See SED:
BR09K5, BR09JG, BR09RY, BR09RZ, BR09PP
BR09PH, BR09JH, BR09K2

⬡ Part Mark Key

1	001SGA07055
2	001SGA19114
3	002SGA19114
4	001SGA12054
5	002SGA07055
6	003SGA19114
7	002SGA12054



ROOF SECONDARY PLAN

1 1'-0"
Dimension Key

High eave

CONSTRUCTION AS-BUILTS
5/20/19

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED PROFESSIONAL ENGINEER

Shape Name = NMI Ground Water Treatment

1. UNLESS NOTED, USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS.
2. FLANGE BRACES ARE AN INTEGRAL PART OF THE STABILITY OF THE STRUCTURAL SYSTEM AND MUST BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS.
3. REMOVAL OR ALTERATION OF ANY COMPONENT IS PROHIBITED.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV.	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

ROOF SECONDARY PLAN

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
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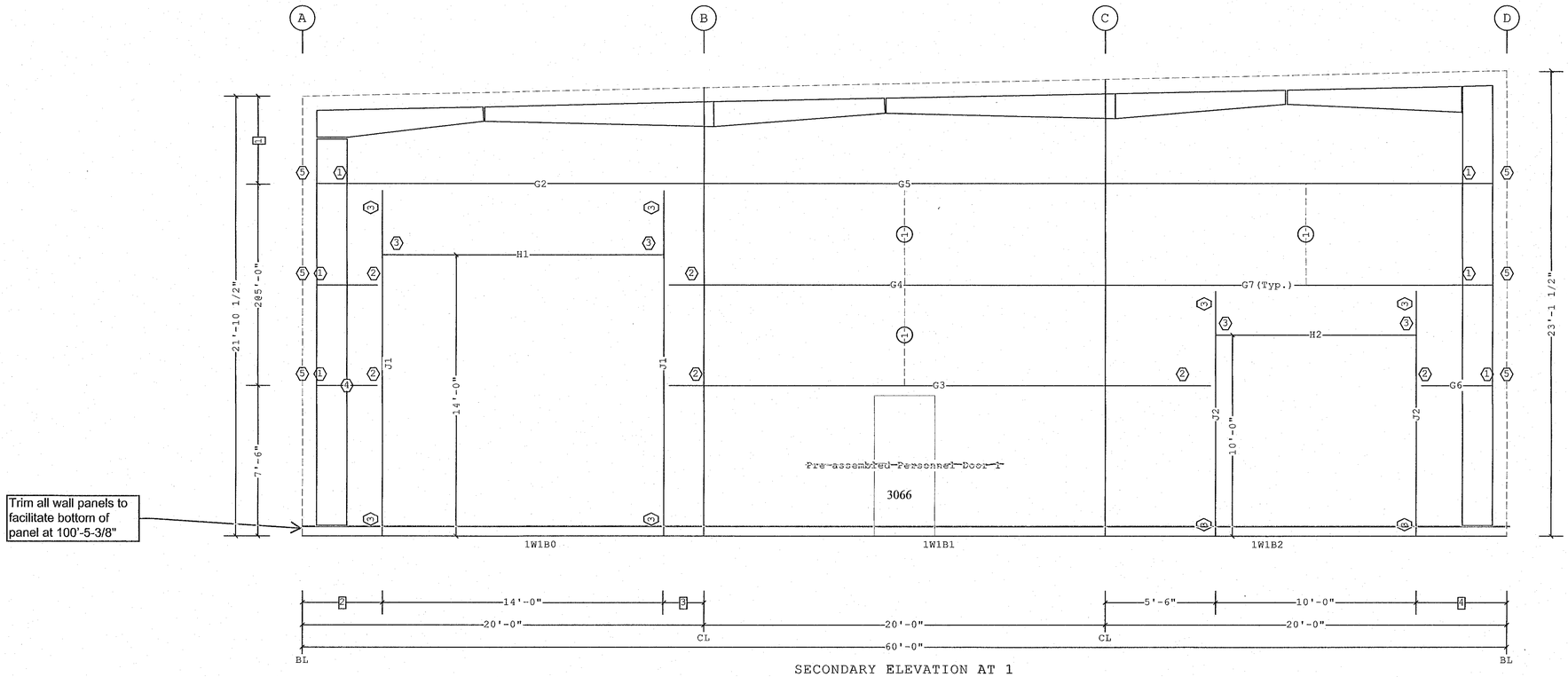
VPC FILENAME: 18-036146-01

Secondary Part Schedule

Mark	Part	Thick.	Depth	Lap	Detail
G1	08Z0211417GQ02	0.0600	8 1/2"		WS12N2,WS20F2
G2	08Z2202417Q402	0.0600	8 1/2"	2'-10 1/2"	WS12N2,WS01G3
G3	00108ZS2611417B2	0.0600	8 1/2"		WS20F2
G4	00208ZS220841702	0.0600	8 1/2"	10 1/2"	WS01G3,WS20F2
G5	08Z25114174402	0.0600	8 1/2"	2'-10 1/2"	WS01G3
G6	08Z0305417GQ02	0.0600	8 1/2"		WS12N2,WS20F2
G7	08Z2202417Q4A2	0.0600	8 1/2"	2'-10 1/2"	WS12N2,WS01G3
H1	00108JS1400017	0.0600	8 1/2"		WS20F9
H2	00308JS1000017	0.0600	8 1/2"		WS20F9
J1	00208JS1702216	0.0680	8 1/2"		WS20F9,WS20F2,WS20B2,WS20B8
J2	00408JS1202217	0.0600	8 1/2"		WS20F9,WS20F2,WS20B2,WS20B8

Secondary Bracing Schedule

Id	Qty	Mark No	Spacing
1	3	CPBB050108	5'-0"



SECONDARY ELEVATION AT 1

4 4'-6"	5 GFAP1054
3 2'-0"	4 G1(Typ.)
2 4'-0"	3 PG1
1 4'-4 1/2"	2 JTG1
Dimension Key	1 VCC07003090
	Part Mark Key

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED PROFESSIONAL ENGINEER

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment, Wall = 1

1. UNLESS NOTED, USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS.
2. FLANGE BRACES ARE AN INTEGRAL PART OF THE STABILITY OF THE STRUCTURAL SYSTEM AND MUST BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS.
3. REMOVAL OR ALTERATION OF ANY COMPONENT IS PROHIBITED.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: **NTS**

SECONDARY ELEVATION AT 1

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
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Secondary Part Schedule

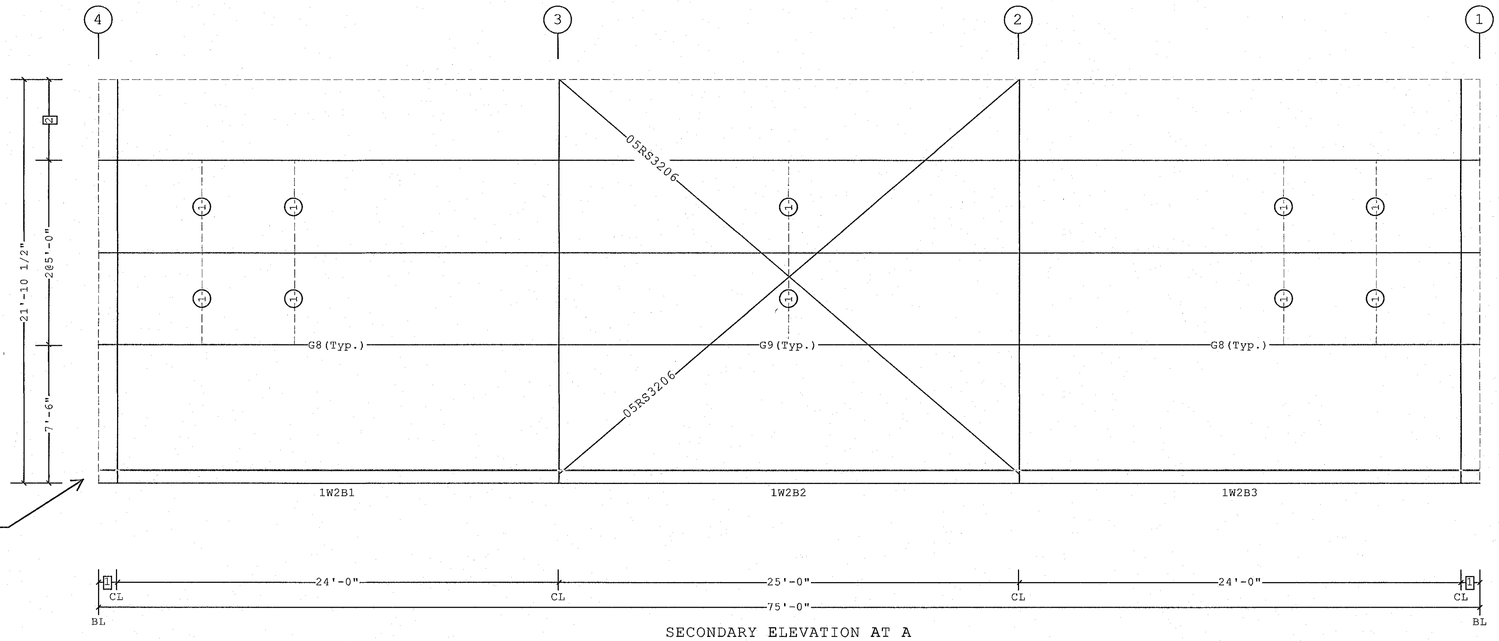
Mark	Part	Thick.	Depth	Lap	Detail
G8	08Z2511417A1B2	0.0600	8 1/2"	10 1/2"	WS12N2,WS01G3
G9	08Z261141711B2	0.0600	8 1/2"	10 1/2"	WS01G3

Secondary Bracing Schedule

Id	Qty	Mark No	Spacing
1	10	CPBB050108	5'-0"

Bracing Part Schedule

Part	Qty	Length	Detail
05RS3206	2	32'-6"	BR01G2



SECONDARY ELEVATION AT A

2 4'-4 1/2"
1 1'-0"
Dimension Key

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED PROFESSIONAL ENGINEER

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment, Wall = 2

1. UNLESS NOTED, USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS.
2. FLANGE BRACES ARE AN INTEGRAL PART OF THE STABILITY OF THE STRUCTURAL SYSTEM AND MUST BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS.
3. REMOVAL OR ALTERATION OF ANY COMPONENT IS PROHIBITED.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

SECONDARY ELEVATION AT A

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
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PAGE: 15

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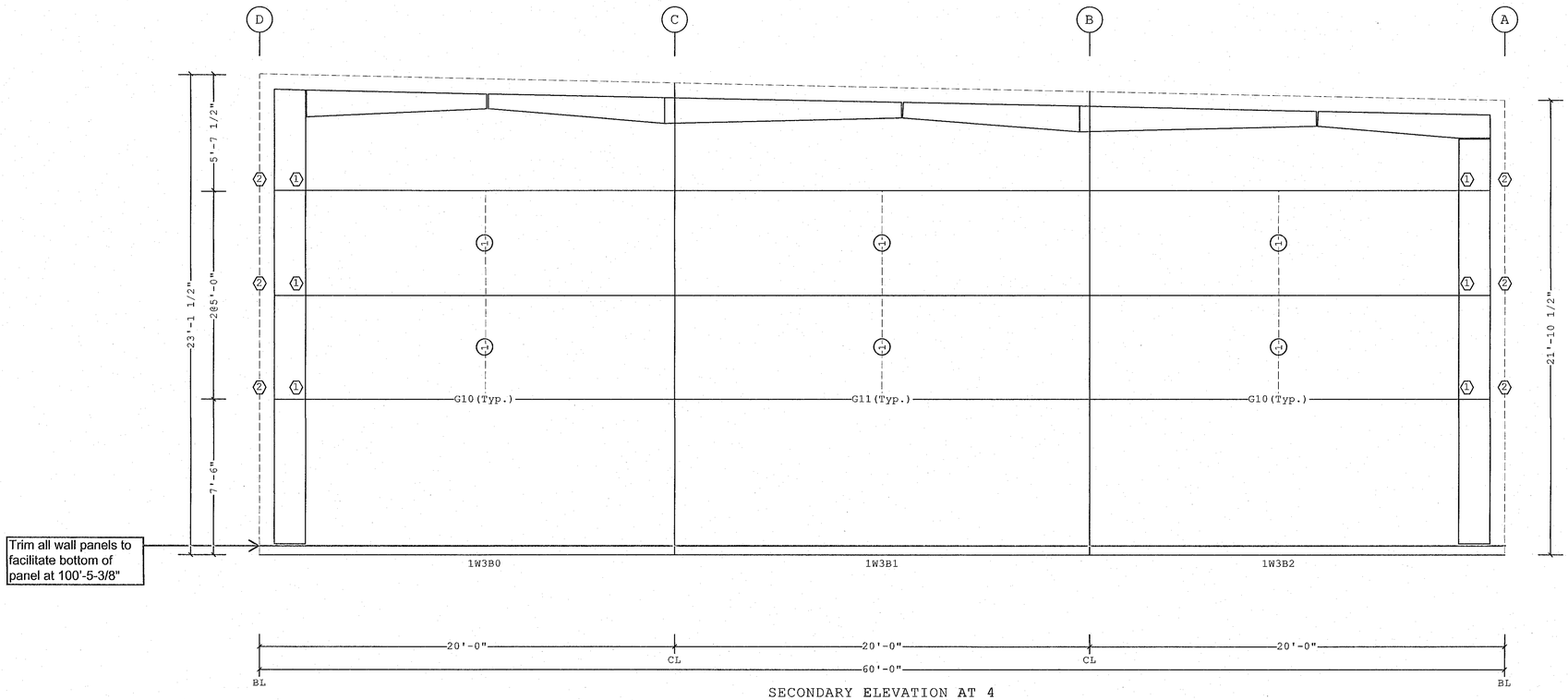
Secondary Part Schedule

Mark	Part	Thick.	Depth	Lap	Detail
G10	08Z2002417Q1B2	0.0600	8 1/2"	10 1/2"	WS12N2,WS01G3
G11	08Z2111417I1B2	0.0600	8 1/2"	10 1/2"	WS01G3

Secondary Bracing Schedule

Id	Qty	Mark No	Spacing
1	6	CPBB050108	5'-0"



SECONDARY ELEVATION AT 4

2 GFAP1054
1 VCC07003090
Part Mark Key

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment, Wall = 3

1. UNLESS NOTED, USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS.
2. FLANGE BRACES ARE AN INTEGRAL PART OF THE STABILITY OF THE STRUCTURAL SYSTEM AND MUST BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS.
3. REMOVAL OR ALTERATION OF ANY COMPONENT IS PROHIBITED.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

SECONDARY ELEVATION AT 4

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 16

VPC FILENAME: 18-036146-01
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Secondary Part Schedule

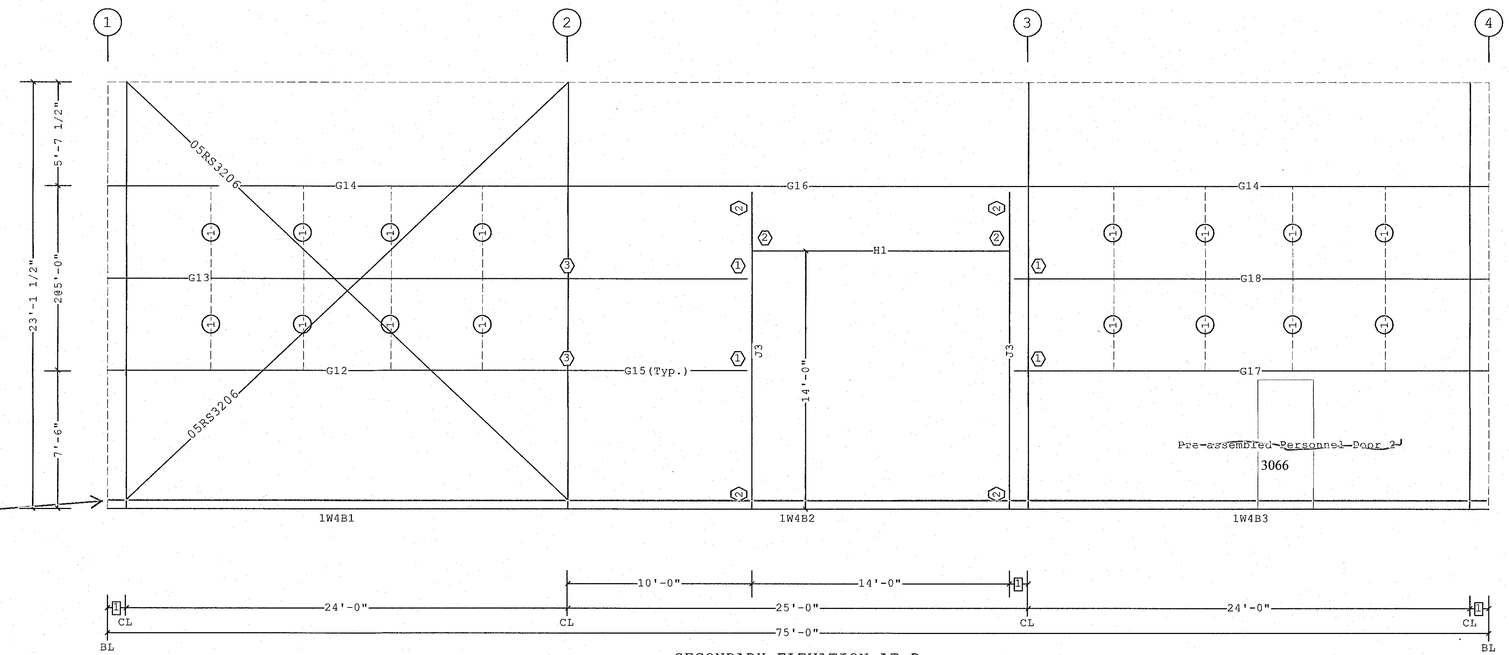
Mark	Part	Thick.	Depth	Lap	Detail
G12	08Z2411415AD02	0.0730	8 1/2"		WS12N2,WS01Q2
G13	08Z2411416AD02	0.0680	8 1/2"		WS12N2,WS01Q2
G14	08Z2511417A102	0.0600	8 1/2"	10 1/2"	WS12N2,WS01G3
G15	08Z0908417DG02	0.0600	8 1/2"		WS20F2,WS01Q2
G16	08Z28114153302	0.0730	8 1/2"	1'-10 1/2"	WS01G3
G17	00308ZS2508415B2	0.0730	8 1/2"		WS12N2,WS20F2
G18	00408ZS2508416B2	0.0680	8 1/2"		WS12N2,WS20F2
H1	00108JS1400017	0.0600	8 1/2"		WS20F9
J3	00508JS1702215	0.0730	8 1/2"		WS20F9,WS20F2,WS20B2,WS20B8

Secondary Bracing Schedule

Id	Qty	Mark No	Spacing
1	16	CPBB050108	5'-0"

Bracing Part Schedule

Part	Qty	Length	Detail
05RS3206	2	32'-6"	BR01G2



Trim all wall panels to facilitate bottom of panel at 100'-5-3/8"

SECONDARY ELEVATION AT D

3	GFAP1054	
2	PG1	
1	JTG1	
1	1'-0"	
☐ Dimension Key		⬡ Part Mark Key

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
PROFESSIONAL ENGINEER
9/17/2019

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment, Wall = 4

1. UNLESS NOTED, USE 1/2 X 1 1/2 A325T BOLT (49080) AND NUT (47120) W/O WASHERS. SNUG TIGHTEN BOLTS FOR ALL SECONDARY CONNECTIONS.
2. FLANGE BRACES ARE AN INTEGRAL PART OF THE STABILITY OF THE STRUCTURAL SYSTEM AND MUST BE PROPERLY INSTALLED PRIOR TO ERECTION OF WALL AND ROOF SHEETS.
3. REMOVAL OR ALTERATION OF ANY COMPONENT IS PROHIBITED.

THE BUTLER MFG. ENGINEER'S SEAL APPLIES ONLY TO THE WORK PRODUCT OF BUTLER MFG. AND DESIGN AND PERFORMANCE REQUIREMENTS SPECIFIED BY BUTLER. THE BUTLER MFG. ENGINEER'S SEAL DOES NOT APPLY TO THE PERFORMANCE OR DESIGN OF ANY OTHER PRODUCT OR COMPONENT FURNISHED BY BUTLER EXCEPT TO ANY DESIGN OR PERFORMANCE REQUIREMENTS SPECIFIED BY BUTLER.

THE GENERAL CONTRACTOR AND/OR ERECTOR IS SOLELY RESPONSIBLE FOR ACCURATE GOOD QUALITY WORKMANSHIP IN ERECTING THIS BUILDING IN ACCORDANCE WITH THIS DRAWING, DETAILS REFERENCED IN THIS DRAWING, ALL APPLICABLE BUTLER MFG. ERECTION GUIDES, AND INDUSTRY STANDARDS PERTAINING TO PROPER ERECTION, INCLUDING THE CORRECT USE OF TEMPORARY BRACING.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV.	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

SECONDARY ELEVATION AT D

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 9/9/18
DRAWN/CHECK: DRR /
PAGE: 17

VPC FILENAME: 18-036146-01

9/7/2018 11:33:23

Covering Schedule

Id	Qty	Start Length	Qty	Stagger Length	Type	Gage	OP	Fin.	Color
#8	1	31'-0 1/8"			MR12	24	86	Z	AZ
#10	1	30'-5 1/2"			MR12	24	87	Z	AZ
#11	19	36'-0 1/8"	18	41'-0 1/8"	MR24	24	13	Z	AZ
#12	19	25'-5 1/2"	18	20'-5 1/2"	MR24	24	11	Z	AZ

Oper. Code:86=SQ,NT
Oper. Code:87=SQ,SQ
Oper. Code:13=SQ,NT
Oper. Code:11=SQ,SQ
Finish:Z=AlZn
Color:AZ=Plain AlZn

Covering Mark Schedule

Id	Qty	Start Panel	Qty	Stagger/Last Panel
#8	1	MR123100124862J0%		MR123100124862AZ
#10	1	MR123005424872J0%		MR123005424872AZ
#11	19	MR243600124132J18		MR244100124132AZ
#12	19	MR242505424112J18		MR242005424112AZ

Planograph Schedule

Id	Details
T1	P-081722,P-081728,P-081730,P-GAI
T2	P-081722,P-081728,P-081730,P-GAI
T3	P-080789,P-081239,P-081730
T4	P-080572,P-104549
T5	P-081731,P-103223,P-103315,P-104714

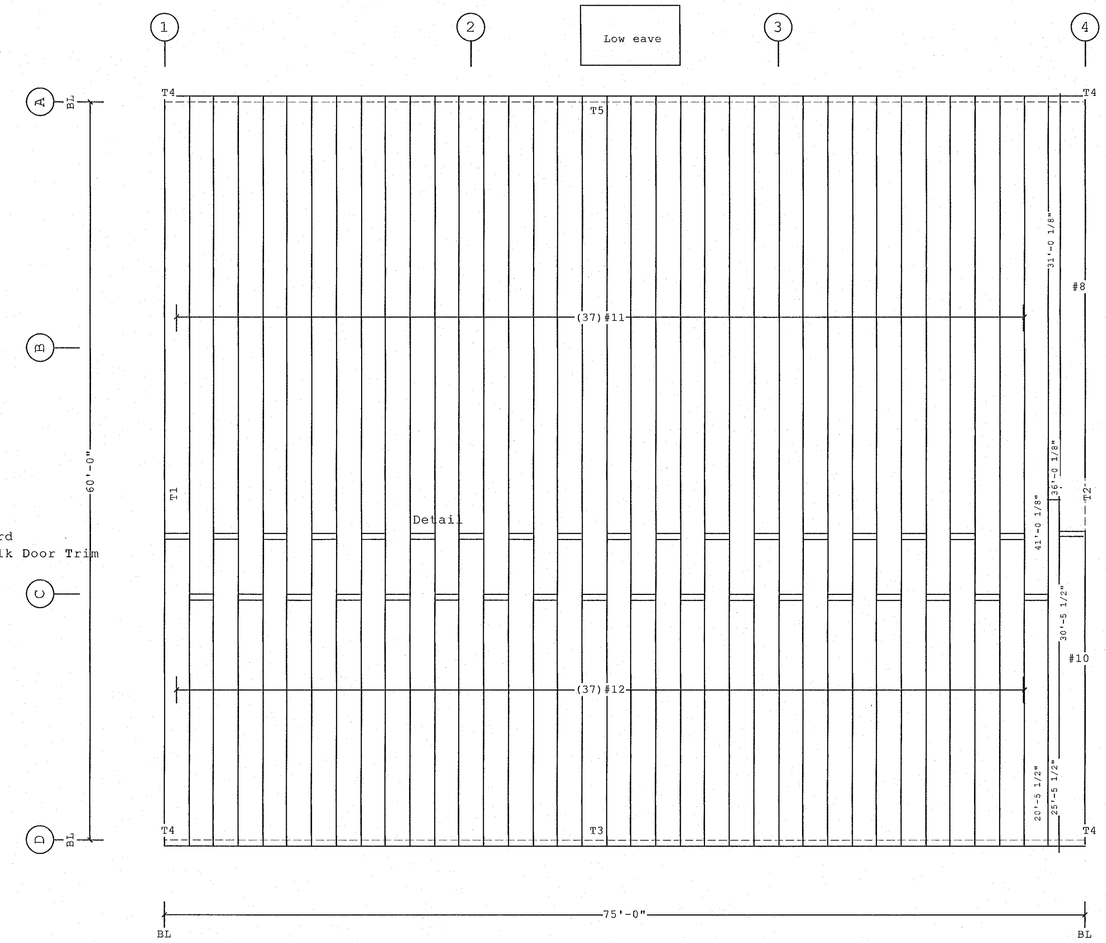
Accessory Schedule

Qty	Color	Description
2	Beige	3070 Door - Standard
2	Cool Birch White	eShadowall 3070 Walk Door Trim

Trim Schedule

Id	Parts
T1	(5.9)WA10C,(2.9)MRGT20L,(5)SHCL12
T2	(5.9)WA10C,(2.9)MRGT20R,(5)SHCL12
T3	(6)0630275,(2)0630393,(7)SHCL12
T4	0630043
T5	(3)GTR25,(7)CLE12C,(7)SHCL12

Color	Details
Cool Birch White	KV977,KV978,MV822,MV831,NV691,PV167
Cool Birch White	KV977,KV978,MV822,MV831,NV691,PV167
Cool Birch White	ENB004,MV821,NV667,NV694,RCB423
Cool Birch White	
Cool Birch White	MV813,MV821,MV822,NV690,NV694



ROOF COVERING PLAN

High eave

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment

1. PRE-DRILLING 1/8 DIAMETER HOLES FOR STRUCTURAL FASTENERS MAY BE REQUIRED FOR HEAVY GAGE NESTED ZEE's AND/OR FASTENERS TO STRUCTURAL BEAMS
2. STEEL PANELS ARE AN INTEGRAL PART OF THE STRUCTURAL SYSTEM. REMOVAL OR ALTERATION WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.
3. DUE TO MANUFACTURING LIMITATIONS SHORT PANELS MAY REQUIRE FIELD CUTTING, SEE THE COVERING SCHEDULE FOR CUT LENGTHS.
4. SEE JOB DETAILS FOR COVERING AND TRIM FASTENER SPECIFICATION.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

ROOF COVERING PLAN

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 20

VPC FILENAME: 18-036146-01
8/7/2018 11:33:27
a division of BlueScope Buildings North America, Inc.

Covering Mark Schedule

Id	Qty	Start Panel	Last Panel	Increment	Direction	Start Dim.
#1	2	SHP21110261KSY	SHP21116261KSY	3/4"	Left to Right	0'-0"
#2	4	SHP07115262KSY	SHP08017262KSY	3/4"	Left to Right	6'-0"
#3	10	SHP22034261KSY	SHP22102261KSY	3/4"	Left to Right	18'-0"
#4	2	SHP12101262KSY	SHP12107262KSY	3/4"	Left to Right	48'-0"
#5	2	SHP23004261KSY	SHP23012261KSY	3/4"	Left to Right	54'-0"

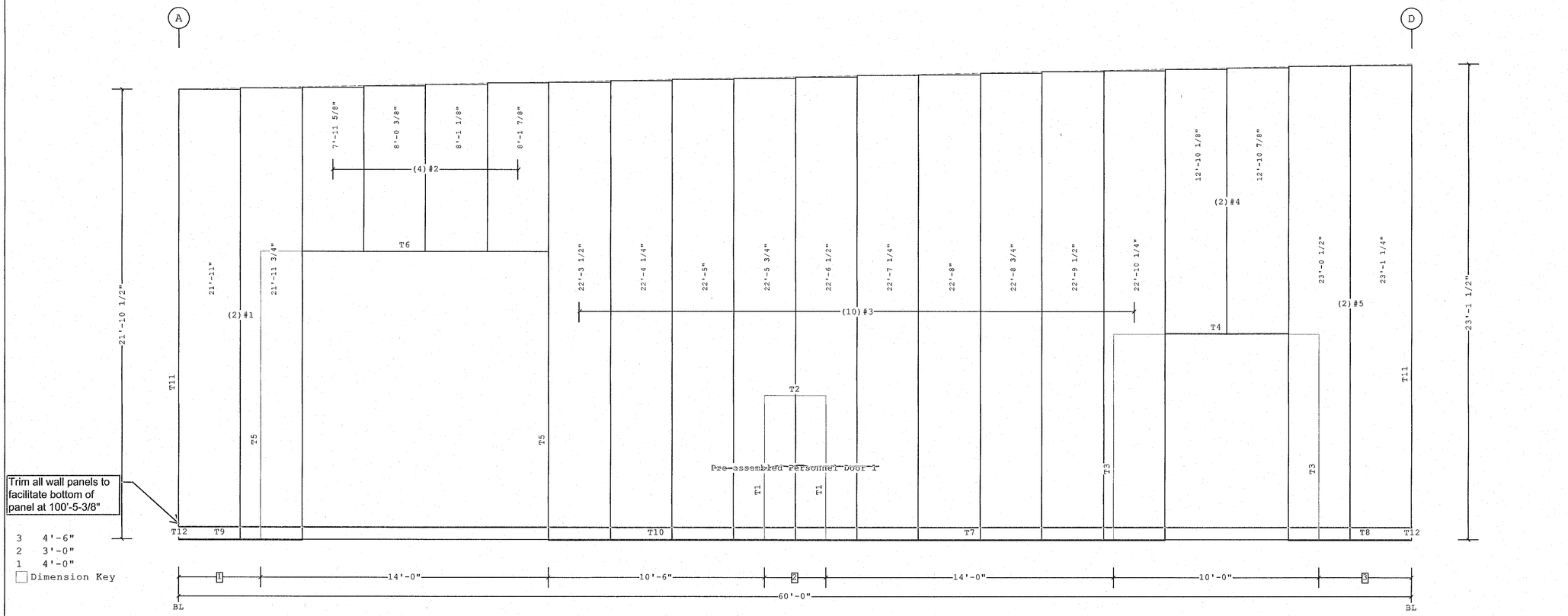
Covering Schedule

Id	Qty	Type	Start Length	Gage	OP	Fin.	Color	Increment	Direction
#1	2	eSHP	21'-11"	26	1	K	SY	3/4"	Left to Right
#2	4	eSHP	7'-11 5/8"	26	2	K	SY	3/4"	Left to Right
#3	10	eSHP	22'-3 1/2"	26	1	K	SY	3/4"	Left to Right
#4	2	eSHP	12'-10 1/8"	26	2	K	SY	3/4"	Left to Right
#5	2	eSHP	23'-0 1/2"	26	1	K	SY	3/4"	Left to Right

Oper. Code:1=SQ,SQ
Oper. Code:2=SQ,SQ
Finish:K=Butler-Cote
Color:SY=Cool Shell Gray

Trim Schedule

Id	Parts	Color	Details
T1	(1.6)DSF12D,(0.6)BCS12,(0.5)DJCH1	Cool Birch White	NV684,WCB026,NV685,NV685
T2	(0.5)SA112,DGS12E	Cool Birch White	NV683
T3	(1.8)DSF12D,(0.8)BCS12,(0.7)DJCH1	Cool Birch White	NV684,WCB026,NV685,NV685
T4	(0.8)SA112,DGS12E	Cool Birch White	NV683
T5	(1.2)DSF12D,(1.2)BCS12	Cool Birch White	NV684,WCB026
T6	(2.3)SA112,(3)DGS12E	Cool Birch White	NV683
T7	(0.6)BA225,(1.2)SA212,(1.2)BT12B	Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
T8	(0.2)BA225,(0.4)SA212,(0.4)BT12B	Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
T9	(0.2)BA225,(0.3)SA212,(0.3)BT12B	Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
T10	(0.4)BA225,(0.9)SA212,(0.9)BT12B	Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
T11	(2)SHCTB12,(3.5)0620163,(2)ICT12	Cool Shell Gray	NV679,NV689
T12	CTB3R,CTB3L	Cool Shell Gray	ENB006,NV664



COVERING ELEVATION AT 1

Planograph Schedule

Id	Details
T1	P-081714,P-081715,P-081716
T2	P-081716,P-081715
T3	P-081714,P-081715,P-081716
T4	P-081716
T5	P-081714,P-081715
T6	P-081716,P-081715
T7	P-081730,P-081733,P-090029
T8	P-081730,P-081733,P-090029
T9	P-081730,P-081733,P-090029
T10	P-081730,P-081733,P-090029
T11	P-081713,P-081733
T12	P-081733,p-090029

Fastener Schedule

Part	Color	Description
0097604-112	Cool Shell Gray	Scrubolt 11/32 x 3 1/2", T-45 Torx Hd w/Washer panel to structural
0097364-112	Cool Shell Gray	(T-1) 1/4-14 x 3/4", T-30 Torx Hd w/Washer panel to panel

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED PROFESSIONAL ENGINEER

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment, Wall = 1

1. PRE-DRILLING 1/8 DIAMETER HOLES FOR STRUCTURAL FASTENERS MAY BE REQUIRED FOR HEAVY GAGE NESTED ZEE's AND/OR FASTENERS TO STRUCTURAL BEAMS
2. STEEL PANELS ARE AN INTEGRAL PART OF THE STRUCTURAL SYSTEM. REMOVAL OR ALTERATION WITHOUT PRIOR AUTHORIZATION IS PROHIBITED.
3. DUE TO MANUFACTURING LIMITATIONS SHORT PANELS MAY REQUIRE FIELD CUTTING. SEE THE COVERING SCHEDULE FOR CUT LENGTHS.
4. SEE JOB DETAILS FOR COVERING AND TRIM FASTENER SPECIFICATION.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV.	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

8/7/2018 11:32:29

COVERING ELEVATION AT 1

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 21

VPC FILENAME: 18-036146-01

Covering Mark Schedule

Id	Qty	Start Panel	Direction	Start Dim.
#6	25	SHP22002261KSY	Left to Right	0'-0"

Covering Schedule

Id	Qty	Type	Start Length	Gage	OP	Fin.	Color	Direction
#6	25	eSHP	22'-0 1/4"	26	1	K	SY	Left to Right

Oper. Code:1=SQ,SQ
Finish:K=Butler-Cote
Color:SY=Cool Shell Gray

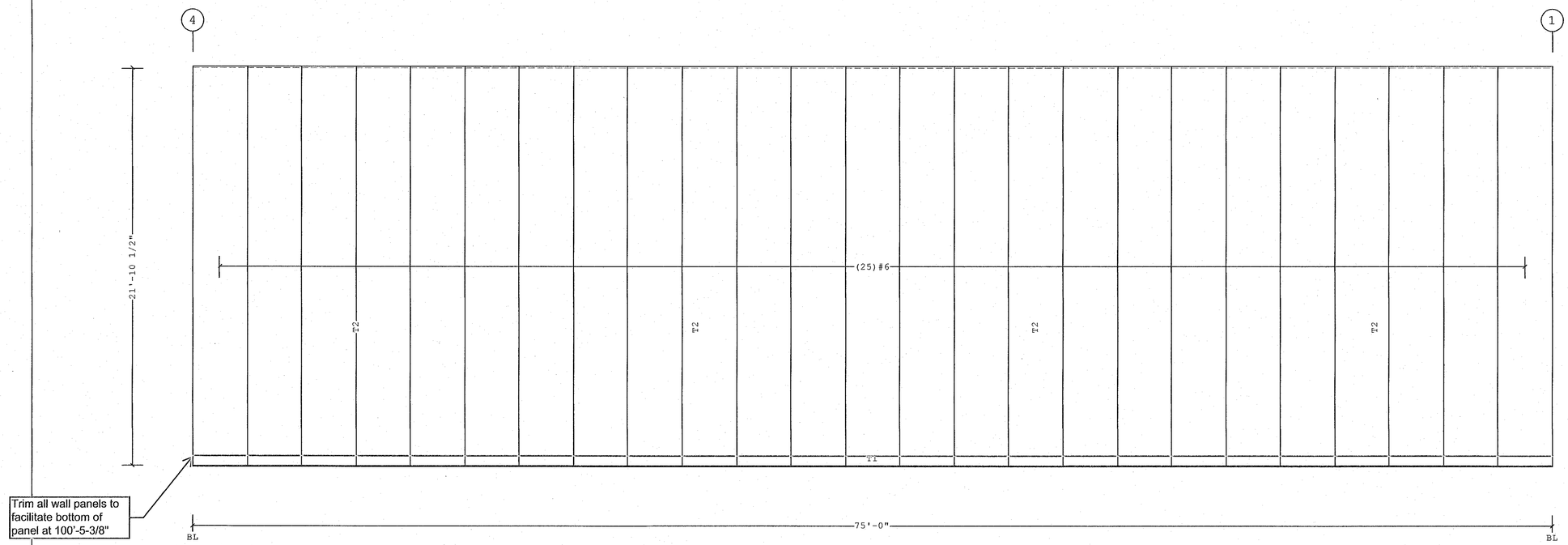
Trim Schedule

Id	Parts
T1	(3)BA225,(6.2)SA212,(6.2)BT12B
T2	0008738,(2.5)CP410,4CE75

Planograph Schedule

Id	Details
T1	P-081730,P-081733,P-090029
T2	P-105224,P-105225,P-105228

Color	Details
Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
Cool Birch White	KV847



COVERING ELEVATION AT A

Fastener Schedule

Part	Color	Description
0097604-112	Cool Shell Gray	Scrubolt 11/32 x 3 1/2", T-45 Torx Hd w/Washer panel to structural
0097364-112	Cool Shell Gray	(T-1) 1/4-14 x 3/4", T-30 Torx Hd w/Washer panel to panel

COMMONWEALTH OF MASSACHUSETTS
BRIAN J KAVANAUGH
STRUCTURAL
No. 41142
PROFESSIONAL ENGINEER

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment, Wall = 2

1. PRE-DRILLING 1/8 DIAMETER HOLES FOR STRUCTURAL FASTENERS MAY BE REQUIRED FOR HEAVY GAGE NESTED ZEE's AND/OR FASTENERS TO STRUCTURAL BEAMS
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3. DUE TO MANUFACTURING LIMITATIONS SHORT PANELS MAY REQUIRE FIELD CUTTING, SEE THE COVERING SCHEDULE FOR CUT LENGTHS.
4. SEE JOB DETAILS FOR COVERING AND TRIM FASTENER SPECIFICATION.

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C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: **NTS**

COVERING ELEVATION AT A

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 22

VPC FILENAME: 18-036146-01

Covering Mark Schedule

Id	Qty	Start Panel	Last Panel	Increment	Direction	Start Dim.
#7	20	SHP23012261KSY	SHP21110261KSY	-3/4"	Left to Right	0'-0"

Covering Schedule

Id	Qty	Type	Start Length	Gage	OP	Fin.	Color	Increment	Direction
#7	20	eSHP	23'-1 1/4"	26	1	K	SY	-3/4"	Left to Right

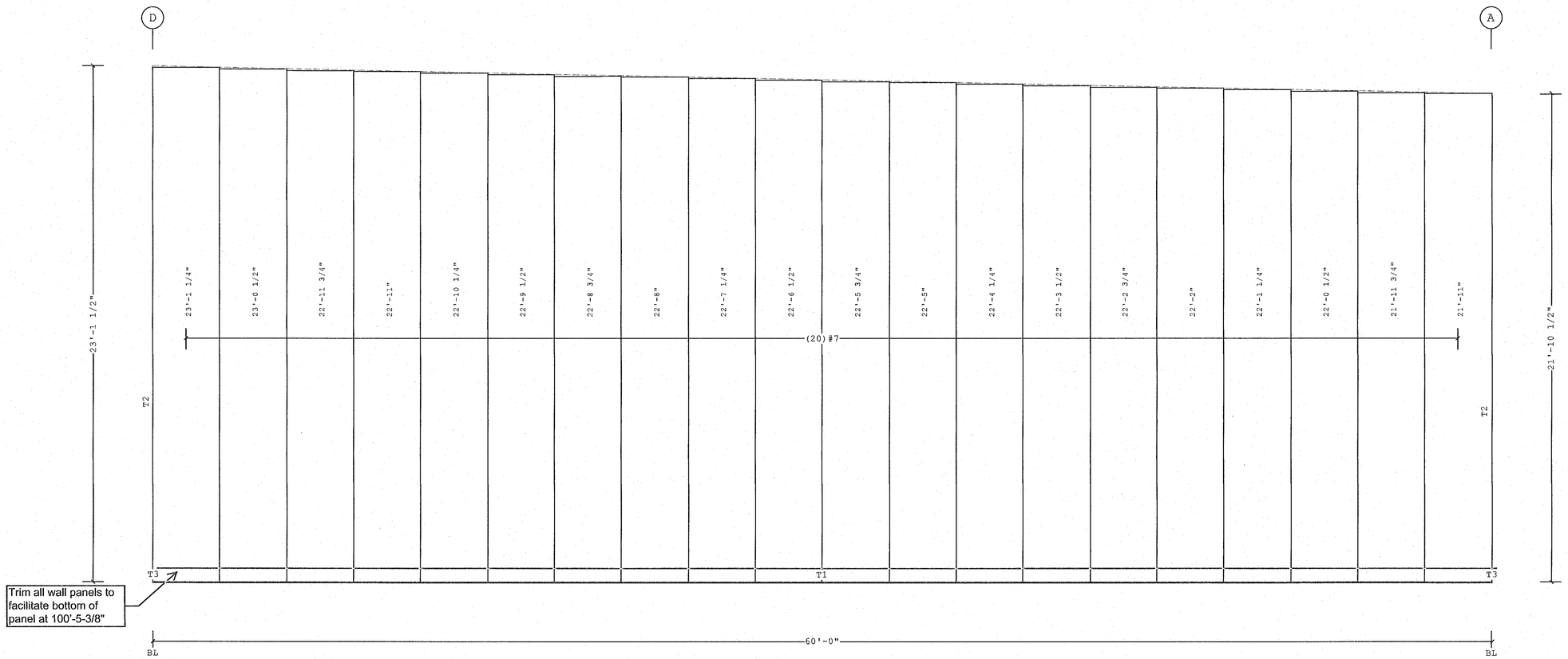
Oper. Code:1=SQ,SQ
Finish:K=Butler-Cote
Color:SY=Cool Shell Gray

Trim Schedule

Id	Parts	Color	Details
T1	(2.4)BA225,(5)SA212,(5)BT12B	Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
T2	(2)SHCTB12,(3.5)0620163,(2)ICT12	Cool Shell Gray	NV679,NV689
T3	CTB3R,CTB3L	Cool Shell Gray	ENB006,NV664

Planograph Schedule

Id	Details
T1	P-081730,P-081733,P-090029
T2	P-081713,P-081733
T3	P-081733,p-090029



COVERING ELEVATION AT 4

Fastener Schedule

Part	Color	Description
0097604-112	Cool Shell Gray	Scrubolt 11/32 x 3 1/2", T-45 Torx Hd w/Washer panel to structural
0097364-112	Cool Shell Gray	(T-1) 1/4-14 x 3/4", T-30 Torx Hd w/Washer panel to panel

CONSTRUCTION AS-BUILTS
5/20/19

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED
PROFESSIONAL ENGINEER

Shape Name = NMI Ground Water Treatment, Wall = 3

1. PRE-DRILLING 1/8 DIAMETER HOLES FOR STRUCTURAL FASTENERS MAY BE REQUIRED FOR HEAVY GAGE NESTED ZEE's AND/OR FASTENERS TO STRUCTURAL BEAMS
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4. SEE JOB DETAILS FOR COVERING AND TRIM FASTENER SPECIFICATION.

C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

COVERING ELEVATION AT 4

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 23

Covering Mark Schedule

Id	Qty	Start Panel	Direction	Start Dim.
#9	17	SHP23032261KSY	Left to Right	0'-0",48'-0"
#14	4	SHP09023262KSY	Left to Right	36'-0"

Covering Schedule

Id	Qty	Type	Start Length	Gage	OP	Fin.	Color	Direction
#9	17	eSHP	23'-3 1/4"	26	1	K	SY	Left to Right
#14	4	eSHP	9'-2 3/8"	26	2	K	SY	Left to Right

Oper. Code:1=SQ,SQ
Oper. Code:2=SQ,SQ
Finish:K=Butler-Cote
Color:SY=Cool Shell Gray

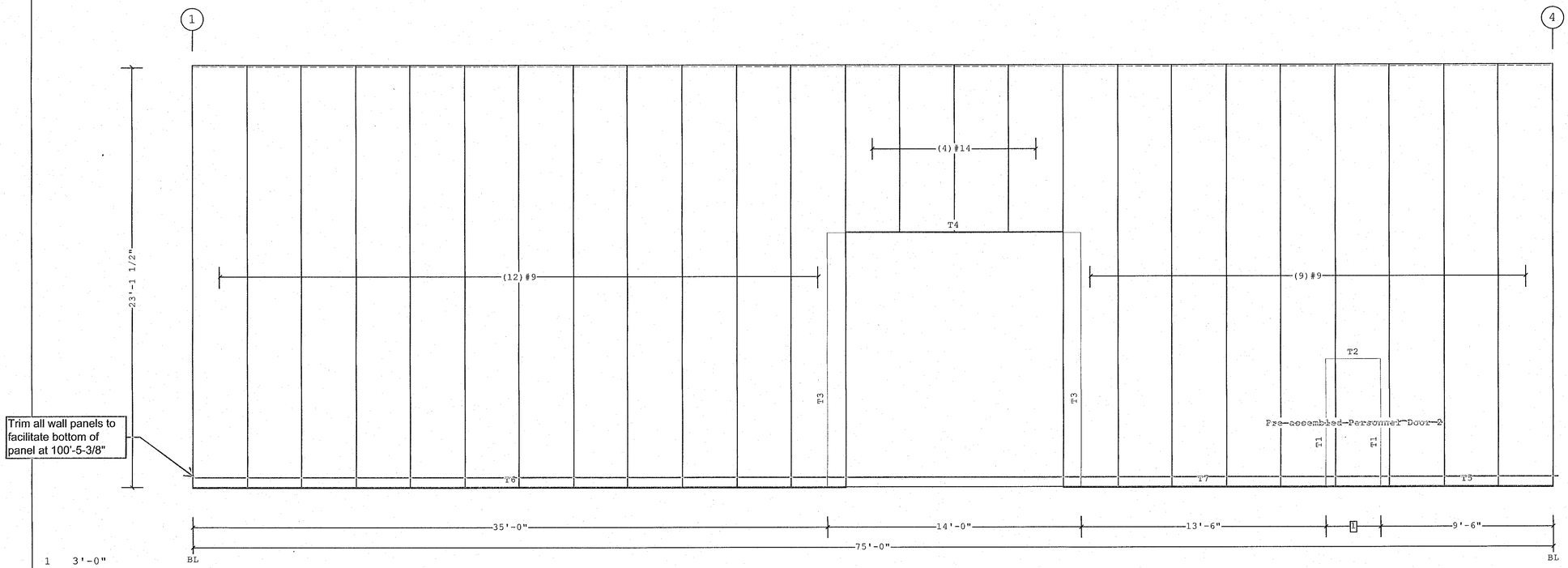
Trim Schedule

Id	Parts
T1	(0.5)DJCH1,(1.6)DSF12D,(0.6)BCS12
T2	(0.5)SA112,DGS12E
T3	(1.2)DSF12D,(1.2)BCS12
T4	(2.3)SA112,(3)DGS12E
T5	(0.4)BA225,(0.8)SA212,(0.8)BT12B
T6	(1.4)BA225,(2.9)SA212,(2.9)BT12B
T7	(0.5)BA225,(1.1)SA212,(1.1)BT12B

Planograph Schedule

Id	Details
T1	P-081714,P-081716,P-081715
T2	P-081716,P-081715
T3	P-081714,P-081715
T4	P-081716,P-081715
T5	P-081730,P-081733,P-090029
T6	P-081730,P-081733,P-090029
T7	P-081730,P-081733,P-090029

Color	Details
Cool Birch White	NV685,WCB026,NV684,NV684
Cool Birch White	NV683
Cool Birch White	NV684,WCB026
Cool Birch White	NV683
Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688
Cool Shell Gray	ENB006,GV442,GV677,NV664,NV688



1 3'-0"
Dimension Key

COVERING ELEVATION AT D

Fastener Schedule

Part	Color	Description
0097604-112	Cool Shell Gray	Scrubolt 11/32 x 3 1/2", T-45 Torx Hd w/Washer panel to structural
0097364-112	Cool Shell Gray	(T-1) 1/4-14 x 3/4", T-30 Torx Hd w/Washer panel to panel

COMMONWEALTH OF MASSACHUSETTS
BRIAN J. KAVANAUGH
STRUCTURAL
No. 41142
REGISTERED
PROFESSIONAL ENGINEER

CONSTRUCTION AS-BUILTS
5/20/19

Shape Name = NMI Ground Water Treatment, Wall = 4

1. PRE-DRILLING 1/8 DIAMETER HOLES FOR STRUCTURAL FASTENERS MAY BE REQUIRED FOR HEAVY GAGE NESTED ZEE's AND/OR FASTENERS TO STRUCTURAL BEAMS
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C

BUTLER MANUFACTURING
1540 GENESSEE ST. KANSAS CITY, MO 64102

REV:	DATE:	BY:	DESCRIPTION:

DRAWING SCALE: NTS

COVERING ELEVATION AT D

BUILDER: Senate Construction
CUSTOMER:
LOCATION: Acton, Massachusetts
PROJECT: Nuclear Metals Superfund Site (NMI)
BUILDER'S PO#: 18-036146-01

BUTLER
Butler Manufacturing
VPC VERSION: 2018.1c

JOB #: 18-036146-01
DATE: 8/9/18
DRAWN/CHECK: DRR /
PAGE: 24

VPC FILENAME: 18-036146-01
8/7/2018 11:33:33
a division of BlueScope Buildings North America, Inc.

Final Construction Control Document

To be submitted at completion of construction by a

Registered Design Professional

for work per the 9th edition of the

Massachusetts State Building Code, 780 CMR, Section 107

Project Title: Nuclear Metals Building Date: 2/25/2019 Permit No.

Property Address: 16 Knox Trail Acton, MA

Project: Check (x) one or both as applicable: x New construction Existing Construction

Project description: New 75'x60' Metal Building

I, Brian Kavanaugh, MA Registration Number: 41142 Expiration date: 6/30/2020 , am a *registered design professional,* and I have prepared or directly supervised the preparation of all design plans, computations and specifications concerning:

____ Architectural __X__ Structural _____ Mechanical
____ Fire Protection _____ Electrical Other: Describe -

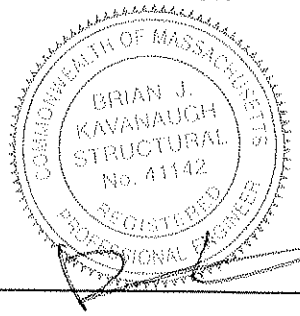
_____

for the above named project. I, or my designee, have performed the necessary professional services and was present at the construction site on a regular and periodic basis. To the best of my knowledge, information, and belief the work proceeded in accordance with the requirements of 780 CMR and the design documents approved as part of the building permit and that I or my designee:

1. Have reviewed, for conformance to this code and the design concept, shop drawings, samples and other submittals by the contractor in accordance with the requirements of the construction documents.
2. Have performed the duties for registered design professionals in 780 CMR Chapter 17, as applicable.
3. Have been present at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the work and to determine if the work was performed in a manner consistent with the construction documents and this code.

Nothing in this document relieves the contractor of its responsibility regarding the provisions of 780 CMR 107.

Enter in the space to the right a "wet" or electronic signature and seal:



Phone number: 978-646-0097 Email: bkavanaugh@mcbrie.com

Building Official Use Only

Building Official Name: Permit No.: Date:

Appendix F
As-Built Drawings – Treatment System

FLOWS & LINES

- NEW MAJOR WATER FLOW LINES, AND REVISION CLOUDS
- NEW MINOR WATER FLOW LINES, NEW CHEMICAL FLOW LINES, NEW MAIN EQUIMENT, NEW CONCRETE BARRIERS
- NEW AIR FLOW LINES, NEW SECONDARY EQUIPMENT,
- NEW VALVES, NEW INSTRUMENTATION SYMBOLS, NEW FITTINGS, NEW INSTRUMENTATION LINES
- FUTURE FLOW LINES & EQUIPMENT
- EXISTING FLOW LINES & EQUIPMENT
- PACKAGE UNIT/SKID LIMITS
- PNEUMATIC LINES
- DATALINK
- DCS-PLC
- HYDRAULIC WATER LINES
- CAPILLARY
- EQUIPMENT DETAILS (HATCHING, INTERIOR COMPONENTS, ETC.)
- BY CUSTOMER
- ELECTRICAL POWER CONNECTION

LINE CONTINUATIONS

INDICATES A LINE GOING TO OR COMING FROM BATTERY LIMITS (CONTRACT LIMITS)

INDICATES A LINE GOING TO OR COMING FROM BATTERY LIMITS (CONTRACT LIMITS)

INDICATES CONTINUATION OF LINE IS ON SHEET NUMBER 5 (SAME DRAWING NUMBER) IN ZONE A-2.

INDICATES CONTINUATION OF LINE IS ON SHEET NUMBER 5 (SAME DRAWING NUMBER) IN ZONE A-2.

SIGNAL CONTINUATIONS

480V/3PH/60Hz 480V/3PH/60Hz INDICATES CONTINUATION OF A SIGNAL IS ON SHEET NUMBER 5.

MATERIAL DESIGNATION CHANGE OVER

CPVC | PVC

LINE IDENTIFIER

3" PVC
- PIPING MATERIAL
- NOMINAL LINE SIZE

RESPONSIBILITY CHANGE OVER

BY OTHERS | BY EVOQUA

TIE POINT SYMBOL

* LOOSE SHIP SYMBOL

ACTUATOR SYMBOLS

- CYLINDER
- DIAPHRAGM
- DOUBLE DIAPHRAGM
- ELECTRO-PNEUMATIC
- MOTOR
- POSITIONER
- RELIEF
- SOLENOID
- MANUAL ACTUATOR
- FAIL CLOSED
- FAIL OPEN
- TRAVEL STOP
- COALESCING FILTER
- SPRAYBALL
- STATIC MIXER
- STEAM TRAP
- STRAINER

VALVE SYMBOLS

- 3-WAY
- 4-WAY
- AIR RELEASE
- AIR RELIEF (SP=___PSIG, PSV)
- BALL
- BUTTERFLY
- BLOCK & BLEED
- CHECK
- DIAPHRAGM
- GATE
- GLOBE
- KNIFE
- NEEDLE
- PLUG
- PRESSURE REDUCING
- RELIEF
- VACUUM BREAKER (STYLE 1)
- CONSERVATION
- Y - DIAPHRAGM

PIPING ACCESSORIES

- DIAPHRAGM SEAL
- DRAIN
- EDUCTOR/EJECTOR
- EXPANSION JOINT
- FLANGE
- FLEXIBLE HOSE
- HOSE CONNECTION
- INSULATION
- INSULATED PIPE WITH ELECTRIC HEAT TRACE
- INSULATED PIPE WITH STEAM HEAT TRACE
- ORIFICE
- UNION
- PIGTAIL
- PULSATION DAMPENER
- PUMP
- METERING PUMP
- QUICK DISCONNECT
- REDUCER (CONCENTRIC)
- REDUCER (ECCENTRIC)
- RUPTURE DISK
- SANITARY COUPLING
- SIGHT FLOW INDICATOR
- SIGHT FLOW STRAINER
- GROOVED COUPLING

INSTRUMENTATION, ELECTRICAL AND RELATED ITEMS

- MAGNETIC FLOW METER
- SONIC FLOW METER
- TURBINE FLOW METER
- VORTEX FLOW METER
- PADDLEWHEEL FLOW METER
- ROTAMETER
- PILOT LIGHT
- VARIABLE FREQUENCY DRIVE
- CALIBRATION COLUMN
- ULTRASONIC SENSOR
- FLOAT LEVEL SENSOR
- FILTER

	PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR (IE: LOCAL PANEL MOUNTED)	FIELD MOUNTED (IE: PIPE MOUNTED)	AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR (IE: REMOTE PANEL MOUNTED)	LOCATION NORMALLY INACCESSIBLE TO OPERATOR (IE: MOUNTED INSIDE PANEL)	BY OTHERS**
DISCRETE INSTRUMENTS	1 IP1*	2	3	4	5
SHARED DISPLAY, SHARED CONTROL	6	7	8	9	10
COMPUTER FUNCTION	11	12	13	14	15
PROGRAMMABLE LOGIC CONTROL	16	17	18	19	20

* ABBREVIATIONS OF THE USER'S CHOICE SUCH AS IP1 (INSTRUMENT PANEL #1), IC2 (INSTRUMENT CONSOLE #2), CC3 (COMPUTER CONSOLE #3), ETC., MAY BE USED WHEN IT IS NECESSARY TO SPECIFY, INSTRUMENT OR FUNCTION LOCATION.
** PRIMARY LOCATION SYMBOL FOR EACH INSTRUMENT TYPE IS SHOWN AS AN EXAMPLE OF "BY OTHERS"
*** AI,AO,DI,DO

INSTRUMENT TAG NUMBERS

TIC-SCH10-01- INSTRUMENT IDENTIFICATION OR TAG NUMBER
- LOOP NUMBER
- MATERIAL IDENTIFIER
- FUNCTIONAL IDENTIFICATION

WHERE:
(LEGEND BASED ON ISA STANDARD S 5.1)

ISA INSTRUMENT IDENTIFICATION TABLE

	FIRST LETTER: PROCESS VARIABLE	FIRST LETTER: MODIFIER (IF NEEDED)	SUCCEEDING LETTERS: READOUT OR COMPUTER FUNCTION	SUCCEEDING LETTERS: MODIFIER (IF NEEDED)
A	ANALYSIS		ALARM	
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE		CONTROL	
D	USER'S CHOICE	DIFFERENTIAL		
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)	
F	FLOW RATE	RATIO (FRACTION)		
G	USER'S CHOICE		GLASS, VIEWING DEVICE	
H	HAND			HIGH
I	CURRENT (ELECTRICAL)		INDICATE	
J	POWER	SCAN		
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE	CONTROL STATION	
L	LEVEL		LIGHT	LOW
M	USER'S CHOICE	MOMENTARY		MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE (RESTRICTION)	
P	PRESSURE, VACUUM		POINT (TEST CONNECTION)	
Q	QUANTITY	INTEGRATE, TOTALIZE		
R	RADIATION		RECORD	
S	SPEED, FREQUENCY	SAFETY	SWITCH	
T	TEMPERATURE		TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECH. ANALYSIS		VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL	
X	UNCLASSIFIED	X-AXIS	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y-AXIS	RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z-AXIS	DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

ABBREVIATIONS

B	BLOWER OR AIR HANDLING	GPD	GALLONS PER DAY	NC	NORMALLY CLOSED	SG	SPECIFIC GRAVITY
BV	BALL VALVE	GPH	GALLONS PER HOUR	NF	NANOFILTER	SOV	SOLENOID VALVE
CDI	CONTINUOUS DEIONIZATION CELL PACK	GPM	GALLONS PER MINUTE	OD	OUTSIDE DIAMETER	SP	SAMPLE PORT
CFM	CUBIC FEET PER MINUTE	HG	INCHES OF MERCURY	OZ	OZONE GENERATOR	SS	STAINLESS STEEL
CS	CARBON STEEL	HOA	HAND/OFF/AUTO	P	PUMP	SSH	STRAIGHT SIDE HEIGHT (SIDE SHELL HEIGHT)
CV	CHECK VALVE	HP	HORSEPOWER	PE	POLYETHYLENE	SST	STAINLESS STEEL TUBE
CW	CITY WATER (POTABLE)	HDPE	HIGH DENSITY POLYETHYLENE	PP	POLYPROPYLENE	SV	SAMPLE VALVE
DA	STEAM DE-AERATOR	HV	MANUAL HAND VALVE	PR	PRESSURE REGULATOR	SW	SEAL WATER
DIA	DIAMETER	HX	HEAT EXCHANGER	PSIA	POUNDS PER SQUARE INCH - ABSOLUTE	T	TANK (LIQUID OR CHEMICAL STORAGE, NEUTRALIZATION)
DWG	DRAWING	IA	INSTRUMENT AIR	PSID	POUNDS PER SQUARE INCH - DIFFERENTIAL	TDH	TOTAL DYNAMIC HEAD (FEET OF FLUID)
DS	DISCONNECT	ID	INSIDE DIAMETER	PSIG	POUNDS PER SQUARE INCH - GAUGE	TYP	TYPICAL
EPSS	ELECTRO POLISHED STAINLESS STEEL	IX	ION EXCHANGER	PVC	POLY VINYL CHLORIDE	UF	ULTRAFILTER MODULE
F	FILTER VESSEL (CARTRIDGE, MEDIA, CARBON, PRECOAT, AIR)	M	MIXER (AGITATOR, AERATOR)	PVDF	POLYVINYLIDENE FLUORIDE	UV	ULTRAVIOLET LIGHT (STERILIZER, TOC OR O3 REMOVAL)
FC	FAIL CLOSED	MD	MEMBRANE DEGASIFIER CONTACTOR	PW	PLANT WATER	VAC	VACUUM
FDD	FORCED DRAFT DECARBONATOR VESSEL	MMF	MULTIMEDIA FILTER	RO	REVERSE OSMOSIS	VD	VACUUM DEGASIFIER VESSEL
FO	FAIL OPEN	MOC	MATERIAL OF CONSTRUCTION	RPM	REVOLUTIONS PER MINUTE	VFD	VARIABLE FREQUENCY DRIVE
FRP	FIBERGLASS REINFORCED PLASTIC	MV	MANUAL VALVE	SB	SPRAYBALL	WC	WATER COLUMN
FV	ACTUATED FLOW CONTROL VALVE	MW	MANWAY	SCFM	STANDARD CUBIC FEET PER MINUTE		
GAL	GALLONS	NO	NORMALLY OPEN	SCH	SCHEDULE		

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
5	CUSTOMER COMMENTS	02/12/20	ASB	AP	KB	
4	CUSTOMER COMMENT ON CARTRIDGE FILTERS	11/08/19	ASB	AP	KB	
3	UPDATES FROM CUSTOMER CHANGE ORDER	10/08/19	ASB	AP	KB	
2	AS BUILTS	05/16/19	ASB	AP	KB	
1	ISSUE FOR RECORD	01/07/19	ASB	AP	KB	
0	CUSTOMER COMMENTS, PTC BACKWASH, LINE SIZES, RECIRC TANK	05/31/18	ASB	AP	KB	
A	INITIAL RELEASE FOR CUSTOMER APPROVAL	05/14/18	ASB	AP	KB	

DESIGNER	ASB 05/11/18
CHECKER	AP 05/11/18
ENGINEER	ASB 05/11/18
MANAGER	KB 05/11/18
FILE:	1200\000999-9100.3.dwg
SCALE:	NONE

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM
LEGEND SHEET ONE

CLIENT: *de maximis*
ACTON, MASSACHUSETTS

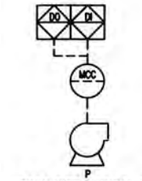
EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	1 OF 14	5

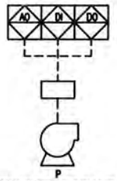
STD: BORDER-0108-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

LANNIE L. UNDERWOOD REGISTERED No. 20451 INDIANA PROFESSIONAL ENGINEER
Lannie L. Underwood 18FEB20

PUMP DIAGRAM NOTES:
1. HAND-OFF-AUTO (H-O-A) COULD BE REPLACED BY HAND-OFF (H-O).
2. MOTOR CONTROL CENTER (MCC), MOTOR STARTER (MS), VARIABLE FREQUENCY DRIVE (VFD) OR DISCONNECT SWITCH (DS) COULD BE BY CUSTOMER OR EVOQUA WATER TECHNOLOGIES.
3. ZS INDICATES VOLUME ADJUSTMENT, EITHER FREQUENCY OR STROKE LENGTH. EXAMPLE INDICATES ADJUSTMENT FROM THE PLC.
4. THE POSITIVE DISPLACEMENT PUMP CAN HAVE THE SAME COMBINATIONS AS SHOWN FOR THE CENTRIFUGAL PUMP.

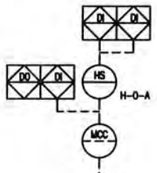


EVOQUA WATER TECHNOLOGIES SUPPLIED STARTER OR VFD TO PLC

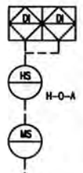


EVOQUA WATER TECHNOLOGIES SUPPLIED VFD

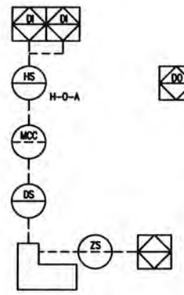
LOCAL MOTOR STARTER TO PLCS



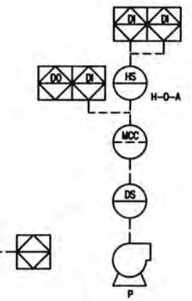
EVOQUA WATER TECHNOLOGIES SUPPLIED STARTER OR VFD TO SELECTOR SWITCH THEN PLC



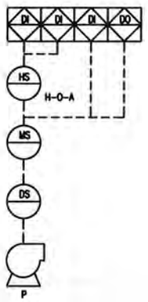
LOCAL MOTOR STARTER TO SELECTOR SWITCH THEN PLC



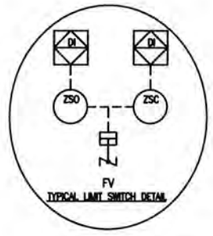
POSITIVE DISPLACEMENT PUMP WITH EVOQUA SUPPLIED DISCONNECT SWITCH AND STARTER OR VFD TO SELECTOR SWITCH THEN PLC.



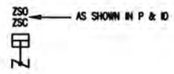
EVOQUA WATER TECHNOLOGIES SUPPLIED DISCONNECT SWITCH AND STARTER OR VFD TO SELECTOR SWITCH



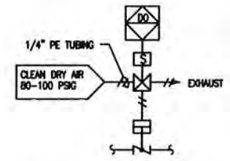
LOCAL MOTOR STARTER TO DISCONNECT SWITCH TO SELECTOR SWITCH THEN PLC



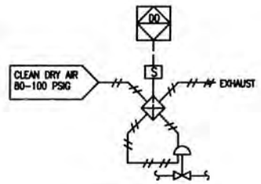
TYPICAL LIMIT SWITCH DETAIL



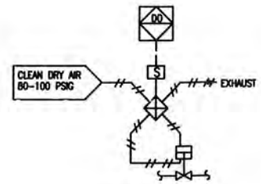
AUTO VALVE ACTUATORS



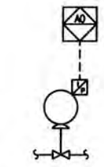
TYPICAL AIR ACTUATED VALVE CONTROL DETAIL (AIR SUPPLY NOT SHOWN ON SYSTEM P&ID)



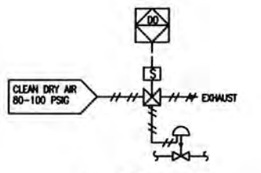
TYPICAL VALVE SCHEMATIC FOR ALL VALVES W/AIR TO AIR DIAPHRAGM ACTUATOR



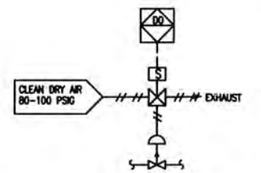
TYPICAL VALVE SCHEMATIC FOR ALL VALVES W/AIR TO AIR CYLINDER ACTUATOR



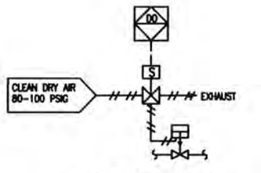
TYPICAL PROPORTIONAL CONTROL VALVE



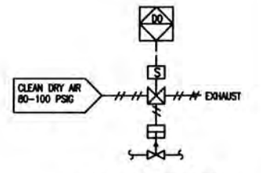
TYPICAL VALVE SCHEMATIC FOR ALL VALVES W/SPRING TO CLOSE DIAPHRAGM ACTUATOR



TYPICAL VALVE SCHEMATIC FOR ALL VALVES W/SPRING TO OPEN DIAPHRAGM ACTUATOR



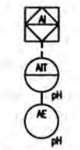
TYPICAL VALVE SCHEMATIC FOR ALL VALVES W/SPRING TO CLOSE CYLINDER ACTUATOR



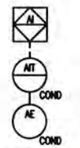
TYPICAL VALVE SCHEMATIC FOR ALL VALVES W/SPRING TO OPEN CYLINDER ACTUATOR

LEVEL SWITCH

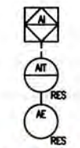
LEVEL TRANSMITTER



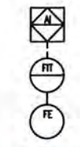
ANALYTICAL ELEMENT pH



ANALYTICAL ELEMENT CONDUCTIVITY



ANALYTICAL ELEMENT RESISTIVITY



INLINE FLOW ELEMENT PANEL-MOUNTED FLOW METER W/ANALOG INPUT

			–	SEE SHEET ONE							
			REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN		

COMPANY CONFIDENTIAL
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DESIGNER	ASB	05/11/18
CHECKER	AP	05/11/18
ENGINEER	ASB	05/11/18
MANAGER	KB	05/11/18
FILE:	1200/000999-9100.dgn	
SCALE:	NONE	

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM
LEGEND SHEET TWO

CLIENT: de maximis
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9900

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	2 OF 14	5

STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

FEED INTERLOCK SIGNAL (BY CUSTOMER)

WELL TRANSDUCER SIGNAL (BY CUSTOMER)

GROUND WATER FEED FLOW - 20 TO 30 GPM (NOMINAL)

480VAC / 3PH / 60HZ (BY CUSTOMER)

SIGNAL FROM POSH 2004

TO VANOX CONTROL PANEL

TO MULTIMEDIA FILTERS 4 C 8

FILTER PRESS EXCESS WATER 14 D 1

BY CUSTOMER

VFD

FIT 001

FE 001

PU-001 BY CUSTOMER

1.5" PVC

LIT 2001

VENTED OR OPEN TOP

T-2001

HV-2001

HV-2002

FEED TANK T-2001
CONE BOTTOM
1400 GALLON CAPACITY
HDPE CONSTRUCTION

SUPPLIED LOOSE BY EVOQUA

DRAIN (BY CUSTOMER)

REMOTE IO PANEL

0100 SKID

2" PVC

2"

1.5"

HV-101

PU-101

CV-101

HV-102

HV-103

SP-101

HV-104

PI 101

FIT 101

FE 101

FEED PUMP SKID
RATED FOR 31 GPM @ 94 PSI (DESIGN)
BALDOR MOTOR, VITON, 3 HP
316SS INTERNAL CONSTRUCTION
460V-3PH-60HZ

PUMP SKID LIMITS

AIT 2001 pH / ORP

AE 2001 pH / ORP

AE 2003 pH / ORP

2" PVC

120VAC / 1PH / 60HZ (BY CUSTOMER)

0200 SKID

1/2" HV-206

PI 201

1/2" CPVC SCH 80

1/2" HV-205

CPVC TUBING

3/8" PFA TUBING

RUNNING

DI DO

NEMA 4X JUNCTION BOX

MFV-201

PU-201

1/2" HV-202

3/8" PLUG

HV-201 1/2"

1/2" STR-201

1/2" CPVC SCH 80

1/4" HV-207

PANEL DRAIN/VENT

WALL MOUNTED SODIUM HYPOCHLORITE FEED SYSTEM

PU-201
SODIUM HYPOCHLORITE PUMP
MODEL: GRUNDFOS DDA 7.5-16
DRIVE: 24 W
CAPACITY: 7.5 LPH @ 16 BAR
120VAC / 1PH / 60HZ

1/4" PFA TUBING

AIR BREAK

100mL CALIBRATION COLUMN CC-201

1/2" HV-210

1/2" HV-208

1/2" HV-209

CHEMICAL DAY TANK 35 GALLON LDPE CONSTRUCTION (BY CUSTOMER)

1400 SKID

1/2" HV-1406

PI 1401

1/2" CPVC SCH 80

1/2" HV-1405

CPVC TUBING

3/8" PFA TUBING

MFV-1401

PU-1401

1/2" HV-1402

3/8" PLUG

HV-1401 1/2"

1/2" STR-1401

1/2" CPVC SCH 80

1/4" HV-1407

PANEL DRAIN/VENT

1/4" PFA TUBING

AIR BREAK

100mL CALIBRATION COLUMN CC-1401

1/2" HV-1410

1/2" HV-1408

1/2" HV-1409

CHEMICAL DAY TANK 35 GALLON LDPE CONSTRUCTION (BY CUSTOMER)

WALL MOUNTED CAUSTIC FEED SYSTEM

PU-1401
CAUSTIC PUMP
MODEL: GRUNDFOS DDA 7.5-16
DRIVE: 24 W
CAPACITY: 7.5 LPH @ 16 BAR
120VAC / 1PH / 60HZ

NEMA 4X JUNCTION BOX

18FEB20

UNDERWOOD REGISTERED PROFESSIONAL ENGINEER NO. 20451 STATE

STD: BORDER-0106-24X36D1

INTL REF:

BAR = 1" AT PLOT SCALE

- SEE SHEET ONE

REV	DESCRIPTION	DATE	DRN	CHKD	APVD	ECN

DESIGNER	ASB 05/11/18
CHECKER	AP 05/11/18
ENGINEER	ASB 05/11/18
MANAGER	KB 05/11/18
FILE	1200\000999-0100.dwg
SCALE	NONE

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT: de maximis
ACTON, MASSACHUSETTS

evoqua WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		0100	3 OF 14	5

SIGNAL TO 0100 RIO PANEL

SIGNAL TO 0100 RIO PANEL

0300 SKID

0-160 PSIG PI 02

DPSH 01

0-160 PSIG PI 01

HEADER-OUT 2" PVC

ITEMS SUPPLIED BY OTHERS

FROM FEED PUMP | 3 | D 1

2" PVC HEADER-IN

PRV SET @ 120 PSIG

1.5" PVC

FROM BACKWASH FEED PUMP | 11 | B 1

AV-01 AV-02 AV-03

0-160 PSIG PI 03 PI 04 PI 05 PI 06 PI 07 PI 08

PRETREATMENT INTERLOCK

MPV-1 MPV-2 MPV-3

DLFC-1 DLFC-2 DLFC-3

FLTR-1 FLTR-2 FLTR-3

PTC TRIPLEX MULTIMEDIA FILTERS
18" DIA X 65" HIGH VESSELS
EACH SIZED FOR 100% CAPACITY
FRP CONSTRUCTION, NON-CODE
4 FT³ QUANTUM DMI MEDIA EACH
MULTI-PORT CONTROLLER VALVE, NEMA 3R
REGENERATION BASED ON VOLUME
110V-1PH-60HZ
PARALLEL OPERATION

110 or 120 VAC, 60W MAX (RECEPTACLE BY CUSTOMER)

110 or 120 VAC, 60W MAX (RECEPTACLE BY CUSTOMER)

110 or 120 VAC, 60W MAX (RECEPTACLE BY CUSTOMER)

2" CLEAR PVC PIPE, 10' LENGTH

BACKWASH COLLECTION TANK | 10 | C 8

3" 2" 3" PVC

HV-311

PORT 303

0.25" SS TUBE

0.25" VENT HV-307

1.5" PVC

HV-312

1.5" HV-301

F-301

1.5" HV-303

1.5" PVC HV-313

0-160 PSIG PI 301

0.5" 0.25" HV-309

0.25" VENT HV-308

0.5" HV-305

0-160 PSIG PI 302

3" PVC 3" 2"

TO VANOX OX60 SKID | 5 | D 8

1.5" HV-302

F-302

1.5" HV-304

1.5" PVC

0.5" 0.25" HV-310

0.5" HV-306

BAG FILTER SKID
MANUFACTURER: HAYWARD
EACH RATED FOR 30 GPM
BAG SIZE 02

TO OPEN DRAIN

120 VAC / 1 PH / 60 HZ

SPD

AO START

DI DO

POLYBLEND SYSTEM

18FEB20

JENNIE L. UNDERWOOD REGISTERED No. 20451 PROFESSIONAL ENGINEER

STD: BORDER-0108-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
-	SEE SHEET ONE					

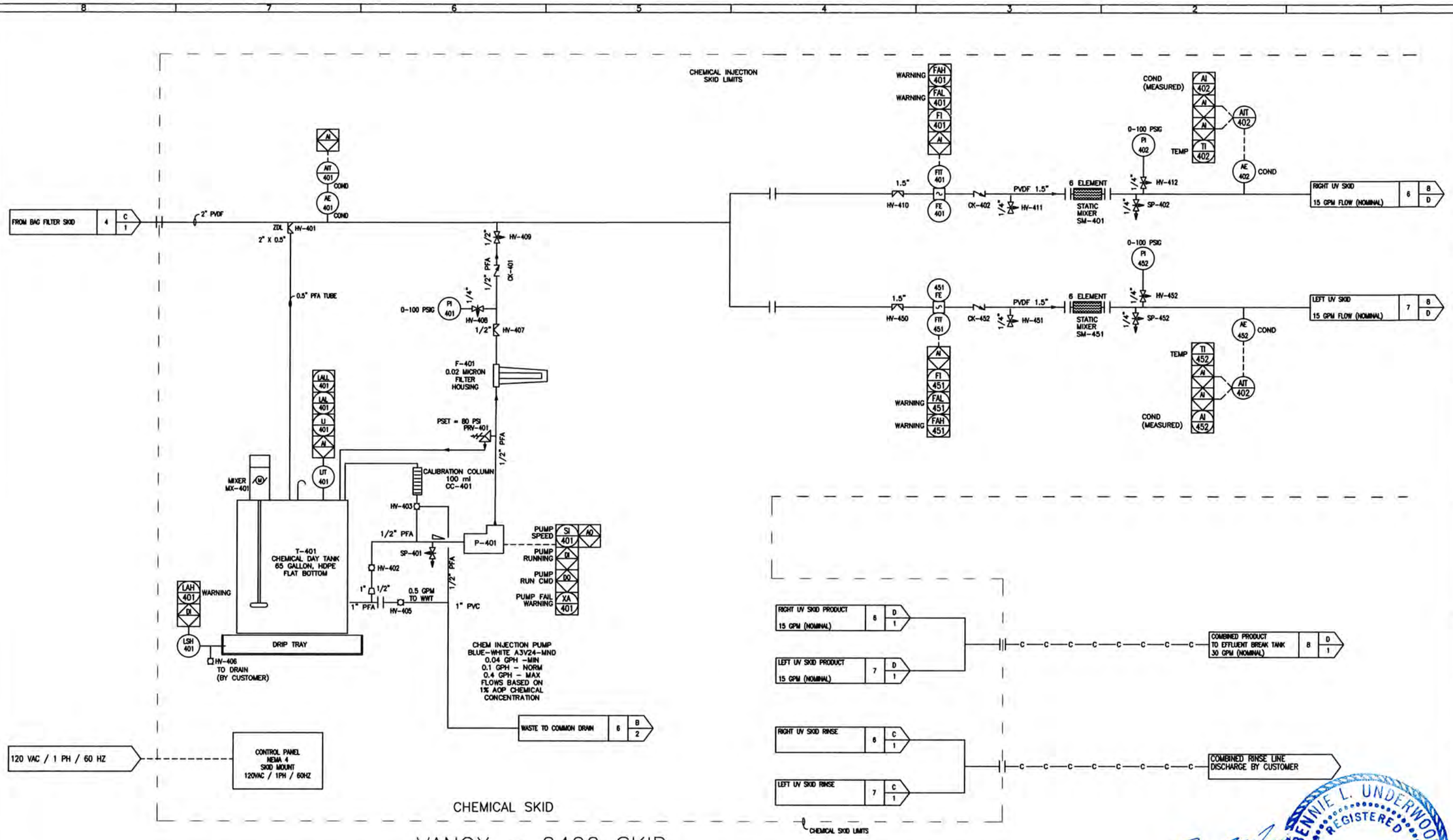
DESIGNER ASB	DATE 05/11/18
CHECKER AP	DATE 05/11/18
ENGINEER ASB	DATE 05/11/18
MANAGER KB	DATE 05/11/18
FILE: 1200/000999-9100.Admx	
SCALE: NONE	

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT: de maximis
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	4 OF 14	5



VANOX – 0400 SKID

BENNIE L. UNDERWOOD REGISTERED No. 20451 STATE PROFESSIONAL ENGINEER
18FEB20

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
–	SEE SHEET ONE					

DESIGNER ASB	DATE 05/11/18
CHECKER AP	DATE 05/11/18
ENGINEER ASB	DATE 05/11/18
MANAGER KB	DATE 05/11/18
FILE: 1200/000999-9100.Adwg	
SCALE: NONE	

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM 1,4-DIOXANE REMOVAL SYSTEM
CLIENT: de maximis ACTON, MASSACHUSETTS
EVOQUA WATER TECHNOLOGIES COLORADO SPRINGS, CO 719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	5 OF 14	5

STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

480 VAC / 3 PH / 60 HZ
(BY CUSTOMER)

UV DRIVER PANEL
NEMA 12
SKID MOUNT
480VAC / 3PH / 60HZ

FROM CHEMICAL SKID 5 1 D

COND AI 403
AIT 403
TEMP AI 403
AE 403 COND

0-100 PSIG PI 403
1/4" HV-431
1/4" SP-403
ZDL HV-432
HV-433
PVDF
PVC
PRODUCT
15 GPM NOMINAL 5 B 4

1.5" PVC
RINSE
1 - 15 GPM 5 A 4

FAL 404 FI 404 AI
FIT 404 5 FE 404
HV-415 1" 1 X 1.5 PVDF SS
HV-416 1" 1 X 1.5 PVDF SS
1/2" SS VENTING
1.5" LIGHT TRAP
1 X 0.5 HV-425
1 X 0.5 HV-426

LP 401 INTENSITY LEVEL
LP 401 LAMP ON
LP 401 DRIVE FAILURE
LP 401 LAMP FAILURE
LP 401 SYSTEM FAILURE
LP 401 RUN CMD

LP-401, 5.4kW
UV-401
LP-402, 5.4kW

HV-419 PVC 0.5" SS 1"
HV-420 SS 1" PVC 0.5"

TT 405
AT 405

CHAMBER TEMPERATURE AI
WARNING TAH 401
SYSTEM SHUTDOWN TAHH 401
WARNING INTENSITY AAL 401 AI

LP 402 RUN CMD
LP 402 SYSTEM FAILURE
LP 402 LAMP FAILURE
LP 402 DRIVE FAILURE
LP 402 LAMP ON
LP 402 INTENSITY LEVEL

HV-414 1" 1 X 1.5 PVDF SS
HV-417 1" 1 X 1.5 PVDF SS
1/2" SS VENTING
1.5" LIGHT TRAP
1 X 0.5 HV-427
1 X 0.5 HV-428

LP 411 INTENSITY LEVEL
LP 411 LAMP ON
LP 411 DRIVE FAILURE
LP 411 LAMP FAILURE
LP 411 SYSTEM FAILURE
LP 411 RUN CMD

LP-411, 5.4kW
UV-411
LP-412, 5.4kW

HV-421 PVC 0.5" SS 1"
HV-422 SS 1" PVC 0.5"

TT 411
AT 411

CHAMBER TEMPERATURE AI
WARNING TAH 411
SYSTEM SHUTDOWN TAHH 411
WARNING INTENSITY AAL 411 AI

LP 412 RUN CMD
LP 412 SYSTEM FAILURE
LP 412 LAMP FAILURE
LP 412 DRIVE FAILURE
LP 412 LAMP ON
LP 412 INTENSITY LEVEL

FAL 406 FI 406 AI
FIT 406 5 FE 406
HV-415 1" 1 X 1.5 PVDF SS
HV-418 1" 1 X 1.5 PVDF SS
1/2" SS VENTING
1.5" LIGHT TRAP
1 X 0.5 HV-429
1 X 0.5 HV-430

LP 421 INTENSITY LEVEL
LP 421 LAMP ON
LP 421 DRIVE FAILURE
LP 421 LAMP FAILURE
LP 421 SYSTEM FAILURE
LP 421 RUN CMD

LP-421, 5.4kW
UV-421
LP-422, 5.4kW

HV-423 PVC 0.5" SS 1"
HV-424 SS 1" PVC 0.5"

TT 421
AT 421

CHAMBER TEMPERATURE AI
WARNING TAH 421
SYSTEM SHUTDOWN TAHH 421
WARNING INTENSITY AAL 421 AI

LP 422 RUN CMD
LP 422 SYSTEM FAILURE
LP 422 LAMP FAILURE
LP 422 DRIVE FAILURE
LP 422 LAMP ON
LP 422 INTENSITY LEVEL

A 2 5 FROM AOP PUMP WASTE

1/2" PVC

1/2" PVC
DRAIN
DISCHARGE BY CUSTOMER
0-10 GPM

VANOX UV SKID (RIGHT)

UV-401, UV-411, UV-421
AOP REACTOR
316SS, 25 RA
480VAC / 3PH / 60HZ

JENNIFER L. UNDERWOOD
REGISTERED
No. 20451
PROFESSIONAL ENGINEER
STATE OF INDIANA
18 FEB 20

			-	SEE SHEET ONE							
			REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN		

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DESIGNER	ASB	05/11/18
CHECKER	AP	05/11/18
ENGINEER	ASB	05/11/18
MANAGER	KS	05/11/18

FILE: 1200/000999-9100_A.dwg
SCALE: NONE

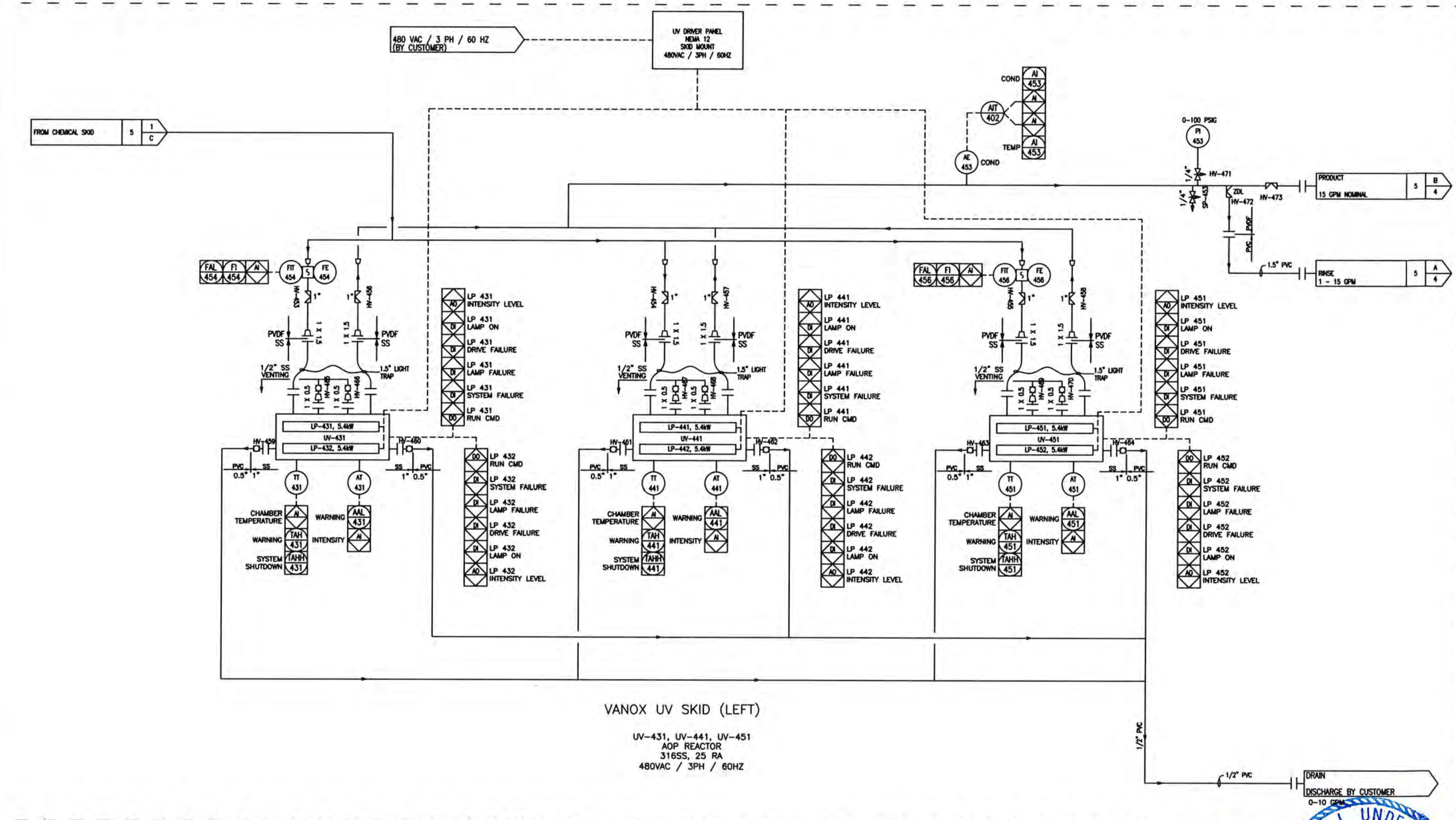
TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM
STAT

CLIENT: de maximis
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	6 OF 14	5

STD: BORDER-0108-24X3601 | INTL REF: | BAR = 1" AT PLOT SCALE



Bennie L Underwood
18FEB20

BENNIE L. UNDERWOOD REGISTERED PROFESSIONAL ENGINEER STATE OF INDIANA

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
-	SEE SHEET ONE					

DESIGNER ASB	DATE 05/11/18
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SCALE: NONE	

TITLE PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT *de maximis*
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	7 OF 14	5

STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

FROM VANOX DX60
FLOW: 30 GPM (NOMINAL)
5 B 2

2" PVC

480VAC / 3PH / 60HZ
(BY CUSTOMER)

TO VANOX CONTROL PANEL

LIT 2101

T-2101

EFFLUENT BREAK TANK T-2101
FLAT BOTTOM
1400 GALLON CAPACITY
HDPE CONSTRUCTION

HV-2101
HV-2102

DRAIN
(BY CUSTOMER)

0500 SKID

REMOTE IO PANEL

AI
FIT 501
FE 501

PI 501

HV-503
HV-502
SP-501

CV-501

HV-501

PU-501

HV-504

2" PVC
1.5"
2"

EFFLUENT PUMP SKID
RATED FOR 31 GPM @ 94 PSI (DESIGN)
BALDOR MOTOR, VITON, 3 HP
316SS INTERNAL CONSTRUCTION
460V-3PH-60HZ

PUMP SKID LIMITS

AI
AIT 2002
pH / ORP
AE 2002
pH / ORP

STATIC MIXER

TO PERCHLORATE REMOVAL
9 D 8

0600 SKID

1/2" HV-606

NEMA 4X JUNCTION BOX

PI 601

1/2" CPVC SCH 80

CPVC TUBING

1/2" HV-605

3/8" PFA TUBING

DI
DO
AO
RUNNING

3/8" PFA TUBING

MFV-101

3/8" PFA TUBING

CPVC TUBING

PU-601

HV-601 1/2"

1/2" HV-602

1/2" STR-601

1/2" CPVC SCH 80

3/8" PLUG

1/4" HV-607

PANEL DRAIN/VENT

1/4" PFA TUBING

AIR BREAK

100mL CALIBRATION COLUMN CC-601

1/2" HV-610

1/2" HV-608

1/2" HV-609

CHEMICAL DAY TANK
35 GALLON
LDPE CONSTRUCTION
(BY CUSTOMER)

WALL MOUNTED CAUSTIC FEED SYSTEM
PU-601
CAUSTIC PUMP
MODEL: GRUNDFOS DDA 7.5-16
DRIVE: 24 W
CAPACITY: 7.5 LPH @ 16 BAR
120VAC / 1PH / 50HZ

Bennie L Underwood
18FEB20

BENNIE L. UNDERWOOD
REGISTERED
No. 20451
STATE OF INDIANA
PROFESSIONAL ENGINEER

STD: BORDER-0106-24X36D1

INTL REF:

BAR = 1" AT PLOT SCALE

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
-	SEE SHEET ONE					

DESIGNER ASB	DATE 05/11/18
CHECKER AP	DATE 05/11/18
ENGINEER ASB	DATE 05/11/18
MANAGER KB	DATE 05/11/18
FILE: 1200/000999-9100-A.dwg	
SCALE: NONE	

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT: de maximis
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	8 OF 14	5

FROM VANOX DX60
FLOW: 30 GPM (NOMINAL)
8 C 1
2" PVC
SIGNAL TO 0100 RIO PANEL
DI
PDSH 2004
CARTRIDGE FILTERS
BY CUSTOMER
EXISTING GAC VESSEL
EXISTING GAC VESSEL
SUPER 30 TANKS
2" PVC
PI
SAMPLE
PI
SAMPLE
PI
SAMPLE
PI
SAMPLE
PERCHLORATE REMOVAL SYSTEM
TWO (2) SUPER 30 TANKS
CAPACITY: 30 FT3 PER VESSEL
MEDIA: DOW PSR2+
SUPPLIED LOOSE BY EVOQUA
DISCHARGE (BY CUSTOMER)

Brenna L Underwood 18FEB20

BRENNIE L. UNDERWOOD REGISTERED PROFESSIONAL ENGINEER STATE OF INDIANA 20451

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
-	SEE SHEET ONE					

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SCALE: NONE

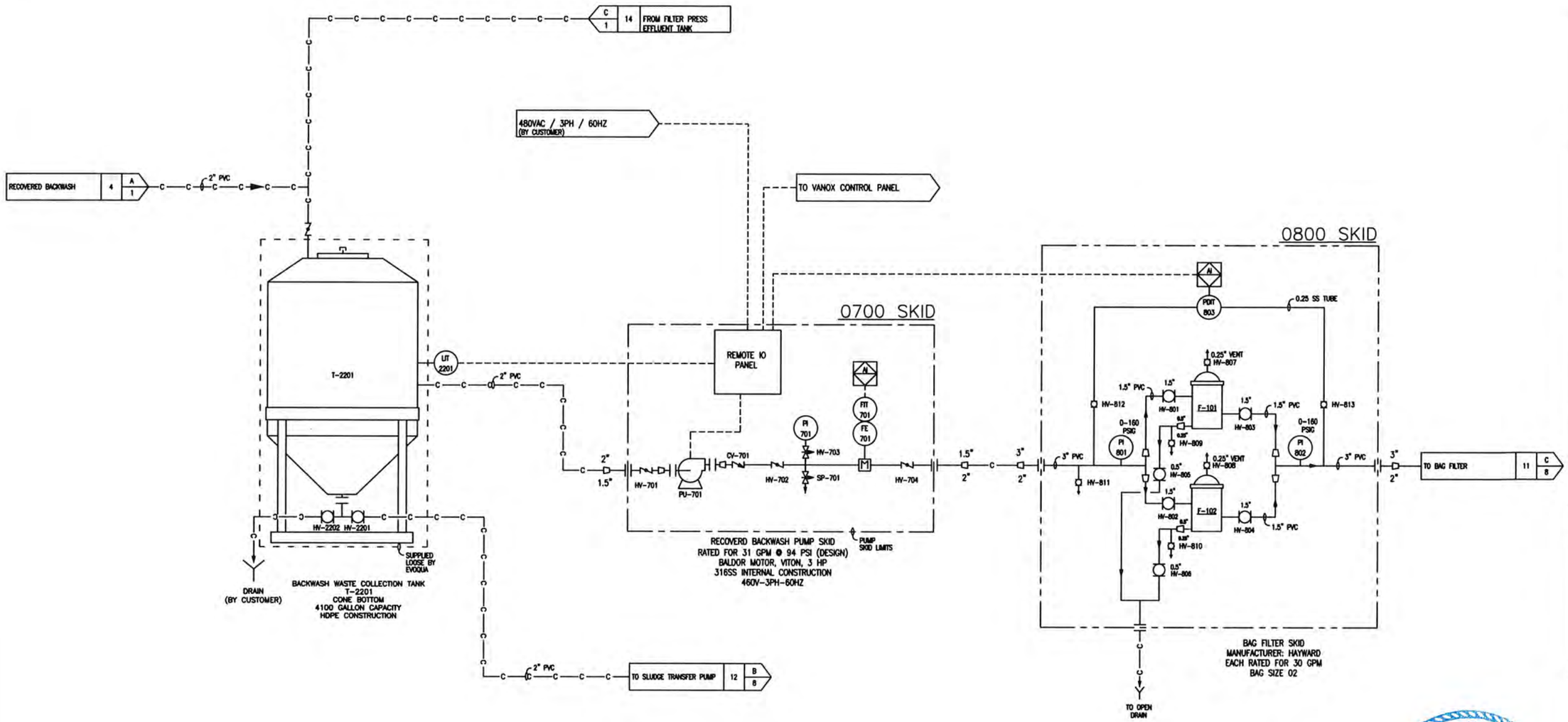
TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT: de maximis
ACTON, MASSACHUSETTS

evoqua WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	9 OF 14	5

STD: BORDER-0106-24X3601 | INTL REF: | BAR = 1" AT PLOT SCALE



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KB	05/11/18

FILE: 1200/000999-9100.Adwg
SCALE: NONE

BENNIE L. UNDERWOOD
REGISTERED
No. 20451
STATE OF INDIANA
PROFESSIONAL ENGINEER
18FEB20

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

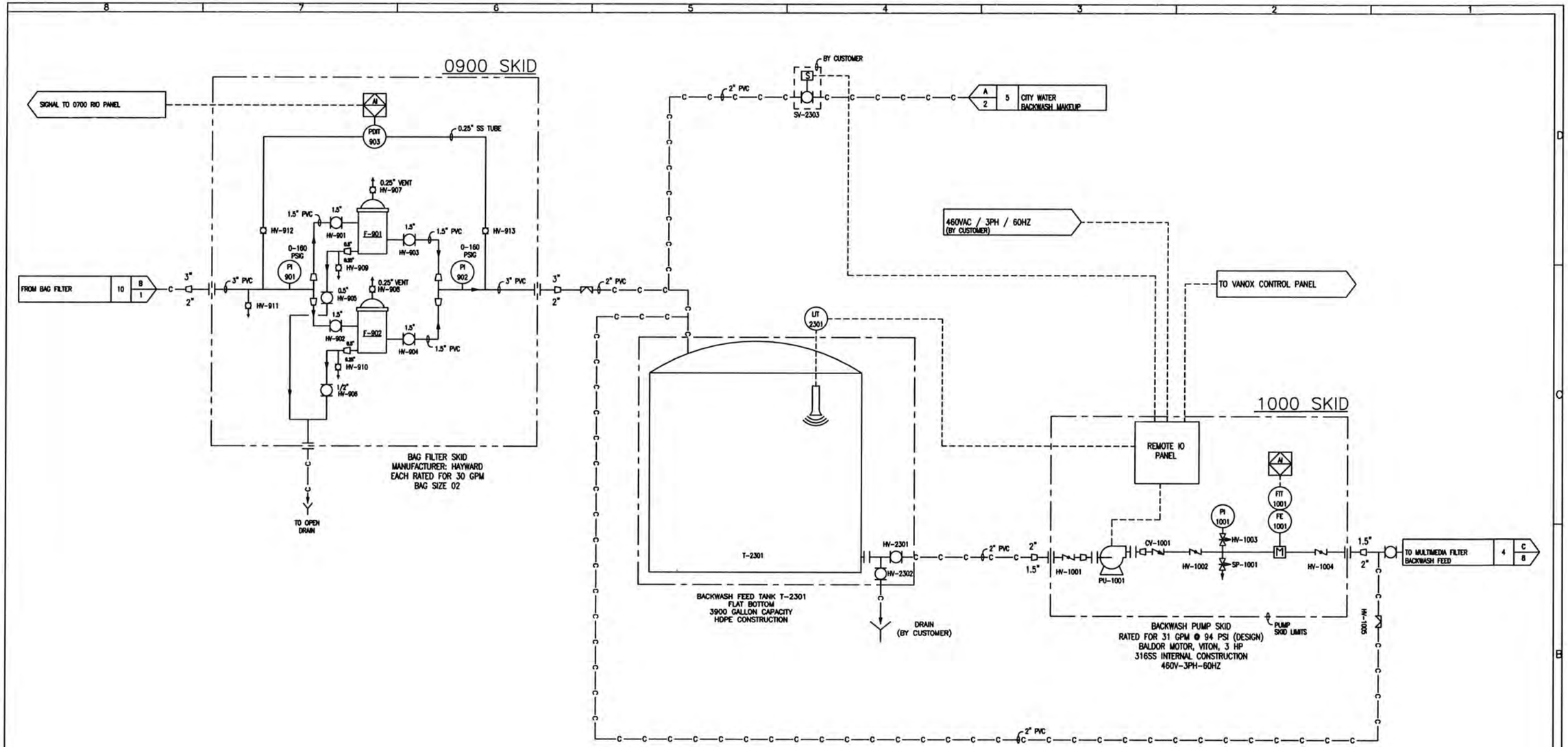
CLIENT: de maximis
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	10 OF 14	5

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
–	SEE SHEET ONE					

STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE



Bennie L Underwood
18FEB20

BENNIE L. UNDERWOOD
REGISTERED
No. 20451
STATE
PROFESSIONAL ENGINEER

			-	SEE SHEET ONE						
			REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN	

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TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT: *de maximis*
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	11 OF 14	5

STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

AIR COMPRESSOR
120 PSI @ 70 SCFM

TO FILTER PRESS | 13 | D 8

SIGNAL TO 0700 RIO PANEL

SIGNAL TO 0700 RIO PANEL

SV-1101

1100 SKID

3/4"
1/2"
HV-1103

F-1101

HV-1104

1"
HV-1102

PU-1101

1"
HV-1101

FROM RECOVERED BACKWASH TANK | 10 | A 5

2"
1.5"

1.5"
2"

1"

BACKWASH SLUDGE TRANSFER PUMP
MODEL: ARO
DESIGN: 20-35 GPM @ 40 PSI
AIR PR: 35-120 PSI @ 8-40 SCFM
MATERIAL: CAST IRON

2" PVC

LT 2401

SIGNAL TO 0700 RIO PANEL

T-2401

HV-2402 HV-2401

2" PVC

TO FILTER PRESS FEED PUMP | 13 | B 8

FILTER PRESS FEED TANK
T-2401
CONE BOTTOM
1400 GALLON CAPACITY
HDPE CONSTRUCTION

SUPPLIED LOOSE BY EVOQUA

DRAIN
(BY CUSTOMER)

Bennie L. Underwood
18FEB20

BENNIE L. UNDERWOOD
REGISTERED
No. 20451
STATE OF INDIANA
PROFESSIONAL ENGINEER

STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

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1,4-DIOXANE REMOVAL SYSTEM

CLIENT: de maximis
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	12 OF 14	5

FROM AIR COMPRESSOR | 12 | D 1

TO FILTER PRESS EFFLUENT PUMP | 14 | D 8

SIGNAL TO 0700 RIO PANEL

SV-1201

1200 SKID

HV-1203

HV-1204

HV-1202

PU-1201

HV-1201

FROM FILTER PRESS FEED TANK | 12 | B 1

FILTER PRESS FEED PUMP
MODEL: ARO
DESIGN: 20-35 GPM @ 40 PSI
AIR PR: 35-120 PSI @ 8-40 SCFM
MATERIAL: CAST IRON

1" PVC (FILTRATE)

1" PVC

TO FILTER PRESS EFFLUENT TANK | 14 | C 8

V-FP470-05

V-FP470-04

V-FP470-01

V-FP470-02

V-FP470-03

AIR BLOW DOWN MANIFOLD

JP-1-470

DUMPSTER

FILTER PRESS
CAPACITY: 1 CU.FT
EXPANDABLE TO 4 CU.FT
AIR BLOWDOWN MANIFOLD
25 SCFM AIR REQUIRED

Benn L Underwood
18FEB20

JENNIE L. UNDERWOOD
REGISTERED
No. 20451
PROFESSIONAL ENGINEER

STD: BORDER-0108-24X36D1

INTL REF:

BAR = 1" AT PLOT SCALE

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
-	SEE SHEET ONE					

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SCALE: NONE

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT: de maximis
ACTON, MASSACHUSETTS

evoqua WATER TECHNOLOGIES
WATER TECHNOLOGIES COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	13 OF 14	5

FROM AIR COMPRESSOR | 13 | D 1

SIGNAL TO 0700 RIO PANEL

SV-1301

1300 SKID

3/4" HV-1303

F-1301

HV-1304

PU-1301

1" HV-1302

1" HV-1301

1" 1.5"

1.5" 2" PVC

TO SYSTEM FEED TANK | 3 | C 8

RETURN TO BACKWASH WASTE COLLECTION TANK | 10 | D 5

FROM FILTER PRESS | 13 | C 1

1.5" PVC

FILTER PRESS EFFLUENT TANK
T-2501
FLAT BOTTOM
360 GALLON CAPACITY
HDPE CONSTRUCTION

FILTER PRESS FEED PUMP
MODEL: ARO
DESIGN: 10-20 GPM @ 25 PSI
AIR PR: 35-75 PSI @ 8-30 SCFM
MATERIAL: CAST IRON

Benn L Underwood
18FEB20

BENNIE L. UNDERWOOD
REGISTERED
No. 20451
STATE
PROFESSIONAL ENGINEER

REV	DESCRIPTION	DATE	DWN	CHKD	APVD	ECN
-	SEE SHEET ONE					

	DESIGNER	DATE
	ASB	05/11/18
	CHECKER	DATE
	AP	05/11/18
	ENGINEER	DATE
	ASB	05/11/18
	MANAGER	DATE
	KB	05/11/18

FILE: 1200/000999-9100.A.dwg
SCALE: NONE

TITLE: PROCESS AND INSTRUMENTATION DIAGRAM
1,4-DIOXANE REMOVAL SYSTEM

CLIENT: de maximis
ACTON, MASSACHUSETTS

EVOQUA WATER TECHNOLOGIES
WATER TECHNOLOGIES
COLORADO SPRINGS, CO
719-570-9600

PROJECT	CODE	DRAWING	SHEET	REV
1200/000999		9100	14 OF 14	5

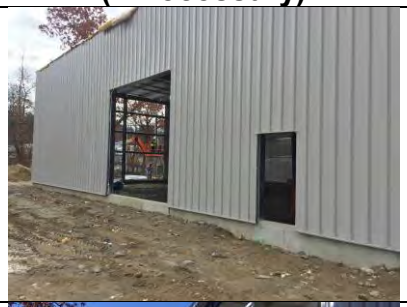
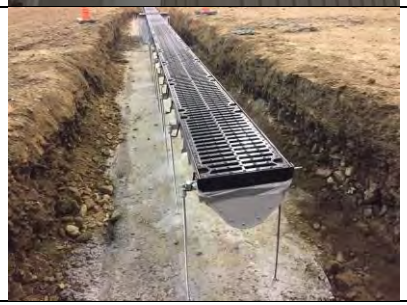
STD: BORDER-0106-24X36D1 | INTL REF: | BAR = 1" AT PLOT SCALE

Appendix G
EPA Inspection Punch List

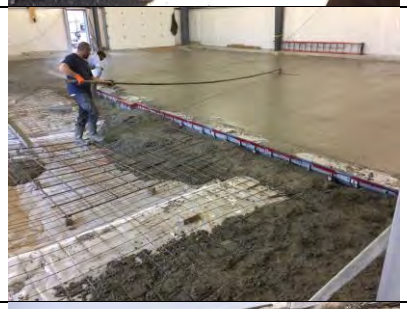
Nuclear Metals, Inc. Site -Concord, MA
Groundwater NTCRA - Draft Punch List of Activities Completed/To Complete
As of June 20, 2019

P.L. Item #	Area/Description	Photo Identification # (if necessary)	Date Added to "Punch List"	Date Completed
01	Confirm site layout with "call before you dig" and dig hole for foundation		Design Requirement	9/7/2018
02	Form foundation footings, place rebar, pour concrete, and take concrete samples. Also place GW piping penetrators.		Design Requirement	9/13/18
03	Form foundation walls, place rebar, pour concrete, and take concrete samples. Place column piers and frame bolting.		Design Requirement	9/21/18
04	Construct steel frame of building, with cross bracing, and correctly torqued bolts.		Design Requirement	10/8/2018

Nuclear Metals, Inc. Site -Concord, MA
Groundwater NTCRA - Draft Punch List of Activities Completed/To Complete
As of June 20, 2019

P.L. Item #	Area/Description	Photo Identification # (if necessary)	Date Added to "Punch List"	Date Completed
05	Place wall insulation and panels		Design Requirement	11/9/2018
06	Place roof insulation and panels		Design Requirement	11/7/2018
07	Place all exterior building trim		Design Requirement	11/18/2018
08	Place building trench drain and reinforce with rebar, and pour initial concrete		Design Requirement	11/29/2018

Nuclear Metals, Inc. Site -Concord, MA
Groundwater NTCRA - Draft Punch List of Activities Completed/To Complete
As of June 20, 2019

P.L. Item #	Area/Description	Photo Identification # (if necessary)	Date Added to "Punch List"	Date Completed
09	Adjust floor slab poring plan to pour entire slab first with thicker dug out portions at pad locations. This required the pad locations to be dug in the ground first.		11/27/2018	12/4/2018
10	Pour concrete slab including reinforce rebar at pad locations and slight slope down to trench. Also pour interior ramps		Design Requirement	12/17/2018
11	Pour exterior concrete ramps, including placing placed		Design Requirement	12/17/2018
12	Pour reinforced raised pads, with rebar throughout		Design Requirement	12/20/18

Nuclear Metals, Inc. Site -Concord, MA
Groundwater NTCRA - Draft Punch List of Activities Completed/To Complete
As of June 20, 2019

P.L. Item #	Area/Description	Photo Identification # (if necessary)	Date Added to "Punch List"	Date Completed
13	Build out indoor office space, including drywall and outlets.		Design Requirement	1/9/2019
14	Place LED overhead lighting in building		Design Requirement	1/7/2019
15	Place heating units in building		Design Requirement	1/10/2019
	Complete NMI building review to check aspects of building construction and notify Senate of issues with construction. The following issues were identified.		Design Requirement	1/17/19

Nuclear Metals, Inc. Site -Concord, MA
Groundwater NTCRA - Draft Punch List of Activities Completed/To Complete
As of June 20, 2019

P.L. Item #	Area/Description	Photo Identification # (if necessary)	Date Added to "Punch List"	Date Completed
16	Northeast ramp on building was not installed with correct thickness. Senate agreed and planned to remove and reinstall with correct specs. Pad re-installed in May 2019.		1/17/19	5/9/2019
17	Some steel frame bolts were found to be loose. Senate agreed, and builders returned to site and tightened bolts.		1/17/19	1/21/2019
18	It was noticed steel cabling holding frame in place seemed to be loose. Senate engineer investigated and confirmed they are correctly tensioned.		1/17/19	1/21/2019
19	Southwest interior insulation panels were disconnected. Senate agreed, and builders returned to fix insulation issue.		1/17/19	1/21/2019
20	It was discovered during a rain/snow storm that the roof of the building leaks. Discussions with Senate immediately began. After some investigation, they agreed to replace the roof in the spring. This was then completed in May 2019 over the course of one day.		1/24/19	5/6/2019
21	Install Tight tank (for building sanitary waste)		6/11/2019	N/A
22	Install fencing encompassing the whole property		6/11/2019	N/A
23	Pave property surrounding building		6/11/2019	N/A

Nuclear Metals, Inc. Site -Concord, MA
Groundwater NTCRA - Draft Punch List of Activities Completed/To Complete
As of June 20, 2019

P.L. Item #	Area/Description	Photo Identification # (if necessary)	Date Added to "Punch List"	Date Completed
01	Place all skids and tanks, including leveling and bolting all equipment.		Design Requirement	4/26/19
02	All piping installation completed; inlet, interconnecting, and outlet. Also check all piping is braced and supported, especially with flow.		Design Requirement	4/26/19
03	All loose electrical components are installed, and all equipment is wired per Evoqua's provided electrical drawings.		Design Requirement	4/26/19
04	Air lines are connected to compressor, to filter press, and to corresponding diaphragm pumps with correct solenoid valves.		Design Requirement	4/26/19
05	Piping and connections leak tested thought the system.		Design Requirement	4/26/19
06	Calibrate all chemical pumps and pH/ORP sensors		Design Requirement	4/26/19
07	Check network ethernet connection of remote panels to the main control panel.		Design Requirement	4/26/19
08	Review construction of system with Technical Component Placement and Photographic Documentation sheets for each piece of equipment.		Design Requirement	4/26/19
09	Test Setpoints and Alarms of the system for If/Then functionality.		Design Requirement	5/29/19
10	Noted that five alarms within the system are incorrect. Evoqua has been contacted, and are in process of making corrections		5/29/19	
11	Carbon Unit began to build pressure over time by filtering out manganese. Temporary solution was decided to place in 5-micron cartridge filters post chemical injection.		5/8/19	5/17/19
12	Evoqua's needs to add EW-1 transducer to the PLC		5/17/19	
13	System Optimization plan and tests. Plan submitted May 23, 2019. EPA comments received June 13, 2019. Revisions in progress.		5/23/19	

Nuclear Metals, Inc. Site -Concord, MA
Groundwater NTCRA - Draft Punch List of Activities Completed/To Complete
As of June 20, 2019

P.L. Item #	Area/Description	Photo Identification # (if necessary)	Date Added to "Punch List"	Date Completed
14	System still does not remove manganese. Added cartridge filters as temporary solution. Evoqua developed plan for permanent solution. Design modification submitted to EPA June 14, 2019.		5/31/19	

Appendix H
Chronology of Events

July 2016
July 11 – The AOC became effective, Groundwater NTCRA Trust Agreement submitted for EPA approval, Groundwater NTCRA Trust Agreement approved by EPA
July 12 -The identity of and associated qualifications of the General Contractor and Project Coordinator were provided to EPA.
July 13 - Requested EPA approval of the "Extraction Well Installation and Pump Test Work Plan submitted under the RI/FS AOC and approved by EPA on June 12, 2016 as the "Pre-Design Investigation (PDI) Work Plan" required to be submitted pursuant to the Groundwater NTCRA AOC.
July 15 - EPA approves PDI Work Plan.
July 15 – Entered into agreement with Acton Water District for access to 16 Knox Trail to conduct Groundwater NTCRA work.
July 25 - Mobilized and began monitoring well and pilot boring drilling in accordance with the PDI Work Plan.

August 2016
August 31 - Onsite meeting with the Agencies, Community Groups, and Acton Water District to discuss status and schedule of work.
Month of August - Continued PDI investigation.

September 2016
Week of September 12 - Installed extraction well (EW-1) and monitoring well MW-45SD.
Week of September 12 – Performed pumping "step-test" on EW-1.
Week of September 26 – Performed pump test of EW-1.

October 2016
October 26 – On-site meeting with EPA, MassDEP, and subcontractors to discuss Remediation General Permit equivalency requirements for discharge to river, treatment options, and status of groundwater work.
Month of October – Analyzed pump test data, started development of MODFLOW groundwater flow model.

November 2016
November 17 – On-site meeting with AWD, EPA and MassDEP to provide an update on work progress and address any questions they have moving forward.
Month of November – Redeveloped EW-1, resulting in yield of 20 gallons per minute (gpm). Continued model development.

December 2016
December 21 – Submitted PDI Evaluation Report for pump-test.
Month of December - Shipped pump-test water for off-site disposal, cleaned and demobilized seven frac-tanks used to contain pump-test water. Continued to develop 100% Temporary Design for the temporary groundwater treatment system and coordinate with the Town of Action on possible discharge points. Started development of draft Removal Design Work Plan (RDWP) and supporting Project Operations Plan. Continued MOD-FLOW model calibration to pump test results.

January 2017
January 19 – On-site meeting with EPA, MassDEP and community groups to present findings from the MOD-FLOW model and provide a status update.
January 26 - Submitted the "100% Temporary Design- Temporary System".
Month of January - Continued drafting the RDWP. Started negotiations with AWD for long-term lease of part of 16 Knox Trail property (on which the groundwater treatment system will be located). Began procurement and initial assembly of the Temporary Groundwater Treatment System. Installed monitoring well cluster MW-46 approximately 100 feet east of Assabet 1A to further delineate the extent of the plume.

February 2017
February 2 – Submitted Treatability Study Work Plan (TSWP).
February 15 – On-site meeting with EPA and MassDEP to introduce the new Remedial Project Manager.
Month of February – Continued lease negotiation. Continued procurement and initial assembly of the Temporary Groundwater Treatment System; received the piping and manholes necessary to install outfall to river.

March 2017
March 15 - Submitted the revised 100% Design Report for the Temporary Groundwater Treatment System (TGTS).
March 24 - Participated in webinar with EPA, MassDEP and Geosyntec to discuss the status and findings of the MODFLOW Model as recalibrated with MW-46 data.
Month of March - Continued lease negotiations. Continued drafting RDWP. Redesigned outfall to address comments received from MA NHESP on March 13. The re-worked design removed the presence of gabion baskets and replaced them with riprap to limit the effects the outfall may have on benthic species habitat.

April 2017
April 3 - Submitted Responses to Comments and revised PDI Evaluation Report for Aquifer Pump Test.
April 5 - Submitted Responses to Comments and revised TSWP.
Month of April - Continued lease negotiations. Continued drafting RDWP. Participated in a meeting with WR Grace Acton site representatives to present the status and preliminary findings from the MODFLOW Model. Started installing TGTS. Components installed in April included:

- Treatment system shed
- Manholes for EW-1 and the discharge line to the outfall location
- Outfall system
- Extraction well pump

May 2017
May 1 - Received approval of the TSWP.
Week of May 1- Installed transducers in 13 locations to gather hydraulic monitoring data. Performed initial groundwater sampling campaign including 31 wells and 3 surface water locations.

May 15 - Executed lease with AWD for portion of 16 Knox Trail.
May 15 – Submitted Responses to Comments and revised PDI Report.
May 23 – Started TGTS operation.
May 25 – Participated in public information meeting at Acton Town Hall.
Month of May - Completed TGTS installation. Work completed during May includes:

- Installation of the discharge line that crosses the underground Eversource Line.
- Programming of the PLC to monitor and maintain flows.
- Connection to electrical service.
- Completed pre-start up procedures (system hydration, bump test, etc.)

June 2017
June 23 – Submitted RDWP for agency review.
June 26 – Initiated Treatability Study.
June 27 – Submitted Emergency Response Plan for AWD.
June 30 – Submitted a request for groundwater sampling plan modifications.
Month of June – Continued TGTS operation at 20 gpm.

July 2017
July 11 – Replaced TGTS granular activated carbon (GAC).
Week of July 10 - Performed a hydraulic monitoring and groundwater sampling event in accordance with the approved TGTS 100% design report.
July 18 - Submitted MODFLOW model development report.
July 24 -Received comments on the request for modifications to the groundwater sampling plan. Participated in a meeting with WR Grace Site representatives to the discuss the MODFLOW model.
Month of July - Continued TGTS operation at 20 gpm

August 2017
August 23 – Abandoned monitoring well OW-1, following EPA approval of request submitted on August 14.
Month of August - Continued TGTS operation at 20 gpm. Continued Treatability Study.

September 2017
September 8 - Submitted Pilot Test Summary memorandum summarizing results of Treatability Study.
September 26 - Participated in a site meeting with EPA and MassDEP to discuss Treatability Study results and recommendation to select the Vanox™ system.
Month of September - Continued TGTS operation at 20 gpm

October 2017
October 26 - Participated in an on-site meeting with EPA, MassDEP, and the Community Groups to provide an update on the status of the temporary groundwater treatment system, results of the Treatability Study, and the next steps in the design/construction of the final system.
Month of October - Continued TGTS operation at 20 gpm. Completed a Pilot Test of iron pre-treatment to reduce iron concentrations in influent of Vanox Unit

November 2017
November 13 – Provided Responses to Comments received on September 22 and revised RDWP.
Month of November - Continued TGTS operation at 20 gpm. Collected samples from system influent and the Assabet River for sulfate analysis. Installed and surveyed a staff gauge and piezometer in both Muskrat and Turtle Ponds.

December 2017
December 12 - Changed out TGTS GAC. Pulled EW-1 pump re-wired it to correct pump malfunction.
December 19 - Re-developed EW-1 on December 19 to increase capacity.
Month of December - Surveyed wetlands and benchmarks to assist in final mark out of leased area. Continued TGTS operation at 20 gpm

January 2018
January 12 - Submitted 90% Treatment System Removal Design to the Agencies.
Month of January - Continued TGTS operation at 20 gpm

February 2018
February 23 – Replaced TGTS GAC.
Month of February - Continued TGTS operation at 20 gpm

March 2018
March 9 – Provided further Responses to Comments and revised RDWP.
Month of March - Continued TGTS operation at 20 gpm. Met with representatives from the WR Grace Site to discuss the Groundwater Model and respond to remaining questions on calibration criteria.

April 2018
April 17 – Submitted the 95% Treatment System Removal Design and Responses to Comments received February 9 on 90% Removal Design.
April 20 – Submitted Responses to Comments received on December 11, 2017 and final Treatability Study Report.
Month of April - Continued TGTS operation at 20 gpm

May 2018
May 31 – Replaced TGTS GAC.
Month of May - Continued TGTS operation at 20 gpm

June 2018
June 18 – 20 – Redeveloped EW-1.
Month of June- Continued TGTS operation at 20 gpm

July 2018
July 30 – Submitted final RDWP in response to comments on FSP/QAPP received on June 15.

July 30 – Submitted Responses to Comments on 95% Removal Design and 100% Removal Design for Treatment System. 100% RD notes that equipment procurement will proceed in parallel with design finalization.
Month of July - Continued TGTS operation at 20 gpm. Completed excavation of test-pits for constructability analysis associated with foundation design. Installed bollards around monitoring wells on the AWD property to protect wells during future solar development.

August 2018
August 21 – Submitted 100% Removal Design for Treatment Building.
August 22 – Replaced TGTS GAC.
August 29 – Received approval to commence work on treatment building foundation.
August 31 – Received EPA's approval of the RDWP.
Month of August - Continued TGTS operation at 20 gpm

September 2018
Month of September - Continued TGTS operation at 20 gpm. Construction of the permanent Treatment Building began on September 6. Work completed relevant to the building includes:

- Received construction equipment on Sept. 4.
- Received the building materials on Sept. 18.
- Completed installation and backfilling of the foundation.
- Performed air monitoring procedures during the excavation, foundation and backfilling work.

October 2018
October 23 – Submitted Responses to Comments received on September 11, and final 100% Removal Design for Water Treatment Building.
Month of October - Continued TGTS operation at 20 gpm. Construction of the permanent Treatment Building continued. Work completed relevant to the building included:

- Completed erection of the building's steel frame on October 5, 2018
- Completed installation of the southern and western walls, began installation of the northern wall.
- Placed the waterline, subgrade, from the building to the road. Final tapping of the water line was pending Acton Water District approval.

November 2018
November 11 – Received EPA approval of 100% Removal Design – Water Treatment Building.
November 28 – Provided Responses to Comments received November 11 and final 100% Removal Design – Treatment System.
Month of November - Continued TGTS operation at 20 gpm. Construction of the permanent Treatment Building continued. Work completed relevant to the building included:

- Completed installation of all insulation and wall panels.

- Completed installation of roof.
- Eversource provided the temporary electric service.
- Installed overhead doors and man-doors.
- Installed the mud-slab and placed the trench-drain.
- Completed installation of water service.

December 2018

December 12 – Received EPA approval of 100% Removal Design Final Treatment System.

Month of December - Continued TGTS operation at 20 gpm. Construction of the permanent Treatment Building continued. Work completed relevant to the building included:

- Completed all work associated with the building erection.
- Completed concrete work - trench drain, slab foundation, equipment pads and ramps.
- Began build out of the office and bathroom areas; rough electrical and plumbing completed.
- Completed installation of overhead door motor and chain drives.

January 2019

Month of January - Continued TGTS operation at 20 gpm. Construction of the permanent Treatment Building continued. Work completed relevant to the building includes:

- de maximis noted a deficiency in the roof which will be remedied in the spring.
- Continued build out of the office and bathroom areas; rough electrical and plumbing completed.
- Completed installation of overhead door motors and chain drives.
- Completed installation of propane service and split heaters.

Construction of the permanent Treatment System began. Work completed relevant to the new system includes:

- Placed all major treatment system components in the building.
- Began plumbing equipment together and running electrical wiring to select components.

February 2019

Month of February – Continued TGTS operation at 20 GPM. Construction of the permanent Treatment System continued. Work completed relevant to the new system includes:

- Eversource installed permanently power
- All tanks installed and plumbed
- Completed electrical installation to equipment
- Evoqua was on site to review electrical installation and begin programming the PLC.

March 2019
March 5 – Replaced GAC in TGTS.
March 6-8 – Redeveloped EW-1.
March 18-26 – Shut down TGTS for tie-in of EW-1 to final system and final system start up. Re-started TGTS on March 26 to continue groundwater capture during final system start up, operational testing and troubleshooting.
Month of March - Continued TGTS operation at 20 gpm.

April 2019
April 9 – 12 - The building construction contractor, Senate, replaced the roof of the Treatment Building between April 9-April 12. This was performed at no cost as a warranty claim.
Month of April - Continued efforts were focused on troubleshooting system issues and optimizing system effectiveness. A summary of troubleshooting operations includes:

- Continued PLC Programming and setup and adjustments.
- Repeated backwash and chlorine dosing of the DMI-65 media to reduce manganese concentrations downstream of the triplex media. Cleaning of fouled system components that resulted from the presence of sediments.
- Adjusted lamps to maintain high efficiencies.
- Identified air in the reaction chambers that resulted in overheating of lamps. Routine maintenance now incorporates off-gassing of chambers on a regular basis.

April 24 – Started Final System operation.

- Day 1 Samples were recollected on April 24.
- Day 3 Samples were collected on April 26.
- Day 7 Samples were collected on April 30.
- Sample results indicate that the Vanox Unit was removing 1,4-dioxane concentrations to non-detectable levels.

May 2019
May 16 – Replaced final system GAC.
Day 14 samples were collected on May 7.
Day 21 Samples were collected on May 20.
Month 1 samples were collected on May 28.
Month of May – Operated Final System at 20 gpm. Additional work included:

- Completed testing alarms and switches.
- Installed cartridge filters downstream of the Vanox break tank to remove manganese particles prior to carbon vessels.

Discussed the potential installation of a production well at the Valley Sports Arena for non-contact cooling water. As follow up, completed low-flow sampling of the MW35 Cluster on May 21 and a specific capacity pump test at MW-S35 and MW-SD35 on May 22.

June 2019
June 14 – Submitted design change to add pH adjustment prior to DMI-65 media filtration to improve manganese removal.
June 19 – EPA approved design change.
June 20 – Performed Construction Completion Inspection with EPA and MassDEP. This inspection started the "Shakedown Period" described in the AOC.
June 21 – Submitted Optimization Plan to test UV levels and persulfate dosing.
Month of June - Operated Final System at 20 gpm.

July 2019
July 2 – Received approval of Vanox Optimization Plan.
July 22 - Received EPA approval of O&M Plan.
Month of July - Operated Final System at 20 gpm.

August 2019
August 19 - Replaced a Vanox Lamp driver and investigated condition insides the reactors.
August 21 – Redeveloped EW-1.
August 29 - Completed testing of the NaOH dosing prior to the DMI-65 Media vessels. Results indicate that dosing prior to the vessels was effective at removing manganese.
Month of August - Operated Final System at 20 gpm.

September 2019
Month of September - Operated Final System at 20 gpm.

October 2019
October 18 - Completed installation of new NaOH dosing skid.
Month of October - Placed tight tank in leased area of 16 Knox Trail. Operated Final System at 20 gpm.

November 2019
Month of November - Completed installation of tight tank. Completed the comprehensive groundwater sampling event between November 11-20, 2019, totaling 130 monitoring wells. Operated Final System at 20 gpm.

December 2019
December 6 – Remedial Design / Remedial Action (RD/RA) Consent Decree (CD) in connection with Civil Action No. 1:19-cv-12097-RGS entered by United States District Court for the District of Massachusetts, Eastern Division.
December 11 – Submitted "Groundwater NTCRA Summary of On-Going Work" pursuant to Paragraph 10.c.(1) of the CD.
December 23 – Installed automatic gas bleed valves on Vanox reactors. These valves should prevent gas build up that causes high-temperature alarms and system shutdowns.
Month of December – Initiated Optimization Study. Operated Final System at 20 gpm.

January 2020
January 24 – Received EPA request for Final Groundwater NTCRA Report.
Month of January – Continued Optimization Study. Operated Final System at 20 gpm.

February 2020
February 13 – Submitted Optimization Report.
Month of February - Operated Final System at 20 gpm.

March 2020
March 16 – Submitted Responses to Comments received February 25 and revised Optimization Report.
March 16 – EPA approves Optimization Report. This approval completed the "Shakedown Period" described in the AOC.
Month of March - Operated Final System at 20 gpm.

Appendix I
Groundwater 1,4-Dioxane Trend Graphs

Note – concentration scales vary.

Designations indicate wells that monitor, respectively:

"S" = shallow overburden

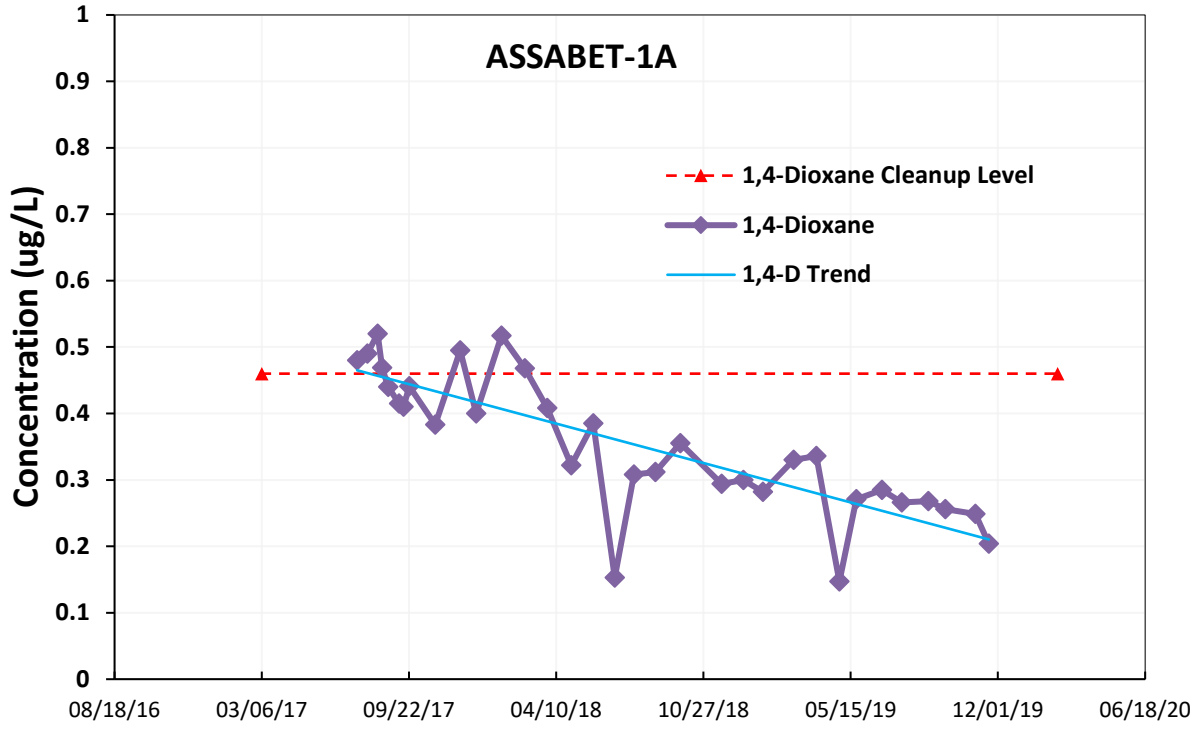
"SM" = middle overburden

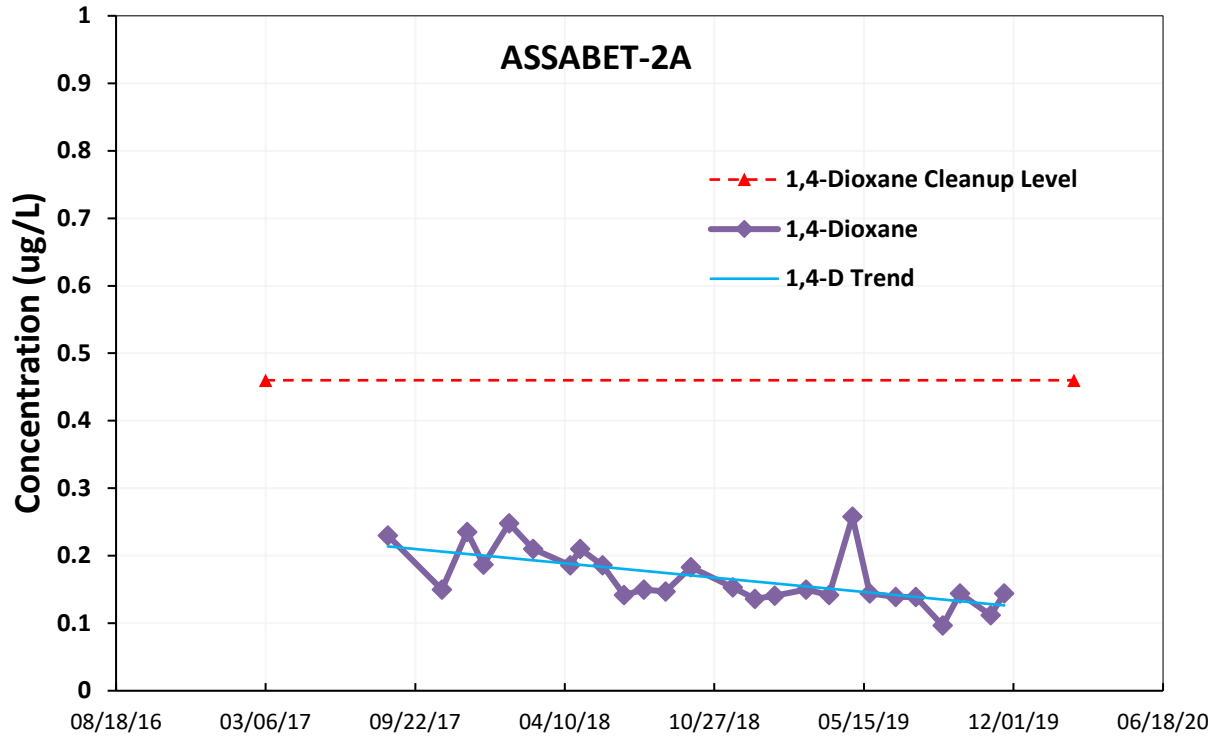
"SD" = deep overburden and

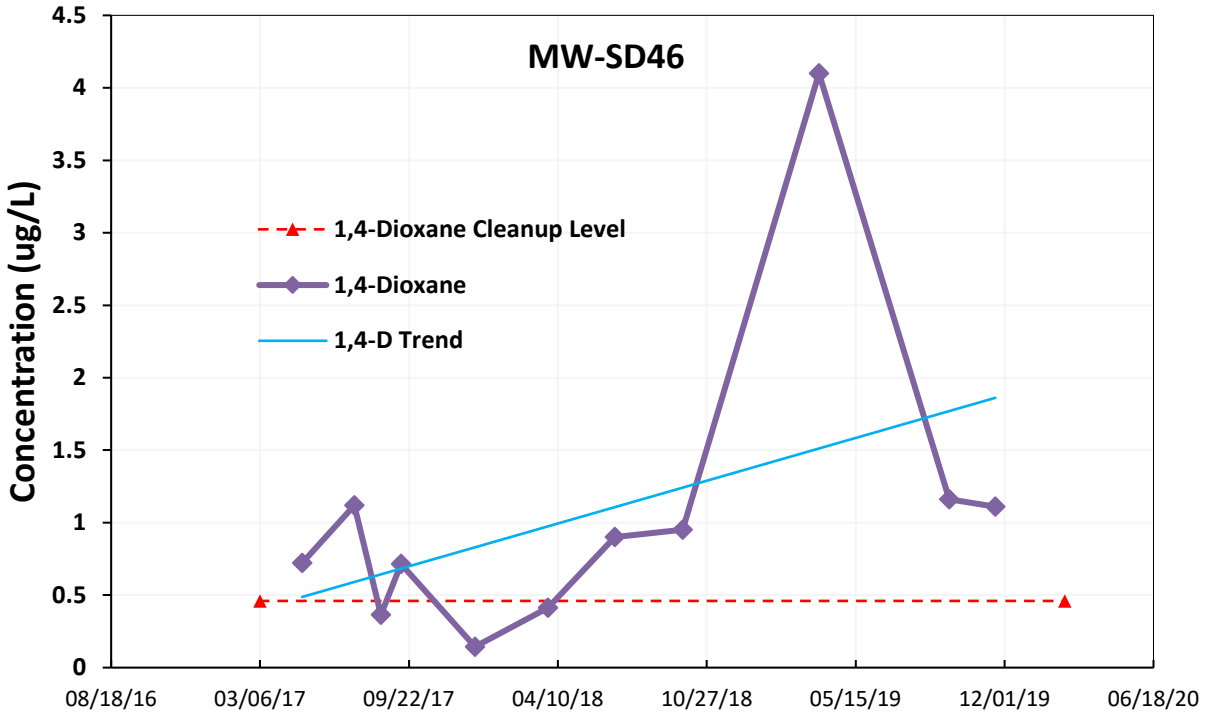
"BS" = shallow bedrock

Trend lines are linear.

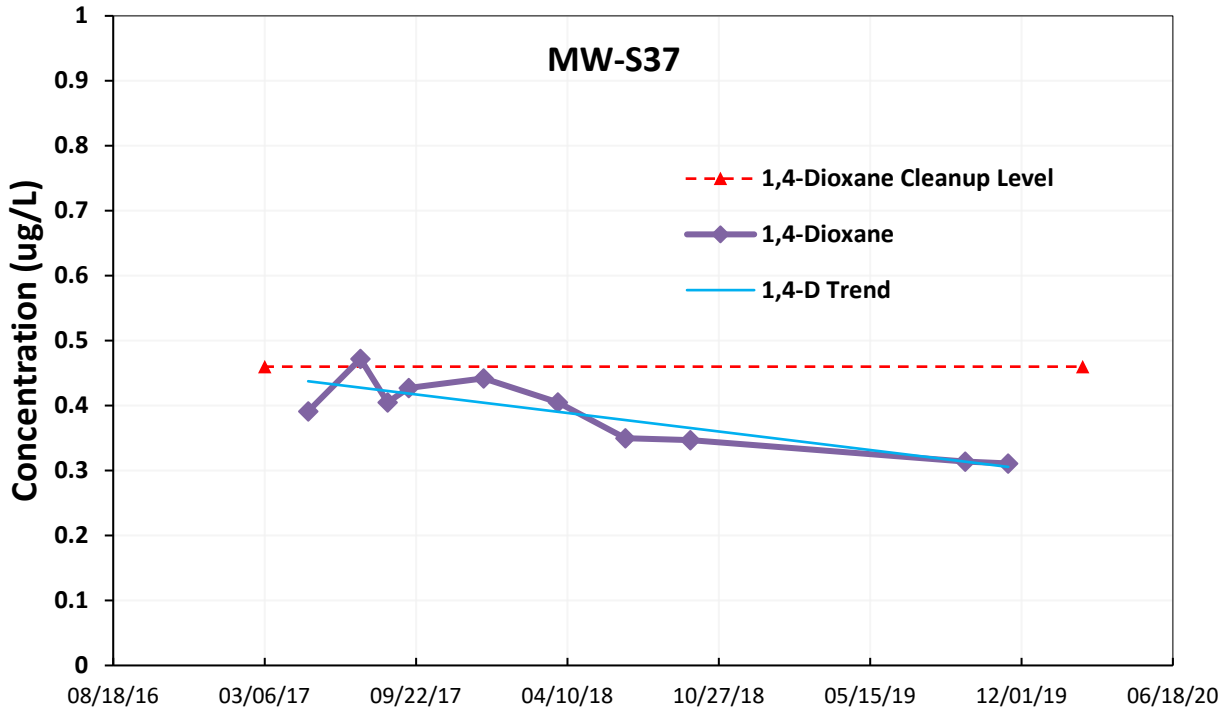
Assabet Production Wells and Immediate Vicinity

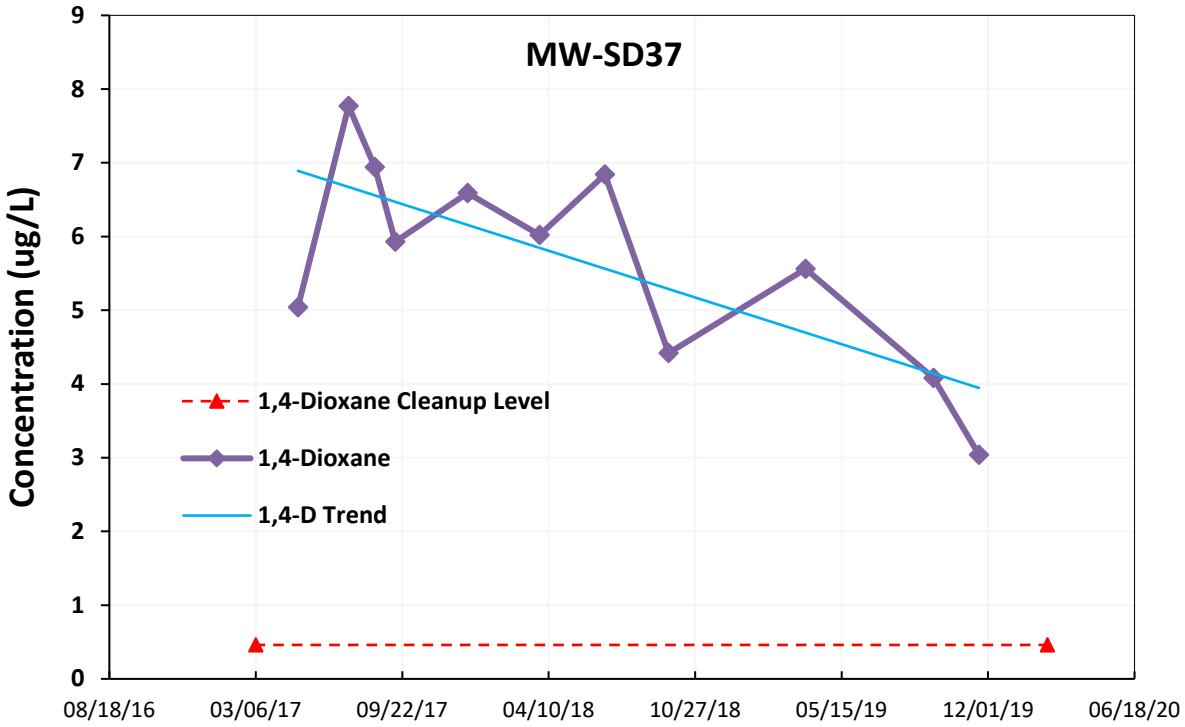


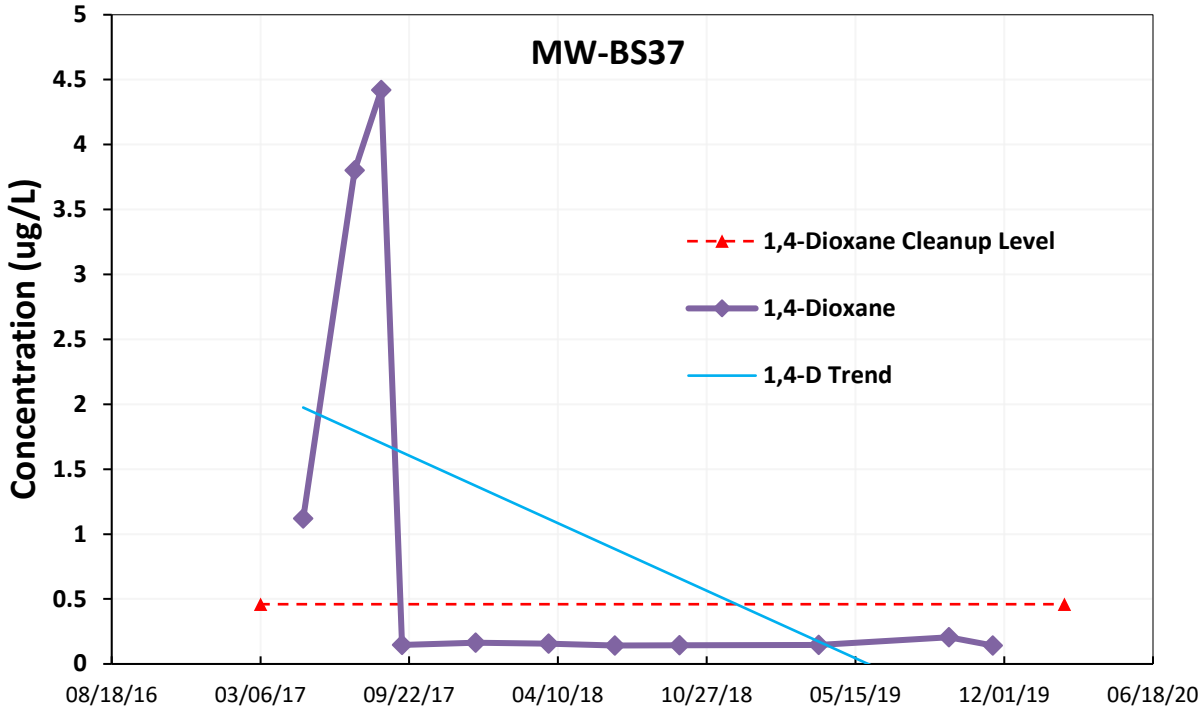


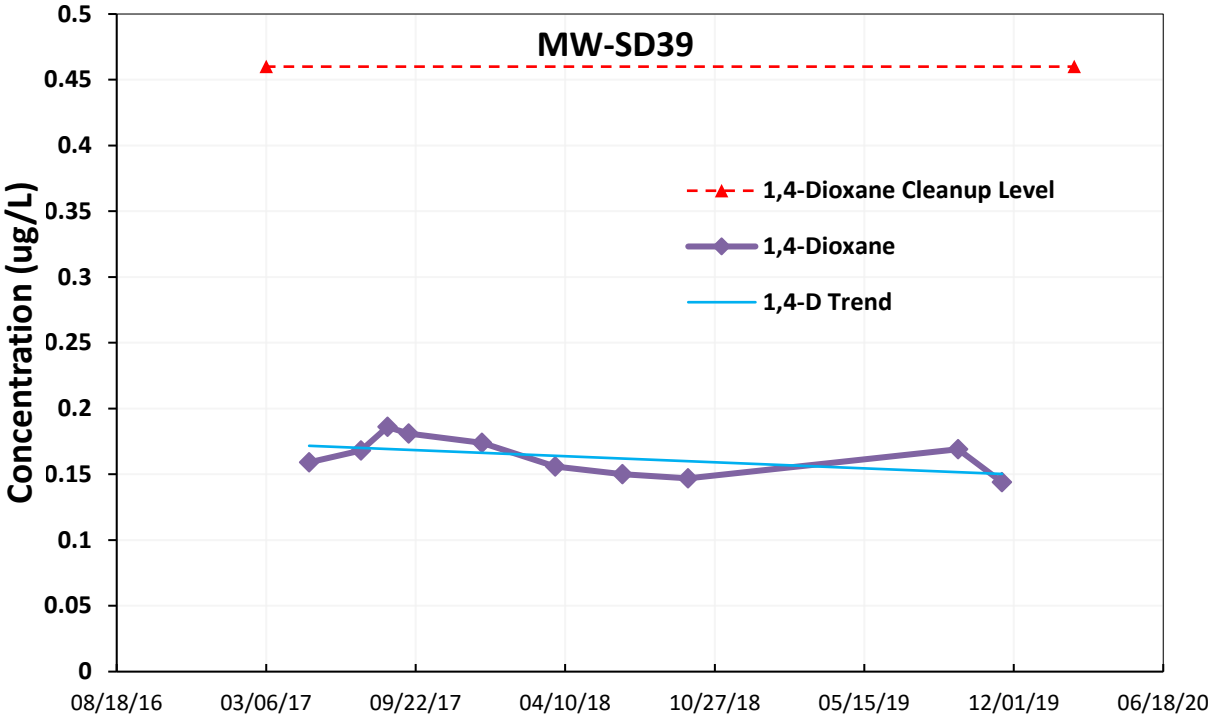


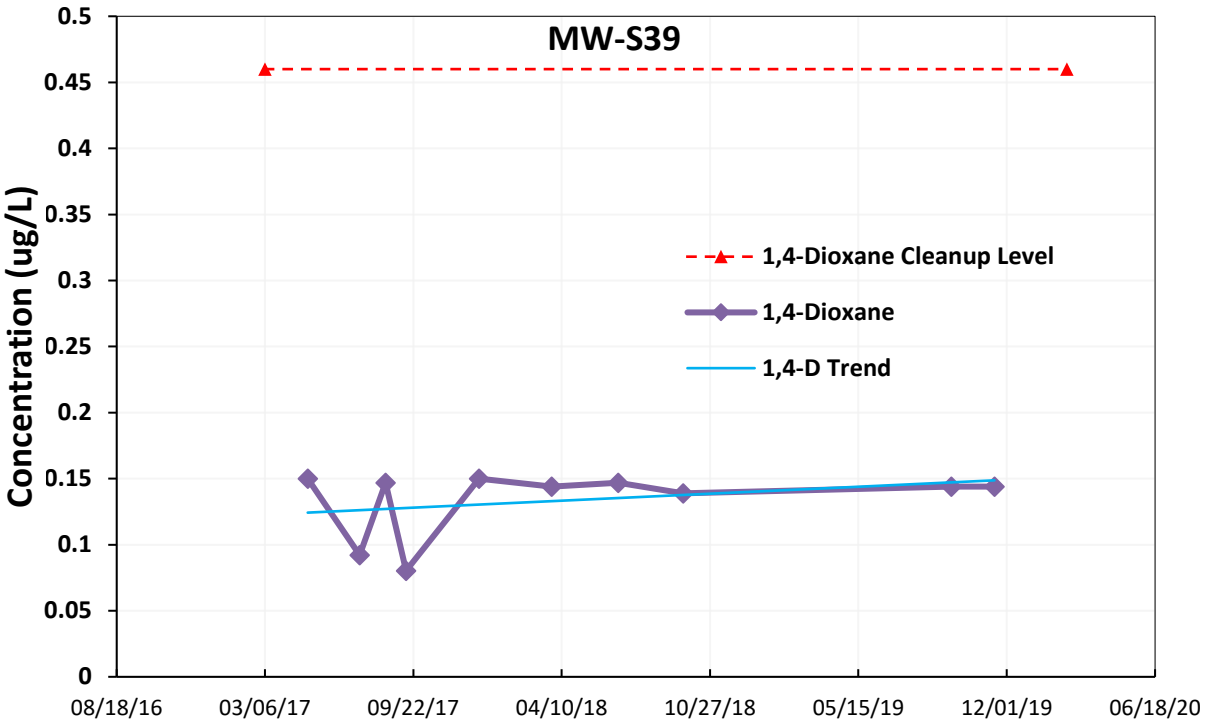
Wells in Area Between Assabet Production Wells and EW-1 Capture Zone (37 Cluster is middle, 39 Cluster to south)

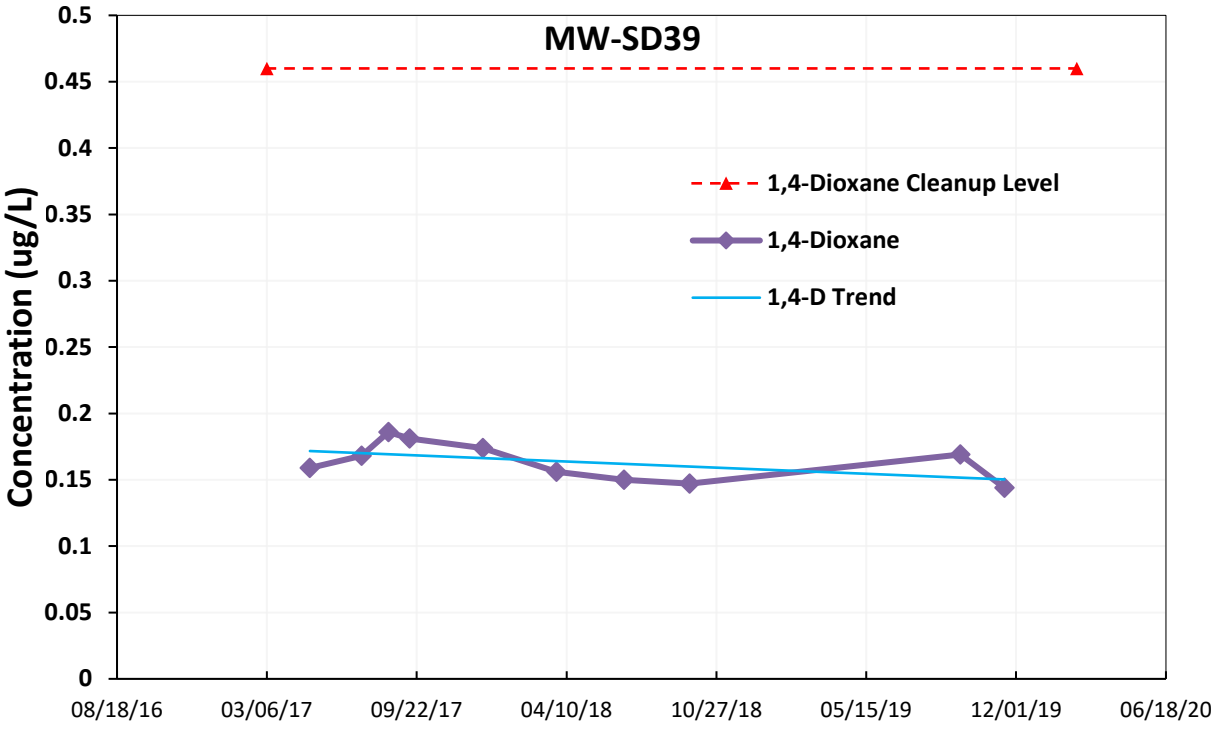


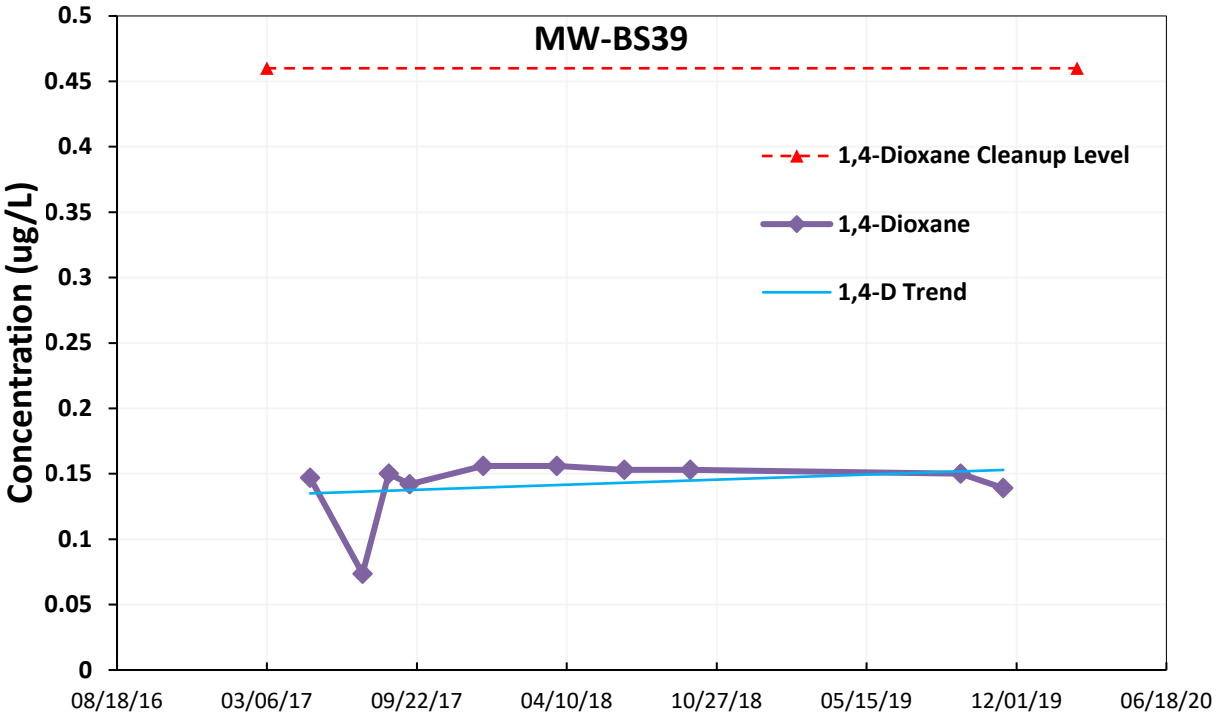

MW-SD37
Concentration (ug/L)
0
1
2
3
4
5
6
7
8
9
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend


MW-BS37
Concentration (ug/L)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend

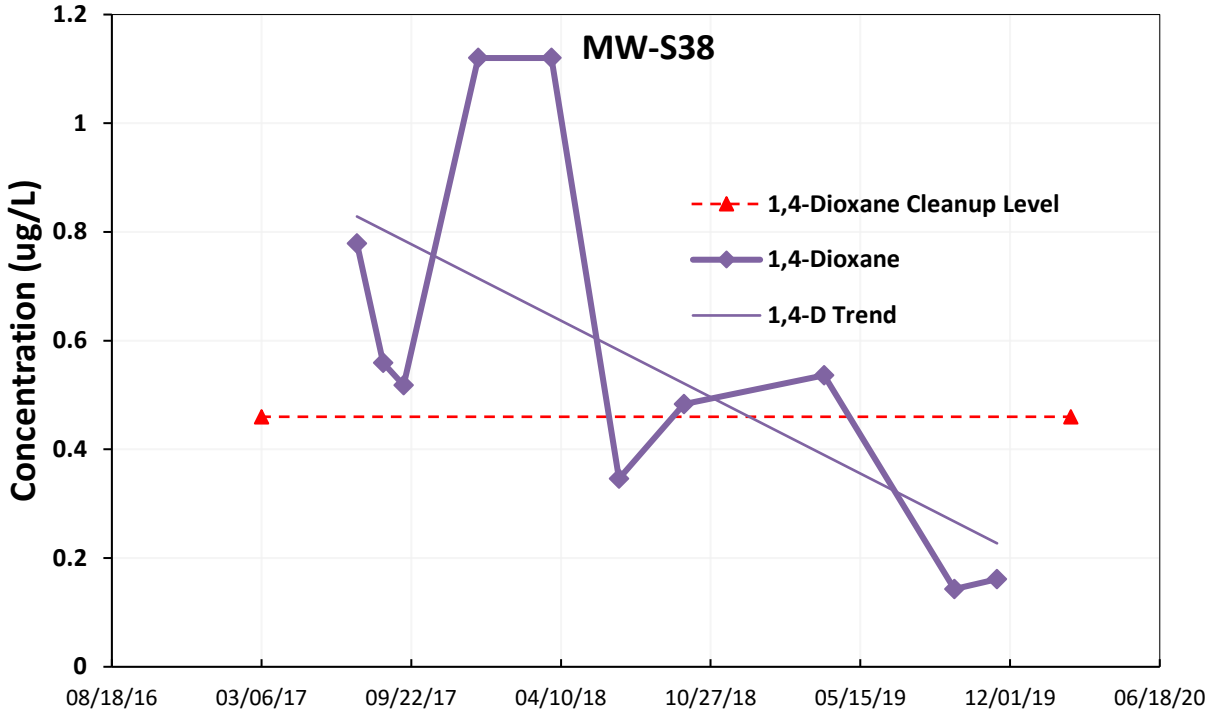

MW-SD39
Concentration (ug/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend

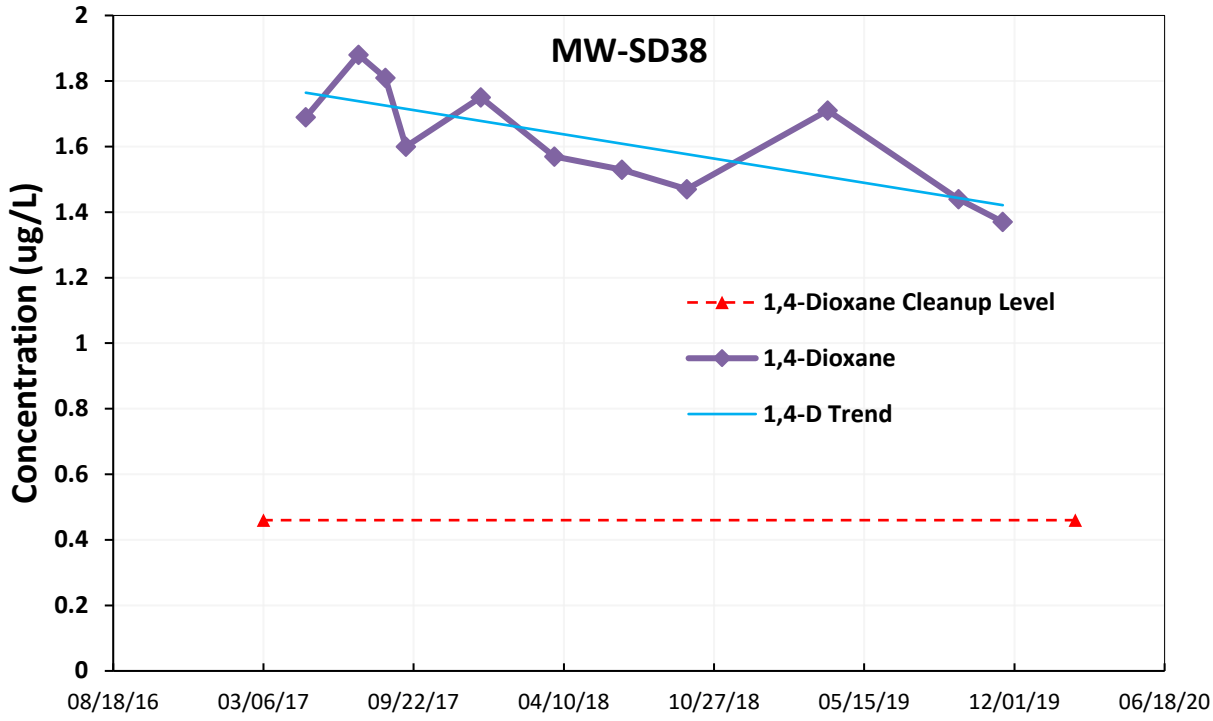

MW-S39
Concentration (ug/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend

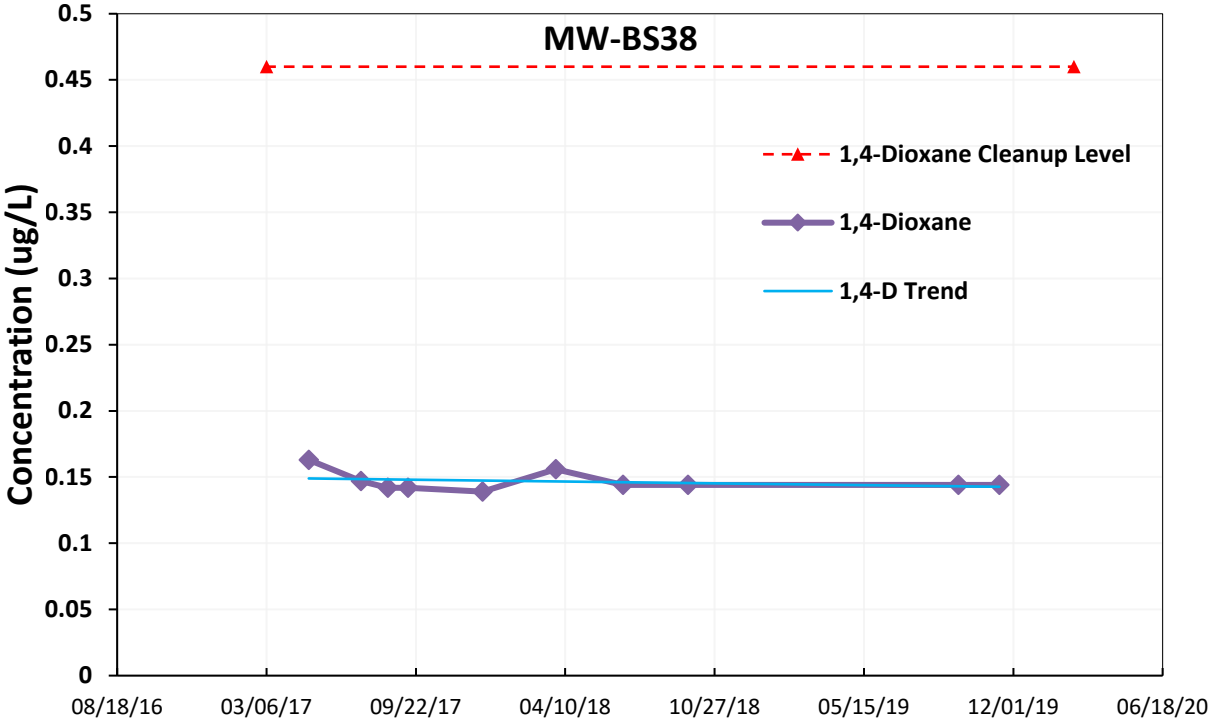

MW-SD39
Concentration (ug/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend


MW-BS39
Concentration (ug/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend

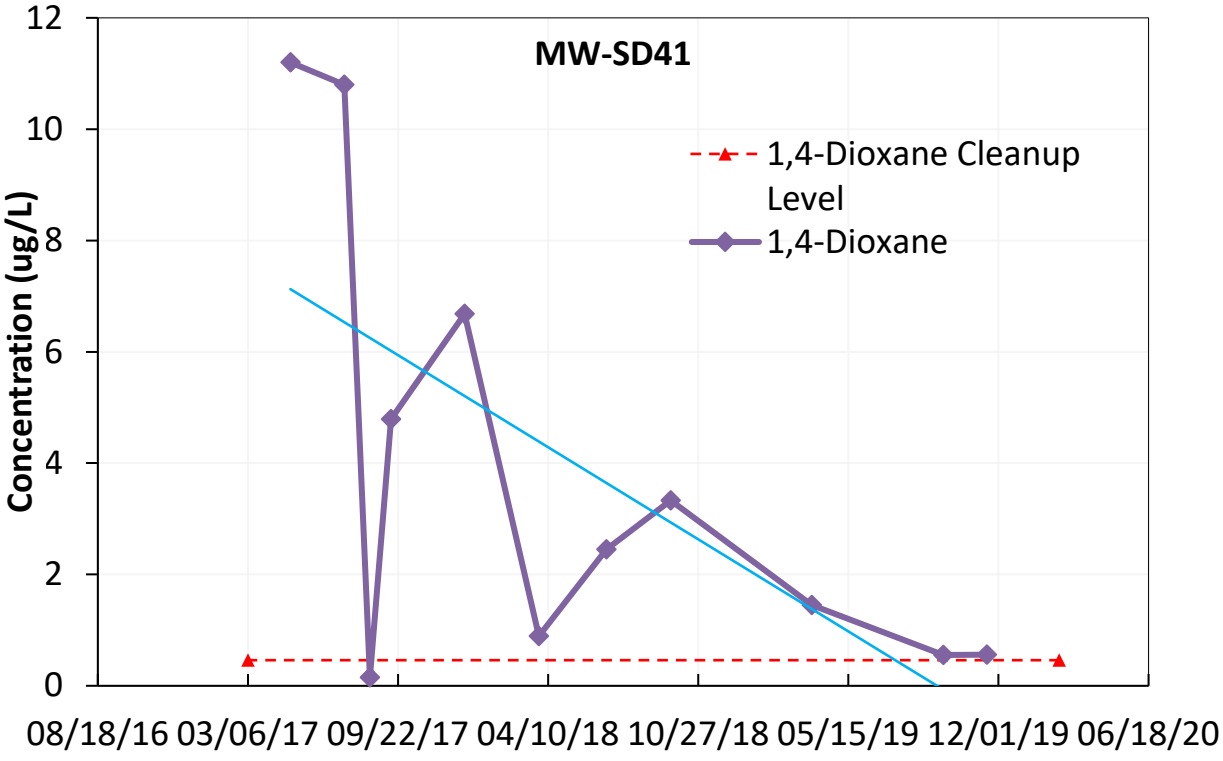
Wells in Area between Assabet Production Wells and EW-1 Capture Zone (38 cluster is to north)

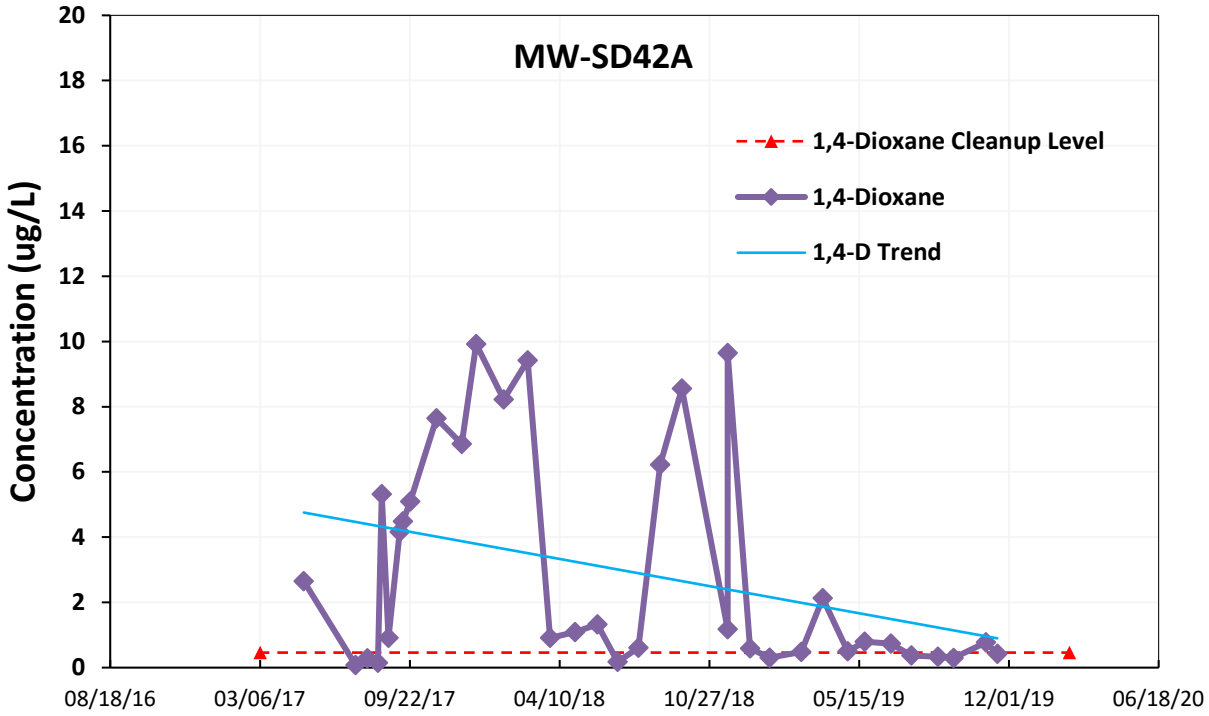


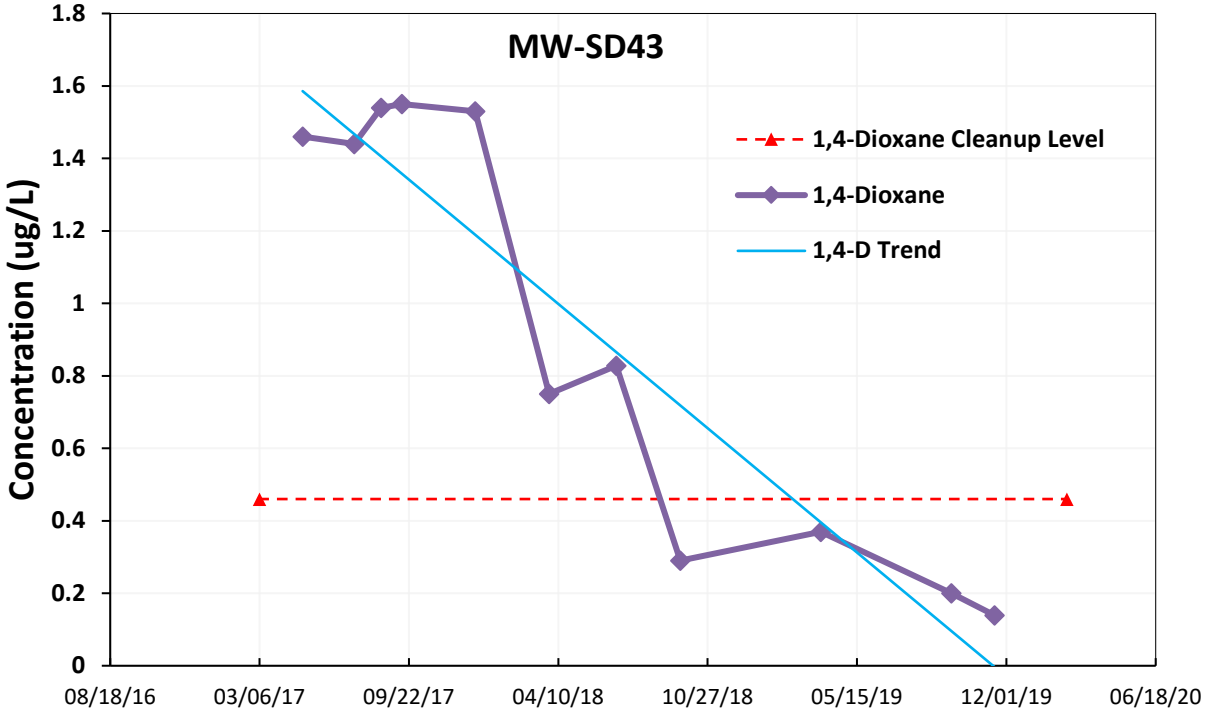


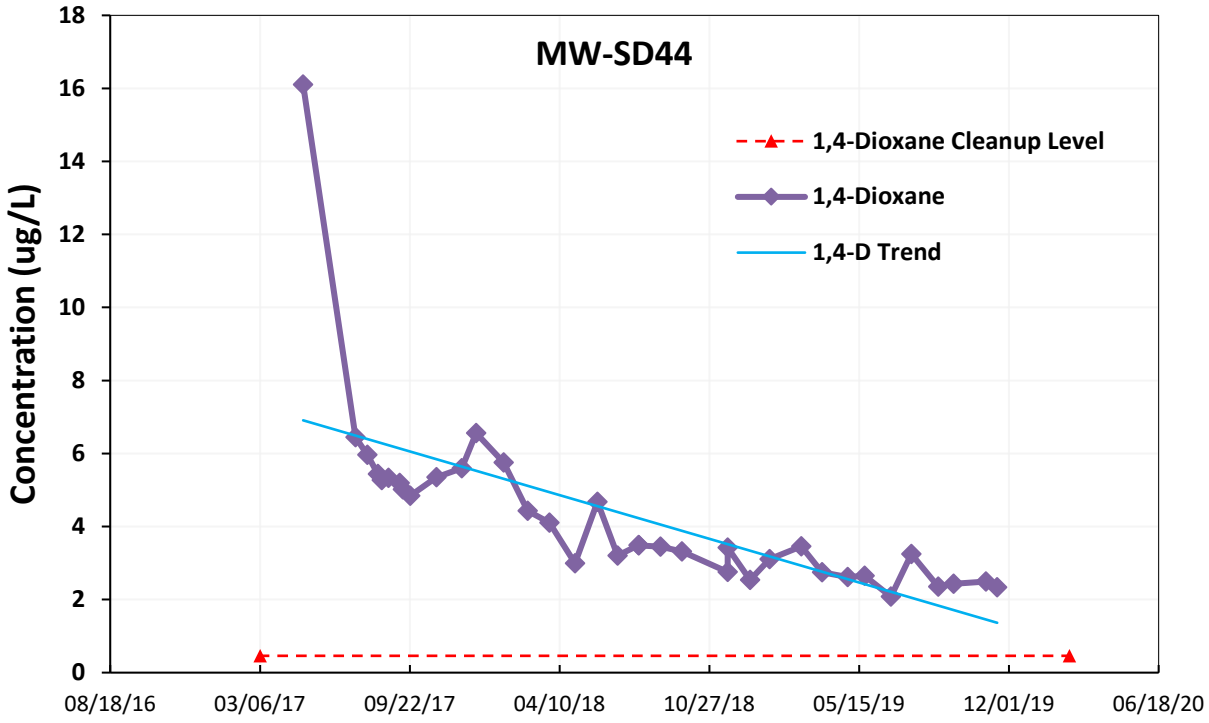


Wells in the immediate vicinity of the Capture Zone

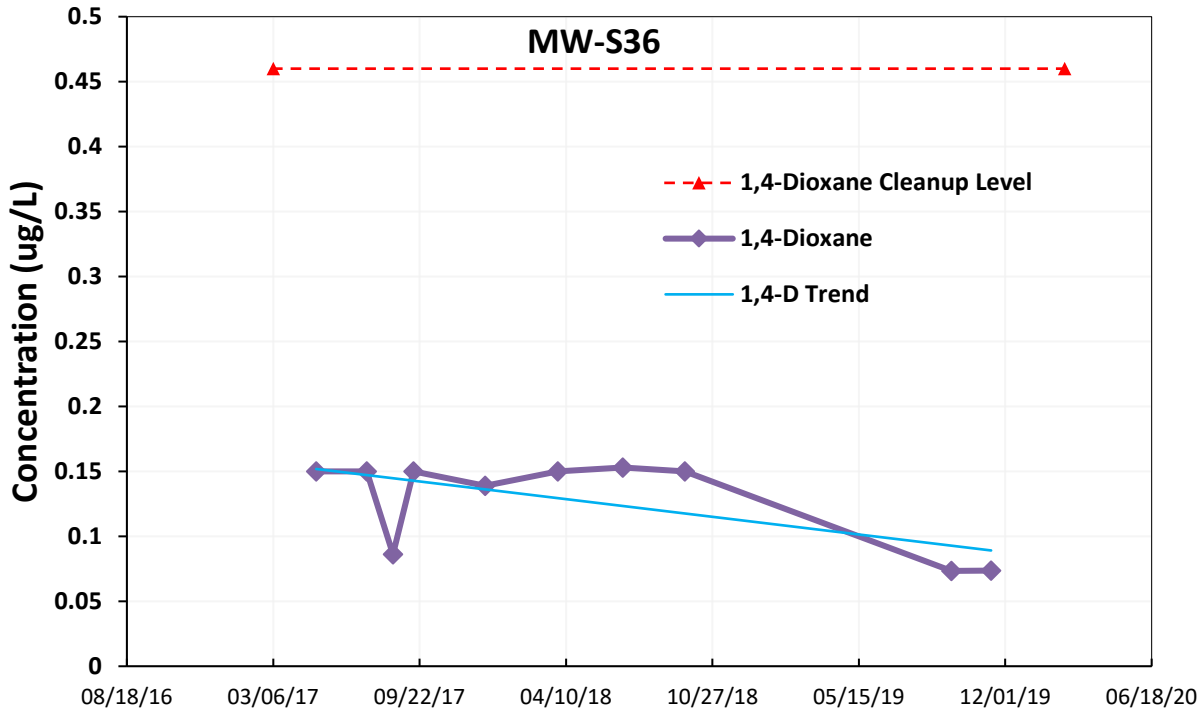


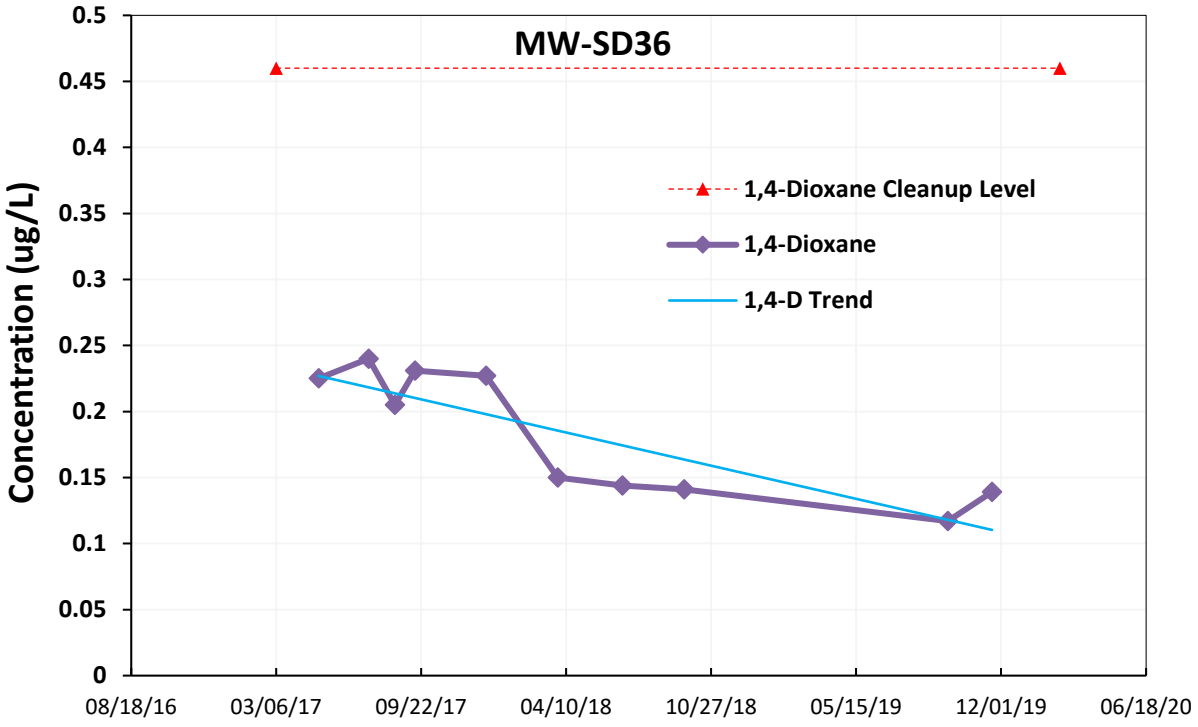

MW-SD42A
Concentration (ug/L)
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend
0
2
4
6
8
10
12
14
16
18
20
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20

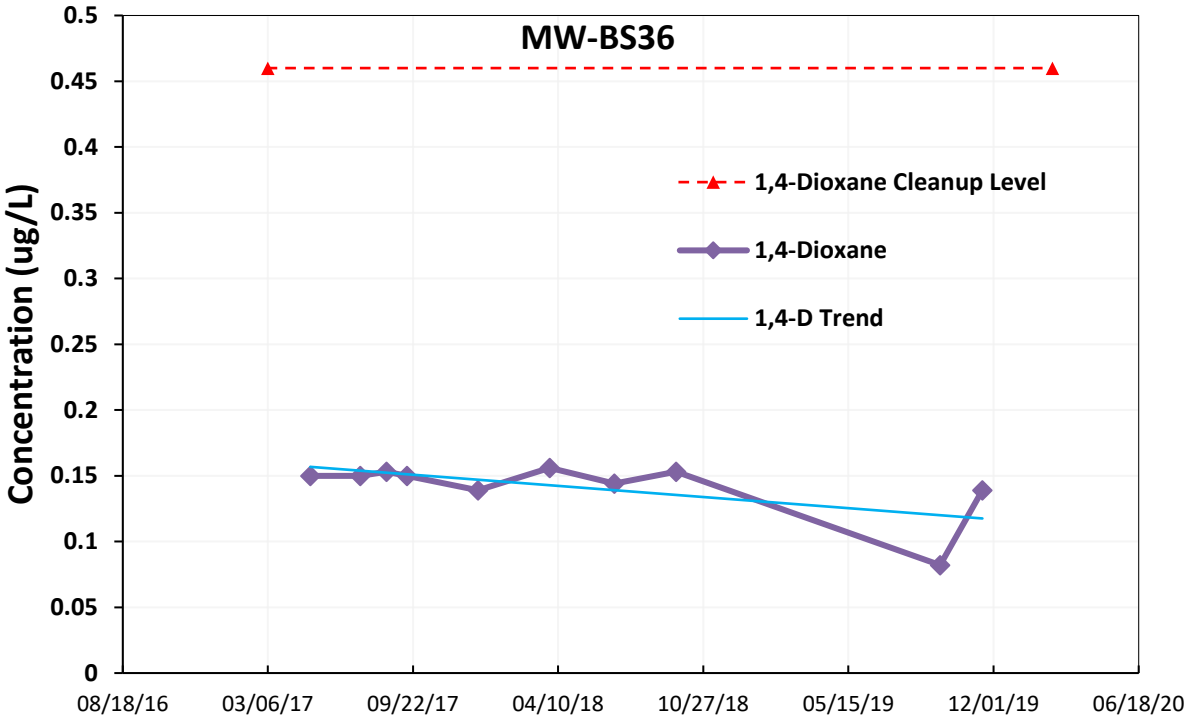

MW-SD43
Concentration (ug/L)
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20



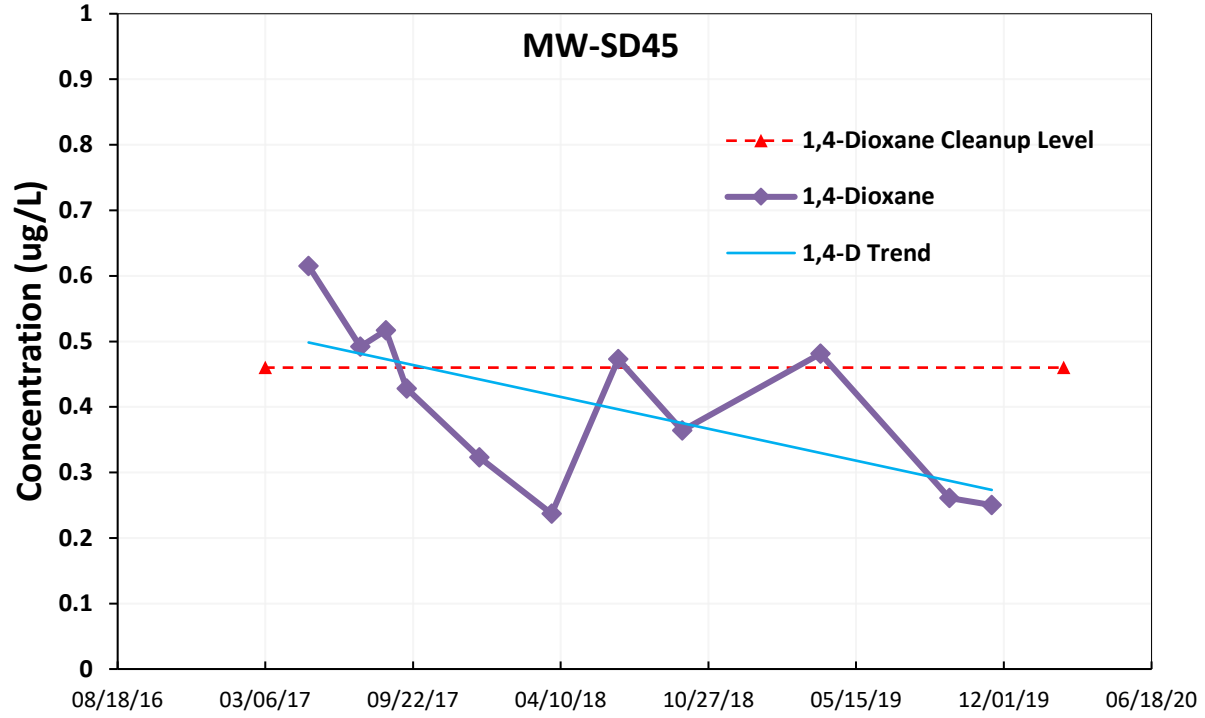
Wells downgradient of EW-1 Capture Zone, to south of plume.

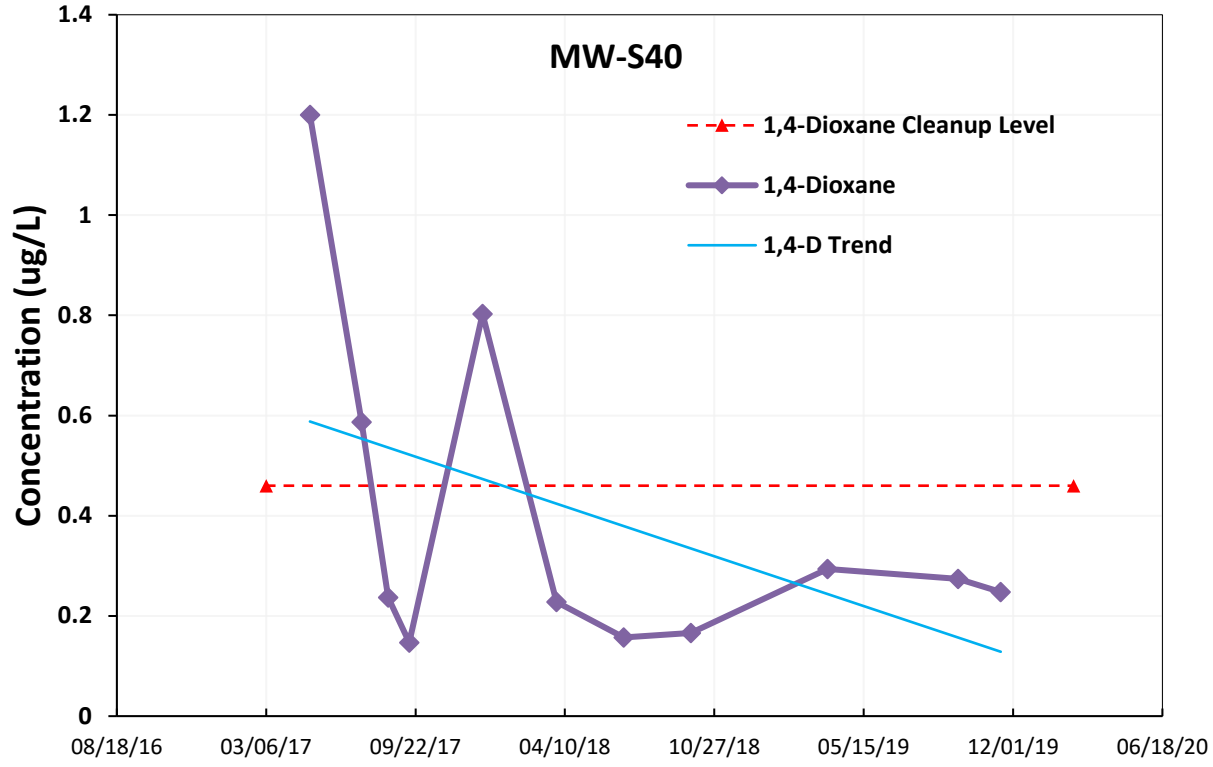


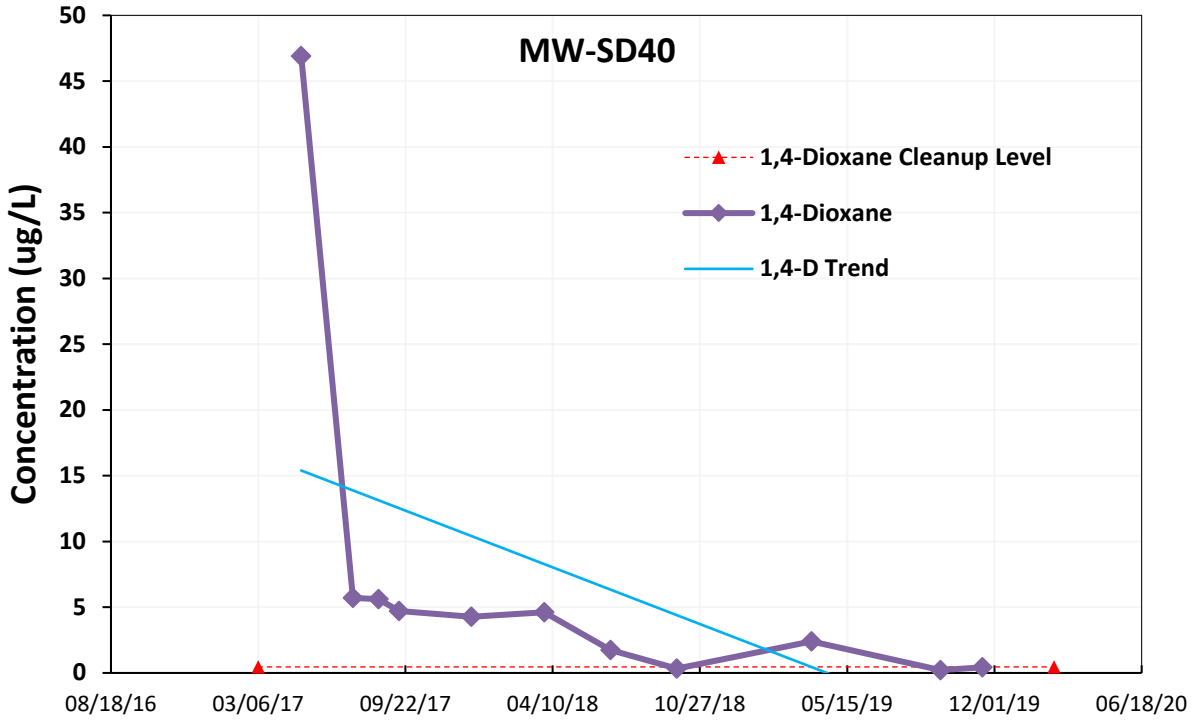

MW-SD36
Concentration (ug/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend

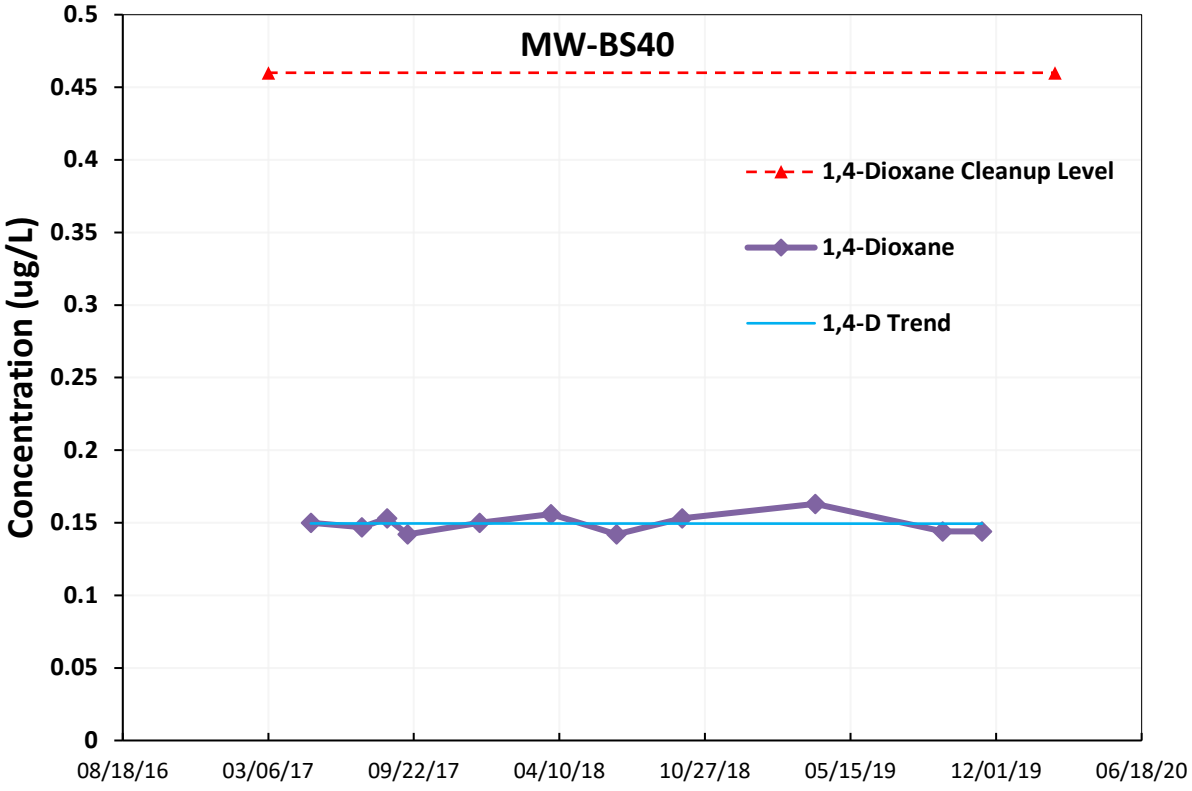

MW-BS36
Concentration (ug/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend

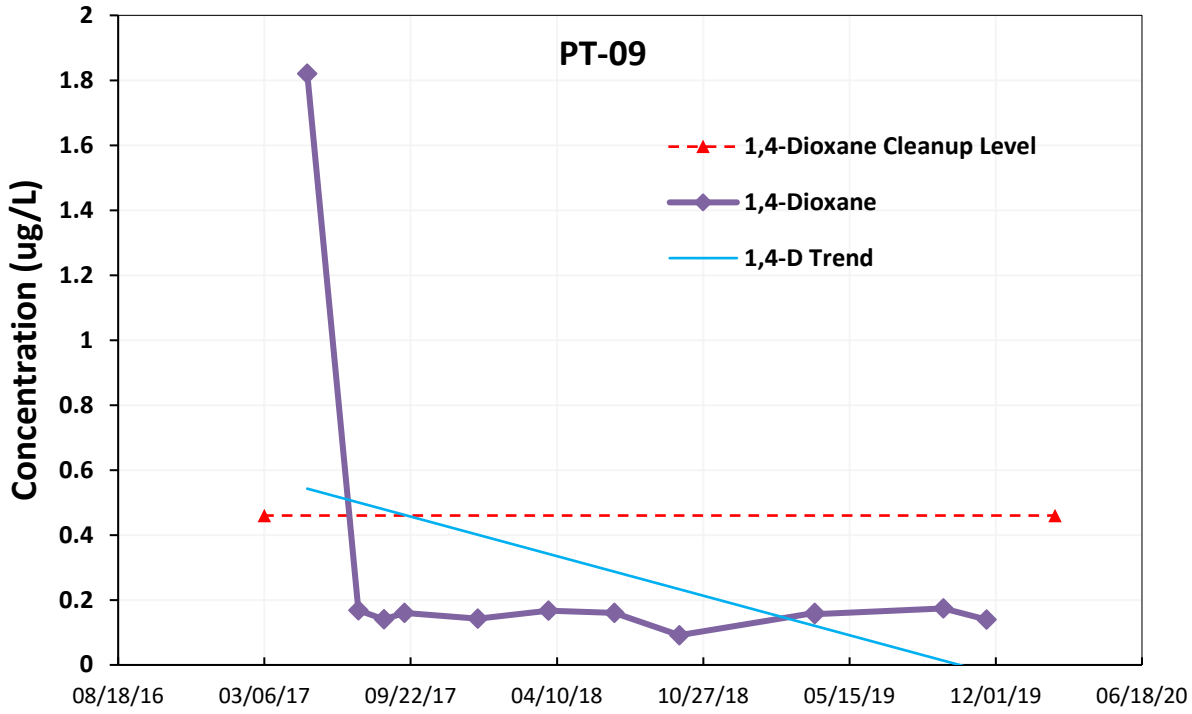
Wells upgradient of EW-1 Capture Zone (45 to the north, 40 cluster adjacent to EW-1, PT-09 to south)



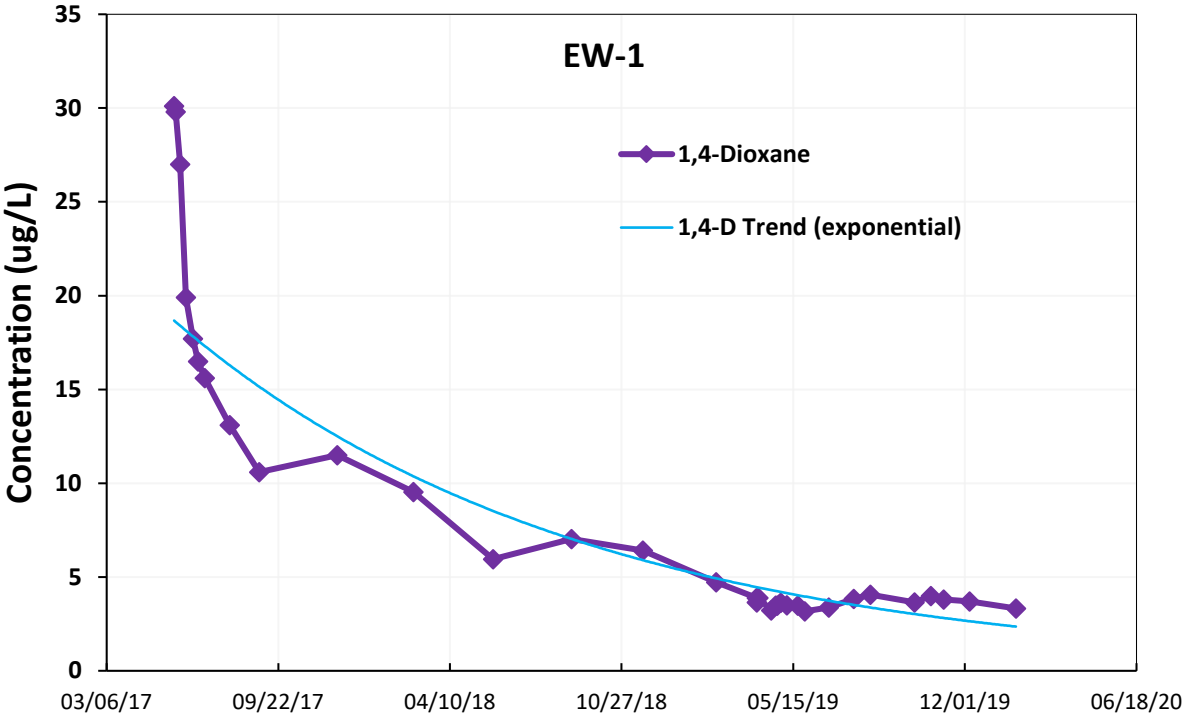



MW-SD40
Concentration (ug/L)
50
45
40
35
30
25
20
15
10
5
0
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20

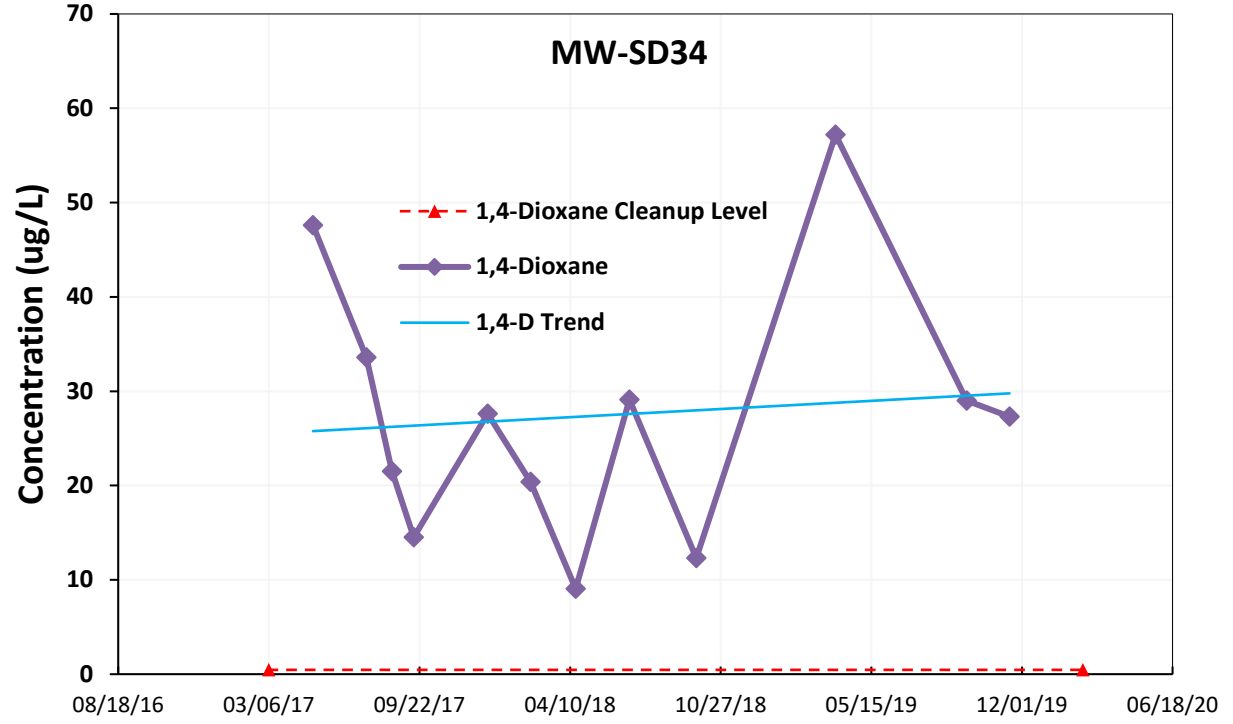

MW-BS40
Concentration (ug/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20

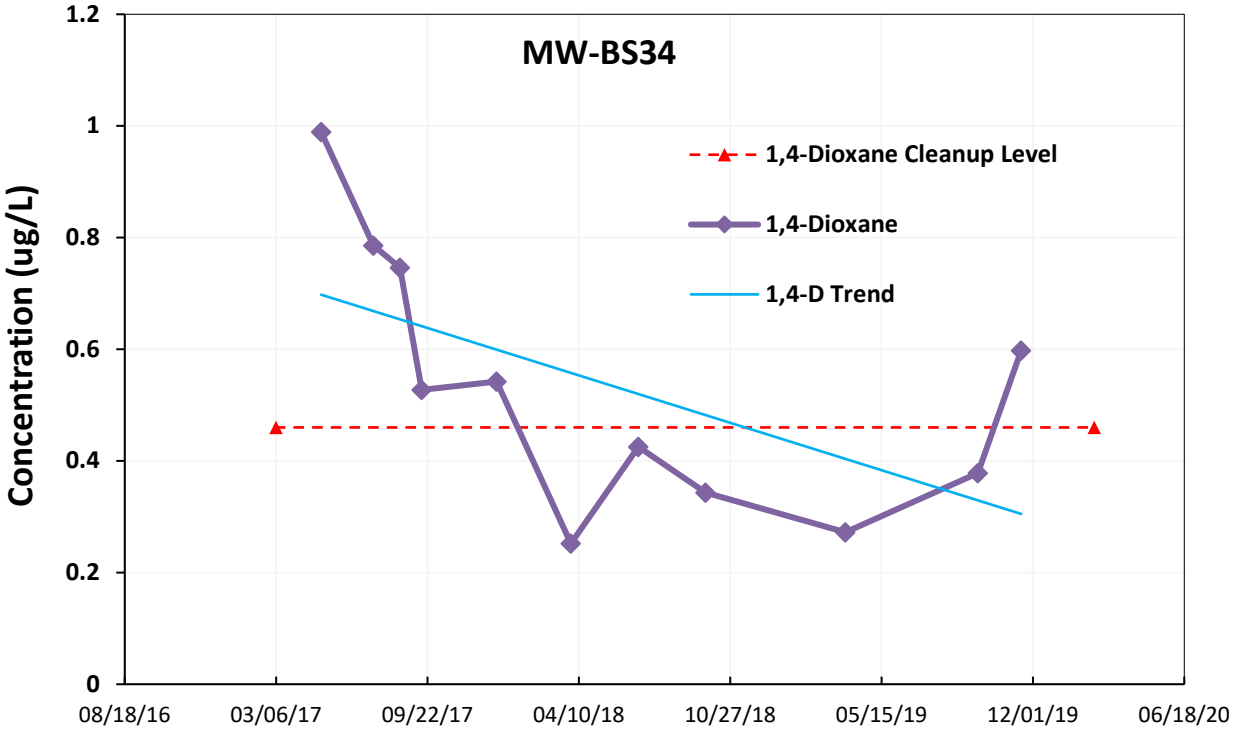


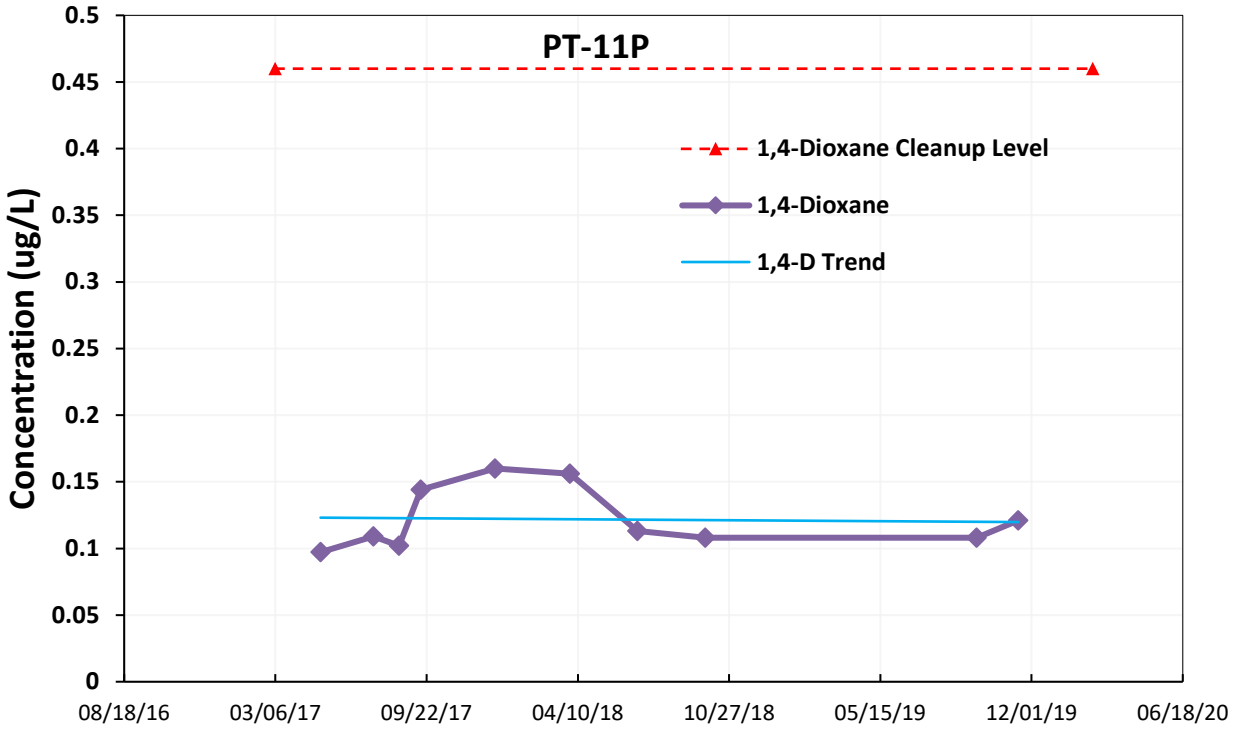
Extraction Well EW-1



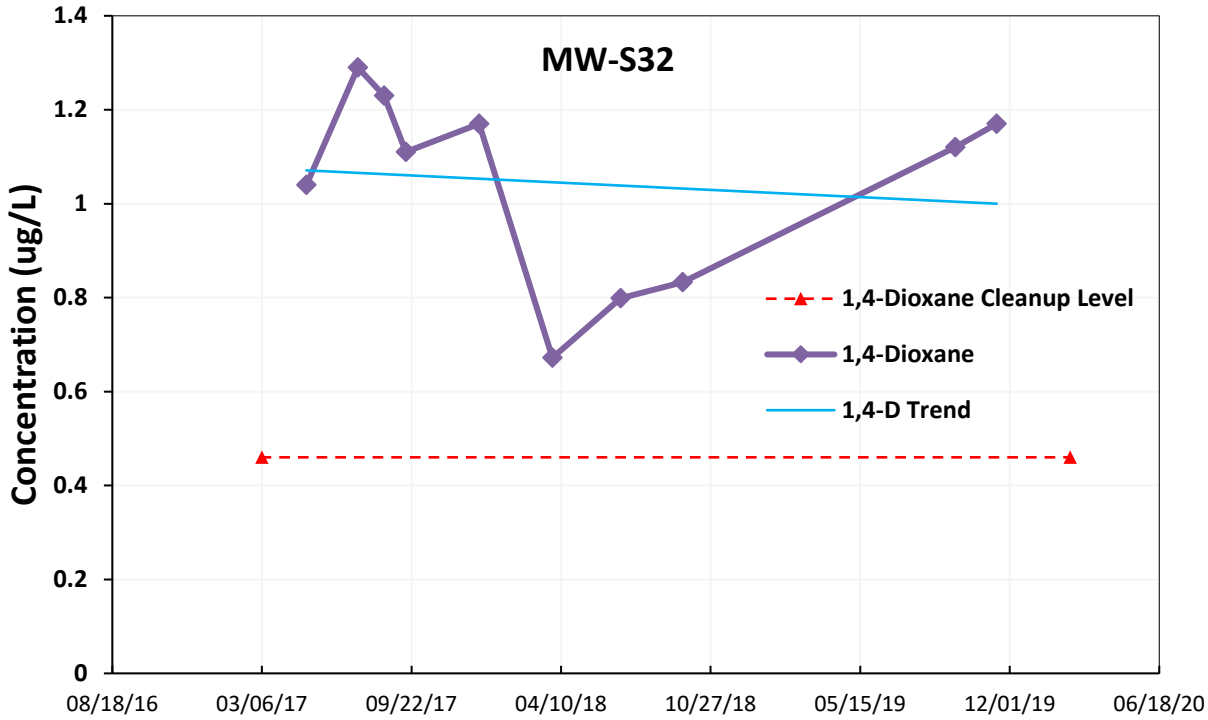
Wells on East Side of Assabet River (34/PT-11 Cluster at north end of skating rink)

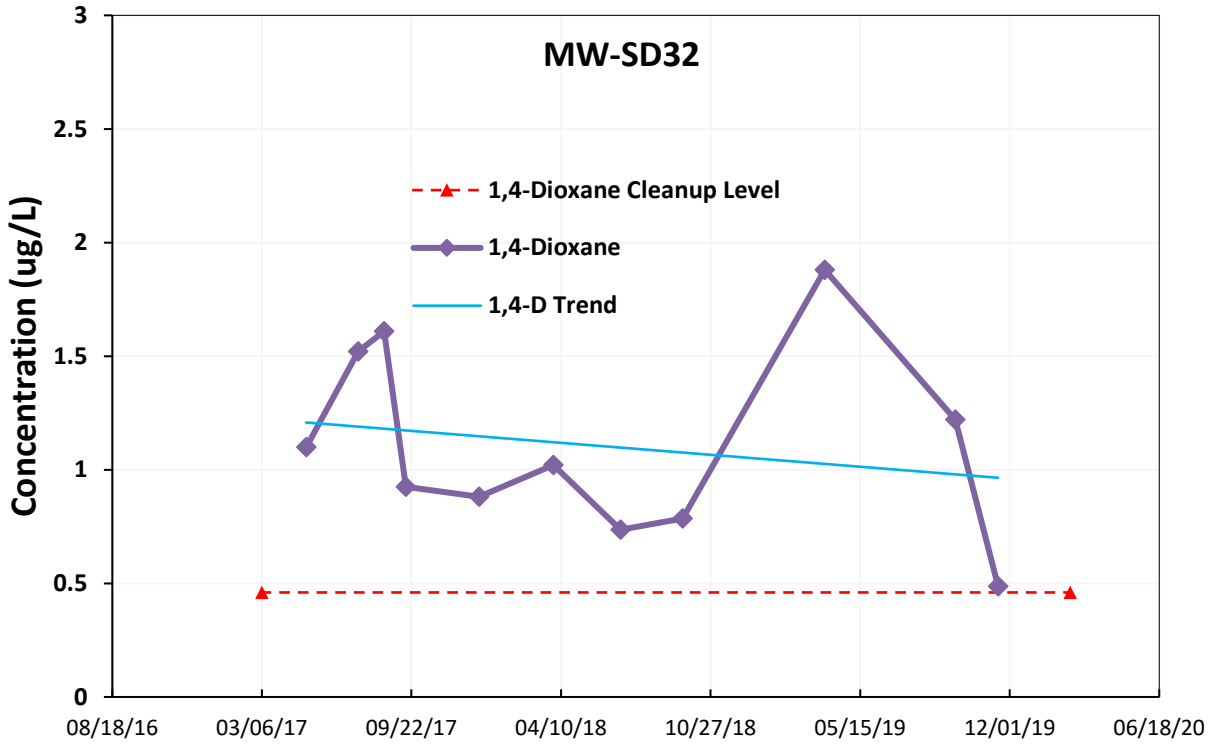


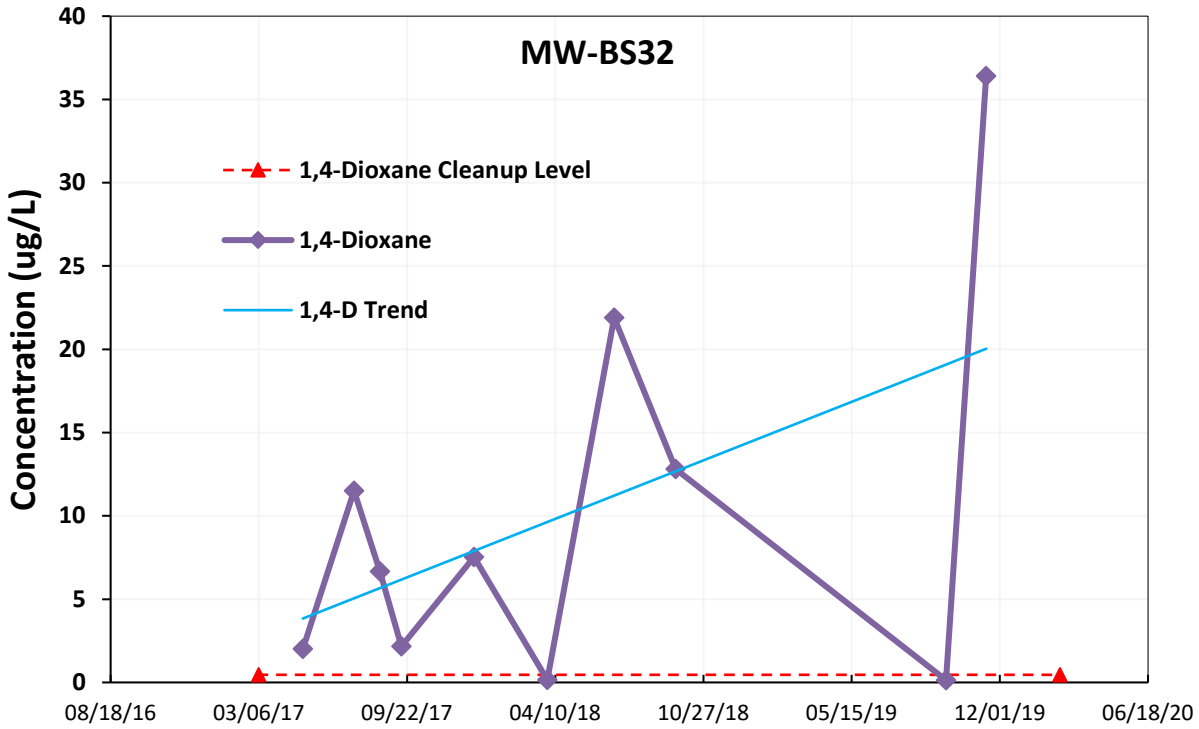




Wells on East Site of Assabet River (32 Cluster to north, near river. 31 at south-east end of skating rink)




MW-SD32
Concentration (ug/L)
3
2.5
2
1.5
1
0.5
0
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20


MW-BS32
Concentration (ug/L)
40
35
30
25
20
15
10
5
0
1,4-Dioxane Cleanup Level
1,4-Dioxane
1,4-D Trend
08/18/16
03/06/17
09/22/17
04/10/18
10/27/18
05/15/19
12/01/19
06/18/20

Wells further upgradient, between skating rink and NMI property