REMEDIAL ACTION WORK PLAN

12TH STREET LANDFILL
OTSEGO TOWNSHIP, MICHIGAN

Prepared For:

Operable Unit No. 4 of the
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

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1.0 INTRODUCTION

On behalf of Weyerhaeuser Company (Weyerhaeuser), Conestoga-Rovers & Associates (CRA) has prepared this Remedial Action (RA) Work Plan (RAWP) for the 12th Street Landfill, Operable Unit No. 4 (OU4) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, located in Otsego, Michigan (Site). This RAWP has been prepared in fulfillment of one of the requirements of the United States Environmental Protection Agency (U.S. EPA) Consent Decree (CD)(Civil Action No. 1:05-CV0003) dated January 3, 2005. In accordance with the CD, the RAWP provides the methodologies to be followed for the construction and implementation of the remedy set forth in the OU4 Record of Decision (ROD) and OU4 Statement of Work (SOW), and for the achievement of the OU4 Performance Standards.

1.1 BACKGROUND INFORMATION AND WORK PLAN PURPOSE

The Site is located at the north end of 12th Street in the Otsego Township, in Allegan County Michigan. The property is currently owned by Weyerhaeuser. Previously, the landfill had been owned and operated by various entities, including Weyerhaeuser, who owned the landfill and the associated Plainwell Mill, between 1961 and 1970. The 12th Street Landfill is designated with United States Environmental Protection Agency (U.S. EPA) identification number MID0060077306.

The 12th Street Landfill is approximately 6.8 acres in size. The landfill is bordered by the Kalamazoo River and associated wetlands to the north and northeast, a parcel owned by the Michigan Department of Natural Resources and Environment (MDNRE) to the east, 12th Street to the south, and by Wyoming Asphalt to the west. A mix of commercial and residential properties is located south of 12th Street. Figure 1.1 presents the Site location. Figure 1.2 presents the Site Plan.

1.1.1 SITE HISTORY

The 12th Street Landfill was utilized by the various owners/operators of a paper mill located at 220 Allegan Street, Plainwell, Michigan for deposition of paper waste/residuals. These wastes contained PCBs. Paper mill waste was deposited in this area from 1955 to 1981. The Michigan Department of Environmental Quality (MDEQ) conducted investigations in the early 1970's that determined that PCBs were in the

sediments of the Kalamazoo River. This discovery led to the identification of potential responsible parties (PRPs). The PRPs signed an Administrative Order by Consent (AOC) with the State of Michigan in 1990. The Remedial Investigation (RI)/Feasibility Study (FS) was funded and conducted by the PRP group. The RI/FS for the 12th Street Landfill began in 1993 and was completed in 1997.

In September 2001, U.S. EPA signed the ROD for the 12th Street Landfill. The ROD requires PCB-containing paper residuals that migrated from the landfill to be excavated and placed back in the landfill. The ROD further requires the landfill be closed following Part 115, Solid Waste Management of the Natural Resources and Environmental Protection Act 1994 PA 451, as amended. Long-term monitoring and maintenance at the Site is also required.

As part of a Time-Critical Removal Action (TCRA) to remove PCB-contaminated residuals in the former Plainwell Impoundment (a section of Operable Unit No. 5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site), the U.S. EPA authorized Weyerhaeuser to conduct an emergency action at the former power house channel to prevent downstream impacts from the TCRA. In 2007, visual paper residuals were excavated and relocated into the landfill. A clay barrier was installed between the Kalamazoo River and the landfill to insure that no hydraulic connection was present between the River and the Landfill to allow for monitoring at the groundwater surface water interface (GSI). This area was also graded to a 5 horizontal to 1 vertical (5H: 1V) slope and riprap was added to protect the clay barrier.

Pursuant to the requirements of the CD, CRA submitted a Final Design Report, on behalf of Weyerhaeuser on January 11, 2010. Subsequently, the Final Design Report was conditionally approved by U.S. EPA on February 18, 2010. The Final Design Report was developed to address the implementation of the selected remedial action outlined in the SOW for the selected Remedial Action at the Site, which is included as part of the ROD and incorporated into the CD. The SOW outlines the conceptual approach to design and implement the individual components of the remedy. The Final Design Report was developed pursuant to the requirements of paragraph 28, parts d, e, and f of the CD to meet the OU4 performance standards included as part of the SOW included in the OU4 ROD.

1.1.2 DESIGN SUBMITTALS

The Final Design Report was completed under the requirements of the CD and the associated OU4 SOW. The conditionally approved Final Design Report included the following:

- Project Specifications
- Draft OU4 Operation and Maintenance Plan
- Construction Quality Assurance Plan (CQAP)
- Remedial Action Health and Safety Plan (HASP)
- Contingency Plan
- Performance Standard Verification Plan (PSVP)
- Multi-Area Quality Assurance Plan (QAP)
- Multi-Area Field Sampling Plan (FSP)

1.1.3 PURPOSE OF THE REMEDIAL ACTION WORK PLAN

The requirements of the RAWP are set out in Section IX and paragraph 29, part b of the CD. The RAWP shall document the overall management strategy for performing the design, construction, operation, maintenance and monitoring of the Remedial Actions. In accordance with these requirements, this RAWP includes a detailed description of the construction and remedial activities at the Site, a project schedule for each major activity and submission of deliverables generated during the RA, and identifies responsibilities of key personnel involved with the implementation.

2.0 REMEDIAL ACTION

Design Drawing C-02 of the Issued for Construction Drawings provided in Appendix A presents the major Site Works to be completed as part of the RA implementation. The major remedy components for the RA include:

- Site preparation activities, including erosion and surface water management controls
- Excavation and delineation of paper and waste residuals outside the landfill footprint
  - Implementation of a verification soil sampling program on the areas outside the landfill footprint
  - Restoration of all impacted areas outside the landfill footprint
- Landfill and landfill slope grading
  - Completion of a global slope stability evaluation
- Installation of final landfill cover system
- Installation of surface water management controls
- Installation of landfill gas management system
  - Installation of perimeter landfill monitoring system
- Institutional controls / deed restrictions / fencing and gating
- Site restoration

2.1 REMEDIAL ACTION CONTRACTOR SUBMITTALS

As stated in the Project Specifications, CRA Services the U.S. construction division of CRA, herein referred to as the "RA Contractor" will be required to submit plans regarding the details of the Site components listed above. The following is a list of submittals required by the Project Specifications and the corresponding Project Specification Section number required to be submitted to CRA by the RA Contractor (additional submittals not specified in the Project Specifications may be required):

- Erosion and Sediment Control Plan (Section 01571)
- Seeding and Erosion Control Plan (Section 02921)

Erosion and Sediment Control Plan

The Erosion and Sediment Control Plan will be prepared in accordance with Guidebook of Best Management Practices for Michigan Watersheds and Michigan Act 451 Part 91. The plan will be submitted to the local authorities for their review. The plan will address all potential critical erosion areas, identify locations of erosion and sediment control measures, and address a maintenance schedule for the temporary and permanent erosion and sediment controls.

Seeding and Erosion Control Plan

The Seeding and Erosion Control Plan will be prepared and submitted, at least 30 days prior to placing top soil and conducting the restoration activities, for review by the U.S. EPA. The plan will include an inventory of the seed mixtures(s) and fertilizers (if required) for the Site, the schedule for planting the seed mixtures and methods of preparing seedbeds and conducting seeding and irrigation. The plan will also provide additional methods and material to be used to provide erosion control (i.e., specific seed mixtures, erosion control blankets, and matting).

In addition to the above reference plans required by the Project Specifications, the following plans will be submitted by the RA Contractor to ensure the substantive requirements are met:

- A water treatment plan
- An excavation plan

2.2 PROJECT ORGANIZATION AND MANAGEMENT

The Project Manager will provide overall management of the project and will be the principal contact to the federal, state, and local government officials. The remedial construction activities will be managed by CRA, under the direction of Weyerhaeuser. CRA will provide construction management and associated construction Quality Assurance/Quality Control (QA/QC) management. The RA Contractor has been selected as the Remedial Construction Contractor and will provide construction services associated with the RA. It should be noted that CRA and CRA Services are two different divisions within the same company and that the typical engineer/contractor relationship will exist. The project organization chart is presented on Figure 2.1. A brief description of the duties of the key personnel is presented below.

CRA Project Manager - Gregory A. Carli, P.E.

- As defined in the CD, will act as Project Coordinator
- Provides overall construction project oversight
- Ensures construction management and professional services by CRA are cost-effective and of high quality
- Ensures all resources of CRA are available on an as-required basis
- Participates in key technical discussions with U.S. EPA
- Provides managerial and technical guidance to Project Coordinator

CRA Project Coordinator – Aaron Stadnyk

- Responsible for contractor compliance with technical specifications and construction contract
- Provides day-to-day project management
- Provides managerial and technical guidance to Field Engineer
- Provides technical representation at project meetings as appropriate
- Retains QA/QC services, including testing laboratories, to perform quality control and field/laboratory tests
- Reviews construction documentation and reports

CRA Design Engineer – Richard Hoekstra

- Reports to the Project Manager
- Review of design related contractor submittals
- Participation in key project meetings
- Responsible for preparing any design modifications that may be required during the RA
- Preparation and review of as-constructed drawings

CRA Geotechnical Engineer – Hassan Gilani

- Reports to the Design Engineer

- Participation in key project meetings
- Monitor construction activities to provide area-specific recommendations pursuant to Section 6.3.3 of the Final Design Report
- Assist Design Engineer with any design modifications that may impact the stability of the landfill
- Review of as-construction drawings

CRA Field Engineer – To Be Determined

- Responsible for field compliance with the project specifications
- Reports to Project Coordinator
- Provides immediate supervision of all on-Site construction activities
- Ensures that regular calibration of testing equipment is conducted and recorded
- Ensures that all Site activities are recorded daily and maintained
- Identifies work that should be accepted, rejected, or uncovered for observation, or that may require special testing, inspection, or approval
- Rejects defective work and verifies that corrective measures are implemented
- Conducts sampling necessary to confirm that the performance standards have been achieved
- Interacts daily with the remedial construction contractor to provide assistance in modifying the materials and work to comply with the specified design
- Maintains copies of applicable referenced standards

CRA QA / QC Officer, Analytical Activities - Paul Wiseman, B.S.

- Reports directly to CRA Project Manager
- Reviews laboratory QA / QC
- Performs data validation and assessment
- Advises on data corrective action procedures
- Prepares and reviews quality assurance reports
- Prepares QA / QC representation of project activities

Remedial Construction Contractor – CRA Services Project Manager – Jodie Dembowske

- Submits samples and/or materials for testing to determine if samples/materials meet specified requirements, and submits results directly to the Field Engineer
- Documents the labor, materials, and equipment utilized during construction activities and submits this information to the Field Engineer
- Provides daily field reports to the Field Engineer
- Responsible for work activities completed by subcontractors of the remedial construction contractor
- Carries out construction activities according to design specifications
- Immediate supervision of construction activities and personnel
- Performs measurements and surveying to ensure the RA meets the specified design

Additional RA Contractor personnel include:

- RA Contractor Project Director – Wayne Bauman
- RA Contractor Health and Safety Officer
- RA Contractor Superintendent – Pete Lewis

Table 2.1 provides a summary of contact information (i.e., address, phone number, fax number, and email) for individuals anticipated to be involved during the RA.

2.2.1 PERSONNEL QUALIFICATIONS

Field Engineer

The Field Engineer will have the following qualifications:

- Graduate of a recognized college in a technically related field
- Minimum 2 years experience in the oversight and implementation of construction activities
- Good management and communication skills
- Appropriate OSHA training

Remedial Construction Contractor

Experienced personnel will have a thorough knowledge of testing procedures, equipment, and documentation procedures required for implementation of the remedial construction activities.

The RA Contractor has designated Pete Lewis as the on-Site Superintendent empowered to act on behalf of the contractor in all matters pertaining to the remedial construction activities.

2.3 BASIS FOR REMEDIAL CONSTRUCTION

The remedial construction for the RA selected for the Site is based on the provisions of the CD and the final design for the RA of the Site as presented in the Final Design Report and conditionally approved by the U.S. EPA in a letter dated February 18, 2010. In order to implement the RA and meet the requirements of the OU4 performance standards, the RA will be conducted and adhere to provisions that include the following supporting documents included in this RAWP.

In accordance with CD, the RAWP must include the supporting documents that are required as part of the Final Design Report listed below:

- RA Construction Completion Schedule
- Performance Standard Verification Plan (PSVP);
- Methods of satisfying permitting requirements
- Methodologies for implementing the OU4 Operation, Maintenance and Monitoring Plan (OU4 OM&M Plan)
- Contingency Plan
- Methodologies for implementing the Contingency Plan
- Construction Quality Assurance Plan (CQAP)
- Procedures for the decontamination and disposal of waste materials

2.3.1 RA CONSTRUCTION COMPLETION SCHEDULE

A RA Construction Completion Schedule has been prepared for the implementation of the selected RA. The schedule identifies the major activities and includes the anticipated dates for the start and completion of each major activity associated with the completion of the RA. The schedule also includes anticipated dates for the development and submittal of future deliverables generated during the RA implementation. The RA Construction Schedule will continue to been revised as needed and will be submitted to U.S. EPA prior to the Pre-Construction Meeting at the Site.

2.3.2 PERFORMANCE STANDARD VERIFICATION PLAN

The PSVP establishes the Performance Standards and provides detailed plans for three of the activities conducted as part of the RA implementation, including verification soil sampling, landfill gas monitoring, and groundwater monitoring programs. The PSVP was submitted to U.S. EPA as part of the Final Design Report and was conditionally approved on February 18, 2010. The PSVP is included as Appendix D of the Final Design Report.

2.3.3 SITE PERMITTING

In accordance with Section IX and paragraph 9 of the CD, no permit shall be required for a portion of the OU4 work conducted on-Site (within the aerial extent of contamination or in very close proximity to the contamination and necessary for implementation of the Work). Currently, long term access agreements and restrictive covenants/deed restrictions have not been resolved with the current property owners, MDNRE and the owner of the Asphalt Plant. At the time of submittal of this document, an access agreement and restrictive covenants/deed restrictions has not been executed. Weyerhaeuser and the property owners continue to work towards resolution of the long-term access requirements for the Site.

2.3.4 OU4 OPERATIONS, MAINTENANCE AND MONITORING PLAN

A draft OM&M Plan was developed and submitted with the Final Design Report. The OM&M plan identifies requirements for Site access controls, the landfill cover, the erosions control measure (permanent), the groundwater monitoring system and the

passive landfill gas venting system. The OM&M Plan includes the scheduling for inspection, maintenance and monitoring activities, which are included as part of the PSVP. The draft OM&M plan includes all required operation and maintenance objectives and maintenance activities, record keeping and reporting, and an Emergency Response and Safety Plan. The draft OM&M plan will be finalized and submitted to U.S. EPA for approval nearing the completion of the RA, as further Operation and Maintenance Objectives may be identified during the implementation of the RA and may be required to be incorporated into the OM&M Plan. The Draft OM&M Plan is included as Appendix H of the Final Design Report.

2.3.5 CONTINGENCY PLAN

A Contingency Plan was developed and included with the Site-Specific Health and Safety Plan (HASP) for the implementation of the work and submitted as part of the Final Design Report. An updated copy of the HASP is included as Appendix B to this RAWP. The Contingency Plan describes procedures that will be followed during the course of the RA implementation in the event of an incident or emergency at the Site. The Contingency Plan includes; the Site personnel responsible for responding in the event of an incident; methods to communicate with the local community, including local, State and Federal agencies involved in the cleanup, as well as local emergency squads or hospitals; first aid and medical information; provisions to conduct air monitoring if required and provisions for spill prevention, control, and methods for responding to potential spills and discharges. Due to the nature of the work, a Spill Prevention, Control and Countermeasures (SPCC) Plan has not be developed, however during the implementation of the RA if such a plan is deemed necessary, the HASP will be amended to include a SPCC Plan.

2.3.5.1 CONTINGENCY PLAN IMPLEMENTATION

The Contingency Plan will be implemented as required and reviewed daily along with the HASP at the Site during the daily Tailgate Safety Meetings. A Site Contact Sheet will be developed and posted in the Site Office(s), which will include all contact information for Weyehaeuser, CRA, and The RA Contractor. The Contact Sheet will also include contact information for the Site personnel responsible for responding in the event of an incident; local community, including local, State and Federal agencies, and numbers for local emergency squads or hospitals. Contact information for Site personnel responsible

to responding in the event of an incident will also be posted on a sign at the entrance gate to the Site.

2.3.6 CONSTRUCTION QUALITY ASSURANCE PLAN

The Construction Quality Assurance Plan (CQAP) was developed and submitted with the Final Design Report. The CQAP describes the OU4 specific components of the quality assurance program, which shall ensure that the completed project meets or exceeds all design criteria, plans and specifications. At a minimum, the CQAP includes the responsibilities and authorities of all organizations and key personnel involved in the design and construction of the RA; qualifications of the Quality Assurance Officials; protocols for sampling and testing used to monitor construction; means of identifying the proposed quality assurance sampling activities including reports designed to deal with sampling, corrective measures, evaluations of RA activities, and acceptance reports. The CQAP also includes all reporting requirements for the Construction Quality Assurance (CQA) requirements, which will include daily reports, inspection data sheets, problem identification and corrective measure reports, design acceptance reports, and final documentation.

2.3.6.1 CQAP IMPLEMENTATION

The CQAP will be implemented immediately when RA activities commence at the Site. Daily reports and CQA activities will be discussed during the daily Safety Tailgate meetings. Daily reports will also be filed at the completion of each working day or the following morning. When required during the implementation of the RA, programs included in the CQAP will be implemented by the responsible quality assurance Site personnel and report to CRA for review and approval.

2.3.7 DECONTAMINATION AND WASTE DISPOSAL

Decontamination of equipment utilized during the RA will be performed at a decontamination pad constructed in accordance with the Final Design Report. Decontamination water will be collected and containerized and temporarily stored on-site as discussed in Section 6.2.2 of the Final Design Report.

Solid paper residual wastes that will be excavated from the areas outside the footprint of the landfill will be relocated to the landfill footprint to meet the requirements of the State of Michigan solid waste management regulations (Part 115). All heavy equipment will be decontaminated, and investigation derived waste, including well development water, will be disposed, in accordance with Section 6.0 of the Field Sampling Plan (FSP), included as Appendix L of the Final Design Report. All investigative derived soil waste will be incorporated under the new 12th Street Landfill cover system.

3.0 SITE MANAGEMENT AND SEQUENCING

The RA can be summarized as having the components that are described as follows:

1. Mobilization to the Site of equipment required during the RA activities.
2. Site preparation (including clearing and grading).
3. Excavation of paper residuals from outside the landfill footprint.
4. Landfill grading.
5. Final landfill cover system (including installation of gas venting system).
6. Surface water management (including access roads).
7. Landfill gas management.
8. Abandonment of existing groundwater monitoring wells.
9. Installation of groundwater monitoring wells on gas probes and the implementation of an effectiveness monitoring program.

3.1 REMEDIAL CONSTRUCTION SEQUENCING

Management of the Site during implementation of the remedial construction will be required to ensure that the remedial construction is successfully implemented in accordance with the Final Design Report. The tasks to complete the components of the RA have been sequenced to meet the following objectives:

1. Tasks are to be performed in an orderly and safe manner such that the movement and double handling of materials and the exposure of personnel and the public to Site-related contaminants is kept to a practicable minimum
2. Tasks are to be scheduled such that there will be ample space for all personnel engaged in work activities to perform their work in a safe and orderly manner

Sequencing of construction activities will be coordinated by CRA and the RA Contractor. Any changes to the sequencing described herein will be subject to Weyerhaeuser, CRA, and U.S. EPA approval and will have to conform to the two objectives stated above.

3.2 SITE MANAGEMENT

The Field Engineer will supervise Site activities related to the remedial construction. Daily logs will be maintained for all activities occurring at the Site during remedial construction activities. Bi-weekly progress meetings will be conducted during the period of active construction with Weyerhaeuser representatives, the CRA Project Manager, the CRA Project Coordinator, the CRA Field Engineer, RA Contractor representatives, the U.S. EPA, and the MDNRE.

4.0 REMEDIAL ACTION IMPLEMENTATION

4.1 SITE PREPARATION

The following section provides a summary of the Site preparation activities. Site preparation activities will be conducted in accordance with the conditionally approved Final Design Report and associated documents.

Prior to excavating paper residuals outside the landfill footprint or the regrading of the landfill, the following activities will be performed:

1. The physical condition of 12th Street (roadway area) will be reviewed and documented to ensure that its condition is maintained throughout construction or restored to pre-construction condition following completion of the construction activities.
2. Silt fencing will be placed around the proposed excavation areas (Drawing C-03) to prevent the potential migration of sediment beyond the limits of construction as a result of surface water runoff. The silt fencing will be installed in accordance with the specifications contained in Appendix E of the Final Design Report.
3. Brush and trees will be cleared and grubbed, as needed in the proposed excavation areas (Drawing C-02 of the Final Design Report), including enough space for equipment to access the areas and for the staging of materials and equipment. All above-grade portions of trees, logs, stumps, brush, rotten wood, and other extracted plant life from the clearing and grubbing operations, will be chipped and managed in accordance with the Final Design Report.
4. Existing groundwater monitoring wells, leachate head wells, landfill gas extraction wells, and staff gauges will be abandoned prior to performing grading and/or excavation activities as described in Section 8.1 of the Final Design Report.
5. A staging area for materials and office and equipment trailers will be established adjacent to 12th Street, outside the limits of paper residuals.
6. A decontamination pad will be constructed at a location directly adjacent to the proposed final limits of paper residuals at the 12th Street Landfill.
7. Temporary access roads will be constructed as necessary to obtain access to the excavation and grading areas.
8. Access agreements, redevelopment plans, and lines of communication will be established with the adjacent property owners.
9. Place sign with emergency contact information at Site entrance.

All Site preparation work will meet the quality control/assurance requirements of the CQAP.

4.2 IMPLEMENTATION AND SEQUENCING

4.2.1 MOBILIZATION

The RA Contractor's mobilization to the Site will begin with establishment of temporary facilities (i.e., office and supply trailers, personnel decontamination trailer, etc.) on Site.

Portable toilet facilities will be provided and maintained by the RA Contractor, and will be located adjacent to the Site offices. Sanitary wastes will be removed and disposed of off Site, on a periodic basis, in accordance with applicable laws and regulations.

4.2.2 SOIL EROSION AND SEDIMENT CONTROL

Prior to commencing activities that will disturb the existing soils at the Site, a Sediment and Erosion Control Plan will be prepared by the RA Contractor, consistent with the requirements of Michigan Act 451, Part 91, Rules 1701 through 1714. The RA Contractor will also be required to comply with the substantive requirements of the laws and regulations pertaining to Michigan Soil Erosion and Sedimentation Control. The Sediment and Erosion Control Plan will consist of temporary measures, such as silt fencing, check dams, sediment traps, diversion swales, etc., to prevent excess sediments from traveling from the construction areas to the adjacent Kalamazoo River, while construction is ongoing and until final vegetation has been established.

The RA Contractor will plan and execute construction methods to minimize the amount of soil exposed at one time. In areas where slopes exceed 5 percent grade and at material stockpiles, the RA Contractor will ensure soil erosion control through the use of siltation fences, straw bales, riprap, sod, or erosion mats, as directed by the Field Engineer.

4.2.3 CLEARING AND GRUBBING

Only those areas required for access to the Site and excavation during remedial activities will be cleared and grubbed. Clearing and grubbing will be performed in a manner which will cause minimal disturbance of Site soils. Trees, stumps, roots, brush, and other vegetation will be cut flush with or below the original ground surface. Any structures that obtrude, encroach upon, or otherwise obstruct work will be removed and disposed off Site. If needed, trees and stumps, outside the designated area for clearing and grubbing, will be removed when directed by the Engineer.

All above-grade portions of trees, logs, stumps, brush, rotten wood, and other extracted plant life from the clearing and grubbing operations, will be chipped and managed in accordance with the Final Design Report.

4.2.4 SURVEYING

The RA Contractor will establish reference benchmarks and base lines adjacent to the works and will be responsible for laying out the works from the established reference points.

4.2.5 TEMPORARY ACCESS ROADS

Access roads will be constructed and maintained by the RA Contractor, as necessary, to allow for loading of material onto transportation vehicles and provide a route for transportation vehicles to pass through the decontamination area prior to leaving the Site. Additional details related to maintenance of roads are provided in the Project Specifications.

4.2.6 FENCE RELOCATION

In addition to the existing fencing at the Site, fencing will either be erected or relocated to accommodate the existing Site activities. Gates present at the entrance to the Site will be locked during non-working hours.

4.2.7 WASTEWATER TREATMENT SYSTEM OPERATION

During the pre-design studies field investigation in June 2008, groundwater was encountered at a minimum of 3 feet bgs in the wetland area. At this point during the implementation of the RA, whether groundwater will enter into the excavation and need to be removed from the excavation is unknown, but quite likely. Prior to the start of construction, the RA Contractor may elect to perform some field testing to confirm whether groundwater will be encountered and check the quality of such encountered groundwater. The RA Contractor will be responsible for identifying and providing the names of a licensed transporter and disposal facility for off-Site disposal in the event that water is encountered during excavation activities, and off-Site disposal is needed. As applicable, the RA Contractor will also be required to provide the sampling procedures that support acceptance at the disposal facility. All transportation and disposal sub-contractors will be required to meet applicable provisions of federal, state, and local regulations and codes. Once an acceptable transporter and disposal site are provided to Weyerhaeuser, and within a minimum of 2 weeks prior to implementation, the proposed transporter, disposal facility, and associated sampling requirements will be provided to the U.S. EPA.

As an alternate to off-Site disposal of water encountered during excavation activities, the RA Contractor may elect to manage the water on-Site. On-Site water management will consist of a system, which will store, treat, and discharge to the sanitary sewer system or to the wetlands under the substantive requirements of a National Pollutant Discharge Elimination System (NPDES) permit. The water handling and on-Site storage system will address the following:

1. Potentially contaminated surface water
2. Water collected from construction excavations
3. Groundwater and surface water entering excavation areas
4. Surface water collected from temporary soil stockpiles
5. Wastewater from the personnel (not including sanitary wastewater) and equipment decontamination facilities

Water from the above-mentioned sources will be collected and pumped to a 20,000-gallon frac tank for temporary storage. The influent frac tank will settle sediment from the water; therefore the RA Contractor shall take care when pumping water from the influent frac tank into the treatment system. Once a sufficient volume of water has been collected, the water will be treated using an on-site water treatment system. The

on-Site wastewater treatment system will consist of bag filter or sand filtration followed by treatment through primary and secondary activated carbon adsorption units. The treated water will be pumped to a 20,000-gallon effluent storage frac tank.

The treated effluent will be sampled by the RA Contractor in the effluent storage frac tank prior to discharge. The RA Contractor will provide a minimum of two 20,000-gallon effluent frac tanks so that sufficient storage capacity is available to prevent delay of the excavation activities. The design flow rate of the system will be approximately 50 gpm. The system will be provided with appropriate secondary containment. Treated effluent will be discharged to the local sanitary sewer system or the wetland area north of the 12th Street Landfill once the treated water has been confirmed to meet the discharge requirements. The parameters for analyzing the effluent prior to discharge will be determined to ensure that the water meets the local municipality's Publicly Owned Treatment Works (POTW) pretreatment requirements or the requirements of an NPDES permit. The proposed discharge rate for the treated water will be determined based on the on-Site water management option selected by the RA contractor. The rate and volume of discharges will be recorded by the RA contractor.

In the event that the surface water and groundwater cannot be treated on-Site to meet POTW or NPDES discharge requirements, the water will be sent off-Site to a commercial treatment facility. Water which requires off-Site disposal will be managed in accordance with applicable regulations as discussed above.

4.2.8 EQUIPMENT DECONTAMINATION

There will be an on-Site Equipment Decontamination Facility erected on the Site in the Contamination Reduction Zone (CRZ).

The facility will provide, operate, and maintain suitable portable, high-pressure, low-volume decontamination wash unit(s) equipped with a self-contained wash water storage tank and pressurizing system and capable of heating and maintaining wash waters to 180 degrees Fahrenheit (F) and providing a nozzle pressure of 150 pounds per square inch (psi).

Water used for cleaning will not be recycled. All rinse water used for equipment decontamination will be collected, treated through the on-Site treatment system, and discharged to the sanitary sewer pending approved analytical results.

4.2.9 SITE SECURITY

Fencing will be installed along 12th Street and along a short portion of the asphalt property and MDNRE property, if necessary, boundaries to deter pedestrians and vehicular traffic from entering the landfill by simply going around the ends of the fence, as shown in the Final Design Report. The fencing and gates are consistent with existing access restrictions and likely restrictions that would be needed for a potential eco-park. If the U.S. EPA and/or Weyerhaeuser determine that an eco-park is not an appropriate land use for the landfill property, Weyerhaeuser will submit a plan to the U.S. EPA to install additional fencing consistent with the ROD.

In accordance with the ROD, permanent markers will be placed along the property boundaries describing the area of the OU-4 and the nature of any restrictions. Warning signs will also be posted on the fence every 200 feet and on all entry gates. The number, content, and location of the permanent markers and warning signs will be presented to the U.S. EPA for approval prior to their installation.

4.2.10 UTILITIES

The RA Contractor will be required to locate and verify the capacity of all aboveground and underground utilities prior to commencing field activities.

Standard electrical service is available. Any additional power requirements should be available from the trunk line. Power distribution and connections required to perform the work will be installed by the RA Contractor. Backup power will also be provided by the RA Contractor for safety equipment and emergency lighting, as required.

Potable water will be trucked in to Site from the City of Otsego.

The RA Contractor will supply portable two-way radios, or equivalent, for Site communications during the performance of the RA and for any operations in which direct visual and verbal contact is not feasible. The RA Contractor will be required to provide two-way radios for use by the Engineer and the Site Safety Officer, as necessary. Suitable warning signals such as horns or whistles will be designated for emergencies.

CRA has contacted the owner of the underground natural gas line which traverses the Site (i.e., Major Pipeline) to discuss arrangements regarding excavation in the vicinity of the gas line. CRA initially contacted them in May 2009 and again contacted them in

April 2010 to give them notice that the construction activities are proceeding and update them on the overall schedule. Major Pipeline will relocate and mark the gas line once a utility locate call is made to MISS DIG. They have asked for 1 to 2 days notice before excavation occurs in the vicinity of the gas line. During excavation Major Pipeline will send a representative on-Site to provide oversight and direction to the RA Contractor. Major Pipeline has not been able to confirm if the line is active, but are proceeding as if the line is active.

4.2.11 EMERGENCY FIRST-AID FACILITY

The RA Contractor will be required to supply and maintain a first-aid facility, which complies with the requirements of 29 CFR 1910.141, during the RA.

4.2.12 FIRE FIGHTING EQUIPMENT

The RA Contractor will be required to provide necessary fire fighting equipment to ensure the safety of Site personnel. Details of the fire fighting equipment are provided in the HASP. Coordination will be established with the local Fire Department to respond to emergencies.

4.3 REMEDIAL CONSTRUCTION

On completion of the Site preparation activities detailed in Section 4.1, the remedial activities will commence. Remedial construction and associated activities are presented in the following sections. Remedial Construction and associated activities will be conducted in accordance with the conditionally approved Final Design Report, and associated documents. A copy of the Issued for Construction Final Design Drawings are provided in Appendix A.

All construction work will meet the quality control/assurance requirements of the CQAP.

Site personnel and local residents will be protected from Site hazards through the implementation of the HASP.

4.3.1 EXCAVATION OF PAPER RESIDUALS OUTSIDE THE LANDFILL FOOTPRINT

The areal limits of visible paper residuals outside the footprint of the landfill on the MDNRE property, the asphalt plant property, and in the wetlands were previously delineated, and have been refined based on the findings of the pre-design investigation performed by Weyerhaeuser in 2008. A copy of the report documenting the pre-design studies is contained in Appendix A of the Final Design Report. Based on the areal limits and the thicknesses of visible paper residuals present in areas beyond the proposed final capped footprint of the landfill, an estimated total of 12,200 cubic yards (cy) of visible paper residuals needs to be excavated and relocated back into the landfill (200 cy from the MDNRE property, 7,500 cy from the asphalt plant property, and 4,500 cy from the wetland).

The estimated volume of off-Site paper residuals to be relocated within the footprint of the landfill was revisited as part of the overall review of the final design to verify the volume of material to be accommodated under the final cover system. The test pit and boring information was provided in Appendix A of the Final Design Report, used to delineate both the horizontal and vertical extent of paper residuals. As a result of the independent review of the calculated excavation volumes, the total volume should be slightly less than previously indicated. There would appear to be approximately 2,000 to 2,200 cy less volume to be removed in the wetlands, but possibly an additional 200 cy to be removed from the MDNRE property. Therefore, the revised total excavation volume will likely decrease from the previous estimate of 12,200 cy to between 10,000 and 10,500 cy, a decrease of approximately 15 percent. It should be remembered that the removal of paper residuals will need to be verified by sampling on the asphalt plant property and the MDNRE property, so the actual excavation volume could be larger than anticipated.

It should be noted that work activities related to the excavation of paper residuals in the wetland areas would typically be regulated under Michigan Act 451, Part 301 (work in wetlands) and Part 31 (work in 100-year flood plains), and would require a joint permit from the MDNRE Land and Water Management Division and the U.S. Army Corps of Engineers. The work activities required for the wetland areas and within the 100-year floodplain will be conducted in accordance with the substantive requirements of the joint permit.

In general, paper residuals on the MDNRE property, the asphalt plant property, and the wetland areas on the 12th Street Landfill property will be excavated and relocated

within the proposed limits of the existing landfill, as shown on Drawing C-02 of the Final Design Report. Initially, the excavation of paper residuals outside the landfill footprint will be based on visual confirmation and finally by verification sampling as required and described in Section 6.2.3 of the Final Design Report. The paper residuals will be placed within the landfill in lifts not exceeding 12 inches, as well as the other conditions discussed in Section 6.3 of the geotechnical slope stability evaluation memorandum presented in Appendix B of the Final Design Report.

The required excavation and removal of paper residuals from the MDNRE property will also require encroachment into the landfill slope to the north (but should not require any significant removal of the landfill slope to the west, as the recent property survey shows that the property line is approximately along the toe of the landfill on this side of the MDNRE property). Referring to Drawing C-02, it can be seen that the property line extends as far into the landfill slope to the 718 elevation contour at the northwest corner of the MDNRE property, which is more than 10 feet in elevation above the toe of slope elevation. Therefore, it is expected that this material may need to be relocated back on to the landfill, which would result in a 10-foot cut at the property boundary. The entire slope may be cut back further into the landfill if paper residuals are found at depth.

Based on the previous investigations, approximately 7,500 cy of visible paper residuals are estimated to be excavated and relocated back into the landfill from the asphalt plant property (Drawing C-02). The area on the asphalt plant property requiring excavation is divided into two areas based on Site features. The northern portion of the excavation area is in the wetland that extends north of both the asphalt property and the landfill. The southern excavation area includes a portion of the western landfill sideslope (as discussed previously), the flatter area directly west of the landfill sideslope, a paved area, and the asphalt berm area.

Paper residuals on the 12th Street Landfill property that are located in the wetland north of the landfill will be excavated and relocated within the proposed limits shown on Drawing C-02 based on visual confirmation, in accordance with the ROD. The paper residuals will be placed within the limits of paper residuals in lifts not exceeding 12 inches. No soil verification sampling will be performed on the 12th Street Landfill property.

In the event that unexpected material is found during excavation activities which is not consistent with types of materials that are known to be present in the landfill, such as paper residuals, the material will need to be either sampled in place or appropriately staged and sampled to determine the appropriate method for addressing this material

(e.g., incorporating it in the landfill footprint, off-site disposal, etc). The exact approach will need to be established in the field depending on the nature of the material discovered; however, the preference will be toward sampling in-place to determine the appropriate characterization provided such activities can be accommodated in the construction sequencing. If temporary staging is required, the staging will be conducted within the landfill footprint on a liner surrounded by a temporary berm. The unexpected material would also be covered when not being accessed.

As needed, the sidewalls of the excavation will be sloped to maintain overall stability of the excavation. The sidewalls of the excavation along the landfill toe of slope areas will be graded to a slope of 4H:1V to maintain the stability of the excavation and the landfill slopes (see calculations provided in Appendix B of the Final Design Report). To the extent practical, and based on visual observation, granular fill/soil and asphalt overlying the paper residuals will be segregated from the paper residuals and stockpiled on the asphalt plant property in a nearby area to be designated by Wyoming Asphalt (the asphalt plant property owner). Excavated paper residuals containing petroleum-based odors will be placed in the landfill (and incorporated with the paper residuals placed under the final cover).

At this point in the design, whether groundwater will enter into the excavation and need to be removed from the excavation is unknown, but quite likely. The RA Contractor intends to collect the water to be containerized, characterized and disposed off-Site. However, at the discretion of the RA Contractor the water may be treated on-Site and discharged, as described the Section 6.0 of the Final Design Report and Section 4.1.7 of this report. If the RA Contractor changes the water management approved and on-Site disposal option is selected, this will be discussed/reviewed with U.S. EPA prior to implementation.

Paper residuals excavated from below the water table will be temporarily stockpiled immediately adjacent to the excavation area (within the silt fencing), where the material will be allowed to dewater (excess water can gravity-drain back into the excavation) prior to being transported to the landfill. After being transported to the landfill, if the paper residuals are still too wet to support additional fill, they may be spread in thin lifts (not exceeding 12 inches) and allowed to air-dry, mixed with mulched materials or dryer fill materials generated from the landfill grading activities, or mixed with solidification agents (e.g., Portland cement).

4.3.1.1 VERIFICATION SOIL SAMPLING ON THE MDNRE AND THE ASPHALT PLANT PROPERTIES

Upon completion of the excavation activities on the MDNRE property and the asphalt plant property, to the visual extent of the distinguishable paper residuals, samples of the native soil at the base of the excavation will be collected and analyzed to confirm the adequacy of the excavation activities. This verification sampling will be used to demonstrate completion with the Michigan Part 201 Generic Residential Cleanup Criteria (GRCC) pursuant to the MDEQ's Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria (STM; MDEQ, 2002).

Soil samples will be collected using a systematic random sampling strategy, as described in Section 6.2.3 of the Final Design Report and in accordance with the FSP and the PVSP.

4.3.1.2 RESTORATION OF DISTURBED AREAS

Once it is determined that the data quality objectives have been met on the MDNRE property, the asphalt plant properties and the wetlands located on the 12th Landfill property, the disturbed areas will be restored to a condition agreed upon between Weyerhaeuser and the MDNRE and Wyoming Asphalt, respectively. At a minimum, this will include placing fill, as needed, to promote positive drainage from the disturbed areas and the establishment of vegetation. Additional restoration activities may include the planting of trees on the MDNRE property to replace trees that need to be removed as part of the excavation activities and/or restoring the paved area on the asphalt plant property that may be disturbed, as described in the CQAP and Specifications (Appendix E of the Final Design Report).

4.3.2 GRADING PLAN

As described in Section 4.3 of the Final Design Report, during the Emergency Action in 2007, the entire eastern slope of the landfill along the Kalamazoo River was cut back to an approximately 5H:1V slope. A buffer zone was created along the former powerhouse channel by cutting back approximately 35 feet of the eastern slope of the landfill adjacent to the river. A clay barrier layer was also constructed along the base of the regraded eastern slope. Additional details regarding the landfill final cover are discussed in Section 6.4 of the Final Design Report.

Following the removal of the visible paper residuals / sediment in the channel, the riverbank from approximately elevation 698.0 to 702.5 feet M.S.L. was regraded to a 3H:1V slope and covered by riprap (D50 of 9 inches), installed over a geotextile fabric. Upslope of the riprap (approximately elevation 703.0 feet M.S.L.), 6 inches of topsoil were placed across the bench (approximately 703.0 feet M.S.L.). From elevation 702.5 to 707.0 feet M.S.L. on the regraded 5H:1V sideslope, 6 inches of general fill material were placed on the eastern sideslope, overlain by 6 inches of topsoil. The topsoil was then covered by erosion control matting (Enkamat®, which is a three-dimensional nylon turf reinforcement mat made of nylon filaments joined at the intersections).

The erosion control matting above elevation 702.5 feet M.S.L. will be removed and restored (i.e., reused) as part of the final landfill cover placement.

The remaining side slopes on the northern, eastern, and western sides of the landfill will be graded to a maximum of 4H:1V. The paper residuals along the MDNRE property and the asphalt plant property boundaries will be pulled back within the property line to provide the space required to build an access road / ditch around the base of the landfill (Detail 5 on Drawing C-11).

Based on the proposed grading plan (Drawing C-05 of the Final Design Report), and the results from the soil borings advanced into the landfill during the recently completed pre-design studies investigation, approximately 22,000 cy (see summary provided in Appendix M of the Final Design Report) of material will be cut from the existing landfill side slopes and relocated further into the landfill. Combined with the approximately 12,000 cy to be excavated from the off-Site areas, the landfill will be required to accommodate an additional 34,000 cy prior to capping. The relocated paper residuals will be placed on top of the existing landfill, as the northern, western, and southeastern landfill side slopes are cut back to 4H:1V slopes. The eastern landfill sideslope along the Kalamazoo River will remain at 5H:1V, while the southern sideslope along 12th Street will be graded to an 8H:1V slope. The top of the landfill will be graded to a minimum 5 percent slope. The approximate fill height after regrading (and placement of the 36-inch cover system) will be approximately 740 feet M.S.L., which is 7 feet higher than the current landfill and approximately 40 feet above the wetlands. As summarized in Appendix M of the Final Design Report, the total design volume beneath the cover system is approximately 36,000 cy, which is 2,000 cy more than the total excavation volume (off-Site and side slopes), thus allowing for some additional excavation based on the confirmatory / verification sampling results. (If the actual excavation volume exceeds the design fill volume of 36,000 cy, the subgrade and final contours will need to be adjusted accordingly).

4.3.3 FINAL LANDFILL COVER SYSTEM

Prior to constructing the final cover over the 5H:1V eastern sideslope, the existing 6-inch thick layer of topsoil along with the turf reinforcement mat (Enkamat®) that was installed during the Emergency Action in 2007, will be removed. The topsoil and Enkamat® were installed as an interim measure until the final cover was constructed.

The riprap and the clay barrier layer installed during the Emergency Action in 2007 will remain in place. The riprap and the clay barrier layer are permanent measures that will not be removed during the Remedial Action. Installation of these measures as part of the Emergency Action will allow for the rest of the final cover system to be installed above the elevation of the 2-year flood event (approximately 702.5 feet M.S.L.).

The final cover will be installed over approximately 6.8 acres of the 12th Street Landfill as described in the Final Design Report (as shown on Drawing C-03). The final cover components described in Section 6.4 of the Final Design Report will be placed in accordance with the requirements of the CQAP and the Specifications (Appendix E of the Final Design Report).

The final cover along the Kalamazoo River will tie into the clay barrier layer. The portion of the clay barrier layer that is disturbed as a result of tying the geomembrane barrier layer into the clay barrier layer will be reconstructed and tested in accordance with the CQAP and the Specifications. Prior to the connection of the final cover to the clay barrier layer along the Kalamazoo River, the portion of the north slope extending beyond the north limit of the previously constructed 5H:1V eastern sideslope (part of Emergency Action in 2007) will be relocated back on to the 12th Street Landfill during the other off-Site material (paper residuals) relocation activities.

As shown in Appendix F of the Final Design Report, the riprap was designed to provide protection from the flow velocity (5.7 feet per second) of the 500-year flood event. Previously, approximately 260 linear feet of riprap were installed along the Kalamazoo River as part of the Emergency Response Action performed in 2007. The riprap was installed over a geotextile fabric from the base of the river up to elevation 703.5 feet M.S.L. (the elevation of the access road along the riverfront is 703 feet M.S.L.).

Upslope of the riprap, for the entire length of the proposed landfill sideslope, erosion control matting (Enkamat®, which is a three-dimensional nylon turf reinforcement mat made of nylon filaments joined at the intersections) will be installed from approximate elevation 703 feet M.S.L. (top of riprap apron) to approximately 707 feet M.S.L.

(Drawing C-02 and Section I on Drawing C-11). Calculations contained in Appendix F show that the Enkamat® installed to an elevation of approximately 707 feet M.S.L. will meet the requirements of the ROD, which requires an erosion protection system to provide protection from a 500-year flood event and extend to a minimum elevation of 707.0 feet M.S.L.

4.3.4 SURFACE WATER MANAGEMENT

Temporary erosion and sedimentation controls will be installed prior to excavation and landfill grading activities and will be maintained until permanent erosion controls are in place. Temporary erosion and sedimentation controls will consist of silt fencing. Silt fence will be installed around the proposed excavation areas to prevent the potential migration of sediment from the limits of construction as a result of surface water runoff. Silt fence will be visually inspected in accordance with Section 7.2 of the Final Design Report. Trapped sediment will be excavated and placed into the landfill underneath the final cover. Sediment controls will be installed in accordance with the Specifications (Appendix E of the Final Design Report) and with the Guidebook of Best Management Practices for Michigan Watersheds (MDEQ, 1998).

In addition to the erosion protection along the eastern landfill sideslope (riprap and Enkamat®), erosion caused by surface water runoff from the rest of the landfill final cover will be minimized by vegetating the final grades. Estimates of erosion from the landfill, using the Revised Universal Soil Loss Equation, are presented in Appendix G of the Final Design Report.

Surface water runoff on the west side of the landfill will be directed by a combined access road / ditch that discharges into the on-Site wetland to the north. On the southern landfill slope, surface water will be diverted to the east through a shallow ditch that directs surface water around the MDNRE property, discharging to the Kalamazoo River (Drawing C-07 and Detail 7 on Drawing C-11). For the northern portion of the 12th Street Landfill, surface water will be allowed to sheet flow off the cover system into a combined shallow ditch / access road, with several V-notches in the outside of the ditch to allow discharge of the collected surface water into the wetlands to the north. The geocomposite drainage net that is part of the final cover will facilitate drainage of any infiltrating precipitation through the upper layers of the final cover soil to the perimeter ditches. As a result of the subsurface water controls and diversion of most of the surface water via shallow ditches around the perimeter of the landfill, the flow rate of surface water that may discharge onto the adjacent MDNRE property or asphalt plant property

from the remaining side slopes beyond the limits of the final cover will be significantly less than under current conditions.

The PCSWMM.net model (SWMM v.5.0.013) was used to calculate storm water flows at ditch inlet locations for both the 25-year and 100-year storm events. The model is a widely accepted hydrologic and hydraulic computer-modeling program based on the U.S. EPA's Storm Water Management Model (SWMM).

The storm water ditches were designed to convey the 24-hour / 25-year storm event, with additional modeling completed for the 24-hour / 100-year storm events. For efficiency, the access road and perimeter ditches have been integrated, which resulted in the dimensions of the road / ditch with a five-foot bottom width and 4H:1V side slopes. The bottoms of the ditches were modeled to include a stone bottom to protect from damage associated with vehicular traffic (ATV's for sampling, etc). To ensure that the stone material remains in place and does not erode under high flow conditions, a perforated Geoweb® material will be incorporated into the granular surface, holding the stone within its "honeycomb" structure.

The ditch outlets consist of depressions approximately every 200 feet along the outside edge of the ditch(es) with the complete outside perimeter along the northern section of the landfill armored with a turf reinforcement mat to protect against erosion. The ditch outlets will discharge to the wetland, with the extreme east end of the perimeter ditches discharging to the Kalamazoo River.

4.3.5 LANDFILL GAS MANAGEMENT

4.3.5.1 GAS SYSTEM

The passive LFG collection system construction will include the placement of a 6 inch select granular fill layer placed on top of the landfill as a suitable subgrade material for the final cover and a gas venting layer for the passive gas venting system. This layer will be capable of collecting landfill gas and conveying it to the passive venting system. Granular fill from an off Site source that has a minimum hydraulic conductivity of 1 x 10-2 cm / s, and that does not contain gravel, retained on the Number 4 sieve (for protection of the 40-mil LLDPE geomembrane above) will be used to construct the gas venting layer.

As described in Section 6.6.1 and the Specifications (Appendix E) of the Final Design Report, the passive gas vents will be spaced approximately 200 feet across the surface of the landfill. The gas vents will interface with the granular venting layer via a gravel pad at each of the gas vent locations. From the individual gravel pad locations, 4-inch polyvinyl chloride (PVC) schedule 40 riser pipes will be installed that will penetrate through the final cover liner system and vent any collected gas directly to the atmosphere. There are eleven (11) proposed gas vents for the 12th Street Landfill, or slightly more than one vent per acre.

In the event that during installation of the liner system it is noticed that gas build up beneath the liner is resulting in distress of the material, additional gas vents will be installed where required. To reduce the potential for distress of the liner system, the RA Contractor will install the liner system with the ability to immediately cover the liner with subsequent final cover soils to reduce the potential for gas build up beneath the liner material.

The passive gas vent locations will be monitored in accordance with the PSVP. Any modifications to the gas management system will be presented to the U.S. EPA for review and approval prior to implementation.

4.3.5.2 PERIMETER LANDFILL GAS MONITORING NETWORK

Following the construction of the final cover, gas monitoring probes will be installed along the southern side of the landfill property, along the boundaries with the MDNRE property and 12th Street, and along the boundaries with the asphalt plant property to the west. The probes will be spaced approximately every 500 feet at the locations shown on Drawing C-06 of the Final Design Report. A typical gas probe construction detail is shown in Detail 13 on Drawing C-12 of the Final Design Report. The landfill gas monitoring probes will be monitored in accordance with the OM&M Plan and the PSVP.

No gas probes will be installed along the northern boundary of the landfill since the wetlands act as a natural barrier to landfill gas migration. As well, the water within the vadose zone prevents the passage of gas through the soil. Also, the presence of water would severely hinder the installation of soil gas probes that could provide meaningful data along this side of the Site.

4.3.6 ACCESS/DITCH ROAD

An approximate 14-foot wide access road will be constructed around the much of the perimeter of the landfill and will be accessible from 12th Street. The access road is combined with the perimeter drainage ditches, with the bottom width being 5 feet to facilitate ATV vehicles for routine monitoring activities.

The access road will effectively be an extension of the cover system, except that the upper topsoil layer would be replaced with a granular stone layer, and will be constructed in accordance with the CQAP and the Specifications (Appendix E of the Final Design Report). The access road / ditch will be installed at a minimum elevation of 703 feet M.S.L. to allow for access during a 2-year flood event (702.5 feet M.S.L.). Along the Kalamazoo River on the eastern side of the landfill, there will be no ditch and the access road will continue as topsoil, plus Enkamat®, in order to provide a more aesthetic view from the river and from the walking paths in the potential future eco-park.

The access road / ditch will be widened approximately 3 feet at certain locations to allow for the installation of, and access to, gas probes and groundwater monitoring wells. A gate, designed to prevent vehicle access, will be installed at the access road entrance along 12th Street.

4.4 PROJECT CLOSEOUT

On completion of the remedial construction activities, all Site offices, construction facilities, and equipment will be decontaminated as necessary, and removed from the Site. The Site will be left in a clean and orderly condition.

5.0 POST CONSTRUCTION ACTIVITIES

The CD requires submittal of a draft OM&M Plan with the Final Design Report.

Following completion of remedial construction activities, the OM&M Plan will be finalized and submitted to U.S. EPA for final approval. A groundwater monitoring program will be established and maintained in accordance with the OU4 SOW included as Appendix E of the CD.

6.0 PROJECT MEETINGS, DOCUMENTATION, AND REPORTING

6.1 MONTHLY PROGRESS REPORTS

Three copies of monthly progress reports will be provided to the U.S. EPA and MDNRE as required by the CD and will include the following major items:

1. A description of the activities conducted during the period and results of data collection activities
2. Problems encountered during the period
3. Schedule variances and corrective actions, if necessary
4. A description of the projected activities for the next six to twelve week period

The progress reports will be submitted by the tenth day of every month until a Certification of Completion of Work is issued by the U.S. EPA.

If the date for submission of any item or notification required by the CD falls upon a weekend or state or federal holiday, the submission date will be extended until the next business day following the weekend or holiday.

6.2 MEETINGS

Project meetings, as detailed herein, will be held during the construction period, to ensure that tasks are accomplished according to schedule and that they are completed in accordance with the construction plans and specifications. These progress meetings will be attended by the CRA Project Manager, the CRA Project Coordinator, CRA Field Engineer, The RA Contractor's representatives, Weyerhauser, the U.S. EPA, and the MDNRE, as appropriate. Along with the following meetings detailed below, there will also be bi-weekly progress meetings which are detailed in the CQAP.

6.2.1 PRE-CONSTRUCTION INSPECTION AND MEETING

Purpose: To resolve any uncertainties in the remedial design plans, and to review levels of responsibility, reporting requirements, and health and safety requirements.

Present: CRA Project Manager, CRA Design Engineer, CRA Geotechnical Engineer, CRA Project Coordinator, CRA Field Engineer, RA Contractor Project Manager, Weyerhauser, U.S. EPA, and MDNRE.

Topics:

- Introduce each organization and Site personnel
- Review of general project scope and requirements specified in the Final Design Report and the Project Specifications
- Review of the CQA Plan, Site HASP, and any potential modifications to ensure that Site specific considerations are addressed
- Review the methods for documenting and reporting inspection data
- Review of project schedule
- Establish a schedule of meetings and briefings during construction
- Review of the roles and responsibilities of each organization and Site personnel
- Review lines of authority and communication
- Review procedures for processing field decisions, submittals, substitutions, applications for payment, proposal requests, field orders, work changes directives, change orders, and close out procedures
- Review temporary facilities and controls, field offices, security, and housekeeping procedures
- Review of the methods for distributing and storing documents and reports
- Identify procedures to resolve disputes or misunderstandings during construction
- Review of endpoint activities and procedures for project completion
- Conduct a Site walk around to verify that the Project Specifications are understood, and to review construction areas, and material and equipment storage locations

Minutes of the pre-construction inspection and meeting will be prepared and transmitted to Weyerhauser, the U.S. EPA, MDNRE, and CRA following the meeting.

For the purposes of this RAWP, the pre-final construction inspection and the pre-final certification inspection are considered the same.

6.2.2 PRE-CERTIFICATION INSPECTION MEETING

Within 30 days after construction completion the U.S. EPA and MDNRE will be notified for the purpose of conducting a Pre-Final Construction Inspection. Participants will include the CRA Project Manager, CRA Project Coordinator, CRA Field Engineer, the RA Contractor Project Manager, Weyerhauser, U.S. EPA, and MDNRE. The Pre-Final Construction Inspection will consist of a walk-through inspection of the entire Site. The objective of the inspection is to determine whether the project is complete and consistent with the RD and RA. A Pre-Certification Inspection Report will be submitted which outlines the outstanding construction items, actions required to resolve the items, anticipated completion dates for the items, and a proposed date for the Final Construction Inspection.

6.2.3 FINAL INSPECTION MEETING

Within 14 days after completion of all outstanding construction items identified in the Pre-Certification Inspection Report, the U.S. EPA and MDNRE will be notified for the purposes of conducting a Final Construction Inspection. The Final Construction Inspection will consist of a walk-through inspection of the entire Site. The Pre-Certification Inspection Report will be used as a check list with the Final Inspection focusing on the outstanding construction items identified in the Pre-Final Inspection. Confirmation will be made during the Final Inspection that all outstanding items have been resolved and the results will be presented in a Construction Completion Report.

6.3 FINAL CONSTRUCTION COMPLETION REPORT

Within 30 days after a successful Final Construction Inspection the Final Construction Completion Report will be submitted to the U.S. EPA. This report will document that the RA has been constructed in accordance with the design and specifications. The Final Construction Completion Report will include signature by the CD Project Coordinator with the following statement:

> "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

6.4 COMPLETION OF REMEDIAL ACTION REPORT

Within 30 days of a successful Final Inspection, a Completion of Remedial Action Report will be submitted to the U.S. EPA and MDNRE. The Completion of Remedial Action Report shall state the Remedial Action has been completed in full satisfaction of the requirements of the CD. The Completion of Remedial Action Report will include signature by the CD Project Coordinator with the following statement:

> "To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

The Completion of Remedial Action Report will also include the following items:

- Chronology of events
- Summary of RA activities
- Summary of the Pre-Certification Inspection
- As-built drawings signed and stamped by a professional engineer or architect for any additional work completed since the Final Construction Completion Report
- Explanation of any modifications to the RA not included in the Construction Completion Report and why the modifications were necessary for the project
- Presentation of performance standards along with explanation of any modifications to these criteria and why the modifications were necessary for the project
- Monitoring results indicating that the Site RA has met or exceeded the performance standards
- Summary of project costs

6.5 COMPLETION OF WORK REPORT

Within 30 days of a successful final inspection and/or completion of a long term remedial action, a Completion of Work Report will be submitted to the U.S. EPA and MDNRE. The Completion of Remedial Action Report will include signature by the CD Project Coordinator with the following statement:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

7.0 COMMUNITY RELATIONS

Weyerhaeuser and CRA will cooperate with the U.S. EPA and MDNRE in providing information regarding the progress of the RA at the Site to the public. Weyerhaeuser and CRA will participate in the preparation of appropriate information disseminated to the public and in public meetings which may be held or sponsored by the U.S. EPA or MDNRE to explain activities at or concerning the Site.

In addition, a Community Information Board (CIB) will be erected at the south end of the Site. The CIB will be periodically updated to reflect the progress of the RA. The CIB will contain the following items:

- A figure of the Site
- An enclosed message board
- A lockable mailbox for community correspondence related to concerns, questions, and / or comments regarding RA activities

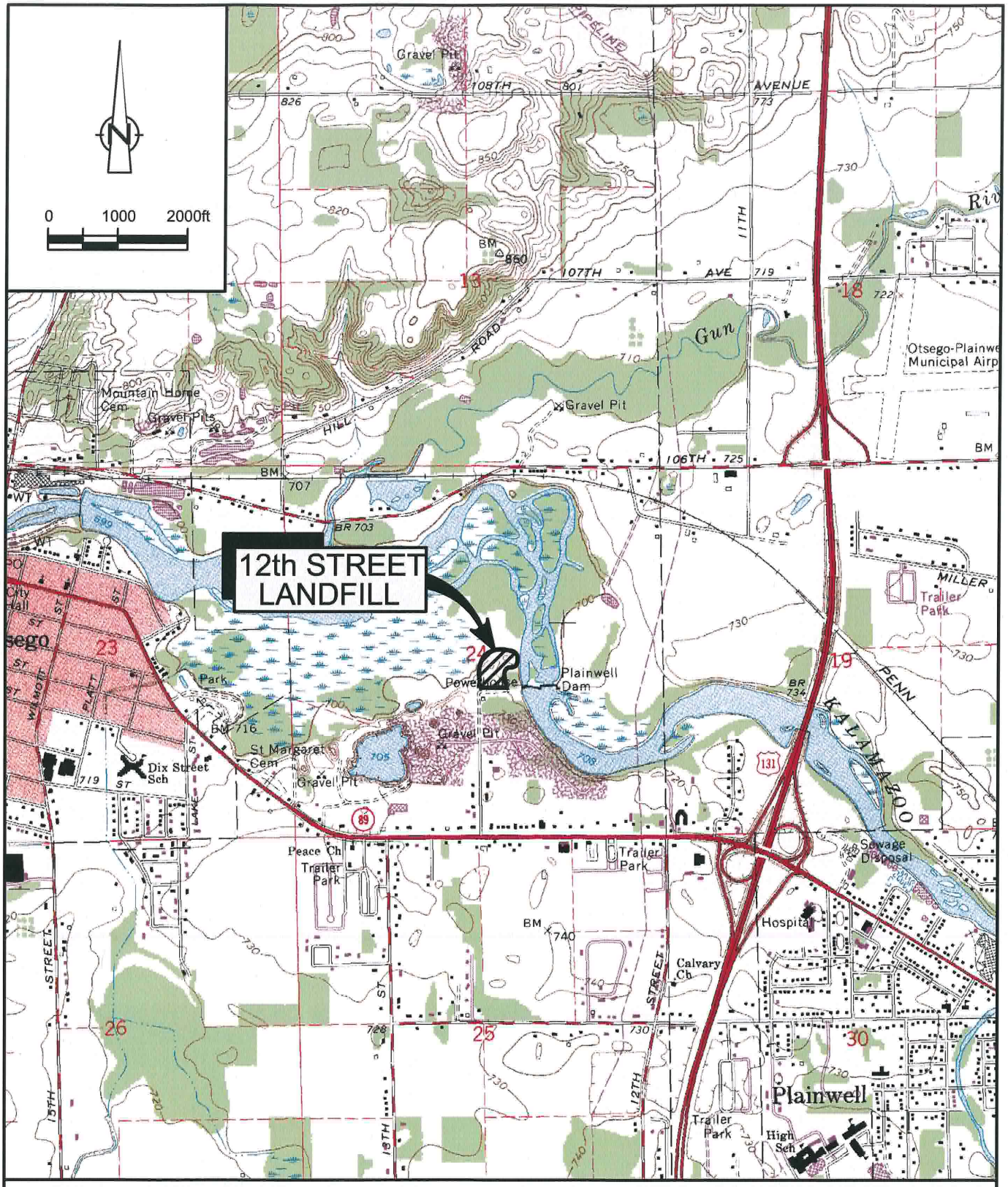
Information including scheduled Site activities, community meetings, progress reports and any other applicable Site related information will be made available by use of the CIB.

8.0 REMEDIAL ACTION SCHEDULE OF ACTIVITIES

Based on the schedule for implementation of the RA presented in the Final Design Report, an updated schedule has been created for this RAWP and is presented on Figure 8.1. The schedule will be updated as necessary throughout the implementation of the RA. Figure 8.1 omits the monthly progress reporting as this task is reoccurring over the long term. Monthly progress reports will be provided to the U.S. EPA by the 10th day of each month.

A final Remedial Action Inspection for Remedial Action Completion will be conducted on completion of all RA activities, excluding long-term monitoring. A Completion of Remedial Action Report will be submitted to the U.S. EPA and MDNRE 30 days after the final RA inspection.

A Completion of Work Report will be submitted on conclusion that all phases of work, including all long term monitoring have been completed. A Completion of Work Report will be submitted to the U.S. EPA and MDNRE 30 days after the inspection.

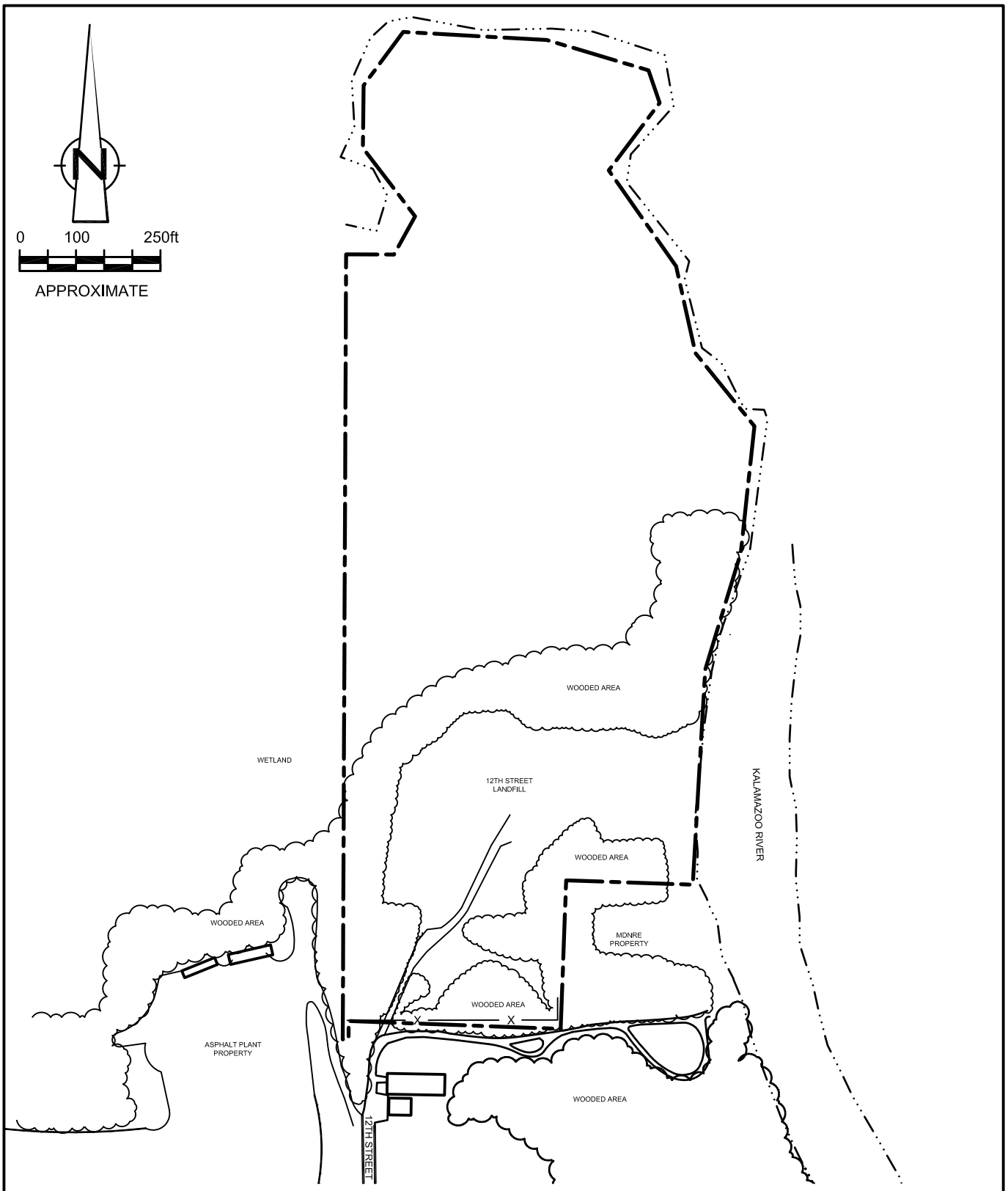


SOURCE: USGS QUADRANGLE MAP;
OTSEGO, MICHIGAN
1967, REVISED 1973

figure 1.1

SITE LOCATION
12TH STREET LANDFILL SITE
Otsego Township, Michigan

056393-00(006)GN-SC001 MAR 08/2010



LEGEND

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE SHORELINE

FENCELINE

figure 1.2

SITE PLAN
12TH STREET LANDFILL SITE
Otsego Township, Michigan

056393-00(006)GN-SC002 MAR 08/2010

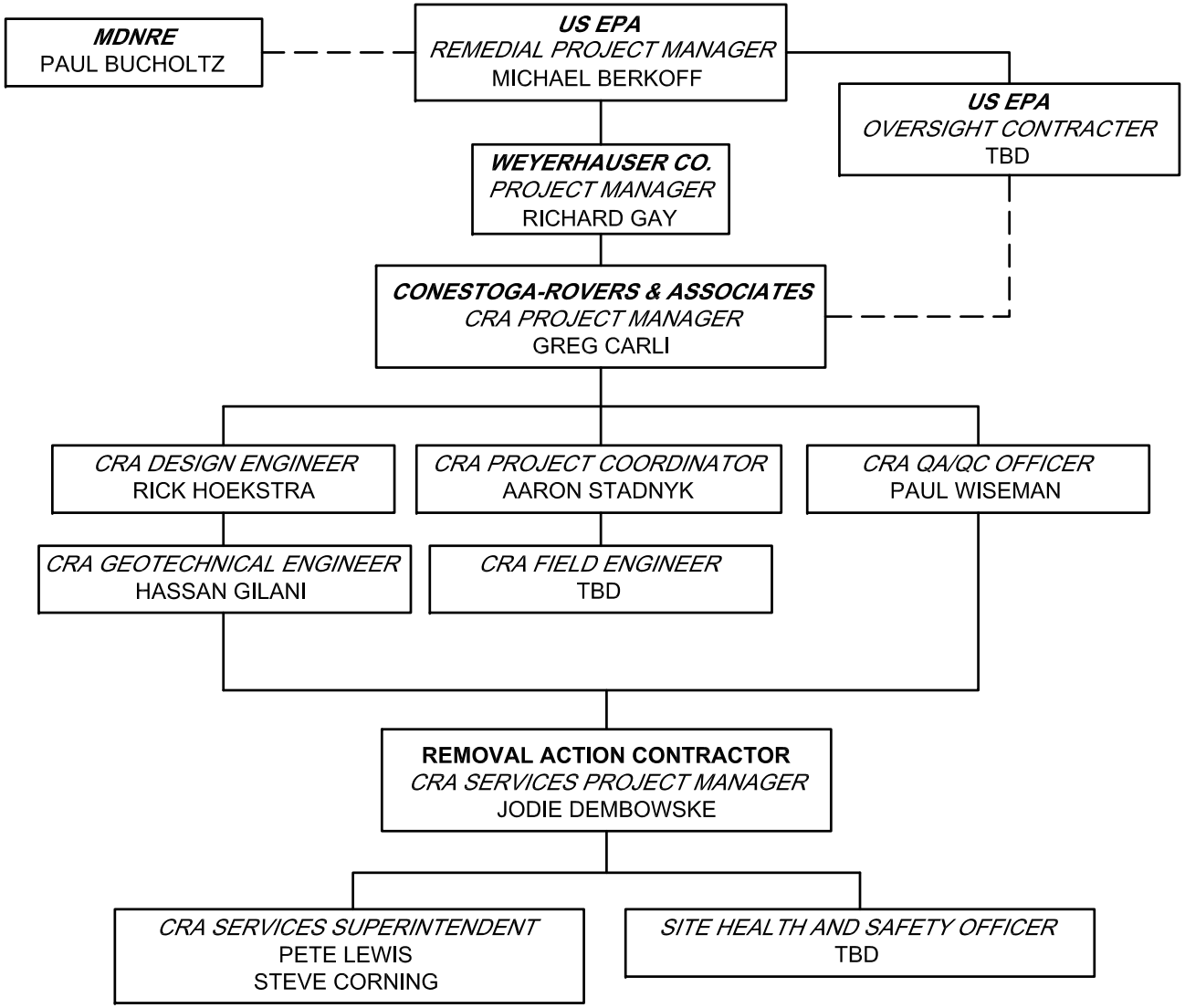


figure 2.1

REMEDIAL ACTION PROJECT ORGANIZATION
12TH STREET LANDFILL SITE
Otsego Township, Michigan

056393-00(006)GN-SC004 APR 06/2010

CONESTOGA-ROVERS & ASSOCIATES
Proudly serving our Clients since 1976

FIGURE 8.1
CONSTRUCTION SCHEDULE*
12th STREET LANDFILL SITE
Otsego Township, Michigan

ID	Task Name	Duration	Start	Finish
1	**2010**	**202 days**	**3/10/10**	**11/15/10**
2	REMEDIAL ACTION WORK PLAN (RAWP) SUBMITTAL	0 days	3/10/10	3/10/10
3	U.S. EPA RAWP Review Period	16 days	3/11/10	4/2/10
4	FINALIZE RAWP	5 days	4/5/10	4/9/10
5	PRE-CONSTRUCTION INSPECTION	0 days	4/21/10	4/21/10
6	PREMOBILIZATION/PERMITTING ACTIVITIES	24 days	3/15/10	4/16/10
7	MOBILIZATION	5 days	4/19/10	4/23/10
8	TEMPORARY CONTROLS/SITE CLEARING/SITE PREPARATION	24 days	4/19/10	5/17/10
9	RELOCATE WASTE/REGRADING AND BACKFILL SURROUNDING AREAS	72 days	5/18/10	8/12/10
10	LANDFILL REGRADING/ 6" COVER OF CLEAN FILL	11 days	8/13/10	8/25/10
11	INSTALL GAS COLLECTION SYSTEM/DRAINAGE LAYER	8 days	8/26/10	9/3/10
12	LINER INSTALLATION/GRANULAR COVER	33 days	9/3/10	10/13/10
13	TOPSOIL/VEGETATIVE LAYER	23 days	10/14/10	11/9/10
14	DEMOBILIZATION	5 days	11/10/10	11/15/10
15	INSTALL GAS PROBES AND MONITORING WELLS	3 days	11/8/10	11/10/10

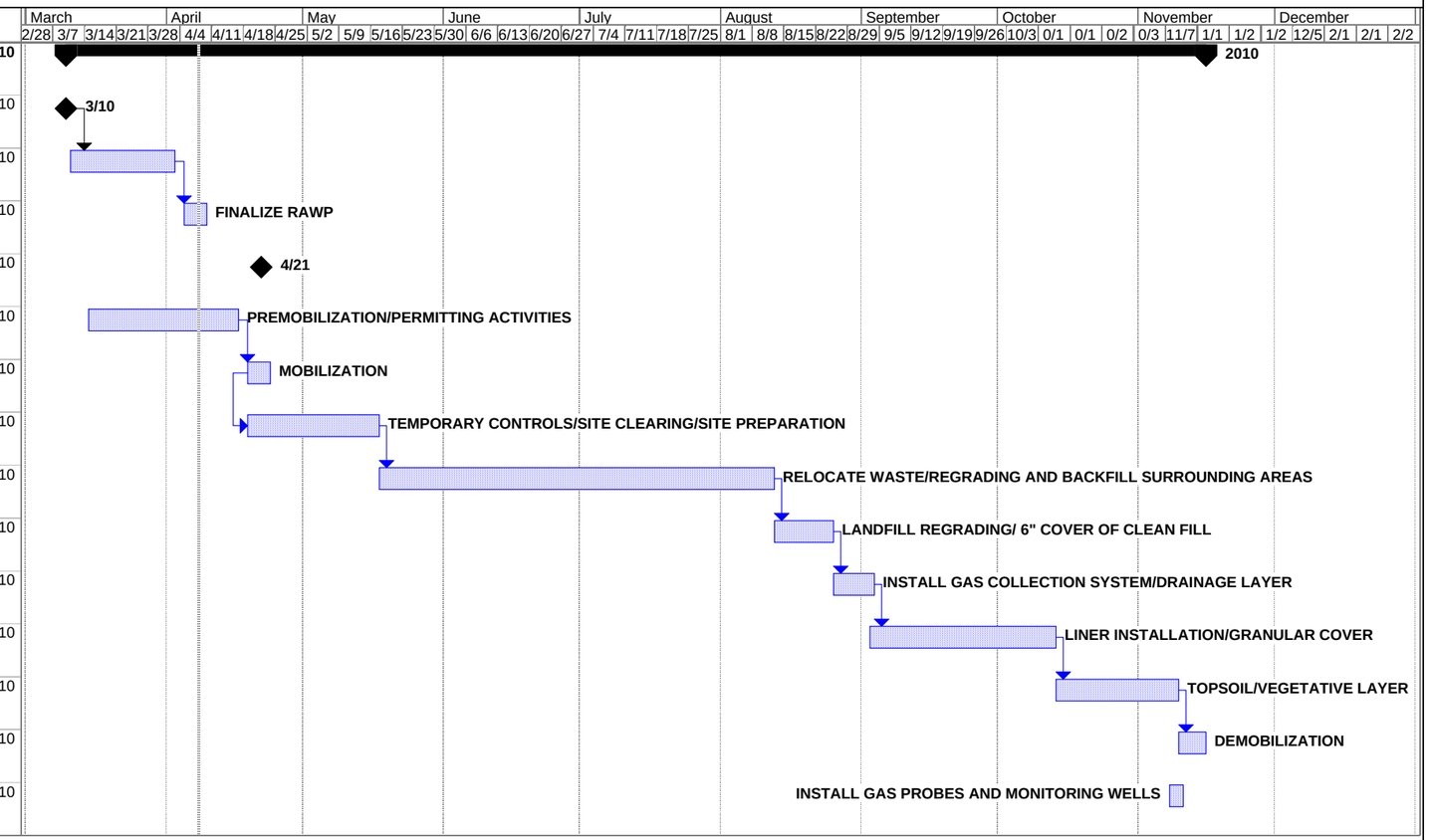


FIGURE 8.1

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

***Schedule subject to project sequencing.**

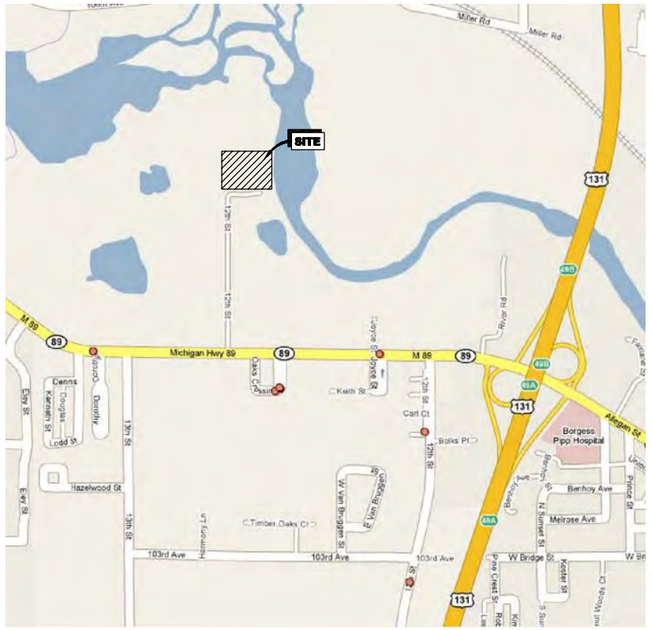
TABLE 2.1

PROJECT PERSONNEL CONTACT INFORMATION
REMEDIAL ACTION WORK PLAN
12TH STREET LANDFILL SITE
OTSEGO TOWNSHIP, MICHIGAN

Name	Company / Position	Phone	Fax	Mobile	Email
Michael Berkoff	U.S. EPA / Remedial Project Manager	(312)-353-8983	(312)-582-5160	-	berkoff.michael@epamail.epa.gov
Paul Bucholtz	MDNRE	(517)-373-8174	-	-	bucholtzp@michigan.gov
TBD	U.S. EPA Oversight Contractor	-	-	-	-
Richard Gay	Weyerhauser Company	(501)-624-8554	-	(501)-545-0310	richard.gay@weyerhauser.com
Greg Carli	CRA / Project Manager	(905)-682-0510	(905)-682-8818	(905)-687-1402	gcarli@craworld.com
Rick Hoekstra	CRA / Design Team	(519)-884-0510	(519)-884-0526	(519)-588-5143	rhoekstra@craworld.com
Aaron Stadnyk	CRA / Project Coordinator	(519)-884-0510	(905)-682-8818	(905)-971-6457	astadnyk@craworld.com
Hasan Gilani	CRA / Geotechnical Engineer	(519)-725-9328	(519)-884-0520	-	hgilani@inspecsol.com
Paul Wiseman	CRA / QA/QC Officer	(734)-453-5123	(734)-453-5201	(734)-660-4210	pwiseman@craworld.com
Jodie Dembowske	CRA Services / Project Manager	(269)-344-1230	(269)-344-8558	(269)-217-1171	jdembowske@craworld.com
Wayne Bauman	CRA Services / Project Director	(269)-344-1230	(269)-344-8558	(269)-217-1171	wbauman@craworld.com
Steve Corning	CRA Services / Superintendant	(269)-344-1230	(269)-344-8558	(269)-207-3393	scorning@craworld.com
Pete Lewis	CRA Services / Surperintendent	(412)-963-7313	(412)-963-7314	(412)-973-9417	plewis@craworld.com
TBD	Site Health and Safety Officer	-	-	-	-

APPENDIX A

ISSUED FOR CONSTRUCTION DESIGN DRAWINGS



SOURCE: GOOGLE MAPS

KEY MAP
1:1000

DRAWING INDEX

DWG. No.	REV. No.	DATE	TITLE
C-01	0	MARCH 2010	EXISTING SITE CONDITIONS
C-02	0	MARCH 2010	SITE WORKS
C-03	0	MARCH 2010	SOIL EROSION AND SEDIMENT CONTROL PLAN
C-04	0	MARCH 2010	SOIL EROSION AND SEDIMENT CONTROL DETAILS
C-05	0	MARCH 2010	SUBGRADE CONTOUR PLAN
C-06	0	MARCH 2010	PASSIVE GAS MANAGEMENT SYSTEM
C-07	0	MARCH 2010	FINAL CONTOUR PLAN
C-08	0	MARCH 2010	CROSS SECTIONS I
C-09	0	MARCH 2010	CROSS SECTIONS II
C-10	0	MARCH 2010	CROSS SECTIONS III
C-11	0	MARCH 2010	DETAILS I
C-12	0	MARCH 2010	DETAILS II

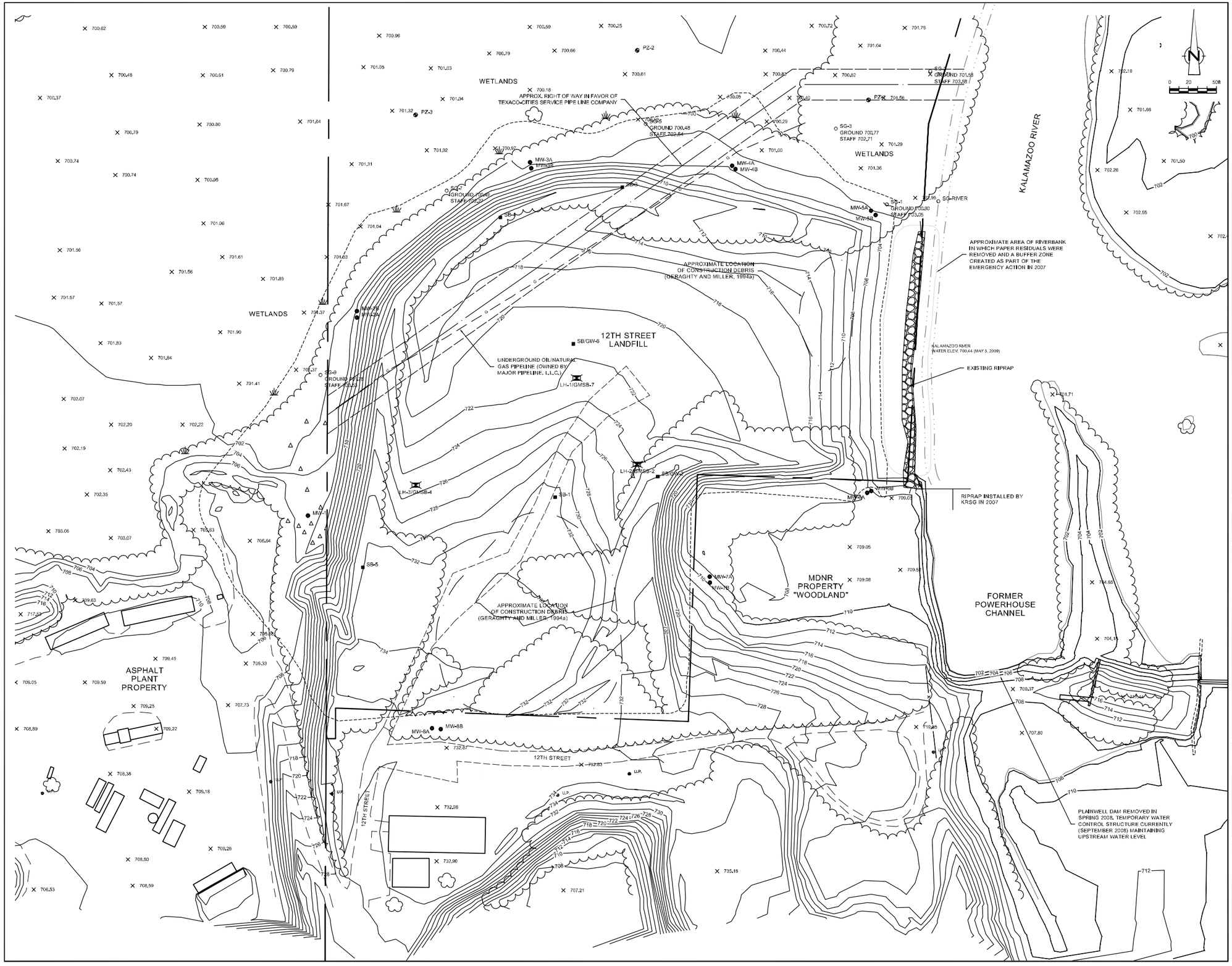
DESIGN DRAWINGS

FINAL DESIGN REPORT

12th STREET LANDFILL
Otsego Township, Michigan

CONESTOGA-ROVERS & ASSOCIATES

56393-05(005)GN-WA001 APR 07/2010



No	Revision	Date	Initial

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING GROUND CONTOUR ELEVATION
- EXISTING SPOT ELEVATION
- EXISTING TREES AND/OR BRUSH
- EXISTING WET AREA AND WETLAND
- EXISTING EDGE OF WATER
- EXISTING LIMITS OF PAPER RESIDUALS
- APPROXIMATE LIMITS OF CONSTRUCTION DEBRIS
- MW-1 EXISTING MONITORING WELL LOCATION
- PZ-2 EXISTING PIEZOMETER LOCATION
- LH-1/GMSB-7 EXISTING LEACHATE HEAD WELL LOCATION
- SG-1 EXISTING STAFF GAUGE
- EXISTING VANE SHEAR TEST LOCATION
- SB-5 EXISTING INSPEC-SOL SOIL BORING LOCATION
- SB/GW-6 EXISTING INSPEC-SOL SOIL BORING LOCATION/GAS WELL

NOTES:

1. BOUNDARY AND TOPOGRAPHIC SURVEY COMPLETED BY PREIN & NEWHOFF ON MAY 19, 2009.
2. THE APPROXIMATE LIMITS OF VISIBLE PAPER RESIDUALS WERE DERIVED FROM THE ALLIED PAPER, INC./PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, (G & M 1994b) AND REVISED BASED ON THE U.S.EPA'S 2003 PREDESIGN INVESTIGATION (U.S. EPA, 2004), THE EMERGENCY ACTIONS PERFORMED ALONG THE RIVERBANK IN 2007 (RMT, 2008b), AND THE PREDESIGN INVESTIGATION CONDUCTED IN JUNE 2008 (COPIED IN APPENDIX A OF THIS REPORT).
3. THE OIL/NATURAL GAS PIPELINE IS CURRENTLY (SEPTEMBER 2008) INACTIVE. IT WAS BURIED IN NATIVE SOIL PRIOR TO DISPOSAL OF PAPER RESIDUALS IN THE LANDFILL. THIS PIPELINE IS BURIED BELOW GRADE.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED FOR CONSTRUCTION	APR. 7, 2010	CRH
ISSUED FOR EPA SUBMISSION (FINAL)	MAR. 12, 2010	CRH

12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

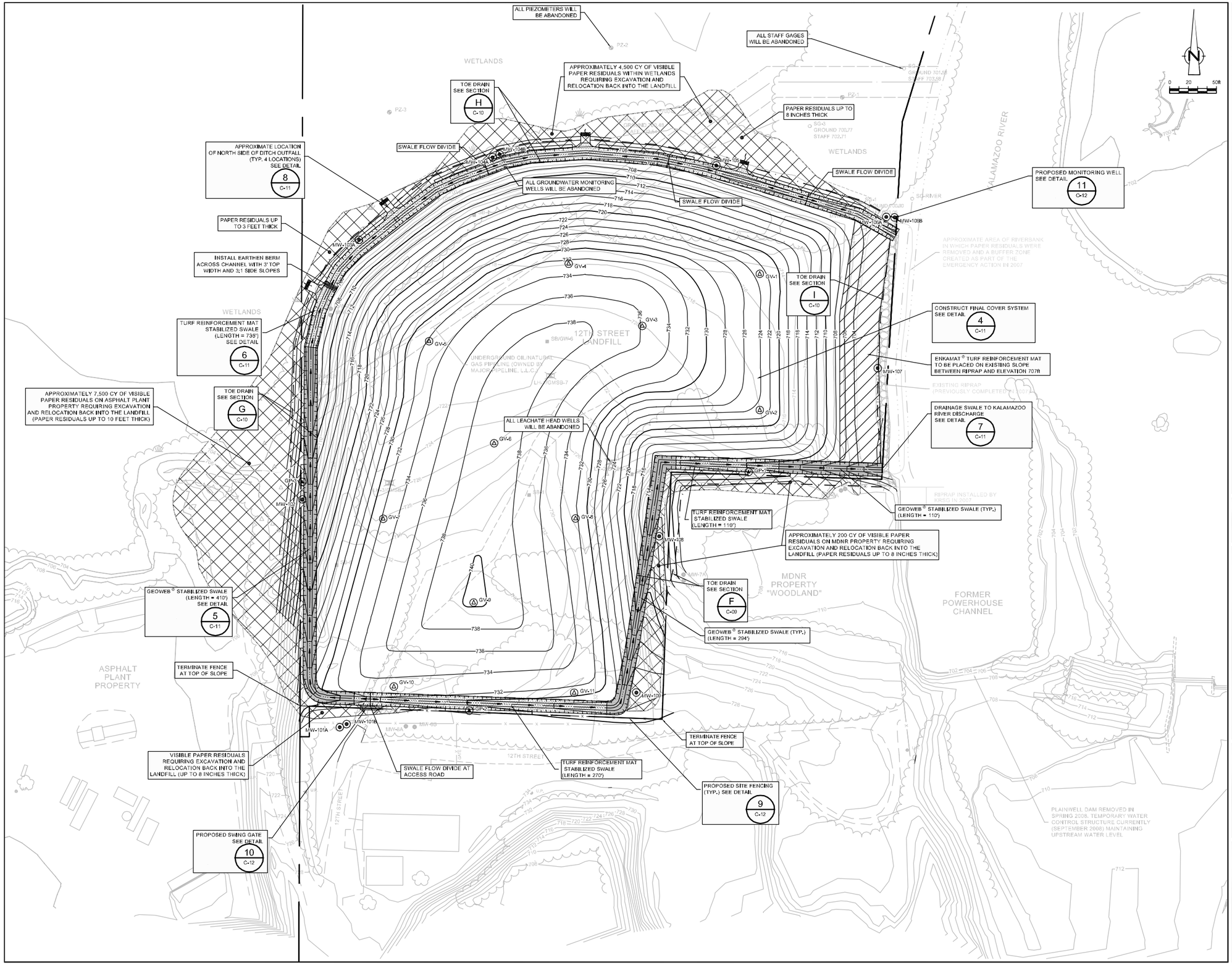
EXISTING SITE CONDITIONS

CONESTOGA-ROVERS & ASSOCIATES

Source References: BASE ADAPTED FROM PREVIOUS RMT DESIGN

Project Manager:	Reviewed By:	Date:	
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale:	Project No:	Report No:	Drawing No:
1" = 50'-0"	56393-05	005	C-01

56393-05(005)CI-WA001 APR 07/2010



NO	Revision	Date	Initial

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING GROUND ELEVATION CONTOUR
- EXISTING TREES AND/OR BRUSH
- EXISTING WET AREA AND WETLAND
- EXISTING EDGE OF WATER
- EXISTING LIMITS OF PAPER RESIDUALS
- MW-1 EXISTING MONITORING WELL LOCATION (TO BE ABANDONED)
- PZ-2 EXISTING PIEZOMETER LOCATION (TO BE ABANDONED)
- LH-1/GMSB-7 EXISTING LEACHATE HEAD WELL LOCATION (TO BE ABANDONED)
- SG-1 EXISTING STAFF GAUGE (TO BE ABANDONED)
- EXISTING VANE SHEAR TEST LOCATION
- SB-5 EXISTING INSPEC-SOL SOIL BORING LOCATION
- EXISTING PAPER RESIDUALS (TO BE RELOCATED ON SITE)
- 718 PROPOSED FINAL ELEVATION CONTOURS
- PROPOSED FENCE
- PROPOSED ROAD/DRAINAGE SWALE c/w TURF REINFORCEMENT MAT
- PROPOSED ROAD/DRAINAGE SWALE STABILIZED WITH GEOWEB
- PROPOSED DRAINAGE SWALE OUTFALLS
- MW-108B PROPOSED MONITORING WELL
- GV-1 PROPOSED GAS VENT
- GP-2 PROPOSED GAS PROBE
- PROPOSED TOE DRAIN

NOTES:

1. TWO CHANNEL LINING TYPES ARE PROPOSED. GEOWEB STABILIZED SWALE ARE PROPOSED FOR CHANNEL GRADES GREATER THAN 3.0%. ALL OTHER CHANNEL AREAS WILL BE LINED WITH PERMANENT TURF REINFORCEMENT MAT.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED FOR CONSTRUCTION	APR. 7, 2010	CRH
ISSUED FOR EPA SUBMISSION (FINAL)	MAR. 12, 2010	CRH

12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

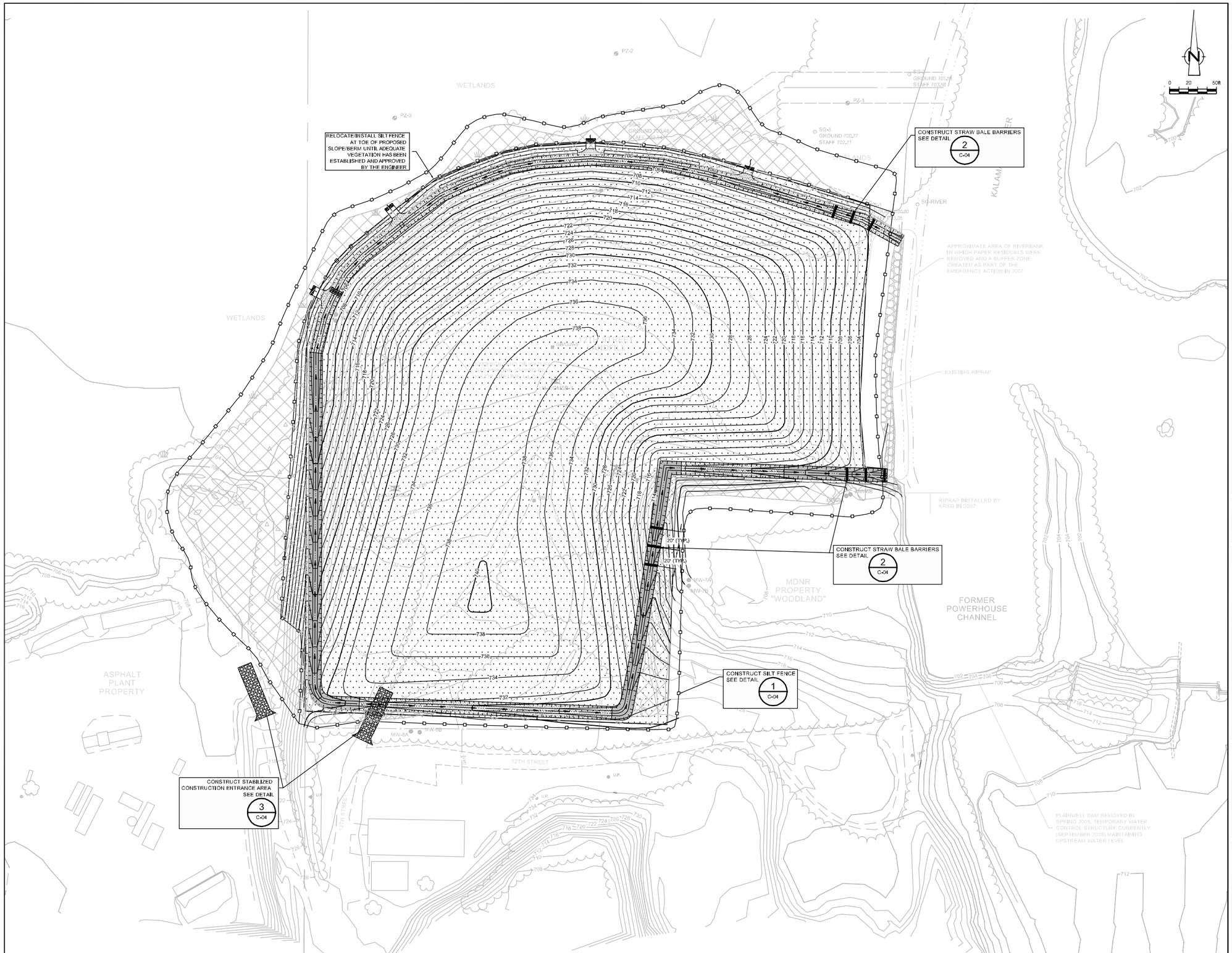
SITE WORKS

CONESTOGA-ROVERS & ASSOCIATES

Source References:
BASE ADAPTED FROM PREVIOUS RMT DESIGN

Project Manager:	Reviewed By:	Date:	
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: 1" = 50'-0"	Project No: 56393-05	Report No: 005	Drawing No: C-02

56393-05(005)CI-WA002 APR 07/2010



No	Revision	Date	Initial

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- 700 EXISTING GROUND ELEVATION CONTOUR
- EXISTING TREES AND/OR BRUSH
- EXISTING WET AREA AND WETLAND
- EXISTING EDGE OF WATER
- EXISTING LIMITS OF PAPER RESIDUALS
- MW-1 EXISTING MONITORING WELL LOCATION (TO BE ABANDONED)
- PZ-2 EXISTING PIEZOMETER LOCATION (TO BE ABANDONED)
- LH-1/GMSB-7 EXISTING LEACHATE HEAD WELL LOCATION (TO BE ABANDONED)
- SG-1 EXISTING STAFF GAUGE (TO BE ABANDONED)
- EXISTING VANE SHEAR TEST LOCATION
- SB-5 EXISTING INSPEC-SOL SOIL BORING LOCATION
- EXISTING PAPER RESIDUALS (TO BE RELOCATED ON SITE)
- 718 PROPOSED FINAL ELEVATION CONTOURS
- PROPOSED SILT FENCE
- PROPOSED ROAD/DRAINAGE SWALE c/w TURF REINFORCEMENT MAT
- PROPOSED ROAD/DRAINAGE SWALE STABILIZED WITH GEOWEB
- PROPOSED STRAW BALE BARRIERS
- PROPOSED CONSTRUCTION ENTRANCE
- PROPOSED LIMITS OF CAPPING
- PROPOSED DRAINAGE SWALE OUTFALLS
- PROPOSED FENCE

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED FOR CONSTRUCTION	APR. 7, 2010	CRH
ISSUED FOR EPA SUBMISSION (FINAL)	MAR. 12, 2010	CRH

12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

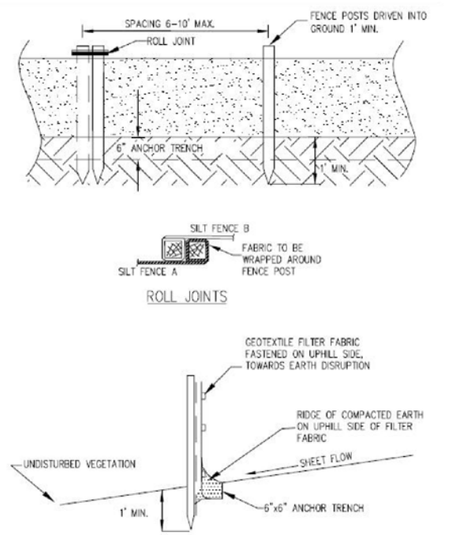
SOIL EROSION AND SEDIMENT CONTROL PLAN

CONESTOGA-ROVERS & ASSOCIATES

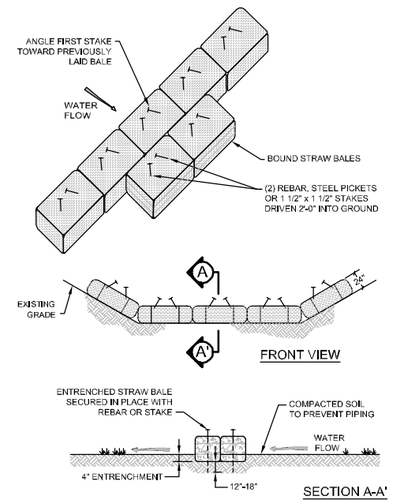
Source References:
BASE ADAPTED FROM PREVIOUS RMT DESIGN

Project Manager:	Reviewed By:	Date:	
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: 1" = 50'-0"	Project No: 56393-05	Report No: 005	Drawing No: C-03

56393-05(005)CI-WA003 APR 07/2010



DETAIL 1 (C-03) SILT FENCE
NTS



NOTE:
INSTALL SECOND ROW OF STRAW BALES IN BOTTOM OF SWALE ONLY.

DETAIL 2 (C-03) STRAW BALE BARRIER
NTS

GENERAL NOTES FOR SOIL EROSION AND SEDIMENT CONTROL

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION AND MAINTENANCE OF SOIL EROSION AND SEDIMENT CONTROL FACILITIES DURING CONSTRUCTION

2. AFTER THE PROJECT HAS BEEN COMPLETED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL PERMANENT SOIL EROSION AND SEDIMENT CONTROL MEASURES ARE IN PROPER WORKING CONDITION

3. SOIL EROSION AND SEDIMENT CONTROL SHALL INCLUDE, BUT NOT BE LIMITED TO, THE ABOVE MEASURES. THE CONTRACTOR SHALL BE RESPONSIBLE TO CORRECT ANY OMISSIONS, ERRORS, OR SUBSEQUENT FIELD OPERATION WHICH MIGHT DEVIATE FROM THE INTENT OF THIS PLAN. THE CONTRACTOR SHALL CORRECT SAID OMISSIONS, ERRORS OR FIELD OPERATION, IMMEDIATELY AND IN ACCORDANCE WITH THE ABOVE MENTIONED GUIDELINES.

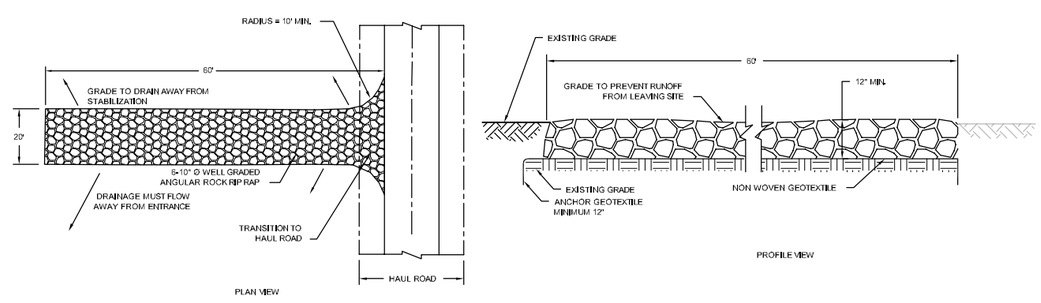
4. WHENEVER SEDIMENTATION IS CAUSED BY STRIPPING VEGETATION, REGRADING OR OTHER DEVELOPMENT, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE IT FROM ALL ADJOINING SURFACES, DRAINAGE SYSTEMS AND WATERCOURSES AND TO REPAIR ANY DAMAGE AS QUICKLY AS POSSIBLE.

5. DURING CONSTRUCTION, THE SITE SHALL BE MAINTAINED AND LEFT EACH DAY IN A SAFE AND SANITARY MANNER AND ANY CONDITION WHICH COULD LEAD TO PERSONAL INJURY OR PROPERTY DAMAGE SHALL BE IMMEDIATELY CORRECTED BY THE CONTRACTOR.

6. PRIOR TO OR DURING CONSTRUCTION, THE ENGINEER MAY REQUIRE THE INSTALLATION OR CONSTRUCTION OF IMPROVEMENTS TO PREVENT OR CORRECT TEMPORARY CONDITIONS ON THE SITE WHICH COULD CAUSE PERSONAL INJURY, DAMAGE TO PROPERTY OR CONSTITUTE A HEALTH HAZARD. THESE CONDITIONS MAY RESULT FROM EROSION OR LANDSLIDE, FLOODING, HEAVY CONSTRUCTION TRAFFIC, CREATION OF STEEP GRADES OR POLLUTION. IMPROVEMENTS MAY INCLUDE BERMS, GRADING, PLANTING, CULVERTS, PIPES, TEMPORARY ROADS, AND OTHER MEASURES APPROPRIATE TO THE SPECIFIC CONDITION. ALL TEMPORARY IMPROVEMENTS SHALL REMAIN IN PLACE AND IN OPERATION UNTIL OTHERWISE DIRECTED BY THE ENGINEER.

7. THE CONTRACTOR SHALL EXERCISE CARE SO AS NOT TO TRACK MUD OR DEBRIS INTO ADJACENT OFF-SITE OR ON-SITE ROADS. THE ROADWAY SHALL BE SWEPT CLEAN DAILY OR AS NEEDED. PUBLIC ROADS SHALL BE MAINTAINED FREE OF MUD OR DEBRIS. LOOSE DEBRIS WILL BE REMOVED AT THE CONSTRUCTION ENTRANCE.

8. THE CONTRACTOR SHALL TAKE NECESSARY MEASURES TO ENSURE SURFACE WATER IS CONTROLLED ADEQUATELY TO PREVENT FLOODING IN WORK AREAS. THE CONTRACTOR MAY NEED TO IMPLEMENT ADDITIONAL SURFACE WATER CONTROL FEATURES SUCH AS UP-STREAM DIVERSION BERMS.



DETAIL 3 (C-03) STABILIZED CONSTRUCTION ENTRANCE
NTS

N2	Revision	Date	Initial

SCALE VERIFICATION
THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

ISSUED FOR CONSTRUCTION	APR. 7, 2010	CRH
ISSUED FOR EPA SUBMISSION (FINAL)	MAR. 12, 2010	CRH
Status	Date	Initial

12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

SOIL EROSION AND SEDIMENT CONTROL DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source References

Project Manager:	Reviewed By:	Date:	
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: AS SHOWN	Project N #: 56393-05	Report N #: 005	Drawing N #: C-04

56393-05(005)CI-WA004 APR 07/2010

Nº	Revision	Date	Initial

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- 700 EXISTING GROUND ELEVATION CONTOUR
- EXISTING TREES AND/OR BRUSH
- EXISTING WET AREA AND WETLAND
- EXISTING EDGE OF WATER
- EXISTING LIMITS OF PAPER RESIDUALS
- MW-1 EXISTING MONITORING WELL LOCATION (TO BE ABANDONED)
- PZ-2 EXISTING PIEZOMETER LOCATION (TO BE ABANDONED)
- LH-1/GMSB-7 EXISTING LEACHATE HEAD WELL LOCATION (TO BE ABANDONED)
- SG-1 EXISTING STAFF GAUGE (TO BE ABANDONED)
- EXISTING VANE SHEAR TEST LOCATION
- SB-5 EXISTING INSPEC-SOL SOIL BORING LOCATION
- 718 PROPOSED SUBGRADE ELEVATION CONTOURS
- PROPOSED ROAD/DRAINAGE SWALE c/w TURF REINFORCEMENT MAT
- PROPOSED ROAD/DRAINAGE SWALE STABILIZED WITH GEOWEB

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
ISSUED FOR CONSTRUCTION	APR. 7, 2010	CRH
ISSUED FOR EPA SUBMISSION (FINAL)	MAR. 12, 2010	CRH

12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

SUBGRADE CONTOUR PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source References:

BASE ADAPTED FROM PREVIOUS RMT DESIGN

Project Manager:	Reviewed By:	Date:	
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: 1" = 50'-0"	Project Nº: 56393-05	Report Nº: 005	Drawing Nº: C-05

56393-05(005)CI-WA005 APR 07/2010

Nº	Revision	Date	Initial

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- 700 EXISTING GROUND ELEVATION CONTOUR
- EXISTING TREES AND/OR BRUSH
- EXISTING WET AREA AND WETLAND
- EXISTING EDGE OF WATER
- EXISTING LIMITS OF PAPER RESIDUALS
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- SG-1 EXISTING STAFF GAUGE (TO BE ABANDONED)
- EXISTING VANE SHEAR TEST LOCATION
- SB-5 EXISTING INSPEC-SOL SOIL BORING LOCATION
- 718 PROPOSED SUBGRADE ELEVATION CONTOURS
- GV-1 PROPOSED GAS VENT
- GP-2 PROPOSED GAS PROBE

NOTE:

1. PASSIVE VENT STRIPS TO BE SPACED AS SHOWN OR AT APPROXIMATELY 200-FOOT CONTERS AROUND LANDFILL PERIMETER.

SCALE VERIFICATION

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Approved

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12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

PASSIVE GAS MANAGEMENT SYSTEM

CONESTOGA-ROVERS & ASSOCIATES

Source References:
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G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: 1" = 50'-0"	Project Nº: 56393-05	Report Nº: 005	Drawing Nº: C-06

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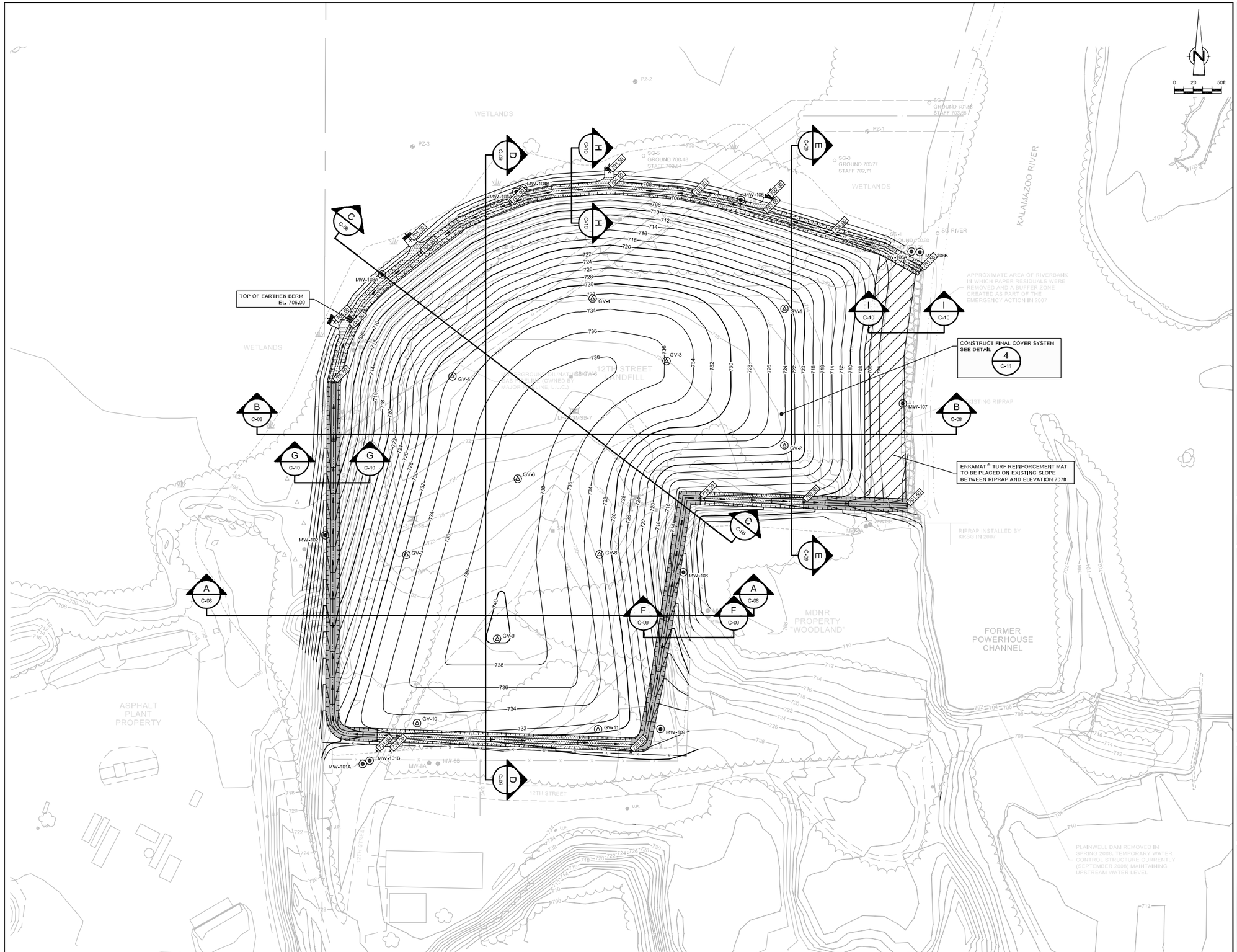

No	Revision	Date	Initial

LEGEND

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- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
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- SB-5 EXISTING INSPEC-SOL SOIL BORING LOCATION
- EXISTING VANE SHEAR TEST LOCATION
- 718 PROPOSED FINAL ELEVATION CONTOURS
- PROPOSED ROAD/DRAINAGE SWALE c/w TURF REINFORCEMENT MAT
- PROPOSED ROAD/DRAINAGE SWALE STABILIZED WITH GEOWEB
- PROPOSED GAS VENT
- MW-109B PROPOSED MONITORING WELL

NOTE:

1. ALL PROPOSED CONTOURS AND INVERT ELEVATIONS ARE TO BE CONFIRMED IN THE FIELD, PRIOR TO CONSTRUCTION, AND VERIFIED THAT THEY CONFORM WITH THE INTENT OF THE DESIGN.

SCALE VERIFICATION

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Otsego Township, Michigan

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FINAL
CONTOUR PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
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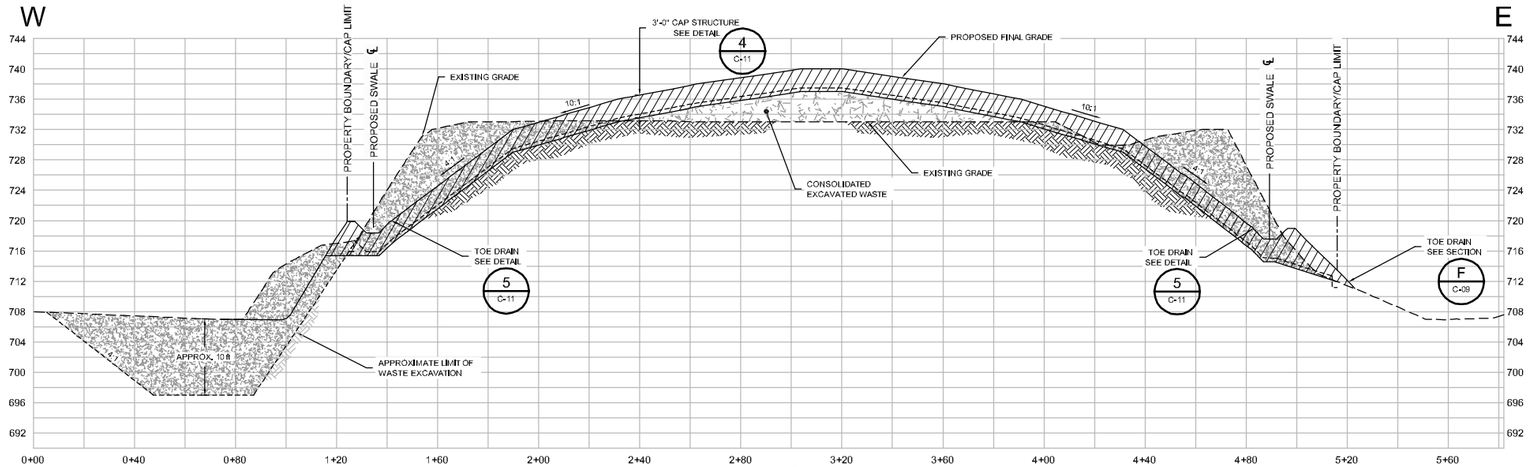
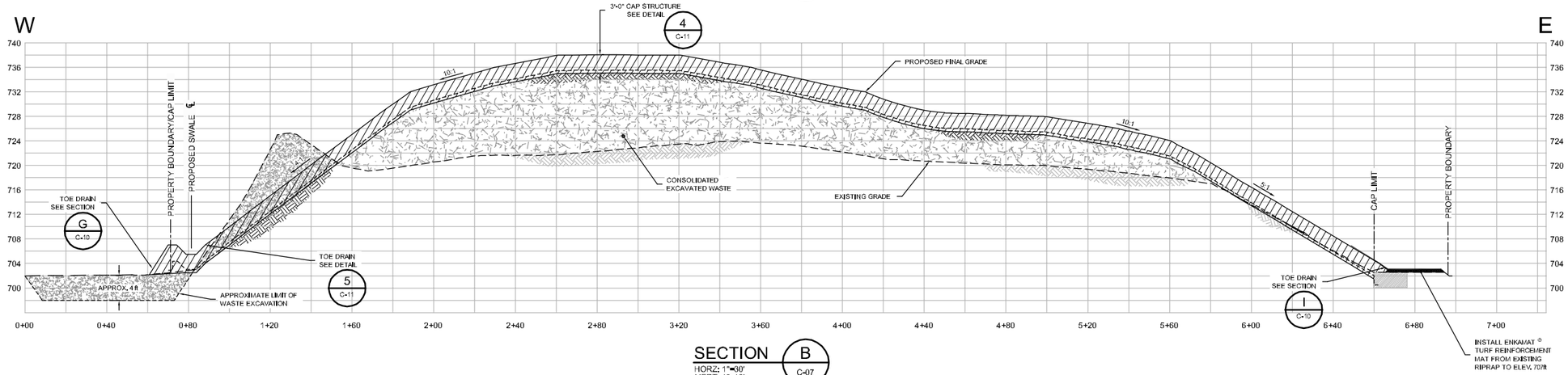
Scale: 1" = 50'-0"	Project No: 56393-05	Report No: 005	Drawing No: C-07

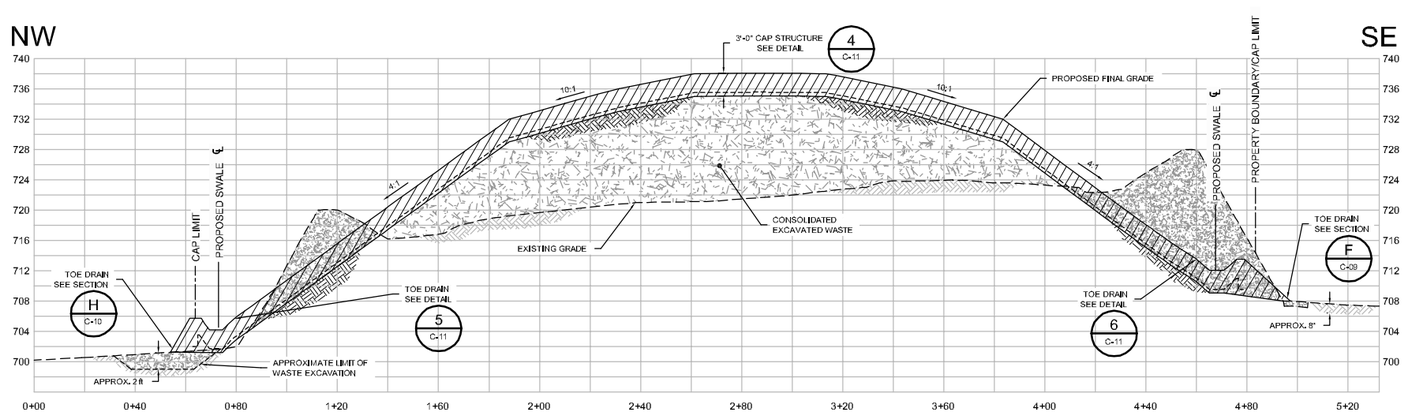
56393-05(005)CI-WA007 APR 07/2010



SECTION A C-07
HORZ: 1"=30'
VERT: 1"=10'



SECTION B C-07
HORZ: 1"=30'
VERT: 1"=10'



SECTION C C-07
HORZ: 1"=30'
VERT: 1"=10'

No	Revision	Date	Initial

SCALE VERIFICATION

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12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

CROSS SECTIONS I

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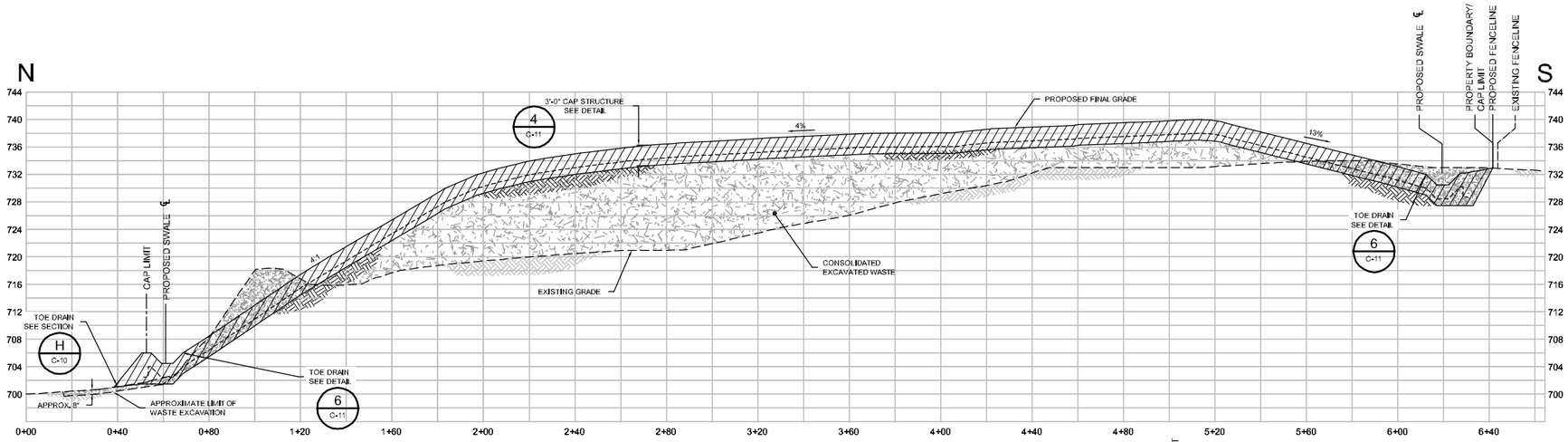
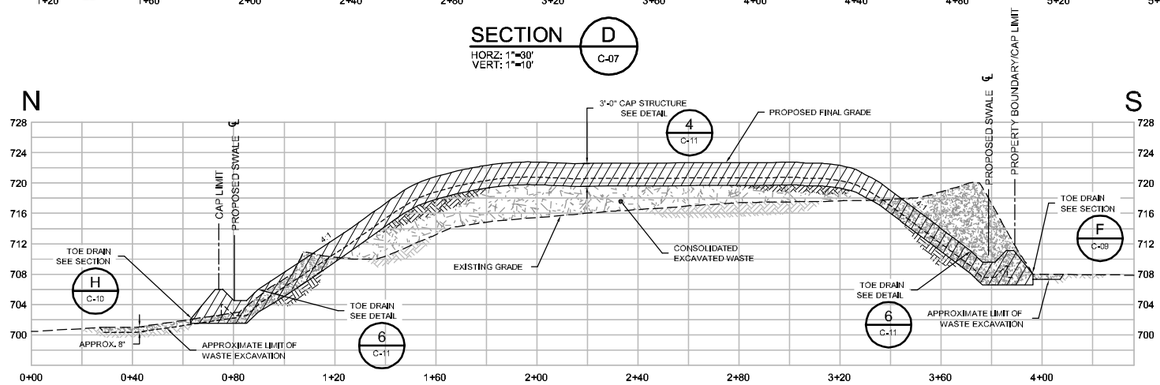
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: AS SHOWN	Project No: 56393-05	Report No: 005	Drawing No: C-08

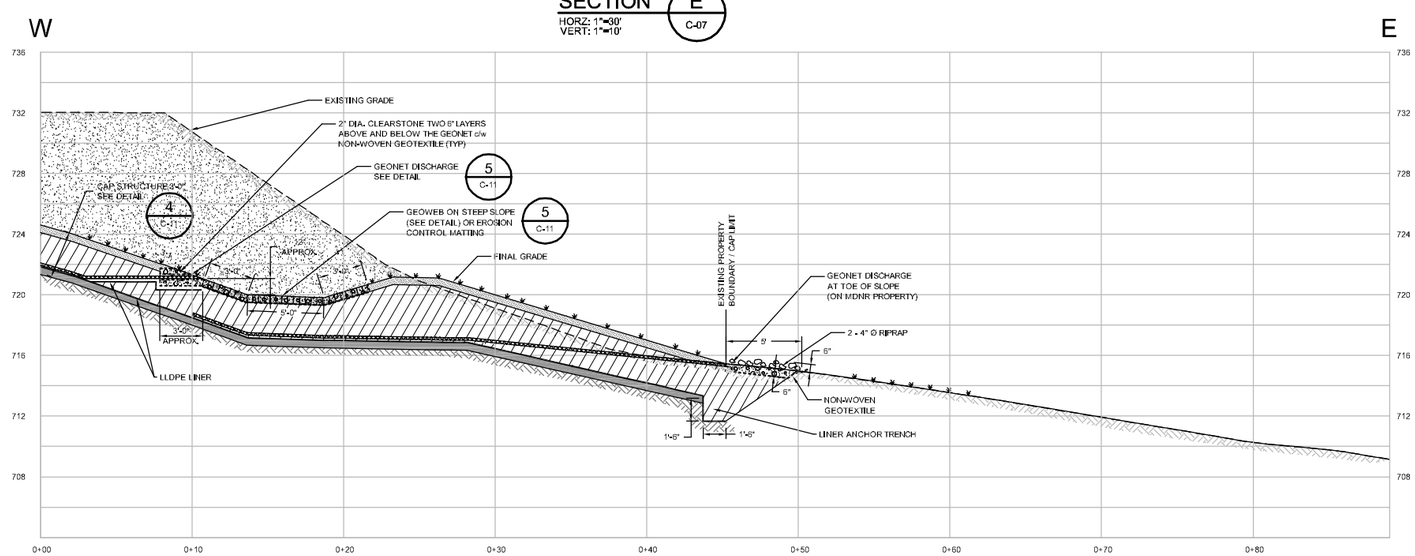
56393-05(005)CI-WA008 APR 07/2010



SECTION D C-07
HORZ: 1"=30'
VERT: 1"=10'



SECTION E C-07
HORZ: 1"=30'
VERT: 1"=10'



SECTION F
HORZ: 1" = 5'
VERT: 1" = 5'
C-02, C-07, C-08, C-09

Nº	Revision	Date	Initial

SCALE VERIFICATION

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Approved

DRAWING STATUS

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12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

CROSS SECTIONS II

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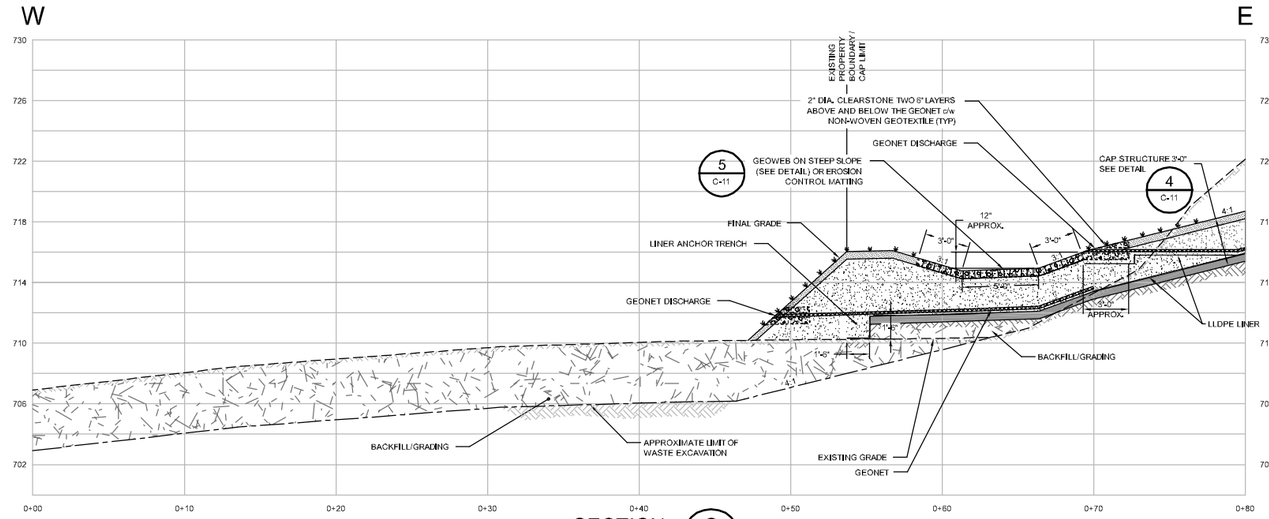
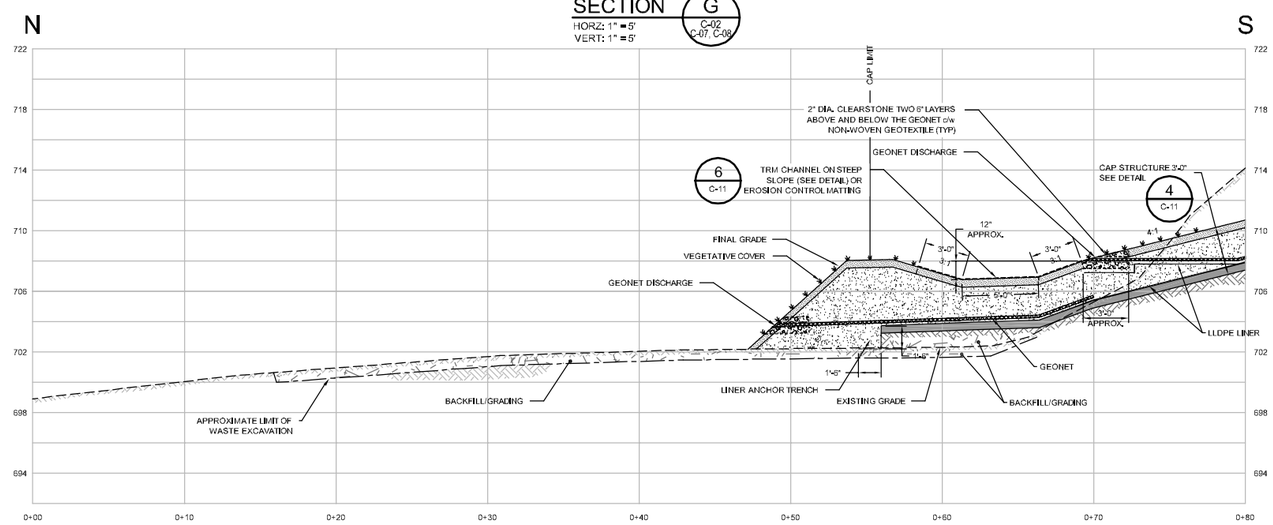
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: AS SHOWN	Project Nº: 56393-05	Report Nº: 005	Drawing Nº: C-09

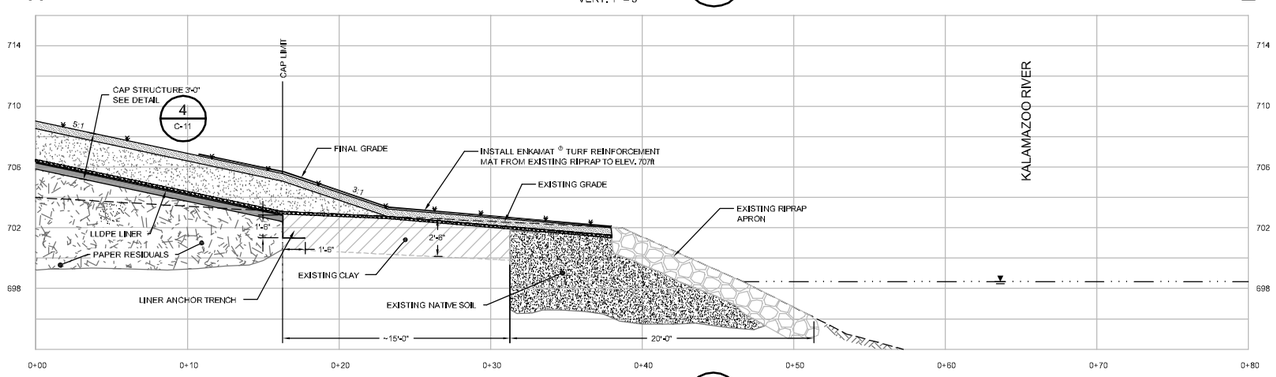
56393-05(005)CI-WA009 APR 07/2010



SECTION G C-02 C-07, C-08
HORZ: 1" = 5'
VERT: 1" = 5'



SECTION H C-02, C-07 C-08, C-09
HORZ: 1" = 5'
VERT: 1" = 5'



SECTION I C-02 C-07, C-08
HORZ: 1" = 5'
VERT: 1" = 5'

N°	Revision	Date	Initial

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12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

CROSS SECTIONS III

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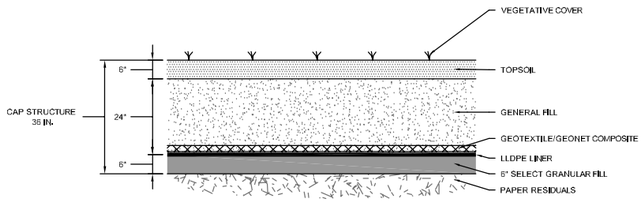
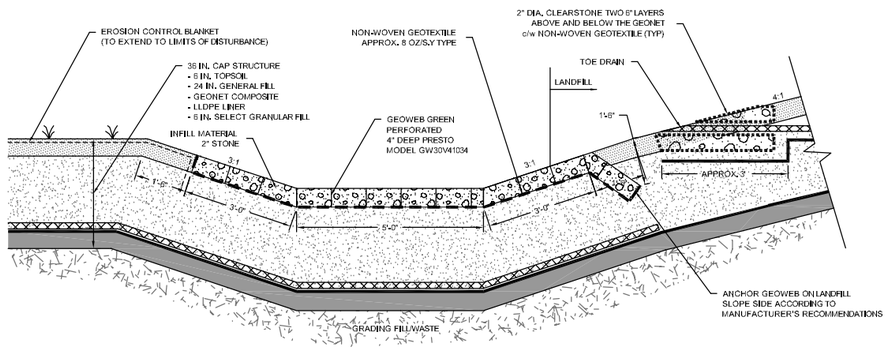
56393-05(005)CI-WA009 APR 07/2010



DETAIL 4 FINAL COVER SYSTEM

1" = 2'-0"

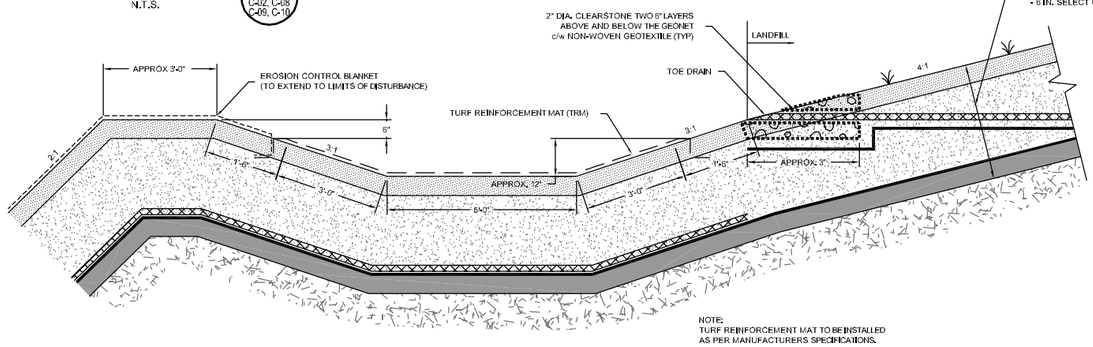
AS SHOWN ON C-02, C-08, C-09, C-10, C-11



DETAIL 5 GEOWEB STABILIZED SWALE

N.T.S.

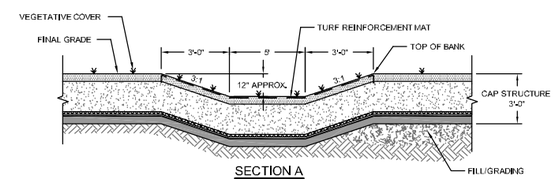
C-02, C-08 C-09, C-10



DETAIL 6 TURF REINFORCEMENT MAT STABILIZED SWALE

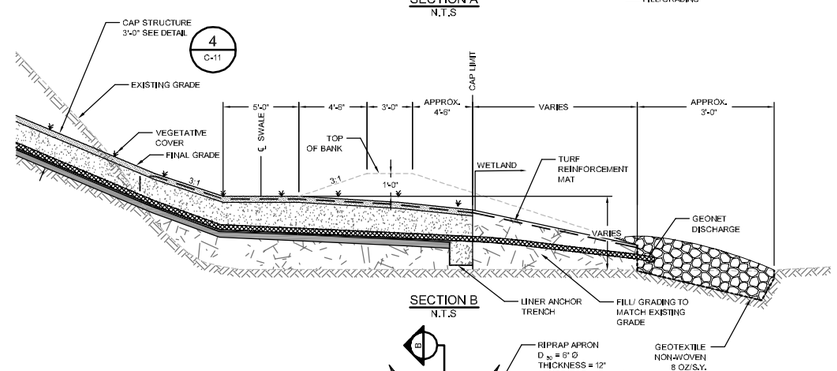
N.T.S.

C-02, C-08 C-09, C-10



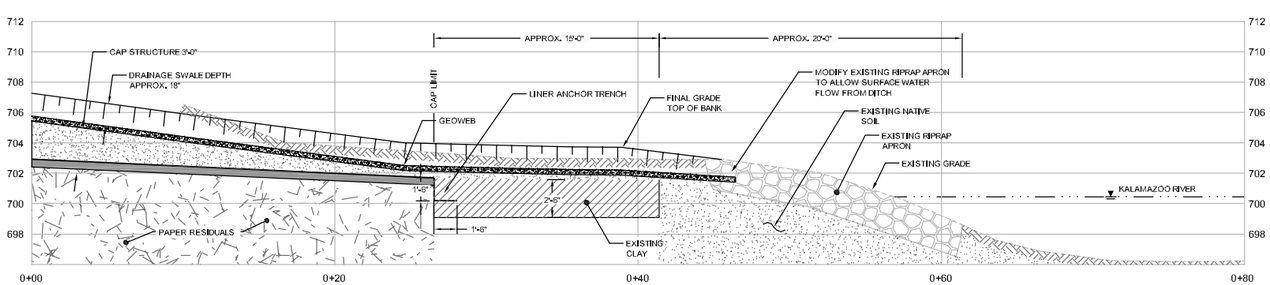
SECTION A

N.T.S



SECTION B

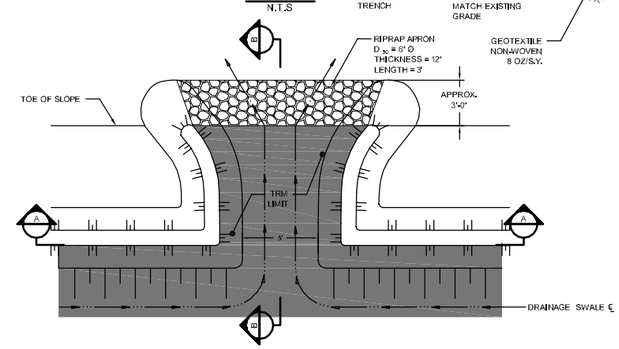
N.T.S



DETAIL 7 DRAINAGE SWALE TO KALAMAZOO RIVER DISCHARGE

1"=5'-0"

C-02



PLAN

DETAIL 8 OUTLET

N.T.S.

C-02

N°	Revision	Date	Initial

SCALE VERIFICATION

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12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

DETAILS I

CONESTOGA-ROVERS & ASSOCIATES

Source References:

Project Manager:	Reviewed By:	Date:	
G. CARLI	R. HOEKSTRA	MARCH 2010	
Scale: AS SHOWN	Project N°: 56393-05	Report N°: 005	Drawing N°: C-11

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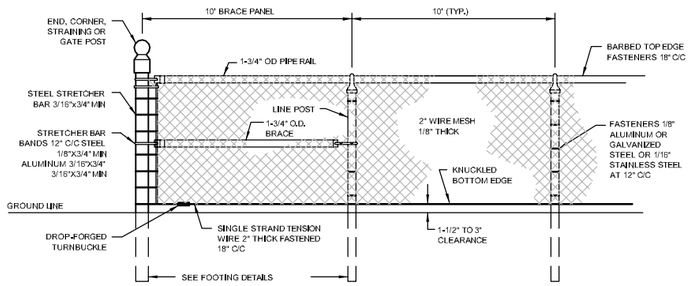
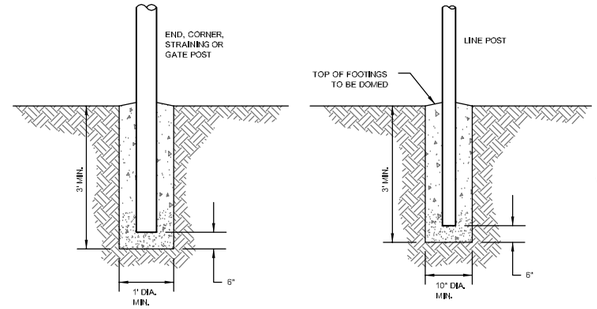


CORNER BRACE

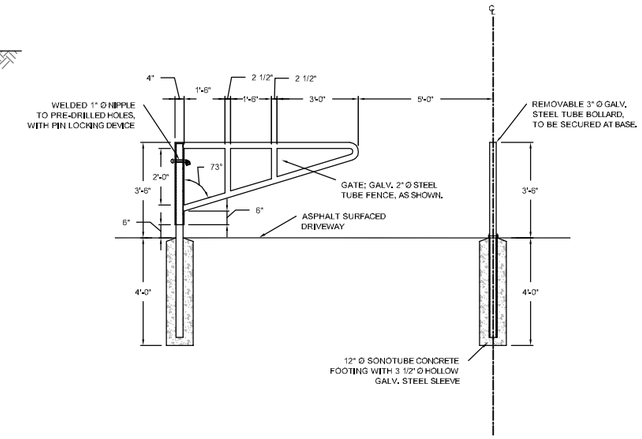


POST DETAILS

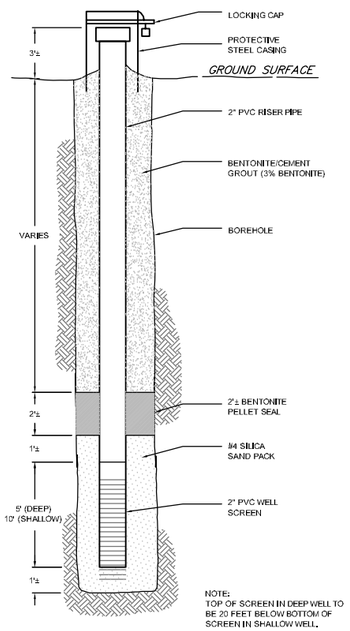
POST AND RAIL SIZES - FENCE			
USE	FABRIC HEIGHT	O.D.*	LBS/FT
INTERMEDIATE POSTS	BELOW 9'	2-3/8"	3.65
CORNER, END, GATE AND BRACE POSTS	BELOW 9'	2-7/8"	5.79
RAILS	ALL	1-5/8"	2.27

* CARBON STEEL PIPE - ASTM A-20, SCH 40

DETAIL 9 SITE FENCING
N.T.S. C-02

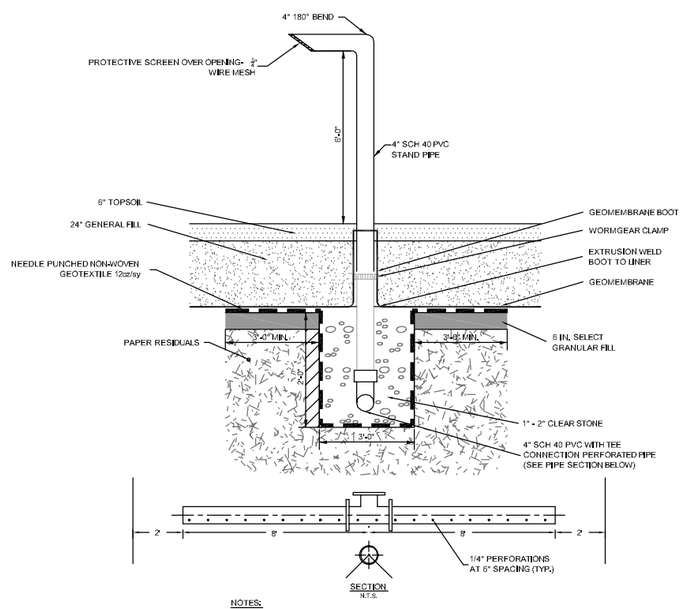


DETAIL 10 SWING GATE
N.T.S. C-02



NOTE:
TOP OF SCREEN IN DEEP WELL TO BE 20 FEET BELOW BOTTOM OF SCREEN IN SHALLOW WELL.

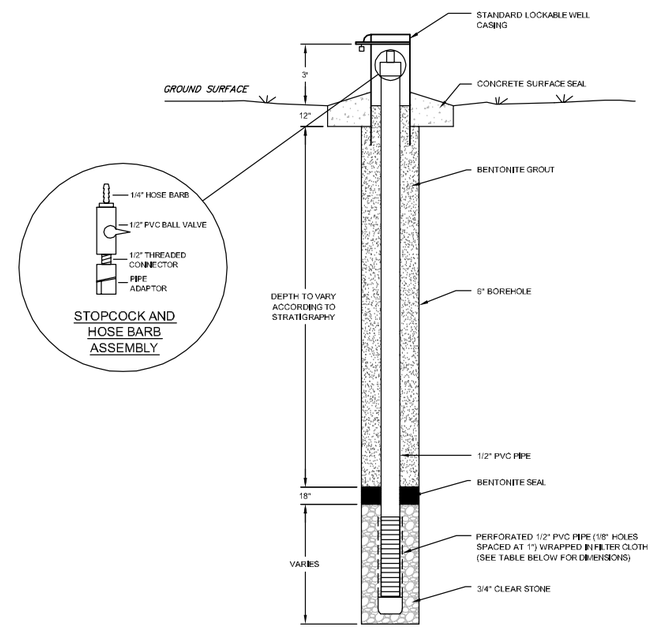
DETAIL 11 MONITORING WELL
N.T.S. C-02



NOTES:

1. PERFORATED PIPE TO EXTEND A MINIMUM OF 8 FEET IN EACH DIRECTION IN TRENCH FROM PASSIVE VENT LOCATION.
2. INSTALL GEOTEXTILE CUSHION A MINIMUM 3 FEET IN EACH DIRECTION PERPENDICULAR TO EDGE OF TRENCH.

DETAIL 12 GAS VENT
N.T.S. C-06



NOTE: GAS PROBE DEPTHS TO BE VERIFIED IN THE FIELD BASED ON LOCAL SOIL CONDITIONS

GAS PROBE	DEPTH (ft)	APPROXIMATE GW SURFACE ELEVATION	LENGTH OF SLOTTED PIPE (ft)
GP-1	10	708	5
GP-2	24	708	19
GP-3	10	700	5

DETAIL 13 GAS PROBE
N.T.S. C-06

N°	Revision	Date	Initial

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12th STREET LANDFILL
Otsego Township, Michigan

FINAL DESIGN REPORT

DETAILS II

CONESTOGA-ROVERS & ASSOCIATES

Source References:

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Scale: AS SHOWN	Project N°: 56393-05	Report N°: 005	Drawing N°: C-12

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APPENDIX B

SITE SPECIFIC HEALTH AND SAFETY PLAN-REVISION 1

Revision 1
March 9, 2010

SITE-SPECIFIC HEALTH AND SAFETY PLAN

12TH STREET LANDFILL SITE
FORMER PLAINWELL PAPER MILL SITE
PLAINWELL, MICHIGAN

Prepared For:
Weyerhaeuser Company

DISCLAIMER:
SOME FORMATTING CHANGES MAY HAVE OCCURRED WHEN THE ORIGINAL DOCUMENT WAS PRINTED TO PDF; HOWEVER, THE ORIGINAL CONTENT REMAINS UNCHANGED.

MARCH 2010
REF. NO. 56393/ 56394 (1)
CRA 200016 QSF-013 - Rev. 7 – 02/20/2007

Prepared by:
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Fax: (905) 682-8818

web: http:\\www.CRAworld.com

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1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) has prepared this Health and Safety Plan (HASP) to support with the requirements of the Remedial Action Work Plan for the 12th Street Landfill in Otsego, Michigan. This HASP will also be utilized for Remedial Investigation (RI) activities including soil and groundwater investigations and building decommissioning assessments at the former Plainwell Paper Mill in Plainwell, Michigan. Figure 1.1 illustrates the general locations of both Sites. Figures 1.2 presents the Site Plan of the 12th Street Landfill while Figure 1.3 present the Site Plan at the former Plainwell Paper Mill.

For the purpose of this HASP, activities performed at the Site involving contact with materials with potentially elevated chemical presence will be considered contaminated operations requiring Personal Protective Equipment (PPE). A detailed description of the PPE required is presented in Section 5.1.

The applicability of this HASP extends to all personnel who will be on Site, including State and Federal Agency personnel, CRA employees, subcontractors, and visitors to the Site.

All project activities at the Site will be conducted in accordance with the provisions of an approved Site-specific HASP. A copy of the Site-specific HASP and employer-specific Standard Operating Procedures (SOPs) will be maintained on Site whenever activities are in progress. This HASP is intended to be used in conjunction with the CRA Corporate Safety and Health Programs, which are referenced herein and a copy of which will be maintained at the Site whenever activities are in progress.

A vital element of CRA's Health and Safety Policies and Procedures is the implementation of a site-specific HASP for field activities. This HASP, as applicable to this project, includes the following measures:

- Communicate the contents of this HASP to site personnel.
- Utilize the **STAR** (Stop, Think, Act, and Review) process before beginning any activity/task/job, after an incident, and/or any unusual circumstances. Stop activities to think about the task, analyze the task hazards and determine methods to reduce risk, and review the results with affected personnel. **Do not proceed unless it is safe to do so.**
- Reporting and investigation of **Incidents and Near Losses**. Project personnel are responsible for promptly reporting, investigating, performing a root cause analysis,

and determining appropriate corrective action(s) for ALL incidents and near losses. Incident Reporting and Near Loss forms are attached in Appendix C.

- Revise or develop **job safety analysis (JSA) form(s**) for activities. Supervisors and affected personnel are responsible for JSA development. A blank JSA form has been included within Appendix B of this HASP.
- Behavioral Based Safety observations via the use of the Safe Task Evaluation Process (**STEP**). This form is included in Appendix C.
- Completion of the **CRA Safety Coordination Review** document on an ongoing (as necessary) basis. This form serves to provide a comprehensive review and framework of project safety guidelines to assist project personnel. The form is meant to be used during pre-construction briefings, project safety audits and inspections, onsite orientation meetings, tailgate safety meetings, and as an end-of-the-project review tool.
- Eliminate unsafe conditions. Efforts must be initiated to identify conditions that can contribute to an accident and to remove exposure to these conditions.
- Reduce unsafe acts. Personnel shall make a conscious effort to work safely. A high degree of safety awareness must be maintained so that safety factors involved in a task become an integral part of the task. Supervisory personnel shall ensure that personnel committing unsafe acts are held accountable via counseling, mentoring and, if necessary, reprimand.
- Inspect frequently. Regular safety inspections of the work site, materials, and equipment by qualified persons ensure early detection of unsafe conditions. Safety and health deficiencies shall be corrected as soon as possible, or project activities shall be suspended. Documentation of daily inspections and corrective actions should be kept with the project files.

1.1 SCOPE OF WORK

The scope of work to be completed by CRA during the project activities at the 12th Street Landfill includes the following:

i) support zone activities which includes mobilization and demobilization of labor, materials, and equipment to and from the Site necessary to implement the remedial activity (RA) which include Site preparation and Site restoration activities;

ii) erosion control;

iii) clear and grub landfill property and offsite property where paper residuals need to be removed;

iv) abandonment of groundwater wells and leachate wells within the landfill footprint;

v) relocation of paper residuals from outside the landfill footprint;

vi) leachate collection/treatment/discharge or disposal;

vii) re-grade the landfill to meet design specifications;

viii) install landfill gas piping/venting system;

ix) cap landfill - place cover material, install Geotextile, LLDPE liner and cover;

x) a 50 foot riprap extension along the Kalamazoo River;

xi) site restoration;

xii) equipment and personnel decontamination activities;

xiii) groundwater monitoring;

xiv) landfill gas monitoring; and,

xv) operations and maintenance of Site.

The scope of work to be completed by CRA during the project activities at the former Plainwell Paper Mill include the following:

i) support zone activities, which includes mobilization and demobilization of labor, materials, and equipment to and from the Site necessary to conduct further assessments/investigations at the Site;

ii) further assessment of environmental concerns at the Mill property, including soil sampling, test pitting, groundwater sampling, building decommissioning assessments, and waste inventory;

iii) decommissioning activities, which include industrial cleaning activities, confined space entries, purging/removal of process lines, removal of PCB-containing light ballasts, fluorescent lights, mercury containing switches, etc.;

iv) contaminated soil excavation, removal, and handling;

v) subsurface utility activities, which include the inspection, cleaning, and removal and/or abandonment of affected utilities;

vi) storage tank removal, which will include the removal of an underground tank as well as aboveground storage tanks;

vii) asbestos abatement;

viii) the partial demolition of the former Mill building and the complete demolition of various out buildings;

ix) equipment and personnel decontamination activities; and,

x) redevelopment of the former Mill property.

During a portion of these activities, personnel may come in contact with waste materials, soils, groundwater, surface water, sediment, and wash waters, which may contain hazardous substances. This HASP has been developed to minimize direct contact by Site personnel with materials potentially having chemical presence by ensuring:

i) that Site personnel are not adversely exposed to the compounds of concern;

ii) that public health and the environment are not adversely impacted by materials with elevated chemical presence that may potentially migrate outside of the work zone during project activities at the Site;

iii) compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists [ACGIH]) regulations and guidelines. In particular, the amended rules of the Occupational Safety and Health Administration (OSHA) for Part 1926 (Title 29 Code of Federal Regulations [CFR] Part 1926.65) will be implemented for all Site work; and,

iv) initiation of proper emergency response procedures to minimize the potential for any adverse impact to Site workers, the general public, or the environment.

1.2 PROJECT ORGANIZATION

CRA PROJECT MANAGEMENT AND SAFETY ORGANIZATION

Project Manager– Greg Carli
The Project Manager (PM) will provide support to the project with respect to all operations on this project.

Project Coordinators – Jodie Dembowske and Emily Stahl
The Project Coordinator shall be responsible for the overall implementation of the HASP, and for ensuring that all health and safety responsibilities are carried out in conjunction with this project. This shall include, but is not limited to, review and approval of the HASP; qualifying/directing subcontractors relative to safety and health performance; coordinating all safety and health submittals; providing the appropriate technical information to write submittals; and consultation with Weyerhaeuser regarding appropriate changes to the HASP. The Project Coordinator will also be

responsible for scheduling and obtaining any necessary safety training for Site personnel that will be working on the Site.

Site Safety & Health Officer (SHO) – TBD

The SHO is the person who, under the supervision of the Project Coordinator and the Regional Safety and Health Manager, shall be responsible for the communication of the Site requirements to Site project personnel and subcontractors and is responsible for carrying out the health and safety responsibilities by making sure that:

- All necessary clean-up and maintenance of safety equipment is conducted by project personnel;
- Emergency services are contacted;
- Hazardous Communication (HAZCOM) program is maintained on Site;
- Forms attached to the HASP are completed, filed, and submitted correctly;
- A pre-entry briefing is conducted, which will serve to familiarize on-Site personnel with the procedures, requirements, and provisions of this HASP;
- All necessary records are maintained in the project files (i.e., air sampling and monitoring results, calibration log sheets, incident reports, daily toolbox meeting log sheets, daily safety logbook entries, etc.); and,
- Daily safety meetings are held and documented by SHO.

The SHO will have prior experience in working at hazardous waste sites. The SHO also has the responsibility of enforcing safe work practices for project employees. The SHO oversees the safety of any visitors who enter the Site. The SHO maintains communication with the CRA Field Engineer.

Other specific duties of the SHO include:

- Orders the immediate shutdown of Site activities in the case of a medical emergency, unsafe condition, or unsafe practice;
- Designate work areas and define minimum PPE requirements;
- Provide the safety equipment, personal protective equipment, and other items necessary for CRA employees;
- Enforce the use of required safety equipment, personal protective equipment, and other items necessary for CRA employee or community safety;
- Conduct job Site inspections as a part of quality assurance for safety and health; and,
- Report safety and health concerns to CRA management as necessary.

Emergency Coordinator (EC)

The SHO or his or her designee will act as the EC. The EC shall be able to implement the emergency procedures and is responsible for the following in the event of an emergency:

- The EC, or his designee, shall immediately respond to all imminent or actual emergency situations. The EC shall notify all personnel and emergency response agencies, identify the problem, assess the health or environmental hazards, and take all reasonable measures to stabilize the situation;
- The EC must take all reasonable measures necessary to ensure that fire, explosion, emission or discharge does not occur, reoccur, or spread. These measures may include stopping operations, collecting and containing released materials, and/or removing or isolating containers;
- The EC shall develop an Emergency Response Evacuation Route and communicate it to all Site personnel; and,
- The EC shall also be responsible for follow-up activities after the incident such as cleanup of the affected area, maintenance and decontamination of the emergency equipment, and submission of any reports.

Construction Site Superintendent (SS) – (Pete Lewis or Dave Dekker)

Health and safety is a line management responsibility, and as such, the Site Superintendent (SS) will implement the overall onsite direction and enforcement of the health and safety for this project. The SS will be designated as the **"competent person"** as per OSHA regulations. The SS will report to the PM for this project.

The SS also has the responsibility of enforcing safe work practices for project employees. The SS oversees the safety of any visitors who enter the site. The SS maintains communication with the Field Engineer.

The SS is the person who, under the supervision of the project manager, shall be responsible for the communication of the site requirements to site project personnel and subcontractors, and is responsible for carrying out the health and safety responsibilities by making sure that:

1. All necessary cleanup and maintenance of safety equipment is conducted by project personnel.
2. **JSA forms** are developed/revised accordingly. **The "seed" JSAs included with this HASP are meant to be modified in the field based on real-time field conditions and situations.**
3. Site personnel are implementing the **STAR** process before initiating activities.

4. **Emergency phone numbers/services including hospital/clinic locations are verified/contacted.**
5. Forms attached to the HASP are completed, filed, and submitted correctly.
6. A pre-entry briefing is conducted and documented, which will serve to familiarize on-site personnel with the procedures, requirements, and provisions of this HASP.

Other duties include overall implementation of the HASP, and ensuring all health and safety responsibilities are carried out in conjunction with this project. This shall include, but is not limited to, review and approval of the HASP, communication of site requirements to subcontractor personnel, and consultation with the client/site representative regarding appropriate changes to the HASP.

Employee Safety Responsibility

CRA employees are responsible for their own safety as well as the safety of those around them. CRA employees shall use any equipment provided in a safe and responsible manner, as directed by their supervisor. CRA personnel will follow the policies set forth in this HASP and the CRA Safety and Health Program.

Employees are directed to take the following actions when appropriate:

- Suspend any operations, which may cause an imminent health hazard to employees, subcontractors, or others.
- Utilize **STAR** process before initiating work.
- Preparation, submission, and review of Behavior Based Safety observations via usage of the **STEP** form. The STEP form is to be used in conjunction with the appropriate JSA to identify positive aspects of task performance as well as to identify any deficiencies associated with the observed task.
- Assist in the development/revision of **JSA** forms that are appropriate to their current scope of work. **The "seed" JSAs included with this HASP are meant to be modified in the field based on real-time field conditions and situations.**
- Correct job Site hazards when possible to do so, without endangering life or health.
- Inspect tools and other equipment before each use or as manufacturer and/or OSHA dictates.
- Report safety and health concerns to the CRA SHO.

Equipment Operators

All equipment operators are responsible for the safe operation of heavy equipment. Operators are responsible for inspecting their equipment on a daily basis to ensure safe performance. Documentation of daily inspections will be required. Brakes, hydraulic lines, backup alarms, and fire extinguishers must be inspected routinely throughout the project. Equipment will be taken out of service if an unsafe condition occurs.

Subcontractors

There is the potential for several subcontractors to be working on Site. The selected subcontractor(s) will be responsible for providing both a Site Supervisor ("competent person") and a SHO to direct their activities and to meet all applicable OSHA Regulations. This may be the same individual if so qualified. These individuals will be responsible for ensuring that all contract specifications are met, including those related to Site health and safety. The names of these individuals will be presented in the subcontractor Site-specific HASP.

All subcontractor personnel working at the Site will report to the SS and, in keeping with OSHA requirements are required to comply with all procedures referenced in this HASP, the subcontractor HASP, and the OSHA Construction Standards as referenced in 29 CFR 1926.

Subcontractors to CRA shall prepare and implement their own Site specific HASP for their contract work and provide all applicable Health and Safety SOPs for use by their Site personnel. The subcontractor's HASP shall meet the minimum requirements of this HASP. CRA will review the subcontractor HASP prior to subcontractor mobilization to the Site. Subcontractors will be responsible for the health and safety of their personnel, which includes following all applicable OSHA Regulations and the subcontractors' Site-specific HASP. Subcontractors will be required to attend an initial Site briefing and subsequent safety meetings.

Authorized Visitors

Upon entry to the Site, authorized visitors shall sign in at the CRA office trailer. Authorized visitors shall be provided with all known information with respect to the Site operations and hazards, as applicable to the purpose of their visit. A brief written summary of information (Appendix A) for each site will be provided to each authorized visitor. Furthermore, a pre-entry briefing will be conducted (by the SHO, SS, or PC), which will serve to familiarize visitors with the procedures, requirements, and provisions of this HASP. A CRA employee will escort authorized visitors during their time on Site.

Hard hats, safety vests, disposable ear plugs, and safety glasses will be kept on site, in the CRA office trailer for use by authorized visitors. Authorized visitors will be required to wear appropriate footwear before accessing the Site. See section 6.0 for more information on Site Control.

1.3 STOP WORK AUTHORITY (SWA)

All CRA employees are empowered and expected to stop the work of co-workers, subcontractors, client employees, or other contractors if any person's safety or the environment are at risk. Additionally, if there is a change to the scope of work or planned activity, then CRA and subcontractor personnel are expected to use Stop Work Authority, if necessary, to address how these changes will affect site safety and operations. NO repercussions will result from this action.

The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the removal of site personnel from that area and reevaluation of the hazard and the levels of protection.

2.0 SITE HISTORIES, CHARACTERIZATION AND POTENTIALLY HAZARDOUS COMPOUNDS

Both Sites are part of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site located along 80 miles of the Kalamazoo River in western Michigan. The Superfund Site is divided up into Operable Units (OUs). This HASP covers activities specified in Section 1.0 at the 12th Street Landfill (OU-4) and the former Plainwell Paper Mill (OU-7). A brief description of each Site follows.

2.1 12TH STREET LANDFILL

The 12th Street Landfill is located at the north end of 12th Street in Otsego, Michigan. The 12th Street Landfill property is approximately 6.5 acres in size. The Landfill is bordered by the Kalamazoo River and associated wetlands to the north and northeast, a parcel owned by the Michigan Department of Natural Resources (MDNR) to the east, 12th Street to the south, and by Wyoming Asphalt to the west. A mix of commercial and residential properties is located south of 12th Street.

Brief History of Site

The 12th Street Landfill was utilized by the various owners/operators of a paper mill located at 220 Allegan Street, Plainwell, Michigan for deposition of paper waste/residuals. These wastes contained PCBs. Paper mill waste was deposited in this area from 1955 to 1981.

The Michigan Department of Environmental Quality (MDEQ) (MDNR) conducted investigations in the early 1970's that determined that PCBs were in the sediments of the Kalamazoo River. This discovery led to the identification of potential responsible parties. The PRPs signed an Administrative Order by Consent (AOC) with the State of Michigan in 1990. The RI/Feasibility Study was funded and conducted by the PRP group. The RI/FS for the 12th Street Landfill (OU-4) was began in 1993 and completed in 1997.

In September 2001, United States Environmental Protection Agency (USEPA) signed the Record of Decision (ROD) for the 12th St. Landfill. The ROD requires PCB-containing paper residuals that migrated from the landfill to be excavated and placed back in the landfill. The ROD further requires the landfill be closed following Part 115, Soild Waste Management of the Natural Resources and Environmental Proection Act 1994 PA 451, as amended. Long-term monitoring and maintenance at the Site was also required.

As part of a Time-Critical Removal Action (TCRA) to remove PCB-contaminated residuals in the former Plainwell Impoundment (a section of Operable Unit No. 5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site), the EPA authorized Weyerhaeuser to conduct emergency response actions at the former power house channel to prevent downstream impacts from the TCRA. In 2007, visual paper residuals were excavated and relocated into the landfill. A clay barrier was installed between the Kalamazoo River and the landfill to insure that no hydraulic connection was present between the River and the Landfill. This area was also graded to a 5:1 slope and riprap was added to protect the clay barrier.

Chemicals of Concern

Table 2.1 presents the maximum detected concentration of chemical compounds of concerns in Site soils as reported in site documents. The exposure routes and regulatory Time Weighted Averages (TWA) exposure levels for the compound of concern are included in the table. These levels are set to protect the health of workers.

2.2 FORMER PLAINWELL MILL

The Site is a former paper manufacturing mill that occupies approximately 34 acres at 220 Allegan Street, Plainwell, Michigan. The Site is bordered on the east by the Mill Race (of the Kalamazoo River) and north by the Kalamazoo River, on the south by Allegan Street, on the west by residential properties and the City of Plainwell's waste water treatment plant (WWTP). Residential properties are located across Allegan Street and the City of Plainwell's central business district is just east of the Mill Race.

The former Mill building is approximately 526,400 square feet of former production space and 80,000 square feet of former warehouse space. The Mill building is made up of 30 interconnected buildings. There are numerous outbuildings, ASTs, and a water tower at the Site. Former waste water and paper residual lagoons are located at the west end of the property.

Chemicals of Concern

Table 2.2 presents the maximum detected concentration of chemical compounds of concerns as reported in site documents. The exposure routes and regulatory TWA exposure levels for the compound of concern are include in the table. These levels are

set to protect the health of workers. The results of previous investigative activities conducted by others do not indicate that radioactive materials are present at the Site.

3.0 BASIS FOR DESIGN

Regulations set forth by OSHA in Title 29, CFR, Parts 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this HASP. Emphasis is placed on Section 1926.65 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), 1910 Subpart Z (Toxic and Hazardous Substances), 1926 Subpart O (Motor Vehicles, Mechanized Equipment, and Marine Operations), and 1926 Subpart F (Excavations). Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of USEPA, the National Institute for Occupational Safety and Health (NIOSH), and the United States Coast Guard (USCG) regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and Site personnel, and the protection of the environment will take precedence over cost and scheduling considerations for all project work.

4.0 EMPLOYEE TRAINING

4.1 GENERAL

Required project personnel, as discussed in Section 1.1, must have completed hazardous waste operations-related training, as required by the OSHA Standard 29 CFR 1926.65. CRA field employees must also receive a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Personnel who completed their training more than 12 months prior to the start of the project must have completed an 8-hour refresher course within the past 12 months. The SS must have completed an additional 8 hours of training for supervisors.

Additional safety training for specific tasks/activities may include safety training for confined space entry, fall protection, ladder safety, lockout/tagout, manlift/aerial lift, etc. may be required based on the scheduled scope of work. This safety training is to be conducted and documented before any task that requires additional training is initiated. It is the responsibility of the SHO and SS to ensure that personnel have the necessary training and skills prior to activity assignment.

4.2 BASIC 40-HOUR COURSE

The following is a list of the topics typically covered in a 40-hour training course:

i) general safety procedures;

ii) physical hazards (fall protection, noise, heat stress, cold stress);

iii) names and job descriptions of key personnel responsible for Site health and safety;

iv) safety, health, and other hazards typically present at hazardous waste sites;

v) use, application, and limitations of PPE;

vi) work practices by which employees can minimize risks from hazards;

vii) safe use of engineering controls and equipment on site;

viii) medical surveillance requirements;

ix) recognition of symptoms and signs, which might indicate overexposure to hazards;

x) worker right-to-know (Hazard Communication OSHA 1926.59/1910.1200);

xi) routes of exposure to contaminants;

xii) engineering controls and safe work practices;

xiii) components of a Site HASP;

xiv) decontamination practices for personnel and equipment;

xv) confined space entry procedures; and,

xvi) general emergency response procedures.

4.3 SUPERVISOR COURSE

Management and supervisors receive an additional 8 hours of training, which typically includes:

i) general Site safety and health procedures;

ii) PPE programs; and,

iii) air monitoring techniques.

4.4 SITE-SPECIFIC TRAINING

An initial site-specific training session or briefing shall be conducted by the PM or SS prior to commencement of work activities. Personnel are not to initiate work activities until they have successfully completed all aspects of the site-specific training.

During this initial training session, employees shall be instructed on the following topics:

- personnel responsibilities including information contained in Section 1.4;
- content and implementation of the HASP;
- site hazards and controls;
- site-specific hazardous procedures (e.g., excavating equipment, working on and near gasoline and diesel pipelines etc.);
- training requirements;
- PPE requirements;
- **emergency information, including local emergency response team phone numbers, route to nearest hospital, accident reporting procedures, and emergency response procedures;**
- instruction in the completion of required inspections and forms; and,

- location of safety equipment (e.g., portable eyewash, first aid kit, fire extinguishers, etc.).

The various components of the project HASP will be presented followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel will not be permitted to enter or work in potentially contaminated areas of the site until they have completed the site-specific training session. Personnel successfully completing this training session shall sign the HASP Training Acknowledgement Form, which is presented in Appendix C.

4.5 DAILY SAFETY MEETINGS

"Tailgate" safety meetings will take place each day prior to beginning the day's work. No work will be performed in an Exclusion Zone (EZ) before the daily safety meeting has been held. All site personnel will attend these safety meetings conducted by the SS and/or SHO. The daily safety meeting must also be held prior to new tasks, and repeated if new hazards are encountered. Appendix C provides the form for documenting the daily safety meetings.

The safety meetings will cover:

- specific health and safety issues;
- site activities;
- relevant JSAs (list JSAs reviewed on the daily safety meeting form);
- changes in site conditions; and,
- and a review of topics covered in the site-specific pre-entry briefing.

4.6 FIRST AID AND CPR

At least one employee current in first aid/CPR will be assigned to the work crew and will be on the Site during operations. Refresher training in first aid and CPR is required to keep the certificate current. These individuals must also receive training regarding the precautions and protective equipment necessary to protect against exposure to blood-borne pathogens. Blood-borne pathogen training is included as part of the first aid/CPR training course delivered by the American Red Cross.

5.0 PERSONAL PROTECTIVE EQUIPMENT

PPE is required to safeguard Site personnel from various hazards. Varying levels of protection may be required depending on the level of contaminants and the degree of physical hazard. This section presents the various levels of protection and defines the conditions of use for each level. Subcontractor Site-specific HASPs will adequately address PPE concerns for each specific task activity based on their proposed scope of work.

5.1 LEVELS OF PROTECTION

Protection levels are determined based upon contaminants present in the work area. The JSA's contained in Appendix B, along with Tables 2.1, 2.2, 5.1, and 5.2 will be utilized to insure workers are wearing the appropriate PPE.

5.1.1 LEVEL D PROTECTION

The minimum level of protection that will be required for all Site personnel will be Level D. The following equipment will be used:

i) work clothing as prescribed by the weather;

ii) safety toe work boots meeting American National Standard Institute (ANSI) Z41;

iii) safety glasses or goggles meeting ANSI Z87;

iv) leather work gloves or nitrile gloves depending on work task;

v) high visibility safety vest (Type 2);

vi) hard hat meeting ANSI Z89; and,

vii) hearing protection (if noise levels exceed 85 dBA, then hearing protection with a USEPA NRR of at least 20 dBA must be used).

5.1.2 MODIFIED LEVEL D PROTECTION

Modified Level D will be used when airborne contaminants are not present at levels of concern, but Site activities present an increased potential for skin contact with hazardous materials. Modified Level D consists of:

i) Tyvek® coveralls or polyethylene coated Tyvek® suit (if liquids/splash hazards are present or based on the degree of hazard);

ii) safety toe work boots meeting ANSI Z41;

iii) vinyl or latex boots, neoprene, or polyvinyl chloride (PVC) overboots;

iv) safety glasses or goggles;

v) hard hat;

vi) face shield in addition to safety glasses or goggles when projectiles and/or splashing liquids pose a hazard;

ii) disposable nitrile inner gloves (NDEX 8005, as manufactured by Best);

iii) nitrile over gloves, as manufactured by Best, or equivalent;

iv) hearing protection (if necessary);

v) high visibility safety vest (Type 2); and,

vi) personal flotation device (if necessary).

5.1.3 LEVEL C PROTECTION

Additionally, when the airborne concentration of suspected contaminants are present in the worker's breathing zone at sustained levels of greater than or equal to the action levels referenced in Table 5.1 or 5.2, Level C protection will be required. These action levels are driven by the presence of Site contaminants (i.e., inorganic compounds, polycyclic aromatic hydrocarbons (PAHs,), PCBs, etc.) that can adhere to soils at the Site. The following equipment will be used for Level C protection:

i) full-face air purifying respirator (APR) with organic vapor/acid gas cartridges in combination with particulate filters (P-100) which are NIOSH approved (MSA GME P100 cartridges or equivalent);

ii) polyethylene coated Tyvek® suit (if liquids/splash hazards are present) or Tyvek® coveralls, ankles, and cuffs taped to boots and gloves;

iii) nitrile over glove, as manufactured by Best or equivalent;

iv) inner nitrile disposable gloves (NDEX 8005, as manufactured by Best);

v) safety toe work boots, ANSI approved;

vi) chemical resistant neoprene boots with steel toes, or latex/PVC booties over safety toe shoes;

vii) hard hat, ANSI approved;

viii) hearing protection (if necessary);

ix) high visibility safety vest (Type 2); and,

x) personal flotation device (if necessary).

5.1.4 LEVEL B PROTECTION (NOT EXPECTED TO BE WORN)

Level B protection will be worn when the airborne concentrations of suspended contaminants are present at sustained levels greater than 25 part per million (ppm) due to the potential to encounter benzene or if carbon monoxide levels exceed 35 ppm.

The following equipment will be used for Level B protection:

i) supplied air respirator (NIOSH approved). Respirators may be positive pressure-demand, self-contained breathing apparatus (SCBA), or positive pressure-demand airline respirator (with 5-minute escape bottle for immediately dangerous to life and health (IDLH) situations);

ii) polyethylene coated Tyvek® or Saranex® coverall with ankles and cuffs taped to boots and gloves;

iii) nitrile over gloves, as manufactured by Best or equivalent;

iv) inner nitrile disposable gloves (NDEX 8005, as manufactured by Best);

v) safety toe work boots, ANSI approved;

vi) chemical resistant neoprene boots with steel toes, or latex/PVC booties over safety toe shoes;

vii) hard hat, ANSI approved;

viii) hearing protection (if necessary);

ix) high visibility safety vest (Type 2); and,

x) personal flotation device (if necessary).

5.1.5 SELECTION OF PPE

Equipment for personal protection will be selected based on the potential for contact, Site conditions, ambient air quality, and the judgement of supervising Site personnel and the Regional Safety and Health Manager. The PPE used will be chosen to be effective against the compound(s) present on the Site.

5.2 RESPIRATORY PROTECTION

Respiratory protection is an integral part of employee health and safety at sites with potential airborne contamination.

5.2.1 SITE RESPIRATORY PROTECTION PROGRAM

The Site respiratory protection program will consist of the following:

i) all Site personnel who may use respiratory protection will have an assigned respirator;

ii) all Site personnel who may use respiratory protection will have been fit tested and trained in the use of a full-facepiece APR within the past 12 months;

iii) all Site personnel who may use respiratory protection must, within the past year, have been medically certified as being capable of wearing a respirator. Documentation of the medical certification must be provided to the SHO prior to commencement of Site work;

iv) only cleaned, maintained, NIOSH-approved respirators are to be used on this Site;

v) if respirators are used, the respirator cartridge is to be properly disposed of at the end of each work shift, prior to expected breakthrough or when filter load-up occurs;

vi) contact lenses may be worn with a full-face respirator;

vii) all Site personnel who may use respiratory protection must be clean shaven. Mustaches and sideburns are permitted, but they must not interfere with the sealing surface of the respirator;

viii) respirators will be inspected and a negative pressure test performed prior to each use; and,

ix) after each use, the respirator will be wiped with a disinfectant, cleansing wipe. When used, the respirator will be thoroughly cleaned at the end of the work shift. The respirator will be stored in a clean plastic bag, away from direct sunlight in a clean, dry location, in a manner that will not distort the facepiece.

Respiratory protection will be required during some of the activities. This is to ensure worker protection from potentially contaminated particulates, PCBs, metals, SVOCs, and VOCs. It is expected that Modified Level D personal protection will be worn during the majority of field activities involving the handling of impacted materials. However,

the SHO will make the determination of the acceptable level of protection based upon the results of the air monitoring program. Also, if during these field activities the real-time air monitoring program indicates the need for an upgrade in protection to Level C or Level B, then these activities will be continued with the increased level of personal protection and additional source controls (i.e., foam, plastic sheeting, soil cover, water spray, etc.) will be implemented to control vapors and/or particulates.

A photoionization detector (PID) with a 10.6 or greater eV lamp will be used to determine if organic vapors are present. A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary for organic vapors are based on the concentration of Site contaminants measured within the breathing zone. The action levels and appropriate respiratory protection for each Site are referenced in Table 5.1 (12th Street Landfill) and 5.2 (Former Plainwell Paper Mill Site) of this document. The PID action levels have been set based on the presence of known VOCs as the main contaminants of concern. However, if the ambient concentrations of organic vapors are due to unidentifiable/unknown substances, the level of respiratory protection may be altered by the SHO.

The appropriate air purifying respirator cartridge to be used at the Site is a combination organic vapor/acid gas and P-100 cartridge. The cartridge must be of the same manufacturer as the respirator face piece.

A personal aerosol monitor (e.g., MIE® Personal DataRam or equivalent) will also be utilized to determine airborne dust/particulate concentrations. A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary for dust levels are based on the concentration of Site contaminants measured within the breathing zone and the results of an industrial hygiene modeling program using "worst case" scenario concentrations of contaminants (dioxins/furans, PCBs, metals, PAHs, etc.) found in the Site soils and sediments. The action levels and appropriate respiratory protection for particulates are included in Tables 5.1 and 5.2 of this document.

5.3 USING PPE

Depending upon the level of protection selected for this project, specific donning and doffing procedures may be required. The procedures presented in this section are mandatory if Level B or Level C PPE is used.

All personnel entering the EZ must put on the required PPE in accordance with the requirements of this plan. When leaving the EZ, PPE will be removed in accordance with the procedures listed to minimize the spread of contamination.

5.3.1 DONNING PROCEDURES

These procedures are mandatory only if Level B or Level C PPE is used on the project:

i) remove bulky outerwear. Remove street clothes and store in clean location;

ii) put on work clothes or coveralls;

iii) put on the required chemical protective coveralls or rain gear;

iv) put on the required chemical protective boots or boot covers;

v) tape the legs of the coveralls to the boots with duct tape;

vi) put on the required chemical protective gloves;

vii) tape the wrists of the protective coveralls to the gloves;

viii) don the required respirator and perform appropriate fit check;

ix) put hood or head covering over head and respirator straps and tape hood to facepiece; and,

x) don remaining PPE, such as hard hat.

When these procedures are instituted, one person must remain outside the work area to ensure that each person entering has the proper protective equipment.

5.3.2 DOFFING PROCEDURES

The following procedures are only mandatory if Level B or C PPE is required for this project. Whenever a person leaves a Level B or C work site, the following decontamination sequence will be followed:

i) upon entering the Contamination Reduction Zone (CRZ), rinse contaminated materials from the boots or remove contaminated boot covers;

ii) clean reusable protective equipment;

iii) remove protective garments, equipment, and respirator. All disposable clothing should be placed in a covered container, which is labeled;

iv) wash hands, face, and neck, or shower (if necessary);

v) proceed to clean area and dress in clean clothing; and,

vi) clean and disinfect respirator for next use.

All disposable equipment, garments, and PPE must be placed in covered containers and labeled for disposal. See Section 9.0 for detailed information on decontamination procedures.

5.4 SELECTION MATRIX

The level of personal protection selected will be based upon real-time air monitoring of the work environment and an assessment by the SS and SHO of the potential for skin contact with contaminated materials. The PPE selection matrix is given in the JSA tables located in Appendix B. This matrix is based upon information available at the time this plan was written. The exposure levels presented in Tables 2.1 or 2.2 (depending on the Site) should be used to verify that the PPE prescribed is appropriate.

5.5 DURATION OF WORK TASKS

The duration of activities involving the usage of PPE will be established by the SHO based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress, see Section 7.3) and limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of APR cartridges, etc.). As a minimum, rest breaks will be observed at the following intervals:

i) 15 minutes midway between shift startup and lunch;

ii) 1/2 to 1 hour for lunch; and,

iii) 15 minutes in the afternoon, between lunch and shift end.

All rest breaks will be taken in a clean area [e.g., Support Zone (SZ)] after full decontamination and PPE removal. Additional rest breaks will be observed, based upon the heat stress monitoring guidelines presented in Section 7.3.

5.6 LIMITATIONS OF PROTECTIVE CLOTHING

PPE ensembles have been selected to provide protection against contaminants at anticipated concentrations. However, no protective garment, glove, or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by contaminant concentrations, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific contaminant; chemical permeation may continue even after the source of contamination has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all Site personnel using PPE:

i) when using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift;

ii) inspect all clothing, gloves, and boots both prior to and during use for:
   - a) imperfect seams;
   - b) non-uniform coatings;
   - c) tears; and,
   - d) poorly functioning closures.

iii) inspect reusable garments, boots, and gloves both prior to and during use for:
   - a) visible signs of chemical permeation;
   - b) swelling;
   - c) discoloration;
   - d) stiffness;
   - e) brittleness;
   - f) cracks;
   - g) any sign of puncture; and,
   - h) any sign of abrasion.

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of contaminants will not be reused.

Site personnel also carry certain responsibilities for their own health and safety, and are required to observe the following safe work practices:

i) familiarize themselves with this HASP;

ii) use the "buddy system" when working in a contaminated operation;

iii) use the safety equipment in accordance with training received, labeling instructions, and common sense;

iv) maintain safety equipment in good condition and proper working order;

v) refrain from activities that would create additional hazards (i.e., smoking, eating, etc., in restricted areas, leaning against dirty, contaminated surfaces);

vi) smoking, eating, and drinking will be prohibited except in designated areas. These designated areas may change during the duration of the project to maintain adequate separation from the active work area(s). Designation of these areas will be the responsibility of the SHO; and,

vii) soiled disposable outerwear shall be removed and placed into a covered container prior to washing hands and face, eating, using lavatory facilities, or leaving the Site.

6.0 SITE CONTROL

6.1 AUTHORIZATION TO ENTER

All personnel working in EZs must have completed hazardous waste operations initial training as defined under OSHA Regulation 29 CFR 1926.65, have completed their training or refresher training within the past 12 months, and have been certified by a physician as fit for hazardous waste operations in order to enter a Site area designated as an EZ or CRZ. Personnel without such training or medical certification may enter the designated SZ only. The SHO will maintain a list of authorized persons; only personnel on the authorized persons list will be allowed within the EZ or CRZ.

6.2 SITE ORIENTATION AND HAZARD BRIEFING

No person will be allowed in the general work area during Site operations without first being given a Site orientation and hazard briefing. This orientation will be presented by the SHO and will consist of a review of this HASP. This review must cover the chemical, physical, and biological hazards, protective equipment, safe work procedures, and emergency procedures for the project. Appendix C provides a Training Acknowledgment Form for documentation purposes. In addition to this meeting, daily safety meetings will be held each day before work begins. All people on the Site, including visitors, must document their attendance to this briefing as well as the daily safety meetings on the forms included with this HASP. Appendix C presents the Daily Safety Meeting Log.

6.3 CERTIFICATION DOCUMENTS

A training and medical file will be established for the project and kept on Site during all Site operations. The 40-hour training, update, and respirator fit test certificates, as well as current medical clearance for all project field personnel will be maintained within that file. Subcontractor personnel must provide a copy of their training, respirator fit test, and medical documentation to the CRA SHO prior to the start of fieldwork. Additional safety training certification documents (fall protection, confined space, aerial lift/scaffold, etc.) may be necessary based on the scheduled task activity.

6.4 ENTRY LOG

A log-in/log-out sheet must be maintained at the Site by the SHO. Personnel may sign in and out on a log sheet as they enter and leave the CRZ, or the SHO may document entry and exit in the field notebook (for truck drivers/deliveries).

6.5 ENTRY REQUIREMENTS

In addition to the authorization, hazard briefing, and certification requirements listed above, no person will be allowed to enter the Site unless he or she is wearing the minimum SZ PPE as described in Section 5.0. Personnel entering the EZ or CRZ must wear the required PPE for those locations.

6.6 EMERGENCY ENTRY AND EXIT

People who must enter the Site on an emergency basis will be briefed of the hazards by the SHO. All hazardous activities will cease in the event of an emergency and any sources of emissions will be controlled, if possible.

People exiting the Site because of an emergency will gather in a safe area for a head count. The SHO is responsible for ensuring that all people who entered the work area have exited in the event of an emergency. A gathering point for each Site is illustrated in Figure 6.6.1 (12th Street Landfill) and Figure 6.6.2 (Former Paper Mill), which are included in each "visitor guide".

See Remedial Action Contingency Plan, provided under separate cover, and Section 11.0 of this HASP for additional information.

6.7 CONTAMINATION CONTROL ZONES

Contamination control zones are maintained to prevent the spread of contamination and to prevent unauthorized people from entering hazardous areas.

6.7.1 EXCLUSION ZONE (EZ)

The EZ consists of the specific work area, or may be the entire area of suspected contamination. All employees entering the EZ must use the required PPE, and must have the appropriate training and medical clearance for hazardous waste work. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. The location of each EZ will be identified by cones, caution tape, or other appropriate means.

6.7.2 CONTAMINATION REDUCTION ZONE (CRZ)

The CRZ or transition area will be established, if necessary, to perform decontamination of personnel and equipment. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination. Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on Site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the SZ.

6.7.3 SUPPORT ZONE (SZ)

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the SZ only after proper decontamination. Smoking will only be permitted in the SZ.

7.0 ACTIVITY HAZARD/RISK ANALYSIS AND GENERAL SAFETY PRACTICES

This section identifies and evaluates the potential chemical, physical, and biological hazards, which may be encountered while conducting Site activities. Specific activity JSA sheets (see Appendix B) have been developed to address the hazards associated with scheduled/known Site activities, which are outlined in Section 1.1 of this HASP. These forms are to be modified in the field based on real-time conditions.

NOTE: If a non-routine task or previously unidentified task becomes necessary, then a job safety analysis that addresses the new task must be developed and implemented before initiating the new activity.

In addition to the chemical hazards presented in Section 2.0 of this HASP, physical and biological hazards including: potential heat and cold stress; hazards presented by the use of heavy equipment; underground/overhead utility hazards; hazards presented by confined spaces and excavations/trenches; biological hazards including snakes, poison ivy, poison oak, mosquitoes, bees, and wasps; uneven terrain and slippery surfaces; water, and the use of decontamination equipment, exist at the Site. It will be the responsibility of the SHO and Site personnel to identify the physical and/or biological hazards posed by the various Site construction activities and implement preventative and corrective action.

7.1 CHEMICAL EXPOSURE

Preventing exposure to toxic chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A contaminant can cause damage at the point of contact or can act systematically, causing a toxic effect at a part of the body distant from the point of initial contact. The chemical contaminants of concern at the Sites are outlined in Table 2.1 (12th Street Landfill) and Table 2.2 (Former Plainwell Paper Mill).

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a contaminant. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposures to "low" concentrations of a contaminant over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each

exposure, and the number of exposures. For a given contaminant, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease may not become evident for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the Site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (i.e., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work site atmosphere may contain such hazardous substances. Chemicals can also enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and preclude their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in contaminated atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the Site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely, however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics at the Site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (i.e., by stepping or tripping and falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

7.2 CHEMICAL HAZARD CONTROLS

Airborne exposure or contact with the Site chemicals shall be controlled by:

- Skin contact with chemicals may be controlled by use of the proper PPE and good housekeeping procedures. The proper PPE (e.g., polycoated Tyvek®, gloves) as described in Section 5.0 of this HASP shall be worn for all activities where contact with potentially harmful media or materials is anticipated;
- Monitoring air concentrations for volatile organic chemicals shall be conducted in the breathing zone with a PID with a 10.6 eV lamp or greater, as discussed in Section 8.0;
- Monitoring air concentrations for dust particles shall be conducted during intrusive activities with a dust monitor; and
- Using respiratory protection as appropriate, in areas known to have concentrations above the specified action level for each chemical.

7.3 HAZARD COMMUNICATION

Personnel required to handle or use hazardous materials as part of their job duties will be trained and educated in accordance with the Hazard Communication standard. The training shall include instruction on the safe usage and handling procedures of hazardous materials, how to read and access Material Safety Data Sheets (MSDSs), and the proper labeling requirements.

The MSDSs for those chemicals in use at the Site will be available to project personnel. The SHO will be responsible for maintaining the MSDSs.

7.4 GENERAL PRACTICES

Additional general safety practices to be implemented are as follows:

i) at least one copy of this HASP must be at the project Site, in a location readily available to all personnel, and reviewed by all project personnel prior to starting work;

ii) all Site personnel must use the buddy system (working in pairs or teams);

iii) food, beverages, or tobacco products must not be present or consumed in the EZ and CRZ. Cosmetics must not be applied within these zones;

iv) emergency equipment such as eyewash, fire extinguishers, etc., must be removed from storage areas and staged in readily accessible locations;

v) contaminated waste, debris, and clothing must be properly contained, and legible and understandable precautionary labels must be affixed to the containers;

vi) removing contaminated soil from protective clothing or equipment with compressed air, shaking, or any other means that disperses contaminants into the air is prohibited;

vii) containers must be moved only with the proper equipment, and must be secured to prevent dropping or loss of control during transport; and,

viii) visitors to the Site must be instructed to stay outside the EZ and CRZ and remain within the SZ during the extent of their stay. Visitors must be cautioned to avoid skin contact with surfaces, which are contaminated or suspected to be contaminated.

7.4.1 BUDDY SYSTEM

All on-Site personnel must use the buddy system. Visual contact must be maintained between crew members at all times, and crew members must observe each other for signs of chemical exposure, heat, or cold stress. Indications of adverse effects include, but are not limited to:

i) changes in complexion and skin coloration;

ii) changes in coordination;

iii) excessive salivation and pupillary response; and,

iv) changes in speech pattern.

Team members must also be aware of potential exposure to possible safety hazards, unsafe acts, or noncompliance with safety procedures. Employees must inform their partners or fellow team members of non-visible effects of exposure to toxic materials. The symptoms of such exposure may include:

i) headaches;

ii) dizziness;

iii) nausea;

iv) blurred vision;

v) cramps; and,

vi) irritation of eyes, skin, or respiratory tract.

If protective equipment or noise levels impair communications, prearranged hand signals must be used for communication. Personnel must stay within line of sight of another team member. The following hand signals will be used by downrange field teams in conjunction with the "buddy" system. These signals are very important when working with heavy equipment. They shall be known by the entire field team before operations commence.

Signal	*Meaning*
• Hand Gripping Throat	Out of Air; Can't Breathe
• Grip Partner's Wrist	Leave Area Immediately
• Hands on Top of Head	Need Assistance
• Thumbs Up	Ok, I'm All Right, I Understand
• Thumbs Down	No, Negative

7.5 HEAT STRESS

Heat stress is caused by a number of interacting factors including environmental conditions, clothing, workload, etc., as well as the physical and conditioning characteristics of the individual. Since heat stress is one of the most common illnesses

associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Heat Rashes: Are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat Cramps: Are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much and too little salt.

Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (plus or minus 0.3 percent NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat Exhaustion: Occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; headache, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment.

Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs

and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat Stroke: Is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict.

Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, (e.g., a rectal temperature of 41°C [105.8°F]). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Heat Stress Safety Precautions: Heat stress monitoring and work rest cycle implementation should commence when the ambient adjusted temperature exceeds

72°F. A minimum work rest regimen and procedures for calculating ambient adjusted temperature are described below.

Adjusted Temperature[1]	*Work-Rest Regimen Normal Work Ensemble*[2]	*Work-Rest Regimen Impermeable Ensemble*
90°C (32.°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° to 90°F (30.8°C to 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° to 87.5°F (28.1° to 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° to 82.5°F (25.3° to 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° to 77.5°F (22.5° to 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Notes:

(1) Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F=ta °F + (13 x percent sunshine). Measure air temperature (ta) with a standard thermometer, with the bulk shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows).

(2) A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

In order to determine if the work rest cycles are adequate for the personnel and specific Site conditions, additional monitoring of individual heart rates will be conducted during the rest cycle. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one-third and maintain the same rest period.

Additionally one or more of the following control measures can be used to help control heat stress and are mandatory if any Site worker has a heart rate (measure immediately prior to rest period) exceeding 115 beats per minute:

i) Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day;

ii) on-Site drinking water will be kept cool (50 to 60°F);

iii) a work regimen that will provide adequate rest periods for cooling down will be established, as required;

iv) all personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps;

v) cooling devices such as vortex tubes or cooling vests should be used when personnel must wear impermeable clothing in conditions of extreme heat;

vi) employees should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary;

vii) a shaded rest area must be provided. All breaks should take place in the shaded rest area;

viii) employees must not be assigned to other tasks during breaks;

ix) employees must remove impermeable garments during rest periods. This includes Tyvek® garments; and,

x) all employees must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

7.6 COLD STRESS

Fatal exposures to cold have been reported in employees failing to escape from low environmental air temperatures or from immersion in low temperature water. Hypothermia, a condition in which the body's deep core temperature falls significantly below 98.6°F (37°C), can be life threatening. A drop in core temperature to 95°F (35°C) or lower must be prevented.

Air temperature is not sufficient to determine the cold hazard of the work environment. The wind-chill must be considered as it contributes to the effective temperature and insulating capabilities of clothing. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the body's core temperature.

The body's physiologic defense against cold includes constriction of the blood vessels, inhibition of the sweat glands to prevent loss of heat via evaporation, glucose production, and involuntary shivering to produce heat by rapid muscle contraction.

The frequency of accidents increases with cold temperature exposures as the body's nerve impulses slow down, individuals react sluggishly and numb extremities make for increased clumsiness. Additional safety hazards include ice, snow blindness, reflections from snow, and possible skin burns from contact with cold metal.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering develops when the body temperature has fallen to 95°F (35°C). This must be taken as a sign of danger to the employees on site, and cold exposures should be immediately terminated for any employee when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

7.6.1 PREDISPOSING FACTORS FOR COLD STRESS

There are certain predisposing factors that make an individual more susceptible to cold stress. It is the responsibility of the project team members to inform the SHO to monitor an individual, if necessary, or use other means of preventing/reducing the individual's likelihood of experiencing a cold related illness or disorder.

Predisposing factors that will increase an individual's susceptibility to cold stress are listed below:

- Dehydration: The use of diuretics and/or alcohol, or diarrhea can cause dehydration. Dehydration reduces blood circulation to the extremities.
- Fatigue During Physical Activity: Exhaustion reduces the body's ability to constrict blood vessels. This results in the blood circulation occurring closer to the surface of the skin and the rapid loss of body heat.
- Age: Some older and very young individuals may have an impaired ability to sense cold.
- Alcohol Consumption: Alcohol dilates the blood vessels near the skin surface resulting in excessive body heat loss.
- Sedative Drugs: Sedatives may interfere with the transmission of impulses to the brain, thereby interfering with the body's physiological defense against cold. Some prescription drugs may react the same way.
- Poor Circulation: Vasoconstriction of peripheral vessels reduces blood flow to the skin surface.
- Heavy Work Load: Heavy workloads generate metabolic heat and make an individual perspire even in extremely cold environments. If perspiration is absorbed by the individual's clothing and is in contact with the skin, cooling of the body will occur.

- The Use of PPE: PPE usage, which traps sweat inside the PPE, may increase an individual's susceptibility to cold stress.
- Lack of Acclimatization: Acclimatization, the gradual introduction of workers into a cold environment, allows the body to physiologically adjust to cold working conditions.
- History of Cold Injury: Previous injury from cold exposures may result in increased cold sensitivity.

7.6.2 PREVENTION OF COLD STRESS

There are a variety of measures that can be implemented to prevent or reduce the likelihood of employees developing cold related ailments and disorders. These include acclimatization, fluid and electrolyte replenishment, eating a well balanced diet, wearing warm clothing, the provision of shelter from the cold, thermal insulation of metal surfaces, adjusting work schedules, and employee education.

- Acclimatization: Acclimatization is the gradual introduction of workers into the cold environment to allow their bodies to physiologically adjust to cold working conditions. However, the physiologic changes are usually minor and require repeated uncomfortably cold exposures to induce them.
- Fluid and Electrolyte Replenishment: Cold, dry air can cause employees to lose significant amounts of water through the skin and lungs. Dehydration affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, non-alcoholic drinks and soup are good sources to replenish body fluids.
- Eating a Well Balanced Diet: Restricted diets including low salt diets can deprive the body of elements needed to withstand cold stress. Eat high-energy foods throughout the day.
- Warm Clothing: It is beneficial to maintain air space between the body and outer layers of clothing in order to retain body heat. However, the insulating effect provided by such air spaces is lost when the skin or clothing is wet.

The parts of the body most important to keep warm are the feet, hands, head, and face. As much as 40 percent of body heat can be lost when the head is exposed.

Recommended cold weather procedures include:

- Inner layers (t-shirts, shorts, and socks) should be of a thin, thermal insulating material.
- Wool or thermal trousers. Denim is not a good protective fabric.
- Felt-lined, rubber-bottomed, leather-upper boots with a removable felt insole is preferred. Change socks when wet.
- Wool shirts/sweaters should be worn over inner layer.
- A wool cap is good head protection. Use a liner under a hard hat.
- Mittens are better insulators than gloves.
- Face masks or scarves are good protection against wind.
- Tyvek/poly-coated Tyvek provides good wind protection.
- Wear loose fitting clothing, especially footwear.
- Carry extra clothing in your vehicle.
- Shelters with heaters should be provided for the employees' rest periods if possible. Sitting in a heated vehicle is a viable option. Care should be taken that the exhaust is not blocked and that windows are partially open to provide ventilation.
- At temperatures of 30°F (-1°C) or lower, cover metal tool handles with thermal insulating material if possible.
- Schedule work during the warmest part of the day if possible, rotate personnel and adjust the work/rest schedule to enable employees to recover from the effects of cold stress.

It may not be practically feasible to implement all the above prevention measures. Follow the guidelines given below when the ambient air temperature is below 0°F (-18°C):

- Dress warmly;
- Replenish fluids and electrolytes at regular intervals;
- Provide shelter from the cold; and,
- Adjust work/rest schedules.

7.6.3 FIRST AID GUIDELINES FOR COLD STRESS

The following describes symptoms of different stages in cold stress and the related first aid treatment guidelines.

FROSTBITE

Stages

Incipient (frost nip)	May be painless. Tips of ears, nose, cheeks, fingers, toes, chin affected. Skin blanched white.
Superficial	Affects skin/tissue just beneath skin; turns purple as it thaws. Skin is firm, waxy; tissue beneath is soft, numb.
Deep	Tissue beneath skin is solid, waxy, white with purplish tinge. Entire tissue depth is affected.

First Aid

Incipient	Warm by applying firm pressure - blow warm breath on spot or submerge in warm water (102°F to 110°F) (39°C to 43°C). Do not rub the area.
Superficial	Provide dry coverage, steady warmth; submerge in warm water.
Deep	Hospital care is needed. Do not thaw frostbitten part if needed to walk on. Do not thaw if there is danger of re-freezing. Apply dry clothing over frostbite. Submerge in water; do not rub.

GENERAL HYPOTHERMIA

Stages

- Shivering.
- Indifference.
- Decreased consciousness.
- Unconsciousness.
- Death.

Symptoms

- Muscle tension.
- Uncontrollable shivering.

- Glassy stare.
- Decreased muscle function.
- Speech distortion.
- Blue, puffy skin.
- Slow pulse.
- Shallow breathing.
- Coordination loss.
- Stumbling.
- Forgetfulness.
- Freezing extremities.
- Dilated pupils.
- Fatigue.

Emergency Response

- Keep person dry; replace wet clothing.
- Apply external heat to both sides of patient using available heat sources, including other bodies.
- Give warm liquids - not coffee or alcohol - after shivering stops and if conscious.
- Handle gently.
- Transport to medical facility as soon as possible.
- If more than 30 minutes from a medical facility, warm person with other bodies.

7.7 EXCAVATION AND TRENCHING

All CRA excavation and trenching operations that employees enter will be observed by a designated competent person. The competent person shall be responsible for evaluating and inspecting excavation and trenching operations to prevent possible cave-in and entrapment, and to avoid other hazards presented by excavation activities.

Each employee in an excavation shall be protected from cave-ins by one of three systems:

- Sloping and benching systems;
- Shoring; and,

- Shielding systems.

All excavation and trenching operations shall be conducted in accordance and in compliance with OSHA's Standards for the Construction Industry, specifically outlined in CRA's Safety and Health Program for excavation and trenching activities (Appendix D). At a minimum, the following safety guidelines shall be adhered to while conducting excavation and trenching activities:

- Excavation and trenching operations require pre-planning to determine whether sloping or shoring systems are required, and to develop appropriate designs for such systems. Also, the estimated location of all underground installations must be determined before digging/drilling begins. Necessary clearances must be observed.
- If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, or where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing, or underpinning.
- Excavations may <u>not</u> go below the base of footings, foundations, or retaining walls unless they are adequately supported or a person who is registered as a Professional Engineer (PE) has determined that they will not be affected by the soil removal. Civil engineers or those with licenses in a related discipline and experience should be consulted in the design and use of sloping and shoring systems. PE qualifications must be documented in writing.

Access and Egress

Personnel access and egress from trench and/or excavations are as follows:

- A stairway, ladder, ramp, or other means of egress must be provided in trenches greater than 4 feet deep and for every 25 feet of lateral travel.
- All ladders shall extend 3 feet above the top of the excavation.
- Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design or by a licensed professional engineer.

Atmosphere Monitoring and Testing

Air quality is measured using three parameters: oxygen concentration, flammability, and the presence of hazardous substances.

Employees should not be exposed to atmospheres containing less than 19.5 percent oxygen or having a lower flammable limit greater than 10 percent, and employees should not be exposed to hazardous levels of atmospheric contaminants.

Whenever potentially hazardous atmospheres are suspected in excavations and trenches, the atmosphere shall be tested by a competent person. Detector tubes, gas monitors, and explosion meters are examples of monitoring equipment that may be used.

In the event that an unusual odor or liquid is suspected in excavations and trenches, the competent person shall stop work on the site and arrange for air quality assessment and mitigation, if necessary.

Atmospheric testing and monitoring shall be performed in excavations in or adjacent to landfill areas, in areas where hazardous materials are/were stored, or in areas where the presence of hazardous materials is suspected.

Daily Inspections

The competent person shall perform daily inspections of excavations, the adjacent areas, and all protective systems for situations that could potentially result in slope failure.

Additionally, the competent person shall be aware of the potential for confined space situations and other hazardous work conditions.

The competent person shall inspect, evaluate, and complete the excavation checklist at the following intervals:

- Prior to the start of work, after each extended halt in work, and as needed throughout the shift as new sections of the excavation or trench are opened; and,
- After every rainstorm and other natural or man-made event that may increase the load on the walls of the excavation, or otherwise affect their stability.

The inspections shall be documented using the CRA Excavation Inspection Checklist attached to this HASP.

The competent person shall stop the work and instruct all employees to leave the excavation or trench when any potential hazards are detected. The competent person has the *authority* to immediately suspend work if any unsafe condition is detected.

7.8 CONFINED SPACES

A confined space provides the potential for unusually high concentrations of contaminants, explosive atmospheres, oxygen deficient atmospheres, limited visibility, and restricted movement. This section establishes requirements for safe entry into, continued work in, and safe exit from confined spaces. Additional information regarding confined space entry can be found in 29 CFR 1926.21, 29 CFR 1910.146, and NIOSH-106.

Entry into a confined space will only be undertaken after remote methods have been tried and found not to be successful. Such work will follow the guidelines presented in the CRA Confined Space Entry Program (Appendix E) or an approved subcontractor's Confined Space Entry Program. The subcontractor's program must minimally meet the requirements set forth in the CRA Confined Space Entry Program.

7.8.1 SITE-SPECIFIC CONFINED SPACE ENTRY PROCEDURES

All confined space entries shall be evaluated to determine the entry status as a permit or non-permit confined space. Prior to entry the following shall be conducted:

i) all energy sources shall be locked and tagged out as discussed in the Control of Hazardous Energy section of this plan;

ii) if necessary, the space shall be washed down with a hose from the outside and drained;

iii) the atmosphere of the space shall be tested for Oxygen, LEL, and toxic concentrations;

iv) the appropriate level of protection shall be determined by conducting a task hazard analysis;

v) ventilation blowers may be used to vent hazardous atmospheres;

vi) two persons trained in confined space entry shall be available for the entry, which include an entrant, and an attendant/supervisor;

vii) the confined space entry permit shall be filled out, signed by the entry supervisor, and posted at the confined space; and,

viii) rescue services as defined in our confined space permit shall be available, verified, and notified of the entry.

During entry operations air monitoring shall be conducted continuously and communication between the attendant and the entrant shall be maintained. The confined space entry permit(s) shall be maintained in a file located at the former Plainwell Paper Mill Site and reviewed annually.

7.9 FALL HAZARDS

Site personnel may be exposed to fall hazards greater than six feet above another surface and where there are no barriers in place to protect them. These hazards may be found in the following activities: working from elevated surfaces, near excavations, on equipment, etc. CRA personnel exposed to fall hazards greater than 6 feet will follow the CRA Fall Protection Program. Subcontractor personnel are responsible for implementing and following their corporate/Site fall protection program.

It is the PM's responsibility to communicate to the SS and subcontractor Site personnel that it will be necessary to control all fall hazards as they relate to project activities.

It is the responsibility of the SS and subcontractor Site supervision to implement the following components of the Site fall protection requirements as they relate to project activities:

i) Ensure appropriate fall protection systems are utilized for project activities;

ii) Verify that all employees are fully protected from fall hazards;

iii) Necessary materials for proper fall protection (PPE, etc.) are available for project activities;

iv) Provide for proper inspection and replacement of fall protection devices;

v) Provide and ensure that all personnel have received the required training in the use, inspection, and the need for fall protection devices (proper fit, proper use, and proper inspection procedures). NOTE: This includes additional training required for the usage of ladders, scaffolds, and manlifts/aerial lifts; and,

vi) Submit any subcontractor's fall protection plans/programs to the CRA Regional Safety and Health Manager for approval.

7.9.1 SLIP/TRIP/FALL INJURIES

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. They occur for a wide variety of reasons, but can be minimized by the following prudent practices:

- Spot check the work area to identify hazards;
- Establish and utilize a pathway, which is free of slip and trip hazards;
- Beware of trip hazards such as wet floors, slippery floors, and uneven surfaces or terrain;
- Carry only loads which you can see over;
- Keep work areas clean and free of clutter, especially in storage rooms and walkways; and,
- Communicate hazards to Site personnel.

7.10 BIOLOGICAL HAZARDS

Biological hazards may include poison ivy, poison oak, snakes, thorny bushes and trees, ticks, mosquitoes, and other pests.

7.10.1 TICK-BORNE DISEASES

Lyme Disease, Erlichiosis, and Rocky Mountain Spotted Fever (RMSF) are diseases transmitted by ticks and occur throughout the United States during spring, summer, and fall.

Lyme Disease: The disease commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, New Jersey, Pennsylvania, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin. Few cases have been identified in other states.

Erlichiosis: The disease also commonly occurs in summer and is transmitted by the bite of infected ticks. "Hot spots" in the United States include New York, Massachusetts, Connecticut, Rhode Island, Minnesota, and Wisconsin. Few cases have been identified in other states.

These diseases are transmitted primarily by the Deer Tick, which is smaller and redder than the common Wood Tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, swelling and pain in the joints, and eventually, arthritis. Symptoms of

Erlichiosis include muscle and joint aches, flu-like symptoms, but there is typically no skin rash.

Rocky Mountain Spotted Fever: This disease is transmitted via the bite of an infected tick. The tick must be attached 4 to 6 hours before the disease-causing organism (*Rickettsia rickettsii*) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for two to three weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death if untreated, but if identified and treated promptly, death is uncommon.

Control: Tick repellent containing diethyltoluamide (DEET) should be used in tick-infested areas, and pants legs should be tucked into boots. In addition, workers should search the entire body every three or four hours for attached ticks. Ticks should be removed promptly and carefully without crushing, since crushing can squeeze the disease-causing organism into the skin. A gentle and steady pulling action should be used to avoid leaving the head or mouth parts in the skin. Hands should be protected with surgical gloves when removing ticks.

7.10.2 POISONOUS PLANTS

Common Poison Ivy (Rhus radicans) grows as a small plant, a vine, and a shrub. Poison Ivy occurs in every state. The leaves always consist of three glossy leaflets. Poison Sumac (Rhus vernix) grows as a woody shrub or small tree 5 to 25 feet tall. It usually contains nine leaves, with eight paired leaves and one on top, and is common in swampy areas. The plants are potent sensitizers and can cause a mild to severe allergic reaction. This reaction is called contact dermatitis.

Dermatitis, in Rhus-sensitive persons, can result from contact with the milky sap found in the roots, stems, leaves, and fruit. The sap may retain its potency for months or years in a dry atmosphere, and can occur during any time of the year. The sap may also be carried by animals, equipment, or apparel.

The best form of prevention is to avoid contact. This can occur by wearing long sleeves and gloves if necessary. Disposable clothing, such as Tyvek, is recommended in high-risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

7.10.3 POISONOUS SNAKES

The possibility of encountering snakes exists, specifically for personnel working in wooded/vegetated areas. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of venomous snakebites include swelling, edema, and pain around the bite, and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

Control: To minimize the threat of snake bites and insect hazards, all personnel walking through vegetated areas must be aware of the potential for encountering snakes, and the need to avoid actions potentiating encounters, such as turning over logs, etc. If a snakebite occurs, an attempt should be made to kill the snake for identification. The victim must be transported to the nearest hospital within 30 minutes; first aid consists of applying a constriction band and washing the area around the wound to remove any unabsorbed venom.

7.10.4 INSECTS

Construction work presents many opportunities to be exposed to a variety of insects. Many of these insects may present health and safety hazards. Wasps, bees, spiders, and mosquitoes present the bulk of these hazards.

Bees and wasps present problems to people working outdoors due to being stung and having adverse reactions to the venom injected during the sting. Mosquitoes on the other hand cause hazards by transmitting disease(s) from other infected animals and humans.

It is important to recognize the venomous spiders (spiders dangerous to humans) that are present in your work environment. Inspect boots, clothing, and other areas before using/entering, as spiders tend to hide in dark places. Many spiders are nocturnal.

Preventing Exposure

Preventing exposure to insects can be accomplished by the following:

- Wearing proper clothing and PPE;
- Inspecting work areas for wasp or bee nests prior to conducting work activities;
- Awareness of regional insects and their behavioral habits;
- Shaking out clothing and shoes and inspecting areas for spiders; and,
- Using repellants.

Proper Clothing

While working outdoors it is important to wear proper clothing and PPE. Insects tend to be attracted to bright colors, floral, prints, black, white, green, tan, and khaki colors. Also it is important to wear long pants and if possible a long-sleeved shirt. Personnel should tuck the pant bottoms into the tops of boots and use insect proof work gloves (leather, thick cloth, etc).

Repellants

It is important to ensure that there is an adequate supply of insect repellent. Use insect repellent, which contains DEET. Apply it to any exposed skin as per the manufacturer's directions.

Reaction to insect bites can range from mild reactions to severe allergic reactions. In addition, mosquitoes may carry life-threatening diseases such as West Nile virus.

Bee (and Wasp) Stings

Reaction to bee stings may range from painful swelling, redness, itching all the way to shock. Swelling, redness, and itching should stop hurting within a day or two. Treatment for these items can be done at home. The treatment will involve initially removing any stinger left in the skin by scraping away from the skin and towards the venom sac (thus preventing one from squeezing more venom into the wound). Afterwards, apply ice and anti-histamine cream. If irritation, swelling and/or pain persist seek medical attention.

If the victim of a bee sting is aware that they are allergic to bees, or if they begin to exhibit signs such as difficulty swallowing, difficulty breathing, abdominal cramps,

nausea then they may be going into anaphylactic shock and will require medical treatment.

If personnel know that they are allergic to insects then they will be required to carry their own insect sting kit as directed by their personal physician. The victim must be taken to the hospital immediately.

Mosquito Bites

Mosquito bites can range from mild skin irritation to severe viral infections. One of the most common viruses that mosquitoes carry is the West Nile virus. West Nile virus can cause encephalitis (swelling of the brain) and meningitis (swelling of the spinal cord).

First symptoms are as follows: rapid onset of headaches, dizziness, difficulty swallowing, deep muscle aches, nausea, stiff neck, high fever, confusion, muscle weakness. Once any of these symptoms are exhibited seek medical attention.

Spider bites

Spider bites can range from mild skin irritation to severe infections and tissue damage depending on the type of spider. The United States has only two spiders that are considered dangerous to humans (the black widow and the brown recluse).

A brown recluse spider (or fiddleback) possesses a V-shaped marking on its back. Its bite will cause tissue damage/destruction for up to 6 weeks. Symptoms can start with little initial pain followed by severe pain, headaches, fever, skin rash, muscle spasms, renal failure and possible coma. A halo may form around the bite. Medical treatment is to be sought immediately.

A black widow spider is an outdoor, nocturnal and non-aggressive spider. A black widow is shiny black with an hourglass shape on its abdomen. Only about one percent of the bites are fatal. The bite is not painful and may not be noticed until later when stomach, muscular or feet pain begin. Other symptoms include heavy sweating, swollen eyelids, erratic saliva production, and difficulty breathing. Seek medical treatment if bitten.

7.11 NOISE

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on Site. The CRA Hearing Conservation Program will be implemented for affected CRA employees.

Control: All personnel must wear hearing protection with a Noise Reduction Rating (NRR) of at least 20 when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All Site personnel who may be exposed to noise must also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, if feasible.

7.12 SANITATION

Site sanitation will be maintained according to OSHA and Department of Health requirements.

7.12.1 BREAK AREA

Breaks must be taken in the SZ, away from the active work area after Site personnel go through decontamination procedures. There will be no smoking, eating, drinking, or chewing gum or tobacco in any area other than the SZ.

7.12.2 POTABLE WATER

The following rules apply for all project field operations:

i) an adequate supply of potable water will be provided at each work Site. Potable water must be kept away from hazardous materials, contaminated clothing, and contaminated equipment;

ii) portable containers used to dispense drinking water must be capable of being tightly closed, and must be equipped with a tap dispenser. Water must not be drunk directly from the container, nor dipped from the container;

iii) containers used for drinking water must be clearly marked and not used for any other purpose; and,

iv) disposable cups must be supplied, and both a sanitary container for unused cups and a receptacle for disposing of used cups must be provided.

7.12.3 SANITARY FACILITIES

Access to facilities for washing before eating, drinking, or smoking will be provided.

7.12.4 LAVATORY

An adequate number of portable chemical toilets will be provided.

7.12.5 TRASH COLLECTION

Trash collected from the CRZ will be separated as potentially contaminated waste. Trash collected in the support and break areas will be disposed of as non-hazardous waste. Trash receptacles will be set up in the CRZ and in the SZ.

7.13 ELECTRICAL HAZARDS

Electricity may pose a particular hazard to Site workers due to the use of portable electrical equipment. When electrical work is needed, it must be performed by a qualified electrician.

General electrical safety requirements include:

i) all electrical wiring and equipment must be a type listed by Underwriters Laboratory (UL), Factory Mutual Engineering Corporation (FM), or other recognized testing or listing agency;

ii) all installations must comply with the National Electrical Safety Code (NESC), the National Electrical Code (NEC), or United States Coast Guard regulations;

iii) portable and semi-portable tools and equipment must be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle;

iv) tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Double insulated tools must be distinctly marked and listed by UL or FM;

v) live parts of wiring or equipment must be guarded to prevent persons or objects from touching them;

vi) electric wire or flexible cord passing through work areas must be covered or elevated to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching;

vii) all circuits must be protected from overload;

viii) temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage;

ix) plugs and receptacles must be kept out of water unless of an approved submersible construction;

x) all extension outlets must be equipped with ground fault circuit interrupters (GFCIs);

xi) attachment plugs or other connectors must be equipped with a cord grip and be constructed to endure rough treatment;

xii) extension cords or cables must be inspected prior to each use, and replaced if worn or damaged. Cords and cables must not be fastened with staples, hung from nails, or suspended by bare wire;

xiii) flexible cords must be used only in continuous lengths without splice, with the exception of molded or vulcanized splices made by a qualified electrician; and

xiv) the OSHA requirements for electrical safety will be adhered to as minimum requirements to be followed by all Site personnel, including subcontractors. Electrical inspections are to occur during initial Site setup and monthly thereafter. These inspections are to be documented via either the SS logbook, the Site Safety and Health Officer's (SHO) logbook, or on the forms found in the attachment to the CRA Electrical SOP.

7.14 CONTROL OF HAZARDOUS ENERGY

During certain activities that involve exposure to stored energy, the procedures set forth in this section for the control of hazardous energy must be followed to prevent accidental energization of equipment and injury to maintenance personnel. In addition to the guidelines set forth in this section, personnel will also need to follow the CRA Lockout/Tagout Safety Program. Lockout/Tagout Forms to assist with the control of hazardous energy have been included in Appendix C for use by authorized personnel.

OSHA's "The Control of Hazardous Energy Sources" standard, 29 CFR 1910.147, outlines lockout/tagout requirements for:

i) identification of hazardous energy sources;

ii) safe shutdown and start-up;

iii) isolation; and,

iv) dissipation of hazardous energy.

Lockout/tagout applies to general industry and covers the servicing and maintenance of all machines and equipment in which the unexpected startup or the release of stored energy could cause possible injury to workers.

OSHA's "Permit-Required Confined Space" standard, 29 CFR 1910.146, requires that the entry permit contain measures for isolation of equipment and procedures for purging, inerting, ventilating, and flushing the environment to remove or control potential hazards.

It is mandatory to develop, document, and use procedures to control potentially hazardous energy sources. Because the project work varies by nature, specific procedures must be developed to complete each project when a hazardous energy source is a concern.

Employee Classifications

The standard differentiates between employees authorized to implement lockout-tagout and those who are affected by it. As the definitions states:

- Authorized employees are those who physically lock or tagout a piece of equipment so they can perform service or maintenance. In some cases, the affected and authorized employee can be the same person;

- Affected employees are those who meet either of two criteria:
  - Their job requires them to operate equipment that is subject to lockout-tagout; or,
  - Their job requires them to work in areas where lockout/tagout is used.

7.14.1 LOCKOUT AND TAGOUT PROCEDURES

Lockout

Lockout procedure consists of placing a lock on an energy-isolating device to ensure that the device and the equipment it controls cannot be operated until the lock is removed. The locks used at the Site will be of standard size, shape, and color. The locks must be individually keyed.

Tagout

Tags are warnings affixed to energy isolating devices that do not provide the physical restraint of a lock. Locks must always be used when possible. Employees must understand the following:

i) a tag should only be removed by or with the authorization of the person who attached it. It must never be bypassed, ignored, or otherwise defeated;

ii) tags must be legible and understandable by all authorized and affected employees, and by all other employees whose work operations may be in the area;

iii) tags and their methods of attachment must be able to withstand the environmental conditions of the work Site;

iv) because tags may evoke a sense of false security, training on their limitations must be given to all employees involved with the project; and,

v) a tag's means of attachment must not be easily defeated (e.g., using string, cord, or adhesive is not permissible). All-environment-tolerant nylon cable ties capable of resisting 50 pounds of force must be used.

7.14.2 SITE-SPECIFIC LOCKOUT/TAGOUT PROCEDURES

The Site activities that will require the use of lockout/tagout will have specific written lockout/tagout procedures for each piece of equipment or process that will follow this basic process:

i) prepare equipment for shutdown and notify affected workers;

ii) shutdown equipment or machines;

iii) isolate the specific energy sources;

iv) place locks and tags on the specific isolation points;

v) verify isolation of hazards by trying (Tryout) to start the specific machine or equipment; and,

vi) return controls to the neutral or off position and begin work.

These specific procedures will ensure the proper shutdown of electrical components, chemical lines, compressed air, process lines, and hydraulics prior to performing major replacement, repair, renovation, tank entry, or modification of machines or equipment.

In addition to the specific lockout/tagout procedures, employees must also adhere to the following practices regarding lockout/tagout:

i) lockout devices must always be affixed so that energy isolating devices are held in the "off" or "safe" position;

ii) lockout must only be implemented by employees authorized or designated by the project manager or project coordinator;

iii) employees authorized to implement a lockout procedure must have had adequate training in lockout and tagout procedures; and,

iv) employees must be retrained whenever a new energy control hazard is present or energy control procedures are changed.

Additionally, whenever major replacement, repair, renovation, or modification of machines or equipment is performed, and whenever new equipment or machines are installed, energy isolating devices for such machines must accept a lockout device.

When any equipment is being serviced, the lockout/tagout standard requires employers to:

i) ensure that new equipment or overhauled equipment can accommodate locks;

ii) employ additional means, such as a tagout program, to ensure safety when locks are used;

iii) establish procedures for releasing of the lockout/tagout that include machine inspection, notification and safe positioning of workers, and removal of the lockout/tagout device; and,

iv) obtain standardized locks and tags that indicate the identity of the worker using them, making sure locks and tags are of sufficient quality and durability to ensure their effectiveness.

As important as a lockout is, it can be effective only if employees are aware of the system and use it properly; thus, employee training is a key requirement to a successful lockout/tagout program.

7.15 MATERIAL HANDLING

Material handling operations to be conducted at the project Site include manual lifting of materials to and from trucks and the setup/maintenance of storage areas.

7.15.1 MANUAL MATERIAL HANDLING

It is the policy of CRA that manual lifting of loads shall be avoided whenever possible. Instead, use equipment such as hoists, carts, and forklifts to assist personnel. However, if manual lifting must take place, the safe work practices referenced in this section shall be followed. Lifting too much weight or using incorrect lifting procedures causes more than 50% of all lost-time back injuries. Therefore CRA has set a maximum personal weight limit of **50 pounds** and requires that all personnel involved in manual material handling activities shall receive training in lifting techniques and back safety.

If there is a discrepancy between this Policy and the client, site, and or subcontractor requirements, then the difference will be resolved by the CRA PM and client or subcontractor PM with technical input from the CRA Corporate Safety and Health Manager (or designee). These individuals will develop a variance to this Policy. This information will be contained in the project health and safety plan and its associated JSA forms.

Specific lifting procedures that should be followed whether on the job or at home are as follows:

- Plan your move. Ensure that your path of travel is free of obstructions including slip/trip/fall hazards.
- Inspect the load – look for any sharp edges, slivers, or other hazards that could cause injury.
- Always push on a load/object as pushing will put less strain on your body and offers some protection should the object tip over.
- Feet must be parted (use a wide balanced stance), with one foot alongside the object being lifted and one foot slightly behind. When the feet are comfortably spread, a more stable lift can occur and the rear foot is in a better position for the upward thrust of the lift.
- Use the squat position and keep the back straight - but remember that straight does not mean vertical. A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the gut that can cause a hernia.
- Tighten your stomach muscles. Inhale prior to the lift and exhale at the top of the lift.
- Grip is one of the most important elements of correct lifting. The fingers and the hand are extended around the object to be lifted - using the full palm. Fingers have very little power - use the strength of your entire hand and keep the load balanced. Use handles or select appropriate gloves to increase quality of grip.
- The load must be drawn close to the body, and the arms and elbows tucked into the side of the body. Holding the arms away from the body increases the strain on the arms and elbows. Keeping the arms tucked in helps keep the body weight centered. One must consider the shape of the load here as the shape of the load may make it difficult to get the center of load close to the body. The further the center of the load is from the body the more stress that will be placed on the body.
- The body must be positioned so that the weight of the body is centered over the feet. This provides a more powerful line of thrust and also ensures better balance. Start the lift with a thrust of the rear foot.
- Do not twist or bend the back/spine. Pick up your feet and pivot to turn.
- Lower the load slowly and in full control using the procedures indicated above.
- For two-person lifts, the lifters should be similar in height and address the overall lifting process in the JSA prior to the lift. Contact a CRA safety professional or your Regional Safety and Health Manager for more information on two-person lifting practices.

It is recommended to keep your body conditioned and to know and comply with your personal limitations. Remember the following phrase: lifting is a breeze when you bend at the knees.

7.15.2 GENERAL STORAGE PRACTICES

The basic safety requirement for storage areas is that the storage of materials and supplies shall not create a hazard. Additional general storage area practices include the following:

- Bags, containers, bundles, etc. stored in tiers shall be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse;
- All stacked materials, cargo, etc. shall be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects should be corrected as they are detected;
- Storage areas shall be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage;
- Storage areas shall have provisions to minimize manual lifting and carrying. Aisles and passageways shall provide for the movement of mechanical lifting and conveyance devices;
- Stored materials shall not block or obstruct access to emergency exits, fire extinguishers, alarm boxes, first aid equipment, lights, electrical control panels, or other control boxes;
- "NO SMOKING" signs shall be conspicuously posted, as needed, in areas where combustible or flammable materials are stored and handled; and,
- Cylindrical materials such as pipes and poles shall be stored in racks, or stacked on the ground and blocked.

7.15.3 SPECIAL PRECAUTIONS FOR HAZARDOUS OR INCOMPATIBLE MATERIALS STORAGE

Generally, materials are considered hazardous if they are ignitable, corrosive, reactive, or toxic. Manufacturers and suppliers of these materials must provide the recipient with MSDSs, which describe their hazardous characteristics, and give instructions for their safe handling and storage.

Many hazardous materials are incompatible, which means they form mixtures that may have hazardous characteristics not described on the individual MSDSs. The following special precautions shall be followed regarding the storage of hazardous materials:

- Based on the information available on the MSDSs, incompatible materials shall be kept in separate storage areas; and,
- Warning signs shall be conspicuously posted, as needed, in areas where hazardous materials are stored.

Hand Protection

Hand protection is the most important form of PPE when handling materials manually. The Site SHO will select the appropriate hand protection for the task/activity. Gloves are often relied upon to prevent against abrasions, cuts, and burns during material handling activities and many types of gloves actually improve your grip factor. Therefore, it is most important that the most appropriate glove (leather, cotton, kevlar, metal mesh, nitrile, etc.) is selected for the given situation. The following table presents protection factors for commonly used gloves.

Type of Glove	Protection
Rubber	Acids, bases, alcohol – moderate resistance to cuts.
Canvas or cloth	Dirt, wood slivers, sharp edges – some resistance to cuts.
Metal mesh or Kevlar	Highly resistant to cuts and scratches and caught between hazards (crushing, etc.)
Insulated	Electrical charges
Cuffed	Protects against liquids trickling into glove and protects the wrist/forearm area from cuts and abrasions.
Leather	Moderate resistance to cuts and abrasions and caught between hazards.

It is important to wash hands frequently when wearing gloves to prevent the build-up of sweat and dirt on the hands. Check gloves regularly for cracks, holes, and rips/tears. Keep gloves clean and dry as much as possible.

7.16 WATER SAFETY

OSHA covers water safety in 29 CFR 1926.106 – Working Over or Near Water. This standard states that certain safety measures are required to be taken when the danger of drowning exists over or near a body of water. These measures include:

- provided all affected employees with a U.S. Coast Guard approved life jacket [personal flotation device (PFD)] or a buoyant work vest (work vest) and require that the PFD or work vest is worn throughout the associated task activity;
- require that the PFD or the work vest be inspected prior to and after each use for defects, which would alter their reliability and buoyancy;
- provide ring buoys with at least 90 feet of line. Ring buoys are to be readily available for emergency response and the distance between the ring buoys is not to exceed 200 feet; and,
- schedule for immediate availability at least one life-saving skiff at locations where employees will be working over or adjacent to water.

8.0 AIR MONITORING PROGRAM

This section of the HASP presents the requirements for conducting air monitoring at the two Sites. The air monitoring program is designed to ensure protection for personnel working at each Site.

8.1 AIR MONITORING – CONSTRUCTION ACTIVITIES

The on-Site monitoring program will be conducted by the SHO and will consist of monitoring Site personnel exposures to VOCs, PAHs, dust/particulate matter, and inorganic compounds of concern, oxygen and combustible gas levels, and carbon monoxide. This monitoring will be completed with the use of both real-time direct reading instruments, colorimetric detector tubes, and laboratory analysis of collected samples.

8.1.1 PERSONNEL AIR SAMPLING PROGRAM

CRA and subcontractors will implement a personnel air sampling program for exposure to chemicals present on Site during activities involving the handling of impacted materials where reasonable potential for chemical exposure exists. The purpose of this program is to verify the adequacy of personal protection and to document the actual exposure level to the selected chemicals of concern. These air sampling programs will meet all OSHA requirements.

CRA and affected subcontractors will collect samples from a representative selection of workers to characterize exposure levels for workers who face the greatest potential for exposure to these substances. Sampling will take place at the initiation of each work activity where reasonable potential for exposure exists and will continue for at least two sampling periods (days/shifts).

Sampling frequency and protocols will be determined by the SHO with input and direction from the CRA Regional Safety and Health Manager. CRA and its subcontractors will use previous Site data/history as well as the location of the work to be performed when determining the sampling protocol(s). At a minimum, sampling will take place for PCBs. The samples will be sent to an American Industrial Hygiene Association (AIHA) accredited laboratory for analysis.

8.1.2 ON-SITE AIR MONITORING

The SHO or designee (i.e., Environmental Monitoring Technician) will perform air monitoring to evaluate the exposure of Site personnel to chemical and physical hazards, verify the effectiveness of engineering controls, and determine the proper level of PPE. During the progress of excavation activities, the SHO will monitor the levels of VOCs, oxygen and combustible gases, carbon monoxide, and particulate levels on an hourly basis or more frequently as necessary based on Site conditions. The following monitoring equipment will be used for this purpose:

i) a PID equipped with a 10.6 or greater eV lamp;

ii) a four gas monitor capable of measuring oxygen levels/combustible gas, carbon monoxide, and hydrogen sulfide;

iii) a particulate monitor;

iv) hydrogen cyanide monitor or colorimetric sampling tubes; and,

v) colorimetric tubes for benzene (at a minimum) and sampling pump.

All instruments will be calibrated on a daily basis in accordance with the manufacturer's guidelines. Records of all calibrations and real-time measurements will be kept in a bound field logbook or documented via air monitoring and calibration log sheets.

When air monitoring is required, worker's breathing zone(s) will be monitored and the results will be recorded. Additionally, area samples at the following locations will be taken daily. Record time, location, and results of monitoring and actions taken based on the readings:

- Upwind of work areas to establish background concentrations;
- In support zone to check for contamination or migration of emissions;
- Along decontamination line to check that decontamination workers are properly protected and on-Site workers are not removing protective equipment in a contaminated area; and,
- Downwind of work area to track any contaminants/emissions leaving the Site. This is in addition to the air monitoring required by the Fugitive Dust Monitoring – Perimeter Program.

The data collected throughout the monitoring effort shall be used to determine the appropriate levels of protection. Action levels for upgrading or downgrading of PPE have been established, and Tables 5.1 and 5.2 present the action levels for the on-Site Air Monitoring Program.

8.1.3 REAL-TIME VOC MONITORING

The SHO will continuously monitor for the presence of VOCs during the handling of impacted materials and intrusive activities. PID readings will be taken in and around all EZs. Action levels for upgrading or downgrading of PPE have been established and Table 5.1 and Table 5.2 presents the action levels for the on-Site Air Monitoring Program.

An action level is a point at which increased protection or cessation of activities is required due to the concentration of contaminants in the work area. All activities shall be initiated in Modified Level D. The appropriate actions will be taken at designated action levels.

In addition to the action levels, an upgrade to supplied air, Level C or evacuation of the immediate area is required if:

- Any symptoms occur, as described in Section 7.1;
- Sustained readings (15 minutes or greater) occur in the worker's breathing zone that are above the applicable action levels;
- Requested by an individual performing the task; and,
- Any irritation to eye, nose, throat, or skin occurs.

8.1.4 COMBUSTIBLE GAS, OXYGEN, HYDROGEN SULFIDE, AND CARBON MONOXIDE

Air monitoring for combustible gases, hydrogen sulfide, carbon monoxide, and oxygen will be conducted during excavation activities, and during other activities where oxygen deficient, elevated carbon monoxide readings, and/or flammable atmospheres may be encountered (e.g., confined space entries, entry into excavations, working within an enclosed building, etc.). The point of excavation and the immediate work area around these activities must be monitored to ensure that an adequate level of oxygen is present, and to determine if a flammable atmosphere exists. Air monitoring for these gases will be conducted as needed in areas that are suspect. The SHO will determine the monitoring frequency based on the observed Site conditions. All work activity must stop where monitoring indicates the flammable vapors concentration is 10 percent of the lower explosive limit (LEL) at a location with a potential ignition source. Such an area must be ventilated to reduce the concentration to an acceptable level.

Action levels for combustible gases, oxygen, hydrogen sulfide, and carbon monoxide are presented in Tables 5.1 and 5.2.

8.1.5 PARTICULATE MONITORING

Based upon the results of an industrial hygiene air monitoring modeling program the mixture PEL total dust levels have been calculated using "worst case" scenario concentrations for contaminants identified in the Site soil and sediment. The particulate action levels are located in Table 5.1 for the 12th Street Landfill and Table 5.2 for the Former Plainwell Paper Mill Site. Dust control measures (water spray, etc.) should be implemented at the Site to control dust emissions.

8.1.6 FUGITIVE DUST MONITORING – PERIMETER – 12TH STREET LANDFILL

The CRA Fugitive Dust Monitoring – Perimeter Program (Fugitive Dust Monitoring Program) is based upon the requirements and information contained in the document entitled, "Pre-Final Design Report, 12th Street Landfill, Otsego Township, Michigan" dated January 2009, specifically Section 7.1, Fugitive Dust Monitoring. Reference the Pre-Final Design Report for additional information with regards to fugitive dust monitoring.

CRA will implement a Fugitive Dust Monitoring Program during performance of the following activities:

Construction equipment traveling over unpaved surfaces;
Relocation of the paper residuals;
Unloading of soil;
Grading activities;
Placement of cover; and,
Other construction activities that may results in nuisance dust.

Although the handling of moist paper residuals and the sandy, native soil provide inherent engineering controls, real-time measurements with a dust monitor (Thermo PDR 1000 or equivalent) will be required to demonstrate compliance with site action levels for dust. Dust control methods may include the use of water spray, decrease size

of open/exposed work area, and/or a decreased rate of production to lower particulate levels below the action level.

The action level applicable to OU-4 perimeters is **150 μg/m³**. The action level when performing excavation activities in the vicinity of DB-3 and relocating these materials into the 12th Street Landfill will be **125 μg/m³.** If either of these action levels is met or exceeded then additional dust control measures will be implemented.

The real-time ambient particulate measurements will be collected at locations on the property line downwind of activities that have the potential to create fugitive dust (an activity list has been provided above). During the actual performance of these activities, the concentrations of particulates in air will be measured at four (4) locations on the landfill property line with a real-time instrument, three (3) times each day for a total of 12 measurements per day. Each measurement will be taken at a different downwind location unless elevated readings are measured at a particular location. In this case, the readings may be repeated at this location during the day. If applicable, locations where visible dust is evident will be preferentially selected for monitoring. A total of three (3) values will be recorded each time a location is monitored, with the average of the three (3) values used for comparison with the action level standards. Any exceedance of the action level is to be communicated to CRA site supervision immediately. Results of this monitoring will be recorded in a field book or on an air monitoring logsheet.

8.2 AIR MONITORING PROGRAM – INVESTIGATION ACTIVITIES

Inhalation hazards are caused from the intake of vapors and contaminated dust. Air monitoring shall be performed while intrusive activities are taking place to detect the presence and relative level of those air contaminants which are inhalation hazards. The purpose of air monitoring is to identify and quantify airborne contaminants in order to determine the level of worker protection needed. Initial screening for identification is often qualitative, but the determination of its concentration (quantification) must wait subsequent testing.

The data collected throughout the monitoring effort shall be used to determine the appropriate levels of protection.

8.2.1 EXPOSURE MONITORING

Air monitoring equipment to be used during site activities shall consist of a PID. Subsurface investigations shall also include the use of a four-gas meter at the 12th St. Landfill Site.

8.2.2 PHOTOIONIZATION DETECTORS

Exposure to VOCs shall be monitored with a PID with a 10.6 eV lamp. The PID has the ability to detect organic vapor concentrations from 1 (ppm to 2,000 ppm. All PID monitoring shall be conducted in the breathing zone.

8.2.3 MULTI-GAS METER (LEL/O2/H2S/CO METERS)

The multi-gas meter is a combination oxygen, carbon monoxide, hydrogen sulfide, and combustible gas indicator, which simultaneously analyzes concentrations of each contaminant in air. When used properly, the portable oxygen indicator will read the percent oxygen in the immediate atmosphere. The normal ambient oxygen concentration is 20.9 percent at sea level. It is necessary to be apprised of such readings as they impact LEL readings and vice versa.

8.2.4 MONITORING FREQUENCY

Monitoring will take place at a minimum before each new task and during the completion of the intrusive task at periodic intervals or more frequently if conditions indicate more monitoring is necessary. The monitoring frequency may be decreased if the work areas and activities are unchanging, the result of the first hour of monitoring indicate contaminant concentrations are non-detect, and no differing conditions are observed.

8.2.5 HEALTH AND SAFETY ACTION LEVELS

An action level is a point at which increased protection or cessation of activities is required due to the concentration of contaminants in the work area. All activities shall be initiated in Modified Level D. The following table provides the action level for each contaminant being monitored.

Parameter	*Action Level**	*Actions To Be Taken*
Dust	Visible particulate	Control by wetting, if wetting cannot control dust, upgrade to Level C
VOC	Sustained background readings of 10 ppm or greater. 50 ppm	Stop work and evacuate area or upgrade to Level C Stop work and evacuate area
Oxygen	Less than 19.5% O_2 Greater than 23.5% O_2	Stop work and evacuate area if levels are less than 19.5% O_2 or greater than 23.5% O_2.
Hydrogen Sulfide	Less than 10 ppm H_2S Greater than or equal to 10 ppm (ceiling) H_2S	Continue work and evaluate work conditions. Stop work and evacuate area if levels are greater than or equal to 10 ppm. Shut off or eliminate any ignition sources along perimeter of site.
Carbon Monoxide	Less than 25 ppm CO Greater than or equal to 25 ppm	Continue work and evaluate work conditions Stop work and evacuate area if levels are greater than or equal to 25 ppm.
Combustible Gas	Less than 10% LEL Greater than 10% LEL	Continue work and evaluate work conditions. Stop work and evacuate area if levels are greater than 10% LEL. Shut off or eliminate any ignition sources along perimeter of site. Consult the CRA RSHM and Project Management.

In addition to the action level, an upgrade to Level C is required if:

- any symptoms occur, as described in Section 7.0;
- requested by an individual performing the task; and,
- any irritation to eye, nose, throat, or skin occurs.

A work stoppage and evacuation (cease and desist) at the specific work area is required if levels in the breathing zone exceed the protection factor of the respirator (50 ppm).

9.0 DECONTAMINATION PROCEDURES

In general, everything that enters the EZ at this Site must either be decontaminated or properly discarded upon exit from the EZ. All personnel, including any State and local officials must enter and exit the EZ through the CRZ. Prior to demobilization, potentially contaminated equipment will be decontaminated on a wash pad (decontamination pad) which has a built in sump and the equipment will be inspected by the SHO before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the EZ until disposal arrangements are made.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for heavy equipment and for any reusable PPE is Alconox/Liqui-nox soap. The MSDSs for Liqui-nox and any other chemical containing products brought to the Site will be maintained on Site by the SHO.

9.1 EQUIPMENT DECONTAMINATION PROCEDURES

All equipment that comes in contact with waste material must be decontaminated within the CRZ by a pressure water cleaner upon exit from the EZ. Decontamination procedures should include: knocking soil/mud from machines; water brush scrubbing using a solution of water and Liqui-nox; and a final water rinse. Personnel shall wear Level C or Modified Level D protection, as determined by the SHO, when decontaminating equipment. Runoff and sediments will be collected and stored until proper disposal arrangements have been made. Following decontamination and prior to exit from the EZ, the SHO shall be responsible for ensuring that the item has been sufficiently decontaminated. This inspection shall be included in the Site log.

9.2 PERSONNEL DECONTAMINATION PROCEDURES

Personnel decontamination will be completed in accordance with the CRA Safety and Health Program for personnel decontamination. Washwater and sediments will be collected and stored with any runoff water collected for subsequent treatment/disposal. PPE, trash, etc. will be sent off-Site for disposal. It will be kept separate from trash generated in clean areas of the Site.

All disposable equipment shall be doffed before meal breaks and at the conclusion of the workday and replaced with new equipment prior to commencing work.

Procedures for decontamination must be followed to prevent the spread of contamination and to eliminate the potential for chemical exposure.

Personnel - Decontamination will take place prior to exiting the contaminated work area.

Modified Level D decontamination procedures are as follows:

Step 1 - Remove all visible contamination and loose debris by washing with clean water.
Step 2 - Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.
Step 3 - Remove protective clothing; dispose of in disposable container.
Step 4 - Remove inner gloves, dispose of in disposable container.
Step 5 - Wash and rinse hands.

Level C decontamination procedures to be utilized as follows:

Step 1 - Remove all visible contamination and loose debris by washing with clean water.
Step 2 - Remove all outer clothing that came in contact with the contamination (i.e., boot covers and outer gloves) and either dispose of in disposable container or wash in detergent solution and rinse.
Step 3 - Remove protective clothing; dispose of in disposable container.
Step **4** - Remove respirator, sanitize prior to reuse.
Step 5 - Remove inner gloves; dispose of in disposable container.
Step 6 - Wash and rinse hands with soap and water.

10.0 MEDICAL SURVEILLANCE

In accordance with the requirements detailed in 29 CFR 1926.65 and 29 CFR 1910.134, all Site personnel who will come in contact with potentially contaminated materials will have received medical surveillance by a licensed physician or physician's group.

Medical records for all on-Site personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work as per the employer's medical surveillance program, which is to be in accordance with 29 CFR 1926.65.

The medical records will be available to the employee or his designated representative upon written request, as outlined in 29 CFR 1910.1020.

Each employer will provide certifications to their on-Site SHO that their personnel involved in Site activities will have all necessary medical examinations prior to commencing work, which requires respiratory protection or potential exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within contaminated areas.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any Site activity or when accidental exposure to elevated concentrations of contaminants occur.

11.0 EMERGENCY CONTINGENCIES

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate. Radios will be provided for contact purposes. All emergencies will be reported to the appropriate emergency responders. They may give CRA and/or the subcontractor further direction as to the responsibilities during any emergency situation. In general, CRA and subcontractor personnel will shut down equipment and evacuate to a safe pre-determined meeting area during Site emergencies. This section is to be used in conjunction with the CRA Emergency Contingency Plan.

11.1 EMERGENCY CONTACTS

City of Otsego Fire Department		269-692-3391
City of Otsego Police Department		269-692-6111
Ambulance		911
Hospital:	Borgess Pipp Hospital 411 Naomi Street Plainwell, Michigan 49080	269-685-6811

Directions to the Hospital (See Figures 11.1 and 11.2– Hospital Route Maps):

From 12th Street Landfill:
Start traveling south on 12th Street towards M-89. Turn left at light onto M-89. Continue on M-89 heading east over US-131 take a right (head south) onto Naomi Street. Travel time is approximately 5 minutes from Site.

From Former Plainwell Paper Mill:
Exit Site onto M-89, take a left toward US-131 (head west). Turn left onto Naomi Street. Travel time is approximately 2 minutes from Site.

Communication between work areas and the command post, located within the CZ, will be via verbal communication, auto horn, or two-way radio. The SHO will use the nearest telephone on Site or may be in the possession of a mobile telephone to communicate with outside emergency and medical facilities.

The following signals shall be established for use with auto or compressed air-type horns:

i) 3 Blasts: evacuate exclusion area.

ii) An "All Clear" will be conveyed by radio communication.

11.2 ADDITIONAL EMERGENCY NUMBERS

National Response Center (NRC) 800-424-8802

Poison Information 800-764-7661

Miss Dig Utility Commission (One Call) 800-482-7171

Agency for Toxic Substances and Disease Registry ..... 404-488-4100 (24 Hours)

EPA Remedial Project Manager - 12th Street Landfill (Michael Berkoff) 312-353-8983

EPA Remedial Project Manager - Former Plainwell Paper Mill (Sam Chummar) 312-886-1434

EPA Remedial Project Manager - Allied Paper Mill/Kalamazoo River Site (Jim Saric) 312-886-0992

U.S. EPA Emergency Response 800-424-8802

State of Michigan Emergency Response Commission 517-373-8481

CRA Project Manager (Greg Carli) ..... 905-682-0510 or 905-687-1402 (mobile)

CRA Project Coordinator (Jodie Dembowske) ..... 269-344-1230 or 269-217-1171 (mobile)

CRA Project Coordinator (Emily Stahl) ..... 905-682-0510 or 905-327-3043 (mobile)

CRA Regional Safety and Health Manager (Jeffrey Maranciak) 412-963-7313

CRA Site Superintendent (J. Pete Lewis) ..... 412-973-9417(mobile)

CRA Health and Safety Officer (TBD) .....

CRA Incident Reporting Hotline (24 Hour) 866-529-4886

11.3 EMERGENCY AND FIRST AID EQUIPMENT

Emergency safety equipment will be available for use by Site personnel and will be located and maintained on Site. The safety equipment will include, but is not limited to, the following:

i) portable emergency eye wash and drench shower (pressurized);

ii) two 20-pound ABC type dry chemical fire extinguishers;

iii) approved first-aid kit for a minimum of twenty personnel;

iv) fire blanket;

v) two SCBA units; and,

vi) portable air horn.

11.4 PROJECT PERSONNEL RESPONSIBILITIES DURING EMERGENCIES

SAFETY AND HEALTH OFFICER (SHO)

As the administrator of the HASP, the SHO has primary responsibility for responding to and correcting emergency situations. The SHO will:

i) take appropriate measures to protect personnel including: posting of acceptable Site evacuation routes , withdrawal from the EZ, total evacuation and securing of the Site or upgrading or downgrading the level of protective clothing and respiratory protection;

ii) take appropriate measures to protect the public and the environment including isolating and securing the Site, preventing runoff to surface waters, and ending or controlling the emergency to the extent possible;

iii) ensure that appropriate Federal, State, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted;

iv) ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained;

v) determine the cause of the incident and make recommendations to prevent the reoccurrence; and,

vi) ensure that all required reports have been prepared.

11.5 MEDICAL EMERGENCIES

Any person who becomes ill or injured in the EZ must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the patient. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the SHO and SS.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a copy of the identified chemicals on Site to which they may have been exposed.

Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

11.6 FIRE OR EXPLOSION

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the SHO or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials on Site.

If it is safe to do so, Site personnel should:

i) report to the CRA SS;

ii) use fire fighting equipment available on Site; or,

iii) remove or isolate flammable or other hazardous materials, which may contribute to the fire.

11.7 AIR MONITORING PLAN

As outlined in section 8.0.

11.8 SPILL PREVENTION, CONTROL, AND COUNTERMEASURES

On-Site

If any unknown chemicals or material with the potential to be released in a spill is encountered on site or if any chemicals or material need to be brought on site to complete the work which would trigger a spill planning obligation, work in the area shall be stopped until an appropriate Spill Prevention, Control, and Countermeasures can be employed during the Site activities.

If a spill occurs, the following procedure will be followed:

i) notify the CRA SHO and SS:

ii) evacuate immediate area of spill;

iii) determine the needed level of PPE;

iv) don required level of PPE and prepare to make entry to apply spill containment and control procedures;

v) no entry will be made until atmosphere is less than 20 percent of the LEL; and

vi) absorb or otherwise clean up the spill and containerize the material, sorbent, and affected soils.

The SS has the authority to commit resources as needed to contain and control released material and to prevent its spread to off-Site areas.

Releases from drums containing solid wastes will be placed into approved containers and covered. Each container will be labeled as to its contents. Solid spills from haulage units will be placed back into haulage units.

In the event that a drum or container of liquid is spilled on Site outside of the EZ, a drum handling team will immediately respond to the spill. The spilled liquids will be confined to the immediate area of the spill and the liquids will be pumped, with the use of a portable hand pump, into a repack drum. The spilled liquids will be confined by diking around the spill with native material or with an inert absorbent. Any residual liquids, which cannot be pumped, will be absorbed with a sufficient quantity of inert absorbent to ensure that no free liquids remain. If the spill occurred on soil, the visibly affected soil will be excavated to limits based on a visual determination of spill contamination with the concurrence of the on-Site Client Representative. The absorbent and excavated material will be drummed or otherwise appropriately contained.

In the event that there is a change in Site characteristics, additional scope, or field observations require it a Spill Prevention, Control, and Countermeasures Plan will developed, addressing those potential changes will be developed and include in a HASP addendum.

11.9 INCIDENT, INJURY, AND ILLNESS REPORTING AND INVESTIGATION

Any work-related incident, accident, injury, illness, exposure, or property loss must be reported to your supervisor, the SS, and *within 1 hour* through the CRA Accident Reporting System. Motor vehicle accidents must also be reported through this system. CRA's Incident Report Form, located in Appendix C, must also be filled out and provided to the SS. The report must be filed for the following circumstances:

- accident, injury, illness, or exposure of an employee;
- injury of a subcontractor;
- damage, loss, or theft of property; and/or,
- any motor vehicle accident, regardless of fault, which involves a company vehicle, rental vehicle, or personal vehicle while the employee is acting in the course of employment.

Occupational accidents resulting in employee injury or illness will be investigated by the SS. This investigation will focus on determining the cause of the accident and modifying future work activities to eliminate the hazard.

All employees have the obligation and right to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others. If you wish to make such a report, it may be made orally to your supervisor or other member of management, or you may submit your concern in writing, either signed or anonymously.

12.0 RECORDKEEPING

The SHO shall establish and maintain records of all necessary and prudent monitoring activities as described below:

i) name and job classification of the employees involved on specific tasks;

ii) records of fit testing and medical surveillance results for Site personnel;

iii) records of all OSHA and other applicable safety training certifications for Site personnel;

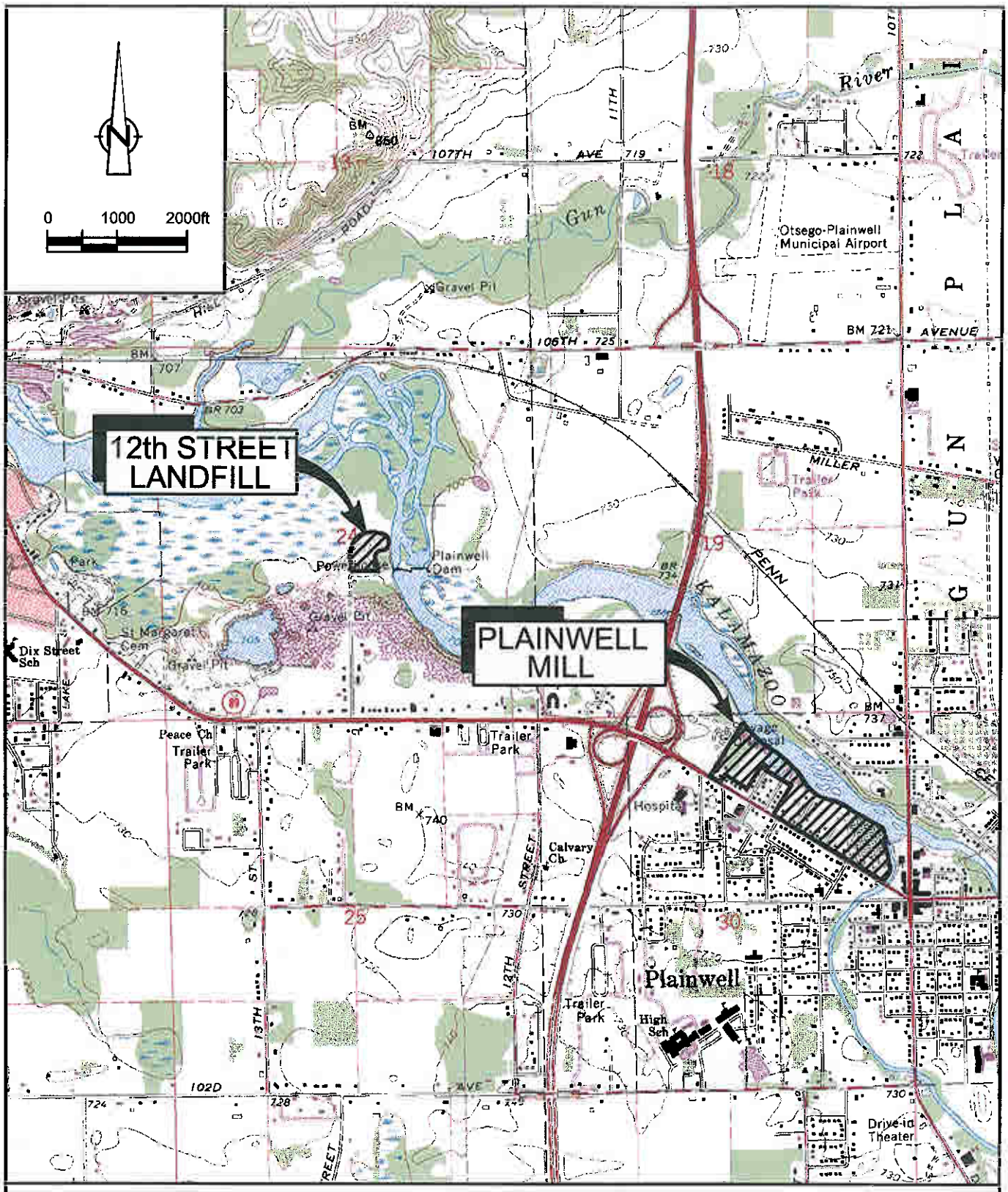
iv) decontamination logs of heavy equipment;

v) records of training acknowledgment forms and daily safety meetings;

vi) emergency report sheets describing any incidents or accidents;

vii) air monitoring equipment calibrations; and,

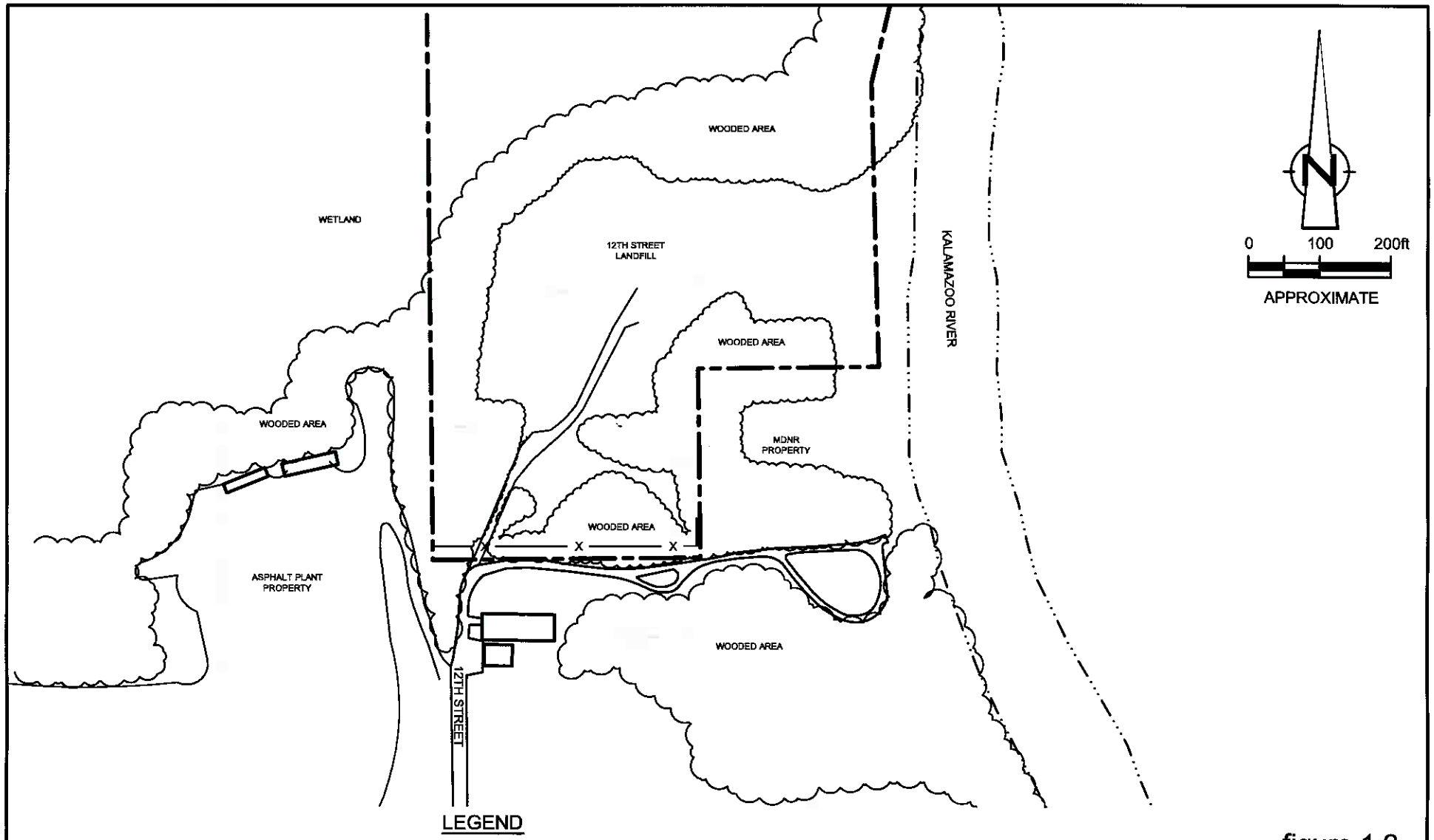
viii) air monitoring data.



SOURCE: USGS QUADRANGLE MAP;
OSTEGO, MICHIGAN
1967, REVISED 1973

figure 1.1
SITE LOCATIONS
FORMER PLAINWELL MILL AND
12TH ST. LANDFILL SITES
Plainwell, Michigan

056394-00(001)GN-SC001 MAR 12/2009



LEGEND

APPROXIMATE PROPERTY BOUNDARY

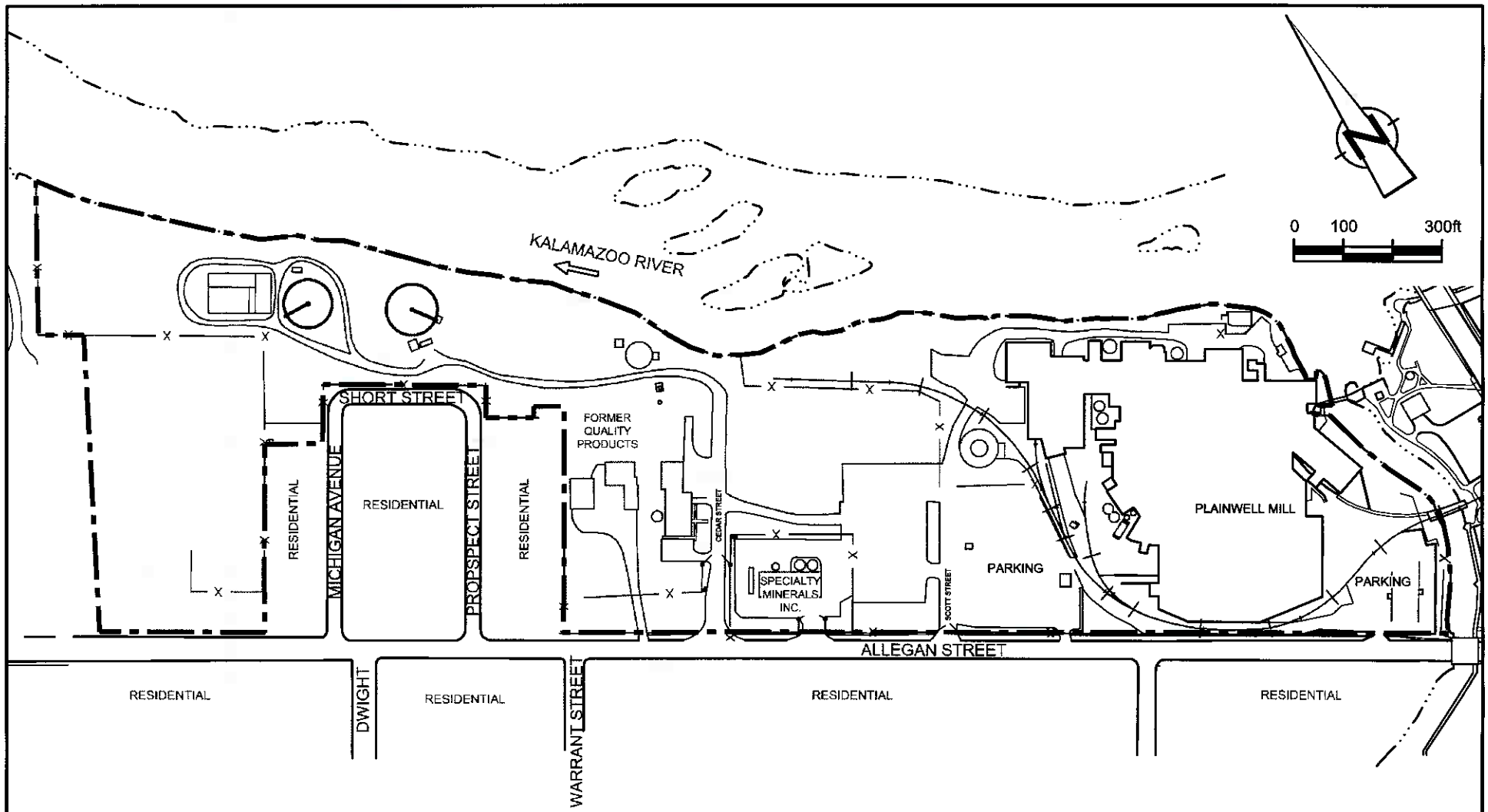
APPROXIMATE SHORELINE

FENCELINE

figure 1.2

SITE PLAN - 12TH STREET LANDFILL SITE
FORMER PLAINWELL MILL AND
12TH STREET LANDFILL SITE
Plainwell, Michigan

056394-00(001)GN-SC002 MAR 12/2009



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- SHORELINE
- FENCELINE
- RAILWAY

figure 1.3

SITE PLAN - PLAINWELL PAPER MILL
FORMER PLAINWELL PAPER MILL AND
12TH STREET LANDFILL SITES
Plainville, Michigan

056394-00(001)GN-SC003 MAR 12/2009

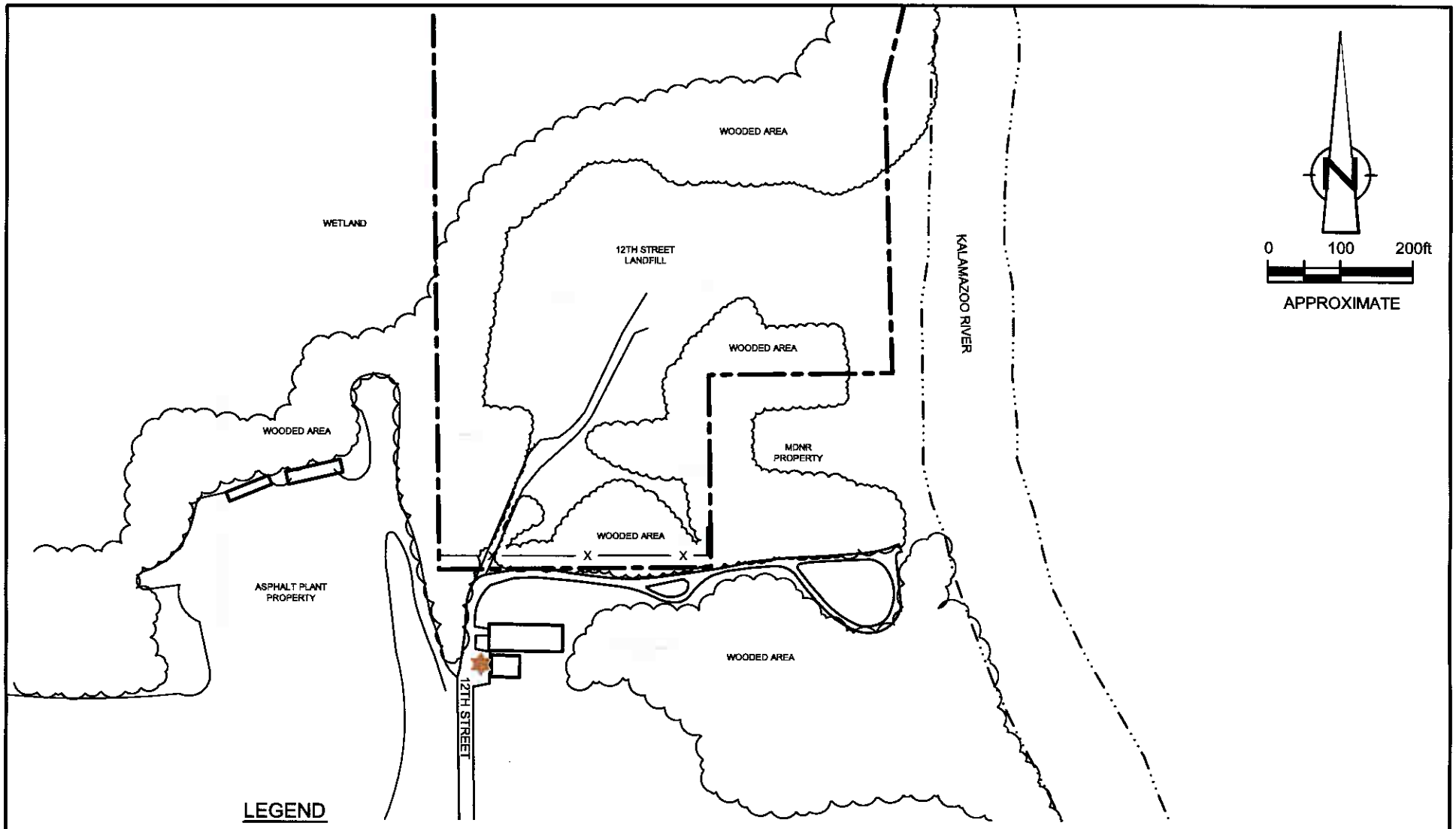
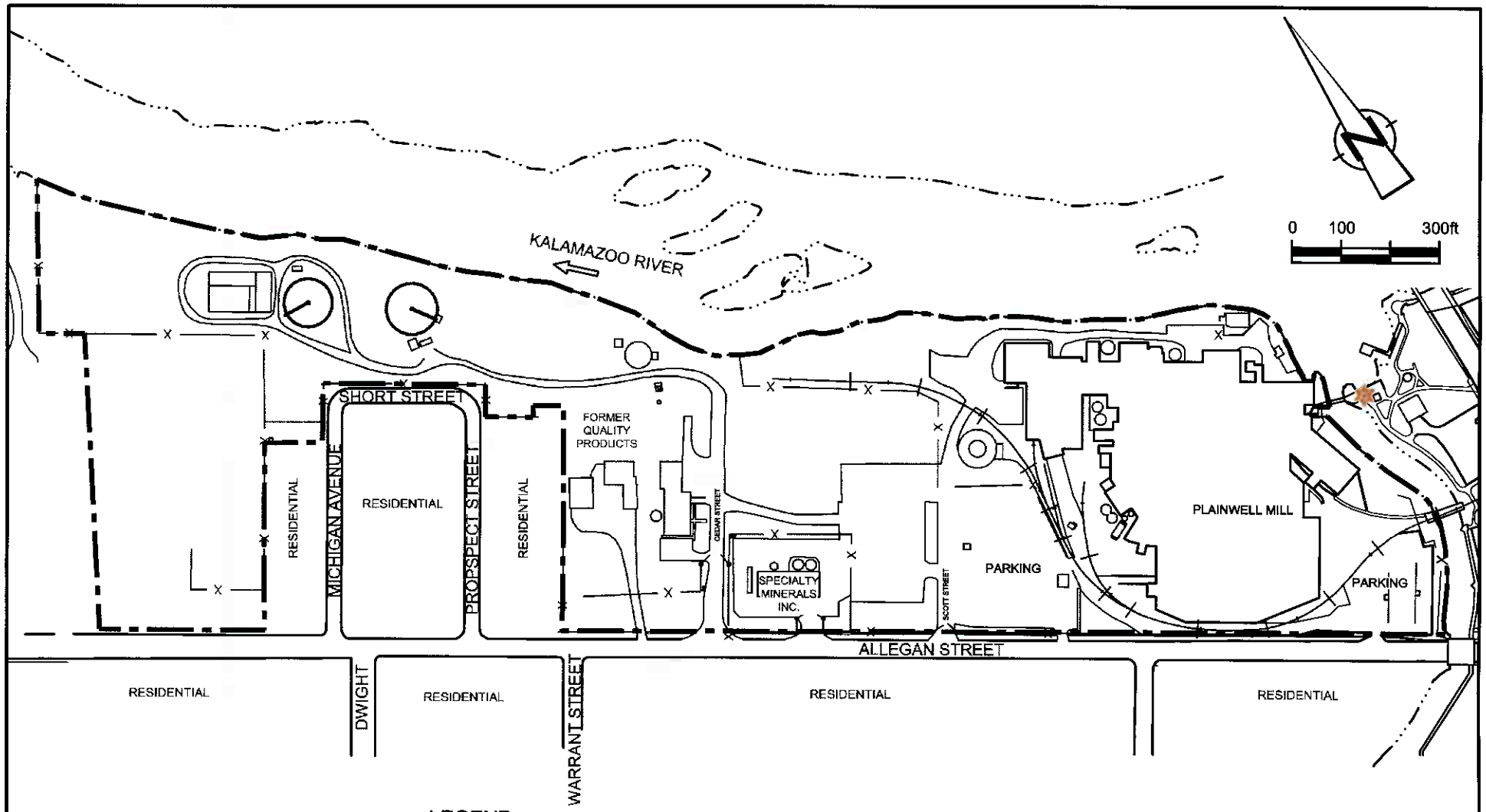


figure 6.2.1

EMERGENCY GATHERING POINT - 12TH STREET LANDFILL SITE
FORMER PLAINWELL MILL AND
12TH STREET LANDFILL SITE
Plainwell, Michigan

056394-00(001)GN-SC004 MAR 12/2009



LEGEND

APPROXIMATE PROPERTY BOUNDARY

SHORELINE

FENCELINE

RAILWAY

EMERGENCY GATHERING POINT

figure 6.2.2

EMERGENCY GATHERING POINT - PLAINWELL PAPER MILL
FORMER PLAINWELL PAPER MILL AND
12TH STREET LANDFILL SITES
Plainville, Michigan

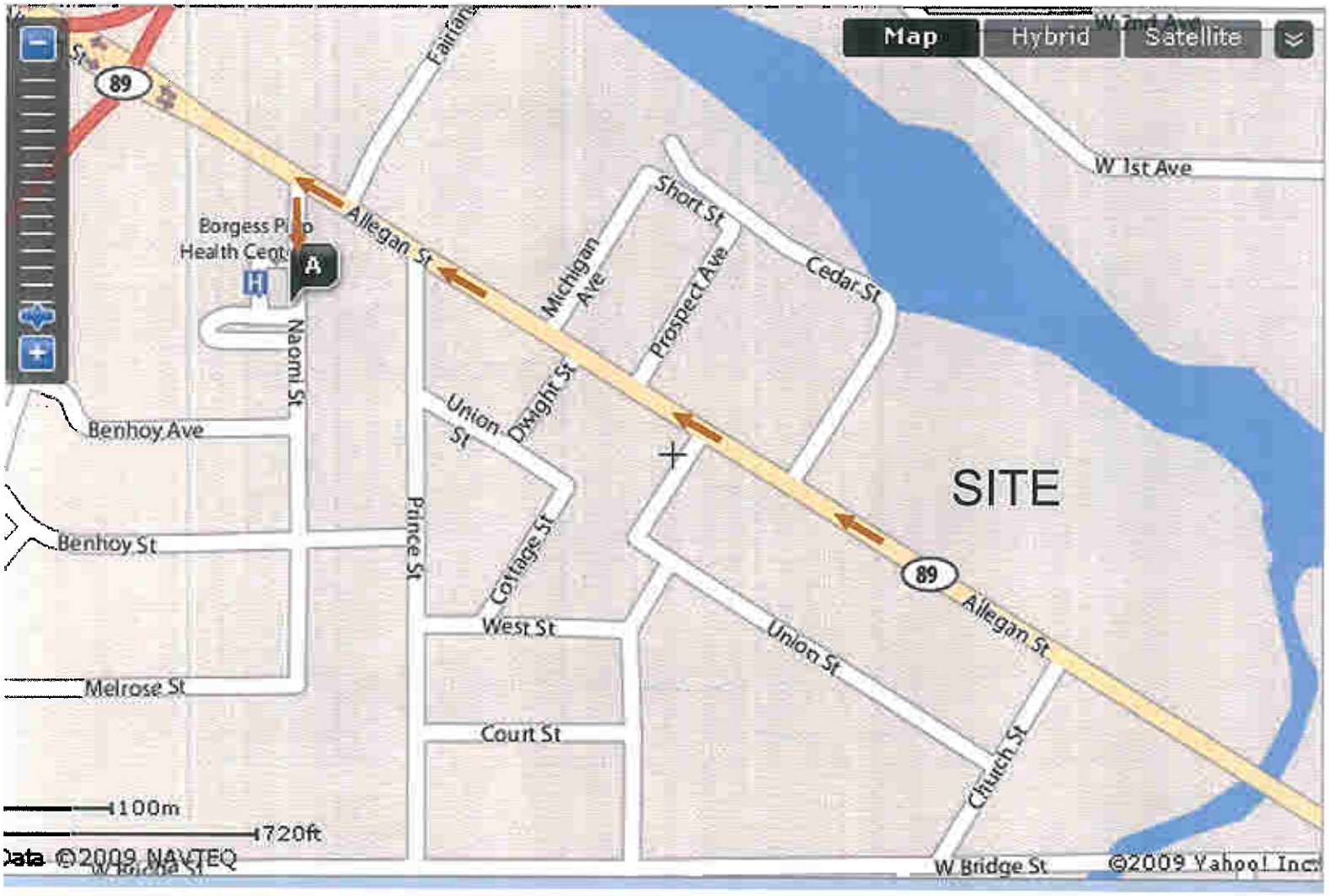
056394-00(001)GN-SC005 MAR 12/2009

Directions:
Drive Straight out of the Site towards Allegan Street.
Make a Left onto Allegan Street, make a right onto Naomi Street (411 Naomi St Plainwell MI US)

figure 11.1

ROUTE TO HOSPITAL - 12TH STREET LANDFILL SITE
FORMER PLAINWELL MILL AND
12TH STREET LANDFILL SITE
Plainwell, Michigan

056394-00(001)GN-SC006 MAR 12/2009



Directions:
Exit Site. Make a right onto Allegan Street
Make a Left onto Naonmi Street (411 Naomi St Plainwell MI US)

figure 11.2

ROUTE TO HOSPITAL - PLAINWELL MILL
FORMER PLAINWELL MILL AND
12TH STREET LANDFILL SITE
Plainwell, Michigan

056394-00(001)GN-SC007 MAR 12/2009

TABLE 2.1

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS, WASTE AND GROUNDWATER
12th STREET LANDFILL

Chemical Name (Synonyms)	***Concentration at Site***	***Exposure Limits***	***Routes Of Entry***	***Symptoms/Health Effects***	***Chemical Properties***	***Physical Characteristics***
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.0000918 mg/kg	There are no numerical limits set although in view of its adverse effects, all contact should be avoided.	Skin absorption Inhalation	ACUTE: **Inhalation** - Can cause burning sensation in nose and throat, headache, dizziness, nausea, vomiting, pain in the joints, tiredness, emotional disorders, blurred vision and muscle pain, nervousness, irritability and intolerance to cold. Itching, swelling and redness followed by acne-like eruptions of the skin known as chloracne commonly occur. Symptoms may appear weeks or months after initial exposure and may last a few months up to 15 years. Can cause abnormalities of liver, pancreas, circulatory system and respiratory system and death. **Skin** - Contact with very small amounts can cause chloracne. **Eyes** - Can cause burning and irritation. **Ingestion** - Can cause effects described under inhalation. Animal studies suggest that daily exposure to amounts smaller than one grain of salt may cause severe symptoms and death within a few weeks. CHRONIC: Long term exposure can cause reduced ability to inhale, chloracne, and numbness and tingling in arms and legs. A blood abnormality may occur which may include light sensitive skin, blisters, dark skin coloration, excessive hair growth and dark red urine. Reproduc	(FP) NI (VP) 0.000002 mm (IP) NI (UEL) NI (LEL) NI	Colorless to white, crystalline solid. Dioxin has no use as such; it is an inadvertent contaminant in herbicide precursors and thus in the herbicides themselves. It is applied in herbicide formulations.
MEK 2-Butanone Methyl ethyl ketone Methyl acetone CAS-78-93-3	Detection noted in groundwater on-Site. Value not presented in reporting.	TLV: 200 ppm PEL: 200 ppm STEL: 300 ppm IDLH: 3,000 ppm	Inhalation Ingestion Skin contact Eye contact	ACUTE: Vapors are irritating to eyes, skin, nose and causes headaches. Ingestion causes dizziness and vomiting. May affect CNS. CHRONIC: Defatting of the skin.	(FP) 16°F (VP) 78 mm (IP) 9.54 eV (UEL) 11.4% (LEL) 1.4%	Colorless liquid with a moderately sharp, fragrant mint- or acetone-like odor.
4,4-DDD	35.0 mg/kg	NI - Use exposure limits for DDT	Skin contact Inhalation Ingestion Eye contact	Similar to DDT	NI	Technical grade DDT may also contain DDE and DDD as contaminants. DDD was also used to kill pests, but to a far lesser extent than DDT.
4,4-DDE	32.0 mg/kg	NI - Use exposure limits for DDT	Skin contact Inhalation Ingestion Eye contact	Similar to DDT	NI	Both DDE and DDD are breakdown products of DDT.

TABLE 2.1

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS, WASTE AND GROUNDWATER
12th STREET LANDFILL

Chemical Name (Synonyms)	***Concentration at Site***	***Exposure Limits***	***Routes Of Entry***	***Symptoms/Health Effects***	***Chemical Properties***	***Physical Characteristics***
Acetone 2-Propanone Methyl ketone Dimethyl ketone CAS-67-64-1	Detection noted in groundwater on-Site. Value not presented in reporting.	TLV: 500 ppm PEL 1,000 ppm STEL: 750 ppm IDLH: 2,500 ppm	Inhalation Ingestion Skin Contact Eye Contact	ACUTE: Vapors irritating to eyes and respiratory tract. May cause headaches and dizziness, effects on CNS, liver, kidneys and gastrointestinal tract. CHRONIC: Prolonged contact causes defatting of the skin, possibly dermatitis. Substance may affect blood and bone marrow.	(FP) 0 degrees F (VP) 180 mm (IP) 9.69 eV (UEL) 12.8 % (LEL) 2.5%	Colorless liquid. With characteristic mint-like odor.
Aldrin	4.4 mg/kg	TLV: 0.05 mg/m3 [skin] PEL: 0.25 mg/m3 STEL (NIOSH): ND IDLH: 25 mg/m3	Inhalation Absorption Ingestion Contact Hazard	ACUTE: Points of attack are the central nervous system, liver, kidneys, and skin. Harmful effects and symptoms are headache, nausea, vomiting, dizziness, and mild clonic jerking. Aldrin can produce convulsions without warning. Aldrin can burn the skin and eyes. Poisoning by aldrin usually involves convulsions due to its effects on the central nervous system. CHRONIC: Reproductive effects and liver effects have also been reported. It is classified as an extremely toxic chemical.	(FP) NA (VP) 0.00008 mm (IP) ND (UEL) NA (LEL) NA	Aldrin is similar chemically and toxicologically to dieldrin. Colorless to dark brown crystalline solid with a mild chemical odor.
Polychlorinated Biphenyls PCB (42%) Chlorodiphenyl (42% chlorine) Aroclor 1242 CAS-53469-21-9	120 mg/kg (soils) 0.0014 mg/L (leachate)	TLV: 1 mg/m3 [skin] PEL: 1 mg/m3 [skin] STEL: NE IDLH: 5 mg/m3	Inhalation Absorption (skin) Ingestion	ACUTE: Eye irritation. CHRONIC: Dermatitis, chloracne, liver damage.	(FP) NA (VP) 0.001 mm (IP) NE (UEL) NA (LEL) NA	Colorless to light colored viscous liquid with a mild hydrocarbon odor.
Arsenic CAS-7440-38-2	41.5 mg/kg	TLV: 0.01 mg/m3 [skin] PEL: 0.010 mg/m3 STEL: NE IDLH: 5 mg/m3 (as As)	Inhalation Absorption Ingestion	ACUTE: Contact dermatitis, gastrointestinal disturbances, and respiratory irritation. CHRONIC: Hyperpigmentation of the skin and cancers of the skin, lungs, and lymphatic system.	(FP) NA (VP) 0 mm (approx.) (IP) NA (UEL) NA (LEL) NA	Silver-gray or tin-white, brittle, odorless, solid.
Benzene Benzol CAS-71-43-2	1 ppm	TLV: 0.5 ppm [skin] PEL: 1 ppm STEL: 5 ppm IDLH: 500 ppm	Inhalation Absorption (skin) Ingestion	ACUTE: Irritation to eyes, skin, respiratory tract; dizziness; headache; nausea; staggered gait; fatigue, abdominal pain. CHRONIC: Defatting of the skin, may have effects on bone marrow and immune system, decrease in blood cells. Carcinogenic to humans.	(FP) 12°F (VP) 75 mm (IP) 9.24 eV (UEL) 7.8% (LEL) 1.2%	Colorless to light-yellow liquid with an aromatic odor. Solid below 42°F.

TABLE 2.1

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS, WASTE AND GROUNDWATER
12th STREET LANDFILL

Chemical Name (Synonyms)	*Concentration at Site*	*Exposure Limits*	*Routes Of Entry*	*Symptoms/Health Effects*	*Chemical Properties*	*Physical Characteristics*
Chlordane Chlordan Chlordano CAS-57-74-9	39.0 mg/kg	TLV: 0.5 mg/m3 [skin] PEL: 0.5 mg/m3 STEL: NE IDLH: 100 mg/m3	Inhalation Skin absorption Ingestion, Skin contact Eye contact	ACUTE: Blurred vision; confusion; ataxia, delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremor, CHRONIC: Convulsions; anuria; in animals: lung, liver, kidney damage; [potential occupational carcinogen]	(FP) NE (VP) NE (IP) NE (UEL) NE (LEL) NE	Noncombustible Liquid, but may be utilized in flammable solutions.
4,4-DDT	75.0 mg/kg	TLV: 1 mg/m3 [skin] PEL: 1 mg/m3 STEL: NE IDLH: 500 mg/m3 (ca)	Inhalation Ingestion Skin contact Absorption Eye contact	ACUTE: Inhalation - Nausea, drowsiness, loss of appetite, visual disturbances, and insomnia. Skin - See ingestion. Ingestion - Headaches, nausea, insomnia, profuse sweating, frothing at the mouth, convulsions, and lack of consciousness. CHRONIC: Dizziness, nausea, muscle twitch, convulsions, enlarged liver, and skin irritation. Suspected carcinogen.	(FP) 162-171°F (VP) 0.00000002 mm (IP) NI (UEL) NI (LEL) NI	White to yellow crystalline powder with a slight musty odor, (pesticide).
Dieldrin HEOD CAS-60-57-1	17.0 mg/kg	TLV: 0.25 mg/m3 PEL: 0.25 mg/m3 [skin] STEL: NE IDLH: 50 mg/m3	Inhalation Skin absorption Ingestion Skin contact Eye contact	ACUTE: Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic, tonic convulsions. CHRONIC: coma; [potential occupational carcinogen]; in animals: liver, kidney damage.	(FP) NE (VP) 77°F (IP) NE (UEL) NE (LEL) NE	Colorless to light-tan crystals with a mild, chemical odor. [insecticide].
Heptachlor CAS-76-44-8	16.0 mg/kg	TLV: 0.05 mg/m3 [skin] PEL: 0.5 mg/m3 [skin] STEL: NE IDLH: 35 mg/m3	Inhalation Ingestion Absorption (skin)	ACUTE: May effect CNS, convulsions. CHRONIC: Liver damage may occur. Possible human carcinogen.	(FP) Not Combustible (VP) 0.0003 mm @77°F (IP) NA (UEL) NA (LEL) NA	White crystals or tan waxy solid with a camphor-like odor (insecticide).
Lead (metal) CAS-7439-92-1	575 mg/kg	TLV: 0.05 mg/m3 PEL: 0.05 mg/m3 STEL: NE IDLH: 100 mg/m3	Inhalation Ingestion Skin contact Eye contact	ACUTE: Lead is a cummulative poison, however, it may cause eye and skin irritation. CHRONIC: Effects blood, bone marrow, CNS, PNS and kidneys resulting in anemia, convulsions, peripheral nerve disease and kidney impairment. Toxicity to human reproduction or development.	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	A heavy, ductile, soft, gray solid. Turns tarnished on exposure to air.

TABLE 2.1

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS, WASTE AND GROUNDWATER
12th STREET LANDFILL

Chemical Name (Synonyms)	***Concentration at Site***	***Exposure Limits***	***Routes Of Entry***	***Symptoms/Health Effects***	***Chemical Properties***	***Physical Characteristics***
Methane Methyl hydride CAS-74-82-8	landfill gas varies up to 24.7% methane in GW up to 0.2 % by volume	TLV: NA - Simple Asphyxiant PEL: NA STEL: NA IDLH: NA	Inhalation	ACUTE: NA CHRONIC: Asphyxiation	(FP) -306°F (VP) NA (IP) 12.48 eV (UEL) 15.0% (LEL) 5.0%	Colorless, compressed or liquified gas, with no odor. Gas is LIGHTER than air.
Polychlorinated Biphenyls PCB (54%) Chlorodiphenyl (54% chlorine) Aroclor 1254 CAS-11097-69-1	158.0 mg/kg	TLV: 0.5 mg/m3 [skin] PEL: 0.5 mg/m3 [skin] STEL: NA IDLH: 5 mg/m3	Inhalation Absorption (skin) Ingestion	ACUTE: Eye irritation. CHRONIC: Dermatitis, chloracne, liver damage.	(FP) NA (VP) 0.00006 mm (IP) NA (UEL) NA (LEL) NA	Colorless to pale yellow viscous liquid or solid (<50°F) with a mild hydrocarbon odor.
Toluene Methylbenzene Toluol CAS-108-88-3	29 mg/kg	TLV: 20 ppm PEL: 200 ppm STEL: 150 ppm (C) IDLH: 500 ppm	Inhalation Ingestion Absorption	ACUTE: Irritation to eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. Unconsciousness and cardiac dysrhythmia at high level exposures. CHRONIC: Defatting of the skin. Affects CNS. Enhanced hearing damage.	(FP) 40°F (VP) 21 mm (IP) 8.82 eV (UEL) 7.1% (LEL) 1.1%	Colorless liquid with a sweet, pungent, benzene-like odor.
Xylene (o;m;p isomers) CAS-106-42-3	unknown	TLV: 100 ppm PEL: 100 ppm STEL: 150 ppm IDLH: 900 ppm	Inhalation Absorption Ingestion	ACUTE: Irritation to eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. CHRONIC: Defatting of the skin, lung damage resulting in chronic bronchitis. Affects CNS and blood.	(FP) 90/82/81°F (IP) 7/9/9 mm (IP) 8.56/8.56/8.44eV (UEL) 7.0% (LEL) 0.9%	Colorless liquid with an aromatic odor. (p-isomer solid <56°F).

TABLE 2.2

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS AND GROUNDWATER
FORMER PLAINWELL PAPER MILL

Chemical Name (Synonyms)	***Concentration at Site***	***Exposure Limits***	***Routes Of Entry***	***Symptoms/Health Effects***	***Chemical Properties***	***Physical Characteristics***
1,2,4-Trimethylbenzene; Asymmetrical trimethylbenzene CAS-95-63-6	680 ug/kg (soils)	TLV: 25 ppm [Mixed] PEL: N/A STEL: N/A IDLH: 900 ppm [LEL]	Inhalation Ingestion Skin Contact Eye Contact	ACUTE: Irritation eyes, skin, nose, throat, respiratory system; bronchitis; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid) CHRONIC: hypochromic anemia	(FP) 112F (VP) 1 mm (IP) 8.27 eV (UEL) 6.4% (LEL) 0.9%	Clear, colorless liquid with a distinctive, aromatic odor. Class II Flammable Liquid
Aldrin	0.023 mg/kg (soil)	TLV: 0.05 mg/m3 [skin] PEL: 0.25 mg/m3 STEL (NIOSH): ND IDLH: 25 mg/m3	Inhalation Absorption Ingestion Contact Hazard	ACUTE: Points of attack are the central nervous system, liver, kidneys, and skin. Harmful effects and symptoms are headache, nausea, vomiting, dizziness, and mild clonic jerking. Aldrin can produce convulsions without warning. Aldrin can burn the skin and eyes. Poisoning by aldrin usually involves convulsions due to its effects on the central nervous system. CHRONIC: Reproductive effects and liver effects have also been reported. It is classified as an extremely toxic chemical.	(FP) NA (VP) 0.00008 mm (IP) ND (UEL) NA (LEL) NA	Aldrin is similar chemically and toxicologically to dieldrin. Colorless to dark brown crystalline solid with a mild chemical odor.
Arsenic CAS-7440-38-2	16.0 mg/kg (soil) 0.025 mg/L (GW)	TLV:0.01 mg/m3 PEL: 0.010 mg/m3 STEL: NE IDLH: 5 mg/m3 (as As)	Inhalation Absorption Ingestion	ACUTE: Contact dermatitis, gastrointestinal disturbances, and respiratory irritation. CHRONIC: Hyperpigmentation of the skin and cancers of the skin, lungs, and lymphatic system.	(FP) NA (VP) 0 mm (approx.) (IP) NA (UEL) NA (LEL) NA	Silver-gray or tin-white, brittle, odorless, solid.
Barium	233 mg/kg	TLV: 0.5 mg/m3 PEL: 0.5 mg/m3 STEL (NIOSH): ND IDLH: 50 mg/m3	Inhalation Ingestion Skin contact Eye contact	ACUTE: Irritant to eyes, skin and upper respiratory system. Causes skin burns to unprotected skin and causes benign pneumoconiosis (baritosis). Can cause muscle spasm/contraction and slow pulse. CHRONIC: Baritosis.	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	White, odorless solid.
Cadmium (dust/metal) CAS-7440-43-9	6.5 mg/kg (soil) 11 u/L (GW)	TLV: 0.01 mg/m3 PEL: 0.005 mg/m3 STEL: NE IDLH: 9 mg/m3	Inhalation Ingestion	ACUTE: Irritation to eyes and respiratory tract. Pulmonary edema, coughing, tightness in chest, headache, chills, muscle aches, nausea, mild anemia. CHRONIC: Damage to respiratory system and kidneys, resulting in proteinuria and kidney dysfunction.	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	Metal: silver-white, blue tinged, lustrous, odorless solid.
Chromium (metal) Chrome CAS-7440-47-3	75 mg/kg (soil) 0.016 mg/L (GW)	TLV: 0.5 mg/m3 PEL: 1.0 mg/m3 STEL: NE IDLH: 250 mg/m3	Inhalation Ingestion Skin contact Eye contact	ACUTE: Irritation to eyes, skin and lungs. CHRONIC: Skin sensitization, fibrosis (histologic)	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	Blue-white to steel gray, lustrous, brittle, hard, odorless solid.

TABLE 2.2

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS AND GROUNDWATER
FORMER PLAINWELL PAPER MILL

Chemical Name (Synonyms)	***Concentration at Site***	***Exposure Limits***	***Routes Of Entry***	***Symptoms/Health Effects***	***Chemical Properties***	***Physical Characteristics***
Copper (dust/mists/metal) CAS-7440-50-8	220 mg/kg (soil) 0.026 mg/L (GW)	TLV: 1 mg/m3 PEL: 1 mg/m3 STEL: NE IDLH: 100 mg/m3	Inhalation Ingestion Skin contact Eye contact	ACUTE: Irritation to eyes, nose and pharynx, metallic taste and nasal perforation. CHRONIC: Skin sensitization, increased risk with Wilson's disease.	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	Red powder, turns green on exposure to moist air.
Dibenz(a,h)anthracene	6,400 ug/kg (soil) 0.09 ug/L (GW)	Use Exposure Limits for PAHs	Inhalation Ingestion Contact	Dibenz(a,h)anthracene is a PAH/coal tar pitch volatile - Reference information for PAHs.	See information for PAHs	See information for PAHs
Lead (metal) CAS-7439-92-1	990 mg/m3 (soil) 0.021 mg/L (GW)	TLV: 0.05 mg/m3 PEL: 0.05 mg/m3 STEL: NE IDLH: 100 mg/m3	Inhalation Ingestion Skin contact Eye contact	ACUTE: Lead is a cummulative poison, however, it may cause eye and skin irritation. CHRONIC: Effects blood, bone marrow, CNS, PNS and kidneys resulting in anemia, convulsions, peripheral nerve disease and kidney impairment. Toxicity to human reproduction or development.	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	A heavy, ductile, soft, gray solid. Turns tarnished on exposure to air.
Mercury (metal) Quicksilver Liquid silver CAS-7439-97-6	5.6 mg/kg (soil) 6.9 x 10-4 mg/L (GW)	TLV: 0.025 mg/m3 [skin] PEL: 0.1 mg/m3 (C) STEL: NE IDLH: 10 mg/m3	Inhalation Absorption (skin) Ingestion	ACUTE: Irritation to skin. Vapor inhalation may cause pneumonitis. May effect CNS and kidneys. CHRONIC: May effect CNS and kidneys, resulting in irritability, tremors, speech disorders, mental/memory disturbances. Inflammation/discoloration of gums. Danger of cumulative effects.	(FP) NA (VP) 0.0012 mm (IP) NE (UEL) NA (LEL) NA	Odorless, heavy and mobile silvery-white liquid metal
Naphthalene Naphthalin Coal tar White tar CAS-91-20-3	7,600 ug/kg (soil) 0.076 ug/L (GW)	TLV: 10ppm [skin] PEL: 10 ppm STEL: 15 ppm IDLH: 250 ppm	Inhalation Ingestion Skin contact Absorption Eye contact	ACUTE: Levels above 10 ppm may cause: Inhalation - Headache, nausea, excessive sweating and vomiting; Skin - May cause irritation and if hypersensitive to naphthalene then severe irritation may occur; Eyes - Irritation. Direct contact may cause blurring vision and damage to the cornea; Ingestion - Nausea, vomiting, abdominal pain, bladder irritation, and brown or black coloration of urine. CHRONIC: Clouding of the eyes. Chronic skin problems in cases of hypersensitivity. Liver and kidney damage.	(FP) 174°F (VP) 0.08 mm (IP) 8.12 eV (UEL) 5.9% (LEL) 0.9%	Colorless to brown solid with an odor of mothballs. Sometimes found as a crystalline white solid. Shipped as a molten solid.
Polyaromatic Hydrocarbons PAHs Coal Tar Pitch Volatiles CAS-65996-93-2	7.7 mg/kg (soil) 0.11 ug/L (GW)	TLV: 0.1 mg/m3 PEL: 0.2 mg/m3 STEL: NA IDLH: 80 mg/m3	Inhalation Ingestion	ACUTE: Bronchitis. CHRONIC: Dermatitis, may cause damage to bladder, kidneys and lungs.	(FP) Varies (VP) NA (IP) Varies (UEL) NA (LEL) NA	Black or dark brown amorphous residue. Properties vary depending upon specific compound.

TABLE 2.2

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS AND GROUNDWATER
FORMER PLAINWELL PAPER MILL

Chemical Name (Synonyms)	***Concentration at Site***	***Exposure Limits***	***Routes Of Entry***	***Symptoms/Health Effects***	***Chemical Properties***	***Physical Characteristics***
Polychlorinated Biphenyls PCB (54%) Chlorodiphenyl (54% chlorine) Aroclor 1254 CAS-11097-69-1	1.6 mg/kg (soils)	TLV: 0.5 mg/m3 [skin] PEL: 0.5 mg/m3 [skin] STEL: NA IDLH: 5 mg/m3	Inhalation Absorption (skin) Ingestion	ACUTE: Eye irritation. CHRONIC: Dermatitis, chloracne, liver damage.	(FP) NA (VP) 0.00006 mm (IP) NA (UEL) NA (LEL) NA	Colorless to pale yellow viscous liquid or solid (<50°F) with a mild hydrocarbon odor.
Phenanthrene	15,000 ug/kg (soils) 0.31 ug/L (GW)	Use Exposure Limits for PAHs	Inhalation Ingestion Contact	Phenanthrene is a PAH/coal tar pitch volatile - Reference information for PAHs.	See information for PAHs	See information for PAHs
Selenium CAS-7782-49-2	2.4 mg/kg (soil) 9.6 x 10-4 (GW)	TLV: 0.2 mg/m3 PEL: 0.2 mg/m3 STEL: NE IDLH: 1 mg/m3	Inhalation Ingestion Skin Contact Eye Contact	ACUTE: Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever, dyspnea (breathing difficulty). Metallic taste, garlic breath. CHRONIC: Bronchitis, , eye, skin burns; gastrointestinal disturbance, dermatitis.	(FP) NA (VP) 0 mm (IP) NA (UEL) NA (LEL) NA	Amorphous or crystalline, red to gray solid
Silver (metal, dust and fume) CAS-7440-22-4	1.0 ug/kg (soil)	TLV: 0.1 mg/m3 PEL: 0.01 mg/m3 STEL: NA IDLH: 10 mg/m3	Inhalation Ingestion Skin Contact Eye Contact	ACUTE: INhalation of large amounts of vapors may cause lung damage, pulmonary edema. CHRONIC: Grey-blue discoloration of eyes, nose, throat and skin (argyria/argyrosis)	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	White, lustrous solid.
Tetrachloroethene PCE Perchloroethylene Tetrachloroethylene CAS-127-18-4	520 ug/kg (soils) 0.38 ug/L (GW)	TLV: 25 ppm PEL: 100 ppm STEL: 100 ppm IDLH: 150 ppm	Inhalation Ingestion Absorption	ACUTE: Irritation to skin, eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. Unconsciousness at high level exposures. CHRONIC: Dermatitis. May cause liver and kidney damage. Probable human carcinogen.	(FP) NA (VP) 14 mm (IP) 9.32 eV (UEL) NA (LEL) NA	Colorless liquid with a mild, chloroform-like odor.
Toluene Methylbenzene Toluol CAS-108-88-3	0.29 ug/L	TLV: 20 ppm [skin] PEL: 200 ppm STEL: 150 ppm (C) IDLH: 500 ppm	Inhalation Ingestion Absorption	ACUTE: Irritation to eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. Unconsciousness and cardiac dysrhythmia at high level exposures. CHRONIC: Defatting of the skin. Affects CNS. Enhanced hearing damage.	(FP)40 degrees F (VP) 21 mm (IP) 8.82 eV (UEL) 7.1% (LEL) 1.1%	Colorless liquid with a sweet, pungent, benzene-like odor.
Xylene (o;m;p isomers) CAS-106-42-3	0.26 ug/L	TLV: 100 ppm PEL: 100 ppm STEL: 150 ppm IDLH: 900 ppm	Inhalation Absorption Ingestion	ACUTE: Irritation to eyes and respiratory tract. Ingestion may cause chemical pneumonitis. Affects CNS. CHRONIC: Defatting of the skin, lung damage resulting in chronic bronchitis. Affects CNS and blood.	(FP) 90/82/81°F (IP) 7/9/9 mm (IP) 8.56/8.56/8.44eV (UEL) 7.0% (LEL) 0.9%	Colorless liquid with an aromatic odor. (p-isomer solid <56°F).

TABLE 2.2

PROPERTIES AND DETECTED CONCENTRATIONS OF CHEMICAL COMPOUNDS OF CONCERN IN SITE SOILS AND GROUNDWATER
FORMER PLAINWELL PAPER MILL

Chemical Name (Synonyms)	***Concentration at Site***	***Exposure Limits***	***Routes Of Entry***	***Symptoms/Health Effects***	***Chemical Properties***	***Physical Characteristics***
Zinc (metal) CAS-7440-66-6	450 mg/kg	TLV: 2 mg/m3 [respirable] PEL: 5 mg/m3 [respirable] STEL: 10 mg/m3 [respirable] IDLH: 500 mg/m3	Inhalation	ACUTE: Metal fume fever; muscle aches, nausea, fever, dry throat, weakness, and lassitude; metallic taste; headache; blurred vision; low back pain. Effects may be delayed. CHRONIC: Decreased pulmonary function. Tightness in chest.	(FP) NA (VP) NA (IP) NA (UEL) NA (LEL) NA	White, odorless solid. Slowly decomposed by water.

TABLE 5.1

ON-SITE AIR MONITORING PROGRAM ACTION LEVELS
HEALTH AND SAFETY PLAN
12th STREET LANDFILL
OTSEGO, MICHIGAN

Monitoring Device	*Action Level*	*Action*
Combustible Gas Indicator	>10 Percent LEL	Cease operations and move to a safe place. Notify SHO. Do not continue working until conditions are constantly below 10 percent LEL.
Oxygen Meter	<19.5 Percent or >23.5 Percent	Cease operations and move to a safe place. Notify SHO. Do not continue working until oxygen levels are between 19.5 and 23.5 percent. Note: When oxygen levels are outside this range, percent LEL readings are not reliable.
Photoionization Detector (PID)	**Benzene present in the Breathing Zone:**	Determine via Colorimetric Sampling
10.6 or greater eV lamp	< 1.0 ppm or Background	Initiate activities in Modified D PPE - Have Full-Face Air Purifying Respirator (FFAPR) and organic vapor/P100 cartridges available
Detector Tubes - Benzene	≥ 1.0 ppm and ≤ 25 ppm	Full-face air purifying respirator Level C PPE MSA GME P100 Cartridge
	>25 ppm and < 500 ppm	Supplied air respirator Level B PPE. Implement additional engineering controls.
	≥ 500 ppm	Shut down activities. Notify SHO. Implement additional engineering controls.
	Benzene not present in the Breathing Zone:	Determine via Colorimetric Sampling
10.6 or greater eV lamp Detector Tubes - As necessary to identify chemicals causing PID readings	< 10 ppm or Background	Initiate activities in Modified D PPE - Have Full-Face Air Purifying Respirator (FFAPR) and organic vapor/P100 cartridges available
	≥ 10 ppm and < 50 ppm	Wear Full-Face Respirator - Level C PPE
	≥ 50 ppm and < 1000 ppm	Wear Supplied Air Respirator - Level B PPE, Implement Additional Engineering Controls
	≥ 1000 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
Dust / Particulate - (Impacted Soils)	< 3.0 mg/m^3 or Background	Full-Face Respirator Available
	≥ 3.0 mg/m^3 and < 50 mg/m^3	Wear Full-Face Respirator - Level C PPE
	> 50 mg/m^3	Wear Supplied Air Respirator - Level B PPE, Implement Additional Engineering Controls
Hydrogen Sulfide	>5 ppm	Shut down activities. Notify SHO. Impletment additional engineering controls

TABLE 5.1

ON-SITE AIR MONITORING PROGRAM ACTION LEVELS
HEALTH AND SAFETY PLAN
12th STREET LANDFILL
OTSEGO, MICHIGAN

Monitoring Device	*Action Level*	*Action*
Carbon Monoxide	>35 ppm	Shut down activities. Notify SHO. Impletment additional engineering controls

If CRA is unable to identify/quantify the contaminants, supplied air will be required **when the PID reading is greater than background** as the contaminant will be unknown and NIOSH, OSHA and the manufacturer's use requirements for Level C (air purifying respirators) will not be met. If PID readings subside, workers can downgrade as necessary. CRA will upgrade to supplied air and attempt to obtain additional information for possible chemicals present in CRA's work area. The Owner will need to provide/obtain additional information as to the identity of the contaminant(s) in order to permit the use of Modified D and/or Level C.

Notes:
SHO Safety and Health Officer
LEL Lower Explosive Limit.
PPE Personal Protection Equipment.
ppm Parts Per Million.

TABLE 5.2

ON-SITE AIR MONITORING PROGRAM ACTION LEVELS
HEALTH AND SAFETY PLAN
FORMER PLAINWELL PAPER MILL
PLAINWELL, MICHIGAN

Monitoring Device	*Action Level*	*Action*
Combustible Gas Indicator	>10 Percent LEL	Cease operations and move to a safe place. Notify SHO. Do not continue working until conditions are constantly below 10 percent LEL.
Oxygen Meter	<19.5 Percent or >23.5 Percent	Cease operations and move to a safe place. Notify SHO. Do not continue working until oxygen levels are between 19.5 and 23.5 percent. Note: When oxygen levels are outside this range, percent LEL readings are not reliable.
Photoionization Detector (PID)	**Benzene present in the Breathing Zone:**	Determine via Colorimetric Sampling
10.6 or greater eV lamp	< 1.0 ppm or Background	Initiate activities in Modified D PPE - Have Full-Face Air Purifying Respirator (FFAPR) and organic vapor/P100 cartridges available
Detector Tubes - Benzene	≥ 1.0 ppm and ≤ 25 ppm	Full-face air purifying respirator Level C PPE MSA GME P100 Cartridge
	>25 ppm and < 500 ppm	Supplied air respirator Level B PPE. Implement additional engineering controls.
	≥ 500 ppm	Shut down activities. Notify SHO. Implement additional engineering controls.
	Benzene not present in the Breathing Zone:	Determine via Colorimetric Sampling
10.6 or greater eV lamp Detector Tubes - As necessary to identify chemicals causing PID readings	< 10 ppm or Background	Initiate activities in Modified D PPE - Have Full-Face Air Purifying Respirator (FFAPR) and organic vapor/P100 cartridges available
	≥ 10 ppm and < 25 ppm	Wear Full-Face Respirator - Level C PPE
	≥ 25 ppm and < 1000 ppm	Wear Supplied Air Respirator - Level B PPE, Implement Additional Engineering Controls
	≥ 1000 ppm	Shut down activities. Notify SHO. Implement additional engineering controls
Dust / Particulate - (Impacted Soils)	< 1.92 mg/m^3 or Background	Full-Face Respirator Available
	≥ 1.92 mg/m^3 and < 50 mg/m^3	Wear Full-Face Respirator - Level C PPE
	> 50 mg/m^3	Wear Supplied Air Respirator - Level B PPE, Implement Additional Engineering Controls
Hydrogen Sulfide	>5 ppm	Shut down activities. Notify SHO. Impletment additional engineering controls

TABLE 5.2

ON-SITE AIR MONITORING PROGRAM ACTION LEVELS
HEALTH AND SAFETY PLAN
FORMER PLAINWELL PAPER MILL
PLAINWELL, MICHIGAN

Monitoring Device	*Action Level*	*Action*
Carbon Monoxide	>35 ppm	Shut down activities. Notify SHO. Impletment additional engineering controls

If CRA is unable to identify/quantify the contaminants, supplied air will be required **when the PID reading is greater than background** as the contaminant will be unknown and NIOSH, OSHA and the manufacturer's use requirements for Level C (air purifying respirators) will not be met. If PID readings subside, workers can downgrade as necessary. CRA will upgrade to supplied air and attempt to obtain additional information for possible chemicals present in CRA's work area. The Owner will need to provide/obtain additional information as to the identity of the contaminant(s) in order to permit the use of Modified D and/or Level C.

Notes:
SHO Safety and Health Officer
LEL Lower Explosive Limit.
PPE Personal Protection Equipment.
ppm Parts Per Million.

APPENDIX A
AUTHORIZED VISTOR INFORMATION

12TH STREET LANDFILL – GENERAL OVERVIEW OF SITE

The 12th Street Landfill is located at the north end of 12th Street in Otsego, Michigan. The 12th Street Landfill proper is approximately 6.5 acres in size. The Landfill is bordered by the Kalamazoo River and associated wetlands to the north and northeast, a parcel owned by the Michigan Department of Natural Resources (MDNR) to the east, 12th Street to the south and by Wyoming Asphalt to the west. A mix of commercial and residential properties is located south of 12th Street.

Brief History of Site

The 12th Street Landfill was utilized by the various owners/operators of a paper mill located at 220 Allegan Street, Plainwell, Michigan for depoistion of paper waste/residuals. These wastes contained PCBs. Paper mill waste was deposited in this area from 1955 to 1981.

The MDEQ (MDNR) conducted investigations in the early 1970's that determined that PCBs were in the sediments of the Kalamazoo River. This discovery led to the identification of potential responsible parties. The PRPs signed an Administrative Order by Consent (AOC) with the State of Michigan in 1990. The RI/Feasibility Study was funded and conducted by the PRP group. The RI/FS for the 12th Street Landfill (OU-4) was began in 1993 and completed in 1997.

In September 2001, U.S. EPA signed the Record of Decision (ROD) for the 12th St. Landfill. The ROD requires, PCBs containing paper residuals that migrated from the landfill to be excavated and placed back in the landfill. The ROD further requires the landfill be closed following Part 115, Soild Waste Management of the Natural Resources and Environmental Proection Act 1994 PA 451, as amended. Long-term monitoring and maintennce at the Site was also required.

As part of a Time-Critical Removal Action (TCRA) to remove PCB-contaminated residuals in the former Plainwell Impoundment (a section of Operable Unit No. 5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site), the EPA authorized Weyerhaeuser to conduct emergency response actions at the former power house channel to prevent downstream impacts from the TCRA. In 2007, visual paper residuals were excavated and relocated into the landfill. A clay barrier was installed between the Kalamazoo River and the landfill to insure that no hydraulic connection was present between the River and the Landfill. This

area was also graded to a 5:1 slope and riprap was added to protect the clay barrier.

The goal of this project is to complete the required actions of the ROD and conduct O & M of the capped landfill property. The scope of work to be completed by Conestoga-Rovers & Associates (CRA) during the project activities at the 12th Street Landfill includes the following:

i) support zone activities which includes mobilization and demobilization of labor, materials, and equipment to and from the Site necessary to implement the RA which include Site preparation and Site restoration activities;

ii) erosion control;

iii) clear and grub landfill property and offsite property where paper residuals need to be removed;

iv) abandonment of groundwater wells and leachate wells within the landfill footprint;

v) relocation of paper residuals from outside the landfill footprint;

vi) leachate collection/treatment/discharge or disposal;

vii) re-grade the landfill to meet design specifications;

viii) install landfill gas piping/venting system;

ix) cap landfill - place cover material, install Geotextile, LLDPE liner and cover;

x) a 50 foot riprap extension along the Kalamazoo River;

xi) site restoration;

xii) equipment and personnel decontamination activities;

xiii) groundwater monitoring;

xiv) landfill gas monitoring; and

xv) operations and maintenance of Site.

Chemicals of Concern

The table attached presents the maximum detected concentration of chemical compounds of concerns in Site soils as reported in Site documets. The exposure routes and regulatory Time Weighted Averages (TWA) exposure levels for the compound of concern are included in the table. These levels are set to protect the health of workers.

FORMER PLAINWELL PAPER MILL

The Site is a former paper manufacturing mill that occupies approximately 34 acres at 220 Allegan Street, Plainwell, Michigan. The Site is bordered on the east by the Mill Race (of the Kalamazoo River) and north by the Kalamazoo River, on the south by Allegan Street, on the west by residential properties and the City of Plainwell's waste water treatment plant (WWTP). Residential properties are located across Allegan Street and the City of Plainwell's central business district is just east of the Mill Race.

The former Mill building is approximately 526,400 square feet of former production space and 80,000 square feet of former warehouse space. The Mill building is made up of 30 interconnected buildings. There are numerous outbuildings, ASTs and a water tower at the Site. Former waste water and paper residual lagoons are located at the west end of the property.

The scope of work to be completed by CRA during the project activities at the former Plainwell Mill include the following:

i) support zone activities which includes mobilization and demobilization of labor, materials, and equipment to and from the Site necessary to implement conduct further assessments/investigations at the Site, which include Site preparation and Site restoration activities;

ii) further assessment of environmental concerns at the Mill property, including soil sampling, groundwater sampling, building decommissioning assessments, waste inventory;

iii) decommissioning activities, which include industrial cleaning activities, confined space entries, purging/removal of process lines, removal of PCB containing light ballasts, fluorescent lights, mercury containing switches, etc.;

iv) contaminated soil excavation, removal and handling;

v) subsurface utility activities, which include the inspection, cleaning, removal and/or abandonment of affected utilities;

vi) storage tank removal, which will include the removal of an underground tank as well as above ground storage tanks;

vii) asbestos abatement;

viii) the partial demolition of the former Mill building and the complete demolition of various out buildings;

ix) equipment and personnel decontamination activities; and
x) redevelopment of the former Mill property.

Chemicals of Concern

Table 2.2 presents the maximum detected concentration of chemical compounds of concerns as reported in Site documents. The exposure routes and regulatory Time Weighted Averages (TWA) exposure levels for the compound of concern are include in the table. These levels are set to protect the health of workers. The results of previous investigative activities, conducted by others, do not indicate that radioactive materials are present at the Site.

APPENDIX B

JOB SAFETY ANALYSIS TABLES

INVESTIGATION JSAs

JSA TEMPLATE (BLANK)
FLUID LEVEL MONITORING
SOIL BORINGS
OPENING ACETATE LINERS FROM DIRECT PUSH PROBING
DECONTAMINATION OF EQUIPMENT BUCKETS
DECONTAMINATION OF SAMPLING EQUIPMENT AND PERSONNEL (PPE LEVEL D)
GROUNDWWATER SAMPLING – BAILER
GROUNDWATER SAMPLING – PERISTALTIC PUMP
MONITORING WELL SAMPLING
LANDFILL GAS MONITORING
PLUGGING AND ABANDONING
EXCAVATION OVERSIGHT
EXCAVATION OVERSIGHT – CONFIRMATION SAMPLE COLLECTION

JOB SAFETY ANALYSIS (JSA)

Title

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	[Date of review/revision]	**JSA Type:**	[Construction/Office Work/O&M/Drilling/Maintenance/Demolition/Decommissioning]
Work Type:	[Environmental/Remediation/Construction/General Industry]	**Client:**	
Work Activity:			
Work Site:	[Site information and address]		
Key Equipment:			
Task-specific Training:	[Identify any special/additional training necessary to safely complete this task]		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☐ Gloves*	**Supplied Air**	**APR**	
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☐ Safety Glasses	☐ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Title

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1		•	•	
2		•	•	
3		•	•	

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Fluid Level Monitoring

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Fluid Level Monitoring
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Fluid level monitoring (collecting water/LNAPL levels/gauging wells)		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Water level meter, PPE		
Task-specific Training:	Fluid Level Monitoring; reference HASP for additional site/client safety training requirements		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Use nitrile gloves when performing work; use hearing protection as necessary based on site conditions						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**
Jodie Dembowske		Project Coordinator				

JOB SAFETY ANALYSIS (JSA)

Fluid Level Monitoring

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Inspect/calibrate equipment	• Loss due to malfunctioning equipment	• Check all equipment to ensure it is in proper working order and has been calibrated to CRA and manufacturer's standards, then document	Sampling Technician
2	Establish work zone at monitoring well location	• Traffic • Pinch points • Lifting hazards • Back injury • Manual material handling	• Maintain awareness of on-site traffic patterns and walking paths • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	Sampling Technician
3	Open monitoring well cover(s)	• Pinch points • Hand injury • Biological hazards	• Avoid placing hands in pinch points • Wear proper PPE (gloves) for task and use the proper tool(s) when opening well covers (open face wrench/socket wrench). • Inspect for other hazards that may affect the hands (hypodermic needles, etc.) • Heightened awareness of wasps, ants, bees, spiders, and poison plants	Sampling Technician
4	Measure water	• Contaminant exposure • Cross contamination	• Wear proper PPE (Ndex nitrile gloves) • Decon probe and measuring tape following gauging of well	Sampling Technician
5	Close monitoring well cover	• Traffic • Hand injury • Pinch points	• Maintain awareness of on-site traffic patterns; verify barricades are still in place • Wear appropriate gloves and use proper tool(s) • Avoid placing hands in pinch points	Sampling Technician

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Soil Borings

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Drilling
Work Type:	Environmental/Remediation]	**Client:**	Weyerhaeuser Company
Work Activity:	Soil borings		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell Michigan		
Key Equipment:	Air monitoring equipment; Geo-probe rig		
Task-specific Training:	HAZCOM, PPE, experience working with a probe rig and collecting soil and groundwater samples		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Nitrile gloves					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Soil Borings

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Markout underground utilities	• Property damage • Explosion • Electrocution • Injury • Death	• Call public underground utility agency (One-Call) at least 5 or more days prior to work activities • Review State Law pertaining to underground pipe line safety and have private utility mark-out performed • Expose lines if warranted (i.e., hand dig, test pit, or daylight)	Project Manager and Site Supervisor
2	Conduct site walk - identify unsafe conditions and determine sample point locations	• Traffic hazard • Slip/trip/fall hazards • Biological hazard • Overhead/underground hazards	• Maintain awareness of on-site traffic and walking surfaces • When selecting soil boring locations, be aware of biological hazards (e.g., ants, poison ivy, wasps) and overhead/underground hazards (e.g., overhead utilities, concrete scarring, station canopy)	Site Personnel
3	Equipment inspection	• Pinch points • Property damage • Lost time due to damaged equipment/parts	• Discuss pinch points on equipment (e.g., drill rig, air knife, pressure washer, etc.) • Familiarize all personnel with location/operation of fire extinguisher(s) and kill switch on drill rig • Visually inspect equipment/parts for damage and document inspections	Site Personnel
4	Set up work zone for drilling	• Traffic hazard • Slip/trip/fall hazards • Property damage • Overhead hazards • Environmental impact	• Maintain awareness of on-site traffic, work zones, walking surfaces, overhead hazards (e.g., canopy and low hanging overhead lines) • Utilize barricades/cones/caution tape to define work zone and direct traffic • Wear leather/cotton when setting up barricades • Be aware of any potential sensitive receptors and verify all personnel are aware of the location of spill kit	Site Personnel
5	Set up staging area	• Traffic hazard • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling • Pinch points • Heat/cold stress	• Maintain awareness of on-site traffic and walking surfaces • Utilize barricades/cones/caution tape to define work zone and direct traffic • Reduce distance needed to travel when carrying materials and or equipment • Wear leather/cotton gloves when setting up barricades • Size up the load, If the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required. • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	Site Personnel

JOB SAFETY ANALYSIS (JSA)

Soil Borings

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	Contractor oversight/ management of hole clearance/drilling activities	• Traffic hazard • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling • Underground utilities • Contaminant exposure • Heat/cold stress	• Maintain awareness of on-site traffic and practice good housekeeping • Perform a prestart meeting, inform subcontractor of safe lifting practices • Refer to step 5 and the HASP for additional lifting information • Ensure subcontractors don proper PPE (e.g., face shield, leather/cotton gloves, hearing protection) • If non-native material (e.g., pea gravel, sand, fill material) or underground utilities are observed, utilize SWA and assess situation • Monitor safe drill movement/positional setup • Monitor breathing zone and refer to HASP for action levels • Monitor all personnel for signs and symptoms of heat/cold stress and refer to HASP for recommendations • Be aware of unsafe hoisting and material handling practices • Be aware of proper augering and auger handling techniques	Site Personnel
7	Site/boring security	• Traffic hazard • Slip/trip/fall hazards • Lifting hazards • Back safety • Manual material handling	• Wear leather/cotton gloves when moving barricades • Maintain awareness of on-site traffic and walking surfaces • Maintain proper lifting techniques as described in Step 5 and 6. • Ensure good house keeping methods are practiced. Work area is kept clean of debris. • Secure boring location if open overnight	Site Personnel

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Opening Acetate Liners from Direct Push Probing

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Drilling
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Soil sampling		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Direct-push hydraulic soil probe, liner holder, cutting tools, extra blades		
Task-specific Training:	Hand Tool Safety; Drilling Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☒ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Cut-resistant gloves – see table below for specifications					
Upgrade/down grade of PPE will be based on action levels in Table 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Opening Acetate Liners from Direct Push Probing

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and (SWA)	• Site personnel not aware of STAR and SWA	• Project team (CRA) discusses importance of and documentation procedures for SWA during pre-job safety meeting. Use SWA to stop any work that is unsafe.	All Staff
2	Unload equipment from vehicle	• Back strain • Cuts • Pinch points • Hand/foot injury • Damaged equipment	• Use proper lifting techniques and buddy system if needed. • Wear leather/cotton gloves to minimize minor cuts/abrasions and avoid placing hands/fingers in pinch point locations. • Wear steel toe boots. • Be aware of equipment that may have shifted during transport.	All Staff – Consultant, Contractors
3	Inspect sampling equipment	• Lost time from improperly functioning equipment • Incorrect sampling procedures/ collection due to malfunctioning equipment	• Ensure all equipment is functioning properly before mobilizing to job site. • Review sampling procedures and sampling plan (if available).	Sampling Technician
4	General sample handling	• Exposure to contaminated materials/soils/groundwater	• Wear appropriate PPE including nitrile gloves, safety glasses and neck-to-toe clothing. Review HASP.	All Staff – Consultant, Contractors
5	Opening the sample liner	• Sharp tools	• Ensure that you have a steady work surface (e.g., tailgate of a pickup, sturdy portable folding table). • Secure the liner prior to cutting **Best Practice**: - Use Geoprobe® Universal Liner Holder (catalog no. 22734) • Use Correct Tools For Opening Acetate Liners **Best Practice**: - Use Geoprobe® DT325 Liner Cutter for DT325 soil sampling system (1.85" core diameter) - Use Geoprobe ® MC Liner Cutter for Macro Core soil sampling system (1.5" core diameter) (AT8010) • Ensure proper footing and lighting • Use proper work gloves **Best Practice**: - Kevlar Gloves (http://www.seattlemarine.net/atlas_gloves/cut_resistant_gloves.htm) - Anti-puncture/cut Police Gloves (http://www.red-diamond-unif.com/hatch3.htm) - Turtle Skin gripped gloves (https://www.turtleskin.com/store/category.aspx?categoryID=4) - Leather work gloves • Cut the liner using the specialty cutting tool using a pulling motion to pull the tool across your body, but not directly toward it. • Ensure that there are no bystanders or obstructions in the path of the cutting tool. • If a cut cannot be started in the liner with the Geoprobe cutting tools STOP WORK and re-assess using the procedures listed below.	Contractor or Sample Technician
6	Assess why cut cannot be started using specialized liner cutters	• Management of change	• Dull Blade - a dull blade(s) requires more force and is more likely to slip than a sharp one. Change the blade whenever it starts to tear instead of cut. See proper procedure below. • Cut cannot be started due to soil conditions, or crimping or other damage to the acetate liner. See proper procedure below.	All Staff – Consultant, Contractors

JOB SAFETY ANALYSIS (JSA)

Opening Acetate Liners from Direct Push Probing

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
7	Changing blades in the specialty cutting tool	• Cuts due to sharp edges • Chemical hazard	• Use a proper tool (e.g. a screwdriver) to access the blades and ensure a good fit. • Have a suitable surface to work on such as a table or tailgate. • Ensure proper footing and lighting. • Wear cut/puncture resistant gloves. • Avoid holding on to other objects while changing the blades (such as the new blades) or for balance. • Always hold the blade at the non-sharp side. • Make sure to re-assemble the tool correctly. Make sure screws are tight. • Clean/decon tool before performing maintenance.	Contractor or Sample Technician
8	Disposal of used blades	• Cuts due to sharp edges	• While wearing cut/puncture resistant gloves, carefully wrap a spent blade in several layers of tape to cover the sharp edges and points. • Dispose of spent blades and associated litter so that the sharp edges do not puncture a trash bag.	Contractor or Sample Technician
9	Cutting a resistant, crimped, or otherwise damaged acetate liner with a safety knife. Assumes that the condition of the liner prevents the use of the specialty-cutting tool in its standard configuration	• Sharp tools • Exertion • Line-of-fire	• Remove one of the two blades from the specialty cutting tool, and then attempt to cut the liner. If successful, twist the liner approximately 60 to 90 degrees down the radial axis before making a second cut. It may be most appropriate to continue the job using the specialty cutting tool in this configuration, if site conditions are causing multiple liners to become damaged. • If liners still cannot be cut with the specialty cutting tool, the most appropriate method is to use a safety knife with a self-retracting hook blade to cut through only the damaged/affected portion of the liner, then resume with the specialty-cutting tool as described above (with either one blade or two installed). **Best Practice** - Uline Comfort Grip Safety Knife, model H-1370 (http://www.uline.com/ProductDetail.asp?model=H-1370) - Hook Blades: Stanley 11-961 - Regular Hook Blades (5-Pack) • The safe procedure for cutting the liner with a safety knife is described below: • Always be sure that blades are properly seated in knives and that knives are properly closed and/or fastened together before use. • Always use sharp blades. A dull blade requires more force and is more likely to slip than a sharp one. Change the blade whenever it starts to tear instead of cut. • Always wear a cut resistant glove on your free hand while cutting with a self-retracting hook bladed razor knife. • Always keep your free hand (and other body parts) away from the line of the cut. Never cut towards yourself (body, hands, face, etc.). • Always pull - never push the knife. The blade could break off, wedging in the material and cutting your arm severely as it passes over the broken blade. • Blades are brittle and can snap easily. Do not bend or apply side loads to blades by using them to pry loose objects. • Do not overexert yourself – ensure you can maintain complete control of the knife throughout the cut.	Contractor or Sample Technician

JOB SAFETY ANALYSIS (JSA)

Opening Acetate Liners from Direct Push Probing

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Decontamination of Equipment Buckets

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Decontamination
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Decontamination of sampling equipment and personnel (PPE Level D)		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Alconox/Liquinox, Simple Green or Diesel, brushes		
Task-specific Training:	Decontamination/Site Control		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Leather and Nitrile gloves to be worn when decontaminating equipment						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Decontamination of Equipment Buckets

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Decontamination of equipment buckets – remove gross contamination	• Contaminant exposure • Eye injury • Pinch points • Slip/trip/hit/fall hazards • Lifting hazards • Back injury • Manual material handling	• Wear appropriate PPE during decon activities • Avoid putting hands in or near pinch points • Maintain good housekeeping and be aware of surroundings • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Refer to the HASP for additional lifting techniques • Use correct tool for work (i.e. brush or scrapper etc)	Laborer
2	Decontamination for PCBs utilizing diesel fuel	• Contaminant exposure • Slip/trip/hit/fall hazards • Splash hazard, exposure to diesel • Exposure to diesel fumes	• Wear appropriate PPE during decon activities • Avoid putting hands in or near pinch points • Maintain good housekeeping and be aware of surroundings • Stay upwind of fumes, minimize use of diesel fuel	Laborer
3	Decontamination utilizing Simple Green or Alconox/Liquinox	• Contaminant exposure • Slip/trip/hit/fall hazards • Splash hazard, exposure to detergent	• Wear appropriate PPE during decon activities • Avoid putting hands in or near pinch points • Maintain good housekeeping and be aware of surroundings	Laborer
4	Management of waste derived from decontamination activities	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling	• Containerize decon waste (water, diesel rags, etc) as required • Maintain good housekeeping and be aware of surroundings • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position •	Laborer

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Decontamination of Sampling Equipment and Personnel (PPE Level D)

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Decontamination
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Decontamination of sampling equipment and personnel (PPE Level D)		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Alconox/Liquinox, brushes		
Task-specific Training:	Decontamination/Site Control; Quality Control/Sampling Plan		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Nitrile gloves to be worn when decontaminating reusable equipment						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Decontamination of Sampling Equipment and Personnel (PPE Level D)

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Decontamination of sampling equipment to include pumps, bailers, tubing, etc.	• Contaminant exposure • Pinch points • Slip/trip/hit/fall hazards • Lifting hazards • Back injury • Manual material handling	• Wear appropriate PPE during decon activities (nitrile gloves) • Avoid putting hands in or near pinch points • Maintain good housekeeping and be aware of surroundings • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical means, such as a dolly, cart, or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Refer to the HASP for additional lifting techniques	Sampling Technician / All Field Crews
2	Decontamination of personnel	• Contaminant exposure • Slip/trip/hit/fall hazards	• Dispose of used PPE in accordance with site requirements • Wash hands and face before eating, drinking, or using tobacco products • Take care when removing PPE (boots, gloves, etc.); sit down to remove/change boots as necessary	Sampling Technician / All Field Crews
3	Management of waste derived from decontamination activities	• Contaminant exposure • Lifting hazards • Back injury • Manual material handling	• Containerize decon waste (water, used PPE, etc) as required • Refer to step 1 and the HASP for additional lifting information	Sampling Technician / All Field Crews

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Groundwater Sampling (Bailer)

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Groundwater Sampling
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Groundwater sampling		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Bailer; safety cones/barricades		
Task-specific Training:	Groundwater Sampling Procedures – reference HASP for additional site/client safety training requirements.		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Sunscreen and Insect Repellant			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Use Ndex nitrile gloves when handling wet sampling containers; use abrasion/cut-resistant gloves for other tasks; use hearing protection as necessary based on site conditions.					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Groundwater Sampling (Bailer)

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Inspect/calibrate sampling equipment	• Loss due to malfunctioning equipment	• Check all equipment (meters) to ensure it is in proper working order and has been calibrated to CRA and manufacturer's standards, and document	Sampling Technician
2	Establish work zone at monitoring well location	• Traffic • Pinch points • Lifting hazards • Back injury • Manual material handling	• Maintain awareness of on-site traffic patterns and walking paths; setup barricades • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves when setting up barricades • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	Sampling Technician
3	Open monitoring well cover(s)	• Pinch points • Hand injury • Biological hazards	• Avoid placing hands in pinch points • Wear proper PPE (gloves) for task and use the proper tool(s) when opening well covers (open face wrench/socket wrench) • Inspect for other hazards that may affect the hands (hypodermic needles, etc.) • Heightened awareness of wasps, ants, bees, spiders, and poison plants	Sampling Technician
4	Measure water levels	• Contaminant exposure • Cross contamination	• Wear proper PPE (Ndex nitrile gloves) • Decon probe and measuring tape following gauging of well	Sampling Technician
5	Develop/purge monitoring well location - bailer	• Slip/trip/fall hazards • Cuts • Pinch points • Back and shoulder strain	• Maintain housekeeping; be aware of ground conditions • Use PPE and proper tools • Keep hands away from pinch points • Stretch affected muscles (triceps, back, neck, and shoulder) prior to/during/after activity • Avoid repetitive motions and overhead lifts; use proper lifting techniques and neutral postures and take breaks	Sampling Technician
6	Collect groundwater sample utilizing bailer	• Chemical exposure • Cuts from container breaking • Sample misidentification	• Wear proper PPE • Inspect bottles for signs of breakage/damage; do not use suspect containers • Close glass bottles carefully – avoid cross threading lid and bottle • Ensure sample id numbers match sample location/site plan • Check sample labels for accuracy prior to placing in container	Sampling Technician
7	Close monitoring well cover	• Traffic • Hand injury • Pinch points	• Maintain awareness of on-site traffic patterns; verify barricades are still in place • Wear appropriate gloves and use proper tool(s) • Avoid placing hands in pinch points	Sampling Technician
8	Pack samples in container (i.e., cooler)	• Bottle breakage • Chemical exposure • Lifting hazards • Back injury • Manual material handling • Lost time due to sampling error	• Pack glass containers in bubble wrap or equivalent protection • Wear appropriate PPE (Ndex nitrile gloves) • Refer to step 2 and the HASP for additional lifting techniques/information • Ensure samples are packed/labeled/shipped correctly – double check	Sampling Technician

JOB SAFETY ANALYSIS (JSA)

Groundwater Sampling (Bailer)

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
9	Manage any investigative derived waste (IDW)	• Chemical exposure • Pinch points • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling • Mislabeling waste	• Wear appropriate PPE (Ndex gloves) and work gloves • Avoid pinch points • Use proper PPE • Inspect for proper housekeeping; clean up work area • Refer to step 2 and the HASP for additional lifting techniques/information • Label IDW appropriately (generator, contact number, identification of contents, and site location); specify type of contents; arrange for disposal	Sampling Technician and Project Manager

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Groundwater Sampling (Peristaltic Pump)

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Groundwater Sampling
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Groundwater sampling		
Work Site:	12th Street Landfill, Otsego Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell Michigan		
Key Equipment:	Peristaltic pump		
Task-specific Training:	Electrical Safety, Groundwater Sampling Procedures – reference HASP for additional site/client safety training requirements.		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Sunscreen and Insect Repellant			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Use Ndex nitrile gloves when handling wet sampling containers; use abrasion/cut-resistant gloves for other tasks; use hearing protection as necessary based on site conditions.					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Groundwater Sampling (Peristaltic Pump)

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Inspect/calibrate sampling equipment	• Loss due to malfunctioning equipment	• Check all equipment to ensure it is in proper working order and has been calibrated to CRA and manufacturer's standards, and document	Sampling Technician
2	Establish work zone at monitoring well location	• Traffic • Pinch points • Lifting hazards • Back injury • Manual material handling	• Maintain awareness of on-site traffic patterns and walking paths; setup barricades • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves when setting up barricades • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	Sampling Technician
3	Open monitoring well cover(s)	• Pinch points • Hand injury • Biological hazards	• Avoid placing hands in pinch points • Wear proper PPE (gloves) for task and use the proper tool(s) when opening well covers (open face wrench/socket wrench) • Inspect for other hazards that may affect the hands (hypodermic needles, etc.) • Heightened awareness of wasps, ants, bees, spiders, and poison plants	Sampling Technician
4	Measure water levels	• Contaminant exposure • Cross contamination	• Wear proper PPE (Ndex nitrile gloves) • Decon probe and measuring tape following gauging of well	Sampling Technician
5	Develop/purge monitoring well location – peristaltic pump	• Slip/trip/fall hazards • Cuts • Pinch points • Electrical (AC or DC) • Back and shoulder strain	• Maintain housekeeping; be aware of ground conditions • Use PPE and proper tools • Keep hands away from pinch points • Inspect wiring, clamps, cables, etc.; avoid arcing • Stretch affected muscles (triceps, back, neck, and shoulder) prior to/during/after activity	Sampling Technician
6	Collect groundwater sample utilizing a peristaltic pump	• Chemical exposure • Cuts from container breaking • Sample misidentification	• Wear proper PPE • Inspect bottles for signs of breakage/damage; do not use suspect containers • Close glass bottles carefully – avoid cross threading lid and bottle • Ensure sample id numbers match sample location/site plan • Check sample labels for accuracy prior to placing in container	Sampling Technician
7	Close monitoring well cover	• Traffic • Hand injury • Pinch points	• Maintain awareness of on-site traffic patterns; verify barricades are still in place • Wear appropriate gloves and use proper tool(s) • Avoid placing hands in pinch points	Sampling Technician
8	Pack samples in container (i.e., cooler)	• Bottle breakage • Chemical exposure • Lifting hazards • Back injury • Manual material handling • Lost time due to sampling error	• Pack glass containers in bubble wrap or equivalent protection • Wear appropriate PPE (Ndex nitrile gloves) • Refer to step 2 and the HASP for additional lifting techniques/information • Ensure samples are packed/labeled/shipped correctly – double check	Sampling Technician

JOB SAFETY ANALYSIS (JSA)

Groundwater Sampling (Peristaltic Pump)

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
9	Manage any investigative derived waste (IDW)	• Chemical exposure • Pinch points • Slip/trip/fall hazards • Lifting hazards • Back injury • Manual material handling • Mislabeling waste	• Wear appropriate PPE (Ndex gloves) and work gloves • Avoid pinch points • Use proper PPE • Inspect for proper housekeeping; clean up work area • Refer to step 2 and the HASP for additional lifting techniques/information • Label IDW appropriately (generator, contact number, identification of contents, and site location); specify type of contents; arrange for disposal	Sampling Technician and Project Manager

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Monitoring Well Sampling

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Investigation and (O & M
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Monitoring well sampling/gauging		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell Michigan		
Key Equipment:	Bailer, peristaltic pump		
Task-specific Training:	SOP monitor well sampling, PPE		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Nitrile Gloves						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Monitoring Well Sampling

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Coordinate site access	• Delays or added work	• Notify Station Manager of schedule • Notify other required personnel if applicable (city, regulators, private property owners, etc.)	Sample Technician
2	Mobilize with proper equipment/ supplies for sampling	• Delay or improper/unsafe performance of work due to improper equipment on site • Cross-contamination of wells	• Review work plan to determine equipment/supply needs • Make sure all sampling/gauging equipment is decontaminated • Bring ice for sample storage • Review THE HASP and gather necessary PPE	Sample Technician
3	Notify other personnel on site	• Unknown traffic or other work hazards • Lack of communication between all interested parties	• Meet with on site personnel (if any) and explain planned activities	Sample Technician
4	Determine sampling order	• Cross-contamination of samples and wells due to incomplete decontamination of sampling equipment	• Review prior analytical results and set sampling order from lowest to highest concentration wells	Sample Technician
5	Perform STAR and tailgate safety meeting upon arrival at site	• Consider worst-case scenario (including weather conditions)	• Review HASP with co-workers • Highlight aspects identified by HASP and, if necessary, add to HASP • Get signature of all co-workers on HASP	Sample Technician
6	Set up any necessary traffic control	• Accident during placement or as a result of improper traffic control equipment placement	• Use buddy system for placing traffic control • Reference traffic control plan section of HASP	Sample Technician
7	Set up exclusion zone(s)	• Injury or exposure to public or other on-site personnel • Slip/trip/fall hazards	• Implement exclusion zone setup instructions of the HASP (barricades, caution tape, cones, etc.) • Set up work area free of trip hazards	Sample Technician
8	Gauge water levels and product thickness (where applicable) in wells	• Back strain • Inhalation or dermal exposure to chemical hazards	• Don any additional PPE and initiate air quality monitoring in accordance with the HASP • Maintain safe distance from well head • Bend at knees, not waist	Sample Technician
9	Purge well(s) and collect purge water	• Cross-contamination • Lifting hazards • Back injury • Manual material handling • Inhalation or dermal exposure to chemicals • Slip/trip/fall hazards • Spilling contaminated water	• Decontaminate purging equipment between each sampling location • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Use PPE and monitoring in accordance with the HASP • Keep work area clear of tripping or slipping hazards • Store purge water in appropriate containers – label drums	Sample Technician

JOB SAFETY ANALYSIS (JSA)

Monitoring Well Sampling

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
10	Collect samples in accordance with sampling plan	• Cross-contamination • Lifting hazards • Back injury • Manual material handling • Inhalation or dermal exposure to chemical hazards • Slip/trip/fall hazards • Improper labeling or storage • Injury from broken sample bottle (cuts or acid burn)	• Decontaminate sampling equipment between each well (unless disposable) • Refer to step 9 and the HASP for additional lifting methods • Use PPE in accordance with the HASP • Label samples in accordance with sampling plan • Keep samples stored in proper containers, at correct temperature, and away from work area • Handle bottles carefully	Sample Technician
11	Clean site/demobilize	• Traffic • Nuisance or safety hazard left on site	• Use buddy system as necessary to remove traffic control • Leave site clean of refuse and debris • Notify on site personnel, and note any purge water left on site • Be sure all drums are properly labeled and secured	Sample Technician
12	Package and deliver samples to lab	• Bottle breakage • Improper temperature • Exceeding hold times • Improper completion of Chain of Custody (COC)	• Pack samples in ice, use bubble wrap/bags for sample bottles • Use standard COC forms and labels • Submit samples to lab as soon as possible (no more than 3 days, but check sampling plan for any special requirements such as rush turnaround or special hold time restrictions)	Sample Technician

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Landfill Gas Monitoring

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Landfill Gas Monitoring and Inspection
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Landfill gas monitoring and landfill gas system inspection		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Landtec landfill gas monitor, manometer, 4-gas meter		
Task-specific Training:	HAZWOPER, Landfill Gas Monitoring		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)

			Supplied Air	APR	
☒ Reflective Vest	☐ Goggles	☒ Gloves*			
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	

ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)

Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.

Please refer to Section 5.0 of the HASP for additional PPE information

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Landfill Gas Monitoring

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Inspect/calibrate monitoring equipment	• Loss due to malfunctioning equipment	• Check all equipment to ensure it is in proper working order and has been calibrated to CRA and manufacturer's standards, then document	Technician
2	Establish work zone at monitoring location	• Pinch points • Lifting hazards • Back injury • Manual material handling	• Be aware of uneven terrain while walking • Reduce travel distance when there is a need to carry/lift materials. • Make sure grip is adequate; wear leather/cotton gloves when setting up barricades • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	Technician
3	Open monitoring location cover (if applicable)	• Pinch points • Hand injury • Lifting hazards • Back injury • Manual material handling • Biological hazards	• Avoid placing hands in pinch points • Wear proper PPE (gloves) for task if necessary and use proper tool(s) when opening well covers (open face wrench/socket wrench) • Refer to step 2 and the HASP for additional lifting information • Inspect for other hazards that may affect the hands (hypodermic needles, etc.) • Heightened awareness of wasps, ants, bees, spiders, and poison plants	Technician
4	Measure pressure and landfill gas composition	• Contaminant exposure • Biological hazards	• Point Landtec landfill gas monitor outlet away from people monitoring • Heightened awareness of wasps, ants, bees, spiders, and poison plants	Technician
5	Measure water levels (if required)	• Contaminant exposure • Biological hazards	• Wear proper PPE (nitrile gloves) • Decon probe and measuring tape following gauging of probe	Technician
6	Record reading	• Contaminant exposure • Slip/trip/fall hazards	• Maintain housekeeping; be aware of ground conditions • Keep hands away from pinch points	Technician
7	Close monitoring location cover (if applicable)	• Pinch points • Hand injury • Lifting hazards • Back injury • Manual material handling • Biological hazards	• Avoid placing hands in pinch points • Wear proper PPE (gloves) for task if necessary and use proper tool(s) when opening well covers (open face wrench/socket wrench) • Refer to step 2 and the HASP for additional lifting information • Inspect for other hazards that may affect the hands (hypodermic needles, etc.) • Heightened awareness of wasps, ants, bees, spiders, and poison plants	Technician

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Plugging and Abandoning

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Well Abandonment
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Oversight of plugging and abandoning activities		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Safety cones/barricades; Geoprobe		
Task-specific Training:	HAZCOM, PPE, Heavy/Mobile Equipment Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☒ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Cease operations and re-evaluate the scope of work or upgrade to Level C (full face respirator with OV carts, Tyvek, nitrile inner and outer gloves, safety rated rubber boots or overboots) if sustained background readings are 1 ppm or greater						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Plugging and Abandoning

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (CRA) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe	All Personnel
2	Tailgate safety meeting	• Not identifying all hazards	• Discuss work to be performed and associated hazards • Open communication among team members • Have all team members sign safety meeting form • Include discussion on SWA, hospital route, evacuation procedures, emergency contact(s), etc. • Identify personnel responsible for respective JSA critical actions for job steps	All Personnel
3	Conduct site walk, identify unsafe conditions, and inspect well locations	• Traffic • Slip/trip/fall hazards • Biological and overhead hazards	• Maintain awareness of on-site traffic and walking surfaces • When inspecting well locations, be aware of biological hazards (e.g., ants, poison ivy, wasps) and overhead hazards (e.g., overhead utilities)	All Personnel
4	Inspection of equipment	• Pinch points • Injury; property damage • Lost time due to damaged equipment/parts	• Discuss pinch points on equipment (e.g., Geoprobe, etc.) • Familiarize all personnel with location/operation of fire extinguisher(s) and kill switch on Geoprobe • Visually inspect equipment/parts for damage	All Personnel
5	Setup of staging area and work zone	• Traffic • Slip/trip/fall hazards • Pinch points • Lifting hazards • Back injury • Manual material handling • Heat stress	• Maintain awareness of on-site traffic and walking surfaces • Utilize barricades/cones/caution tape to define staging area and to direct traffic • Wear leather/cotton gloves when setting up barricades • Identify heavy loads (>50 lbs/23kg) or loads with shapes or weight distribution that makes them unwieldy • Use at least two people to lift and carry loads greater than 50 lbs • Bend and lift with legs and arms not back • Determine path of travel prior to lifting any object • Ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy)	All Personnel
6	Cut well casing two feet below grade and place well cover and cut casing out of the way of further work at the well	• Equipment failure • Eye, hand or foot injury • Lifting hazards • Back injury • Manual material handling • Slip/trip/fall hazards	• Wear proper PPE, leather gloves, safety glasses, safety boots - use proper body positioning • Don't lift greater than 50 lbs – use 2 people to move waste materials • Refer to step 5 and the HASP for additional lifting information • Practice good housekeeping techniques by keeping work zone free of tripping hazards • Maintain awareness of open borehole	All Personnel
7	Breaking and removing of concrete from monitor well pad	• Traffic • Slip/trip/fall hazards • Flying debris, property damage • Hearing loss • Cuts/scrapes • Lifting hazards • Back injury • Manual material handling	• Stay within designated work zones and maintain awareness of on-site traffic and walking surfaces, use rig as shield • Keep workers/vehicles out of "line of fire" • Ensure all on-site personnel are wearing hearing protection (ear plugs) when in the vicinity of the drill rig • Wear leather gloves while handling concrete and watch for rebar and sharp corners of concrete • Refer to step 5 and the HASP for additional lifting information	All Personnel

JOB SAFETY ANALYSIS (JSA)

Plugging and Abandoning

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
8	Mix grout and place down hole/casing	• Lifting hazards • Back injury • Manual material handling • Eye injury • Skin exposure to concrete • Particulate inhalation • Slip/trip/fall hazards	• Use proper lifting techniques and equipment to mix concrete/bentonite mix • Don't lift greater than 50 lbs • Wear nitrile gloves, dust mask, and safety glasses with side shields • Practice good housekeeping techniques by keeping work zone free of tripping hazards • Stay upwind of vapors • Verify surface completions with concrete at grade to prevent a future tripping hazard • Leave barricades over former well locations until concrete is safe to drive on • Refer to step 5 and the HASP for additional lifting information	All Personnel
9	Site cleanup and demobilization (see also job step 2)	• Slip/trip/fall hazards • Vapors and airborne particulates • Lowering mast	• Pick up tools, materials, equipment, and debris to prevent tripping hazards • Wear appropriate PPE including safety glasses, face shield (splash hazard), dust masks (if necessary), and pants • Stay upwind of vapors, monitor with PID and Landtec meter • Keep hands and other body parts clear of mast while lowering to avoid pinch points • Wear leather work gloves	All Personnel

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Excavation Oversight

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Excavation
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Excavation oversight		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Excavator; air monitoring equipment (PID and 4-gas); Excavation Safety Checklist		
Task-specific Training:	40-Hour and 8-Hour HAZWOPER; PPE; Mobile Equipment Operations; Excavation Safety Training; Excavation Competent Person		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Class II vest; leather gloves; Noise Reduction Rating (NRR) 20 hearing protection						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Excavation Oversight

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform the STAR process; discuss SWA; verify Permit to Excavate and Utility Clearance Form is completed (overhead and underground); verify excavation layout	• Underground utility strike • Overhead utilities	• QSF-019 and Permit to Excavate Forms completed and signed off • Utility Locate Ticket number on file within 10 days of excavation startup? • Mark work area and safe distances for overhead lines; use spotter as necessary	CRA Construction Oversight Person
2	Set up necessary work area and traffic controls	• Fall-in • Caught-between • struck-by • Lifting hazards • Manual material handling • Back injury	• Demarcate site and work areas to ensure that personnel and truck/equipment traffic is maintained safely and smoothly • Stockpile and laydown area are set up properly • Perform a pre-start meeting, inform subcontractor of safe lifting practices • Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves when setting up barricades • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing	CRA Construction Oversight Person
3	Hand digging and potholing activities (where/if necessary based on utility locates)	• Underground utility strike	• Use preventive techniques • Maintain proper utility clearances with heavy equipment and use hand digging/potholing when necessary • Refer to step 2 and the HASP for additional lifting information	CRA Construction Oversight Person
1	Heavy equipment operations to excavate and handle soils and waste materials	• Caught-between and struck-by hazards • Underground/overhead utilities	• Stay out of swing radius • Use spotters to verify clear route of travel and work area • Maintain eye contact with operator and/or signal operator • Keep soil 2 feet from edges • Inspect heavy equipment and document inspection • Ensure the above utility clearances and safe work protocols are followed	CRA Construction Oversight Person
2	Excavating activities	• Soil cave-in • Noise hazard • Struck-by/against hazards • Potential contact with chemical waste material, organic vapors, and particulate • Leachate	• Keep proper distances from edge of excavation • Limit equipment operations in trench area • Keep work area free of trip hazards • Perform necessary soil classification • Use hearing protection as necessary • Wear designated PPE and conduct air monitoring • Pump out leachate to designed holding tank for treatment or off site disposal (See JSA on trash pump operations)	CRA Construction Oversight Person

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Excavation Oversight - Confirmation Sample Collection

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction / Remediation
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Excavation oversight - confirmation sample collection		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	PID, Camera, Sample jars, PPE		
Task-specific Training:	Excavation Safety, soil sampling		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☒ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☒ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Photoionization Protector			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Modified Level D (MLD); leather and nitrile gloves					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Excavation Oversight - Confirmation Sample Collection

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	General site activities/traverse site to set up and remove sampling supplies at predetermined sampling location	• Property damage and personal injury from contact with heavy equipment (i.e., excavator, trucks, etc.) • Slip/trip/fall hazards from uneven terrain, piping, weather conditions, and/or overloading/awkward load • Injury from biological hazards • Personal injury from poor ergonomics • Lifting hazards • Back injury • Manual material handling • Personal injury from falling into excavation/ engulfment	• Keep visual contact with the operator at all times when approaching equipment; have a clear view of your surroundings • Keep a clear view of other moving equipment on site to assure no unexpected movements • Restrict dump trucks to designated roads and/or paths • Recognize and identify surface anomalies caused by traffic, existing structures (i.e., piping), and vegetation (STAR) • Use mechanical assistance or take multiple trips to carry equipment • Inspect travel path for weather-related hazards (i.e., puddles and/or mud; use established path and/or access ways • Lift with your legs when moving sampling supplies • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Make sure grip is adequate; use gloves to enhance grip when necessary • Reduce travel distance when carrying materials or equipment • Personnel should stay at least 2 feet from edge of excavation • Install orange construction fencing around excavated area if left unattended • If temporary security fencing is utilized, inspect it and remove hazards related to protruding wire ties, fencing, etc. • No personnel should enter a trench >4 feet in depth • Trenches >4 feet should have the walls sloped backwards; note the competency of the soil to assess degree of slope • Provide OSHA acceptable exits into trenches and excavations at an interval <25 feet • Keep all excavated material a minimum of 2 feet from the edge of the excavation	Sampling Technician And Equipment Operator
2	Collect soil sample from excavator bucket	• Hearing loss from excessive noise Exposure to contaminates; soil, water, particulates and vapor • Personal injury from broken glass container • Personal injury from contact with excavator bucket	• When sound level exceeds 85 dB, wear hearing protection • Rule of Sound: If you are normal conversation distance and need to raise voice, put on hearing protection • Monitor breathing zone with PID and upgrade PPE as per HASP • Wear nitrile gloves when handling impacted materials • See General Site Activities Step 1 • Inspect container/cooler for broken glass • Inspect glassware prior to filling for cracks • Dispose of broken glassware in appropriate waste receptacle • Make sure bucket is lowered to ground surface prior to approaching • Do not approach bucket until the operator indicates it is safe and bucket has been placed onto the ground surface • Do not turn your back to the bucket until >10 feet out of swing radius of equipment • Communicate to operator when safe to lift the bucket and proceed with work activities	Sampling Technician And Equipment Operator

JOB SAFETY ANALYSIS (JSA)

Excavation Oversight - Confirmation Sample Collection

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
3	Collect soils samples	• Chemical exposure • Cuts from container breaking • Sample misidentification	• Wear proper PPE • Inspect bottles for signs of breakage/damage; do not use suspect containers • Close glass bottles carefully – avoid cross threading lid and bottle • Ensure sample id numbers match sample location/site plan • Check sample labels for accuracy prior to placing in container	Sampling Technician
4	Decontaminate sampling equipment	• Exposure to contaminates; soil, water, particulates and vapor • Personal injury from contact with sharp tools	• Wear nitrile gloves when handling impacted materials • See General Site Activities Step 1 • Utilize dust mask to minimize inhalation of particulates • Dispose of affected materials in designated containers that are labeled with type of waste • Don leather gloves to prevent cuts from sharp or rough edges • Place sampling tools with sharp or pointed edge down in decontamination container	Sampling Technician
5	Pack samples in container (i.e., cooler)	• Bottle breakage • Chemical exposure • Lifting hazards • Back injury • Manual material handling • Lost time due to sampling error	• Pack glass containers in bubble wrap or equivalent protection • Wear appropriate PPE (Ndex nitrile gloves) • Refer to step 2 and the HASP for additional lifting techniques/information • Ensure samples are packed/labeled/shipped correctly – double check	Sampling Technician

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CONSTRUCTION JSAs

JSA TEMPLATE (BLANK)
MOBILIZATION-DEMOBILIZATION
DRIVING AND OFF-ROAD DRIVING
MOBILE EQUIPMENT – GENERAL
SILT FENCE INSTALLATION
EQUIPMENT FUELING
MATERIAL HANDLING
SKID STEER OPERATION
CHAINSAW OPERATION – LIMBING
CHIPPER OPERATION
HYDRO-AXE OPERATION
GRINDER OPERATION
TRENCHING-EXCAVATING WITH BACKHOE
SKID STEER GRAPPLE BUCKET OPERATION
LAND SURVEYING
TRASH PUMP SETUP AND OPERATION
DEWATERING AND GROUNDWATER TREATMENT
FILTER BAG CHANGE-OUT
ALL-TERRAIN UTILITY VEHICLE USE
HEAVY EQUIPMENT OPERATION (ARTICULATED) - DUMP TRUCK
HEAVY EQUIPMENT OPERATION – BULLDOZER
HEAVY EQUIPMENT OPERATION – EXCAVATOR
HEAVY EQUIPMENT OPERATION – LOADER
LOADING SOIL WITH EXCAVATOR
LOADING SOIL - PAPER WASTE WITH EXCAVATOR
SOLIDIFICATION OF PAPER MILL RESIDUALS/WASTES
DUMPING SOIL AND WASTE FROM TRUCK
PCB WIPE TESTING
HDPE PIPE WELDING
GEOTEXTILE DEPLOYMENT
LINER DEPLOYMENT
REVEGETATION MAT INSTALLATION

JOB SAFETY ANALYSIS (JSA)

Title

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	[Date of review/revision]	**JSA Type:**	[Construction/Office Work/O&M/Drilling/Maintenance/Demolition/Decommissioning]
Work Type:	[Environmental/Remediation/Construction/General Industry]	**Client:**	
Work Activity:			
Work Site:	[Site information and address]		
Key Equipment:			
Task-specific Training:	[Identify any special/additional training necessary to safely complete this task]		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☐ Gloves*	**Supplied Air**	**APR**	
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☐ Safety Glasses	☐ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Title

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1		•	•	
2		•	•	
3		•	•	

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JOB SAFETY ANALYSIS (JSA)

Mobilization-Demobilization

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Mobilization/Demobilization
Work Type:	Environmental/Remediation/Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Mob of Labor and Equipment		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Vehicle		
Task-specific Training:	Motor vehicle safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☐ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Mobilization-Demobilization

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (CRA) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe	All Personnel
2	Check weather	• Unexpected storm • Fog; rain; snow; lightening/thunder • Heat/cold stress	• Check local weather forecast • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightening/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	All Personnel
3	Load equipment into vehicle	• Lifting hazards • Manual material handling • Back injury • Cuts • Pinch points • Hand/foot injury • Forgotten or damaged equipment	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Avoid placing hands/fingers in pinch point locations • Wear safety-toed boots • Verify requested equipment against warehouse form • Load equipment in an organized manner to prevent shifting during transport or use cargo netting	All Personnel
4	Complete CRA Daily Operator Vehicle Checklist	• Damaged vehicle lights, tires, windows, mirrors, horn • Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers • Visually check the pressure/wear of tires • Ensure the vehicle has a spare tire • Assure windshield and window glass is clean and free from obstructions • Test the windshield wipers and horn • Verify vehicle registration, insurance card, and inspection sticker is present and valid • Ensure the vehicle contains a first aid kit, fire extinguisher, and road hazard kit	All Personnel
5	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain • Blind spot • Impaired vision	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach • Ensure mirrors are properly adjusted	All Personnel
6	Fasten seat belt(s) and ensure passenger(s) seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	• Verify driver and passenger(s) seat belts are in good condition and properly latched	All Personnel

JOB SAFETY ANALYSIS (JSA)

Mobilization-Demobilization

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
7	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision • Unwanted intrusion • Lost equipment	• Manually lock all doors to vehicle	All Personnel
8	Start engine and check gauges and warning lights	• Vehicle breakdown	• Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit	All Personnel
9	Mobilize to site	• Arriving late • Collision • Injury or death to occupants or other parties	• Do not use cell phones or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic lights (fresh vs. stale) • Maintain safety cushion around vehicle (front, sides, and rear) and 4-second following distance • Utilize all driving defensive techniques	All Personnel
10	Arrive at site	• Pedestrian injury • Collision	• Maintain awareness of pedestrian/vehicular traffic when entering site and traveling to work zone	All Personnel
11	Park vehicle	• Pedestrian injury • Collision • Property damage	• Maintain awareness of pedestrian/vehicular traffic • Park vehicle in pull-through parking space or facing the exit • Use caution and mirrors/spotter when backing vehicle	All Personnel
12	Demobilization	• Collision • Injury or death to occupants or other parties	• Perform perimeter vehicle check • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency	All Personnel

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Driving and Off-Road Driving

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Driving
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Travel on landfill path, off road and around former Mill property		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell Michigan		
Key Equipment:	Four-wheel drive vehicle, valid driver's license		
Task-specific Training:	Defensive Driving; review of owner's/operator's manual		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☐ Reflective Vest	☐ Goggles	☐ Gloves*	**Supplied Air**	**APR**		
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☐ Safety Glasses	☐ Safety-toed Boots				☐ Acid Gas	
☒ Other* Seat belt			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Driving and Off-Road Driving

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA – Discuss traffic patterns and review the accepted traffic route(s) for project/site travel	• Site personnel not aware of STAR and SWA	• Project team (CRA) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Discuss route, concerns and alternate routes with passenger and drivers of other vehicles • Use SWA to stop any work that is unsafe • Ensure proper vehicle selected for travel (use a truck if going to construction site or area with rough conditions that would damage a small vehicle?)	Driver and passenger
2	Check weather	• Unexpected storm • Fog; rain; snow; lightening/thunder • Heat/cold stress	• Check local weather forecast • Discuss weather issues and precautions to take while driving and on site during the pre-job safety meeting • If weather conditions (e.g., fog, rain, snow, etc.) impair the ability/vision of the driver, exit at nearest safe location and assess the situation • While on site, at first sign of lightening/thunder utilize SWA and assess weather conditions • In extreme temperatures, ensure all personnel have proper clothing, hydration, and heat/cold protection (e.g., canopy, fan, glove warmers)	Driver or Passenger
3	Complete CRA Daily Operator Vehicle	• Damaged vehicle lights, tires, windows, mirrors, horn • Inadequate vehicle documents and/or safety items	• Check for fluid leaks under vehicle • Test operation of headlights, front/rear turn signals, backup lights, brake lights, and emergency flashers • Visually check the pressure/wear of tires • Ensure the vehicle has a properly inflated spare tire and associated tools to install • Assure windshield and window glass is clean and free from obstructions • Assure all fluids are topped off (ex. windshield wiper fluid) and scheduled routine maintenance has occurred (ex. Oil changes). • Test the windshield wipers and horn • Verify vehicle registration, insurance card, and inspection sticker is present and valid • If the vehicle contains a first aid kit, fire extinguisher, and road hazard kit and that all items with expiration dates are current, that fire extinguisher has had documented monthly check. • Do not use vehicle if any safety device is found not functioning	Driver or Passenger
4	Check and adjust seat, steering wheel, headrest, and mirrors	• Back/body strain • Blind spot • Impaired vision	• Adjust seat, headrest, and steering wheel height so body is fully supported/comfortable and pedals are within easy reach • Ensure mirrors are properly adjusted	Driver or Passenger
5	Fasten seat belt(s) and ensure passenger(s) seat belts are fastened	• Serious injury, ejection, or death from collision and/or traffic citation	• Verify driver and passenger(s) seat belts are in good condition and properly latched	Driver or Passenger

JOB SAFETY ANALYSIS (JSA)

Driving and Off-Road Driving

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	Ensure vehicle doors are locked	• Serious injury, ejection, or death from collision • Unwanted intrusion • Lost equipment	• Manually lock all doors to vehicle prior to starting the vehicle.	Driver
7	Start engine and check gauges and warning lights	• Vehicle breakdown	• Verify sufficient fuel and other hazard lamps (e.g., battery, oil, and temperature) are not lit	Driver
8	Driving – Do not deviate from established traffic patterns unless new path/area has been physically walked by personnel and reviewed for hazards; pay attention to hidden obstacles (holes, obscured objects, etc.)	• Arriving late • Collision • Vehicle damage • Injury or death to occupants or other parties • Unseen/hidden obstacles or other hazards	• Acknowledge and comply with all traffic regulations, laws, and ordinances • Do not use 2-way communicating devices or perform other distracting activities while vehicle is in motion • Constantly scan intersections, move eyes, check mirrors, and assess traffic patterns • Maintain safety cushion around vehicle (front, sides, and rear) and 4-second following distance (add an extra second for each hazardous condition, triple following distance in poor weather conditions) • Avoid driving in treed areas that would result in paint and side mirror damage • Do not drive in other vehicles' blind spots • Review path of travel or follow established traffic pattern(s) • Utilize all driving defensive techniques	Driver
9	Walk the selected route if covered with tall vegetation before driving	• Slip/trip/fall hazards	• Use a walking stick to probe in high vegetation to ensure that ground conditions are suitable for driving at slow speeds	Driver
10	Clear and grub path if access is required frequently	• Refer to Clearing and Grubbing JSA	• Refer to Clearing and Grubbing JSA	Project Coordinator
11	Park vehicle	• Pedestrian injury • Property damage	• Maintain awareness of uneven ground • Use caution and mirrors/spotter when backing vehicle	Driver
12	Demobilization	• Collision • Injury or death to occupants or other parties	• Perform perimeter vehicle check • Maintain awareness of pedestrian/vehicular traffic when exiting site • Utilize defensive driving techniques • Complete post-departure checklist and report vehicle problems to company vehicle maintenance manager or rental car agency	Driver or Passenger
13	Report maintenance or mechanical problems upon returning vehicle	• Conditions worsen leading to mechanical failure resulting in collision and injury	• Report vehicle problems immediately to company representative or rental car agency • Schedule and/or perform repairs as soon as possible	Driver

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Mobile Equipment - General

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Moving and operating mobile/heavy equipment		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Hydraulic excavator; bulldozer; off road truck, loader, skid steer		
Task-specific Training:	Heavy Equipment Operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☒ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather gloves, properly fitted clothing					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Mobile Equipment - General

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process; refer to the mobile/heavy equipment manufacturer's operators manual before operating equipment. Woods equipment shall be equipped as necessary to protect the operator (ROPS, FOPS, mesh enclosures, etc.).	• Slip/trip/fall hazards • Situational risks • Short service employees	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction Training (hands-on) training necessary? • Employees should remove finger rings, necklaces, or jewelry which may be hazardous in equipment operation	All Personnel
2A	Perform daily (pre-shift) equipment inspection include area around the equipment and PPE and perform a complete walk around inspection	• Equipment failure • PPE failure	• Don all necessary PPE • Provide training to personnel on inspection procedures • Document daily inspection • Defects must be corrected before operating unit	Operator
2b	Mount/dismount the equipment (Note: The most common cause of injury for equipment operators is slipping/falling while mounting/ dismounting the machine. **Never jump from the machine**.)	• Slip/trip/fall hazards • Sprains • Strains	• Use three points of contact • Clear tracks and personnel access points of debris and mud as necessary • Only a trained operator will be allowed on equipment • Never carry riders unless unit is so designed	Operator
3a	Starting heavy/mobile equipment (Note: All operators manuals should be available for each piece of equipment and used in employee training)	• Struck-by • Caught between • Equipment failure	• Perform inspection (see item 2a.) • Check to be certain all workers and equipment are a safe distance from unit • Allow proper warm-up and wait for gauges to register properly • Raise the blade, cable and chokers, boom, grapple, or other attachments before moving the unit	Operator
3b	Operation of heavy/mobile equipment	• Struck-by • Caught between • Overhead/underground utilities • Flying debris • Rollover • Fire • Improper housekeeping • Winch failure	• Appropriate guarding (according to machine type and use) shall be in place at all times unit is in operation • Backup alarms shall be functional • Seat belts shall be provided and their use enforced • Fire extinguishers and first aid kits shall be provided on each unit • Fire extinguishers shall be inspected for functionality on a daily basis • Do not overload winch	Operator
4a	Perform equipment maintenance	• Equipment failure/loss • Sharp objects • Pinch points	• Use STAR process • Follow equipment manufacturer's preventive maintenance procedures and instructions • Only qualified individuals should perform maintenance activities on equipment	Operator and Site Supervisor
4b	Cleaning and housekeeping of equipment	• Fire • Slip/trip/fall hazards • Equipment failure	• Remove loose items from operator's compartment • At least once per day remove trash from equipment • Clean equipment as necessary to prevent buildup of debris, wood chips, etc. that may cause fire	Operator and Site Supervisor

JOB SAFETY ANALYSIS (JSA)

Mobile Equipment - General

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Silt Fence Installation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Silt fence installation		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Excavator, backhoe, and ground labor		
Task-specific Training:	Hand Tools, Heavy Equipment Safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Insect Repellant			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather gloves					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Silt Fence Installation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Equipment Inspection	• Hydraulic failure	• Inspect equipment lines and fluid reservoirs	Operator
2	Underground utilities	• Impact, breach, or rupture of underground utilities	• Inspect area • Call underground utility locator and monitor locator during locating activities • Ask questions • Use CRA Underground Utility Clearance Form and verify all markings, locations, and procedures prior to installation work	Operator, Laborer, Superintendent, and all field personnel involved in operation
3	Installation zone inspection	• Underground Insects/hives • Poisonous plants • Stinging/biting insects	• Visually inspect area of fence installation for any activity regarding hornets, yellow jackets, bees, fire ants, or termites • A slow walk or drive along the fence path prior to excavation to inspect for insects flying in and out or ground, ant humps or mounds, and trails	Operator, Laborer, Superintendent, and all field personnel involved in operation
4	Hand tool use	• Improper hammer selection • Stapler use	• Use only a hammer of a weight and handle length appropriate to individual laborer's capability • Inspect every stake for knots, splits, and fractures before impacting stake with hammer • Knotty or split reinforcing stakes should be replaced without exception. Inspect stapler for correct staple installation • Inspect stapler and test operation for gauging correct drive pressure • Use staples of a length needed for the job • Safety glasses and awareness of installer hand location during use of a hammer or staple gun	Operator, Laborer, Superintendent, and all field personnel involved in operation
5	Fence layout activities	• Lifting hazards • Manual material handling • Back injury	• Reduce distance traveled when carrying materials • Make sure grip is adequate; use gloves to enhance grip when necessary • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • 100-foot fence rolls require a coordinated two-man effort to place fence correctly and according to manufacturer's requirements	Operator, Laborer, Superintendent, and all field personnel involved in operation

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Equipment Fueling

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Remediation/Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Pumping fuel into equipment		
Work Site:	12th Street Landfill, Otsego Michigan and Former Plainwell Paper Mill - 220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Pickup truck with fuel tank		
Task-specific Training:	Heavy equipment operation, motor vehicle safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Equipment Fueling

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process; refer to the equipment manufacturer's operating manual before using any machinery	• Slip/trip/fall hazards • Situational risks • Short service employees	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction (hands-on) Training necessary?	All Personnel
2	Place nozzle in tank	• Property damage and personal injury from fire • Fire potential from static/contact spark	• No cell phones in fueling areas • No smoking • No fueling during storm events • Meet with owner's representative to determine appropriate area for fueling • Have two 20-pound fire extinguishers within 25 feet of the fueling area	All Personnel
3	Turn on pump and dispense fuel into equipment	• Property damage and personal injury from fire • Fire potential from static/contact spark • Personal injury due to skin /eye contact with fuel due to splash/ spills of fuel	• No cell phones in fueling areas • No smoking • No fueling during storm events • Meet with owner's representative to determine appropriate area for fueling • Have two 20-pound fire extinguishers within 25 feet of the fueling area • Ensure the end of the nozzle is secured in the tank before turning on the pump and dispensing fuel • Wear proper PPE • Stay upwind when fueling equipment • Remain in attendance of the nozzle at all times during fueling • Avoid overfilling of the equipment	All Personnel
4	Turn off pump and return nozzle to the fuel tank	• Property damage and personal injury from fire • Fire potential from static/contact spark • Slip trip/fall hazards • Pinch points	• No cell phones in fueling areas • No smoking • No fueling during storm events • Meet with owner's representative to determine appropriate area for fueling • Have two 20-pound fire extinguishers within 25 feet of the fueling area • Ensure the end of the nozzle is secured in the tank before turning on the pump and dispensing fuel • Wear proper PPE • Stay upwind when fueling equipment • Remain in attendance of the nozzle at all times during fueling • Avoid overfilling of the equipment • Pay attention to surroundings • Pick up tools, equipment, and trash in the fueling area • Pay attention to the surroundings • Wear gloves • Do not rush	All Personnel

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Material Handling

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Construction
Work Type:	Remediation/Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Lifting and Rigging: Staging of drums		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill –220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Excavator or skid steer with barrel lift		
Task-specific Training:	Rigging; lifting signals; heavy/mobile equipment safety; use of taglines; proper use of load charts, HAZCOM, PPE		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather gloves					
Upgrade/down grade of PPE will be based on action levels in Table 5.1 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information.					

Project Development Team		**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**
Name	**Signature**					
				G.Smiley	Safety Professional	July 30, 2008

JOB SAFETY ANALYSIS (JSA)

Material Handling

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Equipment and Drum Inspection	• Hydraulic failure • Damaged drum could leak contents • Drum contents could be confused	• Inspect equipment lines and fluid reservoirs • Inspect drum for damage and to make sure lid and bung are secure • Make sure each drum is labeled	All Personnel Involved in Operation
2	Rigging components – inspection of load and rigging	• Attachment point failure	• Inspect attachment hook/ring for fractures, dents, or abuse • Certify load capability of attachment point	Operator, Qualified Rigger, and Superintendent
3	Rigging components – continue inspection of load, rigging, and material to be lifted	• Rigging assembly failure	• Inspect rigging cables, hooks, slings, d-rings, splitters, spreaders, and all other components for unusual shape, fractures, fraying, dents, abuse, or abnormalities • Ensure components used have annual certification, proper load rating and are implemented as recommended by training and manufacturer	Operator, Laborer, Site Superintendent, and all field personnel involved in operation
4	Rigging components	• Improper component attachment • Improper lifting point usage • incorrect balance or component orientation	• Use manufacturer's recommended lifting attachment points, slots, or cable points to secure load to be rigged • Use proper rigging components to assure load is evenly distributed, proper balance is achieved, and place hoisting equipment and rigged components in proper orientation to assure placement logistics are correct	Operator, Laborer, Site Superintendent, and all field personnel involved in operation
5	Tag lines – proper placement of taglines to ensure control of load. No one is to work under a suspended load.	• Lift control failure	• Use of tag lines as a lifting control measure is mandatory as appropriate for correct placement of rigged component • Personnel assisting rigging or lift should never physically be in contact with rigged or lifted components as a measure of component control	Operator, Laborer, Site Superintendent, and all field personnel involved in operation
6	Inspect drum to ensure lid is secured and drum is not damaged	• Spill of contents	• Tighten down drum ring and check bung if present (tighten if necessary) • Do not lift or move any damaged drums	Operator, Laborer, Site Superintendent, and all field personnel involved in operation
7a	Pre-plan the lift and prepare the landing zone	• Objects/personnel in swing radius path • Lifting outside of equipment's load safe load radius	• Pre-plan the lift to ensure swing radius does not impact other operations • Ensure that load and load path stays within load radius of lifting equipment	Superintendent, Rigger, and Operator
7b	Component placement – pick the load and place the item in the correct position	• Improper preparation of location receiving rigged or lifted component resulting in need for multiple lifts	• Preparation of the area receiving the rigged or lifted component to avoid and necessary re-lift or multiple lifts • Make sure secondary containment has been set up where drums will be staged	Operator, Laborer, Site Superintendent, and all field personnel involved in operation
8	Maintain control of area	• Unauthorized personnel or equipment in rigging or lifting exclusion zone	• Area marking and clearance of all personnel and equipment to prevent interference during rigging or lifting activities • Spotter action to terminate rigging or lifting if situational changes occur putting personnel or equipment at risk	Operator, Laborer, Site Superintendent, and all field personnel involved in operation
9	Control of communication between task personnel	• Multiple signals interfering with operator	• During lifting or rigging activities, a communication order must be established previous to any attempt to hoist load • Spotters communicate to one load controller, load controller communicates to operator • Operator must maintain visual contact with load controller at all times • All operations are controlled by ground controller	Operator, Laborer, Site Superintendent, and all field personnel involved in operation

JOB SAFETY ANALYSIS (JSA)

Material Handling

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
10	Control of Drum Staging Area	• Damage to drums resulting in spill of contents • Confusion of contents resulting in transportation to incorrect disposal facility	• Make sure drum staging area is out of the “work zone” and is clearly identified • Make sure each drum is labeled as drum is being filled	All Personnel

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Skid Steer Operation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation/Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Clearing and moving trees: basic use procedures and refueling equipment		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Skid steer; first aid kit; fire extinguisher		
Task-specific Training:	Heavy Equipment operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Leather gloves						

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date
Jodie Dembowske		Project Coordinator				

JOB SAFETY ANALYSIS (JSA)

Skid Steer Operation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process; refer to the equipment manufacturer's operating manual before using any machinery	• Slip/trip/fall hazards • Situational risks • Short service employees	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction (hands-on) Training necessary?	All Personnel
2	Prepare daily inspection report while inspecting machine	• Equipment problems • PPE failure	• Don all necessary PPE • Trained on inspection procedures	Skid Steer Operator
3	Transporting the equipment to the work area	• Backing into or running over objects	• Walk around the equipment or use a spotter when necessary	Skid Steer Operator
4	Hooking up to the necessary attachment(s)	• Cuts • Pinched fingers/limbs	• Don all necessary PPE • Use a spotter to help hook up the attachment(s) • Shut down equipment when hooking up hydraulic hoses	Skid Steer Operator and Laborer
5	Operating equipment after making sure area is cleared of all unnecessary personnel	• Flying debris from cutting • Running over stumps/wire/other unknowns	• Don all necessary PPE • Keep attachments as close to the ground as possible • Use a spotter when needed • Keep ground personnel 300 feet or more from chipping/shearing operations	Skid Steer Operator and Laborer
6	Shut down and exiting of equipment	• Slip/trip/fall hazards • Situational risks	• Keep all attachments on the ground when the machine is not running • Maintain three points of contact when entering or exiting	Skid Steer Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Chainsaw Operation - Limbing

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Limbing of felled timber		
Work Site:	12th Street Landfill, Otsego Michigan		
Key Equipment:	Chainsaw; first aid kit; fire extinguisher		
Task-specific Training:	Chainsaw operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☒ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☒ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Chainsaw chaps			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather gloves; protective hard toe type logging boots					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Chainsaw Operation - Limbing

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process; refer to the chainsaw manufacturer's operators manual before operating any chainsaw; check for branches under tension	• Slip/trip/fall hazards • Situational risks	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction Training (hands-on) training necessary? • Review JSA - Chainsaw Operation- General Use prior to beginning operations	Superintendent and Project Coordinator
2	Inspect and use equipment and PPE	• Equipment failure • PPE failure	• Don all necessary PPE • Provide personnel with training on inspection procedures	Chainsaw Operator and Spotter
3a	Set up for limbing operations; clear the work area around the tree of brush and other obstructions; ensure safe work distances from other operations	• Cuts • Poison plants • Biting/stinging insects • Poisonous snakes • Slippery conditions	• Inspect the area for hazards • Provide personnel with training on hazard recognition which includes identifying animals, plants, and hazardous situations	Chainsaw Operator
3b	Continue area setup; inspect each tree noting any hazards	• Cuts • Poisonous plants • Biting/stinging insects • Poisonous snakes • Limbs under tension/stress (whipping hazard)	• Inspect the area for hazards • Provide personnel with training on hazard recognition which includes identifying animals, plants, and hazardous situations • Observe and allow for hazards in surrounding trees which may be triggered by felling/limbing tree	Chainsaw Operator
3c	Take position adjacent to tree	• Biting insects • Slip/trips/falls hazards	• Make sure footing is sound; do not get off balance • Stand with feet clear of tree and/or falling chunks	Chainsaw Operator and Site Supervisor
4s	Begin limbing tree by making the proper cuts	• General chainsaw hazards • Tree failure • Tree felling in wrong direction • Slippery conditions • Kickback hazards	• Review JSA - Chainsaw Operation - General Use • Start limbing from the butt end of the tree and work towards the top • On steep slopes always stand on the uphill side of the tree • Limb from the ground; do not walk on the tree • To reduce kickback danger, do not limb with the tip of the saw • Watch for the "spring or jump" of limbs in a bind • Maintain a safe distance from other felling, skidding, and chainsaw operations	Chainsaw Operator
4b	Cutting "spring poles"	• Limbs under tension	• Relieve pressure by making several shallow cuts to release tension before cutting completely through	Chainsaw Operator
4c	Cutting large limbs	• Cuts • Sprains/strains • Slips/trips/fall hazards • Hazards from other equipment • Biting insects • Chain binding • Saw kickback	• Be alert to saw placement	Chainsaw Operator and Site Supervisor

JOB SAFETY ANALYSIS (JSA)

Chainsaw Operation - Limbing

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
4d	Cutting freely hanging limbs	• Cuts • Sprains/strains • Slips/trips/fall hazards • Hazards from other equipment • Biting insects • Chain binding • Saw kickback	• To prevent chain binding, do not underbuck freely hanging limbs	Chainsaw Operator and Site Supervisor

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Chipper Operation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Feeding 18-inch chipper with logs and brush		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Chipper, first aid kit; fire extinguisher		
Task-specific Training:	Chipper operation, logging safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☐ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☒ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Chainsaw Chaps			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather gloves; protective hard toe type logging boots; properly fitted clothing					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Chipper Operation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process; refer to chippers manufacturer's operators manual before operating any chipper	• Slip/trip/fall hazards • Situational risks	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction (hands-on) Training necessary? • Review JSA - Chipper Operation - General prior to beginning operations	All Personnel
2	Inspect and use equipment and PPE	• Equipment failure • PPE failure	• Don all necessary PPE • Provide training to personnel on inspection procedures	All Personnel
3a	Set up for chipping operations; clear the area around the chipper of brush and other obstructions	• Cuts • Poisonous plants • Biting/stinging insects • Poisonous snakes • Wind • Slippery conditions	• Inspect the area for hazards • Provide training to personnel on hazard recognition which includes identifying animals, plants, and hazardous situations	Chipper Operator
3b	Continue area setup; inspect each tree noting lean, limbs, shape, crook, wind direction, butt defects, dead limbs, lodged limbs	• Cuts • Poisonous plants • Biting/stinging insects • Poisonous snakes	• Inspect the area for hazards • Provide training to personnel on hazard recognition which includes identifying animals, plants, and hazardous situations • Observe and allow for hazards in surrounding area which may be triggered by chipping procedures	Chipper Operator
4	Have the skid bring the logs and brush to be chipped into position	• General chipping hazards • Tree kickbacks • Tree jamming • Slippery conditions • Flying debris	• Review JSA - Chipper Operation - General	Chipper Operator
5	After tree has been inserted into the chipper have personnel move away to ensure that pinch points and grab points are clear	• General chipping hazards • Slippery conditions	• Always keep to the side of tree being chipped • **Never turn your back on the machine while the tree is being chipped** • Do not allow personnel within 300 feet of chipper operations	Chipper Operator/ Equipment Operator
6	Inspect area for potential hazards (whip hazards, lodged trees, biting/stinging insects nests, etc.)	• Cuts • Sprains/strains • Slips/trip/fall hazards • Hazards from other equipment • Biting insects	• Never leave a tree in the chipper because it may kick back or lodge in the chipper unexpectedly • Never work in the area of a lodged tree	Chipper Operator and Site Supervisor

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Hydro-axe Operation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Clearing of brush and small trees: basic use procedures and refueling equipment		
Work Site:	12th Street Landfill, Otsego Michigan		
Key Equipment:	Skid Steer Hydro-axe Attachment		
Task-specific Training:	Understanding of equipment operation (Fecon, Davco etc); logging safety		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Hydro-axe Operation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process; refer to the equipment manufacturer's operating manual before using any machinery	• Slip/trip/fall hazards • Situational risks • Short service employees	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction (hands-on) Training necessary?	All Personnel
2	Complete daily inspection report while inspecting machine	• Equipment problems • PPE failure	• Don all necessary PPE • Trained on inspection procedures	Skid Steer Operator
3	Transporting equipment to the work area	• Backing into or running over objects	• Walk around the equipment or use a spotter when necessary	Skid Steer Operator
4	Hooking up to the necessary attachment	• Cuts • Pinched fingers/limbs	• Use a spotter to help hook up the attachment. Shut down equipment when hooking up hydraulic hoses • Don all necessary PPE • Use a spotter to help back up to equipment • Lock out the controls before attempting to attach cables to equipment	Skid Steer Operator and Laborer
5	Operating equipment after making sure area is cleared of all unnecessary personnel	• Cable or shackle breaks (becomes a flying projectile) • Bulldozer becomes stuck	• Don all necessary PPE • Keep attachment as close to the ground as possible • Use a spotter when needed • Shut down machinery and investigate areas of thick brush • Keep ground personnel 300 feet or more from hydro-axe operations	Skid Steer Operator and Laborer
6	Shutdown and exiting of equipment	Slip/trip/fall hazards Situational risks	• Keep attachment on the ground when the machine is not running; maintain three points of contact when entering or exiting	Skid Steer Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Stump Grinder Operation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation/Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Grinding stumps: basic use procedures and refueling equipment		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Skid steer stump grinder attachment		
Task-specific Training:	Heavy equipment operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather gloves					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Stump Grinder Operation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process; refer to the equipment manufacturer's operating manual before using any machinery	• Slip/trip/fall hazards • Situational risks • Short service employees	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction (hands-on) Training necessary?	All Personnel
2	Completion of daily inspection report while inspecting machine	• Equipment problems • PPE failure	• Don all necessary PPE • Trained on inspection procedures	Skid Steer Operator
3	Transporting equipment to the work area	• Backing into or running over objects	• Walk around the equipment or use a spotter when necessary	Skid Steer Operator
4	Hooking up to the necessary attachment	• Cuts • Pinched fingers/limbs	• Don all necessary PPE • Use a spotter to help hook up the attachment • Shut down equipment when hooking up hydraulic hoses	Skid Steer Operator and Laborer
5	Operating equipment - after ensuring the area is cleared of all unnecessary personnel	• Flying debris from stump grinding • Running over unseen objects • Backing into objects	• Don all necessary PPE • Keep attachments as close to the ground as possible • Shut down operation and use a spotter when needed • Keep personnel 300 feet or more from grinding operations	Skid Steer Operator and Laborer
6	Shutdown and exiting of equipment	• Slip/trip/fall hazards • Situational risks	• Perform STAR process • Keep all attachment on the ground when the machine is not running • Maintain three points of contact when entering or exiting	Skid Steer Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Trenching/Excavating with Backhoe

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Construction
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	Trench for vent piping		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Backhoe or excavator		
Task-specific Training:	Heavy Equipment Safety; PPE, Competent person		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**APR:**			☐ Particulate
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*		☐ Half Mask APR	☐ Full Face APR	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Supplied Air	☐ SCBA	☐ Airline Respirator	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				(attach description)	☐ Acid Gas
☐ Other*				☐ Other*		☐ Other*
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Leather glvoes						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team		**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**
Name	**Signature**					

JOB SAFETY ANALYSIS (JSA)

Trenching/Excavating with Backhoe

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Site preparation (includes air monitoring if excavation into waste, excavation layout, inspect work area, etc.)	• Chemical hazard • Overhead/underground installations • Biological hazards	• Follow air monitoring program in HASP • Inspect work area for utilities, biological hazards • Ensure QSF-019 is complete, and that all relevant utility locate actions have been completed. • Refer to Site Figures for locations of buried pipelines	Site Personnel
2a	Position/set up backhoe	• Slip/trip/fall hazards • Existing/overhead structures	• Always use a spotter to direct backhoe into position • Set outriggers and make sure ground is solid; avoid soft terrain • Be aware of the height restrictions of the equipment • Make sure work area remains clean and organized	Site Personnel
2	Inspect backhoe and surrounding area	• Hydraulic line failure • Release to environment	• Visually inspect all components of equipment, no oil/fluid leaks, tires properly inflated, fluid levels and associated equipment in good condition • Replace worn or damaged hoses	Site Personnel
3	Backhoe operation	• Hitting an underground or overhead utility/structure • Flying debris • COC exposure • Noise - hearing impairment • Dust inhalation • Back strain • Heat/cold stress • Slip/trip/fall hazards • Pinch Points	• Wear all required PPE by HASP • Initiate air monitoring as necessary • Watch overhead clearance at all times, use spotters as necessary • Be aware of the height restrictions of the equipment • Only those workers wearing proper PPE should be allowed near the excavation while backhoe is operating • Use proper lifting techniques • Ensure work area remains clean and organized • Take breaks as necessary or as indicated in the HASP to avoid back strain (repetitive/vibration ergo issues and heat/cold stress) • Perform periodic visual inspection of equipment • Keep hands, feet & clothing away from moving parts/devices	Site Personnel
4	Backfill cleared excavations and mark cleared locations	• Back strain • Eye hazards • COC exposure • Slip/trip/fall hazards • Struck-by hazards	• Use proper lifting techniques • Make sure work area remains clean and organized • Clearly mark cleared locations with a permanent method (e.g., paint, stakes) • Map cleared locations, site structures, and location of wastes • Keep clear of swing radius; demarcate safe work area/zone, wear safety vest • Work with spotter	Site Personnel
5	Site cleanup	• Slip/trip/fall hazards • Back strain	• Use proper lifting techniques • Make sure work area remains clean and organized • Use buddy system, if possible, to remove traffic controls • Leave site clean of debris and refuse	Site Personnel

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

JOB SAFETY ANALYSIS (JSA)

Trenching/Excavating with Backhoe

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Skid Steer Grapple Bucket Operation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Moving trees, debris or drums (containerized IDW)		
Work Site:	12th Street Landfill, Otsego Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell Michigan		
Key Equipment:	Skid steer grapple bucket attachment		
Task-specific Training:	Heavy equipment operation, proper connection of grapple bucket		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team		**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**
Name	**Signature**					

JOB SAFETY ANALYSIS (JSA)

Skid Steer Grapple Bucket Operation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR Process; refer to the equipment manufacturer's operating manual before using any machinery	• Slip/trip/fall hazards • Situational risks • Short service employees	• Verify personnel training is sufficient for scheduled task(s) • Is Job Instruction (hands-on) Training necessary?	All Personnel
2	Prepare daily inspection report while inspecting machine	• Equipment problems • PPE failure	• Don all necessary PPE • Trained on inspection procedures.	Skid Steer Operator
3	Transporting the equipment to the work area	• Backing into or running over objects	• Walk around the equipment or use a spotter when necessary	Skid Steer Operator
4	Hooking up to the necessary attachment(s)	• Cuts • Pinched fingers/limbs	• Don all necessary PPE • Use a spotter to help hook up the attachment(s) • Shut down equipment when hooking up hydraulic hoses	Skid Steer Operator and Laborer
5	Operating equipment after making sure area is cleared of all unnecessary personnel	• Moving trees can roll or fall when turning • Brush and limbs breaking or flying off • Debris can break or bend • Drums can be damaged by bucket • Poor visibility when backing up	• Don all necessary PPE • Keep attachments as close to the ground as possible • Use a spotter when needed • Keep ground personnel 300 feet or more from grappler operations	Skid Steer Operator and Laborer
6	Shut down and exiting of equipment	• Slip/trip/fall hazards • Situational risks	• Keep all attachments on the ground when the machine is not running • Maintain three points of contact when entering or exiting	Skid Steer Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Land Surveying

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Surveying
Work Type:	Environmental/Remediation/Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Surveying		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell, Michigan		
Key Equipment:	Flag or paddle		
Task-specific Training:	Flagger Safety; Traffic Control Devices; Personal Protective Equipment		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Class II vest; leather gloves to mob/demob equipment					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date
						3-1-09

JOB SAFETY ANALYSIS (JSA)

Land Surveying

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Mob equipment to surveying area with CRA vehicle	• Lifting hazards • Manual material handling • Back injury • Pinch points • Moving or flying projectiles inside vehicle while transporting equipment • Slip/trip/fall hazards • Biological hazards	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate; wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Review JSA and HASP • Practice STAR • Properly secure all equipment inside the vehicle	Survey Team
2	Note traffic flow	• Struck by oncoming vehicular traffic or heavy equipment • Slip/trip/fall • Biological hazards • Threatening dogs	• Stage the CRA vehicle to aid in the protection of the survey crew if they need to set up a Temporary Traffic Control Zone (TTCZ) • Make sure to make eye contact with equipment operators and check in and out with Superintendent so operators are aware of surveyors on Site • Practice STAR	Survey Team
3	Develop the Temporary Traffic Control Plan (TTCP) and set up the Temporary Traffic Control Zone (TTCZ)	• Struck by oncoming vehicular traffic or heavy equipment • Slip/trip/fall • Biological hazards • Threatening dogs • Lifting hazards • Manual material handling • Back injury • Heat/cold stress	• Review the requirements of the TTCP ahead of time • Make sure that all temporary traffic control equipment (signs/cones/etc.) is available • Carefully set up TTCZ using the buddy system • Refer to step 1 and HASP for additional lifting methods/information • Position CRA's truck with flashers on for added protection • Follow hot/cold stress procedures presented in the HASP • Practice STAR	Survey Team
4	General use of tools	• Struck by oncoming vehicular traffic or heavy equipment • Slip/trip/fall hazards • Biological hazards • Threatening dogs • Potential injuries from misuse of tools or use of tools in disrepair	• Wear ANSI Class II reflective safety vest, safety-toed boots, and hard hat • Do not use old or faded PPE • Inspect tools • Repair/replace tools as necessary • Practice STAR	Survey Team
5	Conduct survey activities	• Struck by oncoming vehicular traffic or heavy equipment • Slip/trip/fall hazards • Biological hazards • Threatening dogs	• Surveyor will enter roadway after clearance from flag person • Surveyor will maintain contact with flag person during survey • Make sure that proper PPE is being worn • Practice STAR	Survey Team

JOB SAFETY ANALYSIS (JSA)

Land Surveying

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	Exit Site	• Struck by oncoming vehicular traffic or heavy equiopment • Slip/trip/fall hazards • Biological hazards • Threatening dogs	• Surveyor should exit roadway first, followed by flag person nearest oncoming traffic (spotter) • Practice STAR	Survey Team

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Trash Pump Setup and Operation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Construction
Work Type:	Construction/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Setup and operation of 2- and 3-inch trash pumps		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Trash pump; fittings; hose sections; safety fuel can		
Task-specific Training:	Review the manufacturer's recommendations for each specific pump; hand tools		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☒ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Goggles as necessary; abrasion/cut-resistant gloves (leather or equivalent); chemical-resistant gloves needed					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Trash Pump Setup and Operation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Use the Star Process; refer to the specific pump's equipment manufacturer's operating manual before using the equipment. **Note the design of the pump and the configuration of the attachment points, as these may present unique hazards.**	• Slip/trip/fall hazards • Situational risks	• Verify personnel's training is sufficient for the scheduled task(s) • Is job instruction training (hands-on) training necessary? • Employees should remove finger rings, necklaces, or jewelry, which may be hazardous in equipment operation	All Affected Personnel
2	Equipment safety checklist	• Faulty hose connections • Damaged hoses and fittings	• Replace worn or damaged hoses and fittings • Replace hose connections with operational connections • Perform an overall inspection of the equipment for defects or signs of damage	All Affected Personnel
3	Pump and hose setup	• Slip/trip/fall hazards • Uneven terrain • Wet, icy, and muddy conditions • Lifting hazards • Manual material handling • Back injury • Struck-by and line of fire • Pinch points	• Be aware of your surrounding conditions (footing, weather conditions, etc.) • Reduce distance traveled when carrying materials • Make sure grip is adequate; use gloves to enhance grip when necessary • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Grab the equipment only at designated handles or if none are available, at locations where the hands and fingers will not get caught in the equipment or smashed • Test the weight of the equipment before lifting • Straighten out hoses before connection and keep them out of high traffic areas • Be aware of "stored energy" hazards presented by hoses	All Affected Personnel
4	Equipment fueling/refueling	• Fires • Explosions • Chemical hazard	• Turn off equipment before fueling • No smoking while fueling • Do not use cell phones while fueling • Store fuel in proper safety containers only • If transferring fuel from large vessels into portable cans, use proper grounding or bonding techniques • Do not fuel the equipment when it is hot • Wear gloves and wash hands after fueling	All Affected Personnel
5	Starting the pump	• Back strain • Slippery conditions • Methane gas	• Make sure the starting cord is free pulling; test the cord before pulling • Maintain straight posture when pulling the recoil starter cord • Do not over exert when pulling the cord • Be aware of your surrounding conditions • Make sure slip/trip/fall hazards were properly identified and corrected • Check atmosphere with 4 gas meter	Assigned Laborer

JOB SAFETY ANALYSIS (JSA)

Trash Pump Setup and Operation

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	Pump operation	• Splash hazards • Hot surfaces • Noise	• Remove worn or damaged hoses until they can be repaired or replaced • Keep hands away from the exhaust or hot components of the equipment • Be aware of any unguarded moving parts on the equipment • Wear required PPE (hearing protection, Tyvek, etc.)	Assigned Laborer

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Excavation Dewatering and GW or Leachate Treatment for On-Site Discharge

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Excavation Dewatering		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Trash Pump or 3 Inch Diesel Pump		
Task-specific Training:	40-Hour HAZWOPER, LOTO, PPE,		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☒ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Minimum Level D PPE; type of gloves dependent on job-specific requirements. Additional PPE may be required in the Health and Safety Plan (HASP).					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Excavation Dewatering and GW or Leachate Treatment for On-Site Discharge

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Coordinate site access and discharge permit	• Work delays	• Notify other required personnel if applicable (township, regulators, client, etc.)	Project Manager and Coordinator
2	Mobilize with proper equipment/ supplies	• Work delays • Improper work performances • Cross contamination • Improper discharge location	• Review work plan to determine equipment and supply needs • Review HASP and gather necessary PPE • Insure ground water or leachate treatment system is set up in correct order • Locate and mark discharge location	All Site Personnel
3	Perform STAR and tailgate safety meeting upon arrival at site	• Miscommunication • Insufficient information for all personnel to work safely	• Discuss potential hazards • See Mob/Demob JSA	All Site Personnel
4	Set up discharge area	• Ponding water • Slip/Trip/Fall	• Set up berm to keep discharged water from work area • Be sure discharge rate does not produce ponding of the treated water • Set up clear walking paths between workstations • Wear boots with adequate tread • Watch where you step, look for debris which may be covered by brush or rubble	All Site Personnel
5	Set up dewatering equipment	• Inappropriate handling • Heavy lifting • Exposure to chemicals • Falling into excavation	• Don proper PPE in accordance with the HASP • Obtain assistance and proper unloading equipment for heavy lifting (>50 lbs) • Bend at knees, not at back • Wear nitrile gloves if chemical exposure is possible (see PPE requirements in HASP) • Observe appropriate distance away from open excavation and keep aware of your surroundings • Wear leather gloves and be aware of where you place your hands	All Site Personnel
6	Test equipment operation and dewatering activities	• Chemical exposure • Mechanical and electrical operational hazards • Falling into excavation • Incomplete treatment of GW	• Don proper PPE in accordance with the HASP • Ensure proper handing of equipment • Ensure no leaks present after startup • Maintain appropriate distance from excavation • Shut off immediate if any part of dewatering equipment is deemed unsafe • Be sure Frac tank with weir and OWS are operational before introducing impacted GW to carbon system	All Site Personnel
7	Set up necessary system monitoring	• Overfilling of frac tanks • Tardy removal of LNAPL from OWS • Breakthrough of Carbon • Leaks in piping	• Monitoring frac tanks frequently throughout the day when dewatering • Monitor LNAPL in OWS frequently • Periodic laboratory tests on effluent • Check piping route for leaks and repair when necessary	All Site Personnel
8	Collect samples in accordance with sampling plan/discharge permit	• Chemical exposure • Bottle breakage • Cross contamination • Improper labeling or storage • Slips/trips/fall hazards	• Don proper PPE in accordance with the HASP (Kevlar gloves and nitrile gloves) • Handle and pack bottles carefully • Label samples in accordance with sampling plan • Keep samples stored in proper containers, at correct temperature, and away from work area • Keep sampling access ways clear of hoses when possible	Sample Technician

JOB SAFETY ANALYSIS (JSA)

Excavation Dewatering and GW or Leachate Treatment for On-Site Discharge

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
10	Package and deliver samples to lab	• Bottle breakage • Lifting hazard • Improper storage	• Handle and pack bottles carefully. Don proper PPE (Kevlar gloves and nitrile gloves) • Use proper lifting techniques as discussed above • Pack samples in ice with bubble wrap/bags for the bottles • Submit samples to the lab as soon as possible • Check sampling plan for any special requirements	Sample Technician

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Filter Bag Change-Out

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Construction
Work Type:	Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Filter bag change-out		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Bag filters with carbon treatment system, pumps		
Task-specific Training:	40-hour HAZWOPER or 8-hour Refresher, HAZComm, PPE, Lock-Out/Tag-Out		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☐ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☒ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
NRR-20 hearing protection (when system is operating); nitrile gloves; full face shield should be worn in place of safety glasses if there is potential for splashes.						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team		**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**
Name	**Signature**					

JOB SAFETY ANALYSIS (JSA)

Filter Bag Change-Out

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Remove used filter bag from housing unit and replace with new filter	• Contaminant exposure • Back and shoulder strain • Slip/trip/fall hazards • Electrical hazard • Pinch points • Hand injury • Tight area • Potential splash hazard	• Perform Lock-Out/Tag Out procedure prior to performing task • Reduce exposure to contaminant/product by wearing proper PPE including safety glasses/full face shield and nitrile gloves • Ensure that area around bag filter housing is clear and that there are no tripping hazards • Avoid placing hands in pinch points	CRA project personnel on site
2	Place used bag filter in appropriate drum for disposal	• Contaminant exposure • Slip/trip/fall hazards	• Reduce exposure to contaminant/product by wearing proper PPE including safety glasses and nitrile gloves • Follow JSA for handing and moving waste drums	CRA project personnel on site

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

All-Terrain Utility Vehicle Use

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Driving
Work Type:	Vehicle Use	**Client:**	Weyerhaeuser Company
Work Activity:	Operating a utility vehicle – Mule		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Mule		
Task-specific Training:	Utility vehicle-specific training; Operator's Manual including general operation, safety, and inspection procedures		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☐ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Helmet			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

All-Terrain Utility Vehicle Use

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Routine operation – pre-use procedures	• Equipment failure (brakes/ accelerator sticking, fuel leaks)	• Complete ATV Pre-Use Daily Inspection Form • Modify CRA Inspection Form to include manufacturer's specific recommended procedures • Do not use equipment if not safe • Follow manufacturer's recommendations during equipment failure/emergency situations • Know and understand actions to take during equipment failure events (stuck throttle, braking issues, tire blowout, etc.) • Report to site supervisor immediately and tag vehicle out of service if any problems are present	Operator Site Supervisor
2	Routine operation	• Noise • Roll-over injuries • Entrapment/pinned • Collision	• Wear hearing protection as necessary • Operate equipment in accordance with manufacturer's specifications • Set up traffic control plan(s) for site to indicate safe travel areas for site vehicle/equipment traffic • Survey area to determine if ground conditions are suitable for safe operation • Only qualified operators may use equipment • Operate at safe speeds	Operator Site Supervisor
3	Routine operation	• Unexpected ATV movement	• Leave in neutral and set park brake when not in use	Operator
4	Routine operation	• Contact/collision with other mobile or heavy equipment	• Ensure marker flags are in proper position • Ensure warning lights are functioning • Use headlights while operating • Operate at safe speeds and in pre-determined traffic routes	Operator
5	Fueling	• Fire/explosion	• Fuel in a well ventilated area • Never fuel while engine is running • Wipe spilled fuel immediately and wait for fumes to disperse before starting engine	Operator
6	Troubleshooting/maintenance checks	• Pinch points • Entanglement • Burns/scalding	• Stop engine and remove key before performing pre-use checks or troubleshooting • Keep all guards and shields in place • Keep hands, hair, and clothing away from moving parts • Wear appropriate gloves when reaching near hot areas • Do not open radiator cap on liquid cooled engines when engine is hot • Only qualified individual is authorized to perform maintenance or repairs	Operator Qualified Person

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - [Articulated] Dump Truck

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Articulated dump truck operation and soil transport		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Articulated] dump truck; inspection checklist; driver's logbook; commercial driver's license		
Task-specific Training:	Heavy Equipment Operation; Spotter Safety; Towing/Trailering		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Fire Extinguisher			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather work gloves					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - [Articulated] Dump Truck

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA		• Determine the hazards of performing the task and survey the work area • Consider weather conditions such as fog that could reduce visibility • Always consider the worst-case scenario • Analyze the hazards determined • Decide a plan of action to eliminate or reduce the hazards and act on it	Site Supervisor on all
2	Equipment inspection/ maintenance	• Slip/trip/fall hazards • Faulty equipment • Pinch points/hot surfaces	• Inspect travel path for weather related hazards (i.e., wet, puddles, mud, obstacles) • Use three points of contact • Do not jump off of equipment • Must pass equipment inspection checklist prior to operation • Wear leather gloves • Identify and avoid pinch points	Site Supervisor and Operator
3	Traveling around work area	• Overturning • Steep grade collision • Personnel struck by truck	• Control speed • Use proper gear for situation and use turn signals • Monitor truck operation and braking abilities during operation • Evaluate road for slippery conditions • Follow established traffic patterns and instructions • Be cautious of other personnel on site	Site Supervisor and Operator
4	Loading truck	• Overturning • Collision/personnel struck by truck • Contact with utilities • Falling material from side of truck or swing of excavator • Falling from truck/trailer	• Evaluate surface behind truck • Use spotter when backing • position truck so that cab is away from the trackhoe bucket • Stop truck completely prior to starting loading operations • Be cautious of trackhoe operator signals (two honks to stop) for starting and completing loading ops • Do not exit until signaled by operator or spotter • spotter required within 100 feet of overhead utilities • Maintain at least 10 feet from overhead lines and increase distance for high voltage • Utilities (subsurface, power poles, etc) shall be identified, marked, and protected again contact with heavy equipment • Load from the rear of truck and do not swing bucket over cab • Spotter stays clear of truck while loading and pulling away from area • If spotter/driver mounts truck to check load level, etc., always maintain three points of contact with truck/trailer	Site Supervisor and Operator
5	Transport of soils	• Contact with heavy equipment • Overturning • Contact with utilities	• Haul truck operators must slow down when approaching the excavation area • Haul trucks shall follow the approved haul routes as determined by the supervisor and confirmed in the daily TGSM • Maximum speed on site is 15 mph • Excavator operator must ensure that the load on truck is evenly distributed prior to haul truck leaving area • Load must be covered with a tarp per DOTD specifications • Dirt must not be tracked into roadway	Site Supervisor and Operator

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - [Articulated] Dump Truck

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	Dumping load	• Overturning • Collision, personnel struck by truck • Contact with utilities	• Raise truck bed with truck completely stopped and parking brake in place • Lower bed fully before moving vehicle • Use caution when dumping loads of wet material as it may stick to the truck bed causing an imbalance of load	Site Supervisor and Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - Bulldozer

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Bulldozer operation		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Bulldozer		
Task-specific Training:	40-Hour and 8-Hour HAZWOPER; PPE; Mobile Equipment Operations; Heavy Equipment Operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Fire Extinguisher			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather work gloves					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - Bulldozer

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA	• Failing to identify hazardous conditions resulting in losses or near losses	• Determine the hazards of performing the task and survey the work area • Consider weather conditions such as fog that could reduce visibility • Always consider the worst-case scenario • Analyze the hazards determined • Decide a plan of action to eliminate or reduce the hazards and act on it	Site Supervisor on all
2	Inspect equipment	• Equipment malfunction or damage • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc.; accidents, decreased visibility • Fire • Slip/trip/fall hazards • Unexpected operation of equipment	• Follow CRA Equipment Inspection Form/Tag Out if malfunction found • Grease moving parts • Check all fluids • Ensure that fluids are not too low or too full • Walk around equipment and look for leaking fluids • Ensure that dozer tracks are acceptable (no unacceptable wear and no objects present) • Ensure that windows and mirrors are clean • Remove trash or other debris from cab • Ensure that back up alarm and horn are operational • Correct any problems immediately and inform supervisor • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning • Inspect the fire extinguisher monthly • Use three point mount/dismount at all times • Be cautious of where you step and be aware of your surroundings • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged	Site Supervisor and Operator
3	Entering equipment	• Reduced visibility, uncomfortable seating - back strain • Debris on floor getting stuck under pedals • Unexpected movement of truck • Unexpected movement of truck	• Adjust seat and mirrors so that you are able to see where traveling • Adjust controls and seat to your comfort and safety • Ensure that all materials inside dozer cab are secured • Be cautious of where you step and be aware of your surroundings • Ensure steps are clear of water, mud, and other debris • Ensure parking brake is engaged and gear is in neutral	Site Supervisor and Operator
4	Configure controls and seating	• Ergonomics/unnecessary physical stress • Incapable of reaching controls • Visual blocks	• Upon sitting, adjust seat fully to accommodate reach and comfort zone • Fasten seat belt • Make certain all controls are set in neutral positions • Adjust mirrors	Site Supervisor and Operator
5	Starting and warming up	• Unanticipated rolling or movement, engine fire, or mechanical/electrical faults	• Review operator's manual if new to this particular machine • Start engine and check controls to ensure all are in working conditions • Allow a minimum of 2 minutes to warm up	Site Supervisor and Operator
6	Moving equipment work area	• Other equipment, personnel, or objects in work area • Uneven terrain	• Perform STAR • Know the daily task and other people and equipment in the area • Make eye contact with other operators and site personnel in the immediate vicinity • Inspect pathway prior to moving equipment to ensure clear pathway	Site Supervisor and Operator

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - Bulldozer

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
7	Performing tasks	• Other equipment (collision) • Slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities • Dust	• Perform STAR • Know where utilities are located • Be aware of the scope of work to be performed • Know the paths of other equipment or persons entering and leaving your work area • Communicate with supervisors and other operators throughout the day with any questions • Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss • Wear dust mask of conditions warrant	Site Supervisor and Operator
8	Stopping at end of day	• Slip/trip/fall hazards • Overnight parking of equipment	• Be cautious of where you step and be aware of your surroundings • Park in designated area • Set brake/control locks • Idle for 2 minutes if engine is hot • Lower blade to ground • Turn equipment off • Use three-point dismount • Secure inside instruments (i.e., fire extinguisher)	Site Supervisor and Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation – Hydraulic Track Excavator

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Hydraulic Track Excavator		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Hydraulic excavator		
Task-specific Training:	40-Hour and 8-Hour HAZWOPER; PPE; Mobile Equipment Operations; Excavation Safety Training; Excavation Competent Person		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☒ Other* Fire Extinguisher			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Leather gloves, earplugs or muffs						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation – Hydraulic Track Excavator

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA	• Failing to identify hazardous conditions resulting in losses or near losses	• Determine the hazards of performing the task and survey the work area • Consider weather conditions such as fog that could reduce visibility • Always consider the worst-case scenario • Analyze the hazards determined • Decide a plan of action to eliminate or reduce the hazards and act on it	Site Supervisor and Operator
2	Inspect equipment	• Equipment malfunction or damage • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc.; accidents, decreased visibility • Fire • Slip/trip/fall hazards • Unexpected operation of equipment • Swing radius signage missing	• Follow CRA Equipment Inspection Form/Tag Out if malfunction found • Grease moving parts • Check all fluids • Ensure that fluids are not too low or too full • Walk around equipment and look for leaking fluids • Ensure that tracks are acceptable (no unacceptable wear and no objects present) • Ensure that windows and mirrors are clean. Adjust mirrors! • Remove trash or other debris from cab • Ensure that back up alarm and horn are operational • Correct any problems immediately and inform supervisor • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning • Inspect the fire extinguisher monthly • Use three point mount/dismount at all times • Be cautious of where you step and be aware of your surroundings • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged • Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity	Site Supervisor and Operator
3	Entering equipment	• Reduced visibility • Uncomfortable seating - back strain • Debris on floor getting stuck under pedals • Unexpected movement of excavator	• Adjust seat and mirrors so that you are able to see where traveling • Adjust controls and seat to your comfort and safety • Ensure that all materials inside cab are secured • Be cautious of where you step and be aware of your surroundings • Ensure steps are clear of water, mud, and other debris • Ensure parking brake is engaged and gear is in neutral • Use interlock safety mechanism any time equipment is not conducting a productive and/or controlled activity	Site Supervisor and Operator
4	Configure controls and seating	• Ergonomics/unnecessary physical stress/ back injury • Incapable of reaching controls • Visual blocks	• Upon sitting, adjust seat fully to accommodate reach and comfort zone • Fasten seat belt • Make certain all controls are set in neutral positions • Adjust mirrors	Site Supervisor and Operator
5	Starting and warming up	• Unanticipated rolling or movement, engine fire, or mechanical/electrical faults	• Review operator's manual if new to this particular machine • Start engine and check controls to ensure all are in working conditions • Allow a minimum of 2 minutes to warm up	Site Supervisor and Operator

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation – Hydraulic Track Excavator

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	Moving equipment work area	• Other equipment, personnel, or objects in work area • Uneven terrain	• Perform STAR – be aware of surroundings • Know the daily task and other people and equipment in the area • Make eye contact with other operators and site personnel in the immediate vicinity • Inspect pathway prior to moving equipment to ensure clear pathway	Site Supervisor and Operator
7	Performing tasks	• Other equipment (collision) • Slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities • Dust – refer to action level in Table 5.1 and 5.2	• Perform STAR • Know where utilities are located – know where your bucket is in relation to any underground utilities at all times • Be aware of the scope of work to be performed • Use a spotter • Know the paths of other equipment or persons entering and leaving your work area • Communicate with supervisors and other operators throughout the day with any questions • Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss • Wear dust mask if conditions warrant	Site Supervisor and Operator
8	Stopping at end of day	• Slip/trip/fall hazards • Overnight parking of equipment	• Be cautious of where you step and be aware of your surroundings • Park in designated area • Set brake/control locks • Idle for 2 minutes if engine is hot • Lower bucket to ground – zero energy state • Turn equipment off; remove keys • Use three-point dismount • Secure inside instruments (i.e., fire extinguisher)	Site Supervisor and Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - Loader

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Heavy equipment operation - loader		
Work Site:	12th Street Landfill, Otsego Michigan		
Key Equipment:	Loader		
Task-specific Training:	Heavy Equipment Operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Fire Extinguisher			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather gloves					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - Loader

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Review JSA - General Site Activities	• Failing to identify hazardous conditions resulting in losses or near losses	• Conduct STAR • Assess the risks • Determine the hazards of performing the task and survey the work area • Consider weather conditions such as fog that could reduce visibility • Always consider the worst-case scenario • Analyze the hazards determined • Decide a plan of action to eliminate or reduce the hazards and act on it	Site Supervisor on all
2	Inspect equipment	• Equipment malfunction or damage • Hydraulic fluid, fuel, oil leaks/spills • Loss of steering, loss of brakes, etc.; accidents, decreased visibility • Fire • Slip/trip/fall hazards • Unexpected operation of equipment	• Follow CRA equipment inspection form/tag out if malfunction found • Grease moving parts • Check all fluids • Ensure that fluids are not too low or too full • Walk around equipment and look for leaking fluids • Ensure that loader tracks are acceptable (no unacceptable wear and no objects present) • Ensure that windows and mirrors are clean • Remove trash or other debris from cab • Ensure that back up alarm and horn are operational • Correct any problems immediately and inform supervisor • If equipment appears as though it has been tampered with or vandalized, do not start it • Ensure that fire extinguisher is in place and functioning • Inspect the fire extinguisher monthly • Use three-point mount/dismount at all times • Be cautious of where you step and be aware of your surroundings • Ensure that ignition key is in your pocket, equipment is in neutral and parking brake is engaged	Site Supervisor and Operator
3	Entering equipment	• Reduced visibility, uncomfortable seating - back strain • Debris on floor getting stuck under pedals • Unexpected movement of truck • Unexpected movement of truck	• Adjust seat and mirrors so that you are able to see where traveling • Adjust controls and seat to your comfort and safety • Ensure that all materials inside dozer cab are secured • Be cautious of where you step and be aware of your surroundings • Ensure steps are clear of water, mud, and other debris • Ensure parking brake is engaged and gear is in neutral	Site Supervisor and Operator
4	Configure controls and seating	• Ergonomics/unnecessary physical stress • Incapable of reaching controls • Visual blocks	• Upon sitting, adjust seat fully to accommodate reach and comfort zone • Fasten seat belt • Make certain all controls are set in neutral positions • Adjust mirrors	Site Supervisor and Operator
5	Starting and warming up	• Unanticipated rolling or movement, engine fire, or mechanical/electrical faults	• Review operator's manual if new to this particular machine • Start engine and check controls to ensure all are in working conditions • Allow a minimum of 2 minutes to warm up	Site Supervisor and Operator

JOB SAFETY ANALYSIS (JSA)

Heavy Equipment Operation - Loader

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
6	Moving equipment work area	• Other equipment, personnel, or objects in work area • Uneven terrain	• Conducts SPSA • Know the daily task and other people and equipment in the area • Make eye contact with other operators and site personnel in the immediate vicinity • Inspect pathway prior to moving equipment to ensure clear pathway	Site Supervisor and Operator
7	Performing tasks	• Other equipment (collision) • Slopes, ground conditions possible injuries to personnel and equipment, buried obstacles, underground and overhead utilities	• Perform SPSA • Know where utilities are located. Be aware of the scope of work to be performed • Know the paths of other equipment or persons entering and leaving your work area • Communicate with supervisors and other operators throughout the day with any questions • Stop work immediately and contact a supervisor if you are uncertain of your task, experience equipment failure, or personal injury or near loss	Site Supervisor and Operator
8	Stopping at end of day	• Slip/trip/fall hazards • Overnight parking of equipment	• Be cautious of where you step and be aware of your surroundings • Park in designated area • Set brake/control locks • Idle for 2 minutes if engine is hot • Lower blade to ground • Turn equipment off • Use three-point dismount • Secure inside instruments (i.e., fire extinguisher)	Site Supervisor and Operator

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Loading Soil with Excavator

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Loading soil with excavator		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Excavator and Off Road Truck		
Task-specific Training:	40-Hour and 8-Hour HAZWOPER; PPE; Mobile Equipment Operations; Excavation Safety Training; Excavation Competent Person		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☒ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Photoionization detector (PID)			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Modified Level D PPE					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date
Jodie Dembowske		Project Coordinator				

JOB SAFETY ANALYSIS (JSA)

Loading Soil with Excavator

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Inspect work area	• Slip/trip/fall hazards • Biological hazards	• Clear any hazards that are clearable • Mark major obstructions with orange tape • Exercise caution • Pay close attention to the ground surface • Inspect immediate surroundings • Walk cautiously	Site Supervisor and Operators
2	Inspect equipment	• Slip/trip/fall hazards • damage to equipment or self if there is undetected equipment damage	• Use three points of contact • Follow intact equipment inspection form • Parking brake should be engaged and key in pocket • Maintain a three-point mount/dismount • Correct any matters immediately and/or report to supervisor	Operators
3	Establish communication	• Know response for emergencies and accidents	• Hand and horn signals established • Emergency signal established	Site Supervisor and Operators
4	Begin excavation	• Equipment damage • People/hazards in swing radius slides • Cave-ins	• All operators must be trained, skilled, and experienced • Operator must look around area and be aware of surroundings at all times • Use proper sloping/shoring techniques • Keep excavator on even or undisturbed surfaces	Site Supervisor and Operators
5	Excavator loads soil into truck	• Truck running into excavator • Tipping over	• Operators have stopping signal (two honks) • Awareness of surroundings • Do not overload truck or bucket to avoid spillage • Spread the soil in the truck bed to avoid having one side heavier than the other • Trucks need to remain on level ground	Site Supervisor and Operators

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Loading Soil/Paper Waste with Excavator

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Loading soil with excavator		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Excavator and Off Road Truck		
Task-specific Training:	40-Hour and 8-Hour HAZWOPER; PPE; Mobile Equipment Operations; Excavation Safety Training; Excavation Competent Person		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☒ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☒ Other* Photoionization detector (PID)			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Modified Level D PPE						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Loading Soil/Paper Waste with Excavator

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Inspect work area	• Slip/trip/fall hazards • Biological hazards	• Clear any hazards that are clearable • Mark major obstructions with orange tape • Exercise caution • Pay close attention to the ground surface • Inspect immediate surroundings • Walk cautiously	Site Supervisor and Operators
2	Inspect equipment	• Slip/trip/fall hazards • damage to equipment or self if there is undetected equipment damage	• Use three points of contact • Follow intact equipment inspection form • Parking brake should be engaged and key in pocket • Maintain a three-point mount/dismount • Correct any matters immediately and/or report to supervisor	Operators
3	Establish communication	• Know response for emergencies and accidents	• Hand and horn signals established • Emergency signal established	Site Supervisor and Operators
4	Begin excavation	• Equipment damage • People/hazards in swing radius slides • Cave-ins	• All operators must be trained, skilled, and experienced • Operator must look around area and be aware of surroundings at all times • Use proper sloping/shoring techniques • Keep excavator on even or undisturbed surfaces	Site Supervisor and Operators
5	Excavator loads soil into truck	• Truck running into excavator • Tipping over	• Operators have stopping signal (two honks) • Awareness of surroundings • Do not overload truck or bucket to avoid spillage • Spread the soil in the truck bed to avoid having one side heavier than the other • Trucks need to remain on level ground	Site Supervisor and Operators

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Solidification of Paper Residuals/Waste Utilizing Portland Cement (delivered in "super sacks")

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation/Construction]	**Client:**	Weyerhaeuser Company
Work Activity:	Solidification of paper mill waste/residuals		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Off Road Truck and spotter, excavator		
Task-specific Training:	Heavy equipment operation, traffic control plan		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Dust Monitor			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Upgrade/down grade of PPE will be based on action levels in Table 5.1 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information.					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Solidification of Paper Residuals/Waste Utilizing Portland Cement (delivered in "super sacks")

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Machinery Inspection	• Machinery damage • Personal injury	• Perform equipment safety checklist prior to operation • Ensure that all guards and safety equipment is in good operating condition • Proper training of personnel operating the equipment	Operator
2	Handling of Portland cement in Super Sacks	• Machinery and property damage • Pinch Points • Slip, Trip, fall • Falling/overhanging objects • Damage to super sacks	• Walk through work area with operator and laborers to identify possible obstructions. • Stay clear of excavator and or loader while handling/transporting the super sacks to the waste area. • Use proper lifting equipment when carrying the super sacks. OSHA approved slings and shackles. Properly sized for the weight of the super sacks. • Be aware of surrounding terrain and activities in the area. • Super sacks shall be carried low to the ground at slow speed to prevent damage to the sacks	Operator and Laborer
3	Placement of Portland cement in the waste	• Equipment damage • Falling/overhanging objects • Poor visibility • Uneven terrain/equipment tip-over • Dust	• Be aware of your surroundings. ALWAYS CHECK WORK AREA FOR OBSTRUCTIONS AND/OR OTHER EQUIPMENT IN THE WORK ZONE. • Stay clear of excavator while handling and spreading the super sacks on the waste area. • Ensure that ALL ground personnel are out of excavator swing radius prior to placing the Portland cement on the waste area. • Hand and horn signals established • Make sure that the surface the excavator is sitting on is stable, and that super sacks remain close to the ground surface when placing the cement on the waste area. Swinging of the super sacks shall be slow and steady. NO QUICK MOVEMENTS. • Handing/placement of Portland cement shall be done with the bag close to the waste. NO QUICK MOVEMENT. Dust monitoring shall be performed during this operation.	Operator and Laborer
4	Mixing of Portland cement with paper mill waste	• Splash Hazards • Poor Visibility • Uneven terrain/equipment tip-over • dust	• Awareness of surroundings • Make sure that the surface the excavator is sitting on is stable. Mix the material in a fluid motion keeping the excavator bucket close to the waste surface. • Ensure that ALL ground personnel are out of excavator swing radius prior to mixing the Portland cement and the waste material. • Do not drop the cement/waste from elevated heights that could cause the material from splashing operator or laborer. • Mixing of Portland cement and waste shall be done in a fluid/steady motion. NO QUICK MOVEMENT. Dust monitoring shall be performed during this operation. •	
		•	•	
		•	•	

JOB SAFETY ANALYSIS (JSA)

Solidification of Paper Residuals/Waste Utilizing Portland Cement (delivered in “super sacks”)

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
		•	•	
		•	•	
		•	•	
		•	•	

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describes what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Dumping Soil/Waste from Off Road Truck

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation/Construction]	**Client:**	Weyerhaeuser Company
Work Activity:	Unloading/dumping soils and waste from off road truck		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Off Road Truck and spotter		
Task-specific Training:	Heavy equipment operation, traffic control plan		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☒ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☒ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☒ Other* Photoionization detector (PID)			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Modified Level D PPE					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

Dumping Soil/Waste from Off Road Truck

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Machinery Inspection	• Machinery damage • Personal injury	• Perform equipment safety checklist prior to operation • Ensure that all guards and safety equipment is in good operating condition •	Truck Driver
2	Loading of waste	• Machinery and property damage • Personal injury • Falling objects	• Make sure that mirrors are positioned properly for operating • Be aware of surrounding activities and conditions • Spotter shall stay clear of truck while being loaded.	Truck driver and spotter
3	Traveling with waste and Dumping waste	• Equipment damage • Incorrect placement of waste • Falling objects	• Pay attention to spotter's direction • Hand and horn signals established • Emergency signal established • All operators must be trained, skilled, and experienced	Truck driver and spotter
4	Travel back to excavation location	• Other truck traffic • Truck running into excavator • Tipping over	• Awareness of surroundings • Follow traffic plan for Site	Truck Driver

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

PCB Wipe Testing

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	PCB Wipe Testing
Work Type:	Environmental	**Client:**	Weyerhaeuser Company
Work Activity:	PCB wipe testing		
Work Site:	12th Street Landfill, Otsego, Michigan and Former Plainwell Paper Mill – 220 Allegan Street, Plainwell, Michigan		
Key Equipment:	PCB wipes and 100 sq. cm. templates		
Task-specific Training:	Collection of PCB Wipe Tests Using Template		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)						
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**		
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate	☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined	
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas	
☐ Other*			☐ Other*	☐ Other*		
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)						
Nitrile gloves						
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.						
Please refer to Section 5.0 of the HASP for additional PPE information						

Project Development Team						
Name	**Signature**	**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**

JOB SAFETY ANALYSIS (JSA)

PCB Wipe Testing

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Mobilize with proper equipment/ supplies for sampling	• Delay or improper/unsafe performance of work due to improper equipment on site • Cross-contamination of samples	• Review work plan to determine equipment/supply needs • Make sure all sampling/gauging equipment is decontaminated • Gather necessary PPE	Sample Technician
2	Notify other personnel on site	• Unknown traffic or other work hazards • Lack of communication between all interested parties	• Meet with on-site workers and explain planned activities	Sample Technician
3	Perform STAR and tailgate safety meeting upon arrival at site	• Consider worst-case scenario (including weather conditions)	• Review JSA with co-workers • Highlight aspects identified by STAR	Sample Technician
4	Wipe Test Nonporous Surfaces (e.g., epoxy-coated floor and metal clad walls, equipment buckets)	• Dermal exposure to PCBs • Exposure to preservation chemical • Stored energy in equipment	• Wear protective PPE consisting of Level D clothing (work boots and latex gloves) • Make sure equipment is shut off and in proper disengaged position	Sample Technician
5	Secure samples and ship to laboratory	• Improper preservation of samples • Cross contamination of samples • Misidentification of samples	• Make sure sample kits are in good condition • Send cooler to laboratory with sufficient ice to keep samples preserved for analysis • Containerize each sample without delay after collection • Immediately label each sample to prevent misidentification	Sample Technician

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(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

HDPE Pipe Welding

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	HDPE pipe welding		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	HDPE fusion welder/material handling-lifting equipment/generator		
Task-specific Training:	HDPE Fusion Welding Operations; task-specific training		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather abrasion-resistant gloves					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

HDPE Pipe Welding

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Discuss STAR and SWA	• Site personnel not aware of STAR and SWA	• Project team (CRA) discusses importance of and documentation procedures for SWA during pre-job safety meeting • Use SWA to stop any work that is unsafe	Site Supervisor and Laborers
2	Inspect equipment	• Equipment malfunction • Electrical shock	• Perform walk-around inspection for loose wires, cracks in frame, safety guards are in place, cords are in good condition • Inspect controls and gauges for proper operation • Moveable parts move without binding	Site Supervisor and Laborers
3	Assess work area	• Uneven ground • Slip/trip/fall hazards	• Level ground if required • Place barricades around work area to prevent people from entering work area • Police area for obstructions and remove to provide clean work area	Site Supervisor and Laborers
4	Equipment and material staging	• Back/hand/body injuries from lifting • Pinch points	• Reduce travel distance when there is a need to carry/lift materials • Make sure grip is adequate. Wear leather/cotton gloves • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Move along predetermined travel routes • Use inspected slings and shackles	Site Supervisor and Laborers
5	Heavy equipment (ground personnel)	• Pinch points • Crushing/striking	• Stay clear of the equipment swing radius • Enter work zone only if eye contact is made with the operator and the machine has been idled down • Ground personnel shall never position themselves between a fixed object and operating equipment • Designate one person to give hand signals to operator	Site Supervisor and Laborers
6	Heavy equipment (operator)	• Pinch points • Crushing/striking • Slip/trip/fall hazards	• Use three-point contact to enter/exit machine • Always were seatbelt • No passengers • Set brakes when not in use • No phone or radio use while operating	Site Supervisor and Laborers
7	HDPE welding (pipe alignment)	• Pinch points • Heavy lifting strains • Slip/trip/fall hazards • Lacerations	• Establish work zone so personnel appendages are not allowed to enter potential pinch point zones • Refer to step 4 and the HASP for additional lifting information • Utilize positioning block to properly space HDPE pie ends • Use lifting handle to lower and lift cutting blade • Clean shavings within work area to prevent tripping hazard • Watch for moving equipment on the HDPE welding machine • Watch for moving material handling equipment	Site Supervisor and Laborers
8	HDPE welding (welding)	• Burns • Pinch points	• Use lifting handle to lower and lift heating element • Keep hands, fingers, and arms away while heating and cutting	Site Supervisor and Laborers
9	Pipe removal	• Pinch points • Crushing/striking • Heavy equipment	• Raise rollers on fusion welder to bring pipe above brackets to prevent binding • Stay clear as pipe is pulled to weld next joint • Stay clear of heavy equipment travel path	Site Supervisor and Laborers

JOB SAFETY ANALYSIS (JSA)

HDPE Pipe Welding

Safety Means Awareness Responsibility Teamwork

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(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Geotextile Deployment

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Installation of Geotextile fabric for landfill cap		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Wheel Loader, Hyd. Excavator, lyster/sewing machine		
Task-specific Training:	Heavy equipment operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
X Reflective Vest	☐ Goggles	X Gloves*leather	**Supplied Air**	**APR**	
X Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
X Safety Glasses	X Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team		**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**
Name	**Signature**					

JOB SAFETY ANALYSIS (JSA)

Geotextile Deployment

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process	• Slip/trip/fall hazards • Situational risks	• Verify personnel training is sufficient for scheduled task(s)	All Personnel
2	Material unloading and staging	• Moving machinery • Pinch points • Slip, trip, fall • Back strains	• Maintain visual contact with operator. Stay clear of route • Keep hands away from slings or lifting equipment while unloading geotextile rolls • Be aware of your surroundings. Maintain 3 points of contact when climbing onto equipment and truck. • Utilize CRA policy in reference to handling/moving the geotextile rolls. Buddy system should be implemented	All Personnel
3	Deployment of geotextile fabric	• Moving machinery • Pinch points • Slip, trip, fall • Muscle strains • High winds/weather conditions	• Maintain visual contact with operator. Stay clear of route • Keep hands away from rolls while installing on stinger bar • Be aware of your surroundings • Use buddy system when handling rolls. Ensure that proper tools are being used during deployment (i.e. wise grips) • Shut down during high winds	All Personnel
4	Placement of sand bags	• Slip, trip, fall • Muscle strains	• Be aware of your surroundings. • Handle sand bags properly. Maintain proper posture (no twisting of back while handling bags.	All Personnel
5	Sewing/welding of geotextile	• Moving parts • Burns, cuts, punctures • Slip, trip, fall • Muscle strains	• Perform proper equipment safety checklist on sewing machine and/or lyster (all protective shields shall be installed) • Wear proper PPE when handling the sewing machine and/or lyster (leather gloves). • Be aware of your surroundings. Make sure that extension cords are away from working area and behind you. • Use the buddy system when handling the sand bags and/or pulling on the geotextile.	All Personnel

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Liner Deployment

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-1-09	**JSA Type:**	Construction
Work Type:	Environmental/Remediation	**Client:**	Weyerhaeuser Company
Work Activity:	Installation of Textured LLDPE Liner for landfill cap		
Work Site:	12th Street Landfill, Otsego, Mi		
Key Equipment:	Wheel Loader, Hyd. Excavator, welding machine		
Task-specific Training:	Heavy equipment operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
X Reflective Vest	☐ Goggles	X Gloves*leather	**Supplied Air**	**APR**	
X Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
X Safety Glasses	X Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Upgrade/down grade of PPE will be based on action levels in Tables 5.1 and 5.2 of HASP.					
Please refer to Section 5.0 of the HASP for additional PPE information					

Project Development Team		**Position/Title**	**Modified By**	**Reviewed By**	**Position/Title**	**Date**
Name	**Signature**					

JOB SAFETY ANALYSIS (JSA)

Liner Deployment

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process	• Slip/trip/fall hazards • Situational risks	• Verify personnel training is sufficient for scheduled task(s)	All Personnel
2	Material unloading and Staging	• Moving machinery • Pinch points • Slip, trip, fall • Back strains	• Maintain visual contact with operator. Stay clear of route • Keep hands away from slings or lifting equipment while unloading Liner rolls • Be aware of your surroundings. Maintain 3 points of contact when climbing onto equipment and truck. •	All Personnel
3	Deployment of Liner Material	• Moving machinery • Pinch points • Slip, trip, fall • Muscle strains • High winds/weather conditions • Cuts and abrasions	• Maintain visual contact with operator. Stay clear of route • Keep hands away from rolls while installing on deployment equipment • Be aware of your surroundings. • Use buddy system when deploying liner. Ensure that proper tools are being used during deployment (i.e. wise grips) • Handle sand bags properly. Maintain proper posture (no twisting of back while handling bags. • Shut down during high winds • Wear proper PPE when handling and deploying the textured liner.	All Personnel
4	Placement of Sand Bags	• Slip, trip, fall • Muscle strains	• Be aware of your surroundings. • Handle sand bags properly. Maintain proper posture (no twisting of back while handling bags.	All Personnel
5	Welding of Textured LLDPE Liner	• Moving parts • Burns, cuts, punctures • Slip, trip, fall • Muscle strains	• Perform proper equipment safety checklist on the welding machine and proper sized extension cords are being used. Along with GFCI. (all protective shields shall be installed) • Wear proper PPE when handling the welding machine (leather gloves). • Be aware of your surroundings. Make sure that extension cords are away from working area and behind you. • Use the buddy system when handling the sand bags and/or pulling on the liner material.	All Personnel

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

JOB SAFETY ANALYSIS (JSA)

Revegetation Mat Installation

Safety Means Awareness Responsibility Teamwork

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g., site managers, inspectors, clients, subcontractors, etc.). Additionally, a tailgate safety meeting must be performed and documented at the beginning of each workday. **Stop, Think, Act, Review (STAR)** must be used prior to any activity. All personnel must possess the appropriate training prior to initiating scheduled tasks. Also consider weather conditions. CRA personnel have the authority and responsibility to use **Stop Work Authority (SWA).**

Date Issued/Revised:	3-2-09	**JSA Type:**	Construction
Work Type:	Construction	**Client:**	Weyerhaeuser Company
Work Activity:	Revegetation Mat Installation		
Work Site:	12th Street Landfill, Otsego, Michigan		
Key Equipment:	Ground labor and hand tools, backhoe or excavator		
Task-specific Training:	Hand Tools, heavy equipment operation		

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (see job steps for task-specific requirements)					
☒ Reflective Vest	☐ Goggles	☒ Gloves*	**Supplied Air**	**APR**	
☒ Hard Hat	☐ Face Shield*	☐ Coveralls*	☐ SCBA	☐ Full Face APR	☐ Particulate ☐ Organic Vapor
☐ Lifeline/Harness*	☐ Hearing Protection*	☐ PPE Clothing*	☐ Airline Respirator (attach description)	☐ Half Mask APR	☐ Particulate/Organic Vapor Combined
☒ Safety Glasses	☒ Safety-toed Boots				☐ Acid Gas
☐ Other*			☐ Other*	☐ Other*	
ADDITIONAL PPE (*provide specific type(s) or descriptions of this item below)					
Leather abrasion-resistant gloves					

Project Development Team Name	Signature	Position/Title	Modified By	Reviewed By	Position/Title	Date

JOB SAFETY ANALYSIS (JSA)

Revegetation Mat Installation

Safety Means Awareness Responsibility Teamwork

Job Steps[1]	Task Activity	Potential Hazard(s)[2]	Corrective Measure(s)[3]	Person Responsible
1	Perform STAR process	• Slip/trip/fall hazards • Situational risks	• Verify personnel training is sufficient for scheduled task(s)	All Personnel
2	Material unloading and staging	• Moving machinery • Pinch points • Slip, trip, fall • Back strains	• Maintain visual contact with operator. Stay clear of route • Keep hands away from slings or lifting equipment while unloading rolls • Be aware of your surroundings. Maintain 3 points of contact when climbing onto equipment and truck. • Utilize CRA policy in reference to handling/moving the rolls. Buddy system should be implemented	All Personnel
3	Installation zone inspection	• Underground insects/Hives	• Visually inspect area of fence installation for any activity regarding hornets, yellow jackets, bees, fire ants, or termites • A slow walk or drive along the fence path prior to excavation to inspect for insects flying in and out or ground, ant humps or mounds, and trails	All Personnel
4	Deployment of revegetation mat / layout	• Moving machinery • Pinch points • Slip, trip, fall • Manual material handling • Muscle strains, back injury • Injuries typical of work on incline or slope • High winds/weather conditions • Improper installation/overlap	• Maintain visual contact with operator. Stay clear of route • Keep hands away from rolls while installing from stinger bar • Be aware of your surroundings • Use buddy system when handling rolls. Ensure that proper tools are being used during deployment (i.e. wise grips) • Reduce distance traveled when carrying materials • Make sure grip is adequate; use gloves to enhance grip when necessary • Size up the load; if the object is too large or odd shaped OR is in excess of 50 pounds (23 kg) then assistance (mechanical or a buddy lift) will be required • Lift with the legs (bend at the knees and use the leg muscles) to protect the lower back and keep lower back in a neutral position • Avoid one-handed carrying if possible; maintain awareness of footing • Shut down during high winds • Personnel stretching and preparing body for stresses typically endured by the foot, heel, ankle, leg muscles, knees, and hips • Stretching the back and upper body for twisting and reaching on an incline or slope • Follow installation specifications including overlaps specified	All Personnel
5	Pin installation to secure matting, etc.	• Striking hand or wrist with hammer • Impact, breach	• Use only hammer with weight and length within laborers' capability • Use wide head hammers only for pin installation • Take a break to relieve muscle fatigue in wrist, arm, and shoulders as accidental impact with wrist or hands most often results from inaccurate swing resulting from muscle fatigue • Inspect area	All Personnel
6	Hand tool use	• Improper hammer selection • Stapler use	• Use only a hammer of a weight and handle length appropriate to individual laborers' capability • Inspect every stake for knots, splits, and fractures before impacting stake with hammer • Knotty or split reinforcing stakes should be replaced without exception • Use pins of a length needed for the job • Safety glasses and awareness of installer hand location during use of a hammer	All Personnel

JOB SAFETY ANALYSIS (JSA)

Revegetation Mat Installation

(1) Each Job or Task consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the potential (associated) hazards.

(2) A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress/ergonomics/lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught".

(3) Aligning with the Job Steps, Task Activity Description, and Potential Hazard columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable, and quantified terms. Avoid subjective general statements such as "be careful" or "use as appropriate".

APPENDIX C

FORMS

HASP PLAN ACKNOWLEDGEMENT SHEET

DAILY SAFETY MEETING LOGS

LOCKOUT TAG OUT FORMS

INCIDENT REPORTING FORMS

NEAR LOSS REPORTING FORMS

CRA SAFETY COORDINATION REVIEW FORM

STEP OBSERVATION FORMS

CONFINED SPACE ENTRY FORMS

SAFETY INSPECTION CHECKLIST FOR EXCAVTIONS

HASP ACKNOWLEDGMENT SHEET

This is to certify that I have received a pre-entry briefing regarding this HASP (CRA – 12th Street Landfill Site and Former Plainwell Paper Mill Site) and I understand its contents. My failure to follow and comply with the requirements contained in this plan may result in disciplinary action and/or termination.

Print Name	Signature	Date

DAILY SAFETY MEETING LOG
CONESTOGA-ROVERS & ASSOCIATES

PROJECT: **12th Street Landfill –OU-4**

LOCATION: **12th Street, Otsego, Michigan**

DATE/TIME: _____

1. Safety Issues or Topics Discussed:
DAILY SITE SAFETY INSPECTION/AUDIT CONDUCTED – REPORT UNSAFE ACTS,
CONDITIONS, and/or PRACTICES IMMEDIATELY AND IMPLEMENT CORRECTIVE ACTIONS.
2. Work Summary and Physical/Chemical Hazards of Concern:
Planned Activities:
List JSAs reviewed:
Physical hazards:
Biological hazards:
Chemicals onsite:
3. Protective Equipment/Procedures: Refer to task JSA and HASP for additional information
4. Emergency Procedure:
MUSTERING POINT =
In event of an emergency gather/proceed to mustering point(s). Review Contingency Plan
Emergency Procedures for Area(s) of activity.

Print Name	**Signature**
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

DAILY SAFETY MEETING LOG
CONESTOGA-ROVERS & ASSOCIATES

PROJECT: **Former Plainwell Paper Mill**

LOCATION: **220 Allegan Street, Plainwell, Michigan**

DATE/TIME: _____

1. Safety Issues or Topics Discussed:
DAILY SITE SAFETY INSPECTION/AUDIT CONDUCTED – REPORT UNSAFE ACTS,
CONDITIONS, and/or PRACTICES IMMEDIATELY AND IMPLEMENT CORRECTIVE ACTIONS.
2. Work Summary and Physical/Chemical Hazards of Concern:
Planned Activities:
List JSAs reviewed:
Physical hazards:
Biological hazards:
Chemicals onsite:
3. Protective Equipment/Procedures: Refer to task JSA and HASP for additional information
4. Emergency Procedure:
MUSTERING POINT =
In event of an emergency gather/proceed to mustering point(s). Review Contingency Plan
Emergency Procedures for Area(s) of activity.

Print Name	**Signature**
1.	
2.	
3.	
4.	
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6.	
7.	
8.	
9.	
10.	

CONESTOGA-ROVERS & ASSOCIATES
Hazardous Energy Control Program
(Lockout/Tagout)

APPENDIX A

Safety Means Awareness Responsibility Teamwork

Project Name:	Project Number:
Name of Facility:	Maintenance or Repair Activity:
Equipment Name: _____	Equipment Serial Number: _____

Energy Sources Present:

☐ Electrical ☐ Chemical ☐ Mechanical ☐ Pneumatic ☐ Hydraulic ☐ Thermal

☐ Other: _____

SHUT DOWN					
	Energy Source	*Isolating Device*	*Location*	*Action*	*Verification Step*
1					
2					

Note: Photos may be attached to facilitate LOTO procedure detailed above.

START UP					
	Energy Source	*Isolating Device*	*Location*	*Action*	*Verification Step*
2					
1					

Note: Photos may be attached to facilitate LOTO procedure detailed above.

Lockout/Tagout Procedure Written By:

Name: _____ SS#: _____ Date: _____ Signature: _____

Procedure Verification

The procedure listed above was field tested/verified by _____ of _____ on the _____ day of _____, 200__.

If the energy sources affecting this equipment are modified in anyway, the overall procedure should be reevaluated.

CONESTOGA-ROVERS & ASSOCIATES
Hazardous Energy Control Program
(Lockout/Tagout)

APPENDIX B

Safety Means Awareness Responsibility Teamwork

LOCKOUT/TAGOUT PERIODIC INSPECTION	
Project Name:	Project Number:
Name of Facility:	Maintenance or Repair Activity:
Equipment Name:	Equipment Serial Number:
Energy Sources Present:	
☐Electrical ☐Chemical ☐Mechanical ☐Pneumatic ☐Hydraulic ☐Thermal	
☐ Other: _____	

Are changes to the procedure required? ☐YES ☐NO

If YES, identify: _____

_____

_____

Employees included in the inspection: _____

_____

_____

_____

_____ _____
Supervisor (Print Name) Signature

Date of Inspection: _____

CONESTOGA-ROVERS & ASSOCIATES (CRA) INCIDENT REPORTING FORM

Incidents must be called into Incident Hot Line: 1-866-529-4886

Instructions: For Personal Injuries, Occupational Illnesses, and Property Damage, complete Sections 1 and 2.
For Vehicle Accidents, Complete Sections 1, 2, and 4. Initial report must be submitted within 24 hours.

SECTION 1

Report Status - Insert Date: (/ /) Initial Report (/ /) Update Report (/ /) Final Report (/ /) Verification/Validation

A. Employee Identification ( ) CRA Employee ( ) Temporary Employee ( ) Subcontractor

Employee No.	Last Name	First Name	Middle Name/Initial	M or F

Area Code ( )	Telephone Number	Address (Street, City, State, Province, Zip Code)

Date of Hire / /	Position/Title	Supervisor	Employee's Company/Office Location

B. General Information

Where did the incident occur?
( ) Office ( ) Project Site ( ) Other_____
( ) Canada ( ) United States

Type of Loss (Check all that apply)
( ) Employee Injury/Illness ( ) Vehicle Accident
( ) Property Damage Only

Address of Incident (City, State, Province, Zip Code)	Specific Location of Incident (e.g., where on site)

Date and Hour of Loss		Date and Hour Reported to Employer		Date and Hour Last Worked		Time Employee Began Work
Month Day Year	a.m. p.m.	Month Day Year	a.m. p.m.	Month Day Year	a.m. p.m.	a.m. p.m.

Normal Work Hours on Last Day Worked		Witnesses?	Witness Name and Telephone Number
From: To:	a.m. p.m.	( ) Yes ( ) No	

C. Project Information (Project Related Loss Only) Project Related: ( ) Yes ( ) No

Project #	Project Name	Project Manager	Site Telephone Number ( )	Project Manager Cell Number ( )

Was the Client Advised of the Loss?	Name	Date & Time
( ) Yes ( ) No		

SECTION 2

A. Details of the Loss

1. What job/task was being performed when the incident occurred? (Example: collecting groundwater samples).
2. Provide a detailed description of the employee's specific activities at the time of the accident. Include details of equipment/materials being used, including the size and weights of objects being handled. If necessary, attach additional pages to the report.
3. For injuries, identify the specific part of body injured, and specify left or right side. For illnesses, identify and describe the affected area/body part.
4. Identify the object or substance that directly injured employee and how. Include size and weight of object, quantity of substance, etc.
5. Identify property damaged and how it was damaged (include owner of property, nature and source of damage, model and serial number, if appropriate).

B. Health Care/Medical Treatment

Employee received health care?
( ) Yes ( ) No

Identify the type of health care provided and where it was performed. (Check all that apply).
( ) First Aid ( ) Medical treatment other than first aid (sutures, etc.) ( ) Hospitalized
( ) Clinic ( ) Hospital emergency room ( ) On location by self or CRA employee) ( ) On site by EMT

Name of Health Care Provider, Physician's Name, Address (Street, City, Province/State, and Postal/Zip Code)

C. Loss Investigation ( ) 5 Why Root Cause Analysis Investigation [Non-OSHA Recordable, <$1,000 damage]
( ) Tap Root Root Cause Analysis [OSHA Recordable, and/or >$1,000 damages]

HASP prepared?
( ) Yes ( ) No ( ) Not applicable
Submit a PDF of HASP and relevant JSA(s) to Investigation Team.
If yes, what the HASP on-site?
( ) Yes ( ) No

Did the safety plan identify and provide safety procedures for the specific tasks the employee was conducting when injured?
( ) Yes ( ) No If no, why not? (Explain)_____
Did the employee utilize the STAR process before initiating the task?
( ) Yes ( ) No If no, why not? (Explain)_____
Was the employee post incident drug & alcohol tested ( ) Yes ( ) No

SECTION 2 (Continued)

5 Why Root Cause:	
1. Why did "above" happen?	**Verification**
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	
5. Why did "4" happen?	
6. Why did "5" happen?	
Additional information: Attach photos, witness statement(s), affected employee statement, diagrams, as applicable, to the end of this document.	
See the Causative Factors & Corrective Actions	

D. Accountability		
Initial Report Date Month Day Year	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)

E. Stewardship		
Will an Incident Summary be Prepared ( ) Yes ( ) No By:	Disciplinary Action Taken? ( ) Yes ( ) No	
Quality Review By:	Date:	Findings:

Fax Completed Form to CRA's Incident Reporting Fax: (832) 485-5259
Send Original to CRA's Incident Reporting Department, Houston, Texas

SECTION 3

D. Agency Reporting and Recording Information (To be completed by the Regional Safety and Health Manager)			
CANADA			
Form 7 Sent to WSIB? ( ) Yes ( ) Not required	Employee Injury Information (Injury met the following criteria) ( ) First Aid ( ) Medical Treatment ( ) Critical Injury ( ) Modified Duty ( ) Lost Time Injury If medical treatment, what?		
Joint Safety and Health Committee Notified? ( ) Yes ( ) No	Total days of modified duty If exceeds 7 days, report to WSIB.	Total days of lost time (if any)	Date employee returned to work Month Day Year
UNITED STATES			
OSHA Recordable Injury? ( ) Yes ( ) No	Employee Injury Information (Injury met the following OSHA 300 Log criteria) ( ) First Aid ( ) Medical Treatment ( ) Restricted Duty ( ) Lost Time Injury If medical treatment, what?		
Total days of restricted duty	Total days of lost time (if any)		Date employee returned to work Month Day Year

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VEHICLE ACCIDENT SECTION

(Complete this Section for all Vehicle Accidents)

SECTION 4

A. CRA Vehicle

License Plate No.	State/Province	Police Department City State/Province	
Vehicle Year/Make/Model	Odometer Reading at Time of Accident	Police Report Number	Weather Conditions

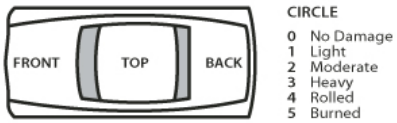
Name of Person Operating Vehicle

Address

City State/Province Zip Code

Telephone: Area Code ( )

"X" IN AREA OF VEHICLE DAMAGE



Vehicle Type: ( ) Personal ( ) Rental ( ) CRA-Own

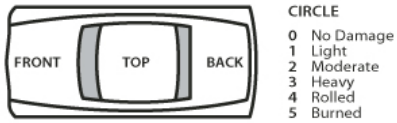
Description of Vehicle Damage:

B. Other Vehicles Involved

Name of Owner	Address	City/State/Prov./Zip	Area Code and Telephone Number ( )
Operator's Name (if different from above)	Address	City/State/Prov./Zip	Area Code and Telephone Number ( )

Year/Make/Model	Description of Property Damage:
Insurance Co. Name & Telephone	
License Plate No./State/Province	

"x" IN AREA OF VEHICLE DAMAGE



C. Injured Persons

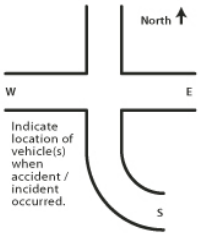
Name	Address Street, City, State/Prov./Zip Code	Phone Number	Nature of Injury	Indicate if Injured was a Vehicle Driver/ Passenger, CRA Employee, Other, or Pedestrian
1.				
2.				
3.				

D. Witnesses

Name	Address Street, City, State/Prov./Zip Code	Area Code and Telephone Number
1.		( )
2.		( )

E. Description of Accident

PLEASE COMPLETE OR ATTACH SEPARATE DIAGRAM



Was Ticket Issued:

Other Operator ☐

CRA Operator ☐

Reason: _____

Report Date Month Day Year	Report Prepared by: (please print)	Report Prepared by: (signature)

Note: If Additional Space is Required to Complete this Report, Use Separate Sheet of Paper and Attach.

Fax Completed Form to CRA's Incident Reporting Fax: (832) 485-5259

Send Original to CRA's Incident Reporting Department, Houston, Texas

Incident Report Corrective Action Verification and Validation

CRA SMART PROGRAM
Safety Means Awareness Responsibility Teamwork

Causative Factor(s) and Corrective Actions(s)						*Verification (Did we do what we said we would do?) and Validation (Is it working?)*		
Item No.	*CF*	*Corrective Actions (Must match Causative Factor)*	*Responsible Party*	*Due Date*	*Date Completed*	*Verified By/ Validated By*	*Date*	*Details*

CRA 10 CAUSATIVE FACTORS (CF)

Personal Factors		Company Factors		External Factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

NL

CONESTOGA-ROVERS & ASSOCIATES (CRA) NEAR LOSS REPORTING FORM

A Significant Near Loss must be called into Incident Hot Line: 1-866-529-4886

CRA SMART PROGRAM
Safety Means Awareness Responsibility Teamwork

Instructions: Complete the Near Loss Report and submit to your Supervisor

SECTION 1

Report Status – Insert Date: (/ /) Initial Report (/ /) Update Report (/ /) Final Report (/ /) Verification/Validation

A. Employee Identification ( ) CRA Employee ( ) Temporary Employee ( ) Subcontractor

Employee No.	Last Name	First Name		
Date of Hire / /	Position/Title	Supervisor	Employee's Company/Office Location	

B. General Information

Where did the Near Loss occur?	Type of Near Loss (Check all that apply)
( ) Office ( ) Project Site ( ) Other_____ ( ) Canada ( ) United States	( ) Employee Injury/Illness ( ) Vehicle Accident ( ) Property Damage ( ) Environmental

Address of Near Loss (City, State, Providence, Zip Code)	Specific Location of Near Loss (eg where on site)

Date and Hour of Near Loss		Date and Hour Reported to CRA		Hours on Last Day Worked		Time Employee Began Work
Month Day Year	a.m. p.m.	Month Day Year	a.m. p.m.	From: To:	a.m. p.m.	a.m. p.m.

Witnesses?	Witness Name and Telephone Number
Yes ( ) No ( )	

C. Project Information (Project Related Near Loss Only): Project Related: ( ) Yes ( ) No

Project #	Project Name	CRA Project Manager	Client	Client Contact

Was the Client Advised of the Near Loss?	Name:	Date & Time
( ) Yes ( ) No ( ) N/A		

SECTION 2

A. Details of the Near Loss

1. What job/task was being performed when the Near Loss occurred? (Example: collecting groundwater samples).

2. Provide a detailed description of the employee's specific activities at the time of the Near Loss. Include details of equipment/materials being used, including the size and weights of objects being handled. If necessary, attach additional pages to the report.

B. Near Loss Investigation

Conduct a 5-Why Root Cause Analysis Investigation. In addition, if there was the potential for a significant injury or loss report the Near Loss to Accident Hot Line so a Detailed Tap Root Cause Analysis

HASP prepared?	Did the safety plan identify and provide safety procedures for the specific tasks being performed when the Near Loss occurred?
( ) Yes ( ) No ( ) Not applicable Submit a PDF of HASP to Investigation Team. If yes, what the HASP on-site? ( ) Yes ( ) No	( ) Yes ( ) No If no, why not? (Explain)_____ Did the employee utilize the STAR process before initiating the task? ( ) Yes ( ) No If no, why not? (Explain)_____

5-Why Root Cause:	
1. Why did "above" happen?	**Verification**
2. Why did "1" happen?	
3. Why did "2" happen?	
4. Why did "3" happen?	
5. Why did "4" happen?	
6. Why did "5" happen?	

Additional information: Attach photos, witness statement(s), affected employee statement, accident diagrams, as applicable, to the end of this document.

See the Causative Factors & Corrective Actions

C. Accountability

Initial Report Date Month Day Year	Initial Report Prepared by: (please print)	Initial Report Prepared by: (signature)
Investigation Team	Company	Position/Title
Final Report Date Month Day Year	Final Report Prepared by: (please print)	Final Report Prepared by: (signature)

D. Stewardship

Will a Near Loss Summary be Prepared ( ) Yes ( ) No By:		
Quality Review By:	Date:	Findings:

SECTION 3

Corrective Action					Validation & Verification		
CF	Corrective Actions (Must match Causative Factor)	Responsible Party	Due Date	Date Completed	Verified By/ Validated By	Date	Details

CRA 10 CAUSATIVE FACTORS (CF)

Personal Factors		Company Factors		External Factors	
1	Insufficient training for task	5	Incomplete or no procedures	10	Exposure to conditions
2	Hurrying to complete the task	6	Procedures not known or enforced		
3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

CRA SAFETY COORDINATION REVIEW

SECTION A - JOB SCOPE

		Completed by:
	Pre-Job Meeting/Prep HASP	
	On-Site Orientation Meeting	
	End of Job Evaluation	
	Tailgate Safety Meeting Planning Tool	
	Site Audit	

Date: _____ Project Name:_____ Project Number: _____

Project Location: _____

Project Description _____

CRA Project Team

PM:_____ Site Supervisor: _____ SHO: _____

Technician(s): _____ Others:_____

CLIENT INFORMATION

Company Name: _____

Address: _____

Primary Contact: _____

Phone: _____ Cell: _____ Fax: _____

SUBCONTRACTOR INFORMATION

Company Name: _____

Address: _____

Primary Contact: _____

Phone: _____ Cell: _____ Fax: _____

additional subcontractors listed on last page

SECTION B - PROJECT SAFETY COORDINATION

1.1 High Risk Activities

Confirm activities to be conducted during project	Resource	Yes	No
Working at or above 6 feet (fall protection)	PM		
Aerial lift	PM		
Heavy equipment	PM		
Drilling	PM		
Excavation	PM		
Lock-Out Tag-Out permit(s) required	PM		
Hot work	PM		
Hot work permit(s) required	PM		
Confined space entry	PM		
Confined space entry permit required	PM		
Subsurface activities	PM		
ATV, Snowmobile, 4 wheeler	PM		
Access agreements in-hand and signed by property owner	PM		
Permit requirements communicated to affected employees	PM		

CRA SAFETY COORDINATION REVIEW

1.2 Guiding Principals

(All items identified, verified and discussed)	Resource	Yes	No
Safety Commitment	SMART		
Injury Free Operation (IFO)	SMART		
Stop Work Authority	SMART		
Lessons Learned	SMART		
Any unresolved safety concerns or issues	SS		

1.3 Personnel Requirements

(All items identified, verified and discussed)	Resource	Yes	No	N/A
Site personnel trained to execute the Scope of Work	PM			
Verification of all personnel's training certifications	PM			
Potential for language barrier issues for this project	PM			
Potential technical understanding barriers for this project	PM			
Number of SSE(s) on site concurrent with CRA/client policy	PM			
Short Service Employee(s) identification	PM			
Mentor assignment for each SSE(s)	PM			
Employees trained to use the tools/equipment	PM			
Verification of all personnel's:				
- Medical clearance & respirator fit test (as required)	Safety Admin			
- Alcohol & drug clearance	Safety Admin			
Daily personnel evaluation if they are fit to function and working safely	SS			
Safety Health Officer required for the site	PM			

1.4 Behavior Based Safety - SMART Tools

(All items identified, verified and discussed)	Resource	Yes	No	N/A
STAR/Loss Prevention Self Assessment (LPSAs)	SMART			
Near loss/incident reporting procedure	SMART			
STEP/LPO	SMART			
At-risk behaviors and observation trends	SMART			

1.5 HASP Development & Review

(All items identified, verified and discussed)	Resource	Yes	No	N/A
Site-specific Health & Safety Plan developed	HASP			
Site-specific Health & Safety Plan approval by CRA safety professional	HASP			
System to modify the Health & Safety Plan in the field (ie., "dirty JSA/JLA")	HASP			

1.6 JSA/JLA

(All items identified, verified and discussed)	Resource	Yes	No	N/A
On-site hazard assessment	PM			
JSA/JLAs available for all tasks including those performed by subcontractors	HASP			
Requirement to have JSA/JLAs modified in the field daily (ie., "dirty JSA/JLA	SS			
MSDSs obtained, reviewed, and hazards incorporated into JSA/JLAs	HASP			

CRA SAFETY COORDINATION REVIEW

1.7	**PPE**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	Confirm task-specific PPE per JSA/JLAs	HASP			
	System to inspect PPE before start of work	SS			
1.8	**Site Emergency Response**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	First-aid requirements	HASP			
	Minimum - one first-aid trained person on-site	HASP			
	First-aid equipment within 50 feet of risk	HASP			
	Eye wash/shower within 50 feet of risk	HASP			
	Spill response equipment inspected and available within 50 feet of risk	HASP			
	Emergency Action Plan (EAP) - specific personnel identified for key incident command roles - discussed role responsibilities and actions with all site personnel, mustering/meeting location set	HASP			
	Site emergency evacuation alarm confirmed	SS			
	EAP drill schedule	HASP			
	Nearest hospital confirmation	HASP			
	Nearest hardwired telephone confirmation	Site Drawing			
	Emergency shut-off switch/valve locations confirmation	Site Drawing			
	Emergency contact confirmation - coordinate with facility and client	HASP			
1.9	**Utility Locates**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	CRA and/or client-specific Subsurface Utility Clearance Protocol reviewed and adhered to	PM			
	QSF-019 Property Access Form completed	PM			
	Client-specific requirements communicated to all affected employees	PM			
	One-call responses verified	PM			
1.10	**Traffic Control Program**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	Temporary Traffic Control Plan (TTCP) required	PM			
	TTCP provided	PM			
	TTCP approval by the client, if required	PM			
1.11	**Site Control**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	Have the following areas been considered for site control:				
	Fencing, barricades or other identifiers	SS			
	Signage to control pedestrian traffic	SS			
	Safety perimeter around equipment and work zone	SS			
	Swing radius barricades and/or signage struck-by (crush zones) reviewed and controlled.	SS			
1.12	**Equipment**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	Proper lifting/transport of heavy objects (drums, augers)	SS			
	Equipment inspected and documented where required	SS			
	GFCI used and tested	SS			

CRA SAFETY COORDINATION REVIEW

1.13	**Weather**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	Weather condition changes discussed - how to handle during work	HASP			
	Weather monitoring- who is responsible	HASP			
	Weather related hazards (heat/cold accommodations)	HASP			
	Hold time after lightning and thunder	SS			
1.14	**Crew Commitment**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	Crew is aware of Safety Commitment that they are making	TBD			
1.15	**Materials**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	MSDSs availability for all HAZCOM/WHMIS regulated materials on the job site	HASP			
	Affected employees aware of special handling instructions for hazardous materials	HASP			
	Hazardous materials stored appropriately	HASP			
	Plan for dealing with leftover and/or waste materials	WP			
1.16	**Sub-Contractors**				
	(All items identified, verified and discussed)	**Resource**	**Yes**	**No**	**N/A**
	Approval through the QSF 12, 22, 30, 31	PM			
	CRA Safety Coordination Review Form completed with the subcontractor as applicable	PM			
1.17	**Documentation**				
	All required QS Forms are available and attached to the project file	PM	**Yes**	**No**	**N/A**
	- QSF-12	PM			
	- QSF-13	PM			
	- QSF-16	PM			
	- QSF-19	PM			
	- QSF-22	PM			
	- QSF-30/31	PM			
	- Meeting attendance sign in sheets	PM			
	Daily Tailgate sign in sheets	PM			
	Permits/air monitoring records	PM			
	STEP observation form	PM			
	Equipment inspection forms	PM			
	Client specific forms	PM			

CRA SAFETY COORDINATION REVIEW

SECTION C - ACTION ITEMS		
Action Items:	Responsible	Due Date

HASP Health and Safety Plan
PM Project Manager
SS Site Supervisor
SHO Safety & Health Officer

SUBCONTRACTOR INFORMATION
Company Name: _____
Address: _____
Primary Contact: _____
Phone: _____ Cell: _____ FAX: _____

SUBCONTRACTOR INFORMATION
Company Name: _____
Address: _____
Primary Contact: _____
Phone: _____ Cell: _____ FAX: _____

Copies of the forms for Pre-Job Meeting and On-Site Orientation shall be maintained in the Project File

SAFE TASK EVALUATION PROCESS (STEP)

Report Status: (insert date)	Initial Report	Updated Report	Final Report	Verification/Validation

Date:	Time:	Project No. (if applicable):
Client:	Project Name:	
Office:	Work Group:	Site Location:
Subcontractor: ☐ Yes ☐ No	Subcontractor Company Name:	

Feedback Conducted By:	Date:	Time:
Observer's Name:	Observee's Supervisor:	

Check Task Being Observed (if not listed here, go to columns at right)		If checking this column, write in the specific task	
☐ Air Knifing	☐ Manual Lifting	☐ Agricultural Services	
☐ Clearing	☐ Mob/Demob	☐ Construction	
☐ Demolition	☐ Project Oversight	☐ Landfill	
☐ Drilling	☐ Soil Sampling	☐ Office Operations	
☐ Driving	☐ Stack Testing	☐ O&M	
☐ Electrical Work	☐ Surveys & Audits	☐ Pipeline	
☐ Excavation	☐ Traffic Control	☐ Refinery	
☐ General Site Cleaning	☐ UST Removal	☐ Treatment Plants	
☐ Heavy Equipment Operations	☐ Water Sampling	☐ Other	
☐ IH Sampling	☐ Well Management		

Background Information (Give a brief description of task being performed and your surroundings)

Observer's Positive Comments

Feedback Conclusion (Why the Questionable Items Occurred)

SAFE TASK EVALUATION PROCESS (STEP)

PERSONAL PROTECTIVE EQUIPMENT	Meets Work Standards	???	N/A	Evaluation Comments
1. Hearing Protection (e.g., Ear Plugs)				
2. Head Protection (e.g., Hard Hat)				
3. Eye Protection (e.g., Safety Glasses/Goggles)				
4. Hand Protection (e.g., Gloves)				
5. Foot Protection (e.g., Steel-toe Boots)				
6. Respiratory Protection				
7. Fall Protection (e.g., lanyard/harness)				
8. High Visibility Clothing (e.g., Work Vest)				
9. First Aid Kit/Fire Extinguisher				
10. Other (be specific)				
BODY POSITION	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
11. Proper Body Positioning When Exerting Force (Lifting/Pushing/Pulling)				
12. Pinch Points/Moving Equipment - Hands/Body Placement				
13. 3-Points of Contact				
14. Other (be specific)				
WORK ENVIRONMENT	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
15. Work/Walk Surface Clear (Free And Clear Pathway)				
16. Housekeeping/Equipment Storage				
17. Controlled Work Zone (e.g., Warning Devices, Barricades, Cones, Flags)				
18. Emergency Stop/Safety Switches				
19. Materials Labeled Correctly				
20. Storage/Disposal of Waste				
21. Other (be specific)				
OPERATING PROCEDURES	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
22. STAR Performed/Job Planning				
23. Stop Work Authority				
24. JSA/JLA Reviewed and Followed				
25. Daily Site Inspection				
26. High Risk Task Specific (Hot Work, Confined Space, LOTO, Excavation/ Trenching)				
27. Inspect Work Zone for Hazards				
28. Coordinate/Communicate with Site Rep and/or other others on site				
29. Spotters used appropriately				
30. Underground/Overhead Utilities Identified				
31. Other (be specific)				
TOOLS/EQUIPMENT	**Meets Work Standards**	**???**	**N/A**	**Evaluation Comments**
32. Hand/Power Tool - Selection, Condition, and Use				
33. Field/Test Equipment - Selection, Condition, and Use				
34. Heavy Equipment - Selection, Condition, and Use				
35. Other (be specific)				
Observation Total Occurrences				
% Observations to Meet Work Standards				
Item Specific to Work Task	**Meets Work Standards**	**???**		**Evaluation Comments**
Insert Task/JSA/SOP Step				
Insert Task/JSA/SOP Step				
Insert Task/JSA/SOP Step				

SAFE TASK EVALUATION PROCESS (STEP)

Causative Factors and Corrective Actions						Verification (Did we do what we said we would do?) and Validation (Is it working?)		
Item No.	CF	Corrective Actions (Must match Causative Factor)	Responsible Party	Date Due	Date Completed	Verified By/ Validated By	Date	Details

CRA 10 CAUSATIVE FACTORS

Personal Factors		Company Factors		External Factors	
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3	Easier if proper process not followed	7	Improper PPE		
4	Took shortcuts without prior incident	8	Improper tools		
		9	Improper workplace layout		

CRA
CONFINED SPACE ENTRY PERMIT

Permit Date: _____ / _____ / _____ CRA Office: _____

Site Name: _____

Job Number: _____ Entry Class (MN only) ☐ IA ☐ IB ☐ II ☐ III

Section 1: Confined Space Characteristics

Purpose of Entry: (specify) _____

Locations and Configuration of Confined Space (specify) _____

Section 2: Chemical and Physical Hazards

Materials Present or Previously Stored in space (specify):* _____

Material State: ☐ Solid ☐ Liquid ☐ Gas ☐ Sludge

Physical Hazards:

☐ Physical Exertion	☐ Heat Stress	☐ Cold Stress	☐ Heavy Equipment
☐ Fire Hazards	☐ Lifting Hazards	☐ Slip, Trip, Fall	☐ High Noise
☐ Overhead Hazard	☐ Underground Hazard	☐ Fall Protection	☐ Electrical
☐ Hand/Power Tools	☐ Welding/Cutting	☐ Sparks	☐ Grinding
☐ Explosive	☐ Visibility	☐ Respiratory (dust)	☐ Splash
☐ Flying Debris	☐ Pinch, Grab, Roll	☐ Internal Obstruction	☐ Oxygen Deficient
☐ Engulfment	☐ Other (specify) _____		

*Note: The health effects of the contaminant(s) need to be discussed with the team prior to entry. Smoking is prohibited.

Section 3: Lock-Out/Tag-Out/Isolation

Pipes/Valves	☐ Yes	☐ No	☐ N/A	Pipes/valves closed, multiple locked, and tagged.	Initials: _____
	☐ Yes	☐ No	☐ N/A	Pipes blanked.	Initials: _____
	☐ Yes	☐ No	☐ N/A	Vents/drains blocked.	Initials: _____
Electrical	☐ Yes	☐ No	☐ N/A	Switches / Lines off, multiple locked, and tagged.	Initials: _____
Mechanical	☐ Yes	☐ No	☐ N/A	Pumps, motors and other mechanical devices off, multiple locked, and tagged.	Initials: _____

Other: _____

Section 4: Personal Protective/Safety Equipment Assessment

☐ Faceshield	☐ Alarm/Air Horn	☐ Airline/5 minute escape	☐ Tripod escape unit/hoist
☐ Hard hat	☐ Signage, barricades, etc.	☐ Coveralls, other: _____	☐ Fire Extinguisher
☐ Hearing protection	☐ Gloves, other: _____	☐ Spark Resistant Tools	☐ Fall Protection Device
☐ Steel-toed shoes	☐ Tyvek suit	☐ Radios, telephone, etc.	☐ Intrinsic lighting & tools
☐ Rubber boots	☐ PVC/Splash suit	☐ First Aid Kit	☐ Other: _____
☐ Portable eyewash	☐ Air-purifying respirator	☐ Escape harness/lifeline	☐ Other: _____

Note: MN requires a hoist and harness for all Class II and III entries and otherwise for all permit-required entries greater than 5 feet. An eyewash is needed if the CS contains corrosives. OSHA requires a mechanical device to be available to retrieve personnel from vertical spaces more than 5 feet (1.52 meters) deep. A SCBA is required on standby for all MN Class III entries.

Section 5: Air Monitoring

Test(s) Required	Instrument/Model & Serial Number	Permissible Entry Level	Date: Time:	Date: Time:	Date: Time:	Date: Time:	Date: Time:
% O_2		≥ 19.5% and < 22.0%					
% LEL		< 10%					
ppm CO		< 35 PPM					
ppm H_2S		< 5 PPM					
ppm VOC		See HASP					
Other							
Other							
Equipment will be calibrated in accordance with manufacturers' guidelines.		Tester's Initials:					

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Section 6: Authorized Entrants/Attendants within Permit Space

I understand that I have reviewed this permit and know my job function and procedures necessary to accomplish this task safely.

Entrant	Signature	Time In	Time Out	Time In	Time Out	Time In	Time Out
Authorized Attendant	**Signature**	**Time In**	**Time Out**	**Time In**	**Time Out**	**Time In**	**Time Out**

Section 7: Confined Space Certifications

Based on the hazard assessment, the following entry procedure will be followed:

☐ Non-Permit Entry ☐ Alternate Entry ☐ Permit Required Entry

I certify that all required precautions have been taken and necessary equipment and emergency response is provided for safety entry and work in this confined space:

Signature of Entry Supervisor Authorizing Entry Date/Time _____

DURATION: This permit is approved for _____hours on this day. Only the entry supervisor can extend this permit to a maximum of 12 hours.

Section 8: Emergency Response Support for Permit Required Spaces

IDLH Conditions are Present or Possible (Note: If Yes, then responders must be on site during entry.) ☐ Yes ☐ No

Name and Phone Number of Emergency Responders: _____

Called Responders to Brief and Confirm Availability: ☐ Yes ☐ No ☐ Not Applicable

CRA Incident Reporting Hotline Number: 866-529-4886 See Responder Evaluation Form.

Section 9: Task Completion and Permit Close-Out

Verification of System Line Restoration (Removal of locks, tags, blanks, blocks, etc.) ☐ Yes ☐ No ☐ N/A

I certify that this permit is finalized and closed out.

_____ _____

Entry Supervisor (Print and Sign Name) Date/Time

This Permit must be sent to Linda DiBartolomeis in Niagara Falls. Confined Space entry permits must be kept on file for a period of 1 year. If there are any questions, call the Regional Safety Manager. Copies may be placed in the project file if required.

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CRA EVALUATION FORM
FOR EMERGENCY RESCUE SERVICES
IN PERMIT REQUIRED CONFINED SPACES

Directions: This evaluation must be completed initially and then annually for sites and/or facilities which rely on community/local rescue services to provide emergency rescue services to their permit-required confined spaces. The rescue service should visit each site and/or facility to view all permit-required confined spaces and review their potential hazard(s). All questions must be answered satisfactorily in order to be able to list 911 on the CS permit and rely on the rescue service. It is acceptable to work with and assist rescue services in achieving a satisfactory evaluation.

Name of Service: _____ Contact's Name: _____

Emergency Phone No.: _____ Business Phone No.: _____

		Yes	*No*
1.	Does the rescue service have the ability, in terms of proficiency, with rescue-related tasks and equipment?	☐	☐
2.	Will the rescue service stand by (on site) at the permit space for IDLH or potential ILDH atmospheres? The cost for providing this service is $_____.	☐	☐
3.	Can the rescue service respond in a 10 to 15-minute timeframe for non-IDLH situations (i.e., mechanical hazards that may cause broken bones, abrasions, etc.)? The availability of the rescue service is (i.e., 24 hours a day or are there times when key personnel would not be available)? _____	☐	☐
4.	Does the rescue service:		
	A. Provide all required PPE and equipment that may be needed at the site and/or facility? If no, CRA will provide. _____.	☐	☐
	B. Train rescue personnel annually in accordance with the standard?	☐	☐
5.	Will the rescue service commit to providing rescue services to the site and/or facility?	☐	☐
6.	Is there an adequate method of communication between the attendant and rescue service to summon help?	☐	☐
7.	Has the rescue service practiced rescues or successfully performed a permit space rescue within the last 12 months?	☐	☐

Evaluation Completed By:

_____	_____	_____
Name (Print)	Signature	Date

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SAFETY INSPECTION CHECKLIST – MOBILE EQUIPMENT SAFETY

Week Ending:	Job No.:	Equipment:

(This form is to be completed daily by the operator. Deficiencies should be addressed immediately.)

Superintendent: _____

	Date:	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Sun.	Comments
Equipment Hours:	***Start:***								
	Stop:								
Fluid Levels:									
	Oil								
	Hydraulic								
	Transmission								
	Radiator								
	Grease Fittings								
	Fuel								
Safety Checks:									
	Fire Extinguisher								
	Seat and Safety Belts								
	Warning Devices (backup alarms, lights, etc.)								
	Housekeeping								
	Brakes								
	Mirrors								
	Windshield and Wipers								
	Steering								
	Horn								
	Lights								
	Tires								
	Guards								
	Instruments								
	Exhaust System								
Accessories:									
	Boom or Mast								
	Controls								
	Level Indicators								
	Tracks								
	Other								
Sign-Off:									
	Operator's Initials								
	Supervisor's Initials								

Additional Comments: (Please write any additional comments here. Use the back of this form if necessary.)

√ = OK NR = Needs Repair NA = Not Applicable

SAFETY INSPECTION CHECKLIST FOR EXCAVATIONS REFERENCED BY OSHA STANDARDS

This checklist is to be completed by the competent person at the start of work and as needed throughout the shift (i.e., after rain events, etc.). ***(A competent person has been trained in the current OSHA excavation standard, is knowledgeable about soil analysis and protective systems, and has the authority to shut down the job.)***

Site Location: _____	Project #: _____
Date: _____ Time: _____	Competent Person: _____
Were visual soil tests made? If Yes, what type?	YES ☐ NO ☐ Type: _____
Were manual soil tests made? If yes, what type?	YES ☐ NO ☐ Type: _____
Soil Type: _____	Signature: _____
Soil Classification: _____	
Excavation Depth: _____	Excavation Width: _____
Protective System Used:	

In the following table, please place a Y for Yes, N for No, or N/A for Not Applicable in the right hand column for each item. If No, place the date of correction.

	Subject	*Y, N, or NA*	*Date Corrected*
GENERAL INSPECTION OF THE JOB SITE			
1.	Does the competent person have the authority to remove employees from the excavation immediately?		
2.	Are surface obstructions removed or supported?		
3.	Are employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation?		
4.	Are hard hats worn by all employees?		
5.	Are excavated soil, materials, and equipment placed at least 2 feet from the edge of the excavation?		
6.	Are walkways and bridges over excavations 4 feet or more in depth equipped with standard guardrails and toe-boards?		
7.	Are warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic?		
8.	Are employees required to stand away from vehicles being loaded or unloaded?		
9.	Is a warning system established and used when mobile equipment operates near the edge of the excavation?		
10.	Are employees prohibited from going beneath suspended loads?		
11.	Are employees prohibited from working on the faces of sloped or benched excavations above other employees?		
UTILITIES			
12.	Were utility companies contacted and/or utilities located?		
13.	Are the exact locations of the utilities marked?		
14.	Are underground installations protected, supported, or removed when excavation is opened?		
MEANS OF ENTERING AND EXITING THE TRENCH			
15.	Is the distance along the trench to an exit no greater than 25 feet in excavations 4 feet or more in depth?		

	Subject	*Y, N, or NA*	*Date Corrected*
16.	Is a support system, such as underpinning, being used?		
17.	Are ladders used in excavations secured and extended 3 feet above edge of the trench?		
18.	Are structural ramps used by employees designed by a competent person?		
19.	Are structural ramps used for equipment designed by a registered professional engineer?		
20.	Are employees protected from cave-ins when entering or exiting the excavation?		
WET CONDITIONS			
21.	Is water removal equipment monitored by a competent person?		
22.	Is surface water or runoff diverted or controlled to prevent accumulation in the excavation?		
23.	Are inspections made after every rainstorm or other hazard-increasing occurrence?		
HAZARDOUS ATMOSPHERE			
24.	Is the atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible, or other harmful contaminant exposing employees to a hazard?		
25.	Are adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or other hazardous atmospheres?		
26.	Is ventilation provided to prevent employee exposure to an atmosphere containing flammable gas 10% above the lower explosive limit of a gas?		
27.	Is testing conducted often to ensure that the atmosphere remains safe?		
28.	Is emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist?		
SUPPORT SYSTEMS			
29.	Are materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads?		
30.	Are materials and equipment used for protective systems inspected and in good condition?		
31.	Are protective systems installed without exposing employees to the hazards of cave-ins (including end walls), collapses, or threat of being struck by materials or equipment?		
32.	Are excavations below the level of the base, or footing supported, approved by a registered professional engineer?		
33.	Does the removal of support systems progress from the bottom and members are released slowly? Note any indication of possible failure.		
34.	Is the excavation of material a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth?		
35.	Is there a shield system placed to prevent lateral movement?		

APPENDIX D

EXCVATION SAFETY PROGRAM

EXCAVATION AND TRENCHING

Studies show that excavation work is one of the most hazardous types of work conducted in the construction industry. Accidents occur more frequently in excavation work than in construction work in general. The primary type of accident related to excavation work is the cave-in. Cave-ins result in over 100 fatalities a year in North America. When compared to the total number of accidents in all of construction, the actual number of cave-ins is not large; however, they are very serious in nature and much more likely to be fatal than other types of construction accidents.

Excavation activities during CRA projects have the potential to create oxygen-deficient, explosive, and/or toxic atmospheres. Adequate precautions must be taken to prevent employees entering excavations from being exposed to a hazardous atmosphere.

Serious accidents and injury can occur to employees working in excavations and trenches due to cave-ins and hazardous atmospheres. Rescue attempts in any excavation or trench cave-in should be approached with the safety of the rescuers in mind.

A. POLICY

All CRA excavation and trenching operations for which employees shall enter or be exposed shall have a safety plan in place and shall be observed by a designated competent person. The competent person shall be responsible for evaluating and inspecting excavation and trenching operations to prevent possible cave-in and entrapment, and to avoid other hazards presented by excavation activities.

Each employee in an excavation shall be protected from cave-ins by one of three systems:

1. Sloping and benching systems.
2. Shoring.
3. Shielding systems.

There is only one situation where such protective systems are not required; the excavation is less than 4 feet deep, and a competent person has determined that there is no indication of a potential cave-in.

All employees working in and around excavations and trenches shall receive training regarding the safe use of shoring and shielding equipment.

Employees may not design and fabricate their own protective systems. Only manufactured systems and systems designed and certified by professional engineers shall be used.

The competent person shall be responsible for recognizing conditions that might result in employees being exposed to hazardous atmospheres, and for monitoring air quality in accordance with this policy.

Prior to initiating work in excavations, the competent person shall outline the emergency procedures to be utilized in the event of an emergency in the excavation. All employees working in or near the trench shall be knowledgeable of these procedures.

In the event of any life-threatening incident, the employee shall immediately contact 911 or Dispatch for emergency assistance.

B. REGULATORY BACKGROUND

The OSHA excavation standard (29 CFR 1926.650-652) sets forth the safety requirements for all excavation and trenching activities including construction, inspection, and entry into excavations or trenches. In addition, HAZWOPER and the OSHA General Industry Standard (29 CFR 1910) include the same requirements for excavation and trenching by referencing the construction standard.

C. SAFE WORK PRACTICES

Utility Clearances

Prior to the commencement of any project and/or site work that include intrusive activities, utility clearances must be conducted. Elevated superstructures (e.g., drill rigs, backhoes, scaffolding, ladders, cranes) shall remain a distance of 10 feet away from utility lines (<50 kV) and 20 feet away from power lines. Underground utilities, if present, shall be clearly marked and identified prior to commencement of work.

Personnel involved in intrusive work shall:

- Review and adhere to CRA's subsurface utility clearance protocol.

- Utilize the Property Access/Utility Clearance Data Sheet (QSF-019).
- Be able to determine the minimum distance from marked utilities which work can be conducted with the assistance of the locator line service.
- Contact utility companies prior to the start of excavation work to mark the location of all underground utilities. Utility companies may take up to 4 days to respond to a call, so planning is recommended.

All exposed utility lines in an excavation must be properly supported.

Access and Egress

Personnel access and egress from trench and/or excavations are as follows:

- A stairway, ladder, ramp, or other means of egress must be provided in trenches greater than 4 feet deep and for every 25 feet of lateral travel.
- All ladders shall extend 3 feet above the top of the excavation.
- Structural ramps to be used by employees for access and egress must be designed by a competent person, qualified in structural design, or by a licensed professional engineer.

Vehicular Traffic

The following safety measures are to be taken by personnel that have the potential to be exposed to vehicle traffic:

- Safety vests shall be worn made of reflectorized or high-visibility material meeting ANSI Class II or III as applicable to traffic speeds.
- Employees shall work using the "buddy system".
- Cones, etc. shall be used to demarcate a safe work zone around the monitoring wells.
- Appropriate signage shall be posted as necessary to inform roadway/parking lot users of any additional control measures necessary to protect the public and CRA employees.

Falling Loads

Personnel are not permitted to work under or near loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by falling materials.

Protection from Water Accumulation

Employees must not work in excavations containing accumulated water unless adequate precautions have been taken. These precautions include special support or shield systems to prevent cave-ins, water removal, and/or use of a harness and lifeline.

The use of water removal equipment in an excavation must be monitored by a competent person.

Excavation work that interrupts the natural drainage of surface water shall use diversion ditches, dikes, or other suitable means to prevent surface runoff from entering the excavation. The competent person must inspect the excavation before employees enter the excavation after heavy rains.

Shoring, Shielding, and Trench Boxes

The following are general safety precautions to observe when using shoring, shielding, or trench boxes:

- Manufactured protective systems shall only be used according to the manufacturer's specifications, recommendations, and limitations. Copies of these data shall be made available at the project site.
- Plans and material specifications for manufactured protective systems designed by a professional engineer shall be made available at the project site.
- No manufactured protective system shall be subjected to loads in excess of those for which it was designed.
- Members of protective systems shall be securely connected to prevent sliding, falling, kick-outs, and other predictable failure.
- Installation of protective systems shall be closely coordinated with the progress of excavating or trenching operations.
- Protective systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapse, or being struck by members of the system.
- Excavations and trenches shall be backfilled as soon as possible following removal of the protective system.

- Excavation of material deeper than 2 feet below the support system shall be permitted only if the system is designed to resist the forces for the full depth of the excavation.

In addition to the general considerations above, one special consideration regarding shoring systems is that their removal shall begin at, and progress from, the bottom of the excavation.

The following are special precautions to observe when using shielding systems and trench boxes:

- Shields shall be installed in a manner which restricts lateral or other hazardous movement in the sudden application of lateral loads.
- Employees shall be protected from cave-in when entering or leaving areas protected by shields. This is to include all faces of the excavation (i.e., side walls and end walls).
- Employees shall not ride in shields when they are being installed, repositioned or removed.
- No employee shall be positioned under an elevated load.

Benching and Sloping

Bench and slope configurations are based on soil properties. With detailed information on soil properties, special benching and slope plans may be developed by the competent person, or professional engineer, that exceed the following minimum slope requirements. No other employees are authorized to make decisions on benching or sloping systems. There are four types of soil classifications as per OSHA. General information on the four types of soil is provided below:

- **Stable rock** – Natural solid mineral matter whose sides remain vertical when excavated;
- **Type A soil** – Cohesive soils (clay, silty clay, sandy clay, clay loam, and sometimes silty clay loam and sandy clay loam) with a compressive strength greater than 1.5 tons per square foot (tsf);
- **Type B soil** – Cohesive soils (granular, cohesive soil or silts) with a compressive strength between 0.5 to 1.5 tsf; and

- **Type C soil –** Cohesive soil with compressive strength less than 0.5 tsf, granular soils (gravel, sand, etc.), submerged soil and soil with water seepage, and submerged unstable rock.

Minimum Slope Requirements

In the absence of detailed information on soil properties, or whenever the soils involved are granular or saturated with water, the following minimum requirements for bench and slope construction shall apply:

- All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 1/2:1 (34 degrees measured from the horizontal).
- All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or shored to a height of at least 18 inches above the top of the vertical side.
- All excavations deeper than 20 feet shall be designed by a professional engineer with knowledge of soil mechanics and state and OSHA excavation requirements. Copies of this designed system must be maintained at the project site.

Atmosphere Monitoring and Testing

There are three parameters by which air quality is measured: 1) oxygen concentration, 2) flammability, and 3) the presence of hazardous substances.

Employees must not be exposed to atmospheres containing less than 19.5 percent oxygen, or having a lower flammable limit greater than 10 percent; and employees must not be exposed to hazardous levels of atmospheric contaminants.

Air Quality Monitoring

Whenever potentially hazardous atmospheres are suspected in excavations and trenches, the atmosphere shall be tested by a competent person. Detector tubes, gas monitors, and explosion meters are examples of monitoring equipment that may be used.

In the event that an unusual odor or liquid is suspected in excavations and trenches, the competent person shall stop work on the site and arrange for air quality assessment and mitigation if necessary.

Atmospheric testing and monitoring shall be performed in excavations in or adjacent to landfill areas, in areas where hazardous materials are/were stored, or in areas where the presence of hazardous materials is suspected.

Air Quality Controls

Air quality can be controlled with proper ventilation and respiratory protection. When such controls are used, atmospheric monitoring shall be conducted as often as needed, but not less than every 30 minutes, to ensure that the atmosphere remains safe. Employees required to work under such conditions shall receive special training related to hazardous materials and respiratory protection.

Emergency Rescue Equipment

Emergency rescue equipment, such as breathing apparatus, a safety harness with lifeline, and any other appropriate safety equipment, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work. Communication to outside rescue providers shall be readily available prior to employees entering trenches. Rescue for cave-in situations shall be limited to hand implements, such as shovels, hoes, etc.

D. COMPETENT PERSON RESPONSIBILITIES

The competent person shall ensure that all surface structures (buildings, retaining walls, sidewalks, etc.) are removed or supported, as necessary, to safeguard employees.

The competent person shall ensure the location of all subsurface structures (utilities, pipelines, underground tanks, etc.) which might reasonably be encountered during the course of the excavation.

The competent person shall ensure that safe access and egress from the excavation or trench are provided. An exit must be provided if the excavation is 4 feet deeper or greater. This exit must be within 25 feet of every worker.

The competent person shall ensure that all employees exposed to vehicular traffic wear warning vests or other suitably marked clothing.

The competent person shall ensure that all excavations and trenches are properly barricaded, flagged, or otherwise protected, and that a designated spotter is assigned to warn approaching machinery and pedestrians of the hazards.

The competent person shall prevent exposure of employees to hazardous atmospheres in excavations and trenches through the administration of an appropriate Atmospheric Monitoring Program.

The competent person shall prevent employees from working in excavations and trenches where there are hazards associated with water accumulation. The person shall also be responsible for monitoring the proper operation of water removal equipment.

The competent person shall ensure that employees are protected from falling equipment and previously excavated material by keeping such equipment or materials at least 2 feet back from the edge of the excavation.

The competent person shall ensure that walkways with a minimum width of 20 inches are provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with OSHA 29 CFR 1926.502 (b) shall be provided where walkways are 6 feet or more above lower levels.

Daily Inspections

The competent person shall perform daily inspections of excavations, the adjacent areas, and all protective systems for situations that could potentially result in slope failure.

Additionally, the competent person shall be aware of the potential for confined space situations and other hazardous work conditions.

The competent person shall inspect, evaluate, and complete the excavation checklist at the following intervals:

- Prior to the start of work, after each extended halt in work, and as needed throughout the shift as new sections of the excavation or trench are opened.
- After every rainstorm and other natural or man-made event that may increase the load on the walls of the excavation or otherwise affect their stability.

The competent person shall instruct employees to report any indications of potential slope failure.

The competent person shall stop the work and instruct all employees to leave the excavation or trench when any potential hazards are detected. The competent person has the authority to immediately suspend work if any unsafe condition is detected.

E. EMPLOYEE TRAINING

Employees who work in areas where shoring, sloping and benching, shielding, and other protective equipment are used shall receive initial training regarding the hazards associated with excavation and trenching operations.

Such employees shall receive refresher safety training whenever the following conditions apply:

- The hazards associated with their work environment change significantly.
- The supervisor has reason to believe that there are inadequacies in the person's knowledge of excavation and trenching operations.

Employees who work in excavations or trenches where there is a potential for hazardous atmospheres shall be trained to understand the nature of the hazard, to take necessary health and safety precautions, and to use the air quality controls and PPE.

Competent Person Training

Competent person training shall consist of formalized classroom instruction with examination and field exercises as permitted. A certificate of course completion indicating course title and names of trainee and instructor shall be issued in order to document successful course completion. Initially, a competent person assigned to excavation and trenching jobs shall be able to:

- Recognize and classify the basic soil types and understand their slope-holding characteristics.
- Select, recognize, and use different types of shoring, sloping and benching, shielding, and other types of protective equipment.
- Recognize confined space situations.
- Understand the basic hazards associated with excavation, trenching, and trenching operations.
- Recognize situations that could result in slope failure, and understand basic slope stabilizing methods.

- Perform atmospheric testing and monitoring.
- Complete excavation checklist.

A competent person shall receive additional training whenever the following conditions apply:

- There is a significant change in the job description or the type of equipment being used.
- There is a new hazard added to the work environment.
- The supervisor has reason to believe that there are inadequacies in the person's knowledge of excavation and trenching safety.

F. CHECKLISTS

- Safety Inspection Checklist for Excavations.

SAFETY INSPECTION CHECKLIST FOR EXCAVATIONS REFERENCED BY OSHA STANDARDS

This checklist is to be completed by the competent person at the start of work and as needed throughout the shift (i.e., after rain events, etc.). ***(A competent person has been trained in the current OSHA excavation standard, is knowledgeable about soil analysis and protective systems, and has the authority to shut down the job.)***

Site Location: _____	Project #: _____
Date: _____ Time: _____	Competent Person: _____
Were visual soil tests made? If Yes, what type?	YES ☐ NO ☐ Type: _____
Were manual soil tests made? If yes, what type?	YES ☐ NO ☐ Type: _____
Soil Type: _____	Signature: _____
Soil Classification: _____	
Excavation Depth: _____	Excavation Width: _____
Protective System Used:	

In the following table, please place a Y for Yes, N for No, or N/A for Not Applicable in the right hand column for each item. If No, place the date of correction.

	Subject	***Y, N, or NA***	***Date Corrected***
GENERAL INSPECTION OF THE JOB SITE			
1.	Does the competent person have the authority to remove employees from the excavation immediately?		
2.	Are surface obstructions removed or supported?		
3.	Are employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation?		
4.	Are hard hats worn by all employees?		
5.	Are excavated soil, materials, and equipment placed at least 2 feet from the edge of the excavation?		
6.	Are walkways and bridges over excavations 4 feet or more in depth equipped with standard guardrails and toe-boards?		
7.	Are warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic?		
8.	Are employees required to stand away from vehicles being loaded or unloaded?		
9.	Is a warning system established and used when mobile equipment operates near the edge of the excavation?		
10.	Are employees prohibited from going beneath suspended loads?		
11.	Are employees prohibited from working on the faces of sloped or benched excavations above other employees?		
UTILITIES			
12.	Were utility companies contacted and/or utilities located?		
13.	Are the exact locations of the utilities marked?		
14.	Are underground installations protected, supported, or removed when excavation is opened?		
MEANS OF ENTERING AND EXITING THE TRENCH			
15.	Is the distance along the trench to an exit no greater than 25 feet in excavations 4 feet or more in depth?		
16.	Is a support system, such as underpinning, being used?		
17.	Are ladders used in excavations secured and extended 3 feet above edge of the trench?		

	Subject	*Y, N, or NA*	*Date Corrected*
18.	Are structural ramps used by employees designed by a competent person?		
19.	Are structural ramps used for equipment designed by a registered professional engineer?		
20.	Are employees protected from cave-ins when entering or exiting the excavation?		
WET CONDITIONS			
21.	Is water removal equipment monitored by a competent person?		
22.	Is surface water or runoff diverted or controlled to prevent accumulation in the excavation?		
23.	Are inspections made after every rainstorm or other hazard-increasing occurrence?		
HAZARDOUS ATMOSPHERE			
24.	Is the atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible, or other harmful contaminant exposing employees to a hazard?		
25.	Are adequate precautions taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or other hazardous atmospheres?		
26.	Is ventilation provided to prevent employee exposure to an atmosphere containing flammable gas 10% above the lower explosive limit of a gas?		
27.	Is testing conducted often to ensure that the atmosphere remains safe?		
28.	Is emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher readily available where hazardous atmospheres could or do exist?		
SUPPORT SYSTEMS			
29.	Are materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads?		
30.	Are materials and equipment used for protective systems inspected and in good condition?		
31.	Are protective systems installed without exposing employees to the hazards of cave-ins (including end walls), collapses, or threat of being struck by materials or equipment?		
32.	Are excavations below the level of the base, or footing supported, approved by a registered professional engineer?		
33.	Does the removal of support systems progress from the bottom and members are released slowly? Note any indication of possible failure.		
34.	Is the excavation of material a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth?		
35.	Is there a shield system placed to prevent lateral movement?		

APPENDIX E

CONFINED SPACE PROGRAM

CONESTOGA-ROVERS & ASSOCIATES, INC.
PERMIT-REQUIRED CONFINED SPACE ENTRY PROGRAM

REF. NO. 56393/56394 (1)

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LIST OF APPENDICES

APPENDIX A PERMIT-REQUIRED CONFINED SPACE INVENTORY

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1.0 PURPOSE

The purpose of this document is to establish consistent procedures to: (1) prevent unauthorized entry into permit-required confined spaces; (2) identify and evaluate permit-required confined space hazards; and (3) implement the means, procedures, and practices necessary for safe entry operations. Adherence to the requirements of this procedure will help ensure that risk to employees from the hazards posed by confined spaces is minimized.

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2.0 SCOPE

This document serves as the Conestoga-Rovers & Associates (CRA) Permit-Required Confined Space Entry (PRCSE) Program. This PRCSE Program covers all CRA and sub-contractor employees who enter confined spaces and contains the practices and procedures for their safe entry.

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3.0 REGULATORY BACKGROUND

On January 14, 1993, OSHA published its final rule on permit-required confined spaces (29 CFR 1910.146) for General Industry. The standard requires identification of confined spaces in the workplace; evaluation of the spaces; prohibiting unauthorized access to permit-required spaces; and development of a confined space entry permit program.

Working in a permit-required confined space requires that employer's prepare a permit in a standardized format, through which the employer identifies all conditions that must be evaluated to ensure safe entry. Under the entry permit program, the employer shall include the following information:

- **Hazard Identification —** Identify and evaluate each hazard of the permit spaces, including determination of severity.
- **Hazard Control —** Establish the means, procedures, and practices by which the permit spaces can be entered safely.
- **Permit System —** Establish a written permit system for the proper preparation, issuance, and implementation of entry permits.
- **Employee Information —** Indicate that signs shall be posted near permit spaces to notify employees what hazards may be present and that only authorized individuals may enter the permit spaces.
- **Prevention of Unauthorized Entry —** Identify measures such as training or posting signs and barriers to prevent unauthorized employee entry as necessary.
- **Employee Training —** Describe training provided to employees so that attendants, authorized entrants, and entry supervisors in charge of entry can work safely in and around the permit space.
- **Equipment —** Discuss means by which to provide, maintain, and ensure the proper use of the equipment necessary for safe entry, including testing, monitoring, communication, and personal protective equipment.
- **Rescue —** Identify procedures and equipment to rescue entrants from permit spaces and ensure they are implemented and provided.
- **Protection from External Hazards —** Describe pedestrian, vehicle, or other barriers used to protect entrants from external hazards.
- **Duty to Other Employers —** Discuss procedures to implement when an employer, such as a contractor, plans to send employees into a permit space that is under the

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control of another employer (host employer). The host employer provides the contractor with all available information on permit space hazards, on efforts to comply with this standard, and on any other workplace hazards, safety rules, and emergency procedures of which the contractor needs to be aware in order to comply with this standard.

3.1 DEFINITIONS

Confined Space means a space that has *all* of the following conditions present:

- is large enough, and so configured that, an employee can bodily enter and perform assigned work;
- has limited or restricted means for entry or exit; and
- is not designed for continuous employee occupancy.

Examples of confined spaces include, but are not limited to: pipes, ducts, mixers, tanks, pits, vaults, manholes, conduits, wells, stacks, tunnels, steam condensers, boiler drums, sewers, silos, coffer dams, bunkers, bins, compartments, filter or process equipment, equipment housings, penthouses, and any potentially hazardous storage, mixing, or process areas.

Permit-required confined space (permit space) means a confined space that has *one or more* of the following characteristics:

- contains or has a potential to contain a hazardous atmosphere; or
- contains a material that has the potential for engulfing an entrant; or
- has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or by a floor which slopes downward; or
- contains any other recognized, serious safety or health hazard.

Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness. Such hazards, can be presented by *one or more* of the following:

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- flammable gas, vapor, or airborne combustible dust in excess of 10 percent of its lower explosive limit (LEL);
- oxygen concentrations below 19.5 percent or above 23.5 percent; and/or
- atmospheric concentrations of vapors or gases above their exposure limit.

3.2 ADDITIONAL DEFINITIONS

Attendant means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized entrant means an employee who is authorized by the employer to enter a permit space.

Entry supervisor means the person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

Note: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of the entry supervisor may be passed from one individual to another during the course of an entry operation.

Entry permit (permit) means the written or printed document that is provided by the employer to allow and control entry into a permit space.

Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes work activities performed in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space. Reaching into the space with a tool is not considered entry.

Non-Permit Space is a confined space that does not contain and has no potential to contain any hazard capable of causing death or serious injury.

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Retrieval system means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

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4.0 PROGRAM ADMINISTRATION

The CRA-PRCSE Program is coordinated through the company's Safety and Health Manager, who is responsible for maintaining a current program. Supervisors with affected employees are responsible for implementing the program and making it available to employees. Specific questions about the program and interpretations of its content should be directed to the administrator.

The Administrator will periodically audit work operations and documentation using canceled permits to evaluate the overall effectiveness of the confined space entry program and ensure that employees participating in entry operations are protected from permit space hazards. The Administrator will also assist each Supervisor/Project Manager in identifying confined spaces that may be encountered by his/her employees.

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5.0 DUTIES AND RESPONSIBILITIES

5.1 SUPERVISORS AND PROJECT MANAGERS

Supervisors and project managers shall be responsible for the following:

- identify and report job areas and locations that are or may be confined spaces. A current list of identified confined spaces is attached to this program as Appendix A;
- classify confined spaces as "permit-required" or "non permit-required";
- identify personnel who will take part in the entry of a permit-required confined space;
- provide detailed instruction and training on confined space hazards and entry procedures to those who may enter confined spaces;
- provide instruction to personnel on the proper use of equipment required for confined space entry;
- provide and maintain equipment that is used to enter confined spaces;
- conduct work site inspections to review compliance with confined space entry procedures;
- maintain records of equipment maintenance and employee training;
- inform employees who may enter a permit space by posting danger signs and/or by training; and
- take the necessary measures to prevent unauthorized entrance (i.e., entry without a permit, etc.) into permitted spaces.

5.2 EMPLOYEES

Employees who enter confined spaces shall be responsible for the following:

- comply with the confined space entry procedures contained herein and with those procedures stipulated by their supervisor;
- store, clean, and maintain equipment used for confined space entry;
- report any deficiencies or malfunction of equipment to a supervisor;
- understand emergency procedures in case of an accident in a confined space;

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- under no circumstances enter a confined space that is suspected of having a non-respirable atmosphere, even to rescue a fellow employee;
- employees involved in a permit-required confined space entry project will be designated as an entrant, an attendant, or an entry supervisor. The roles and responsibilities of these designations are described in Section 6.5; and
- all facility employees will be trained to recognize permit-required confined space signs and will receive awareness training on the hazards associated with confined spaces.

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6.0 PROGRAM ELEMENTS

6.1 IDENTIFICATION AND CLASSIFICATION OF CONFINED SPACES

Prior to entering a confined space, the employees Supervisor must confirm the classification of the confined space as either a (1) permit-required confined space; or (2) a non-permit confined space. CRA has evaluated the facility to identify the permit-required confined spaces. See Appendix A for a current list of PRCSEs.

6.2 CHANGES IN SPACE USE OR CONFIGURATION

When there are changes in the use and configuration of a non-permit confined space that might increase the hazards to entrants, the space is to be reevaluated and, if necessary, reclassified as a permit-required confined space. Any changes should be brought to the attention of the Administrator.

6.3 CONFINED SPACE RECLASSIFICATION

A permit-required confined space may be reclassified as a non-permit confined space under the following conditions:

- if the space poses no actual or potential atmospheric hazards and the hazards are eliminated without entry, and as long as the non-atmospheric hazards remain eliminated;
- entry into the space to eliminate the hazards is under an authorized permit and testing and inspection during the entry demonstrate the hazards were eliminated without requiring continuous forced air ventilation; and/or
- the elimination of the previously identified hazards is documented.

If hazards arise within a permit space that has been declassified to a non-permit space, each employee must exit the space and the space is reevaluated to determine if it must be reclassified as a permit space.

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6.4 PREVENTING UNAUTHORIZED ENTRY

The following measures are to be implemented, as necessary, to prevent unauthorized employee entry into permit spaces:

- affected employees will be informed through safety training about the characteristics and presence of permit spaces; and
- some permit spaces will also be posted with danger signs to supplement the safety training. However, the posting of danger signs is not all inclusive and each employee must know what a permit space is, the usual hazards involved, and what precautions are required to ensure safe entry so they can help ensure their own protection.

Contractors and visitors are informed as to the presence of and hazards associated with confined spaces, as appropriate.

6.5 CONFINED SPACE ENTRY PROCEDURES

The PRCSE Program is designed to prevent unauthorized entry into permit confined spaces, identify and evaluate hazards, and establish procedures and practices for safe entry, including testing and monitoring conditions. The program requires for an attendant stationed outside permit spaces during entry; procedures to summon rescuers and prevent unauthorized personnel from attempting rescue; and a system for preparing, issuing, using, and canceling entry permits.

The following means, procedures, and practices necessary for safe permit-space entry operations have been implemented.

6.5.1 PRE-ENTRY REQUIREMENTS

A. Notifications

Prior to the start of a permit-required confined space entry operation, both the Administrator (or designated representative) and the supervisor and/or project manager must be notified of the proposed entry.

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B. Pre-Entry Review Meeting

Prior to entering a permit-required confined space, the entry supervisor must conduct a pre-entry review meeting with all persons involved in the operation, including employees, sub-contractors, and other contractors. The pre-entry review meeting must, at a minimum, discuss the following topics:

- hazards associated with the space;
- the method of communication to be used between the entrants and the attendants;
- how emergency services are summoned;
- the use of required equipment; and
- the specific duties and responsibilities of each of the participants.

C. Isolating the Permit Space

All hazardous energy sources associated with permit spaces that may expose entrants to potential injury are isolated, locked out, and/or tagged out prior to entry. Due to the inherent hazards associated with confined space entries, preference shall be given to isolating the space utilizing standard lockout/tagout procedures.

D. External Hazards

Pedestrian, vehicle, or other barriers are provided, as necessary, to protect entrants from external hazards.

E. Means of Egress

If possible, a ladder is required in all confined spaces deeper than the employee's shoulders. The ladder shall be secured and not removed until all employees have exited the space. In addition, a mechanical device shall be available to retrieve personnel from all vertical type permit spaces more than 5 feet deep.

F. Lighting

The lighting used is to be at a minimum of 20-foot candles, or 20 feet of clear vision, and must meet the classification rating for the area in which it is to be used.

G. Atmospheric Monitoring

Prior to entering a confined space, the atmosphere is tested, to determine if acceptable entry conditions exist before entry is authorized to begin. To the extent feasible, entry conditions are continuously monitored in work areas. The tests and monitoring are

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conducted in permit spaces, as necessary, to determine if acceptable entry conditions are being maintained during the course of entry operations.

Employees or their designated representative shall be provided the opportunity to observe the testing of the space upon pre-entry and subsequent testing. Results of the tests must be placed on the permit and made available to all employees participating in the entry project and/or their designated representatives. A person who has been properly trained shall conduct this atmospheric monitoring. The type and frequency of atmospheric monitoring will be determined by the person conducting the tests, and must be stated on the permit. When conducting tests for atmospheric hazards, *oxygen tests are conducted first, then combustible gases and vapors, and then for toxic gases and vapors*. The tests are conducted in order to ensure that test instruments function properly since an oxygen deficient atmosphere may adversely affect the test results.

ACCEPTABLE ENTRY CONDITIONS

For entries, the following values are to be considered acceptable atmospheric entry conditions.

Oxygen Level	19.5% - 23.5%
Flammables	<10% of the lower explosive limit (LEL)
Toxic (CO)	<35 parts per million (ppm)
Toxic (H_2S)	<10 ppm

The Entry Supervisor must be contacted for instructions and/or approval if these values cannot be reached. *Note:* If monitoring indicates that the lower explosive limit exceeds 10 percent in the space and the Entry Supervisor has approved entry, all tools must be non-sparking, only low-voltage explosive-proof lights may be used, and all equipment must be intrinsically safe.

Re-testing is required should an extended break occur or if new hazards are introduced. Re-testing may also be requested by an authorized entrant or attendant who suspects that conditions have changed or that the initial evaluation of the space was not adequate.

Any testing that indicates conditions are outside of the defined safe entry levels listed on the entry permit will require further evaluation of the space. The Entry Supervisor must

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be made aware of this situation and consulted prior to continuing with the entry. The use of ventilation or personal protective equipment, such as respirators, may be required to continue. There must be no entry into this type of confined space without approval by the Entry Supervisor.

If ventilation is to be used to eliminate conditions of a hazardous atmosphere, ensure that the space is ventilated before starting work in the confined space, and for the duration that the work is to be performed in the space. Where air-moving equipment is used to provide ventilation, chemicals shall be removed from the vicinity to prevent introduction into the confined space. Vehicles shall not be left running near confined space work or near air-moving equipment being used for confined space ventilation.

H. Purging, Inerting, Flushing, or Ventilating Permit Spaces

All permit entry spaces are thoroughly purged, inerted, flushed, and/or ventilated, as necessary, to ensure the elimination and/or control of all hazards which may cause entrants injury and /or illness.

I. Written Entry Permit

No task(s) involving confined space entry into a permit space may begin until an appropriate Confined Space Entry Permit (see Appendix B) is issued. The entry supervisor shall initiate the permit. The permit will be completed by the personnel involved in the entry, and must be approved by the supervisor before personnel will be permitted to enter the confined space. Approval means the supervisor will review and sign the permit.

The permit shall be valid only for the performance of the work identified, and for the location and time specified. Permits must be reissued at the beginning of each workday or each work shift.

The permit shall be considered void if work in the confined space causes unanticipated changes within the space, or changes in the work scope or duration occur.

The permit must be posted at the entry portal, and copies shall be placed in the project site file and retained for a minimum of 3 years. Upon project completion, these records will be forwarded to safety and kept on file in the Niagara Falls office location.

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The following requirements must be recorded on the entry permit:

(a) permit space to be entered, purpose of the entry, and date and authorized duration of the entry permit;

(b) names of authorized entrants (or suitable tracking system);

(c) current attendants' names;

(d) entry supervisor's name and signature, including original authorizing supervisor;

(e) hazards of the space;

(f) measures used to isolate the space and to eliminate or control the space hazards, before entry;

(g) acceptable entry conditions (see Section 6.5.1);

(h) results of initial and periodic tests accompanied by the names or initials of the testers and time of the tests;

(i) available rescue and emergency services and how to summon them;

(j) communication procedures used by entrants and attendants to maintain contact during entry;

(k) equipment, such as personal protective equipment, alarm systems, and rescue equipment, to be provided;

(l) if respirators are required, all persons entering the confined space must show proof of respirator fit testing. All other requirements of the CRA Respiratory Protection Policy must be followed; and

(m) any other pertinent information necessary to ensure entrant safety.

Additional permits, such as hot work, that have been issued to authorize work in the space are to be attached to the posted entry permit.

6.5.2 EMERGENCY PREPAREDNESS

Rescue Service Responsibilities

A Rescue Service within a 30-minute response to the site must be available for any permit-required entry. If the entry is into a space that might possibly contain an Immediately Dangerous to Life and Health (IDLH) situation, then at least one assigned rescuer must be standing by at the portal for the duration of the entry.

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The entry supervisor cannot rely on the local fire department to provide this service without first contacting the service, verifying response times, and confirming their acceptance of their role in writing (see page 3 of Appendix B). The Supervisor must also confirm that the rescue service is in compliance with the following conditions:

- the rescue service shall ensure that each member of the team is provided with, and is trained to use properly, the personal protective equipment and rescue equipment necessary for making rescues from permit spaces; and
- each member of the rescue service shall be trained to perform the assigned rescue duties.

Non-Entry Rescue

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.

Retrieval systems shall meet the following requirements: Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head. Wristlets may be used in lieu of the chest or full body harness if the employer can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative. The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

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6.5.3 ENTRY OPERATIONS

Attendants

At least one attendant is required outside the permit space for the duration of the authorized entry operation. All attendants are required:

- to know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- to be aware of possible behavioral effects of hazard exposure in entrants;
- to continuously maintain an accurate count of entrants in the permit space and ensure a means to accurately identify authorized entrants;
- to remain outside the permit space during entry operations until relieved by another attendant. Once properly relieved, they may participate in other activities;
- to communicate with entrants frequently, to monitor entrant status, and alert entrants of the need to evacuate;
- to monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the entrants to immediately evacuate if:
  - the attendant detects a prohibited condition, detects entrant behavioral effects of hazard exposure, or detects a situation or emergency outside the space that could endanger the entrants, and
  - the attendant cannot effectively and safely perform all the attendant duties;
- to summon rescue and other emergency services as soon as the attendant determines that entrants need assistance to escape the permit space hazards;
- to take the following action when unauthorized persons approach or enter a permit space while entry is underway:
  - warn the unauthorized persons that they must stay away from the confined space,
  - advise the unauthorized persons that they must exit immediately if they have entered the space, and
  - inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;
- to perform non-entry rescues as specified by that rescue procedure and entry supervisor;

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- not to perform duties that might interfere with the attendant's primary duty to monitor and protect the entrants.
- in the event of an emergency, the attendant may not attempt to perform any rescue, other than non-entry rescue, until a new attendant has arrived to assume their responsibilities; and
- if multiple confined spaces are to be monitored by a single attendant, a procedure shall be put in place that will enable the attendant to respond to an emergency affecting one or more of the confined spaces being monitored without distraction from the attendant's responsibilities. The attendant must evacuate entrants from all confined spaces before the attendant can assist in any emergency rescue.

Entrants

All entrants must be authorized by the entry supervisor to enter permit spaces, have received the required training, use the proper equipment, and observe the entry procedures and permit. The following entrant duties are required:

- know the hazards that may be encountered during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
- properly use the equipment required for safe entry;
- communicate with the attendant frequently to enable the attendant to monitor the status of the entrants and to enable the attendant to alert the entrants of the need to evacuate the space if necessary;
- alert the attendant whenever the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or any prohibited condition is detected; and
- exit the permit space as quickly as possible whenever the attendant or entry supervisor gives an order to evacuate the permit space; the entrant recognizes any warning sign or symptom of exposure to a dangerous situation; the entrant detects a prohibited condition; or when an evacuation alarm is sounded.

Entry Supervisors

Entry supervisors are responsible for the overall permit space entry and must coordinate all entry procedures, tests, permits, equipment, and other relevant activities. The following entry supervisor duties are required:

- know the hazards involved with the work;

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- ensure that all necessary resources (equipment, training, etc.) are available to provide a safe work environment for the employees;
- verify appropriate entries are made on the permit and procedures are in place;
- terminate the entry (if necessary);
- verify that rescue services are available and appropriate;
- remove all unauthorized personnel entering or attempting to enter the space;
- assure that entry procedures are in compliance with the permit, this program, and any other site safety documents, or OSHA regulations; and
- inform the rescue service of the hazards they may confront when called on to perform rescue at the host employer's facility.

Provide the rescue service with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

6.5.4 POST-ENTRY REVIEW MEETING

At the conclusion of the confined space entry, a post-entry review meeting must be conducted with all persons involved in the entry. The intent of this meeting is to review the job and highlight any problems which may have been encountered or created during the course of the entry. Any comments that are made should be noted on the Entry Permit.

Once the post-entry review meeting has been completed, the entry supervisor must write the word "CANCELLED" across the face of the permit and forward the cancelled permit, with comments from the post-entry review meeting, to the Regional Safety and Health Manager (RSHM) for records retention.

The RSHM shall review the permit-required confined space program, using the canceled permits, within 1 year after each entry and revise the program as necessary, to ensure that employees participating in entry operations are protected from confined space hazards.

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6.6 ALTERNATE ENTRY PROCEDURES

Provided that the only hazard in the space is the presence of a hazardous atmosphere, and that atmosphere can be controlled by means of ventilation alone, employees need not comply with the procedures set forth in this program. In lieu of this program, the supervisor can utilize an alternate entry procedure provided the following actions occur:

- the opening is guarded by barriers or other means to prevent people from accidentally falling in;
- there may be no hazardous atmosphere at any time an employee is in the space;
- the ventilation is provided directly to the area where the employees are working;
- the atmosphere in the space is continuously monitored for hazardous conditions; and
- the space is immediately evacuated if the ventilation fails or if a hazardous condition is detected.

If an initial entry of the permit space is necessary to obtain the data required, the entry is performed according to the procedures set forth in this document concerning the entry of a permit-required confined space.

Certification of these conditions is required on the permit.

If the permit space poses no atmospheric hazards, and all other hazards may be eliminated without entering the space, the space may be reclassified as a non-permit space for as long as the hazards remain eliminated. This elimination and records of air monitoring to confirm the lack of atmospheric hazards must be recorded on the permit and placed in the project files. If a hazard arises during entry under this procedure, the space must be evacuated and reevaluated.

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7.0 EMPLOYEE TRAINING

All entry supervisors, attendants, and entrants must be trained. Specific training requirements include, but are not limited to:

- Each affected employee is trained. This includes entrants, attendants, and entry supervisors.
- Training is provided:
  - before the employee is first assigned duties involving confined space entry;
  - before there is a change in assigned duties;
  - if there is a change in the permit-space program or the permit space operation presents a new hazard; and
  - when an employee's job performance shows deficiencies;
- The training establishes employee proficiency in the required duties and introduces new or revised procedures, as necessary.
- The training is certified and contains each employee's name, signatures or initials of the trainers, and training dates.

The training certification is available for inspection by employees and their authorized representatives.

Additional training may also be provided whenever an incident has occurred and the root cause and/or contributing factors is a lack of skill or knowledge; or lack of or inadequate operational procedures.

Training also is required for rescue team members (if team has been designated and on site), including cardiopulmonary resuscitation (CPR) and first-aid training. Certification is required showing that training has been accomplished.

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8.0 CONTRACTORS

In some cases, contractors and other non CRA employees may enter permit spaces to perform work. When contractors and others enter permit spaces, the Supervisor and/or Project Manager is responsible for informing the all contractors of the CRA Permit-Required Confined Space Entry Program. The contractor is responsible for complying with this procedure and their own.

CRA Responsibility

- Contractors are informed that the workplace contains permit spaces and that they must follow a permit space entry program per OSHA Standard 29 CFR 1910.146 and use an authorized permit for entry.
- Apprise the contractor of the elements, including the hazards identified and the experience with the space making it a permit space.
- Apprise the contractor of the precautions or procedures implemented for protection of employees in or near permit spaces.
- All activities of multi-employer operations must be coordinated; this includes mandatory participation in the pre-entry review meeting and post-entry debriefing.
- Debrief the contractor at the conclusion of the entry regarding the permit space program followed and any hazards confronted or created in space(s) during entry operations.

Contractor Responsibility

All contractors performing permit space entry are required to:

- obtain and use the available information provided;
- coordinate entry operations with others working in or near permit spaces; and
- **follow the CRA PRCSE entry program.**

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9.0 PROGRAM EVALUATION AND DOCUMENT CONTROL

The entry supervisor will review entry operations and revise the procedures to correct any deficiencies before subsequent entries are authorized. Any revisions will be reported to the program Administrator in order to revise the written program.

The Administrator will review the program annually in light of actual entry, work, and exit experience to determine how the program can be improved.

This program will be reviewed and updated, as necessary, at a frequency necessary to maintain its effectiveness. The responsibility for maintenance of this program belongs to the facility Administrator. The revision date for this document is located in the lower left hand corner of each page.

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APPENDIX A

PERMIT-REQUIRED CONFINED SPACE INVENTORY

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PERMIT-REQUIRED CONFINED SPACE INVENTORY

No:	Type	Location	Existing or Potential Hazards	Other Comments

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APPENDIX B

CONFINED SPACE ENTRY PERMIT

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CRA

CONFINED SPACE ENTRY PERMIT

Permit Date: _____/_____/_____ CRA Office: _____

Site Name: _____

Job Number: _____ Entry Class (MN only) ☐ IA ☐ IB ☐ II ☐ III

Section 1: Confined Space Characteristics

Purpose of Entry: (specify) _____

Locations and Configuration of Confined Space (specify) _____

Section 2: Chemical and Physical Hazards

Materials Present or Previously Stored in space (specify):* _____

Material State: ☐ Solid ☐ Liquid ☐ Gas ☐ Sludge

Physical Hazards:

☐ Physical Exertion	☐ Heat Stress	☐ Cold Stress	☐ Heavy Equipment
☐ Fire Hazards	☐ Lifting Hazards	☐ Slip, Trip, Fall	☐ High Noise
☐ Overhead Hazard	☐ Underground Hazard	☐ Fall Protection	☐ Electrical
☐ Hand/Power Tools	☐ Welding/Cutting	☐ Sparks	☐ Grinding
☐ Explosive	☐ Visibility	☐ Respiratory (dust)	☐ Splash
☐ Flying Debris	☐ Pinch, Grab, Roll	☐ Internal Obstruction	☐ Oxygen Deficient
☐ Engulfment	☐ Other (specify) _____		

*Note: The health effects of the contaminant(s) need to be discussed with the team prior to entry. Smoking is prohibited.

Section 3: Lock-Out/Tag-Out/Isolation

Pipes/Valves	☐ Yes	☐ No	☐ N/A	Pipes/valves closed, multiple locked, and tagged.	Initials: _____
	☐ Yes	☐ No	☐ N/A	Pipes blanked.	Initials: _____
	☐ Yes	☐ No	☐ N/A	Vents/drains blocked.	Initials: _____
Electrical	☐ Yes	☐ No	☐ N/A	Switches / Lines off, multiple locked, and tagged.	Initials: _____
Mechanical	☐ Yes	☐ No	☐ N/A	Pumps, motors and other mechanical devices off, multiple locked, and tagged.	Initials: _____

Other: _____

Section 4: Personal Protective/Safety Equipment Assessment

☐ Faceshield	☐ Alarm/Air Horn	☐ Airline/5 minute escape	☐ Tripod escape unit/hoist
☐ Hard hat	☐ Signage, barricades, etc.	☐ Coveralls, other: _____	☐ Fire Extinguisher
☐ Hearing protection	☐ Gloves, other: _____	☐ Spark Resistant Tools	☐ Fall Protection Device
☐ Steel-toed shoes	☐ Tyvek suit	☐ Radios, telephone, etc.	☐ Intrinsic lighting & tools
☐ Rubber boots	☐ PVC/Splash suit	☐ First Aid Kit	☐ Other: _____
☐ Portable eyewash	☐ Air-purifying respirator	☐ Escape harness/lifeline	☐ Other: _____

Note: MN requires a hoist and harness for all Class II and III entries and otherwise for all permit-required entries greater than 5 feet. An eyewash is needed if the CS contains corrosives. OSHA requires a mechanical device to be available to retrieve personnel from vertical spaces more than 5 feet (1.52 meters) deep. A SCBA is required on standby for all MN Class III entries.

Section 5: Air Monitoring

Test(s) Required	Instrument/Model & Serial Number	Permissible Entry Level	Date: Time:	Date: Time:	Date: Time:	Date: Time:	Date: Time:
% O_2		≥ 19.5% and < 22.0%					
% LEL		< 10%					
ppm CO		< 35 PPM					
ppm H_2S		< 5 PPM					
ppm VOC		See HASP					
Other							
Other							
		Tester's Initials:					

Equipment will be calibrated in accordance with manufacturers' guidelines.

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Section 6: Authorized Entrants/Attendants within Permit Space

I understand that I have reviewed this permit and know my job function and procedures necessary to accomplish this task safely.

Entrant	Signature	Time In	Time Out	Time In	Time Out	Time In	Tune Out
Entrant	**Signature**	**Time In**	**Time Out**	**Time In**	**Time Out**	**Time In**	**Tune Out**

Section 7: Confined Space Certifications

Based on the hazard assessment, the following entry procedure will be followed:

☐ Non-Permit Entry ☐ Alternate Entry ☐ Permit Required Entry

I certify that all required precautions have been taken and necessary equipment and emergency response is provided for safety entry and work in this confined space:

Signature of Entry Supervisor Authorizing Entry Date/Time _____

DURATION: This permit is approved for _____hours on this day. Only the entry supervisor can extend this permit to a maximum of 12 hours.

Section 8: Emergency Response Support for Permit Required Spaces

IDLH Conditions are Present or Possible (Note: If Yes, then responders must be on site during entry.) ☐ Yes ☐ No

Name and Phone Number of Emergency Responders: _____

Called Responders to Brief and Confirm Availability: ☐ Yes ☐ No ☐ Not Applicable

CRA Incident Reporting Hotline Number: 866-529-4886 See Responder Evaluation Form.

Section 9: Task Completion and Permit Close-Out

Verification of System Line Restoration (Removal of locks, tags, blanks, blocks, etc.) ☐ Yes ☐ No ☐ N/A

I certify that this permit is finalized and closed out.

_____ _____

Entry Supervisor (Print and Sign Name) Date/Time

This Permit must be sent to Linda DiBartolomeis in Niagara Falls. Confined Space entry permits must be kept on file for a period of 1 year. If there are any questions, call the Regional Safety Manager. Copies may be placed in the project file if required.

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CRA EVALUATION FORM
FOR EMERGENCY RESCUE SERVICES
IN PERMIT REQUIRED CONFINED SPACES

Directions: This evaluation must be completed initially and then annually for sites and/or facilities which rely on community/local rescue services to provide emergency rescue services to their permit-required confined spaces. The rescue service should visit each site and/or facility to view all permit-required confined spaces and review their potential hazard(s). All questions must be answered satisfactorily in order to be able to list 911 on the CS permit and rely on the rescue service. It is acceptable to work with and assist rescue services in achieving a satisfactory evaluation.

Name of Service: _____ Contact's Name: _____

Emergency Phone No.: _____ Business Phone No.: _____

		Yes	*No*
1.	Does the rescue service have the ability, in terms of proficiency, with rescue-related tasks and equipment?	☐	☐
2.	Will the rescue service stand by (on site) at the permit space for IDLH or potential ILDH atmospheres? The cost for providing this service is $_____.	☐	☐
3.	Can the rescue service respond in a 10 to 15-minute timeframe for non-IDLH situations (i.e., mechanical hazards that may cause broken bones, abrasions, etc.)? The availability of the rescue service is (i.e., 24 hours a day or are there times when key personnel would not be available)? _____	☐	☐
4.	Does the rescue service:		
	A. Provide all required PPE and equipment that may be needed at the site and/or facility? If no, CRA will provide. _____.	☐	☐
	B. Train rescue personnel annually in accordance with the standard?	☐	☐
5.	Will the rescue service commit to providing rescue services to the site and/or facility?	☐	☐
6.	Is there an adequate method of communication between the attendant and rescue service to summon help?	☐	☐
7.	Has the rescue service practiced rescues or successfully performed a permit space rescue within the last 12 months?	☐	☐

Evaluation Completed By:

_____	_____	_____
Name (Print)	Signature	Date

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