Appendix J

Supporting Deliverables

100031210

Attachment 1 – Health and Safety Plan - Northern Impoundment

Provided as Part of Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

June 17, 2024

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Emergency Contact List

Emergency Information		
Contact	**Phone Number**	**Site Location, Hospital & Clinic Directions**
Local Police: Harris County Constable Baytown Police Department	911 (713) 637-0014 (281) 422-8371	Northern Impoundment: 18001 East Freeway Service Road Channelview, Texas 77530 (29.795230, -95.066734)
Local Fire Department: Channelview Fire Department	911 (281) 452-5782	
Ambulance	911	
Local Hospital: Houston Methodist Baytown Hospital Address: 4401 Garth Road Baytown, Texas 77521	(281) 420-8600	Hospital Directions: Get on I-10 East (1.4 mi) Keep right at fork to continue on TX-330 Spur South following signs for Baytown (1.6 mi) Take the Wade Rd/Baker Rd exit (0.2 mi) Merge onto Decker Dr. (1.1 mi) Turn left onto W Baker Rd (2.1 mi) Turn right (400 ft.) Turn right (351 ft.) Turn right at the 1st cross street (128 ft.) Destination will be on the right Driving Time: 14 minutes Driving Distance: 7.9 miles
Work Care Clinic: Occupational Healthcare Address: 610 S. Main Street Highlands, Texas 77562	(281) 843-2441	Occupational Healthcare Directions: Merge onto I-10 East (1.3 mi) Take exit 787 for Crosby - Lynchburg Rd (0.1 mi) Use any lane to turn left onto Crosby - Lynchburg Rd/S Main St Continue to follow S Main St and destination will be on the left Driving Time: 7 min Driving Distance: 3.9 miles
National Poison Center	(800) 222-1222	
National Response Center	(800) 424-8802	
State Emergency Response System	(512) 424-2138	
EPA Environmental Response Team	(201) 321-6600	
United State Coast Guard	(713) 578-3000	
Implementing Party(ies) Project Manager Work: Cell:		
Project Coordinator Work: Cell:		
Site Supervisor Work: Cell:		
On-Site Health and Safety Officer Work: Cell:		
Other Contacts Work: Cell:		
Person to verify hospital route:	Signature	

1. Introduction

This Health and Safety Plan (HASP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (work site). This HASP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Final 100% Remedial Design for the Northern Impoundment (Northern Impoundment 100% RD) submittal to the EPA.

This HASP was developed to outline potential activities to be performed to protect personnel from physical, chemical, and all other hazards that may be encountered during implementation of the remedial action (RA), which is described in detail in the Northern Impoundment 100% RD. Prior to initiation of RA activities, the selected remedial contractor (RC) will either update this HASP or develop its own HASP to address the components outlined in this document. This HASP was prepared in accordance with the EPA Emergency Responder Health and Safety and Occupational Safety and Health Administration (OSHA) requirements under 29 Code of Federal Regulations (CFR) 1910 and 1926, as specified in the SOW. References in this HASP to the “work site” are to the Northern Impoundment and references to “Implementing Party” are to the entity(ies) implementing the RA for the Northern Impoundment.

1.1 Background

The work site is located in Harris County, Texas, east of the City of Houston, between two unincorporated areas known as Channelview and Highlands. The Northern Impoundment is approximately 15 acres in size and is located on a small peninsula and includes surrounding in-water and upland areas of the San Jacinto River that extends north of Interstate Highway 10 (I-10).

The primary hazardous substances identified in the subsurface within the Northern Impoundment are polychlorinated dibenzodioxins and polychlorinated dibenzofurans.

1.2 Purpose

The purpose of this Site-specific HASP for the Northern Impoundment is to provide specific guidelines and establish procedures for the protection of personnel performing the activities described in Section 2. The HASP is a living document, in that it must continually evolve as work site conditions and knowledge of work activities develop. As previously stated, prior to initiation of Northern Impoundment RA activities, the RC will update this HASP or develop its own HASP to address the components outlined in this document.

1.3 Stop Work Authority

All employees will be empowered and expected to stop the work of co-workers, subcontractors, Implementing Party employees, or other contractors if any person’s safety or the environment are at risk. No repercussions will result from such an action.

During the Northern Impoundment RA, the discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the removal of work site personnel from that area and re-evaluation of the hazard and the levels of protection.

1.4 Personnel Requirements

All personnel conducting activities at the work site must conduct their activities in compliance with all applicable health, safety and environment (HSE) requirements at both state and federal levels to include, but not limited to, the Texas Administrative Code (TAC), 29 CFR 1910, 29 CFR 1926, and associated policies and procedures. OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) standards (in general industry, 29 CFR 1910.120; and construction 29 CFR 1926.65) establish health and safety requirements for employers and require that employers follow specific work policies, practices, and procedures to protect their workers potential exposure to hazardous substances. The policies and practices, and procedures are incorporated into this document.

Project personnel must also be familiar with the procedures and requirements of the Site-specific HASP. In the event of conflicting safety procedures/requirements, personnel must implement those safety practices affording the highest level of safety and protection.

1.5 Project Management and Safety Responsibilities

The organizational structure of this HASP is consistent with OSHA requirements in 29 CFR 1910.120(b)(2) and, for purposes of the Northern Impoundment RA, outlines project management and safety responsibilities, as described below.

Project Coordinator

The Project Coordinator (PC) or the equivalent will be responsible for the overall implementation of the HASP, and for ensuring that all HSE responsibilities are carried out in conjunction with this project. These responsibilities will include, but are not limited to, review and approval of the HASP, qualifying and directing subcontractors relative to HSE performance, coordinating all HSE submittals, and consultation with the Site Supervisor (SS) regarding appropriate changes to the HASP.

Site Supervisor

The SS or the equivalent is the person who, under the supervision of the PC, will be responsible for the communication of work site requirements to project personnel and subcontractors. These responsibilities will include, but are not limited to, the following:

1. Conducting a daily safety meeting that communicates the work site-specific hazards for the operations that day and identifies proactive measures that will minimize the hazards.
2. Implementing procedures to confirm that all necessary clean-up and maintenance of safety equipment is conducted by project personnel.
3. Verifying that emergency phone numbers and information about emergency services, including hospital and clinic locations, is current.
4. Developing Job Safety Analysis (JSA) forms for all work tasks and revising them as appropriate.
5. Implementing procedures so that required forms are completed, filed, and submitted correctly, including those related daily safety meetings and completion of daily inspection checklists.
6. Requiring that a pre-entry briefing is conducted and documented, and serves to familiarize on-site personnel with the procedures, requirements, and provisions of the HASP.

Other duties will include responsibility for overall implementation of the HASP and for ensuring that all HSE responsibilities are carried out. These additional responsibilities will include, but are not limited to, review and approval of the HASP, communication of work site requirements to subcontractor personnel, and consultation with the Implementing Party/work site representative regarding appropriate changes to the HASP.

The SS will also be assigned responsibility for enforcing safe work practices for project employees. In that role, the SS will watch for ill effects on personnel, especially those symptoms caused by cold/heat stress or chemical exposure and

oversee the safety of visitors who enter the work site. The SS may also be assigned responsibility for communications with the Implementing Party/work site representative(s).

Other specific duties of the SS will include:

– Ordering the immediate shutdown and/or stop work of activities in the case of a medical emergency, unsafe condition, or unsafe practice.
– Providing the safety equipment, personal protective equipment (PPE), and other items necessary for employees.
– Enforcing the use of required safety equipment, PPE, and other items necessary for employee or community safety.
– Conducting work site inspections as a part of quality assurance for HSE.
– Reporting HSE concerns to work site and/or project management, as necessary.

The SS will be selected based upon their qualifications to meet the duties outlined above.

Health and Safety Officer

The health and safety officer (HSO) will be responsible for assisting in the communication of work site requirements to project personnel and subcontractors and for carrying out the health and safety responsibilities, including those listed under the SS. The HSO operates under the supervision of the PC and SS.

Site personnel

Employees will be responsible for their own safety as well as the safety of those around them. Employees and subcontractors will be required to use any equipment that is provided in a safe and responsible manner, as directed by their supervisor.

Employees will be directed to take the following actions when appropriate:

– Engaging in all aspects of their tasks and jobs when they are prepared to do the job safely, well rested, and mentally prepared for work.
– Implementing Stop Work Authority for any operations that may cause an imminent health hazard to employees, subcontractors, or others.
– Assisting in the development and revision of Job Safety Analysis (JSA) forms that are appropriate to their current scope of work.
– Use, inspect and maintain PPE as required by JSA and work site conditions.
– Inspecting tools and other equipment before each use or as manufacturer dictates and documenting any defects.
– Correcting work site hazards, when possible, without endangering life or health.
– Reporting safety and health concerns to the SS, PC, or HSO (if appointed).

Subcontractors

Subcontractors will each be responsible for:

– Developing and implementing their own HASP and complying with its contents.
– Attending an initial site orientation and subsequent safety meetings.
– Ensuring that their employees adhere to all site personnel requirements.
– Submitting required documentation to the SS regarding federal, state, or local requirements before beginning any work.
– Obtaining approval for the use of another contractor’s equipment.
– Observing and obeying all RC/client requirements as well as any specific direction given by the RC's management team.
– Wearing appropriate PPE at all times as required by their HASP and the RC.

– Meeting all governing legislation/regulation/industry standards for equipment used at the work site.
– Verifying that all subcontractor employees have required training, medical clearance, and substance abuse testing as required by project.
– Not being in possession or under the influence of alcohol, incapacitating drugs or medications.

In the event of conflicting safety procedures or requirements, the subcontractor's personnel will be required to implement those safety practices that afford the highest level of safety and protection. Subcontractors will be required to attend an initial work site orientation and subsequent safety meetings.

Equipment Operators

All equipment operators must meet all the requirements of site personnel listed above and will be responsible for the safe operation of heavy equipment. Operators are responsible for conducting documented daily inspections on their equipment to ensure safe performance. 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. Daily inspections must be provided to the RC SS prior to the equipment being used.

Authorized Visitors

Authorized visitors will be provided with all relevant information with respect to Northern Impoundment RA operations and hazards as applicable to the purpose of their visit and should be accompanied by personnel familiar with the work site's layout and procedures. All work site visitors must comply with PPE requirements as stated in Section 4.

1.6 Site HASP Amendments

During the Northern Impoundment RA, any change to the scope of work must be evaluated for its impact on the overall health and safety aspects of the project and on associated personnel and to determine if modifications to the then -applicable HASP are required. A minor change would be one that mitigates hazards that are already documented within the HASP and would not expose work site personnel to chemicals above exposure limits, such as the introduction of a new JSA or PPE that does not involve a change in respiratory protection. Amendments to the HASP are to be documented, in addition to notifying key personnel.

Significant changes to the scope of work will require a rewrite and review/approval of the HASP.

1.7 Training Requirements

All personnel conducting work at the work site are to have completed the appropriate HSE training as applicable to their job tasks/duties. Training requirements are consistent with the requirements of 29 CFR 1910.120(e) and (q)(11) and are referenced throughout this HASP.

1.7.1 Site-Specific Training

It is required that an initial site-specific training session or briefing be conducted by the PC, SS, or HSO prior to commencement of Northern Impoundment RA work activities. During this initial training session, employees will be instructed on the following topics:

– Personnel roles and responsibilities, in regard to HSE.
– Content and implementation of the HASP.
– Work site hazards and controls.
– Site-specific hazardous procedures.
– PPE requirements.
– Emergency information, including local emergency response team phone numbers, route to nearest hospital, incident reporting procedures, and emergency response procedures.

– Instruction in the completion of required inspections and forms.
– Location of safety equipment, such as portable eyewash, first aid kit, fire extinguishers, etc.

The training may include presentation of various components of this HASP, followed by an opportunity for attendees to ask questions. Personnel should not be permitted to enter or perform work at the work site until they have completed the site-specific training session.

Visitors will be given a site-specific briefing to provide information about work site hazards, the work site layout, including work zones, emergency evacuation procedures, and other pertinent HSE requirements, as appropriate.

1.7.2 Safety Meeting/HASP Review

Daily safety meetings will take place each day prior to beginning the day's work and all work site personnel will be required to attend these safety meetings, to be conducted by the SS or a designee. The safety meetings should cover specific HSE issues, including the appropriate JSAs, work site activities, changes in work site conditions, and a review of topics covered in the site-specific pre-entry briefing. The safety meetings should be documented each day with written sign-in sheets containing a list of topics discussed.

1.7.3 Fatigue Management

RC personnel and subcontractors are responsible for ensuring they are both physically and mentally fit to perform their job functions safely. The RC will use the following control measures to minimize fatigue during the project:

– Alter the work schedule to reduce the overall time a worker will perform physically demanding work.
– Monitoring employee behaviors for signs of fatigue.
– Eliminate or reduce where practicable the need to work extended hours, night shifts, or overtime.
– Use work-rest patterns during repetitive tasks to control fatigue and increase mental fitness.

The work/rest balance requirements are referenced based on weight of the vehicle. For vehicles weighing less than 10,000 lbs./4536 kg (passenger cars, pickup trucks, SUV), personnel will follow the following guidelines:

– Maximum working time and/or driving and working time within one work day: 14 hours (extendable up to 16 hours if drive time< 4 hours and/or airplane travel is involved; this approach can be taken three times in a 7 day period).
– Maximum continuous drive time: 3 hours followed by a 15-minute break.
– Maximum drive time per day: 9 hours (extendable up to 10 hours twice in 7-day period).

Personnel that drive vehicles greater than 10,000 lbs./4,536 kg must meet the requirements of the transportation agency for which they work and travel.

1.7.4 Medical Surveillance Program

Medical surveillance requirements should be based on a worker's potential for exposure as determined by the work site characterization and job hazard analysis and as required by 29 CFR 1910.120(f)(2).

A work site medical surveillance program will be developed that provides that if a worker is injured, becomes ill, or develops signs or symptoms of possible over-exposure to hazardous substances or health hazards, medical examinations are provided to that worker, as soon as possible after the occurrence and as required by the attending physician.

Medical examinations and procedures are performed by or under the supervision of a licensed physician and are provided to employees free of cost, without loss of pay, and at a reasonable time and place. The need to implement a more comprehensive medical surveillance program will be re-evaluated in the event of an over-exposure incident.

2. Work Site Operations

2.1 Background

The Northern Impoundment is located in Harris County, Texas, east of the City of Houston, between two unincorporated areas known as Channelview and Highlands. In 1965 and 1966, pulp and paper mill waste was reportedly transported by barge from the Champion Paper, Inc. paper mill in Pasadena, Texas, and deposited in the Northern Impoundment. The Preliminary Site Perimeter established by EPA for the Remedial Investigation (RI) encompasses this impoundment and the surrounding in water and upland areas of the San Jacinto River. The Northern Impoundment is located immediately north of the I-10 Bridge over the San Jacinto River.

The remedy selected by the EPA for the Northern Impoundment, as outlined in the Record of Decision (ROD), includes the excavation and off-site disposal of waste material located beneath the TCRA armored cap such that the resulting surface is below the prescribed clean-up concentration of 30 ng/kg $TEQ_{DF,M}$. As described in the ROD, the selected remedy is to utilize a BMP, such as a cofferdam, to isolate the excavation area from the river.

The excavation areas that will be part of the Northern Impoundment RA activities have been determined based upon soil sampling data from the RI conducted in 2011 and 2012, the Pre-Design Investigations (PDI) conducted in 2018 and 2019, and the Supplemental Design Investigation (SDI) conducted in 2021.

The excavation approach will include (1) installation of a physical BMP around the perimeter of the Northern Impoundment, (2) removal of river water prior to removal of the TCRA armored cap, (3) removal of the waste material with land-based excavation and/or mechanical dredging equipment working within a seasonal cell, removing the TCRA armored cap as work progresses (while leaving in place the portions of the TCRA armored cap not being excavated), (4) placing an engineered cap over the exposed slope of the seasonal cell limit of excavation at the end of each excavation season, and (5) treatment and discharge of water.

Based on the updated excavation limits, the approximate volume of waste material in the Northern Impoundment is 230,000 cubic yards. To facilitate a seasonal excavation approach, the total volume of material will be divided into multiple cells, with a single cell excavated each excavation season.

2.2 Scope of Work

The scope of work for the Northern Impoundment RA is defined in the Northern Impoundment RD, as approved by the EPA pursuant to the AOC.

This HASP will cover the specific work site activities that are expected to be conducted by personnel and their subcontractors during the Northern Impoundment RA. These activities are expected at a minimum to include:

- Mobilization/demobilization of personnel, materials, and equipment to and from the work site.
- Northern Impoundment remediation activities.
  - Work site preparations, temporary facilities, and fencing
  - Installation and removal of Engineered Barrier BMP
  - Excavation
  - Water Treatment System construction, operation, and demobilization
  - Transportation and Disposal
  - Monitoring and Controls
- Over-water and near-water activities
- Heavy equipment spotting
- Surveying activities

– Lifting and rigging activities
– Equipment fueling
– Soil sampling
– Decontamination of personnel and equipment

Upon selection of the RC, this HASP will be updated, or one will be developed to address the scope of work in the approved Northern Impoundment RA and the specific hazards associated with that scope of work. The RC will also be expected to develop task specific JSAs for tasks involved in Northern Impoundment RA activities, which will include the activities listed above, in accordance with the job hazard analysis requirements of 29 CFR 1910.120(b)(4)(ii)(A) and the workplace hazard assessment requirements of 29 CFR 1910.132(d).

3. Hazard Evaluation

This section identifies and evaluates potential chemical, physical, and biological hazards that may be encountered during implementation of the Northern Impoundment RA, in compliance with 29 CFR 1910.120(b)(4)(ii)(A), 1910.120(c) and 1910.120(i). These hazards and any discussion regarding anticipated initial exposure levels are based on information developed in connection with the Northern Impoundment RD.

3.1 Chemical Hazards

The chemical hazards associated with conducting work site operations are expected to include the potential exposure to contaminants encountered during field activities, such as removal and handling of cap materials, removal and handling of waste materials (via excavation or dredging), dewatering, sampling, decontamination of equipment, and the use of support products, such as fuel. The potential routes of exposure from these products during normal use may occur through inhalation of vapors and dusts, or direct contact or absorption with the materials.

The chemical hazards of concern that may be encountered during the tasks identified in the project's scope of work are listed in Table 1, and include: dioxins, furans, and polychlorinated biphenyls (PCBs). Information about those chemical hazards is included in Table 1, which includes exposure limits, signs and symptoms of exposure, chemical properties, and physical characteristics. The RC will consult the RI Report to evaluate whether or not additional chemical hazards of concern warrant inclusion in the site-specific HASP.

3.1.1 Chemical Hazard Controls

It is recommended that exposure to potential work site contaminants/chemicals during implementation of the Northern Impoundment RA be controlled by:

– Monitoring air concentrations with appropriate equipment in the breathing zone.
– Engineering controls such as wetting the area, ventilation, or elimination.
– Administrative controls such as work rotation or training.
– Using PPE, as appropriate, in areas known to have concentrations above the specified action level for each contaminant.

JSAs are developed and revised to list the associated hazard controls on a task-specific basis.

3.1.2 Skin Contact and Absorption Contaminants

Skin contact with chemicals will be controlled by use of the proper PPE and good housekeeping procedures. PPE (e.g., Tyvek®, gloves) as described in Section 4 will be required for all activities where contact with potentially harmful

media or materials is anticipated. Any such requirements should utilize applicable data on permeation and degradation to minimize skin contact potential.

3.1.3 Hazard Communication/WHMIS

It is recommended that personnel required to handle or use hazardous materials, as part of their job duties, be trained and educated in accordance with the Workplace Hazardous Materials Information System (WHMIS) standard as applicable. Such training may include instruction on the safe use and handling procedures of hazardous materials, how to read and access safety data sheets (SDSs), and the proper labeling requirements.

When working with hazardous chemicals, readily available and up-to-date SDSs are required for each chemical. RC personnel and subcontractors will be responsible for obtaining and maintaining SDSs for their controlled products and for products that they are bringing onto the work site. An inventory of SDSs will be maintained at the work site and will be readily available to all work site personnel and visitors.

3.1.4 Container Labels

All hazardous materials, hazardous waste, chemical containers, and chemical storage areas will be appropriately labeled indicating the chemical identity, hazards present, and any relevant regulatory requirements. Labeling of all chemical containers assists emergency personnel and others in identifying hazards if a spill occurs or emergency situation arises.

Chemical container labeling is the responsibility of the individual who fills and/or uses the chemicals. All containers into which chemicals are transferred will be legibly labeled and include the name of the chemical and appropriate hazard warnings.

3.1.5 Flammable and Combustible Liquids

The storage, dispensing, and handling of flammable and combustible liquids should be handled in accordance with industry standards, such as National Fire Protection Agency (NFPA) guidelines. The specific flammable or combustible liquids to be used at the work site may include gasoline, diesel, kerosene, oils, and solvents. The following are requirements to be applied to the handling of such liquids.

Flammable and combustible liquids are classified according to flash point. This is the temperature at which the liquid gives off sufficient vapors to readily ignite. Flammable liquids have flash points below 100 degrees Fahrenheit (°F) (37.8 degrees Celsius [°C]). Combustible liquids have flash points above 100°F (37.8°C) and below 200°F (93.3°C). Any oil container that is 55 gallons or more in volume will require secondary containment.

Storage

Many flammables can ignite at temperatures at or below room temperature. They are far more dangerous than combustibles when they are heated. As a result, these products must be handled very carefully. At normal temperatures, these liquids can release vapors that are explosive and hazardous to employee health. Exposure to heat can cause some of these liquids to break down into acids, corrosives, or toxic gases. For this reason, flammable and combustible liquids should be stored in cool, well-ventilated areas away from any source of ignition. Always consult the MSDS of the product for specific information.

Flammable and combustible liquids should be stored in designated areas. Such areas should be isolated from equipment and work activity that may produce flames, sparks, heat, or any form of ignition, including smoking. The most practical method is the use of one or more approved (commercially available) flammable/combustible liquid storage cabinets.

Cabinets must be labeled “Flammable - Keep Fire Away.” Doors should be kept closed and labeled accordingly. Containers should be kept in the cabinet when not in use.

General Requirements

- Keep containers of flammable/combustible liquids closed when not in use.
- Keep flammable/combustible liquids in designated areas and approved cabinets.
- Do not allow use of unapproved containers for transfer or storage. Use only approved safety cans (5-gallon maximum) with a spring closing lid and spout cover, designated to safely relieve internal pressure when exposed to heat or fire.
- Use only approved self-closing spigots, faucets, and manual pumps when drawing flammable/combustible liquids from larger containers/barrels.
- Use only approved metal waste cans with lids for disposal of shop towels/oily rags.
- Designate “Smoking” and “No Smoking” areas.
- Designate fueling areas.
- Observe all signs indicating “No Smoking,” “No Flames,” and “No Ignition.”

Transferring Flammable/Combustible Liquids

This seemingly routine task can be hazardous if certain precautions are not followed. Grounding and bonding should be observed at all times to prevent the accumulation of static electricity when transferring containers/barrels one to another. Bonding is necessary between conductive containers (e.g., a barrel and a 5-gallon container).

3.2 Physical Hazards

Physical hazards that may be present during implementation of the Northern Impoundment RA are detailed below. In addition, personnel should be made aware that wearing PPE may limit dexterity and visibility and may increase the difficulty of performing some tasks.

3.2.1 Heavy Equipment

The following practices will be adhered to by personnel operating heavy equipment and personnel working in the vicinity of heavy equipment:

- Heavy equipment is to be inspected when equipment is initially mobilized, delivered to the work site, or after it is repaired and returned to service, to ensure that it meets all manufacturer and OSHA specifications (e.g., fire extinguishers, backup alarms, etc.).
- Heavy equipment brought to the work site should be in clean and proper working condition.
- Heavy equipment is to be inspected on a daily basis and the inspections documented.
- Heavy equipment is only to be operated by authorized, competent operators.
- Operators are to conduct a 360-degree walk around the equipment prior to entering the equipment.
- Seat belts/restraining devices are to be used on heavy equipment that is not designed for stand-up operation.
- Equipment/vehicles whose payload is loaded by crane, excavator, loader, etc. will have a cab shield and/or canopy to protect the operator.
- Personnel will not be raised/lowered in buckets.
- Personnel will not ride on fender steps or any place outside the cab.
- Before leaving the equipment controls, operators are to ensure that the equipment is in its safe resting position or cribbed in a “dead” or neutral position. No controls are abandoned while under load.
- Before raising any booms, buckets, etc., personnel are to check for overhead obstructions. All overhead hazards should be identified in the JSAs.
- Personnel are to wear high visibility safety vests where any vehicular traffic occurs.

– A competent spotter will be used when moving heavy equipment, working within 10 feet of a stationary object, encroaching overhead utilities clearance minimums, in tight quarters, or with limited visibility.
– Working areas are properly delineated to keep unauthorized individuals out. Personnel should never proceed into a work zone without making eye contact and receiving authorization from the operator or spotter to cross the path of heavy equipment. Authorization is given from outside the blind or crushing zones of the equipment.

3.2.2 Noise

Hearing protection is required for project activities that include working in close proximity to heavy equipment and/or drilling operations, or using power tools that generate noise levels exceeding the decibel range of 85 decibels measured on the A-weighted scale (dBA). Hearing protection (earplugs/muffs) will be available to personnel and visitors requiring entry into these areas.

Noise monitoring will be conducted in accordance with the hearing conservation program. The hearing conservation program requires monitoring of noise exposure levels in a way that identifies employees exposed to noise at or above 85 decibels (dB) averaged over 8 working hours, or an 8-hour time-weighted average (TWA).

3.2.3 Utility Clearances

Extreme caution is needed when working around electrical power lines. Electricity flows through metal, wood, and many other conducting materials. Elevated superstructures (e.g., drill rigs, backhoes, scaffolding, ladders, cranes) will remain a distance of at least 10 feet away from utility lines (<50 kilovolts [kV]) and at least 20 feet away from power lines (>50 kV). For power lines rated over 50 kV, minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV, over 50 kV, or twice the length of the line insulator, but never less than 10 feet.

Underground utilities, if present, are to be clearly marked and identified prior to commencement of work. Local/state regulations and Implementing Party requirements with regards to utility locating requirements (e.g., One-Call) will be followed. The Texas811 One-Call service can be reached by dialing 811 or 1-800-344-8377.

Personnel involved in intrusive work will:

– Confirm proposed excavation(s) and heavy truck routes are not in the area of subsurface utilities.
– Pre-clear holes to 120% of the drill diameter to a minimum depth of 5 feet below ground surface. Consider pre-clearing to greater depths if in close proximity to process piping, such as loading racks.
– Locate boreholes a minimum distances of 5 feet perpendicular from utility mark-out lines.
– On private property, request that the owner of the service locate and mark the service.
– If a service may pose a hazard and cannot be shut off or disconnected, request that the owner of the service supervise the uncovering of the service during the work.
– Identify the work that can be conducted with the assistance of the locator line service, coordinate document drawing review, and inspect the work site for manholes, catch basins, valve boxes, etc. that may indicate the direction/depth of underground installations. Marking indicates only the approximate location of buried lines.

The following are the Uniform Color Codes for utility locates:

– White: proposed excavation
– Pink: temporary survey marking
– Red: electrical power lines, cables, conduit and lighting cables
– Yellow: gas, oil, steam, petroleum or gaseous material
– Orange: communication, alarm or signal lines, cables or conduit
– Blue: potable water
– Purple: reclaimed water, irrigation and slurry lines

– Green: sewers and drain lines

If personnel must expose a line, state law requires contractors to protect and support the underground facility line while working at the work site. Refer to the *Texas Utilities Code, Title 5, Chapter 251*, *and TAC Title 16, Chapter 18* for additional guidance.

3.2.4 Drilling Equipment

Personnel should minimize time spent in close proximity to an operating drill rig, including during setup/teardown time. It is critical to maintain a safe work distance from the drill rig crew to allow them the necessary room to perform their tasks. Personnel should only be near the drill rig when their work activity, such as air monitoring, soil sampling, and/or confirmation of borehole locations, dictates.

Drill crew staff will be responsible for all activities related to drill rig setup and operations. The drilling contractor will brief the RC personnel and the rig crew during the daily safety meeting on the rig's critical safety features and identify known hazards when working near the rig.

The SS or HSO will ensure the following:

– All PPE and protective hazard mitigations are in place prior to work starting.
– JSAs are reviewed and applied.
– A daily inspection is completed and documented by the operator to ensure that the equipment is functioning as intended.
– The emergency switches are functional and verified to be operational during the documented daily equipment check.
– All utility clearances are obtained, reviewed, understood, and confirmed before drilling activities begin.
– No rig operators will be wearing any loose-fitting clothing, including untied shoe/boot laces, drawstrings, etc., due to the potential of being caught in rotating machinery.
– Overhead hazards including utility lines are checked.
– Before the mast of a drill rig is raised, the drill rig is first leveled and stabilized with leveling jacks and/or cribbing, the drill rig is re-leveled if settling occurs after initial setup, the mast is lowered only when the leveling jacks are down, and the leveling jack pads remain deployed until the mast is lowered completely.
– The work area is properly demarcated with rope, caution tape, and fencing, and marked or posted to keep the area clear of pedestrian traffic or spectators.
– Before leaving the controls, the operator shifts the transmission controlling the rotary drive into neutral and places the feed lever in the neutral position.
– Before leaving the vicinity of the drill, the operator shuts down the drill engine.

3.2.5 Vacuum Trucks

Working around vacuum trucks can be dangerous because of the operator's limited field of vision and the noise levels that can be produced by the truck. The following practices shall be adhered to by operators and any other personnel working around vacuum trucks:

– All vacuum trucks must arrive at the work site empty of any product in the cargo tank. Product in the tank can cause cross contamination and a potentially explosive atmosphere within the tank.
– Vacuum trucks cargo tank will be depressurized.
– Before beginning operations, operators shall conduct an inspection and document their findings on the inspection checklist.
– Vacuum trucks shall be operated in accordance with manufacturers specifications.
– Parking brakes shall always be applied on parked equipment.

– All personnel shall leave the vacuum truck cab during loading and offloading operations.
– All personnel around the vacuum truck shall wear hearing protection while the vacuum truck is in operation.
– Atmospheric air monitoring shall be conducted prior to and during operations involving hazardous materials.
– The vacuum transfer system shall be bonded to achieve a continuous conductive path from the truck through the hose and nozzle to the tank or other container and grounded to earth. Grounding may be achieved by connecting to any properly grounded object like a metal building, tank frame, a fire hydrant, or a metal light post.
– Vacuum truck operators shall monitor the transfer operation and be ready to quickly close the product valve and stop the pump in the event of a blocked line or release of material.
– All vacuum trucks being used in the exclusion zone shall remain in the exclusion zone until decontaminated.

3.2.6 Vehicle Traffic and Control

The following safety measures will be taken by personnel that have the potential to be exposed to vehicle traffic:

– A high visibility safety vest meeting American National Standards Institute (ANSI) Class II garment requirements is to be worn at all times.
– Cones and other visible markers will be used to demarcate a safe work zone around the active work zone(s).
– Appropriate signage will be posted as necessary, to inform roadway/parking lot users of any additional control measures necessary.
– A flagger may be required to alert roadway users of trucks entering or the roadway.

Additionally, **when working on an active roadway or along the shoulder or side of the road is necessary**, project personnel should follow the requirements presented in the Manual on Uniform Traffic Control Devices (MUTCD), which is found at: http://mutcd.fhwa.dot.gov/pdfs/2009r1r2/pdf_index.htm.

A Temporary Traffic Control Plan (TTCP) may need to be developed. The RC will work with the Implementing Party, along with the local municipality (Harris County Engineering Department and the Texas Department of Transportation [TxDOT]), to determine if a TTCP is required.

Temporary traffic control (TTC) procedures standardize and clarify minimum expectations for practices of TTC when performing field activities on or within 3 meters (10 ft) of active roadways. Following the requirements of this procedure helps to reduce the risk posed to employees from distracted drivers.

Responsibilities of SS and PC include the following:

– Identify and communicate areas on the work site that require proper TTC
– Identify personnel who complete the work and verify that they are adequately trained in TTC procedures, including documentation of training records
– Coach and guide personnel on the proper use and care of equipment required for TTC
– Provide and maintain required TTC equipment
– Complete work site inspections to ensure compliance with TTC procedures
– Prevent unauthorized entrance into the work zone

Responsibilities of personnel working on near active roadways consist of the following:

– Cooperate and comply with the TTC procedures contained herein and with procedures outlined by supervisor
– Inspect road area for hazards and revise JSA as needed
– Maintain equipment used for TTC
– Communicate any issues, including equipment condition, to SS
– Issue Stop Work Authority (SWA) if unable to adhere to this program

The levels of TTC are based on the task on hand, the proximity of the roadway, and the duration of the activity.

3.2.6.1 Traffic Control Level 2

Level 2 includes general street conditions that are not a highway, or for tasks such as monitoring, drilling, or inspection within 3 meters or 10 feet of an active roadway. Basic requirements for Level 2 include:

– Develop a JSA that follows the MUTCD or local equivalent for lane closures and redirection of traffic.
– Obtain a permit from the municipality if necessary.
– Adhere to a maximum speed limit of 50km/h or 30mph.
– Complete a safety and health review.
– Use equipment per MUTCD or local equivalent.

3.2.7 ATV/UTV Operations

This section provides the minimum requirements for safe work practices during the operation of all-terrain vehicles (ATVs) and utility task vehicles (UTVs) (i.e., Kawasaki Mule, Yamaha Rhino, John Deere Gator, etc.) as these vehicles are specifically designed for off road use only. These vehicles operate and maneuver differently than a passenger vehicle (i.e., cars, trucks, etc.) when driving on uneven terrain and or in muddy, rocky and heavily vegetated areas. Personnel having to use such vehicles will be required to be properly instructed and trained on the units prior to operation.

Personnel will be familiar with the operations and maintenance of the units according to the manufacturer's "owner's" manual.

Prior to operating these vehicles, authorized personnel will complete a daily inspection. Remove all debris (e.g., mud, weeds) from moving components and perform housekeeping in and around the cab area. Each vehicle shall be equipped with a minimum of a 2.5-pound ABC rated fire extinguisher and a high visibility flag that is set in a vertical position and extends at least 3 feet above the canopy or roll bar.

All authorized personnel shall operate such vehicles in a safe and responsible manner according to the owner's manual. Excessive speeding or horseplay will not be tolerated when operating these vehicles. Based on certain models and types of vehicles, seat belts are provided and must be worn by the operator and passenger at all times. These types of vehicles (model) are susceptible to tipping/rolling over when operations are being conducted on steep inclines. Avoid operating across bodies of water (e.g., rivers, creeks) until depth of water has been verified and confirmed by the operator.

Transporting of materials/supplies when using utility task vehicles should be loaded uniformly for weight distribution and secured. Refer to the owner's manual for maximum load capacities.

3.2.8 Material Handling and Storage

Material handling and storage practices will be conducted at the work site.

General Storage Practices

Storage of materials and supplies must not create a hazard. General storage area practices include the following:

– Bags, containers, bundles, etc. stored in tiers must be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse.
– All stacked materials, cargo, etc. must be examined for sharp edges, protrusions, signs of damage, or other factors likely to cause injury to persons handling these objects. Defects are to be corrected as they are detected.
– Storage areas must be kept free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.
– Storage areas have provisions to minimize manual lifting and carrying. Aisles and passageways provide for the movement of mechanical lifting and conveyance devices.

– Stored materials do not block or obstruct access to emergency exits, fire extinguishers, alarm boxes, first aid equipment, lights, electrical control panels, or other control boxes.
– Hazardous materials are stored in accordance with the details outlined in the MSDS, or accepted guidelines from reputable agencies. Guidelines include details about the materials reactivity, corrosivity, flammability, etc., as well as appropriate signage.

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 should provide the recipient with SDSs, which describe their hazardous characteristics and give instructions for their safe handling and storage.

It is recommended that the following special precautions be followed regarding the storage of hazardous materials:

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

3.2.9 Manual Lifting

Proper lifting reduces the risk associated with moving heavy objects. No one person should handle, lift, or move 50 pounds or more by themself. Even if the object weighs less than 50 pounds, the configuration or shape of the object should be evaluated to see if two people should be used to lift the object. The following will be considered prior to a lift.

– Establish that you can lift the load safely.
– Use a mechanical lifting device, if available.
– Inspect route to be travelled, confirming sufficient clearance.
– Look for any obstructions or spills along route.
– Inspect the object to determine how it should be grasped.
– Select and use containers with handles where practical.
– Look for any sharp edges, slivers, or other things that may cause personal injury.
– Do not move any object that will obstruct your field of vision when transporting the load.

When lifting objects, use proper lifting techniques. Position the body so that the weight of the body is centered over the feet (to provide a more powerful line of thrust and ensure better balance). Start the lift with a thrust of the rear foot and do not twist.

3.2.10 Working Near Water

The Northern Impoundment RA will involve working in areas where there is the potential for slipping or falling into water that is greater than 3 feet in depth. In that instance, a “no entry zone” will be established between the work area and the water hazard. The no entry zone will be clearly defined and/or demarcated by the RC.

– When working in or around water, implement the buddy system.
– When working at ground level, a 5-foot “no entry zone” may be established between the work area and the water hazard. The no entry zone is to be clearly defined and/or demarcated. Personnel will not be permitted to enter into this area unless the other provisions of this section are in place.
– Standard guardrails are required on any walking/working surface over or near water.
– Where guardrails are not practical due to impairment of work being performed, other types of safeguarding, such as safety harnesses, lifelines, and lanyards may be used.
– If providing fall protection is not feasible due to the scope of work or location, personnel will be required to wear U.S. Coast Guard approved life jackets or buoyant work vests. Prior to each use and after each use, the buoyant

work vests and life preservers must be inspected for defects that would affect strength and/or buoyancy. Any damaged or defective buoyant work vest or life preserver cannot be used.

– Call in or make prearranged contacts after each activity posing a drowning hazard is completed.
– If work on wet or slippery surfaces above water is necessary, non-slip tape or other methods are to be used to increase traction.
– Ring buoys with a minimum 90 feet of line must be readily available for emergency operations. The distance between buoys cannot exceed 200 feet.
– Due to the anticipated scope of work, a lifesaving skiff may be necessary. However, the SS in conjunction with the HSO will evaluate current work site conditions to determine if a skiff is required.

3.2.11 Boating Safety

Boating Safety

Safety precautions must be taken when project activities include working in or from a boat. It is a Texas requirement for operators of small boats or vessels to complete the Texas Parks and Wildlife Division (TPWD) Boater Education Course. This course can be taken online and must be completed prior to operating a boat or vessel over 15 horsepower.

The following summarizes key guidelines for the safe operation of boats:

1. An approved Type I, II, III, or V personal flotation device (PFD) must be available onboard for each person on the boat. A PFD shall be worn when working in the smaller boats used for collecting samples from bodies of water.
2. Vessels longer than 16 feet in length shall also have an approved Type IV throwable ring buoy or buoyant cushion onboard.
3. No vessel shall be operated in a reckless or negligent manner. Examples of reckless or negligent operation include:
    a. Excessive speed in regulated or congested areas.
    b. Operating in a manner that may cause an accident.
    c. Operating in a swimming area with bathers present.
    d. Operating while under the influence of alcohol.
    e. Operation of a personal watercraft that endangers life or property.
    f. Every vessel shall display the lights and shapes required by the navigation rules.
    g. Accidents should be reported immediately to a law enforcement agency.
    h. It is recommended for all vessels with a motor to have an approved, fully charged fire extinguisher onboard.

Operator's Responsibilities

1. Make sure the boat is in top operating condition and that there are no tripping hazards. The boat should be free of fire hazards and have clean bilges.
2. Ensure that safety equipment required by law is on board, equipment is maintained in good condition, and you know how to properly use these devices.
3. File a float plan with a co-worker who is ashore.
4. Have complete knowledge of the operation and handling characteristics of your boat.
5. Know your position and know where you are going.
6. Maintain a safe speed at all times to avoid collision.
7. Keep an eye out for changing weather conditions and act accordingly.
8. Know and practice Navigational Rules.

9. Know and obey federal and state regulations and waterway markers.
10. Maintain a clear, unobstructed view forward at all times. Scan the water back and forth; avoid tunnel vision. Most boating collisions are caused by inattention.

Overloading

Never overload a boat with passengers and cargo beyond its safe carrying capacity. Too many people and/or too much gear will cause the boat to become unstable. Always balance the load so that the boat maintains proper trim. Here are some things to remember when loading a boat:

1. Distribute the load evenly fore and aft from side to side.
2. Keep the load low.
3. Keep passengers seated (do not allow them to stand up in a small boat).
4. Fasten gear to prevent shifting.
5. Do not exceed the "U.S. Coast Guard Maximum Capacities" information label (commonly called the Capacity Plate). This plate displays three important items:
   a. The maximum weight of persons on board in pounds.
   b. The maximum carrying weight of the vessel in pounds.
   c. The maximum horsepower recommended for the boat.
6. If there is no capacity plate, use the following chart as a guide to determine the maximum number of persons you can safely carry in calm weather. The chart is applicable only to mono-hull boats less than 20 feet in length. A mono-hull is a boat that makes a single "footprint" in the water when loaded to its rated capacity. For example, a catamaran, trimaran, or a pontoon boat is not a mono-hull boat.

Maximum Persons	1	2	2	3	4	5	6	7
Boat Length (feet)	6	8	10	12	14	16	18	20

Alternatively, the following formula can be used to determine the safe loading capacity when a capacity plate is not available.

Formulas For Safe Loading			
Horsepower Capacity:		Person Capacity:	
For small, flat-bottom boats:		Average weight per person is 150 pounds (lbs.).	
Multiply boat length (feet) times transom width (feet)			
If answer is:	Maximum HP is:		
35 or less	3	(Boat length X Boat width) / 15	= Number of People
36 to 39	5		
40 to 42	7.5		
43 to 45	10		
46 to 52	15		
Note: For flat-bottom, hard chine boats, with an answer of 52 or less, reduce one increment (e.g., 5 to 3).		Boat length and width are measured in feet. Round fractions down to next lower number.	

Always check the capacity plate to make sure to not overload or over-power the vessel. A motor larger than recommended will make the stern too heavy and can cause the boat to flip. The transom will ride too low in the water and the boat could be swamped by its own wake or a passing boat's wake. The boat will not sit properly in the water and will be difficult to handle.

Too many people and/or too much gear will also cause the boat to become unstable. Always balance the load so that the vessel maintains proper trim. Too much weight to one side or the other will cause the boat to list and increase the chance of taking on water. Too much weight in the bow causes the vessel to plow through the water and too much weight in the stern will create a large wake. All of these situations make the vessel difficult to handle and susceptible to swamping.

Anchoring

Anchoring is done for two principal reasons to stop and stay in one location and to keep a vessel from running aground in bad weather, as a result of engine failure. Anchoring can be a simple task if the following guidelines are followed:

1. Make sure to have the proper type of anchor (Danforth/plow/mushroom).
2. A 3- to 6-foot length of galvanized chain should be attached to the anchor. The chain will stand up to the abrasion of sand, rock, or mud on the bottom much better than a fiber line.
3. A suitable length of nylon anchor line should be attached to the end of the chain (this combination is called the "Rode"). The nylon will stretch under heavy strain cushioning the impact of the waves or wind on the boat and the anchor.
4. Determine depth of water and type of bottom (preferably sand or mud).
5. Calculate the amount of anchor line that will be needed. As a general rule, use five to seven times as much anchor line as the depth of water plus the distance from the water to where the anchor will attach to the bow. For example, if the water depth is 8 feet and it is 2 feet from the top of water to the bow cleat, you would multiply 10 feet by 5 to 7 to get the amount of anchor line to put out.
6. Secure the anchor line to the bow cleat at the point where it should stop.
7. Bring the bow of the vessel into the wind or current.
8. When the boat arrives where it should be anchored, place the engine in neutral.
9. When the boat comes to a stop, slowly lower the anchor. Do not throw the anchor over, as it could entangle the anchor line.
10. When all anchor line has been let out, back down on the anchor with engine in idle reverse to help set the anchor.
11. When the anchor is firmly set, use reference points (landmarks) in relation to the boat to make sure it is not drifting. Check these points frequently.

Restrictions

Do not anchor in the traveled portion of any river or channel so as to prevent, impede, or interfere with safe passage of any other boat through the same area.

Do Not Anchor by the Stern

Anchoring a small boat by the stern has caused many to capsize and sink. The transom is usually squared off and has less freeboard than the bow. In a current, the force of the water can pull the stern under. The boat is also vulnerable to swamping by wave action. The weight of a motor, fuel tank, or other gear in the stern increases the risk of swamping.

Fueling Precautions

Most fires and explosions happen during or after fueling of a boat. To prevent an accident, follow these rules:

1. Portable tanks should be refueled ashore.
2. Close all hatches and other openings before fueling.
3. Extinguish all smoking materials.
4. Turn off engines, all electrical equipment, radios, stoves, and other appliances.
5. Remove all passengers.
6. Keep the fill nozzle in contact with the tank and wipe up any spilled fuel.
7. Open all ports, hatches, and doors to ventilate.
8. Run the blower for at least 4 minutes.
9. Check the bilges for fuel vapors before starting the engine.
10. Do the "sniff test." Sniff around to make sure there is no odor of gasoline anywhere in the boat.

Fuel Management

Practice the “One Third Rule” by using:

1. One third of the fuel going out.
2. One third to get back.
3. One third in reserve.

Weather

Never leave the dock without first checking the local weather forecast. You can get the weather information from the TV, radio, local newspaper, online, or from one of the weather channels on a very high frequency (VHF) radio.

At certain times of the year, weather can change rapidly, therefore the operator should continually keep a “weather eye” out. While in a boat, here are a few signs that indicate an approaching weather change.

1. Weather changes generally come from the west. Scan the sky, especially to the west.
2. Watch for cloud build-up, especially rapid vertically rising clouds.
3. Sudden drop in temperature.
4. Sudden change in wind direction and/or speed.
5. If you have a barometer on your boat, check it every 2 to 3 hours. A rising barometer indicates fair weather and rise in wind velocity; a falling barometer indicates stormy or rainy weather.

What To Do in Severe Weather

1. Reduce speed, but keep just enough power to maintain headway.
2. Put on your PFD.
3. Turn on running lights.
4. Head for nearest shore that is safe to approach, if possible.
5. Head the bow of the boat into the waves at about a 45-degree angle.
6. Keep bilges free of water.
7. Seat passengers on the bottom of the boat near the centerline.
8. If the engine fails, trail a sea anchor on a line from the bow to keep the boat headed into the waves. A bucket will work as a sea anchor in an emergency.
9. Anchor the boat, if necessary.

3.2.12 Hoisting and Rigging

If hoisting and rigging operations occur, the following standards apply as minimum guidelines:

– Only qualified competent personnel trained in safe rigging procedures are authorized to engage in rigging procedures. This includes understanding and use of recognized rigging methods and crane signals. Records of Training will be available at the work site.
– Wire ropes, chains, ropes, and other rigging equipment are inspected prior to each use and as necessary during use to ensure their safety. Defective rigging equipment are tagged and immediately removed from service.
– No equipment is modified or used outside of its intended design.
– Rigging is not used unless the weight of the load falls within the rigging's manufacturer's safe work operating range. This must be verified by the authorized rigger prior to any “pick” or lifting operation.
– The proper length of rope or chain slings is used to avoid wide angle lifts and dangerous slack. Knotted ropes or lengths of ropes reduced by bolts, knots, or other keepers are not used.
– Tag lines are used during load movements unless they create an unsafe condition.

- Job or shop hooks and links and other makeshift fasteners are not used. When U bolts are used for eye splices, the U bolt is applied so the “U” section is in contact with the dead end of the rope.
- Wire ropes, chains, ropes, and other rigging equipment are stored where they will remain clean, dry, and protected from the weather, traffic, and corrosive fumes.

3.2.13 Fall Hazards

Personnel that will use ladders and have the potential hazard of working on elevated surfaces or platforms of 6 feet or greater during project activities shall follow the RC’s safety protocols for fall protection. Specific guidelines for portable ladders are outlined below.

The emergency rescue plan for retrieving any worker who has fallen and is suspended in air is to be done any way possible without putting other employees in danger. Time is of the essence to prevent the development of a life-threatening condition, such as orthostatic intolerance or suspension trauma, due to being suspended for a period of time. Specific rescue methods and equipment will be specified by the RC; however, the following are examples of typical rescue methods/equipment:

- A scissor lift or articulating boom already on site.
- Lower/raise worker by an acceptable physical and/or mechanical means (self-rescue is not acceptable as primary rescue method).
- A rescue team trained in above ground rescue techniques.
- A rope or cable system to lower employee to ground (requires point of attachment for rigging tackle).
- A crane man basket setup in advance for rescue.

3.2.14 Manlifts/Aerial Lift

The following should be considered when using manlifts (aerial lifts)/platforms:

- Lift controls shall be tested and documented using an inspection checklist each day prior to use to verify they are in a safe working condition.
- Belting off to an adjacent pole, structure, or equipment while working from a manlift is not permitted.
- Articulating boom and extendible boom platform lifts shall have both platform (upper) and lower controls.
- Controls shall be plainly marked as to their function. Lower-level controls shall not be operated unless permission is obtained from the personnel working in the lift.
- If the machine is to be unattended, lower the platform, shut off the engine, engage the parking brake, and remove the key.
- Never attempt to mount or dismount a moving machine.
- The insulated portion of the manlift shall not be altered in any way that might reduce its insulating value.
- Check overhead clearances and note any obstructions.
- Only proficient operators shall operate an aerial lift.
- Personal fall protection (e.g., harness and lanyard) shall be worn and attached to an appropriate anchorage while in the aerial lift basket.
- Personnel must always stand firmly on the floor of the basket.
- Boom and load limits specified by the manufacturer shall not be exceeded.
- Vehicle brakes, outriggers, and wheel chocks should be used when required and/or available.
- The aerial lift truck shall not be moved when the boom is elevated with people in the basket unless the aerial lift is designed to do so (i.e., controls to move truck are located in and may be operated while in the basket).
- In these cases, the movement of the lift truck shall be for work positioning only and not for movement from one work location to another.

3.2.15 Scaffolding

Use of scaffolding should be consistent with the following guidelines:

- No one shall erect, move, dismantle, or alter scaffolding, except under the supervision of a competent person.
- A competent person may recommend changes or alterations of the scaffolding that are as stringent or even stricter than regulations to protect employees.
- Personnel subject to periods of dizziness should not work on a scaffold.
- A survey shall be made for hazardous conditions in the area where the scaffold will be erected.
- Scaffolds shall not be altered or moved horizontally while they are in use or occupied.
- Scaffolds shall not be loaded in excess of the working load they are designed to hold.
- Footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.
- Scaffolds and their components shall be maintained in a safe condition. Any broken, bent, excessively rusted, altered, or otherwise structurally damaged frames or accessories shall be taken out of service.
- Scaffolds and their components shall be inspected before each work shift and after any incident that could affect the structure of the scaffold by the competent person.
- Scaffolds shall be continually inspected by the users to ensure that the scaffold is maintained in a safe condition. Unsafe conditions are to be reported to the supervisor.
- Scaffolds shall be tied to or securely braced against the structure horizontally and/or vertically as required for support.
- Scaffolds shall be constructed to support at least four times the maximum intended loads.
- Scaffold platforms shall be equipped with standard guardrails and mid rails, be completely decked with safety planks or scaffold decking, and have rigidly secured toe boards on sides and ends as determined by the scaffolding competent person.
- Tools and materials on scaffold platforms must be placed in such a manner that they will not create a tripping hazard or become dislodged and fall.
- Tools, materials, and debris should not be allowed to accumulate in quantities to cause a hazard.
- Slippery conditions on scaffolds should be eliminated as soon as possible after they occur.
- Work on scaffolds shall be suspended during storms or high winds.
- Windscreens (plastic coverings) shall be inspected to ensure the system can accommodate the anticipated wind loads. This system is to be approved by a structural engineer before use as wind can easily topple a scaffold system.
- A ladder or stairway must be used for proper access to a scaffold platform.
- Personal fall arrest systems are required when erecting, dismantling, or working on scaffolding, unless the personnel is sufficiently guarded from falling by other fall control measures.

3.2.16 Cranes and Hoists

The use of cranes may take place during project activities. If cranes are utilized during the Northern Impoundment RA, personnel will ensure that the following safety practices are enforced:

- Each crane operator will provide a copy of the crane's annual inspection report to the SS and a copy of their crane operator certification documentation to the PC prior to initiating operations.
- Operators of cranes and hoists will make visual and operational inspections of the equipment prior to use. Any discrepancies that would jeopardize the safe operation of the equipment will be corrected prior to use. These inspections are to be documented via a daily inspection checklist or equivalent.
- The posted capacity of the crane will be adhered to and overloading of the equipment will not be allowed.

– The accessible swing radius of the crane will be demarcated and/or barricaded to prevent employees from entering the area.
– A competent person will investigate the soil for stability and determine the necessary amount of “cribbing” to be placed under the outrigger pads or if crane mats are necessary.
– No personnel will be permitted to work under a suspended load.
– Except for emergency communications, the operator will only recognize signs and signals from one designated signal person. This signal person will serve as the crane operator’s eyes in areas that the crane operator cannot see. This person should be familiar with crane signals, operation of the crane, and safe methods of securing and handling a load.

The RC will be responsible for ensuring the crane operator has the required training and certifications.

3.2.17 Hand and Power Tools

The following precautions are recommended when using hand and power tools.

Hand Tools

– Hand tools should meet the manufacturer’s safety standards.
– Hand tools should not be altered in any way.
– At a minimum, appropriate eye protection should be used when working with hand tools.
– Wrenches (including adjustable, pipe, end, and socket wrenches) are not to be used when jaws are sprung to the point that slippage occurs.
– Impact tools (such as, drift pins, wedges, and chisels) should be kept free of mushroom heads.
– Wooden handles should be free of splinters or cracks and secured tightly to the tool.
– Any damaged or defective tools should be immediately removed from service and tagged for destruction.

Power Tools

– All power tools should be inspected regularly and used in accordance with the manufacturer’s instructions and the tool’s capabilities.
– Electric tools should not be used in areas subject to fire or explosion hazards, unless they are approved for that purpose.
– Corded portable electric tools should be connected to a Ground Fault Circuit Interrupter (GFCI) when working in wet areas.
– Coiled cords/extension cords are uncoiled when plugged in to allow for dissipation of heat.
– Cords/extension cords rated appropriately for the temperature are used.
– Proper eye and face protection that meets current applicable standards (ANSI/CSA) should be used when working with power tools.
– Personnel should be trained in the proper use of each specific tool.
– Any damaged or defective power tools should be immediately tagged and removed from service.
– Repairs to hand or power tools are only made by qualified individuals and in accordance with the manufacturer's standards.
– Field or shop modifications to tools or equipment are only made by qualified individuals and in accordance with either manufacturer or engineer-approved specifications.

3.2.18 Electrical Hazards

Only qualified individuals should be allowed to perform work on electrical circuits or perform electrical work on equipment. It is recommended that no employee be permitted to work on any part of an electrical power circuit unless

the person is protected against electric shock by de-energizing the circuit and grounding it or ensuring that it has been locked and tagged out. It is recommended that any necessary electrical work adhere to the following precautions:

– All electrical wiring and equipment shall be a type listed by Underwriters Laboratories (UL) or Factory Mutual (FM) for the specific application.
– All installations shall comply with the National Electric Code (NEC) and the National Electric Safety Code (NESC).
– All electrical circuits shall be grounded according to NEC and NESC Code. GFCIs shall be used in the absence of properly grounded circuitry or when portable tools must be used around wet areas.
– Generators and like equipment should be grounded in accordance with NEC, unless exempted by NEC 250-6.
– All live wiring or equipment shall be guarded to protect all persons or objects from harm.

3.2.19 Control of Hazardous Energy

Hazardous energy sources may be encountered during the servicing and maintenance of machines and equipment, in which the unexpected energization or startup of the machines or equipment could cause injury to personnel.

The minimum performance requirements to control hazardous energy requires that employers develop and implement an energy control program. The elements of an energy control program are as follows:

– Lockout/tagout
– Employee protection
– Energy control procedure
– Protective materials and hardware
– Periodic inspections
– Training and communication
– Energy isolation
– Employee notification

Project personnel who are required to conduct operations and maintenance activities that will require the isolation of an energy hazard using a lockout/tagout device will follow the RC's developed program and written procedures.

Personnel authorized to attach and remove lockout/tagout devices will be provided with initial and refresher training regarding the safe application, usage, and removal of such devices. Each authorized person will receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the associated energy, and the methods necessary for energy isolation and control.

3.2.20 Compressed Gas Cylinders

Compressed gases cylinders present several hazards from the gas itself and contents under pressure. In addition to being properly stored or handled, the cylinder is properly labeled, hazardous properties are identified (toxicity, flammability, presence of an oxidizer, etc.), and an SDS is supplied by the manufacturer.

Regardless of the gas properties, any gas under pressure can explode if the cylinder is improperly stored or handled. The following are general safe storage and handling procedures for compressed gas cylinders.

– Store cylinders in an area specifically designated for that purpose. This area protects the cylinders from being struck by another object. The area is well ventilated, away from sources of heat, and at least 20 feet away from highly combustible materials. Oxidizers are stored at least 20 feet away from flammable gases.
– Chain and rack cylinders in an upright position during use and storage. When transporting cylinders, secure them from falling.
– When moving a cylinder, even for a short distance, all the valves are closed, the regulators removed, and valve caps installed. Never use a valve cap, sling, or magnet to move a cylinder. If using a crane or some other lifting device to move a cylinder, use a cradle or boat designed for that purpose.

– Never permit cylinders to contact live electrical equipment or grounding cables.
– Protect cylinders from temperature extremes, the sun's direct rays, and ice and snow accumulation.
– Before the gas is used, install the proper pressure reducing regulator on the valve. After installation, verify the regulator is working, all gauges are operating correctly, and all connections are tight with no leaks. When using the gas, open the valve with your hands. Never use a wrench or other tool. If you cannot open it with your hands, do not use it.

3.2.21 Excavations

All excavation and trenching operations shall be conducted in accordance and in compliance with OSHA's Standards for the Construction Industry. At a minimum, the following safety guidelines will 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. In addition, the estimated location of all underground installations should be determined before digging/drilling begins. Necessary clearances should 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 should be removed or supported by adequate shoring, bracing, or underpinning.
– Excavations may **not** 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 (P.E.) 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. P.E. qualifications should 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 work site and arrange for an air quality assessment and mitigation, if necessary.

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

Daily Inspections

The excavation competent person will 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 should be aware of the potential for confined space situations and other hazardous work conditions. All excavation and trenching operations that personnel shall enter will be observed and inspected by the competent person. All personnel in an excavation shall be protected from cave-ins by one of three systems:

– Sloping and benching systems
– Shoring
– Shielding systems

The competent person will 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 manmade event that may increase the load on the walls of the excavation, or otherwise affect their stability.

The competent person will be given the authority to immediately suspend work, if any unsafe condition is detected.

3.2.22 Slip/Trip/Hit/Fall

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. The following practices will be implemented by personnel to minimize injuries:

– Spot check work areas to identify hazards.
– Establish and utilize a pathway free of slip and trip hazards.
– Beware of trip hazards, such as wet floors, slippery surfaces, uneven surfaces or terrain, and areas recently exposed to precipitation.
– Utilize/install appropriate lighting for walking paths and working areas.
– Carry only loads that you can see over.
– Keep work areas clean and free of clutter, especially in storage rooms and walkways.
– Refrain from the use of portable communication devices (cell phones, two-way radios) while traversing the work site.
– Communicate hazards to on-site personnel.

3.2.23 Heat Stress

Recognition and Symptoms

Temperature stress is one of the most common illnesses faced by project personnel when working in elevated temperatures and/or humidity. Acclimatization and frequent rest periods must be established for conducting activities where temperature stress may occur. Below are listed signs and symptoms of heat stress along with recommended mitigation actions.

– *Heat Rash:* Redness of skin. Frequent rest and change of clothing are recommended.
– *Heat Cramps:* Painful muscle spasms in hands, feet, and/or abdomen. It is recommended to administer lightly salted water by mouth, unless there are medical restrictions.
– *Heat Exhaustion:* Clammy, moist, pale skin, along with dizziness, nausea, rapid pulse, fainting. It is recommended to move the affected personnel to a cooler area, administer fluids, and monitor.
– *Heat Stroke:* Hot dry skin; red, spotted, or bluish; high body temperature of 104°F; mental confusion; loss of consciousness; convulsions or coma. It is recommended to immediately cool the victim by immersion in cool

water. Wrap with wet sheet and sponge with cool liquid while fanning; treat for shock. **Do not delay treatment. Cool body while awaiting ambulance.**

Work Practices

The RC will be asked to implement procedures, which will include the following, to reduce heat stress:

– Heat stress monitoring.
– Acclimatization.
– Work/rest regimes (schedule of breaks) - mandatory breaks scheduled in summer months or during high-risk activities for heat stress.
– Heat stress safety PPE (cool-vests, bandanas, etc.).
– Provide protection from sun exposure, where possible (i.e., covered area, canopies, trees)
– Liquids that replace electrolytes, water, and salty foods available during rest.
– Use of buddy system.

3.2.24 Sun Exposure

Overexposure to sunlight is a common concern when conducting fieldwork. Overexposure can occur on clear, sunny days, as well as on overcast and cloudy days. Ultraviolet (UV) rays from the sun can cause skin damage or sunburn, but can also result in vision problems, allergic reactions, and other skin concerns. The RC will be asked to implement procedures, which will include the following steps, to protect against overexposure to sunlight:

– ***Always Use Sunscreen:*** Apply a broad-spectrum sunscreen with Sun Protection Factor (SPF) of at least 15 or higher liberally on exposed skin. Reapply every 2 hours or more. Even waterproof sunscreen can come off when using a towel or sweating.
– ***Cover Up:*** Wearing tightly woven, loose-fitting, and full-length clothing is a good way to protect your skin from UV rays.
– ***Wear a Hat:*** A hat with a wide brim offers good sun protection to your eyes, ears, face, and the back of your neck - areas particularly prone to overexposure to the sun.
– ***Wear Sunglasses That Block 99 to 100 Percent of UV Radiation:*** Sunglasses or tinted safety glasses that provide 99 to 100 percent UVA and UVB protection will greatly reduce sun exposure that can lead to cataracts and other eye damage. Check the label when buying sunglasses.
– ***Seek Shade:*** Shade is a good source of protection, but keep in mind that shade structures (e.g., trees, umbrellas, canopies) do not offer complete sun protection.
– ***Limit Time in the Midday Sun:*** The sun's rays are strongest between 10:00 a.m. and 4:00 p.m. Whenever possible, limit exposure to the sun during these hours.

3.2.25 Cold Stress

Cold stress is similar to heat stress, in that it is caused by a number of interacting factors including environmental conditions, clothing, and workload, as well as the physical and conditioning characteristics of the individual. 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 wind 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.

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 should be taken as a sign of

danger to personnel on-site, and cold exposures should be immediately terminated for any person when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Prevention of Cold Stress

A variety of measures can be implemented by the RC 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 work/rest regimes (schedule of breaks). The parts of the body most important to keep warm are the feet, hands, head, and face. As much as forty percent of body heat can be lost when the head is exposed.

3.2.26 Adverse Weather Conditions

The SS will monitor weather-related information provided by National Weather Service, and the SS will be assigned responsibility to decide whether or not to continue work based on current and pending weather conditions and taking into account the provisions of the Emergency Response Plan and High-Water Preparedness Plan (HWPP) for the Northern Impoundment RA (ERP). Electrical storms, heavy rains, hurricanes, tornado warnings, and sustained strong winds (approximately 40 mph) are examples of conditions that would call for the discontinuation of work and evacuation of the work site.

In addition, no work with elevated super structures (e.g., drilling, crane operations) will be permitted during any type of electrical storm, or during wind events that have wind speeds exceeding 40 mph, consistent with requirements of the ERP.

3.2.26.1 Tornadoes

Tornadoes occur most frequently between April and October from 3:00 to 7:00 p.m. but can occur any time. In most cases, tornadoes move from a west/southwest direction. A typical tornado is a swirling storm of short duration with winds up to 300 miles per hour and a near vacuum at its center. It appears as a rotating funnel shaped cloud, from gray to black in color, extending towards the ground from the base of a thundercloud.

Tornadoes usually only cover a limited geographical area and give off a roaring sound. A tornado is the most concentrated and destructive potential weather event at the work site. Tornadoes are usually the result of the interaction of a warm, moist air mass with a cool or cold air mass. Secondary effects of tornadoes may include flash flooding, electric power outages, transportation system and communication system disruption, and/or fires.

Whenever weather conditions develop that indicate tornadoes are expected, the National Weather Service will issue a tornado watch to alert people in a designated area for a specific time period (normally 6 hours) to remain alert for approaching storms. The tornado watch is upgraded to a tornado warning when a funnel cloud (tornado) is actually sighted or indicated by weather radar.

When a tornado is approaching, personnel will only have a short time to react. Therefore, personnel must be prepared to react during periods of severe weather. Memorize the following tornado danger signs:

– Approaching clouds of debris can mark the location of a tornado even if a funnel cloud is not visible.
– Before a tornado hits, the wind may die down and the air can become very still/calm.
– It is not uncommon to see clear, sunlit skies behind a tornado as they usually occur at/near the trailing edge of thunderstorms.

Tornado Evacuation Procedures

Work site personnel will evacuate the work zone(s) when a tornado watch has been issued by the National Weather Service. Personnel will contact the project team to inform them they are leaving the work site and provide them a location of the muster point (shelter) that they are going to. The SS is responsible for work areas; they will check

remote areas of the work zone(s) to ensure personnel have reacted to the alert. Personnel must proceed to the mustering point (shelter) and wait for further instructions.

If a tornado watch is upgraded to a tornado warning, personnel will proceed to designated tornado shelters. Once inside the shelter, conduct a head count to ensure that personnel are accounted for. In general, stay away from all windows and doors that lead to the outside. Remain in the shelter until the “all clear” signal is given by the SS.

Directions to the tornado shelter are to be communicated to personnel during initial site safety orientation and during subsequent safety meetings throughout tornado season.

If unable to reach the designated shelter, the best protection in a tornado is usually an underground area. If an underground area is not available, consider small interior rooms on the lowest floor without windows, hallways, on the lowest floor away from doors and windows, rooms constructed with reinforced concrete/brick/block with a heavy concrete floor and roof, and protected areas away from doors and windows.

3.2.26.2 Rain and Snow

Excessive amounts of precipitation may cause potential safety hazards for work tasks. The hazards that would be the most common are slipping, tripping, or falling due to slippery surfaces. Severe weather conditions will result in work stoppage and the implementation of further emergency measures.

3.2.26.3 Flash Flooding

Floods are one of the most common hazards in low lying areas, however not all floods are alike. Some floods develop slowly, while others such a flash floods, can develop in just a few minutes and without visible signs of rain. Additionally, floods can be local, impacting a neighborhood or community, or very large, affecting entire river basins and multiple states.

Flash floods can occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Flash floods often have a dangerous wall of roaring water carrying rocks, mud, and other debris.

Be aware of flood hazards no matter where you live or work, but especially if you are in low-lying areas, near water, behind a levee or downstream from a dam. Even very small streams, gullies, creeks, culverts, dry streambeds or low-lying ground that appear harmless in dry weather can flood.

Please refer to provisions detailed in the ERP and HWPP for procedures related to flooding conditions at or near the work site.

3.2.26.4 Wind

High winds may be encountered at the work site and can cause hazards that may affect personnel health and safety. Preventative measures that will be implemented if necessary are as follows:

– Restrict work site activities.
– Batten down light equipment or building materials.
– Partially enclose work areas.
– Reduce or Stop Work activities.

3.2.26.5 Lightning and Thunder

You can see a lightning bolt before the sound of thunder reaches you, as light travels at a faster speed than sound. To judge how close lightning is, count the seconds between the flash and the thunderclap. Each second represents about 328 yards/300 meters. If you count fewer than 30 seconds between the lightning strike and the thunder, the storm is less than 6.2 miles/10 km away, and there is an 80 percent chance the next strike will happen within that 6.2 miles/10 kilometers.

Lightning may strike several miles/kilometers away from the parent cloud and therefore precautions should be taken even if the thunderstorm is not directly overhead.

If you hear thunder or see lightning, stop work immediately and seek safe shelter. Remain sheltered for 30 minutes after hearing the last thunder before returning to work.

3.2.26.6 General Outdoor Precautions During Severe Weather

- Keep a safe distance from tall objects, such as trees, hilltops, and telephone poles.
- Avoid projecting above the surrounding landscape. Seek shelter in low lying areas such as valleys, ditches, and depressions, but also be aware of flooding.
- Stay away from water. Don't go boating if a storm threatens. Move to land as quickly as possible if you are on the water. Lightning can strike the water and travel some distance from its point of contact. Don't stand in puddles even if you are wearing rubber boots.
- Stay away from objects that conduct electricity, such as tractors, metal fences, motorcycles, lawnmowers, and tall metal objects.
- Avoid being the highest point in an open area. Holding a conductive item, such as a metal tool or umbrella, can make you the tallest object and a target for lightning.
- You are safe inside a car during lightning, but don't park near or under trees or other tall objects, which may topple over during a storm. Be aware of downed power lines, which may be touching your car.
- In a forest, seek shelter in a low-lying area under a thick growth of small trees or bushes.
- Be alert for flash floods, which are sometimes caused by heavy rainfall, if seeking shelter in a ditch or low-lying area.
- If caught in a level field far from shelter and you feel your hair stand on end, lightning may be about to hit you. Kneel on the ground immediately, with feet together, place your hands on your knees and bend forward. Don't lie flat.
- If you are in a group in the open, spread out, keeping people several yards/meters apart.

3.2.26.7 General Indoor Precautions During Severe Weather

- Before the storm hits, disconnect electrical appliances including radios and television sets. Do not touch them during the storm.
- Don't go outside unless absolutely necessary.
- Stay away from doors, windows, fireplaces, and anything that will conduct electricity, such as radiators, stoves, sinks, and metal pipes. Keep as many walls as possible between you and the outside.
- Don't handle electrical equipment or telephones. Use battery operated appliances only.

3.3 Biological Hazards

During the Northern Impoundment RA, on-site personnel may encounter biological hazards, including bloodborne pathogens, insects, spiders, scorpions, rodents, snakes, and large predators. This section identifies precautions that will be taken if these hazards are encountered.

3.3.1 Vegetation Overgrowth

Overgrown weeds, bushes, trees, grass, and other vegetation are fire and safety hazards. A number of hidden hazards may not be immediately recognized due to the overgrowth of vegetation in areas where field activities may occur, including discarded junk, litter, and debris. Construction materials, such as boards, nails, concrete, and other debris may be hidden beneath tall grass, weeds, and bushes. Other hazards may include steep slopes, potholes, trenches, soft spots, dips, etc., all dangerously concealed from the view of individuals walking or operating motorized

equipment in the area. Additionally, biological hazards such as snakes, ticks, chiggers, and mosquitoes may be present, as they breed in overgrowth conditions.

Wear proper PPE, long pants, and eye protection, and use extra caution when walking through overgrown vegetation due to potentially unseen holes, trip hazards, or biological hazards.

3.3.2 Poisonous Plants

Common poison ivy 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 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, referred to as “contact dermatitis.”

Hogweed resembles a large Queen Anne's lace or Cow Parsnip. The sap on the underside of the leaves and on the stem have the highest concentration of toxin. Do not touch with bare skin. Do not cut the plant down; contact local environmental authorities and report the location.

Stinging nettles are a common plant found throughout North America. Stinging nettles can reach 5-8 feet at maturity. Leaves are about 2-5 inches long with jagged edges. Leaves are pointed at the tips with indented veins. The plant will have silky hairs up the stalk and stems that can attach to the skin and cause pain and irritation.

Poison hemlock is the most poisonous plant in North America. Poison hemlock stems are hairless, hollow, and usually have purplish-red splotching or streaking on them, especially towards the base of the plant. It is found in marshy areas across the country. All the plant parts are poisonous.

The best form of prevention is to avoid contact. Wearing long sleeves and use of gloves and disposable clothing, such as Tyvek, are recommended in high-risk areas to avoid exposure from contaminated apparel. Barrier creams and cleaners are also recommended.

3.3.3 Insects

Ticks

Ticks are blood feeding external parasites of mammals, birds, and reptiles throughout the world. Some human diseases of current interest in the United States caused by tick-borne pathogens include Lyme disease, ehrlichiosis, babesiosis, Rocky Mountain spotted fever, tularemia, and tick-borne relapsing fever.

Prevention

Preventative measures include wearing light-colored clothing, keeping clothing buttoned, tucking pant legs in socks, and keeping shirttails tucked in. Periodic checks for ticks should be made during the day, and especially at night. Hair should also be checked by parting it and combing through it to make sure that no ticks have attached to the scalp. Also, check clothing when it is first removed, before ticks have a chance to crawl off. A shower or bath should be taken, as soon as possible after leaving the work site for the day.

Bees, Wasps, and Yellow Jackets

Stinging insects are members of the order Hymenoptera of the class Insecta. There are two major subgroups: Apidae (honeybees and bumblebees) and vespids (wasps, yellow jackets, and hornets). Apidae are docile and usually do not sting unless provoked. The stinger of the honeybee has multiple barbs, which usually detach after a sting. Vespids have few barbs and can inflict multiple stings.

Types of stinging insects that might be encountered at the work site may include:

- Carpenter bees
- Bumblebees
- Africanized killer bees
- Cicada killer wasps
- Honeybees
- Paper wasps

– Mud dauber wasps – Giant hornets – Yellow jackets

Symptoms

If a person is stung, three types of reactions are possible: a normal, a toxic, or an allergic reaction.

– *Normal Reaction:* Only lasts a few hours and consists of pain, redness, swelling, itching, and warmth near the sting area.
– *Toxic Reaction:* Will last for several days, results from multiple stings, and may cause cramps, headaches, fever, and drowsiness.
– *Allergic Reaction:* Can cause hives, itching, swelling, tightness in the chest area, and a possibility of breathing difficulties, dizziness, unconsciousness, and cardiac arrest.

The stingers of many Hymenoptera may remain in the skin and should be removed, as quickly as possible without concern for the method of removal. An ice cube placed over the sting will reduce pain; aspirin may also be useful. Persons with known hypersensitivity to such stings should carry a kit containing epinephrine in a prefilled syringe. Antihistamines may help decrease hives and angioedema. Persons who have severe symptoms of anaphylaxis, have positive venom skin test results, and are at risk for subsequent stings should receive immunotherapy regardless of age or time since anaphylaxis.

Fire Ants

Fire ants are reddish-brown in color and range from 1/8 inch to 3/8 inch in length. When a fire ant stings an individual, the individual is rarely only stung once. Most fire ant stings result in a raised welt with a white pustule. If stung by a fire ant, continue to observe the welt, and try to prevent secondary infection by keeping the welt intact. However, some individuals may have an allergic reaction to a fire ant sting and require immediate medical attention. Pesticides and even hot water can be used to kill fire ant colonies. Fire ants are normally seen in the southern states.

Mosquitoes

Mosquitoes are common pests that can be found in any state and any work environment where warm, humid conditions exist. Mosquitoes can pass along diseases, such as West Nile virus and malaria. Several different methods can be used to control adult mosquito populations: repellants such as DEET, mosquito traps, foggers, and vegetation and water management.

3.3.4 Poisonous Spiders

Black Widow

Black Widow spiders are not usually deadly (especially to adults) and only the female is venomous. The female spider is shiny black, usually with a reddish hourglass shape on the underside of her spherical abdomen. Her body is about 1.5 inches long, while the adult male's is approximately half that. The spider's span ranges from 1 to 3 inches. The adult males are harmless, have longer legs, and usually have yellow and red bands and spots over their back, while the young black widows are colored orange and white. The bite of a black widow is often not painful and may go unnoticed. However, the poison injected by the spider's bite can cause severe reactions in certain individuals.

Symptoms

Symptoms include abdominal pain, profuse sweating, swelling of the eyelids, pains to muscles or the soles of the feet, salivation and dry-mouth (alternating), and paralysis of the diaphragm. If a person is bitten, they should seek immediate medical attention. Clean the area of the bite with soap and water. Apply a cool compress to the bite location. Keep affected limb elevated to about heart level. Ask a doctor if acetaminophen or aspirin can be taken to relieve minor symptoms. Additional information can be obtained from the Poison Center (1-800-222-1222). Black widows are found throughout the tropics, U.S., and Canada.

Brown Recluse

Brown recluse spiders are usually light brown in color, but in some instances they may be darker. Brown recluse spiders are highly venomous spiders, native to the United States, and found coast to coast. The brown recluse can vary in size, but some can obtain bodies of 5/8 inches in length with a leg span of 1 1/2 inches in diameter. They can be identified by their three pairs of eyes along the head area and their fiddle shaped markings on the back. Most brown recluse bites are defensive rather than offensive. They generally only bite when they feel threatened.

Symptoms

If bitten by a brown recluse, an individual may experience open, ulcerated sores, which when left untreated may become infected and cause tissue necrosis. If an individual believes a spider has bitten them, they need to seek medical attention, as soon as possible. In order to minimize the occurrence of brown recluse bites, individuals should shake their clothing and shoes thoroughly, eliminate the presence of cluttered areas, and spray the building perimeters with pesticides. Brown recluse are found throughout the U.S., Mexico, and Canada.

3.3.5 Threatening Dogs

It is recommended that the following instructions be provided to personnel to address situations in which they are approached by a frightened or menacing dog:

– Do not attempt to run and do not turn your back.
– Stay quiet and remember to breathe.
– Be still, with arms at sides or folded over chest with hands in fists.
– Slowly walk away sideways.
– Do not stare a dog in the eyes, as this will be interpreted as a threat.
– Avoid eye contact.

Seek immediate medical attention if bitten by a dog.

3.3.6 Rodents

Rodentia: (rats, mice, beavers, squirrels, guinea pigs, capybaras, coypu)

Rodents, or Rodentia, are the most abundant order of mammals. There are hundreds of species of rats; the most common are the black and brown rat.

The **Brown Rat** has small ears, blunt nose, and short hair. It is approximately 14 to 18 inches long (with tail). They frequently infest garbage/rubbish, slaughterhouses, domestic dwellings, warehouses, shops, and supermarkets; they also frequent any space with an easy meal and potential nesting sites.

The **Black Rat** can be identified by its tail, which is always longer than the combined length of the head and body. It is also slimmer and more agile than the Norwegian or Brown rat. Its size varies according to its environment and food supply.

The **House Mouse** has the amazing ability to adapt and now can frequently be found in human dwellings. In buildings, mice will live anywhere, and they are very difficult to keep out. Mice are also omnivorous and will eat anything.

Rats and mice often become a serious problem in cold winter months when they seek food and warmth inside buildings. They may suddenly appear in large numbers when excavation work disturbs their in-ground nesting locations or their food source is changed.

If encountered in the work area, inspect the work area for rodent droppings.

– For low amounts of droppings, use Level C with N95 disposable respiratory protection.
– For heavy accumulation, use Level C Full Face PAPR with PlO0 cartridge or, in severe cases, Level B.

Soak any dead mice, nests, and droppings thoroughly with a 1:10 solution of sodium hypochlorite (household bleach. Place contaminated material in a plastic bag and seal for disposal. Disinfect by wet wiping all reusable respirator surfaces, gloves, rubber boots, and goggles with bleach solution. Place all disposable protective clothing, gloves, and respirators in plastic bags and seal for disposal, and thoroughly wash hands with soap and water after removing gloves.

3.3.7 Snakes

Snakes may be found in any region of the country. While many snakes encountered are not venomous, a few are, so all snakes should be given a wide berth. If conducting work in heavy vegetation and underbrush, snake chaps can be worn to prevent snake bites. If a snake is observed, back away from it slowly and do not touch it. If someone is bitten, try to see and remember the color and shape of the snake, which can help with treatment of the snakebite.

Venomous snakes include the coral snake and pit vipers, such as the cottonmouth (water moccasin), copperhead, and rattlesnake. The venom of pit vipers is primarily *hemotoxic* because it acts upon the victim's blood system. This venom breaks down blood cells and blood vessels and affects heart action. Bite victims experience severe burning pain, localized swelling, and discoloration for the first 3 to 30 minutes, followed by nausea, vomiting, occasional diarrhea, and usually shock. Seek immediate medical attention if bitten by a snake.

3.3.8 Scorpions

Forty different types of scorpions are found in the U.S. ***All the different types are located in the southern states.***

Wind scorpions, including sun scorpions, are easily recognized by the pair of large, pincer-like chelicerae on the head in front of the mouth and by the slight, waist-like constriction near the middle of the body. Unlike the broadly joined cephalothorax and abdomen of scorpions, wind scorpions have three distinct body regions - a segmented cephalothoracic area with two eyes at the front margin, a three-segmented thorax, and a ten-segmented abdomen.

Death by a scorpion sting, if it occurs, is the result of heart or respiratory failure some hours after the incident. Seek immediate medical attention if bitten by a scorpion.

3.3.9 Alligators

Similar to snakes, lizards, and other reptiles, alligators are cold-blooded (or ectothermic), meaning the air or water temperature around them determines their body temperature. The **American alligator** primarily ***inhabits the southeastern U.S.: Alabama, Arkansas, North and South Carolina, Florida, Georgia, Louisiana, Mississippi, Oklahoma, and Texas.*** They primarily live-in freshwater swamps and marshes, but also in rivers, lakes, and smaller bodies of water. Alligators are classified as a threatened species and thus enjoy the protection of state and federal law. State and federal law prohibits people from killing, harassing, molesting, or attempting to move alligators. The potential for being bitten or injured by a provoked alligator is high.

Maintain a distance of at least 15 feet from any alligator. Keep an eye on your surroundings near fresh or brackish waters. Work during daylight hours, as alligators are most active at night. Use the buddy system when working near known areas of alligators. Be especially cautious during alligator mating season, as most attacks happen from May to September.

Seek immediate medical attention if bitten by an alligator. Alligators harbor very infectious bacteria, and even minor bites may require special treatment.

3.3.10 Bats

Bats can be found in most regions of the United States. Bat droppings carry Histoplasmosis, which is a respiratory disease. Avoid handling due to rabies, lice, fleas, and other parasites.

If encountered, consider nesting areas to be hazardous locations. Use Level C protection in cases of a colony location. Do not disturb dropping-enriched soils. Dampen with water to prevent dust. Clean footwear before leaving the area to prevent spore dissemination.

3.3.11 Bloodborne Pathogens

Hepatitis and other communicable diseases are largely transmitted through exposure to bodily fluids containing the hepatitis virus, which could be found on refuse encountered in subsurface investigations.

Preventative measures include wearing appropriate PPE: work gloves, a long-sleeved shirt, and safety footwear.

4. Personal Protective Equipment (PPE)

4.1 General

The purpose of PPE is to shield or isolate individuals from the chemical and physical hazards that may be encountered during work activities. The type of PPE required for a project will vary based on the level of protection required to protect the employee from physical, chemical, biological, and thermal hazards.

4.2 Levels of Protection

The level of protection should correspond to the level of hazard known or suspected in the specific work area. Prior to commencement of Northern Impoundment RA work, PPE will be selected by the RC and Implementing Party and as directed by the HSO, with specific considerations to the hazards associated with work site activities. It is anticipated that the minimum required PPE level for the work site will be Level D.

– All PPE should be disposed of and/or decontaminated at the conclusion of each workday. Decontamination procedures should follow the concept of decontaminating the most contaminated PPE first.
– All disposable equipment should be removed before meal breaks and at the conclusion of the workday, and replaced with new equipment prior to commencing work.
– Reusable equipment (safety glasses, hard hats, goggles, etc.) is cleaned and sanitized according to manufacturer guidelines.
– Eating, drinking, chewing gum or tobacco, and smoking are prohibited while working in areas where the potential for chemical and/or explosive hazards may be present. Personnel must wash thoroughly before initiating any of the aforementioned activities.

4.2.1 Reassessment of Protection Levels

It is recommended that protection levels provided by PPE selection be upgraded or downgraded by the RC and Implementing Party and as directed by the HSO, based upon a change in work site conditions or the review of the results of air monitoring.

When a significant change occurs, the hazards are reassessed. Some indicators of the need for reassessment are:

– Commencement of a new work phase.
– Change in job tasks during a work phase.
– Change of season/weather.
– Temperature extremes or individual medical considerations limiting the effectiveness of PPE.
– Chemicals other than those expected to be encountered are identified.
– Change in ambient levels of chemicals.

– Change in work scope that affects the degree of contact with areas of potentially elevated chemical presence must be re-evaluated.

Emergency response personnel entering an exclusion zone (EZ) for emergency spill/release response should, depending on the task and exposure potential, be required to wear an appropriate protection level as determined by the RC and Implementing Party and as directed by the HSO. Emergency equipment are detailed in the ERP.

4.3 Respiratory Protection

Respiratory protection is sometimes required for personnel during project activities when action levels exceed the occupational exposure levels, which are provided in the Air Monitoring Plan that is provided as Attachment 1 to the Site-Wide Monitoring Plan (SWMP). When respirators are required, personnel identify and select the appropriate air purifying respirator and supporting cartridge medium, and follow the procedures and guidelines in their respective written Respiratory Protection program.

At a minimum, all personnel required to use this equipment are:

– Instructed in how to properly fit a respirator to achieve the required face piece to face seal for respiratory protective purposes.
– Medically cleared for the use of respiratory protection.
– Appropriately fitted for the selected respirator through established recognized fit testing methods (quantitative/qualitative), and documentation of fit is readily available.
– Free of beards, sideburns, eyeglasses, and upper or lower dentures that could affect the face seal.

Further regulations for the use of respiratory protection include:

– Cartridges are changed prior to breakthrough, daily, or when personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property.
– Respiratory equipment and other non-disposable equipment are fully decontaminated.
– Appropriate action levels are established and documented based on the applicable occupational exposure limits.

4.3.1 Respirator Cleaning

Respirator decontamination is conducted once daily at a minimum. Face pieces are disassembled, the cartridges are thrown away, and all other parts are placed in a cleansing solution. After an appropriate amount of time in the solution, the parts are removed and re seated with tap water. Face pieces are allowed to air dry before being placed in sanitized bags and stored in a clean area.

5. Air Monitoring Program

Air monitoring will be performed while intrusive activities are taking place to detect the presence and relative level of any air contaminants that may be an inhalation hazard. The purpose of air monitoring is to identify and quantify airborne contaminants in order to determine the level of worker protection needed. A site-specific Air Monitoring Plan has been developed and is provided as Attachment 1 to the SWMP. The RC will determine which direct reading instrumentation will be used for air monitoring prior to implementation of the Northern Impoundment RA.

All instruments will be calibrated on a daily basis in accordance with the manufacturer's guidelines. Records of all calibrations should be documented.

Correction factors have been determined by the air monitoring equipment manufacturers that enable the user to quantify a large number of chemicals using only a single calibration gas, typically isobutylene for PIDs and methane for LEL. Applicable Correction Factors (CF) for either LEL or PIDs must be applied for known chemicals of concern.

These CFs and how to apply them can be found in the air monitoring instrument operating manual or online from the manufacturer's website.

When air monitoring is required, the workers' breathing zone(s) will be monitored and the results recorded. Additionally, when necessary, area samples may be collected.

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.
– Downwind of work area to track any contaminants/emissions leaving the work site.

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

5.1 Air Monitoring 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. The appropriate actions are to be taken at designated action levels. The initial action level(s) for site work can be found in the site-specific Air Monitoring Plan that is provided as Attachment 1 to the SWMP.

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

– Requested by an individual performing the task
– Any irritation to eye, nose, throat, or skin occurs

A Stop Work and evacuation at the specific work area is required if levels in the breathing zone exceed the protection factor of the respirator.

6. Work Site Control

The RC will adopt requirements governing work site control and work area demarcation, in compliance with 29 CFR 1910.120(b)(4)(ii)(F) and 29 CFR 1910.120(d), that include posting signage and placing barricades. All construction areas will have the appropriate signage posted. Barricades and warning signs will be placed to warn personnel of potential hazards. The RC may elect to utilize a standby person (spotter) in place of barricades, where appropriate.

6.1 Communication

All work site personnel should be capable of communicating with other personnel at all times. It is recommended that different means of communications be utilized, including as appropriate using an air horn, walkie-talkie, cell phone, or hand signals.

The following procedures will be followed by all work site workers when using a cell phone on the work site:

– No cell phone use while driving or operating equipment.
– No cell phone use while in the Exclusion Zone.

If using a cell phone on the work site, find a location where you can safely use the phone. Do not walk around the work site while using a cell phone. Understanding of the following standard hand signals will be required for all personnel, regardless of other means of communication:

– Hand gripping throat - Cannot breathe
– Hands on top of head - Need assistance

– Thumbs up - OK, I'm alright, I understand
– Thumbs down - No, negative
– Gripping partner's wrist, or gripping both of your own hands on wrist (if partner is out of reach) - Leave area immediately

6.2 Two-Person Crew/Buddy System

A Two-Person Crew or Buddy System shall be implemented to protect the employees and public when conducting high risk activities such as:

– Working near traffic
– Working ON or NEAR water
– Excessive noise to which hearing traffic or communication is difficult
– Confined or restricted spaces
– In an isolated area such as landfills or wooded areas
– Areas with high crime rates

When using 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:

– Changes in complexion and skin coloration
– Changes in coordination
– Excessive salivation and pupillary response
– Changes in speech pattern.

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

– Headaches
– Dizziness
– Nausea
– Blurred vision
– Cramps
– 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.

6.3 Work Site Security

Work site security is necessary to prevent the exposure of unauthorized, unprotected people to work site hazards and to avoid interference with safe working procedures. Security should be maintained outside of the actual work area(s) as to prevent unauthorized entry into the work area(s). The following materials may be used to barricade the work area and protect both the public and personnel at the work site:

– Temporary Fencing
– High Visibility Tape, Rope or Chain
– Saw Horses
– Flagging

– Warning Signs
– Permanent Fencing
– Traffic Cones
– “Employees at Work” Signs

It is recommended that a “No Trespassing: Violators Will Be Prosecuted” sign should be maintained at the entrance to the work site, with only authorized personnel allowed in this area.

Street/Vehicle Security Precautions

When walking to and from your vehicle, or in and around the work site:

– Be alert to your surroundings and the people around you, especially if you are alone or it is dark.
– Whenever possible, travel with a colleague.
– Stay in well lighted areas as much as possible.
– Walk close to the curb; avoid doorways, bushes, and alleys where someone could hide.
– Walk confidently, and at a steady pace; make eye contact with people when walking.
– Do not respond to conversation from strangers on the street; continue walking.

You can help prevent yourself being a victim of car jacking by:

– Keeping your doors locked and windows closed/completely up, especially at traffic lights.
– Be aware of what people are doing around you.
– Use the middle lane if there is one, when waiting at junctions or lights, so that your car is harder to get to/from the pavement.
– Do not stop to help someone who has broken down. Instead, you can pull over at the next garage or police station and call them for to send help.
– If someone tries to pull you over for no reason, drive to the next garage or police station and report them.
– A car jacker may “accidentally” bump into your car, aiming to get you out of the car so they can steal it. If this happens, you may choose not to get out of the car, especially if you do not think it is a genuine accident.

6.3.1 Aggressive or Menacing Behavior

The RC will adopt procedures for situations in which personnel are confronted by an individual whose behavior becomes aggressive or menacing. Those procedures will include instructing personnel to remain as calm as possible and to avoid arguing with or physically confronting the individual, to attempt to distance yourself from the individual, and advising others in the area to leave the scene and request police assistance by having someone call 911.

6.3.2 Drug Paraphernalia

Personnel must not handle or remove any hypodermic needles or syringes. Contact the local Police Department, Fire Department, or Health Department for removal from the work site.

If an accident occurs where a needle or other sharp object has punctured the skin, then the injured person should:

– Encourage the wound to bleed gently
– Wash well with soap under cold running water
– Cover the wound with a waterproof dressing
– Seek medical attention as soon as possible. If injured by a discarded needle, you can receive a vaccination against Hepatitis B within 48 hours of the incident.
– Inform the SS and/or PC

Should an aggressor only be interested in the taking or damaging of property, do not interfere. Obtain a description of the individual to provide to local law enforcement, including height, weight, race, sex, clothing, accent, unusual markings such as tattoos, piercings, scars, hair color, and weapon, if any.

6.4 Work Zone Demarcation

When performing work that could put yourself or others at risk, you must demarcate an Exclusion Zone around your work. Use signs, placards, barricade tape, or other postings as necessary to warn others not to enter the demarcated area unless they have authorization to enter. Where appropriate, post special requirements for entry.

The levels and requirements for work zone demarcation is based on the task being performed or the requirements of the client.

Approved pedestrian and vehicle traffic paths will be determined during daily safety meetings based upon current work site conditions and work locations. When applicable, one pathway should be established for heavy equipment and one for personnel decontamination.

6.4.1 Work Zone Demarcation Level 2

Level 2 of Work Zone Demarcation is required for active or inactive retail sites when there is heavy equipment operation. Level 2 is to be set up to isolate the work area from public access.

– Excavation
– Crane and Aerial lifts
– Anytime an excavation is being left open for any duration

These tasks require sawhorse barrier or temporary fencing which prevents the public from entering the work area. Signs must be posted indicating the required PPE.

6.5 Decontamination

The SS will be responsible for ensuring that all personnel and pieces of equipment leaving the work site are properly decontaminated according to the procedures outlined below.

6.5.1 Personnel and Equipment Decontamination Procedures

All PPE should be disposed of and/or decontaminated at the conclusion of each workday. Decontamination procedures should follow the concept of decontaminating the most contaminated PPE first, along with other requirements of 29 CFR 1910.120(k).

Personnel decontamination will take place prior to exiting any contaminated work area. 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 these 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.

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

All equipment and vehicles should be decontaminated or discarded upon exit. A temporary decontamination pad will be set up on-site during project operations, as needed. All decontamination materials should be drummed for subsequent disposal. Decontamination wash water will be treated through the on-site wastewater treatment system, as that system is described in the Northern Impoundment 100% RD.

6.5.2 General Safety and Personnel Hygiene

- Eating at the work site is prohibited, except in specifically designated areas. Designation of eating areas will be identified to each employee. The location of these areas may change over the duration of the project to maintain adequate separation from the active work area(s).
- Smoking at the work site is prohibited.
- Individuals getting wet to the skin with effluent from the washing operation must wash the affected area immediately. If clothes in contact with skin are wet, then these must be changed.
- Hands, face, neck, and other exposed areas must be washed with soap and water before eating, drinking, smoking, before using toilets, and before leaving the work site.
- All disposable coveralls and soiled gloves will be placed in covered containers at the end of every shift or sooner, if deemed necessary by the HSO. Wastes will be stored until proper disposal arrangements have been made.
- If air purifying respirators are required, personnel will not be permitted to wear facial hair that interferes with the mask to face seal on air purifying respirators.
- All personnel performing or supervising work within the EZ must wear appropriate PPE.
- Personnel found to be disregarding the personal hygiene provisions of this HASP will, at the discretion of the HSO, be barred from the work site.

7. Emergency Procedures

7.1 On-Site Emergencies

Emergencies can range from minor to serious conditions. Various procedures for responding to site emergencies are listed in this section. The SS or HSO will be responsible for contacting local emergency services, if necessary, for specific emergency situations.

An Emergency Information Sheet containing the hospital location, directions, government agency phone numbers, and emergency phone numbers are located in at the front of this HASP. The contact information will need to be updated prior to commencement of Northern Impoundment RA activities.

7.2 Incident, Injury, and Illness Reporting and Investigation

Any work-related incident, injury, illness, exposure, property loss, and/or security issue will be reported to the SS, and then to the PC and the Implementing Party. Motor vehicle accidents should also be reported through this system.

Occupational incidents resulting in employee injury or illness should be investigated by the SS. This investigation will focus on determining the cause of the incident and modifying future work activities to eliminate the hazard. All personnel have the right and obligation to report unsafe work conditions, previously unrecognized safety hazards, or safety violations of others.

7.3 Emergency Equipment/First Aid

Safety equipment will be made available for use by personnel and be located and maintained at the work site. The safety equipment will include, but is not limited to, the following:

– OSHA approved First Aid kit (size dependent upon the number of personnel on-site).
– Emergency eyewash bottles and/or an eyewash station.
– Emergency alarms as a means to alert all personnel instantaneously for an emergency.
– Air horn.
– Additional PPE equipment.
– Potable water.20-pound ABC type dry chemical fire extinguishers (one per each piece of heavy equipment).

7.4 Emergency Procedures for Contaminated Personnel

Whenever possible, personnel should be decontaminated in the contamination reduction zone before administering first aid, without causing further harm to the patient.

– Skin Contact: Remove contaminated clothing, wash immediately with water, and use soap, if available.
– Inhalation: Remove victim from contaminated atmosphere. Remove any respiratory protection equipment. Initiate artificial respiration, if necessary. Transport to the hospital.
– Ingestion: Remove from contaminated atmosphere. Do not induce vomiting if victim is unconscious. Never induce vomiting when acids, alkalis, or petroleum products are suspected. Transport to the hospital, if necessary.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a listing of the contaminants of concern to which they may have been exposed.

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

7.5 Work Site Evacuation

In the event of an emergency situation, such as fire, explosion, or significant release of toxic gases, personnel should follow the procedures outlined in the ERP. Prior to commencement of Northern Impoundment RA activities, the RC will develop and post relevant routes to the nearest hospital, urgent care facility, and storm shelter.

7.6 Spill and Release Contingencies

If a spill has occurred, the first step is personal safety, then controlling the spread of contamination, if possible.

A sufficient supply of emergency response clean-up equipment should be maintained at the work site to be used for spill/release control. The RC will determine which emergency response clean-up equipment should be used in for spill/release control prior to the commencement of activities at the work site as part of the Northern Impoundment RA. Personnel should follow the procedures outlined in the ERP.

8. Recordkeeping

The SS will be assigned responsibility for establishing and maintaining records of all necessary monitoring activities. These records may include the items listed below:

– Name and job classification of the employees involved on specific tasks.
– Air monitoring/sampling results and instrument calibration logs.

– Records of training acknowledgment forms (work site-specific training, safety meetings, etc.).
– Documentation of work site inspections, results of inspections, and corrective actions implemented.
– Emergency reports describing any incidents or accidents.

9. References

– EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, CERCLA Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.
– Occupational Safety and Health Administration, United States Department of Labor, 2024. Code of Federal Regulations (CFR) Title 29, Chapter XVII, Parts 1910 and 1926. May 2024.

Table 1

Properties of Potential Site Contaminants
Health and Safety Plan
San Jacinto River Waste Pits Site Harris County, Texas

Chemical Name (Synonyms)	Exposure Limits	Routes of Entry	Symptoms/Health Effects	Chemical Properties	Physical Characteristics
2, 3, 7, 8-tetrachloro-dibenzo-p-dioxin Dioxine TCDBD TCDD 2, 3, 7, 8-TCDD CAS-1746-01-6	TLV: NE PEL: NE STEL: NE IDLH: NE	Inhalation Absorption Ingestion Eye/skin contact	ACUTE: Irritation to the eyes; allergic dermatitis; gastrointestinal disturbance: CHRONIC: Chloracne: Porphyria; possible reproductive and teratogenic effects; liver and kidney damage; hemorrhage. Potential occupational carcinogen.	(FP) NE (VP) 0.000002 mm (IP) NE (UEL) NE (LEL) NE	Colorless to white, crystalline solid. (Exposure may occur through contact at previously contaminated worksites
Furfuran Divinylene oxide CAS-110-00-9	TLV: NE PEL: NE STEL: NE IDLH: NE	Inhalation Absorption	ACUTE: Irritation of the respiratory tract. May cause lung oedema. CHRONIC: May be fatal if swallowed	(FP) -35 C (VP) NE (IP) NE (UEL) 14.3% (LEL) 2.3%	Clear, colorless liquid that turns brown upon standing with a characteristic odor.
Polychlorinated Biphenyls PCB (42%) Chlorodiphenyl (42% chlorine) Aroclor 1242 CAS-53469-21-9	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) NA (UEL) NA (LEL) NA	Clororless to light colored viscous liquid with a mild hydrocarbon odor.
Polychlorinated Biphenyls PCB (54%) Chlorodiphenyl (54% chlorine) Aroclor 1254 CAS-11097-69-1	TLV: 0.5 mg/m3 [skin] PEL: 0.5 mg/m3 [skin] STEL: NE IDLH: 5 mg/m3	Inhalation Absorption (skin) Ingestion	ACUTE: Eye irritation. CHRONIC: Dermatitis, chloracne, liver damage.	(FP) NA (VP) 0.00006 mm (IP) NA (UEL) NA (LEL) NA	Clororless to pale yellow viscous liquid or solid (<50°F) with a mile hydrocarbon odor.
Aroclor-1260 CAS-11096-82-5	TLV: 0.5 ug/m3 [skin] PEL: 0.5 ug/m3 [skin] STEL: NE IDLH: 5 mg/m3	Absorption Ingestion Inhalation	May cause skin lesions. Potential liver toxin which can be absorbed through skin in hazardous amounts. Potential carniogen.	(FP) 50°F (VP) 41 mm (IP) NE (UEL) 6% (LEL) 1.1%	Yellow solid, odor not available.

Notes:

FP	FP - Flash Point	PEL	PEL - OSHA Permissible Exposure Limit
IDLH	IDLH- Immediately Dangerous to	STEL	STEL - Short Term Exposure Limit
IP	IP - Ionization Potential	TLV	TLV - ACGIH Thresehold Limit Value
NE	NE - Not Established (Information	VP	VP - Vapor Pressure
NA	NA - Not Applicable	C	C - Ceiling Exposure Limit
CNS	CNS - Central Nervous System	[skin]	[skin] - potential for dermal absorption
PNS	PNS - Peripheral Nervous Syster	mm	mm - milimeters Hg (mercury)
ppm	ppm - parts per million	eV	eV - electrovolts
mg/m3	mg/m3 - miligrams per cubic meter		

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The Power of Commitment

Attachment 2 – Emergency Response Plan - Northern Impoundment

Provided as Part of Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

June 17, 2024

→ **The Power of Commitment**

Contents

Appendices

1. Introduction

This Emergency Response Plan (ERP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). This ERP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018, (United States Environmental Protection Agency [EPA], 2018), and in accordance with the EPA Emergency Responder Health and Safety and Occupational Safety and Health Administration (OSHA) requirements under 29 Code of Federal Regulations (CFR) 1910 and 1926. The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Final 100% Remedial Design for the Northern Impoundment (Northern Impoundment 100% RD) submittal to the EPA.

Major incidents that may require emergency response could include severe weather, fire, explosion, chemical reaction, truck rollovers, off-site accidents involving transport vehicles, spills or other incidents that may pose a hazard to on-site personnel and nearby residents and/or the environment. References in this ERP to the “work site” are to the Northern Impoundment and references to “Implementing Party” are to the entity(ies) implementing the remedial action (RA) for the Northern Impoundment.

The Site is located in Harris County, Texas, east of the City of Houston, between two unincorporated areas known as Channelview and Highlands. The Northern Impoundment is approximately 15 acres in size and is located on a small peninsula and includes surrounding in-water and upland areas that extends north of Interstate Highway 10 (I-10).

2. Pre-Emergency Planning

2.1 Coordination with Outside Parties

During any emergency events on-site, personnel may coordinate and communicate with the following authorities (as necessary):

– EPA Region 6.
– Harris County Sheriff.
– Channelview Fire Department.
– National Response Center.
– Harris County Hazardous Materials Response Team (HCHMRT).
– Texas Commission on Environmental Quality (TCEQ).
– Texas Railroad Commission (TRRC).
– Texas Department of Transportation (TxDOT).
– United States Coast Guard (USCG).
– Port of Houston Authority (POHA).

A meeting with these authorities may be conducted by the Implementing Party prior to the commencement of each phase of Northern Impoundment RA activities at the work site, in order to facilitate a coordinated, integrated, and timely response for any emergencies that may occur during intrusive field activities which represent a potential for release of hazardous substances. Topics that may be discussed/reviewed at the meeting will include the following:

– Site history/historical response actions

– Nature and extent of contamination
– Nature and duration of anticipated RA field activities
– Contents of the Northern Impoundment Health and Safety Plan (HASP)
– ERP contents
– Transportation routes
– Emergency response support that can be provided by local emergency response authorities

2.2 Initial Notification Procedures

To minimize hazards to human health and safety and/or the environment, in the event of a fire, explosion, spill, severe weather, or release involving a hazardous substance including oil, raw materials and by-products, or hazardous waste, it will be the responsibility of on-site personnel to immediately report any such releases to the Site Supervisor (SS) (whose role is defined in Section 4). The SS will be responsible for implementing emergency procedures, if necessary, and for notification of appropriate project specific contacts and local emergency response authorities listed in Table 1.

2.3 Emergency Contacts

The emergency telephone numbers for the local emergency response authorities and other local, state, and federal authorities are presented in Table 1. The closest hospital to the work site is located approximately 9 miles east in Baytown, Texas. The emergency telephone numbers and the emergency route to the hospital will be posted at the work site prior to commencement of Northern Impoundment RA activities and will be included in the Northern Impoundment HASP.

Table 1 Emergency Information

EMERGENCY INFORMATION		
Contact	**Phone Number**	**Site Location**
Local Police: Harris County Constable Baytown Police Department	911 (713) 637-0014 (281) 422-8371	Northern Impoundment: 18001 East Freeway Service Road Channelview, Texas 77530 (29.795230, -95.066734)
Local Fire Department: Channelview Fire Department	911 (281) 452-5782	
Ambulance	911	
Stakeholders		
EPA Region 6	(800) 887-6063 or (214) 665-2760	
National Response Center	(800) 424-8802	
Harris County Hazardous Materials Response Team 24-Hour Emergency Line	(800) 590-0005	
Texas Commission on Environmental Quality (TCEQ)	(713) 767-3500	
Texas State Emergency Response Commission	(800) 832-8224	
Harris County Pollution Control Services	(713) 920-2831	
Texas Department of Transportation (TxDOT)	(800) 558-9368	
United States Coast Guard (USCG)	(504) 589-6225	
Port of Houston Emergency Dispatch	(713) 670-3611	

EMERGENCY INFORMATION		
Contact	**Phone Number**	**Site Location**
Non-Emergency Dispatch	(713) 670-3620	

3. Emergency Recognition and Prevention

This section describes the methods and procedures that will be used to recognize and prevent or minimize the adverse effects of any releases of hazardous substances that may occur at the work site during implementation of the Northern Impoundment RA.

3.1 Emergency Recognition

Procedures will be put in place so that on-site personnel will be prepared to recognize and report to the SS any incident (e.g., fire, explosion) or releases of hazardous substances which may endanger human health and safety or the environment. Specifically, when personnel discover such an incident or release of a hazardous substance, the procedures that on-site personnel would be instructed to follow would include the following:

– Report the incident/release to the SS.
– The SS will determine if the incident/release represents an emergency and, if so, will immediately notify a person to be designated by the Implementing Party or the Remedial Contractor (RC) as the project coordinator (or equivalent) for the Northern Impoundment RA (Project Coordinator) and local emergency response authorities, if necessary.

The procedures would also address plans so that personnel in the affected area(s) will immediately evacuate the area of release or the work site in accordance with the "Evacuation Procedures," presented in Section 6.

3.2 Release Prevention Measures

The following procedures/measures will be implemented at the work site to prevent potential releases of or minimize the impact of releases of hazardous substances during the Northern Impoundment RA:

– All potential hazardous substances (i.e., diesel fuel, etc.) will be stored in vessels with adequate secondary containment should a spill occur.
– All potential contaminated substances generated during activities (i.e., impacted soils, dewatering fluids, decontamination fluid, used Personal Protective Equipment (PPE), etc.) will be placed onto the appropriate staging pads or placed in compatible containers.
– The SS will be accountable for hazardous substances spill/release prevention, and is responsible for properly instructing on-site personnel in the operation and maintenance of equipment to prevent the discharges of hazardous substances.
– A supply of spill/release response materials and emergency safety equipment will be stored at the work site during activities to immediately respond to releases/emergencies. Equipment and materials may include, but are not limited to, spill kits, shovels, wheelbarrows, dirt, sand, and visqueen that may be used to dike, contain, or remove minor to moderate spills or releases.
– On-site personnel will be trained, consistent with the level of their responsibilities and in accordance with 29 CFR 1910.120(q)(6), so that they are capable of providing immediate response in order to contain and/or mitigate spills and releases. If necessary, a spill response contractor will be contracted to clean up larger spills or releases.
– A meeting is to be conducted with local emergency response authorities in order to facilitate a coordinated, integrated, and timely response for any emergencies that on-site personnel are unable to contain and/or control.

3.2.1 Emergency Conditions

An emergency condition is any condition that could reasonably be expected to endanger the health or safety of the public, cause significant adverse impact to the land, water, or air environment, or cause severe damage to property. In the event of an unauthorized discharge that causes an emergency condition, the TCEQ 24-hour State of Texas Spill Reporting Hotline (800-832-8224) or State Emergency Response Commission (SERC) (800-832-8224) and the Federal National Response Center (NRC) (800-424-8802) must be notified immediately after determining an emergency situation exists. Notification required by this section must be made regardless of the volume of discharge. A written report must be provided within seven (7) calendar days of becoming aware of the circumstances. The written report should contain the following information:

– A description of the noncompliance and its cause
– The period of noncompliance including exact dates and times, and, if the noncompliance has not been corrected, the anticipated time it is expected to continue
– Steps being taken to reduce, eliminate, and prevent recurrence of the noncompliant discharge

An example spill report form is available in Appendix A.

3.2.2 Non-Emergency Conditions (Exceedance of a Reportable Quantity)

In the event of an unauthorized discharge that exceeds a reportable quantity, but does not cause an emergency condition, SERC or NRC must be notified by telephone within 24 hours. A written follow-up report is also required and must be submitted within seven (7) calendar days of the event. Notifications shall also be provided as set forth in Section 9.

A reportable quantity spill is a discharge or spill of oil, petroleum product, used oil, industrial solid waste, hazardous substances including mixtures, streams or solutions, or other substances into the environment in a quantity equal to or greater than the reportable quantity list in 30 Texas Administrative Code (TAC) Chapter 327.4 (relating to Reportable Quantities) in a 24-hour period and subject to 30 TAC Chapter 327.3 (relating to Notification Requirements).

The written report should contain the same information required for emergency conditions, as discussed in Section 3.2.1 above. The spill reports will be kept on file at the work site.

3.2.2.1 Reportable Quantities (30 TAC 327.4)

The reportable quantity list as defined in 30 TAC 327.4 is as follows:

a. The reportable quantities for hazardous substances shall be:
    1. for spills or discharges onto land: the quantity designated as the Final Reportable Quantity (RQ) in Table 302.4 in 40 CFR §302.4; or
    2. for spills or discharges into waters in the state: the quantity designated as the Final RQ in Table 302.4 in 40 CFR §302.4, except where the Final RQ is greater than 100 pounds in which case the RQ shall be 100 pounds. Table 302.4 in 40 CFR §302.4 is included as Appendix B.
b. The reportable quantities for oil, petroleum product, and used oil shall be:
    1. The RQ for crude oil and oil other than that defined as petroleum product or used oil shall be:
        a. for spills or discharges onto land: 210 gallons (five barrels); or
        b. for spills or discharges directly into water in the state: quantity sufficient to create a sheen.
    2. The RQ for petroleum product and used oil shall be:
        a. except as noted in subparagraph (b) of this paragraph, for spills or discharges onto land: 25 gallons;
        b. for spills or discharges to land from petroleum storage tank (PST) exempted facilities: 210 gallons (five barrels); or

c. for spills or discharges directly into water in the state: quantity sufficient to create a sheen.

c. The reportable quantities for industrial solid waste or other substances, for spills or discharges into water in the state, shall be 100 pounds.

3.2.2.2 Notification Requirements (30 TAC 327.3)

The notification requirements as defined in 30 TAC 327.3 is as follows:

3.2.2.2.1 Initial Notification

– Upon the determination that a reportable discharge or spill has occurred, the responsible person shall notify the TCEQ as soon as possible but not later than 24 hours after the discovery of the spill or discharge.

– The responsible person shall notify the TCEQ and EPA in any reasonable manner including by telephone, in person, or by any other method approved by the TCEQ. In all cases, the initial notification shall provide, to the extent known, the information listed in subsection (d) of this section. Notice provided under this section satisfies the federal requirement to notify the State Emergency Response Commission in the State of Texas. The responsible person shall notify one of the following:

  1. the State Emergency Response Center (1-800-832-8224);
  2. during normal business hours only, the regional office for the TCEQ region in which the discharge or spill occurred; or
  3. the TCEQ at the TCEQ's 24-hour spill reporting number (800-832-8224).

– In all cases, the initial notification shall provide, to the extent known, the information in the following list. Copies of spill reports prepared for other governmental agencies shall satisfy this requirement if they contain, or are supplemented to contain, all the information in the following list. The initial notification shall contain:

  1. the name, address and telephone number of the person making the telephone report;
  2. the date, time, and location of the spill or discharge;
  3. a specific description or identification of the oil, petroleum product, hazardous substances or other substances discharged or spilled;
  4. an estimate of the quantity discharged or spilled;
  5. the duration of the incident;
  6. the name of the surface water or a description of the waters in the state affected or threatened by the discharge or spill;
  7. the source of the discharge or spill;
  8. a description of the extent of actual or potential water pollution or harmful impacts to the environment and an identification of any environmentally sensitive areas or natural resources at risk;
  9. if different from the information in item 1 above, the names, addresses, and telephone numbers of the responsible person and the contact person at the location of the discharge or spill;
  10. a description of any actions that have been taken, are being taken, and will be taken to contain and respond to the discharge or spill;
  11. any known or anticipated health risks;
  12. the identity of any governmental representatives, including local authorities or third parties, responding to the discharge or spill; and
  13. any other information that may be significant to the response action.

3.2.2.2.2 Update Notification

– The responsible person shall also notify the TCEQ as soon as possible whenever necessary to provide information that would trigger a change in the response to the spill or discharge.

3.2.2.2.3 Notification to Local Governmental Authorities

– If the discharge or spill creates an imminent health threat, the responsible person shall immediately notify and cooperate with local emergency authorities (fire department, fire marshal, law enforcement authority, health authority, or Local Emergency Planning Committee [LEPC], as appropriate). The responsible party will cooperate with the local emergency authority in providing support to implement appropriate notification and response actions. The local emergency authority, as necessary, will implement its emergency management plan, which may include notifying and evacuating affected persons. In the absence of a local emergency authority, the responsible person shall take reasonable measures to notify potentially affected persons of the imminent health threat.

3.2.2.2.4 Notification to Property Owner and Residents

– As soon as possible, but no later than two weeks after discovery of the spill or discharge, the responsible person shall reasonably attempt to notify the owner (if identifiable) or occupant of the property upon which the discharge or spill occurred, as well as the occupants of any property that the responsible person reasonably believes is adversely affected.

The written report should contain the same information required for emergency conditions, as discussed in Section 3.2.1 above. The spill reports will be kept on file at the work site. In lieu of hardcopy spill report forms, copies of incident reports may also be maintained electronically and will be available upon request.

4. Personnel Roles

This section of the ERP describes, for purposes of the Northern Impoundment RA, the various personnel roles, responsibilities, and the lines of authority that individuals will be assigned and communication procedures that will be followed by on-site personnel involved in responses to incidents or emergencies.

4.1 Site Supervisor

The Site Supervisor (or equivalent), referred to in this ERP as the “SS,” will be assigned responsibility for implementing on-site emergency response procedures and directing the on-site and emergency personnel. All on-site personnel and their communications would be coordinated through the SS. Specific duties of the SS in the case of an incident will include the following, as applicable:

– Initially identify the source and character of the incident and the type and quantity of any release (if applicable). Assess possible hazards to human health or the environment in consultation with the Health and Safety Officer (as defined in Section 4.2) that may result directly from the incident. See Table 2 in Section 6 of this document for details on release criteria and reporting requirements.
– If the incident may threaten human health or safety of on-site personnel, immediately determine whether evacuation of the work site is necessary in consultation with the Project Coordinator and EPA Remedial Project Manager (RPM).
– If the incident does not threaten human health or safety of on-site personnel or nearby residents or the environment, determine if on-site personnel can contain or control the incident or release. If not, notify local emergency response authorities identified above in Table 1.
– Direct on-site personnel to control the incident or release until, if necessary, outside emergency response help arrives. Specifically ensure that the location where the incident/release occurred and the surrounding area are evacuated and all operations in the vicinity of the incident are discontinued to ensure that fire, explosions, or spills do not spread. Direct work site personnel not involved in emergency response actions to avoid the area of the incident and leave emergency control procedures unobstructed and ensure protected personnel are on standby for emergency rescue, if necessary.

– Determine, in consultation with the Health and Safety Officer, when the emergency has passed and initiate an "all clear" signal to notify on-site personnel of such.
– Ensure that all emergency equipment used is decontaminated, recharged, and/or fit for its intended use before work site operations are resumed.
– Record time, date, and details of the incident, and submit a written incident report to the EPA within applicable time periods required by any order under which the Northern Impoundment RA is being performed, if the release is at or above reportable quantities.
    - Per regulations developed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (Superfund), a spill/release of one pound or more of any hazardous substance for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or Toxic Substances Control Act (TSCA), may require reporting.

4.2 Health and Safety Officer

This individual will be responsible for identifying and evaluating actual and potential hazards and providing oversight of emergency response actions with respect to the safety of operations being conducted. The Health and Safety Officer will likely report directly to the SS. Specific duties of the Health and Safety Officer may include:

– Conduct an initial assessment of the emergency situation to identify chemical(s) and potential physical hazard(s) of the emergency response actions.
– Perform necessary air monitoring to determine levels of exposure and necessary protective equipment for emergency personnel and evaluate the potential for off-site migration of airborne contaminants.
– Present a safety briefing to on-site personnel to inform them of the actual and potential hazards of the emergency response and required levels of personnel protective equipment.
– Identify use of any engineering controls, (e.g., ventilation, remote handling devices, etc.), to control overexposure of personnel to hazardous substances.
– Identify work zones to be established by on-site personnel.
– Investigate any injuries or illnesses as a result of accidents occurring during an emergency response.
– Observe the safety of clean-up activities and ensure appropriate PPE requirements are being adhered to.
– Determine when it is safe for personnel to return to the affected area after emergency response actions are completed.
– Maintain a log of safety briefings, air monitoring, safety observations, and other important issues relevant to safety.

4.3 On-Site Personnel

The SS will be responsible for directing the on-site personnel in emergency response operations. Specific steps that the SS may take in directing on-site personnel are described below.

The on-site personnel will be instructed to respond initially to all emergency incidents. Priorities of on-site personnel will be to protect human health and safety of on-site personnel and nearby residents, and then the environment. Efforts should be made to prevent a spill/release from spreading to nearby areas. Specific duties of the on-site personnel may be as follows:

– Clear the area of all personnel not actually involved in responding to the emergency, and remove any injured persons from the area, such that medical treatment can be administered by qualified first-aid trained personnel.
    - Prior to allowing treatment of injured persons by first-aid trained personnel, decontamination of the injured persons will be performed. On-site personnel will be responsible for ensuring that the level of decontamination is consistent with the extent of injury and level of contamination.
– Establish appropriate work zones for emergency response as directed by the Health and Safety Officer.

– Control the incident or release at the direction of the SS, until, if necessary, outside emergency response help arrives.

The SS will appoint or designate, as necessary, on-site personnel to assist in the following efforts:

– Notification of local emergency response authorities.
– Work site evacuation and accounting of personnel and visitors.
– Assuring that personnel not involved in the emergency response and/or clean-up activities are kept a safe distance from the area and do not interfere with operations.
– Maintaining on-site traffic lanes for emergency response vehicles.
– Sampling efforts to determine the extent of contamination and clean-up efforts, if appropriate.
– Proper containerization, labeling and staging of any recovered hazardous substances, if appropriate.
– Assisting in decontaminating, recharging, or replacing all emergency equipment used during the emergency response.
– Assisting in returning personnel to their work areas after the "all clear" signal is given.

5. Severe Weather and High-Water Preparation

The SS will adopt procedures to monitor weather and river levels, which may include Hazardous Weather Outlooks for the surrounding areas, as defined by the Climate Prediction Center U.S. Hazard Outlook, a division of the National Oceanic and Atmospheric Administration (NOAA). The SS will also adopt procedures to be followed in the event that a severe weather or tornado watch or warning is issued by the National Weather Service, which will include directing on-site personnel to shelter areas, which will be determined prior to the Northern Impoundment RA. Routes to shelters will be included in the Northern Impoundment HASP.

As detailed in the Northern Impoundment 100% RD, it is anticipated that Northern Impoundment RA activities may be conducted in the months of November through April, with the possibility of extending the excavation season through July. Defined preparation phases to address situations involving severe weather, a high-water event, a tropical depression, tropical storm, or a hurricane that is anticipated to make landfall in the general vicinity of the work site, are described in the High-Water Preparedness Plan (HWPP) included as Attachment L in the 100% RD. During the Northern Impoundment RA, the HWPP Coordinator will be documenting weather events and delays due to weather events.

5.1 Re-Entry Procedure

The SS, in coordination with the Project Coordinator and Implementing Party, will be responsible for determining the appropriate time for personnel to return to the work site.

Federal, state, and local government agencies and law enforcement officials have agreed to recognize specific identification from critical infrastructure owners and operators, and their contractors, subcontractors, and assignees that seek access into a closed emergency area. Once identity has been verified, access is granted at the discretion of agency or official representatives (e.g., law enforcement, National Guard, TxDOT). A valid State Driver’s License and/or employer-issued photo ID and/or Transportation Worker Identification Credential (TWIC) Card may be required to gain access at checkpoints.

Once the local authorities and any other parties whose consent is necessary have granted access, the SS, in coordination with the Implementing Party, can then determine the appropriate time for personnel to return to the work site.

5.2 Site Inspection

Once it is determined that the work site is safe to access, it is anticipated that specific personnel selected by the SS will mobilize to the work site to complete a post-severe weather work site inspection. The SS will be responsible for determining how such personnel should document work site conditions, including with photographs and field notes. In addition, the SS may have such personnel note any damage or impact to materials or equipment, determine approximate high-water levels, and/or obtain relevant information from any local residents that may have stayed in the area during the storm. The SS will also be responsible to, if necessary, direct personnel to prepare a work site inspection report for submittal to the EPA.

6. Evacuation Route and Procedures

Emergencies require prompt and deliberate action. In the event of a hazardous substance spill/release, it will be necessary for the RC's personnel and other persons present at the work site to follow an established set of procedures consistent with OSHA requirements in 29 CFR 1910.120(b)(4)(ii)(J) and (j)(1)(viii). The procedures that are established should be followed as closely as possible, with the understanding that, in specific emergency situations, the SS may deviate from the procedures to provide a more effective plan for bringing the situation under control. The SS will be responsible for determining which situations require evacuation of the work site.

This section describes procedures which will be employed to address potential exposures of on-site personnel and persons in the vicinity of the work site to hazardous conditions arising out of spills/releases of hazardous substances at the work site. It is anticipated that no single defined route can be identified for evacuation or safe distances due to the nature of the work, and that safe distances will only be determined at the time of an emergency, based on a combination of work site and incident conditions. The muster point would likely be at the east end of the East Freeway Service Road in Channelview, Texas, at the entrance gate to the Northern Impoundment. This muster point may be revised in the site-specific HASP that is developed for the RA by the RC. The evacuation route from the work site is the East Freeway Service Road to I-10.

The following measures are provided to serve as general guidelines. Table 6.1 below addresses the criteria for minor and major releases, and the procedures for both are detailed in Section 6.1 and 6.2, respectively.

Table 6.1 Criteria for Hazardous Substances Spill/Release Incidents

Release Classification	Criteria
Minor Release	– Low toxicity compound spill > 1 barrel (bbl) outside secondary containment, or ≥ 5 bbl inside secondary containment, unless it impacts or potentially impacts state or marine waters. – Single handheld detector with a lower explosive limit (LEL) reading ≥ 10 percent. – Smoke Investigation.
Major Release	– High toxicity compound spill impacting or potentially impacting state or marine waters. – Fire or Explosion. – Hazardous substances release with off-site potential.

6.1 Minor Releases Requiring Limited Evacuation

As part of the procedures applicable in the event of minor releases (small spills of low toxicity) of hazardous substances, personnel may be directed to evacuate the immediate area and report to the Contaminant Reduction Zone (CRZ). The CRZ will be determined by the RC and Implementing Party prior to the Northern Impoundment RA. Low toxicity is defined for this purpose as a compound having an Animal LD_{50} greater than 50 milligrams per kilogram (mg/kg). A signal to evacuate a limited area in the case of a minor release will be established, such as one short blast using an air horn or verbal communication. Small spills or leaks from a container will require initial evacuation of an area, potentially at least 35 feet in all directions, to allow for clean-up and to prevent exposure.

After initial assessment of the extent of the release and potential hazards, the SS, in consultation with the Health and Safety Officer, will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, or barricades would be used to secure the boundaries.

6.2 Major Release Requiring Evacuation of the Work Site

As part of the procedures applicable in the event of a major hazardous substance release (large spills of high toxicity), personnel may be directed to evacuate the work site. High toxicity is defined for this purpose as a compound having an Animal LD_{50} less than 50 mg/kg. A signal to notify on-site personnel to evacuate the work site in case of major releases requiring evacuation of the work site will be established prior to the Northern Impoundment RA. Site evacuation would be initiated by the SS, in consultation to the extent practical, with the Health and Safety Officer and the Project Coordinator. However, if necessary, the SS would initiate work site evacuation, as necessary, to protect the health and safety of on-site personnel. At this time, no substances are expected to be present at the work site that would be defined as a high toxicity substance. The RC will update the site-specific HASP in the event that a substance is identified that meets this criterion.

6.3 Work Site Evacuation Route

As part of the procedures governing evacuation of the work site, muster points and evacuation routes for the work site will be identified, as discussed in Section 6. The routes should be addressed during safety meetings, including any changes to such routes due to changing work site conditions, work activities, and weather factors. A secondary evacuation route would also be identified during the safety meeting.

6.4 Evacuation Procedures

As part of the procedures to be followed in the event work site evacuation is necessary, it is recommended that the following actions (or similar) be undertaken:

- The signal for work site evacuation should be activated.
- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the work site should cease to allow safe exit of personnel and movement of emergency equipment.
- **ALL** personnel, visitors, and contractors should immediately leave through the identified primary or secondary evacuation route.
- No persons will remain or re-enter the work site unless to carry out their emergency duty procedures. Those within the worksite area will normally only include emergency response personnel or other emergency teams (e.g., fire department).
- Immediately upon exit, **ALL** personnel, visitors, and contractors should be accounted for by the SS or designee.
- The names of emergency response team members and/or other emergency team members involved in emergency response should be reported to the SS.
- Re-entry into emergency areas, to find persons not accounted for should not be attempted.
- Re-entry into the work site will be made only after an "all clear" signal is given by the SS. At his/her direction, a signal or other notification will be given for re-entry into the work site.

7. Emergency Work Site Security and Control

The SS will put in place security measures to be followed in the event of an emergency. Implementation of security procedures should begin with the notification that an emergency has occurred. If it is necessary to evacuate personnel from the work site or an area within the work site, security measures would be implemented to safely remove

personnel and to secure the area from re-entry, to prevent or minimize the exposure of unprotected personnel to work site hazards and avoiding interference with emergency response actions. As part of those measures, on-site personnel should be instructed to immediately take steps to secure the incident area and establish safe boundaries (i.e., work zones). This may include, if necessary, establishing the following three work zones at the direction of the Health and Safety Officer:

– ***Support Zone (SZ)*** - The uncontaminated area where emergency response personnel should not be exposed to hazardous conditions.
– ***Contaminant-Reduction Zone (CRZ)*** - The area where decontamination takes place.
– ***Exclusion Zone (EZ)*** - The contaminated area/emergency response area.

7.1 Delineation of Work Zones

The location of these three zones would be pre-determined, based on, to the extent applicable, sampling and monitoring results, expected work activities, and potential routes and extent of contamination dispersion in the event of a release. Procedures should be adopted to minimize movement of personnel and equipment among these zones, to restrict access to control points to prevent cross contamination from contaminated areas to clean areas, and to clearly mark work zones, including by lines, placards, hazard tape, construction cones and/or signs, or enclosed by physical barriers such as fences or ropes.

7.2 Communication Systems

A system of communication should be established at the hazardous substance spill/release scene. The communication system would address both internal communication among on-site personnel and external communication between on-site and off-site personnel.

The SS will be responsible for determining the proper methods of communication at the work site. The SS will also be responsible for instructing all on-site personnel on the use of the selected communication methods.

Internal Communication

Internal communication will be used to:

– Alert emergency response personnel members to emergencies.
– Pass along safety information, such as the next rest period, air change, heat-stress check, etc.
– Communicate changes in the work to be accomplished.
– Maintain site control.

The SS will be responsible for determining the proper methods of communication at the work site. The SS will also be responsible for instructing all on-site personnel on the use of the selected communication methods.

External Communication

An external communication system between on-site and off-site personnel will be implemented to:

– Coordinate emergency response.
– Report to management.
– Maintain contact with essential off-site personnel.
– The primary means of external communication will be by telephone.

8. Emergency First Aid and Medical Treatment

During the Northern Impoundment RA, it is anticipated that any personnel requiring emergency medical attention would be evacuated immediately from EZs and CRZs and that personnel will be instructed to not enter any such area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation in such a situation will be based on the type and severity of the illness or injury and the nature of the contaminant. Personnel will be instructed that if decontamination does not interfere with essential treatment, it should be performed.

8.1 Emergency Medical Actions

If actual or suspected serious injury occurs, it is recommended that these steps be followed:

– Remove the exposed or injured person(s) from immediate danger.
– First aid to be rendered at on-site personnel discretion. Decontaminate affected personnel after critical first aid is given.
– Notify SS and Health and Safety Officer of the incident.
– Obtain emergency medical services or ambulance transport to the hospital. Routes to the nearest hospital and urgent care facility will be included in the HASP and posted at the work site.
– Other personnel in the work area will be evacuated to a safe distance until the Health and Safety Officer determines that it is safe for work to resume. If there is any doubt regarding the condition of the area, work shall not commence until all hazard-control issues are resolved.

8.2 First Aid

Qualified personnel may give first aid at their discretion and stabilize an individual needing assistance. Professional medical assistance should be obtained at the earliest possible opportunity.

8.3 Emergency Numbers

In the event of an emergency medical incident the telephone numbers provided in Table 1 should be available to be used to summon assistance.

9. Emergency Alerting and Response Procedures for On-Site Incidents

In the event of an emergency involving an on-site hazardous substance spill or release, the general procedures that will be used for rapid and safe response and control of the situation may include those identified below.

9.1 Emergency Alerting Procedures

If on-site personnel discover a chemical spill or a vapor or substance release, they should immediately notify the SS. When contacted, the SS should obtain information pertaining to the following, to the extent applicable:

– The substance spilled or released.
– Location of the release or spillage of the substance.

– An estimate of quantity released and the rate at which it is being released.
– The direction in which the spill/release or vapor or smoke release is heading.
– Any injuries involved.
– Fire explosion or chemical reaction or possibility of these events.
– The area and substances involved and the intensity of the fire or explosion.

This information will then be used by the SS to assess the magnitude and potential severity of the spill or release.

9.2 Emergency Response Procedures

The initial response to any emergency should be to protect human health and safety, and then the environment. Other steps, such as identification, containment, treatment, and disposal assessment, should be considered, as part of the secondary response.

Emergency response procedures may include the measures described below:

– If a spill/release occurred that was not contained within a dike or sump area (e.g., drum staging area or decontamination pad), an area of isolation should be established around the spill/release. The size of the area should be established depending on the size of the spill/release and the substances involved.
– If the spill/release results in the formation of a toxic vapor cloud (by outbreak of fire or otherwise), further evacuation may be required, based on isolation directions that have been established prior to the initiation of work activities for Northern Impoundment RA. A decision may be made to modify the scope of the evacuation based on air monitoring performed by the Health and Safety Officer.
– If the control and clean-up of a spill or release is determined to be within the capabilities of the on-site personnel and to not threaten human health or safety of on-site personnel or nearby residents, a decision on notifications to local emergency authorities will be made by the SS, and in consultation with the Implementing Party and EPA RPM, if practicable.
– Any release occurring from drums or other containers containing solid wastes should be placed into approved containers and should be labeled as to its contents and transferred to the on-site staging area pending treatment and/or off-site disposal.
– In the event of spilled liquid, the spilled liquids should be confined to the immediate area of the spill and the liquids will either be pumped, with the use of a portable hand pump, into an overpack drum or tank (or similar container) or absorbed with an inert absorbent. The spilled liquids should be confined by implementing steps, such as diking around the spill with native material or with an inert absorbent. Containers containing such materials should be appropriately labeled as to contents and transferred to an on-site drum staging area pending treatment and/or off-site disposal. In some situations, such as if the spilled liquid consisted of non-aqueous phase liquids (NAPL) or decontamination water, additional steps may be required to address the spilled substance and visibly affected soils.

The SS has designated responsibility for determining whether spill or release is not within the capabilities of the on-site personnel or for other reasons should be immediately reported to the 911 dispatcher. In that situation, the SS will have responsibility for initiating evacuation of potentially affected work site areas.

10. Personal Protection and Emergency Equipment

10.1 Personal Protective Equipment

Emergency response personnel entering an EZ for emergency spill/release response should, depending on the task and exposure potential, be required to wear an appropriate protection level as determined by the RC and Implementing Party and as directed by the Health and Safety Officer.

10.2 Emergency Equipment

Emergency equipment will need to be available for deployment during emergencies/releases of hazardous substances if needed. That emergency equipment may include the equipment discussed below.

10.2.1 Air Monitoring Equipment

The SS will determine which direct reading instrumentation will be used in emergency situations to assess the degree of environmental hazard prior to the Northern Impoundment RA. The equipment to be used for air monitoring is further discussed in the Northern Impoundment 100% RD Site-Wide Monitoring Plan.

10.2.2 Emergency Response Clean-Up Equipment

A sufficient supply of emergency response clean-up equipment should be maintained at the work site to be used for spill/release control. The SS will determine which emergency response clean-up equipment should be used in for spill/release control prior to the commencement of activities at the work site as part of the Northern Impoundment RA.

10.2.3 Emergency Safety Equipment

It is recommended that the following equipment, at a minimum, be staged at the work site, during active Northern Impoundment RA activities, to provide for safety and first aid:

– Air horn.
– Additional PPE equipment.
– Potable water.
– OSHA approved first aid kit sized for a minimum of ten people.
– Portable emergency eyewash.
– 20-pound ABC type dry chemical fire extinguishers (one per each piece of heavy equipment).

11. Response Follow-Up

Following all emergency response actions and activation of this ERP, it is recommended that the SS adopt response follow-up procedures that include conducting a debriefing session for all key individuals involved to evaluate the response and revisions to ERP, if necessary. The follow-up procedures may address the need for and responsibility for preparation of an incident report.

12. References

– EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, CERCLA Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.

Appendices

Appendix A

Example Spill Report Form

Spill Report Form
San Jacinto Waste Pits Superfund Site - Northern Impoundment
Channelview, Texas

Date of Spill:_____ Date of Spill Discovery:_____
Time of Spill:_____ Time of Spill Discovery:_____

Name and Title of Discoverer:_____

Type of material spilled and manufacturer's name:_____

Description of spill location:_____

Directions from nearest community:_____

Estimated volume of spill:_____

Weather conditions:_____

Topography and surface conditions of spill site:_____

Impacted medium (pavement, sandy soil, water, etc.):_____

Proximity of spill to surface waters: _____

Did the spill reach a waterbody? _____Yes _____No

If so, was a sheen present? _____Yes _____No

Describe the causes and circumstances resulting in the spill:_____

_____

_____

Describe the extent of observed contamination, both horizontal and vertical (*i.e.*, spill-stained soil in a 5-foot radius to a depth of 1 inch): _____

_____

_____

Describe immediate spill control and/or cleanup methods used and implementation schedule: _____

_____

Current status of cleanup actions:_____

Name/Company/Address/Phone Number for the following:

Spill Coordinator:_____

Person Who Reported the Spill:_____

Form completed by:_____Date:_____

Spill Report Form
San Jacinto Waste Pits Superfund Site - Northern Impoundment
Channelview, Texas

Date of Spill:_____ Date of Spill Discovery:_____
Time of Spill:_____ Time of Spill Discovery:_____

Name and Title of Discoverer:_____

Type of material spilled and manufacturer's name:_____

Description of spill location:_____

Directions from nearest community:_____

Estimated volume of spill:_____

Weather conditions:_____

Topography and surface conditions of spill site:_____

Impacted medium (pavement, sandy soil, water, etc.):_____

Proximity of spill to surface waters: _____

Did the spill reach a waterbody? _____Yes _____No

If so, was a sheen present? _____Yes _____No

Describe the causes and circumstances resulting in the spill:_____

_____

_____

Describe the extent of observed contamination, both horizontal and vertical (*i.e.*, spill-stained soil in a 5-foot radius to a depth of 1 inch): _____

_____

_____

Describe immediate spill control and/or cleanup methods used and implementation schedule: _____

_____

Current status of cleanup actions:_____

Name/Company/Address/Phone Number for the following:

Spill Coordinator:_____

Person Who Reported the Spill:_____

Form completed by:_____Date:_____

Spill Report Form
San Jacinto Waste Pits Superfund Site - Northern Impoundment
Channelview, Texas

Date of Spill:_____ Date of Spill Discovery:_____
Time of Spill:_____ Time of Spill Discovery:_____

Name and Title of Discoverer:_____

Type of material spilled and manufacturer's name:_____

Description of spill location:_____

Directions from nearest community:_____

Estimated volume of spill:_____

Weather conditions:_____

Topography and surface conditions of spill site:_____

Impacted medium (pavement, sandy soil, water, etc.):_____

Proximity of spill to surface waters: _____

Did the spill reach a waterbody? _____Yes _____No

If so, was a sheen present? _____Yes _____No

Describe the causes and circumstances resulting in the spill:_____

_____

_____

Describe the extent of observed contamination, both horizontal and vertical (*i.e.*, spill-stained soil in a 5-foot radius to a depth of 1 inch): _____

_____

_____

Describe immediate spill control and/or cleanup methods used and implementation schedule: _____

_____

Current status of cleanup actions:_____

Name/Company/Address/Phone Number for the following:

Spill Coordinator:_____

Person Who Reported the Spill:_____

Form completed by:_____Date:_____

Spill Report Form
San Jacinto Waste Pits Superfund Site - Northern Impoundment
Channelview, Texas

Date of Spill:_____ Date of Spill Discovery:_____
Time of Spill:_____ Time of Spill Discovery:_____

Name and Title of Discoverer:_____

Type of material spilled and manufacturer's name:_____

Description of spill location:_____

Directions from nearest community:_____

Estimated volume of spill:_____

Weather conditions:_____

Topography and surface conditions of spill site:_____

Impacted medium (pavement, sandy soil, water, etc.):_____

Proximity of spill to surface waters: _____

Did the spill reach a waterbody? _____Yes _____No

If so, was a sheen present? _____Yes _____No

Describe the causes and circumstances resulting in the spill:_____

_____

_____

Describe the extent of observed contamination, both horizontal and vertical (*i.e.*, spill-stained soil in a 5-foot radius to a depth of 1 inch): _____

_____

_____

Describe immediate spill control and/or cleanup methods used and implementation schedule: _____

_____

Current status of cleanup actions:_____

Name/Company/Address/Phone Number for the following:

Spill Coordinator:_____

Person Who Reported the Spill:_____

Form completed by:_____Date:_____

Spill Report Form
San Jacinto Waste Pits Superfund Site - Northern Impoundment
Channelview, Texas

Date of Spill:_____ Date of Spill Discovery:_____
Time of Spill:_____ Time of Spill Discovery:_____

Name and Title of Discoverer:_____

Type of material spilled and manufacturer's name:_____

Description of spill location:_____

Directions from nearest community:_____

Estimated volume of spill:_____

Weather conditions:_____

Topography and surface conditions of spill site:_____

Impacted medium (pavement, sandy soil, water, etc.):_____

Proximity of spill to surface waters: _____

Did the spill reach a waterbody? _____Yes _____No

If so, was a sheen present? _____Yes _____No

Describe the causes and circumstances resulting in the spill:_____

_____

_____

Describe the extent of observed contamination, both horizontal and vertical (*i.e.*, spill-stained soil in a 5-foot radius to a depth of 1 inch): _____

_____

_____

Describe immediate spill control and/or cleanup methods used and implementation schedule: _____

_____

Current status of cleanup actions:_____

Name/Company/Address/Phone Number for the following:

Spill Coordinator:_____

Person Who Reported the Spill:_____

Form completed by:_____Date:_____

Appendix B

Table 302.4 in 40 CFR §302.4

potentially responsible parties to undertake response actions.

(e) Because state and local public safety organizations would normally be the first government representatives at the scene of a discharge or release, they are expected to initiate public safety measures that are necessary to protect the public health and welfare and that are consistent with containment and cleanup requirements in the NCP, and are responsible for directing evacuations pursuant to existing state or local procedures.

[59 FR 47473, Sept. 15, 1994, as amended at 80 FR 37121, June 29, 2015; 83 FR 5209, Feb. 6, 2018; 84 FR 56670, Oct. 22, 2019; 85 FR 22342, Apr. 21, 2020]

PART 302—DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION

Sec.
302.1 Applicability.
302.2 [Reserved]
302.3 Definitions.
302.4 Designation of hazardous substances.
302.5 Determination of reportable quantities.
302.6 Notification requirements.
302.7 Penalties.
302.8 Continuous releases.

AUTHORITY: 33 U.S.C. 1251 *et seq.*

SOURCE: 50 FR 13474, Apr. 4, 1985, unless otherwise noted.

§ 302.1 Applicability.

This regulation designates under section 102(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (''the Act'') those substances in the statutes referred to in section 101(14) of the Act, identifies reportable quantities for these substances, and sets forth the notification requirements for releases of these substances. This regulation also sets forth reportable quantities for hazardous substances designated under section 311(b)(2)(A) of the Clean Water Act.

§ 302.2 [Reserved]

§ 302.3 Definitions.

As used in this part, all terms shall have the meaning set forth below:

The Act, CERCLA, or *Superfund* means the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Pub. L. 96–510);

Administrator means the Administrator of the United States Environmental Protection Agency (''EPA'');

Animal waste means feces, urine, or other excrement, digestive emission, urea, or similar substances emitted by animals (including any form of livestock, poultry, or fish). The term ''animal waste'' includes animal waste that is mixed or commingled with bedding, compost, feed, soil, or any other material typically found with such waste.

Consumer product shall have the meaning stated in 15 U.S.C. 2052;

Environment means (1) the navigable waters, the waters of the contiguous zone, and the ocean waters of which the natural resources are under the exclusive management authority of the United States under the Fishery Conservation and Management Act of 1976, and (2) any other surface water, ground water, drinking water supply, land surface or subsurface strata, or ambient air within the United States or under the jurisdiction of the United States;

Facility means (1) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or (2) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel;

Farm means a site or area (including associated structures) that—

(1) Is used for—

(i) The production of a crop; or

(ii) The raising or selling of animals (including any form of livestock, poultry, or fish); and

(2) Under normal conditions, produces during a farm year any agricultural products with a total value equal to not less than $1,000.

Hazardous substance means any substance designated pursuant to 40 CFR part 302;

Hazardous waste shall have the meaning provided in 40 CFR 261.3;

Navigable waters means the waters of the United States, including the territorial seas, as defined in §120.2 of this chapter.

Offshore facility means any facility of any kind located in, on, or under, any of the navigable waters of the United States, and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel;

Onshore facility means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under, any land or non-navigable waters within the United States;

Person means an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, United States Government, State, municipality, commission, political subdivision of a State, or any interstate body;

Release means any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing any hazardous substance or pollutant or contaminant), but excludes:

(1) Any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons;

(2) Emissions from the engine exhaust of a motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station engine;

(3) Release of source, byproduct, or special nuclear material from a nuclear incident, as those terms are defined in the Atomic Energy Act of 1954, if such release is subject to requirements with respect to financial protection established by the Nuclear Regulatory Commission under section 170 of such Act, or for the purposes of section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act or any other response action, any release of source, byproduct, or special nuclear material from any processing site designated under section 102(a)(1) or 302(a) of the Uranium Mill Tailings Radiation Control Act of 1978; and

(4) The normal application of fertilizer;

Reportable quantity (''RQ'') means that quantity, as set forth in this part, the release of which requires notification pursuant to this part;

United States include the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction; and

Vessel means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water.

[50 FR 13474, Apr. 4, 1985, as amended at 67 FR 45321, July 9, 2002; 73 FR 76959, Dec. 18, 2008; 80 FR 37123, June 29, 2015; 83 FR 5209, Feb. 6, 2018; 83 FR 37446, Aug. 1, 2018; 84 FR 56671, Oct. 22, 2019; 85 FR 22342, Apr. 21, 2020]

§ 302.4 Designation of hazardous substances.

(a) *Listed hazardous substances.* The elements and compounds and hazardous wastes appearing in table 302.4 are designated as hazardous substances under section 102(a) of the Act.

(b) *Unlisted hazardous substances.* A solid waste, as defined in 40 CFR 261.2, which is not excluded from regulation as a hazardous waste under 40 CFR 261.4(b), is a hazardous substance under section 101(14) of the Act if it exhibits any of the characteristics identified in 40 CFR 261.20 through 261.24.

NOTE: The numbers under the column headed ''CASRN'' are the Chemical Abstracts Service Registry Numbers for each hazardous substance. The ''Statutory Code'' column indicates the statutory source for designating each substance as a CERCLA hazardous substance: ''1'' indicates that the statutory source is section 311(b)(2) of the Clean Water Act, ''2'' indicates that the source is section 307(a) of the Clean Water Act, ''3'' indicates that the source is section 112 of the Clean Air Act, and ''4'' indicates that the source is section 3001 of the Resource Conservation and Recovery Act (RCRA). The ''RCRA Waste Number'' column provides the waste identification numbers assigned to various substances by RCRA regulations. The ''Pounds (kg)'' column provides the reportable quantity adjustment for each hazardous substance in pounds and kilograms. Appendix A to §302.4, which lists CERCLA hazardous substances in sequential order by CASRN, provides a per-substance

grouping of regulatory synonyms (*i.e.*, names by which each hazardous substance is identified in other statutes and their implementing regulations).

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
A2213	30558431	4	U394	5000 (2270)
Acenaphthene	83–32–9	2		100 (45.4)
Acenaphthylene	208–96–8	2		5000 (2270)
Acetaldehyde	75–07–0	1,3,4	U001	1000 (454)
Acetaldehyde, chloro-	107–20–0	4	P023	1000 (454)
Acetaldehyde, trichloro-	75–87–6	4	U034	5000 (2270)
Acetamide	60–35–5	3		100 (45.4)
Acetamide, N-(aminothioxomethyl)-	591–08–2	4	P002	1000 (454)
Acetamide, N-(4-ethoxyphenyl)-	62–44–2	4	U187	100 (45.4)
Acetamide, N-9H-fluoren-2-yl-	53–96–3	3,4	U005	1 (0.454)
Acetamide, 2-fluoro-	640–19–7	4	P057	100 (45.4)
Acetic acid	64–19–7	1		5000 (2270)
Acetic acid, (2,4-dichlorophenoxy)-, salts & esters	94–75–7	1,3,4	U240	100 (45.4)
Acetic acid, ethyl ester	141–78–6	4	U112	5000 (2270)
Acetic acid, fluoro-, sodium salt	62–74–8	4	P058	10 (4.54)
Acetic acid, lead(2 +) salt	301–04–2	1,4	U144	10 (4.54)
Acetic acid, thallium(1 +) salt	563–68–8	4	U214	100 (45.4)
Acetic acid, (2,4,5-trichlorophenoxy)-	93–76–5	1,4	See F027	1000 (454)
Acetic anhydride	108–24–7	1		5000 (2270)
Acetone	67–64–1	4	U002	5000 (2270)
Acetone cyanohydrin	75–86–5	1,4	P069	10 (4.54)
Acetonitrile	75–05–8	3,4	U003	5000 (2270)
Acetophenone	98–86–2	3,4	U004	5000 (2270)
2-Acetylaminofluorene	53–96–3	3,4	U005	1 (0.454)
Acetyl bromide	506–96–7	1		5000 (2270)
Acetyl chloride	75–36–5	1,4	U006	5000 (2270)
1-Acetyl-2-thiourea	591–08–2	4	P002	1000 (454)
Acrolein	107–02–8	1,2,3,4	P003	1 (0.454)
Acrylamide	79–06–1	3,4	U007	5000 (2270)
Acrylic acid	79–10–7	3,4	U008	5000 (2270)
Acrylonitrile	107–13–1	1,2,3,4	U009	100 (45.4)
Adipic acid	124–04–9	1		5000 (2270)
Aldicarb	116–06–3	4	P070	1 (0.454)
Aldicarb sulfone	1646884	4	P203	100 (45.4)
Aldrin	309–00–2	1,2,4	P004	1 (0.454)
Allyl alcohol	107–18–6	1,4	P005	100 (45.4)
Allyl chloride	107–05–1	1,3		1000 (454)
Aluminum phosphide	20859–73–8	4	P006	100 (45.4)
Aluminum sulfate	10043–01–3	1		5000 (2270)
4-Aminobiphenyl	92–67–1	3		1 (0.454)
5-(Aminomethyl)-3-isoxazolol	2763–96–4	4	P007	1000 (454)
4-Aminopyridine	504–24–5	4	P008	1000 (454)
Amitrole	61–82–5	4	U011	10 (4.54)
Ammonia	7664–41–7	1		100 (45.4)
Ammonium acetate	631–61–8	1		5000 (2270)
Ammonium benzoate	1863–63–4	1		5000 (2270)
Ammonium bicarbonate	1066–33–7	1		5000 (2270)
Ammonium bichromate	7789–09–5	1		10 (4.54)
Ammonium bifluoride	1341–49–7	1		100 (45.4)
Ammonium bisulfilte	10192–30–0	1		5000 (2270)
Ammonium carbamate	1111–78–0	1		5000 (2270)
Ammonium carbonate	506–87–6	1		5000 (2270)
Ammonium chloride	12125–02–9	1		5000 (2270)
Ammonium chromate	7788–98–9	1		10 (4.54)
Ammonium citrate, dibasic	3012–65–5	1		5000 (2270)
Ammonium fluoborate	13826–83–0	1		5000 (2270)
Ammonium fluoride	12125–01–8	1		100 (45.4)
Ammonium hydroxide	1336–21–6	1		1000 (454)
Ammonium oxalate	6009–70–7 5972–73–6 14258–49–2	1		5000 (2270)
Ammonium picrate	131–74–8	4	P009	10 (4.54)
Ammonium silicofluoride	16919–19–0	1		1000 (454)
Ammonium sulfamate	7773–06–0	1		5000 (2270)
Ammonium sulfide	12135–76–1	1		100 (45.4)
Ammonium sulfite	10196–04–0	1		5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Ammonium tartrate	14307–43–8	1		5000 (2270)
	3164–29–2			
Ammonium thiocyanate	1762–95–4	1		5000 (2270)
Ammonium vanadate	7803–55–6	4	P119	1000 (454)
Amyl acetate	628–63–7	1		5000 (2270)
iso-Amyl acetate	123–92–2			
sec-Amyl acetate	626–38–0			
tert-Amyl acetate	625–16–1			
Aniline	62–53–3	1,3,4	U012	5000 (2270)
o-Anisidine	90–04–0	3		100 (45.4)
Anthracene	120–12–7	2		5000 (2270)
Antimony††	7440–36–0	2		5000 (2270)
ANTIMONY AND COMPOUNDS	N.A.	2,3		**
Antimony Compounds	N.A.	2,3		**
Antimony pentachloride	7647–18–9	1		1000 (454)
Antimony potassium tartrate	28300–74–5	1		100 (45.4)
Antimony tribromide	7789–61–9	1		1000 (454)
Antimony trichloride	10025–91–9	1		1000 (454)
Antimony trifluoride	7783–56–4	1		1000 (454)
Antimony trioxide	1309–64–4	1		1000 (454)
Argentate(1-), bis(cyano-C)-, potassium	506–61–6	4	P099	1 (0.454)
Aroclor 1016	12674–11–2	1,2,3		1 (0.454)
Aroclor 1221	11104–28–2	1,2,3		1 (0.454)
Aroclor 1232	11141–16–5	1,2,3		1 (0.454)
Aroclor 1242	53469–21–9	1,2,3		1 (0.454)
Aroclor 1248	12672–29–6	1,2,3		1 (0.454)
Aroclor 1254	11097–69–1	1,2,3		1 (0.454)
Aroclor 1260	11096–82–5	1,2,3		1 (0.454)
Aroclors	1336–36–3	1,2,3		1 (0.454)
Arsenic††	7440–38–2	2,3		1 (0.454)
Arsenic acid H3AsO4	7778–39–4	4	P010	1 (0.454)
ARSENIC AND COMPOUNDS	N.A.	2,3		**
Arsenic Compounds (inorganic including arsine)	N.A.	2,3		**
Arsenic disulfide	1303–32–8	1		1 (0.454)
Arsenic oxide As2O3	1327–53–3	1,4	P012	1 (0.454)
Arsenic oxide As2O5	1303–28–2	1,4	P011	1 (0.454)
Arsenic pentoxide	1303–28–2	1,4	P011	1 (0.454)
Arsenic trichloride	7784–34–1	1		1 (0.454)
Arsenic trioxide	1327–53–3	1,4	P012	1 (0.454)
Arsenic trisulfide	1303–33–9	1		1 (0.454)
Arsine, diethyl-	692–42–2	4	P038	1 (0.454)
Arsinic acid, dimethyl-	75–60–5	4	U136	1 (0.454)
Arsonous dichloride, phenyl-	696–28–6	4	P036	1 (0.454)
Asbestos†††	1332–21–4	2,3		1 (0.454)
Auramine	492–80–8	4	U014	100 (45.4)
Azaserine	115–02–6	4	U015	1 (0.454)
Aziridine	151–56–4	3,4	P054	1 (0.454)
Aziridine, 2-methyl-	75–55–8	3,4	P067	1 (0.454)
Azirino[2′,3′:3,4]pyrrolo[1,2–a]indole-4,7-dione, 6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a,8b- hexahydro-8a-methoxy-5- methyl-,[1aS- (1aalpha,8beta,8aalpha, 8balpha)]-.	50–07–7	4	U010	10 (4.54)
Barban	101279	4	U280	10 (4.54)
Barium cyanide	542–62–1	1,4	P013	10 (4.54)
Bendiocarb	22781233	4	U278	100 (45.4)
Bendiocarb phenol	22961826	4	U364	1000 (454)
Benomyl	17804352	4	U271	10 (4.54)
Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-	56–49–5	4	U157	10 (4.54)
Benz[c]acridine	225–51–4	4	U016	100 (45.4)
Benzal chloride	98–87–3	4	U017	5000 (2270)
Benzamide, 3,5-dichloro-N-(1,1-dimethyl-2propynyl)-	23950–58–5	4	U192	5000 (2270)
Benz[a]anthracene	56–55–3	2,4	U018	10 (4.54)
1,2-Benzanthracene	56–55–3	2,4	U018	10 (4.54)
Benz[a]anthracene, 7,12-dimethyl-	57–97–6	4	U094	1 (0.454)
Benzenamine	62–53–3	1,3,4	U012	5000 (2270)
Benzenamine, 4,4′-carbonimidoylbis (N,N dimethyl-	492–80–8	4	U014	100 (45.4)
Benzenamine, 4-chloro-	106–47–8	4	P024	1000 (454)
Benzenamine, 4-chloro-2-methyl-, hydrochloride	3165–93–3	4	U049	100 (45.4)
Benzenamine, N,N-dimethyl-4-(phenylazo)-	60–11–7	3,4	U093	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Benzenamine, 2-methyl-	95–53–4	3,4	U328	100 (45.4)
Benzenamine, 4-methyl-	106–49–0	4	U353	100 (45.4)
Benzenamine, 4,4′-methylenebis [2-chloro-	101–14–4	3,4	U158	10 (4.54)
Benzenamine, 2-methyl-,hydrochloride	636–21–5	4	U222	100 (45.4)
Benzenamine, 2-methyl-5-nitro-	99–55–8	4	U181	100 (45.4)
Benzenamine, 4-nitro-	100–01–6	4	P077	5000 (2270)
Benzene[a]	71–43–2	1,2,3,4	U019	10 (4.54)
Benzeneacetic acid, 4-chloro-α-(4-chlorophenyl)-α-hydroxy-, ethyl ester.	510–15–6	3,4	U038	10 (4.54)
Benzene, 1-bromo-4-phenoxy-	101–55–3	2,4	U030	100 (45.4)
Benzenebutanoic acid, 4-[bis(2- chloroethyl)amino]-	305–03–3	4	U035	10 (4.54)
Benzene, chloro-	108–90–7	1,2,3,4	U037	100 (45.4)
Benzene, (chloromethyl)-	100–44–7	1,3,4	P028	100 (45.4)
Benzenediamine, ar-methyl-	95–80–7 496–72–0 823–40–5 25376–45–8	3,4	U221	10 (4.54)
1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester	117–81–7	2,3,4	U028	100 (45.4)
1,2-Benzenedicarboxylic acid, dibutyl ester	84–74–2	1,2,3,4	U069	10 (4.54)
1,2-Benzenedicarboxylic acid, diethyl ester	84–66–2	2,4	U088	1000 (454)
1,2-Benzenedicarboxylic acid, dimethyl ester	131–11–3	2,3,4	U102	5000 (2270)
1,2-Benzenedicarboxylic acid, dioctyl ester	117–84–0	2,4	U107	5000 (2270)
Benzene, 1,2-dichloro-	95–50–1	1,2,4	U070	100 (45.4)
Benzene, 1,3-dichloro-	541–73–1	2,4	U071	100 (45.4)
Benzene, 1,4-dichloro-	106–46–7	1,2,3,4	U072	100 (45.4)
Benzene, 1,1′-(2,2-dichloroethylidene) bis[4-chloro-	72–54–8	1,2,4	U060	1 (0.454)
Benzene, (dichloromethyl)-	98–87–3	4	U017	5000 (2270)
Benzene, 1,3-diisocyanatomethyl-	91–08–7 584–84–9 26471–62–5	3,4	U223	100 (45.4)
Benzene, dimethyl-	1330–20–7	1,3,4	U239	100 (45.4)
1,3-Benzenediol	108–46–3	1,4	U201	5000 (2270)
1,2-Benzenediol,4-[1-hydroxy-2-(methyl amino)ethyl]-	51–43–4	4	P042	1000 (454)
Benzeneethanamine, alpha,alpha-dimethyl-	122–09–8	4	P046	5000 (2270)
Benzene, hexachloro-	118–74–1	2,3,4	U127	10 (4.54)
Benzene, hexahydro-	110–82–7	1,4	U056	1000 (454)
Benzene, methyl-	108–88–3	1,2,3,4	U220	1000 (454)
Benzene, 1-methyl-2,4-dinitro-	121–14–2	1,2,3,4	U105	10 (4.54)
Benzene, 2-methyl-1,3-dinitro-	606–20–2	1,2,4	U106	100 (45.4)
Benzene, (1-methylethyl)-	98–82–8	3,4	U055	5000 (2270)
Benzene, nitro-	98–95–3	1,2,3,4	U169	1000 (454)
Benzene, pentachloro-	608–93–5	4	U183	10 (4.54)
Benzene, pentachloronitro-	82–68–8	3,4	U185	100 (45.4)
Benzenesulfonic acid chloride	98–09–9	4	U020	100 (45.4)
Benzenesulfonyl chloride	98–09–9	4	U020	100 (45.4)
Benzene,1,2,4,5-tetrachloro-	95–94–3	4	U207	5000 (2270)
Benzenethiol	108–98–5	4	P014	100 (45.4)
Benzene,1,1′-(2,2,2-trichloroethylidene) bis[4-chloro-	50–29–3	1,2,4	U061	1 (0.454)
Benzene,1,1′-(2,2,2-trichloroethylidene) bis[4-methoxy-	72–43–5	1,3,4	U247	1 (0.454)
Benzene, (trichloromethyl)-	98–07–7	3,4	U023	10 (4.54)
Benzene, 1,3,5-trinitro-	99–35–4	4	U234	10 (4.54)
Benzidine	92–87–5	2,3,4	U021	1 (0.454)
Benzo[a]anthracene	56–55–3	2,4	U018	10 (4.54)
1,3-Benzodioxole, 5-(1-propenyl)-1	120–58–1	4	U141	100 (45.4)
1,3-Benzodioxole, 5-(2-propenyl)-	94–59–7	4	U203	100 (45.4)
1,3-Benzodioxole, 5-propyl-	94–58–6	4	U090	10 (4.54)
1,3-Benzodioxol-4-ol, 2,2-dimethyl-	22961826	4	U364	1000 (454)
1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate	22781233	4	U278	100 (45.4)
Benzo[b]fluoranthene	205–99–2	2		1 (0.454)
Benzo(k)fluoranthene	207–08–9	2		5000 (2270)
7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-	1563388	4	U367	10 (4.54)
7-Benzofuranol, 2,3-dihydro-2,2- dimethyl-, methylcarbamate.	1563–66–2	1,4	P127	10 (4.54)
Benzoic acid	65–85–0	1		5000 (2270)
Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1).	57647	4	P188	100 (45.4)
Benzonitrile	100–47–0	1		5000 (2270)
Benzo[rst]pentaphene	189–55–9	4	U064	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Benzo[ghi]perylene	191–24–2	2		5000 (2270)
2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts.	81–81–2	4	P001 U248	100 (45.4)
Benzo[a]pyrene	50–32–8	2,4	U022	1 (0.454)
3,4-Benzopyrene	50–32–8	2,4	U022	1 (0.454)
ρ-Benzoquinone	106–51–4	3,4	U197	10 (4.54)
Benzotrichloride	98–07–7	3,4	U023	10 (4.54)
Benzoyl chloride	98–88–4	1		1000 (454)
Benzyl chloride	100–44–7	1,3,4	P028	100 (45.4)
Beryllium ††	7440–41–7	2,3,4	P015	10 (4.54)
BERYLLIUM AND COMPOUNDS	N.A.	2,3		**
Beryllium chloride	7787–47–5	1		1 (0.454)
Beryllium compounds	N.A.	2,3		**
Beryllium fluoride	7787–49–7	1		1 (0.454)
Beryllium nitrate	13597–99–4 7787–55–5	1		1 (0.454)
Beryllium powder ††	7440–41–7	2,3,4	P015	10 (4.54)
alpha-BHC	319–84–6	2		10 (4.54)
beta-BHC	319–85–7	2		1 (0.454)
delta-BHC	319–86–8	2		1 (0.454)
gamma-BHC	58–89–9	1,2,3,4	U129	1 (0.454)
2,2′-Bioxirane	1464–53–5	4	U085	10 (4.54)
Biphenyl	92–52–4	3		100 (45.4)
[1,1′-Biphenyl]-4,4′-diamine	92–87–5	2,3,4	U021	1 (0.454)
[1,1′-Biphenyl]-4,4′-diamine,3,3′-dichloro-	91–94–1	2,3,4	U073	1 (0.454)
[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethoxy-	119–90–4	3,4	U091	100 (45.4)
[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethyl-	119–93–7	3,4	U095	10 (4.54)
Bis(2-chloroethoxy) methane	111–91–1	2,4	U024	1000 (454)
Bis(2-chloroethyl) ether	111–44–4	2,3,4	U025	10 (4.54)
Bis(chloromethyl) ether	542–88–1	2,3,4	P016	10 (4.54)
Bis(2-ethylhexyl) phthalate	117–81–7	3,4	U028	100 (45.4)
Bromoacetone	598–31–2	4	P017	1000 (454)
Bromoform	75–25–2	2,3,4	U225	100 (45.4)
Bromomethane	74–83–9	2,3,4	U029	1000 (454)
4-Bromophenyl phenyl ether	101–55–3	2,4	U030	100 (45.4)
Brucine	357–57–3	4	P018	100 (45.4)
1,3-Butadiene	106–99–0	3		10 (4.54)
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87–68–3	2,3,4	U128	1 (0.454)
1-Butanamine, N-butyl-N-nitroso-	924–16–3	4	U172	10 (4.54)
1-Butanol	71–36–3	4	U031	5000 (2270)
2-Butanone	78–93–3	3,4	U159	5000 (2270)
2-Butanone, 3,3-dimethyl-1(methylthio)-, O-[(methylamino)carbonyl] oxime.	39196–18–4	4	P045	100 (45.4)
2-Butanone peroxide	1338–23–4	4	U160	10 (4.54)
2-Butenal	123–73–9 4170–30–3	1,4	U053	100 (45.4)
2-Butene, 1,4-dichloro-	764–41–0	4	U074	1 (0.454)
2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3- methyl-1-oxobutoxy] methyl]-2,3, 5,7a-tetrahydro- 1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z), 7(2S*,3R*),7aalpha]]-.	303–34–4	4	U143	10 (4.54)
Butyl acetate	123–86–4	1		5000 (2270)
iso-Butyl acetate	110–19–0			
sec-Butyl acetate	105–46–4			
tert-Butyl acetate	540–88–5			
n-Butyl alcohol	71–36–3	4	U031	5000 (2270)
Butylamine	109–73–9	1		1000 (454)
iso-Butylamine	78–81–9			
sec-Butylamine	513–49–5 13952–84–6			
tert-Butylamine	75–64–9			
Butyl benzyl phthalate	85–68–7	2		100 (45.4)
n-Butyl phthalate	84–74–2	1,2,3,4	U069	10 (4.54)
Butyric acid	107–92–6	1		5000 (2270)
iso-Butyric acid	79–31–2			
Cacodylic acid	75–60–5	4	U136	1 (0.454)
Cadmium ††	7440–43–9	2		10 (4.54)
Cadmium acetate	543–90–8	1		10 (4.54)
CADMIUM AND COMPOUNDS	N.A.	2,3		**

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Cadmium bromide	7789–42–6	1		10 (4.54)
Cadmium chloride	10108–64–2	1		10 (4.54)
Cadmium compounds	N.A.	2,3		**
Calcium arsenate	7778–44–1	1		1 (0.454)
Calcium arsenite	52740–16–6	1		1 (0.454)
Calcium carbide	75–20–7	1		10 (4.54)
Calcium chromate	13765–19–0	1,4	U032	10 (4.54)
Calcium cyanamide	156–62–7	3		1000 (454)
Calcium cyanide Ca(CN)2	592–01–8	1,4	P021	10 (4.54)
Calcium dodecylbenzenesulfonate	26264–06–2	1		1000 (454)
Calcium hypochlorite	7778–54–3	1		10 (4.54)
Captan	133–06–2	1,3		10 (4.54)
Carbamic acid, 1H-benzimidazol-2-yl, methyl ester	10605217	4	U372	10 (4.54)
Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-,methyl ester.	17804352	4	U271	10 (4.54)
Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester	101279	4	U280	10 (4.54)
Carbamic acid, [(dibutylamino)-thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester.	55285148	4	P189	1000 (454)
Carbamic acid, dimethyl-,1-[(dimethyl-amino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester.	644644	4	P191	1 (0.454)
Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester.	119380	4	P192	100 (45.4)
Carbamic acid, ethyl ester	51–79–6	3,4	U238	100 (45.4)
Carbamic acid, methyl-, 3-methylphenyl ester	1129415	4	P190	1000 (454)
Carbamic acid, methylnitroso-, ethyl ester	615–53–2	4	U178	1 (0.454)
Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester.	23564058	4	U409	10 (4.54)
Carbamic acid, phenyl-, 1-methylethyl ester	122429	4	U373	1000 (454)
Carbamic chloride, dimethyl-	79–44–7	3,4	U097	1 (0.454)
Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters	111–54–6	4	U114	5000 (2270)
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester.	2303–16–4	4	U062	100 (45.4)
Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester.	2303175	4	U389	100 (45.4)
Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester	52888809	4	U387	5000 (2270)
Carbaryl	63–25–2	1,3,4	U279	100 (45.4)
Carbendazim	10605217	4	U372	10 (4.54)
Carbofuran	1563–66–2	1,4	P127	10 (4.54)
Carbofuran phenol	1563388	4	U367	10 (4.54)
Carbon disulfide	75–15–0	1,3,4	P022	100 (45.4)
Carbonic acid, dithallium(1 +) salt	6533–73–9	4	U215	100 (45.4)
Carbonic dichloride	75–44–5	1,3,4	P095	10 (4.54)
Carbonic difluoride	353–50–4	4	U033	1000 (454)
Carbonochloridic acid, methyl ester	79–22–1	4	U156	1000 (454)
Carbon oxyfluoride	353–50–4	4	U033	1000 (454)
Carbon tetrachloride	56–23–5	1,2,3,4	U211	10 (4.54)
Carbonyl sulfide	463–58–1	3		100 (45.4)
Carbosulfan	55285148	4	P189	1000 (454)
Catechol	120–80–9	3		100 (45.4)
Chloral	75–87–6	4	U034	5000 (2270)
Chloramben	133–90–4	3		100 (45.4)
Chlorambucil	305–03–3	4	U035	10 (4.54)
Chlordane	57–74–9	1,2,3,4	U036	1 (0.454)
Chlordane, alpha & gamma isomers	57–74–9	1,2,3,4	U036	1 (0.454)
CHLORDANE (TECHNICAL MIXTURE AND METABOLITES).	57–74–9	1,2,3,4	U036	1 (0.454)
CHLORINATED BENZENES	N.A.	2		**
Chlorinated camphene	8001–35–2	1,2,3,4	P123	1 (0.454)
CHLORINATED ETHANES	N.A.	2		**
CHLORINATED NAPHTHALENE	N.A.	2		**
CHLORINATED PHENOLS	N.A.	2		**
Chlorine	7782–50–5	1,3		10 (4.54)
Chlornaphazine	494–03–1	4	U026	100 (45.4)
Chloroacetaldehyde	107–20–0	4	P023	1000 (454)
Chloroacetic acid	79–11–8	3		100 (45.4)
2-Chloroacetophenone	532–27–4	3		100 (45.4)
CHLOROALKYL ETHERS	N.A.	2		**
p-Chloroaniline	106–47–8	4	P024	1000 (454)
Chlorobenzene	108–90–7	1,2,3,4	U037	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Chlorobenzilate	510–15–6	3,4	U038	10 (4.54)
p-Chloro-m-cresol	59–50–7	2,4	U039	5000 (2270)
Chlorodibromomethane	124–48–1	2		100 (45.4)
1-Chloro-2,3-epoxypropane	106–89–8	1,3,4	U041	100 (45.4)
Chloroethane	75–00–3	2,3		100 (45.4)
2-Chloroethyl vinyl ether	110–75–8	2,4	U042	1000 (454)
Chloroform	67–66–3	1,2,3,4	U044	10 (4.54)
Chloromethane	74–87–3	2,3,4	U045	100 (45.4)
Chloromethyl methyl ether	107–30–2	3,4	U046	10 (4.54)
beta-Chloronaphthalene	91–58–7	2,4	U047	5000 (2270)
2-Chloronaphthalene	91–58–7	2,4	U047	5000 (2270)
2-Chlorophenol	95–57–8	2,4	U048	100 (45.4)
o-Chlorophenol	95–57–8	2,4	U048	100 (45.4)
4-Chlorophenyl phenyl ether	7005–72–3	2		5000 (2270)
1-(o-Chlorophenyl)thiourea	5344–82–1	4	P026	100 (45.4)
Chloroprene	126–99–8	3		100 (45.4)
3-Chloropropionitrile	542–76–7	4	P027	1000 (454)
Chlorosulfonic acid	7790–94–5	1		1000 (454)
4-Chloro-o-toluidine, hydrochloride	3165–93–3	4	U049	100 (45.4)
Chlorpyrifos	2921–88–2	1		1 (0.454)
Chromic acetate	1066–30–4	1		1000 (454)
Chromic acid	11115–74–5 7738–94–5	1		10 (4.54)
Chromic acid H2CrO4, calcium salt	13765–19–0	1,4	U032	10 (4.54)
Chromic sulfate	10101–53–8	1		1000 (454)
Chromium ††	7440–47–3	2		5000 (2270)
CHROMIUM AND COMPOUNDS	N.A.	2,3		**
Chromium Compounds	N.A.	2,3		**
Chromous chloride	10049–05–5	1		1000 (454)
Chrysene	218–01–9	2,4	U050	100 (45.4)
Cobalt Compounds	N.A.	3		**
Cobaltous bromide	7789–43–7	1		1000 (454)
Cobaltous formate	544–18–3	1		1000 (454)
Cobaltous sulfamate	14017–41–5	1		1000 (454)
Coke Oven Emissions	N.A.	3		1 (0.454)
Copper ††	7440–50–8	2		5000 (2270)
COPPER AND COMPOUNDS	N.A.	2		**
Copper cyanide Cu(CN)	544–92–3	4	P029	10 (4.54)
Coumaphos	56–72–4	1		10 (4.54)
Creosote	N.A.	4	U051	1 (0.454)
Cresol (cresylic acid)	1319–77–3	1,3,4	U052	100 (45.4)
m-Cresol	108–39–4	3		100 (45.4)
o-Cresol	95–48–7	3		100 (45.4)
p-Cresol	106–44–5	3		100 (45.4)
Cresols (isomers and mixture)	1319–77–3	1,3,4	U052	100 (45.4)
Cresylic acid (isomers and mixture)	1319–77–3	1,3,4	U052	100 (45.4)
Crotonaldehyde	123–73–9 4170–30–3	1,4	U053	100 (45.4)
Cumene	98–82–8	3,4	U055	5000 (2270)
m-Cumenyl methylcarbamate	64006	4	P202	10 (4.54)
Cupric acetate	142–71–2	1		100 (45.4)
Cupric acetoarsenite	12002–03–8	1		1 (0.454)
Cupric chloride	7447–39–4	1		10 (4.54)
Cupric nitrate	3251–23–8	1		100 (45.4)
Cupric oxalate	5893–66–3	1		100 (45.4)
Cupric sulfate	7758–98–7	1		10 (4.54)
Cupric sulfate, ammoniated	10380–29–7	1		100 (45.4)
Cupric tartrate	815–82–7	1		100 (45.4)
Cyanide Compounds	N.A.	2,3		**
CYANIDES	N.A.	2,3		**
Cyanides (soluble salts and complexes) not otherwise specified.	N.A.	4	P030	10 (4.54)
Cyanogen	460–19–5	4	P031	100 (45.4)
Cyanogen bromide (CN)Br	506–68–3	4	U246	1000 (454)
Cyanogen chloride (CN)Cl	506–77–4	1,4	P033	10 (4.54)
2,5-Cyclohexadiene-1,4-dione	106–51–4	3,4	U197	10 (4.54)
Cyclohexane	110–82–7	1,4	U056	1000 (454)
Cyclohexane, 1,2,3,4,5,6-hexachloro-, (1α, 2α, 3β–, 4α, 5α, 6β).	58–89–9	1,2,3,4	U129	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Cyclohexanone	108–94–1	4	U057	5000 (2270)
2-Cyclohexyl-4,6-dinitrophenol	131–89–5	4	P034	100 (45.4)
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77–47–4	1,2,3,4	U130	10 (4.54)
Cyclophosphamide	50–18–0	4	U058	10 (4.54)
2,4-D Acid	94–75–7	1,3,4	U240	100 (45.4)
2,4-D Ester	94–11–1	1		100 (45.4)
	94–79–1			
	94–80–4			
	1320–18–9			
	1928–38–7			
	1928–61–6			
	1929–73–3			
	2971–38–2			
	25168–26–7			
	53467–11–1			
2,4-D, salts and esters	94–75–7	1,3,4	U240	100 (45.4)
Daunomycin	20830–81–3	4	U059	10 (4.54)
DDD	72–54–8	1,2,4	U060	1 (0.454)
4,4′-DDD	72–54–8	1,2,4	U060	1 (0.454)
DDE [b]	72–55–9	2		1 (0.454)
DDE [b]	3547–04–4	3		5000 (2270)
4,4′-DDE	72–55–9	2		1 (0.454)
DDT	50–29–3	1,2,4	U061	1 (0.454)
4,4′-DDT	50–29–3	1,2,4	U061	1 (0.454)
DDT AND METABOLITES	N.A.	2		**
DEHP	117–81–7	2,3,4	U028	100 (45.4)
Diallate	2303–16–4	4	U062	100 (45.4)
Diazinon	333–41–5	1		1 (0.454)
Diazomethane	334–88–3	3		100 (45.4)
Dibenz[a,h]anthracene	53–70–3	2,4	U063	1 (0.454)
1,2:5,6-Dibenzanthracene	53–70–3	2,4	U063	1 (0.454)
Dibenzo[a,h]anthracene	53–70–3	2,4	U063	1 (0.454)
Dibenzofuran	132–64–9	3		100 (45.4)
Dibenzo[a,i]pyrene	189–55–9	4	U064	10 (4.54)
1,2-Dibromo-3-chloropropane	96–12–8	3,4	U066	1 (0.454)
Dibromoethane	106–93–4	1,3,4	U067	1 (0.454)
Dibutyl phthalate	84–74–2	1,2,3,4	U069	10 (4.54)
Di-n-butyl phthalate	84–74–2	1,2,3,4	U069	10 (4.54)
Dicamba	1918–00–9	1		1000 (454)
Dichlobenil	1194–65–6	1		100 (45.4)
Dichlone	117–80–6	1		1 (0.454)
Dichlorobenzene	25321–22–6	1		100 (45.4)
1,2-Dichlorobenzene	95–50–1	1,2,4	U070	100 (45.4)
1,3-Dichlorobenzene	541–73–1	2,4	U071	100 (45.4)
1,4-Dichlorobenzene	106–46–7	1,2,3,4	U072	100 (45.4)
m-Dichlorobenzene	541–73–1	2,4	U071	100 (45.4)
o-Dichlorobenzene	95–50–1	1,2,4	U070	100 (45.4)
p-Dichlorobenzene	106–46–7	1,2,3,4	U072	100 (45.4)
DICHLOROBENZIDINE	N.A.	2		**
3,3′-Dichlorobenzidine	91–94–1	2,3,4	U073	1 (0.454)
Dichlorobromomethane	75–27–4	2		5000 (2270)
1,4-Dichloro-2-butene	764–41–0	4	U074	1 (0.454)
Dichlorodifluoromethane	75–71–8	4	U075	5000 (2270)
1,1-Dichloroethane	75–34–3	2,3,4	U076	1000 (454)
1,2-Dichloroethane	107–06–2	1,2,3,4	U077	100 (45.4)
1,1-Dichloroethylene	75–35–4	1,2,3,4	U078	100 (45.4)
1,2-Dichloroethylene	156–60–5	2,4	U079	1000 (454)
Dichloroethyl ether	111–44–4	2,3,4	U025	10 (4.54)
Dichloroisopropyl ether	108–60–1	2,4	U027	1000 (454)
Dichloromethane	75–09–2	2,3,4	U080	1000 (454)
Dichloromethoxyethane	111–91–1	2,4	U024	1000 (454)
Dichloromethyl ether	542–88–1	2,3,4	P016	10 (4.54)
2,4-Dichlorophenol	120–83–2	2,4	U081	100 (45.4)
2,6-Dichlorophenol	87–65–0	4	U082	100 (45.4)
Dichlorophenylarsine	696–28–6	4	P036	1 (0.454)
Dichloropropane	26638–19–7	1		1000 (454)
1,1-Dichloropropane	78–99–9			
1,3-Dichloropropane	142–28–9			
1,2-Dichloropropane	78–87–5	1,2,3,4	U083	1000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Dichloropropane—Dichloropropene (mixture)	8003–19–8	1		100 (45.4)
Dichloropropene	26952–23–8	1		100 (45.4)
2,3-Dichloropropene	78–88–6			
1,3-Dichloropropene	542–75–6	1,2,3,4	U084	100 (45.4)
2,2-Dichloropropionic acid	75–99–0	1		5000 (2270)
Dichlorvos	62–73–7	1,3		10 (4.54)
Dicofol	115–32–2	1		10 (4.54)
Dieldrin	60–57–1	1,2,4	P037	1 (0.454)
1,2:3,4-Diepoxybutane	1464–53–5	4	U085	10 (4.54)
Diethanolamine	111–42–2	3		100 (45.4)
Diethylamine	109–89–7	1		100 (45.4)
N,N-Diethylaniline	91–66–7	3		1000 (454)
Diethylarsine	692–42–2	4	P038	1 (0.454)
1,4-Diethyleneoxide	123–91–1	3,4	U108	100 (45.4)
Diethylene glycol, dicarbamate	5952261	4	U395	5000 (2270)
Diethylhexyl phthalate	117–81–7	2,3,4	U028	100 (45.4)
N,N′-Diethylhydrazine	1615–80–1	4	U086	10 (4.54)
O,O-Diethyl S-methyl dithiophosphate	3288–58–2	4	U087	5000 (2270)
Diethyl-p-nitrophenyl phosphate	311–45–5	4	P041	100 (45.4)
Diethyl phthalate	84–66–2	2,4	U088	1000 (454)
O,O-Diethyl O-pyrazinyl phosphorothioate	297–97–2	4	P040	100 (45.4)
Diethylstilbestrol	56–53–1	4	U089	1 (0.454)
Diethyl sulfate	64–67–5	3		10 (4.54)
Dihydrosafrole	94–58–6	4	U090	10 (4.54)
Diisopropylfluorophosphate (DFP)	55–91–4	4	P043	100 (45.4)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha, 8alpha,8abeta)-.	309–00–2	1,2,4	P004	1 (0.454)
1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta, 5beta,8beta,8abeta)-.	465–73–6	4	P060	1 (0.454)
2,7:3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1aalpha,2beta, 2aalpha,3beta,6beta,6aalpha, 7beta,7aalpha)-.	60–57–1	1,2,4	P037	1 (0.454)
2,7:3,6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-,(1aalpha,2beta, 2abeta,3alpha,6alpha, 6abeta,7beta,7aalpha)-, & metabolites.	72–20–8	1,2,4	P051	1 (0.454)
Dimethoate	60–51–5	4	P044	10 (4.54)
3,3′-Dimethoxybenzidine	119–90–4	3,4	U091	100 (45.4)
Dimethylamine	124–40–3	1,4	U092	1000 (454)
Dimethyl aminoazobenzene	60–11–7	3,4	U093	10 (4.54)
p-Dimethylaminoazobenzene	60–11–7	3,4	U093	10 (4.54)
N,N-Dimethylaniline	121–69–7	3		100 (45.4)
7,12-Dimethylbenz[a]anthracene	57–97–6	4	U094	1 (0.454)
3,3′-Dimethylbenzidine	119–93–7	3,4	U095	10 (4.54)
alpha,alpha-Dimethylbenzylhydroperoxide	80–15–9	4	U096	10 (4.54)
Dimethylcarbamoyl chloride	79–44–7	3,4	U097	1 (0.454)
Dimethylformamide	68–12–2	3		100 (45.4)
1,1-Dimethylhydrazine	57–14–7	3,4	U098	10 (4.54)
1,2-Dimethylhydrazine	540–73–8	4	U099	1 (0.454)
alpha,alpha-Dimethylphenethylamine	122–09–8	4	P046	5000 (2270)
2,4-Dimethylphenol	105–67–9	2,4	U101	100 (45.4)
Dimethyl phthalate	131–11–3	2,3,4	U102	5000 (2270)
Dimethyl sulfate	77–78–1	3,4	U103	100 (45.4)
Dimetilan	644644	4	P191	1 (0.454)
Dinitrobenzene (mixed)	25154–54–5	1		100 (45.4)
m-Dinitrobenzene	99–65–0			
o-Dinitrobenzene	528–29–0			
p-Dinitrobenzene	100–25–4			
4,6-Dinitro-o-cresol, and salts	534–52–1	2,3,4	P047	10 (4.54)
Dinitrophenol	25550–58–7	1		10 (4.54)
2,5-Dinitrophenol	329–71–5			
2,6-Dinitrophenol	573–56–8			
2,4-Dinitrophenol	51–28–5	1,2,3,4	P048	10 (4.54)
Dinitrotoluene	25321–14–6	1,2		10 (4.54)
3,4-Dinitrotoluene	610–39–9			
2,4-Dinitrotoluene	121–14–2	1,2,3,4	U105	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
2,6-Dinitrotoluene	606–20–2	1,2,4	U106	100 (45.4)
Dinoseb	88–85–7	4	P020	1000 (454)
Di-n-octyl phthalate	117–84–0	2,4	U107	5000 (2270)
1,4-Dioxane	123–91–1	3,4	U108	100 (45.4)
DIPHENYLHYDRAZINE	N.A.	2		**
1,2-Diphenylhydrazine	122–66–7	2,3,4	U109	10 (4.54)
Diphosphoramide, octamethyl-	152–16–9	4	P085	100 (45.4)
Diphosphoric acid, tetraethyl ester	107–49–3	1,4	P111	10 (4.54)
Dipropylamine	142–84–7	4	U110	5000 (2270)
Di-n-propylnitrosamine	621–64–7	2,4	U111	10 (4.54)
Diquat	85–00–7 2764–72–9	1		1000 (454)
Disulfoton	298–04–4	1,4	P039	1 (0.454)
Dithiobiuret	541–53–7	4	P049	100 (45.4)
1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)-carbonyl]oxime.	26419738	4	P185	100 (45.4)
Diuron	330–54–1	1		100 (45.4)
Dodecylbenzenesulfonic acid	27176–87–0	1		1000 (454)
Endosulfan	115–29–7	1,2,4	P050	1 (0.454)
alpha-Endosulfan	959–98–8	2		1 (0.454)
beta-Endosulfan	33213–65–9	2		1 (0.454)
ENDOSULFAN AND METABOLITES	N.A.	2		**
Endosulfan sulfate	1031–07–8	2		1 (0.454)
Endothall	145–73–3	4	P088	1000 (454)
Endrin	72–20–8	1,2,4	P051	1 (0.454)
Endrin aldehyde	7421–93–4	2		1 (0.454)
ENDRIN AND METABOLITES	N.A.	2		**
Endrin, & metabolites	72–20–8	1,2,4	P051	1 (0.454)
Epichlorohydrin	106–89–8	1,3,4	U041	100 (45.4)
Epinephrine	51–43–4	4	P042	1000 (454)
1,2-Epoxybutane	106–88–7	3		100 (45.4)
Ethanal	75–07–0	1,3,4	U001	1000 (454)
Ethanamine, N,N-diethyl-	121–44–8	1,3,4	U404	5000 (2270)
Ethanamine, N-ethyl-N-nitroso-	55–18–5	4	U174	1 (0.454)
1,2-Ethanediamine, N,N-dimethyl-N′-2-pyridinyl-N′-(2-thienylmethyl)-.	91–80–5	4	U155	5000 (2270)
Ethane, 1,2-dibromo-	106–93–4	1,3,4	U067	1 (0.454)
Ethane, 1,1-dichloro-	75–34–3	2,3,4	U076	1000 (454)
Ethane, 1,2-dichloro-	107–06–2	1,2,3,4	U077	100 (45.4)
Ethanedinitrile	460–19–5	4	P031	100 (45.4)
Ethane, hexachloro-	67–72–1	2,3,4	U131	100 (45.4)
Ethane, 1,1′-[methylenebis(oxy)]bis[2- chloro-	111–91–1	2,4	U024	1000 (454)
Ethane, 1,1′-oxybis-	60–29–7	4	U117	100 (45.4)
Ethane, 1,1′-oxybis[2-chloro-	111–44–4	2,3,4	U025	10 (4.54)
Ethane, pentachloro-	76–01–7	4	U184	10 (4.54)
Ethane, 1,1,1,2-tetrachloro-	630–20–6	4	U208	100 (45.4)
Ethane, 1,1,2,2-tetrachloro-	79–34–5	2,3,4	U209	100 (45.4)
Ethanethioamide	62–55–5	4	U218	10 (4.54)
Ethane, 1,1,1-trichloro-	71–55–6	2,3,4	U226	1000 (454)
Ethane, 1,1,2-trichloro-	79–00–5	2,3,4	U227	100 (45.4)
Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester.	30558431	4	U394	5000 (2270)
Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester.	23135220	4	P194	100 (45.4)
Ethanimidothioic acid, N-[[(methylamino) carbonyl]oxy]-, methyl ester.	16752–77–5	4	P066	100 (45.4)
Ethanimidothioic acid, N,N'-[thiobis[(methylimino) carbonyloxy]]bis-, dimethyl ester.	59669260	4	U410	100 (45.4)
Ethanol, 2-ethoxy-	110–80–5	4	U359	1000 (454)
Ethanol, 2,2′-(nitrosoimino)bis-	1116–54–7	4	U173	1 (0.454)
Ethanol, 2,2'-oxybis-, dicarbamate	5952261	4	U395	5000 (2270)
Ethanone, 1-phenyl-	98–86–2	3,4	U004	5000 (2270)
Ethene, chloro-	75–01–4	2,3,4	U043	1 (0.454)
Ethene, (2-chloroethoxy)-	110–75–8	2,4	U042	1000 (454)
Ethene, 1,1-dichloro-	75–35–4	1,2,3,4	U078	100 (45.4)
Ethene, 1,2-dichloro-(E)	156–60–5	2,4	U079	1000 (454)
Ethene, tetrachloro-	127–18–4	2,3,4	U210	100 (45.4)
Ethene, trichloro-	79–01–6	1,2,3,4	U228	100 (45.4)
Ethion	563–12–2	1		10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Ethyl acetate	141–78–6	4	U112	5000 (2270)
Ethyl acrylate	140–88–5	3,4	U113	1000 (454)
Ethylbenzene	100–41–4	1,2,3		1000 (454)
Ethyl carbamate	51–79–6	3,4	U238	100 (45.4)
Ethyl chloride	75–00–3	2,3		100 (45.4)
Ethyl cyanide	107–12–0	4	P101	10 (4.54)
Ethylenebisdithiocarbamic acid, salts & esters	111–54–6	4	U114	5000 (2270)
Ethylenediamine	107–15–3	1		5000 (2270)
Ethylenediamine-tetraacetic acid (EDTA)	60–00–4	1		5000 (2270)
Ethylene dibromide	106–93–4	1,3,4	U067	1 (0.454)
Ethylene dichloride	107–06–2	1,2,3,4	U077	100 (45.4)
Ethylene glycol	107–21–1	3		5000 (2270)
Ethylene glycol monoethyl ether	110–80–5	4	U359	1000 (454)
Ethylene oxide	75–21–8	3,4	U115	10 (4.54)
Ethylenethiourea	96–45–7	3,4	U116	10 (4.54)
Ethylenimine	151–56–4	3,4	P054	1 (0.454)
Ethyl ether	60–29–7	4	U117	100 (45.4)
Ethylidene dichloride	75–34–3	2,3,4	U076	1000 (454)
Ethyl methacrylate	97–63–2	4	U118	1000 (454)
Ethyl methanesulfonate	62–50–0	4	U119	1 (0.454)
Famphur	52–85–7	4	P097	1000 (454)
Ferric ammonium citrate	1185–57–5	1		1000 (454)
Ferric ammonium oxalate	2944–67–4 55488–87–4	1		1000 (454)
Ferric chloride	7705–08–0	1		1000 (454)
Ferric fluoride	7783–50–8	1		100 (45.4)
Ferric nitrate	10421–48–4	1		1000 (454)
Ferric sulfate	10028–22–5	1		1000 (454)
Ferrous ammonium sulfate	10045–89–3	1		1000 (454)
Ferrous chloride	7758–94–3	1		100 (45.4)
Ferrous sulfate	7720–78–7 7782–63–0	1		1000 (454)
Fine mineral fibers[c]	N.A.	3		**
Fluoranthene	206–44–0	2,4	U120	100 (45.4)
Fluorene	86–73–7	2		5000 (2270)
Fluorine	7782–41–4	4	P056	10 (4.54)
Fluoroacetamide	640–19–7	4	P057	100 (45.4)
Fluoroacetic acid, sodium salt	62–74–8	4	P058	10 (4.54)
Formaldehyde	50–00–0	1,3,4	U122	100 (45.4)
Formetanate hydrochloride	23422539	4	P198	100 (45.4)
Formic acid	64–18–6	1,4	U123	5000 (2270)
Formparanate	17702577	4	P197	100 (45.4)
Fulminic acid, mercury(2 +)salt	628–86–4	4	P065	10 (4.54)
Fumaric acid	110–17–8	1		5000 (2270)
Furan	110–00–9	4	U124	100 (45.4)
2-Furancarboxaldehyde	98–01–1	1,4	U125	5000 (2270)
2,5-Furandione	108–31–6	1,3,4	U147	5000 (2270)
Furan, tetrahydro-	109–99–9	4	U213	1000 (454)
Furfural	98–01–1	1,4	U125	5000 (2270)
Furfuran	110–00–9	4	U124	100 (45.4)
Glucopyranose, 2-deoxy-2–(3-methyl-3-nitrosoureido)-,D-	18883–66–4	4	U206	1 (0.454)
D-Glucose, 2-deoxy-2-[[(methylnitrosoamino)-carbonyl]amino]-.	18883–66–4	4	U206	1 (0.454)
Glycidylaldehyde	765–34–4	4	U126	10 (4.54)
Glycol ethers[d]	N.A.	3		**
Guanidine, N-methyl-N′-nitro-N-nitroso-	70–25–7	4	U163	10 (4.54)
Guthion	86–50–0	1		1 (0.454)
HALOETHERS	N.A.	2		**
HALOMETHANES	N.A.	2		**
Heptachlor	76–44–8	1,2,3,4	P059	1 (0.454)
HEPTACHLOR AND METABOLITES	N.A.	2		**
Heptachlor epoxide	1024–57–3	2		1 (0.454)
Hexachlorobenzene	118–74–1	2,3,4	U127	10 (4.54)
Hexachlorobutadiene	87–68–3	2,3,4	U128	1 (0.454)
HEXACHLOROCYCLOHEXANE (all isomers)	608–73–1	2		**
Hexachlorocyclopentadiene	77–47–4	1,2,3,4	U130	10 (4.54)
Hexachloroethane	67–72–1	2,3,4	U131	100 (45.4)
Hexachlorophene	70–30–4	4	U132	100 (45.4)
Hexachloropropene	1888–71–7	4	U243	1000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Hexaethyl tetraphosphate	757–58–4	4	P062	100 (45.4)
Hexamethylene-1,6–diisocyanate	822–06–0	3		100 (45.4)
Hexamethylphosphoramide	680–31–9	3		1 (0.454)
Hexane	110–54–3	3		5000 (2270)
Hexone	108–10–1	3,4	U161	5000 (2270)
Hydrazine	302–01–2	3,4	U133	1 (0.454)
Hydrazinecarbothioamide	79–19–6	4	P116	100 (45.4)
Hydrazine, 1,2-diethyl-	1615–80–1	4	U086	10 (4.54)
Hydrazine, 1,1-dimethyl-	57–14–7	3,4	U098	10 (4.54)
Hydrazine, 1,2-dimethyl-	540–73–8	4	U099	1 (0.454)
Hydrazine, 1,2-diphenyl-	122–66–7	2,3,4	U109	10 (4.54)
Hydrazine, methyl-	60–34–4	3,4	P068	10 (4.54)
Hydrochloric acid	7647–01–0	1,3		5000 (2270)
Hydrocyanic acid	74–90–8	1,4	P063	10 (4.54)
Hydrofluoric acid	7664–39–3	1,3,4	U134	100 (45.4)
Hydrogen chloride	7647–01–0	1,3		5000 (2270)
Hydrogen cyanide	74–90–8	1,4	P063	10 (4.54)
Hydrogen fluoride	7664–39–3	1,3,4	U134	100 (45.4)
Hydrogen phosphide	7803–51–2	3,4	P096	100 (45.4)
Hydrogen sulfide H2S	7783–06–4	1,4	U135	100 (45.4)
Hydroperoxide, 1-methyl-1-phenylethyl-	80–15–9	4	U096	10 (4.54)
Hydroquinone	123–31–9	3		100 (45.4)
2-Imidazolidinethione	96–45–7	3,4	U116	10 (4.54)
Indeno(1,2,3-cd)pyrene	193–39–5	2,4	U137	100 (45.4)
Iodomethane	74–88–4	3,4	U138	100 (45.4)
1,3-Isobenzofurandione	85–44–9	3,4	U190	5000 (2270)
Isobutyl alcohol	78–83–1	4	U140	5000 (2270)
Isodrin	465–73–6	4	P060	1 (0.454)
Isolan	119380	4	P192	100 (45.4)
Isophorone	78–59–1	2,3		5000 (2270)
Isoprene	78–79–5	1		100 (45.4)
Isopropanolamine dodecylbenzenesulfonate	42504–46–1	1		1000 (454)
3-Isopropylphenyl N-methylcarbamate	64006	4	P202	10 (4.54)
Isosafrole	120–58–1	4	U141	100 (45.4)
3(2H)-Isoxazolone, 5–(aminomethyl)-	2763–96–4	4	P007	1000 (454)
Kepone	143–50–0	1,4	U142	1 (0.454)
Lasiocarpine	303–34–4	4	U143	10 (4.54)
Lead††	7439–92–1	2		10 (4.54)
Lead acetate	301–04–2	1,4	U144	10 (4.54)
LEAD AND COMPOUNDS	N.A.	2,3		**
Lead arsenate	7784–40–9 7645–25–2 10102–48–4	1		1 (0.454)
Lead, bis(acetato-O)tetrahydroxytri-	1335–32–6	4	U146	10 (4.54)
Lead chloride	7758–95–4	1		10 (4.54)
Lead compounds	N.A.	2,3		**
Lead fluoborate	13814–96–5	1		10 (4.54)
Lead fluoride	7783–46–2	1		10 (4.54)
Lead iodide	10101–63–0	1		10 (4.54)
Lead nitrate	10099–74–8	1		10 (4.54)
Lead phosphate	7446–27–7	4	U145	10 (4.54)
Lead stearate	1072–35–1 7428–48–0 52652–59–2 56189–09–4	1		10 (4.54)
Lead subacetate	1335–32–6	4	U146	10 (4.54)
Lead sulfate	7446–14–2 15739–80–7	1		10 (4.54)
Lead sulfide	1314–87–0	1		10 (4.54)
Lead thiocyanate	592–87–0	1		10 (4.54)
Lindane	58–89–9	1,2,3,4	U129	1 (0.454)
Lindane (all isomers)	58–89–9	1,2,3,4	U129	1 (0.454)
Lithium chromate	14307–35–8	1		10 (4.54)
Malathion	121–75–5	1		100 (45.4)
Maleic acid	110–16–7	1		5000 (2270)
Maleic anhydride	108–31–6	1,3,4	U147	5000 (2270)
Maleic hydrazide	123–33–1	4	U148	5000 (2270)
Malononitrile	109–77–3	4	U149	1000 (454)
Manganese, bis (dimethylcarbamodithioato-S,S')-	15339363	4	P196	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Manganese Compounds	N.A.	3		**
Manganese dimethyldithiocarbamate	15339363	4	P196	10 (4.54)
MDI	101–68–8	3		5000 (2270)
MEK	78–93–3	3,4	U159	5000 (2270)
Melphalan	148–82–3	4	U150	1 (0.454)
Mercaptodimethur	2032–65–7	1,4	P199	10 (4.54)
Mercuric cyanide	592–04–1	1		1(0.454)
Mercuric nitrate	10045–94–0	1		10 (4.54)
Mercuric sulfate	7783–35–9	1		10 (4.54)
Mercuric thiocyanate	592–85–8	1		10 (4.54)
Mercurous nitrate	10415–75–5	1		10 (4.54)
Mercury	7782–86–7 7439–97–6	2,3,4	U151	1 (0.454)
MERCURY AND COMPOUNDS	N.A.	2,3		**
Mercury, (acetato-O)phenyl-	62–38–4	4	P092	100 (45.4)
Mercury Compounds	N.A.	2,3		**
Mercury fulminate	628–86–4	4	P065	10 (4.54)
Methacrylonitrile	126–98–7	4	U152	1000 (454)
Methanamine, N-methyl-	124–40–3	1,4	U092	1000 (454)
Methanamine, N-methyl-N-nitroso-	62–75–9	2,3,4	P082	10 (4.54)
Methane, bromo-	74–83–9	2,3,4	U029	1000 (454)
Methane, chloro-	74–87–3	2,3,4	U045	100 (45.4)
Methane, chloromethoxy-	107–30–2	3,4	U046	10 (4.54)
Methane, dibromo-	74–95–3	4	U068	1000 (454)
Methane, dichloro-	75–09–2	2,3,4	U080	1000 (454)
Methane, dichlorodifluoro-	75–71–8	4	U075	5000 (2270)
Methane, iodo-	74–88–4	3,4	U138	100 (45.4)
Methane, isocyanato-	624–83–9	3,4	P064	10 (4.54)
Methane, oxybis(chloro-	542–88–1	2,3,4	P016	10 (4.54)
Methanesulfenyl chloride, trichloro-	594–42–3	4	P118	100 (45.4)
Methanesulfonic acid, ethyl ester	62–50–0	4	U119	1 (0.454)
Methane, tetrachloro-	56–23–5	1,2,3,4	U211	10 (4.54)
Methane, tetranitro-	509–14–8	4	P112	10 (4.54)
Methanethiol	74–93–1	1,4	U153	100 (45.4)
Methane, tribromo-	75–25–2	2,3,4	U225	100 (45.4)
Methane, trichloro-	67–66–3	1,2,3,4	U044	10 (4.54)
Methane, trichlorofluoro-	75–69–4	4	U121	5000 (2270)
Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride.	23422539	4	P198	100 (45.4)
Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino) carbonyl]oxy]phenyl]-.	17702577	4	P197	100 (45.4)
6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide.	115–29–7	1,2,4	P050	1 (0.454)
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.	76–44–8	1,2,3,4	P059	1 (0.454)
4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-—.	57–74–9	1,2,3,4	U036	1 (0.454)
Methanol	67–56–1	3,4	U154	5000 (2270)
Methapyrilene	91–80–5	4	U155	5000 (2270)
1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one, 1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.	143–50–0	1,4	U142	1 (0.454)
Methiocarb	2032–65–7	1,4	P199	10 (4.54)
Methomyl	16752–77–5	4	P066	100 (45.4)
Methoxychlor	72–43–5	1,3,4	U247	1 (0.454)
Methyl alcohol	67–56–1	3,4	U154	5000 (2270)
2-Methyl aziridine	75–55–8	3,4	P067	1 (0.454)
Methyl bromide	74–83–9	2,3,4	U029	1000 (454)
1-Methylbutadiene	504–60–9	4	U186	100 (45.4)
Methyl chloride	74–87–3	2,3,4	U045	100 (45.4)
Methyl chlorocarbonate	79–22–1	4	U156	1000 (454)
Methyl chloroform	71–55–6	2,3,4	U226	1000 (454)
3-Methylcholanthrene	56–49–5	4	U157	10 (4.54)
4,4′-Methylenebis(2-chloroaniline)	101–14–4	3,4	U158	10 (4.54)
Methylene bromide	74–95–3	4	U068	1000 (454)
Methylene chloride	75–09–2	2,3,4	U080	1000 (454)
4,4′-Methylenedianiline	101–77–9	3		10 (4.54)
Methylene diphenyl diisocyanate	101–68–8	3		5000 (2270)
Methyl ethyl ketone	78–93–3	3,4	U159	5000 (2270)
Methyl ethyl ketone peroxide	1338–23–4	4	U160	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Methyl hydrazine	60–34–4	3,4	P068	10 (4.54)
Methyl iodide	74–88–4	3,4	U138	100 (45.4)
Methyl isobutyl ketone	108–10–1	3,4	U161	5000 (2270)
Methyl isocyanate	624–83–9	3,4	P064	10 (4.54)
2-Methyllactonitrile	75–86–5	1,4	P069	10 (4.54)
Methyl mercaptan	74–93–1	1,4	U153	100 (45.4)
Methyl methacrylate	80–62–6	1,3,4	U162	1000 (454)
Methyl parathion	298–00–0	1,4	P071	100 (45.4)
4-Methyl-2-pentanone	108–10–1	3,4	U161	5000 (2270)
Methyl tert-butyl ether	1634–04–4	3		1000 (454)
Methylthiouracil	56–04–2	4	U164	10 (4.54)
Metolcarb	1129415	4	P190	1000 (454)
Mevinphos	7786–34–7	1		10 (4.54)
Mexacarbate	315–18–4	1,4	P128	1000 (454)
Mitomycin C	50–07–7	4	U010	10 (4.54)
MNNG	70–25–7	4	U163	10 (4.54)
Monoethylamine	75–04–7	1		100 (45.4)
Monomethylamine	74–89–5	1		100 (45.4)
Naled	300–76–5	1		10 (4.54)
5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-.	20830–81–3	4	U059	10 (4.54)
1-Naphthalenamine	134–32–7	4	U167	100 (45.4)
2-Naphthalenamine	91–59–8	4	U168	10 (4.54)
Naphthalenamine, N,N′-bis(2-chloroethyl)-	494–03–1	4	U026	100 (45.4)
Naphthalene	91–20–3	1,2,3,4	U165	100 (45.4)
Naphthalene, 2-chloro-	91–58–7	2,4	U047	5000 (2270)
1,4-Naphthalenedione	130–15–4	4	U166	5000 (2270)
2,7-Naphthalenedisulfonic acid, 3,3′-[(3,3′-dimethyl-(1,1′-biphenyl)-4,4′-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	72–57–1	4	U236	10 (4.54)
1-Naphthalenol, methylcarbamate	63–25–2	1,3,4	U279	100 (45.4)
Naphthenic acid	1338–24–5	1		100 (45.4)
1,4-Naphthoquinone	130–15–4	4	U166	5000 (2270)
alpha-Naphthylamine	134–32–7	4	U167	100 (45.4)
beta-Naphthylamine	91–59–8	4	U168	10 (4.54)
alpha-Naphthylthiourea	86–88–4	4	P072	100 (45.4)
Nickel††	7440–02–0	2		100 (45.4)
Nickel ammonium sulfate	15699–18–0	1		100 (45.4)
NICKEL AND COMPOUNDS	N.A.	2,3		**
Nickel carbonyl Ni(CO)4, (T-4)-	13463–39–3	4	P073	10 (4.54)
Nickel chloride	7718–54–9 37211–05–5	1		100 (45.4)
Nickel compounds	N.A.	2,3		**
Nickel cyanide Ni(CN)2	557–19–7	4	P074	10 (4.54)
Nickel hydroxide	12054–48–7	1		10 (4.54)
Nickel nitrate	14216–75–2	1		100 (45.4)
Nickel sulfate	7786–81–4	1		100 (45.4)
Nicotine, & salts	54–11–5	4	P075	100 (45.4)
Nitric acid	7697–37–2	1		1000 (454)
Nitric acid, thallium (1 +) salt	10102–45–1	4	U217	100 (45.4)
Nitric oxide	10102–43–9	4	P076	10 (4.54)
p-Nitroaniline	100–01–6	4	P077	5000 (2270)
Nitrobenzene	98–95–3	1,2,3,4	U169	1000 (454)
4-Nitrobiphenyl	92–93–3	3		10 (4.54)
Nitrogen dioxide	10102–44–0 10544–72–6	1,4	P078	10 (4.54)
Nitrogen oxide NO	10102–43–9	4	P076	10 (4.54)
Nitrogen oxide NO2	10102–44–0 10544–72–6	1,4	P078	10 (4.54)
Nitroglycerine	55–63–0	4	P081	10 (4.54)
Nitrophenol (mixed)	25154–55–6	1		100 (45.4)
m-Nitrophenol	554–84–7			
o-Nitrophenol	88–75–5	1,2		100 (45.4)
p-Nitrophenol	100–02–7	1,2,3,4	U170	100 (45.4)
2-Nitrophenol	88–75–5	1,2		100 (45.4)
4-Nitrophenol	100–02–7	1,2,3,4	U170	100 (45.4)
NITROPHENOLS	N.A.	2		**
2-Nitropropane	79–46–9	3,4	U171	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
NITROSAMINES	N.A.	2		**
N-Nitrosodi-n-butylamine	924–16–3	4	U172	10 (4.54)
N-Nitrosodiethanolamine	1116–54–7	4	U173	1 (0.454)
N-Nitrosodiethylamine	55–18–5	4	U174	1 (0.454)
N-Nitrosodimethylamine	62–75–9	2,3,4	P082	10 (4.54)
N-Nitrosodiphenylamine	86–30–6	2		100 (45.4)
N-Nitroso-N-ethylurea	759–73–9	4	U176	1 (0.454)
N-Nitroso-N-methylurea	684–93–5	3,4	U177	1 (0.454)
N-Nitroso-N-methylurethane	615–53–2	4	U178	1 (0.454)
N-Nitrosomethylvinylamine	4549–40–0	4	P084	10 (4.54)
N-Nitrosomorpholine	59–89–2	3		1 (0.454)
N-Nitrosopiperidine	100–75–4	4	U179	10 (4.54)
N-Nitrosopyrrolidine	930–55–2	4	U180	1 (0.454)
Nitrotoluene	1321–12–6	1		1000 (454)
m-Nitrotoluene	99–08–1			
o-Nitrotoluene	88–72–2			
p-Nitrotoluene	99–99–0			
5-Nitro-o-toluidine	99–55–8	4	U181	100 (45.4)
Octamethylpyrophosphoramide	152–16–9	4	P085	100 (45.4)
Osmium oxide OsO4, (T–4)–	20816–12–0	4	P087	1000 (454)
Osmium tetroxide	20816–12–0	4	P087	1000 (454)
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	145–73–3	4	P088	1000 (454)
Oxamyl	23135220	4	P194	100 (45.4)
1,2-Oxathiolane, 2,2-dioxide	1120–71–4	3,4	U193	10 (4.54)
2H-1,3,2-Oxazaphosphorin-2–amine, N,N- bis(2-chloroethyl)tetrahydro-, 2-oxide.	50–18–0	4	U058	10 (4.54)
Oxirane	75–21–8	3,4	U115	10 (4.54)
Oxiranecarboxyaldehyde	765–34–4	4	U126	10 (4.54)
Oxirane, (chloromethyl)-	106–89–8	1,3,4	U041	100 (45.4)
Paraformaldehyde	30525–89–4	1		1000 (454)
Paraldehyde	123–63–7	4	U182	1000 (454)
Parathion	56–38–2	1,3,4	P089	10 (4.54)
PCBs	1336–36–3	1,2,3		1 (0.454)
PCNB	82–68–8	3,4	U185	100 (45.4)
Pentachlorobenzene	608–93–5	4	U183	10 (4.54)
Pentachloroethane	76–01–7	4	U184	10 (4.54)
Pentachloronitrobenzene	82–68–8	3,4	U185	100 (45.4)
Pentachlorophenol	87–86–5	1,2,3,4	See F027	10 (4.54)
1,3-Pentadiene	504–60–9	4	U186	100 (45.4)
Perchloroethylene	127–18–4	2,3,4	U210	100 (45.4)
Phenacetin	62–44–2	4	U187	100 (45.4)
Phenanthrene	85–01–8	2		5000 (2270)
Phenol	108–95–2	1,2,3,4	U188	1000 (454)
Phenol, 2-chloro-	95–57–8	2,4	U048	100 (45.4)
Phenol, 4-chloro-3-methyl-	59–50–7	2,4	U039	5000 (2270)
Phenol, 2-cyclohexyl-4,6-dinitro-	131–89–5	4	P034	100 (45.4)
Phenol, 2,4-dichloro-	120–83–2	2,4	U081	100 (45.4)
Phenol, 2,6-dichloro-	87–65–0	4	U082	100 (45.4)
Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E)	56–53–1	4	U089	1 (0.454)
Phenol, 2,4-dimethyl-	105–67–9	2,4	U101	100 (45.4)
Phenol, 4-(dimethylamino)-3,5-dimethyl-, 4 methylcarbamate (ester).	315–18–4	1,4	P128	1000 (454)
Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate	2032–65–7	1,4	P199	10 (4.54)
Phenol, 2,4-dinitro-	51–28–5	1,2,3,4	P048	10 (4.54)
Phenol, methyl-	1319–77–3	1,3,4	U052	100 (45.4)
Phenol, 2-methyl-4,6-dinitro-, & salts	534–52–1	2,3,4	P047	10 (4.54)
Phenol, 2,2′-methylenebis[3,4,6- trichloro-	70–30–4	4	U132	100 (45.4)
Phenol, 2-(1-methylethoxy)-, methylcarbamate	114–26–1	3,4	U411	100 (45.4)
Phenol, 3-(1-methylethyl)-, methyl carbamate	64006	4	P202	10 (4.54)
Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate	2631370	4	P201	1000 (454)
Phenol, 2-(1-methylpropyl)-4,6-dinitro-	88–85–7	4	P020	1000 (454)
Phenol, 4-nitro-	100–02–7	1,2,3,4	U170	100 (45.4)
Phenol, pentachloro-	87–86–5	1,2,3,4	See F027	10 (4.54)
Phenol, 2,3,4,6-tetrachloro-	58–90–2	4	See F027	10 (4.54)
Phenol, 2,4,5-trichloro-	95–95–4	1,3,4	See F027	10 (4.54)
Phenol, 2,4,6-trichloro-	88–06–2	1,2,3,4	See F027	10 (4.54)
Phenol, 2,4,6-trinitro-, ammonium salt	131–74–8	4	P009	10 (4.54)
L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-	148–82–3	4	U150	1 (0.454)
p-Phenylenediamine	106–50–3	3		5000 (2270)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Phenylmercury acetate	62–38–4	4	P092	100 (45.4)
Phenylthiourea	103–85–5	4	P093	100 (45.4)
Phorate	298–02–2	4	P094	10 (4.54)
Phosgene	75–44–5	1,3,4	P095	10 (4.54)
Phosphine	7803–51–2	3,4	P096	100 (45.4)
Phosphoric acid	7664–38–2	1		5000 (2270)
Phosphoric acid, diethyl 4-nitrophenyl ester	311–45–5	4	P041	100 (45.4)
Phosphoric acid, lead(2 +) salt (2:3)	7446–27–7	4	U145	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester.	298–04–4	1,4	P039	1 (0.454)
Phosphorodithioic acid, O,O-diethyl S-[(ethylthio)methyl] ester.	298–02–2	4	P094	10 (4.54)
Phosphorodithioic acid, O,O-diethyl S-methyl ester	3288-58–2	4	U087	5000 (2270)
Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.	60–51–5	4	P044	10 (4.54)
Phosphorofluoridic acid, bis(1-methylethyl) ester	55–91–4	4	P043	100 (45.4)
Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester	56–38–2	1,3,4	P089	10 (4.54)
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297–97–2	4	P040	100 (45.4)
Phosphorothioic acid, O-[4-[(dimethylamino) sulfonyl]phenyl] O,O-dimethyl ester.	52–85–7	4	P097	1000 (454)
Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester.	298–00–0	1,4	P071	100 (45.4)
Phosphorus	7723–14–0	1,3		1 (0.454)
Phosphorus oxychloride	10025–87–3	1		1000 (454)
Phosphorus pentasulfide	1314–80–3	1,4	U189	100 (45.4)
Phosphorus sulfide	1314–80–3	1,4	U189	100 (45.4)
Phosphorus trichloride	7719–12–2	1		1000 (454)
Physostigmine	57476	4	P204	100 (45.4)
Physostigmine salicylate	57647	4	P188	100 (45.4)
PHTHALATE ESTERS	N.A.	2		**
Phthalic anhydride	85–44–9	3,4	U190	5000 (2270)
2-Picoline	109–06–8	4	U191	5000 (2270)
Piperidine, 1-nitroso-	100–75–4	4	U179	10 (4.54)
Plumbane, tetraethyl-	78–00–2	1,4	P110	10 (4.54)
POLYCHLORINATED BIPHENYLS	1336–36–3	1,2,3		1 (0.454)
Polycyclic Organic Matter[e]	N.A.	3		**
POLYNUCLEAR AROMATIC HYDROCARBONS	N.A.	2		**
Potassium arsenate	7784–41–0	1		1 (0.454)
Potassium arsenite	10124–50–2	1		1 (0.454)
Potassium bichromate	7778–50–9	1		10 (4.54)
Potassium chromate	7789–00–6	1		10 (4.54)
Potassium cyanide K(CN)	151–50–8	1,4	P098	10 (4.54)
Potassium hydroxide	1310–58–3	1		1000 (454)
Potassium permanganate	7722–64–7	1		100 (45.4)
Potassium silver cyanide	506–61–6	4	P099	1 (0.454)
Promecarb	2631370	4	P201	1000 (454)
Pronamide	23950–58–5	4	U192	5000 (2270)
Propanal, 2-methyl-2-(methyl- sulfonyl)-, O-[(methylamino)carbonyl] oxime.	1646884	4	P203	100 (45.4)
Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime.	116–06–3	4	P070	1 (0.454)
1-Propanamine	107–10–8	4	U194	5000 (2270)
1-Propanamine, N-propyl-	142–84–7	4	U110	5000 (2270)
1-Propanamine, N-nitroso-N-propyl-	621–64–7	2,4	U111	10 (4.54)
Propane, 1,2-dibromo-3-chloro-	96–12–8	3,4	U066	1 (0.454)
Propane, 1,2-dichloro-	78–87–5	1,2,3,4	U083	1000 (454)
Propanedinitrile	109–77–3	4	U149	1000 (454)
Propanenitrile	107–12–0	4	P101	10 (4.54)
Propanenitrile, 3-chloro-	542–76–7	4	P027	1000 (454)
Propanenitrile, 2-hydroxy-2-methyl-	75–86–5	1,4	P069	10 (4.54)
Propane, 2-nitro-	79–46–9	3,4	U171	10 (4.54)
Propane, 2,2′-oxybis[2-chloro-	108–60–1	2,4	U027	1000 (454)
1,3-Propane sultone	1120–71–4	3,4	U193	10 (4.54)
1,2,3-Propanetriol, trinitrate	55–63–0	4	P081	10 (4.54)
Propanoic acid, 2-(2,4,5-trichlorophenoxy)-	93–72–1	1,4	See F027	100 (45.4)
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126–72–7	4	U235	10 (4.54)
1-Propanol, 2-methyl-	78–83–1	4	U140	5000 (2270)
2-Propanone	67–64–1	4	U002	5000 (2270)
2-Propanone, 1-bromo-	598–31–2	4	P017	1000 (454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Propargite	2312–35–8	1		10 (4.54)
Propargyl alcohol	107–19–7	4	P102	1000 (454)
2-Propenal	107–02–8	1,2,3,4	P003	1 (0.454)
2-Propenamide	79–06–1	3,4	U007	5000 (2270)
1-Propene, 1,3-dichloro-	542–75–6	1,2,3,4	U084	100 (45.4)
1-Propene, 1,1,2,3,3,3-hexachloro-	1888–71–7	4	U243	1000 (454)
2-Propenenitrile	107–13–1	1,2,3,4	U009	100 (45.4)
2-Propenenitrile, 2-methyl-	126–98–7	4	U152	1000 (454)
2-Propenoic acid	79–10–7	3,4	U008	5000 (2270)
2-Propenoic acid, ethyl ester	140–88–5	3,4	U113	1000 (454)
2-Propenoic acid, 2-methyl-, ethyl ester	97–63–2	4	U118	1000 (454)
2-Propenoic acid, 2-methyl-, methyl ester	80–62–6	1,3,4	U162	1000 (454)
2-Propen-1-ol	107–18–6	1,4	P005	100 (45.4)
Propham	122429	4	U373	1000 (454)
beta-Propiolactone	57–57–8	3		10 (4.54)
Propionaldehyde	123–38–6	3	1000 (454)	
Propionic acid	79–09–4	1		5000 (2270)
Propionic anhydride	123–62–6	1		5000 (2270)
Propoxur (Baygon)	114–26–1	3,4	U411	100 (45.4)
n-Propylamine	107–10–8	4	U194	5000 (2270)
Propylene dichloride	78–87–5	1,2,3,4	U083	1000 (454)
Propylene oxide	75–56–9	1,3		100 (45.4)
1,2-Propylenimine	75–55–8	3,4	P067	1 (0.454)
2-Propyn-1-ol	107–19–7	4	P102	1000 (454)
Prosulfocarb	52888809	4	U387	5000 (2270)
Pyrene	129–00–0	2		5000 (2270)
Pyrethrins	121–29–9 121–21–1 8003–34–7	1		1 (0.454)
3,6-Pyridazinedione, 1,2-dihydro-	123–33–1	4	U148	5000 (2270)
4-Pyridinamine	504–24–5	4	P008	1000 (454)
Pyridine	110–86–1	4	U196	1000 (454)
Pyridine, 2-methyl-	109–06–8	4	U191	5000 (2270)
Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts	54–11–5	4	P075	100 (45.4)
2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2- chloroethyl)amino]-	66–75–1	4	U237	10 (4.54)
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56–04–2	4	U164	10 (4.54)
Pyrrolidine, 1-nitroso-	930–55–2	4	U180	1 (0.454)
Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a- hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-.	57476	4	P204	100 (45.4)
Quinoline	91–22–5	1,3		5000 (2270)
Quinone	106–51–4	3,4	U197	10 (4.54)
Quintobenzene	82–68–8	3,4	U185	100 (45.4)
Radionuclides (including radon)	N.A.	3		§
Reserpine	50–55–5	4	U200	5000 (2270)
Resorcinol	108–46–3	1,4	U201	5000 (2270)
Safrole	94–59–7	4	U203	100 (45.4)
Selenious acid	7783–00–8	4	U204	10 (4.54)
Selenious acid, dithallium (1 +) salt	12039–52–0	4	P114	1000 (454)
Selenium††	7782–49–2	2		100 (45.4)
SELENIUM AND COMPOUNDS	N.A.	2,3		**
Selenium Compounds	N.A.	2,3		**
Selenium dioxide	7446–08–4	1,4	U204	10 (4.54)
Selenium oxide	7446–08–4	1,4	U204	10 (4.54)
Selenium sulfide SeS2	7488–56–4	4	U205	10 (4.54)
Selenourea	630–10–4	4	P103	1000 (454)
L-Serine, diazoacetate (ester)	115–02–6	4	U015	1 (0.454)
Silver††	7440–22–4	2		1000 (454)
SILVER AND COMPOUNDS	N.A.	2		**
Silver cyanide Ag(CN)	506–64–9	4	P104	1 (0.454)
Silver nitrate	7761–88–8	1		1 (0.454)
Silvex (2,4,5-TP)	93–72–1	1,4	See F027	100 (45.4)
Sodium	7440–23–5	1		10 (4.54)
Sodium arsenate	7631–89–2	1		1 (0.454)
Sodium arsenite	7784–46–5	1		1 (0.454)
Sodium azide	26628–22–8	4	P105	1000 (454)
Sodium bichromate	10588–01–9	1		10 (4.54)
Sodium bifluoride	1333–83–1	1		100 (45.4)
Sodium bisulfite	7631–90–5	1		5000 (2270)
Sodium chromate	7775–11–3	1		10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Sodium cyanide Na(CN)	143–33–9	1,4	P106	10 (4.54)
Sodium dodecylbenzenesulfonate	25155–30–0	1		1000 (454)
Sodium fluoride	7681–49–4	1		1000 (454)
Sodium hydrosulfide	16721–80–5	1		5000 (2270)
Sodium hydroxide	1310–73–2	1		1000 (454)
Sodium hypochlorite	7681–52–9 10022–70–5	1		100 (45.4)
Sodium methylate	124–41–4	1		1000 (454)
Sodium nitrite	7632–00–0	1		100 (45.4)
Sodium phosphate, dibasic	7558–79–4 10039–32–4 10140–65–5	1		5000 (2270)
Sodium phosphate, tribasic	7601–54–9 10101–89–0 10361–89–4	1		5000 (2270)
Sodium selenite	7782–82–3 10102–18–8	1		100 (45.4)
Streptozotocin	18883–66–4	4	U206	1 (0.454)
Strontium chromate	7789–06–2	1		10 (4.54)
Strychnidin-10-one, & salts	57–24–9	1,4	P108	10 (4.54)
Strychnidin-10-one, 2,3-dimethoxy-	357–57–3	4	P018	100 (45.4)
Strychnine, & salts	57–24–9	1,4	P108	10 (4.54)
Styrene	100–42–5	1,3		1000 (454)
Styrene oxide	96–09–3	3		100 (45.4)
Sulfuric acid	7664–93–9 8014–95–7	1		1000 (454)
Sulfuric acid, dimethyl ester	77–78–1	3,4	U103	100 (45.4)
Sulfuric acid, dithallium (1 +) salt	7446–18–6 10031–59–1	1,4	P115	100 (45.4)
Sulfur monochloride	12771–08–3	1		1000 (454)
Sulfur phosphide	1314–80–3	1,4	U189	100 (45.4)
2,4,5-T	93–76–5	1,4	See F027	1000 (454)
2,4,5-T acid	93–76–5	1,4	See F027	1000 (454)
2,4,5-T amines	2008–46–0 1319–72–8 3813–14–7 6369–96–6 6369–97–7	1		5000 (2270)
2,4,5-T esters	93–79–8 1928–47–8 2545–59–7 25168–15–4 61792–07–2	1		1000 (454)
2,4,5-T salts	13560–99–1	1		1000 (454)
TCDD	1746–01–6	2,3		1 (0.454)
TDE	72–54–8	1,2,4	U060	1 (0.454)
1,2,4,5-Tetrachlorobenzene	95–94–3	4	U207	5000 (2270)
2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746–01–6	2,3		1 (0.454)
1,1,1,2-Tetrachloroethane	630–20–6	4	U208	100 (45.4)
1,1,2,2-Tetrachloroethane	79–34–5	2,3,4	U209	100 (45.4)
Tetrachloroethylene	127–18–4	2,3,4	U210	100 (45.4)
2,3,4,6-Tetrachlorophenol	58–90–2	4	See F027	10 (4.54)
Tetraethyl pyrophosphate	107–49–3	1,4	P111	10 (4.54)
Tetraethyl lead	78–00–2	1,4	P110	10 (4.54)
Tetraethyldithiopyrophosphate	3689–24–5	4	P109	100 (45.4)
Tetrahydrofuran	109–99–9	4	U213	1000 (454)
Tetranitromethane	509–14–8	4	P112	10 (4.54)
Tetraphosphoric acid, hexaethyl ester	757–58–4	4	P062	100 (45.4)
Thallic oxide	1314–32–5	4	P113	100 (45.4)
Thallium ††	7440–28–0	2		1000 (454)
THALLIUM AND COMPOUNDS	N.A.	2		**
Thallium (I) acetate	563–68–8	4	U214	100 (45.4)
Thallium (I) carbonate	6533–73–9	4	U215	100 (45.4)
Thallium chloride TlCl	7791–12–0	4	U216	100 (45.4)
Thallium (I) nitrate	10102–45–1	4	U217	100 (45.4)
Thallium oxide Tl2O3	1314–32–5	4	P113	100 (45.4)
Thallium (I) selenite	12039–52–0	4	P114	1000 (454)
Thallium (I) sulfate	7446–18–6 10031–59–1	1,4	P115	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Thioacetamide	62–55–5	4	U218	10 (4.54)
Thiodicarb	59669260	4	U410	100 (45.4)
Thiodiphosphoric acid, tetraethyl ester	3689–24–5	4	P109	100 (45.4)
Thiofanox	39196–18–4	4	P045	100 (45.4)
Thioimidodicarbonic diamide [(H2N)C(S)] 2NH	541–53–7	4	P049	100 (45.4)
Thiomethanol	74–93–1	1,4	U153	100 (45.4)
Thioperoxydicarbonic diamide [(H2N)C(S)] 2S2, tetramethyl-.	137–26–8	4	U244	10 (4.54)
Thiophanate-methyl	23564058	4	U409	10 (4.54)
Thiophenol	108–98–5	4	P014	100 (45.4)
Thiosemicarbazide	79–19–6	4	P116	100 (45.4)
Thiourea	62–56–6	4	U219	10 (4.54)
Thiourea, (2-chlorophenyl)-	5344–82–1	4	P026	100 (45.4)
Thiourea, 1-naphthalenyl-	86–88–4	4	P072	100 (45.4)
Thiourea, phenyl-	103–85–5	4	P093	100 (45.4)
Thiram	137–26–8	4	U244	10 (4.54)
Tirpate	26419738	4	P185	100 (45.4)
Titanium tetrachloride	7550–45–0	3		1,2,41000 (454)
Toluene	108–88–3	1,2,3,4	U220	1000 (454)
Toluenediamine	95–80–7 496–72–0 823–40–5 25376–45–8	3,4	U221	10 (4.54)
2,4-Toluene diamine	95–80–7 496–72–0 823–40–5 25376–45–8	3,4	U221	10 (4.54)
Toluene diisocyanate	91–08–7 584–84–9 26471–62–5	3,4	U223	100 (45.4)
2,4-Toluene diisocyanate	91–08–7 584–84–9 26471–62–5	3,4	U223	100 (45.4)
o-Toluidine	95–53–4	3,4	U328	100 (45.4)
p-Toluidine	106–49–0	4	U353	100 (45.4)
o-Toluidine hydrochloride	636–21–5	4	U222	100 (45.4)
Toxaphene	8001–35–2	1,2,3,4	P123	1 (0.454)
2,4,5-TP acid	93–72–1	1,4	See F027	100 (45.4)
2,4,5-TP esters	32534–95–5	1		100 (45.4)
Triallate	2303175	4	U389	100 (45.4)
1H-1,2,4-Triazol-3-amine	61–82–5	4	U011	10 (4.54)
Trichlorfon	52–68–6	1		100 (45.4)
1,2,4-Trichlorobenzene	120–82–1	2,3		100 (45.4)
1,1,1-Trichloroethane	71–55–6	2,3,4	U226	1000 (454)
1,1,2-Trichloroethane	79–00–5	2,3,4	U227	100 (45.4)
Trichloroethylene	79–01–6	1,2,3,4	U228	100 (45.4)
Trichloromethanesulfenyl chloride	594–42–3	4	P118	100 (45.4)
Trichloromonofluoromethane	75–69–4	4	U121	5000 (2270)
Trichlorophenol	25167–82–2	1		10 (4.54)
2,3,4-Trichlorophenol	15950–66–0			
2,3,5-Trichlorophenol	933–78–8			
2,3,6-Trichlorophenol	933–75–5			
3,4,5-Trichlorophenol	609–19–8			
2,4,5-Trichlorophenol	95–95–4	1,3,4	See F027	10 (4.54)
2,4,6-Trichlorophenol	88–06–2	1,2,3,4	See F027	10 (4.54)
Triethanolamine dodecylbenzenesulfonate	27323–41–7	1		1000 (454)
Triethylamine	121–44–8	1,3,4	U404	5000 (2270)
Trifluralin	1582–09–8	3		10 (4.54)
Trimethylamine	75–50–3	1		100 (45.4)
2,2,4-Trimethylpentane	540–84–1	3		1000 (454)
1,3,5-Trinitrobenzene	99–35–4	4	U234	10 (4.54)
1,3,5-Trioxane, 2,4,6-trimethyl-	123–63–7	4	U182	1000 (454)
Tris(2,3-dibromopropyl) phosphate	126–72–7	4	U235	10 (4.54)
Trypan blue	72–57–1	4	U236	10 (4.54)
Unlisted Hazardous Wastes Characteristic of Corrosivity	N.A.	4	D002	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Ignitability	N.A.	4	D001	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Reactivity	N.A.	4	D003	100 (45.4)
Unlisted Hazardous Wastes Characteristic of Toxicity:				
Arsenic (D004)	N.A.	4	D004	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Barium (D005)	N.A.	4	D005	1000 (454)
Benzene (D018)	N.A.	1,2,3,4	D018	10 (4.54)
Cadmium (D006)	N.A.	4	D006	10 (4.54)
Carbon tetrachloride (D019)	N.A.	1,2,4	D019	10 (4.54)
Chlordane (D020)	N.A.	1,2,4	D020	1 (0.454)
Chlorobenzene (D021)	N.A.	1,2,4	D021	100 (45.4)
Chloroform (D022)	N.A.	1,2,4	D022	10 (4.54)
Chromium (D007)	N.A.	4	D007	10 (4.54)
o-Cresol (D023)	N.A.	4	D023	100 (45.4)
m-Cresol (D024)	N.A.	4	D024	100 (45.4)
p-Cresol (D025)	N.A.	4	D025	100 (45.4)
Cresol (D026)	N.A.	4	D026	100 (45.4)
2,4-D (D016)	N.A.	1,4	D016	100 (45.4)
1,4-Dichlorobenzene (D027)	N.A.	1,2,4	D027	100 (45.4)
1,2-Dichloroethane (D028)	N.A.	1,2,4	D028	100 (45.4)
1,1-Dichloroethylene (D029)	N.A.	1,2,4	D029	100 (45.4)
2,4-Dinitrotoluene (D030)	N.A.	1,2,4	D030	10 (4.54)
Endrin (D012)	N.A.	1,4	D012	1 (0.454)
Heptachlor (and epoxide) (D031)	N.A.	1,2,4	D031	1 (0.454)
Hexachlorobenzene (D032)	N.A.	2,4	D032	10 (4.54)
Hexachlorobutadiene (D033)	N.A.	2,4	D033	1 (0.454)
Hexachloroethane (D034)	N.A.	2,4	D034	100 (45.4)
Lead (D008)	N.A.	4	D008	10 (4.54)
Lindane (D013)	N.A.	1,4	D013	1 (0.454)
Mercury (D009)	N.A.	4	D009	1 (0.454)
Methoxychlor (D014)	N.A.	1,4	D014	1 (0.454)
Methyl ethyl ketone (D035)	N.A.	4	D035	5000 (2270)
Nitrobenzene (D036)	N.A.	1,2,4	D036	1000 (454)
Pentachlorophenol (D037)	N.A.	1,2,4	D037	10 (4.54)
Pyridine (D038)	N.A.	4	D038	1000 (454)
Selenium (D010)	N.A.	4	D010	10 (4.54)
Silver (D011)	N.A.	4	D011	1 (0.454)
Tetrachloroethylene (D039)	N.A.	2,4	D039	100 (45.4)
Toxaphene (D015)	N.A.	1,4	D015	1 (0.454)
Trichloroethylene (D040)	N.A.	1,2,4	D040	100 (45.4)
2,4,5-Trichlorophenol (D041)	N.A.	1,4	D041	10 (4.54)
2,4,6-Trichlorophenol (D042)	N.A.	1,2,4	D042	10 (4.54)
2,4,5-TP (D017)	N.A.	1,4	D017	100 (45.4)
Vinyl chloride (D043)	N.A.	2,3,4	D043	1 (0.454)
Uracil mustard	66–75–1	4	U237	10 (4.54)
Uranyl acetate	541–09–3	1		100 (45.4)
Uranyl nitrate	10102–06–4 36478–76–9	1		100 (45.4)
Urea, N-ethyl-N-nitroso-	759–73–9	4	U176	1 (0.454)
Urea, N-methyl-N-nitroso-	684–93–5	3,4	U177	1 (0.454)
Urethane	51–79–6	3,4	U238	100 (45.4)
Vanadic acid, ammonium salt	7803–55–6	4	P119	1000 (454)
Vanadium oxide V2O5	1314–62–1	1,4	P120	1000 (454)
Vanadium pentoxide	1314–62–1	1,4	P120	1000 (454)
Vanadyl sulfate	27774–13–6	1		1000 (454)
Vinyl acetate	108–05–4	1,3		5000 (2270)
Vinyl acetate monomer	108–05–4	1,3		5000 (2270)
Vinylamine, N-methyl-N-nitroso-	4549–40–0	4	P084	10 (4.54)
Vinyl bromide	593–60–2	3		100 (45.4)
Vinyl chloride	75–01–4	2,3,4	U043	1 (0.454)
Vinylidene chloride	75–35–4	1,2,3,4	U078	100 (45.4)
Warfarin, & salts	81–81–2	4	P001, U248	100 (45.4)
Xylene	1330–20–7	1,3,4	U239	100 (45.4)
m-Xylene	108–38–3	3		1000 (454)
o-Xylene	95–47–6	3		1000 (454)
p-Xylene	106–42–3	3		100 (45.4)
Xylene (mixed)	1330–20–7	1,3,4	U239	100 (45.4)
Xylenes (isomers and mixture)	1330–20–7	1,3,4	U239	100 (45.4)
Xylenol	1300–71–6	1		1000 (454)
Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methyl ester (3beta,16beta,17alpha, 18beta,20alpha).	50–55–54	4	U200	5000 (2270)
Zinc††	7440–66–6	2		1000 (454)
ZINC AND COMPOUNDS	N.A.	2		**

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Zinc acetate	557–34–6	1		1000 (454)
Zinc ammonium chloride	52628–25–8 14639–97–5 14639–98–6	1		1000 (454)
Zinc, bis(dimethylcarbamodithioato-S,S')-	137304	4	P205	10 (4.54)
Zinc borate	1332–07–6	1		1000 (454)
Zinc bromide	7699–45–8	1		1000 (454)
Zinc carbonate	3486–35–9	1		1000 (454)
Zinc chloride	7646–85–7	1		1000 (454)
Zinc cyanide Zn(CN)2	557–21–1	1,4	P121	10 (4.54)
Zinc fluoride	7783–49–5	1		1000 (454)
Zinc formate	557–41–5	1		1000 (454)
Zinc hydrosulfite	7779–86–4	1		1000 (454)
Zinc nitrate	7779–88–6	1		1000 (454)
Zinc phenolsulfonate	127–82–2	1		5000 (2270)
Zinc phosphide Zn3P2	1314–84–7	1,4	P122, U249	100 (45.4)
Zinc silicofluoride	16871–71–9	1		5000 (2270)
Zinc sulfate	7733–02–0	1		1000 (454)
Ziram	137304	4	P205	10 (4.54)
Zirconium nitrate	13746–89–9	1		5000 (2270)
Zirconium potassium fluoride	16923–95–8	1		1000 (454)
Zirconium sulfate	14644–61–2	1		5000 (2270)
Zirconium tetrachloride	10026–11–6	1		5000 (2270)
F001	.....	4	F001	10 (4.54)
The following spent halogenated solvents used in degreasing; all spent solvent mixtures/blends used in degreasing containing, before use, a total of ten percent or more (by volume) of one or more of the halogenated solvents listed below or those solvents listed in F002, F004, and F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127–18–4	2,3,4	U210	100 (45.4)
(b) Trichloroethylene	79–01–6	1,2,3,4	U228	100 (45.4)
(c) Methylene chloride	75–09–2	2,3,4	U080	1000 (454)
(d) 1,1,1-Trichloroethane	71–55–6	2,3,4	U226	1000 (454)
(e) Carbon tetrachloride	56–23–5	1,2,3,4	U211	10 (4.54)
(f) Chlorinated fluorocarbons	N.A.	.....		5000 (2270)
F002	.....	4	F002	10 (4.54)
The following spent halogenated solvents; all spent solvent mixtures/blends containing, before use, a total of ten percent or more (by volume) of one or more of the halogenated solvents listed below or those solvents listed in F001, F004, or F005; and still bottoms from the recovery of these spent solvents and spent solvent mixtures.				
(a) Tetrachloroethylene	127–18–4	2,3,4	U210	100 (45.4)
(b) Methylene chloride	75–09–2	2,3,4	U080	1000 (454)
(c) Trichloroethylene	79–01–6	1,2,3,4	U228	100 (45.4)
(d) 1,1,1-Trichloroethane	71–55–6	2,3,4	U226	1000 (454)
(e) Chlorobenzene	108–90–7	1,2,3,4	U037	100 (45.4)
(f) 1,1,2-Trichloro-1,2,2-trifluoroethane	76–13–1	.....		5000 (2270)
(g) o-Dichlorobenzene	95–50–1	1,2,4	U070	100 (45.4)
(h) Trichlorofluoromethane	75–69–4	4	U121	5000 (2270)
(i) 1,1,2-Trichloroethane	79–00–5	2,3,4	U227	100 (45.4)
F003	.....	4	F003	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents.				
(a) Xylene	1330-20–7	.....		1000 (454)
(b) Acetone	67–64–1	.....		5000 (2270)
(c) Ethyl acetate	141–78–6	.....		5000 (2270)
(d) Ethylbenzene	100–41–4	.....		1000 (454)
(e) Ethyl ether	60–29–7	.....		100 (45.4)
(f) Methyl isobutyl ketone	108–10–1	.....		5000 (2270)
(g) n-Butyl alcohol	71–36–3	.....		5000 (2270)
(h) Cyclohexanone	108–94–1	.....		5000 (2270)
(i) Methanol	67–56–1	.....		5000 (2270)
F004	.....	4	F004	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Cresols/Cresylic acid	1319–77–3	1,3,4	U052	100 (45.4)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
(b) Nitrobenzene	98–95–3	1,2,3,4	U169	1000 (454)
F005		4	F005	100 (45.4)
The following spent non-halogenated solvents and the still bottoms from the recovery of these solvents:				
(a) Toluene	108–88–3	1,2,3,4	U220	1000 (454)
(b) Methyl ethyl ketone	78–93–3	3,4	U159	5000 (2270)
(c) Carbon disulfide	75–15–0	1,3,4	P022	100 (45.4)
(d) Isobutanol	78–83–1	4	U140	5000 (2270)
(e) Pyridine	110–86–1	4	U196	1000 (454)
F006		4	F006	10 (4.54)
Wastewater treatment sludges from electroplating operations except from the following processes: (1) sulfuric acid anodizing of aluminum, (2) tin plating on carbon steel, (3) zinc plating (segregated basis) on carbon steel, (4) aluminum or zinc-aluminum plating on carbon steel, (5) cleaning/stripping associated with tin, zinc and aluminum plating on carbon steel, and (6) chemical etching and milling of aluminum.				
F007		4	F007	10 (4.54)
Spent cyanide plating bath solutions from electroplating operations.				
F008		4	F008	10 (4.54)
Plating bath residues from the bottom of plating baths from electroplating operations where cyanides are used in the process.				
F009		4	F009	10 (4.54)
Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used in the process.				
F010		4	F010	10 (4.54)
Quenching bath residues from oil baths from metal heat treating operations where cyanides are used in the process.				
F011		4	F011	10 (4.54)
Spent cyanide solutions from salt bath pot cleaning from metal heat treating operations.				
F012		4	F012	10 (4.54)
Quenching wastewater treatment sludges from metal heat treating operations where cyanides are used in the process.				
F019		4	F019	10 (4.54)
Wastewater treatment sludges from the chemical conversion coating of aluminum except from zirconium phosphating in aluminum can washing when such phosphating is an exclusive conversion coating process. Wastewater treatment sludges from the manufacturing of motor vehicles using a zinc phosphating process will not be subject to this listing at the point of generation if the wastes are not placed outside on the land prior to shipment to a landfill for disposal and are either: disposed in a Subtitle D municipal or industrial landfill unit that is equipped with a single clay liner and is permitted, licensed or otherwise authorized by the state; or disposed in a landfill unit subject to, or otherwise meeting, the landfill requirements in § 258.40, § 264.301 or § 265.301. For the purposes of this listing, motor vehicle manufacturing is defined in § 261.31(b)(4)(i) and § 261.31(b)(4)(ii) describes the recordkeeping requirements for motor vehicle manufacturing facilities				
F020		4	F020	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tri- or tetrachlorophenol or of intermediates used to produce their pesticide derivatives. (This listing does not include wastes from the production of hexachlorophene from highly purified 2,4,5-trichlorophenol.)				
F021		4	F021	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production or manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of pentachlorophenol or of intermediates used to produce its derivatives.				
F022	.....	4	F022	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzenes under alkaline conditions.				
F023	.....	4	F023	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the production or manufacturing use (as a reactant, chemical intermediate, or a component in a formulating process) of tri- and tetrachlorophenols. (This listing does not include wastes from equipment used only for the production or use of hexachlorophene from highly purified 2,4,5-trichlorophenol.)				
F024	.....	4	F024	1 (0.454)
Process wastes, including but not limited to, distillation residues, heavy ends, tars, and reactor clean-out wastes, from the production of certain chlorinated aliphatic hydrocarbons by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution. (This listing does not include wastewaters, wastewater treatment sludges, spent catalysts, and wastes listed in 40 CFR 261.31 or 261.32.)				
F025	.....	4	F025	1 (0.454)
Condensed light ends, spent filters and filter aids, and spent desiccant wastes from the production of certain chlorinated aliphatic hydrocarbons, by free radical catalyzed processes. These chlorinated aliphatic hydrocarbons are those having carbon chain lengths ranging from one to and including five, with varying amounts and positions of chlorine substitution.				
F026	.....	4	F026	1 (0.454)
Wastes (except wastewater and spent carbon from hydrogen chloride purification) from the production of materials on equipment previously used for the manufacturing use (as a reactant, chemical intermediate, or component in a formulating process) of tetra-, penta-, or hexachlorobenzene under alkaline conditions.				
F027	.....	4	F027	1 (0.454)
Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols. (This listing does not include formulations containing hexachlorophene synthesized from prepurified 2,4,5- trichlorophenol as the sole component.)				
F028	.....	4	F028	1 (0.454)
Residues resulting from the incineration or thermal treatment of soil contaminated with EPA Hazardous Waste Nos. F020, F021, F022, F023, F026, and F027.				
F032	.....	4	F032	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with § 261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (*i.e.*, F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.				
F034	.....	4	F034	1 (0.454)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.				
F035	.....	4	F035	1 (0.454)
Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.				
F037	.....	4	F037	1 (0.454)
Petroleum refinery primary oil/water/solids separation sludge-Any sludge generated from the gravitational separation of oil/water/solids during the storage or treatment of process wastewaters and oily cooling wastewaters from petroleum refineries. Such sludges include, but are not limited to those generated in oil/water/solids separators; tanks and impoundments; ditches and other conveyances; sumps; and stormwater units receiving dry weather flow. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges generated in aggressive biological treatment units as defined in § 261.31(b)(2) (including sludges generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and K051 wastes are not included in this listing. This listing does include residuals generated from processing or recycling oil-bearing hazardous secondary materials excluded under § 261.4(a)(12)(i), if those residuals are to be disposed of.				
F038	.....	4	F038	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Petroleum refinery secondary (emulsified) oil/water/solids separation sludge-Any sludge and/or float generated from the physical and/or chemical separation of oil/water/solids in process wastewaters and oily cooling wastewaters from petroleum refineries. Such wastes include, but are not limited to, all sludges and floats generated in: induced air flotation (IAF) units, tanks and impoundments, and all sludges generated in DAF units. Sludges generated in stormwater units that do not receive dry weather flow, sludges generated from non-contact once-through cooling waters segregated for treatment from other process or oily cooling waters, sludges and floats generated in aggressive biological treatment units as defined in §261.31(b)(2) (including sludges and floats generated in one or more additional units after wastewaters have been treated in aggressive biological treatment units) and F037, K048, and K051 wastes are not included in this listing.				
F039	.....	4	F039	1 (0.454)
Leachate (liquids that have percolated through land disposed wastes) resulting from the disposal of more than one restricted waste classified as hazardous under subpart D of 40 CFR part 261. (Leachate resulting from the disposal of one or more of the following EPA Hazardous Wastes and no other hazardous wastes retains its EPA Hazardous Waste Number(s): F020, F021, F022, F026, F027, and/or F028.)				
K001	.....	4	K001	1 (0.454)
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol.				
K002	.....	4	K002	10 (4.54)
Wastewater treatment sludge from the production of chrome yellow and orange pigments.				
K003	.....	4	K003	10 (4.54)
Wastewater treatment sludge from the production of molybdate orange pigments.				
K004	.....	4	K004	10 (4.54)
Wastewater treatment sludge from the production of zinc yellow pigments.				
K005	.....	4	K005	10 (4.54)
Wastewater treatment sludge from the production of chrome green pigments.				
K006	.....	4	K006	10 (4.54)
Wastewater treatment sludge from the production of chrome oxide green pigments (anhydrous and hydrated).				
K007	.....	4	K007	10 (4.54)
Wastewater treatment sludge from the production of iron blue pigments.				
K008	.....	4	K008	10 (4.54)
Oven residue from the production of chrome oxide green pigments.				
K009	.....	4	K009	10 (4.54)
Distillation bottoms from the production of acetaldehyde from ethylene.				
K010	.....	4	K010	10 (4.54)
Distillation side cuts from the production of acetaldehyde from ethylene.				
K011	.....	4	K011	10 (4.54)
Bottom stream from the wastewater stripper in the production of acrylonitrile.				
K013	.....	4	K013	10 (4.54)
Bottom stream from the acetonitrile column in the production of acrylonitrile.				
K014	.....	4	K014	5000 (2270)
Bottoms from the acetonitrile purification column in the production of acrylonitrile.				
K015	.....	4	K015	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Still bottoms from the distillation of benzyl chloride. K016	.....	4	K016	1 (0.454)
Heavy ends or distillation residues from the production of carbon tetrachloride. K017	.....	4	K017	10 (4.54)
Heavy ends (still bottoms) from the purification column in the production of epichlorohydrin. K018	.....	4	K018	1 (0.454)
Heavy ends from the fractionation column in ethyl chloride production. K019	.....	4	K019	1 (0.454)
Heavy ends from the distillation of ethylene dichloride in ethylene dichloride production. K020	.....	4	K020	1 (0.454)
Heavy ends from the distillation of vinyl chloride in vinyl chloride monomer production. K021	.....	4	K021	10 (4.54)
Aqueous spent antimony catalyst waste from fluoromethanes production. K022	.....	4	K022	1 (0.454)
Distillation bottom tars from the production of phenol/acetone from cumene. K023	.....	4	K023	5000 (2270)
Distillation light ends from the production of phthalic anhydride from naphthalene. K024	.....	4	K024	5000 (2270)
Distillation bottoms from the production of phthalic anhydride from naphthalene. K025	.....	4	K025	10 (4.54)
Distillation bottoms from the production of nitrobenzene by the nitration of benzene. K026	.....	4	K026	1000 (454)
Stripping still tails from the production of methyl ethyl pyridines. K027		4	K027	10 (4.54)
Centrifuge and distillation residues from toluene diisocyanate production. K028		4	K028	1 (0.454)
Spent catalyst from the hydrochlorinator reactor in the production of 1,1,1-trichloroethane. K029		4	K029	1 (0.454)
Waste from the product steam stripper in the production of 1,1,1- trichloroethane. K030		4	K030	1 (0.454)
Column bottoms or heavy ends from the combined production of trichloroethylene and perchloroethylene. K031		4	K031	1 (0.454)
By-product salts generated in the production of MSMA and cacodylic acid. K032		4	K032	10 (4.54)
Wastewater treatment sludge from the production of chlordane. K033		4	K033	10 (4.54)
Wastewater and scrub water from the chlorination of cyclopentadiene in the production of chlordane. K034		4	K034	10 (4.54)
Filter solids from the filtration of hexachlorocyclopentadiene in the production of chlordane. K035		4	K035	1 (0.454)
Wastewater treatment sludges generated in the production of creosote. K036		4	K036	1 (0.454)
Still bottoms from toluene reclamation distillation in the production of disulfoton. K037		4	K037	1 (0.454)
Wastewater treatment sludges from the production of disulfoton. K038		4	K038	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Wastewater from the washing and stripping of phorate production.				
K039		4	K039	10 (4.54)
Filter cake from the filtration of diethylphosphorodithioic acid in the production of phorate.				
K040		4	K040	10 (4.54)
Wastewater treatment sludge from the production of phorate.				
K041		4	K041	1 (0.454)
Wastewater treatment sludge from the production of toxaphene.				
K042		4	K042	10 (4.54)
Heavy ends or distillation residues from the distillation of tetrachlorobenzene in the production of 2,4,5-T.				
K043		4	K043	10 (4.54)
2,6-Dichlorophenol waste from the production of 2,4-D.				
K044		4	K044	10 (4.54)
Wastewater treatment sludges from the manufacturing and processing of explosives.				
K045		4	K045	10 (4.54)
Spent carbon from the treatment of wastewater containing explosives.				
K046		4	K046	10 (4.54)
Wastewater treatment sludges from the manufacturing, formulation and loading of lead-based initiating compounds.				
K047		4	K047	10 (4.54)
Pink/red water from TNT operations.				
K048		4	K048	10 (4.54)
Dissolved air flotation (DAF) float from the petroleum refining industry.				
K049		4	K049	10 (4.54)
Slop oil emulsion solids from the petroleum refining industry.				
K050		4	K050	10 (4.54)
Heat exchanger bundle cleaning sludge from the petroleum refining industry.				
K051		4	K051	10 (4.54)
API separator sludge from the petroleum refining industry.				
K052		4	K052	10 (4.54)
Tank bottoms (leaded) from the petroleum refining industry.				
K060		4	K060	1 (0.454)
Ammonia still lime sludge from coking operations.				
K061		4	K061	10 (4.54)
Emission control dust/sludge from the primary production of steel in electric furnaces.				
K062		4	K062	10 (4.54)
Spent pickle liquor generated by steel finishing operations of facilities within the iron and steel industry (SIC Codes 331 and 332).				
K064		4	K064	10 (4.54)
Acid plant blowdown slurry/sludge resulting from the thickening of blowdown slurry from primary copper production.				
K065		4	K065	10 (4.54)
Surface impoundment solids contained in and dredged from surface impoundments at primary lead smelting facilities.				
K066		4	K066	10 (4.54)
Sludge from treatment of process wastewater and/or acid plant blowdown from primary zinc production.				
K069		4	K069	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Emission control dust/sludge from secondary lead smelting. (Note: This listing is stayed administratively for sludge generated from secondary acid scrubber systems. The stay will remain in effect until further administrative action is taken. If EPA takes further action effecting the stay, EPA will publish a notice of the action in the FEDERAL REGISTER.)				
K071		4	K071	1 (0.454)
Brine purification muds from the mercury cell process in chlorine production, where separately prepurified brine is not used.				
K073		4	K073	10 (4.54)
Chlorinated hydrocarbon waste from the purification step of the diaphragm cellprocess using graphite anodes in chlorine production.				
K083		4	K083	100 (45.4)
Distillation bottoms from aniline production.				
K084		4	K084	1 (0.454)
Wastewater treatment sludges generated during the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.				
K085		4	K085	10 (4.54)
Distillation or fractionation column bottoms from the production of chlorobenzenes.				
K086		4	K086	10 (4.54)
Solvent washes and sludges, caustic washes and sludges, or water washes and sludges from cleaning tubs and equipment used in the formulation of ink from pigments, driers, soaps, and stabilizers containing chromium and lead.				
K087		4	K087	100 (45.4)
Decanter tank tar sludge from coking operations.				
K088		4	K088	10 (4.54)
Spent potliners from primary aluminum reduction.				
K090		4	K090	10 (4.54)
Emission control dust or sludge from ferrochromiumsilicon production.				
K091		4	K091	10 (4.54)
Emission control dust or sludge from ferrochromium production.				
K093		4	K093	5000 (2270)
Distillation light ends from the production of phthalic anhydride from ortho-xylene.				
K094		4	K094	5000 (2270)
Distillation bottoms from the production of phthalic anhydride from ortho-xylene.				
K095		4	K095	100 (45.4)
Distillation bottoms from the production of 1,1,1-trichloroethane.				
K096		4	K096	100 (45.4)
Heavy ends from the heavy ends column from the production of 1,1,1-trichloroethane.				
K097		4	K097	1 (0.454)
Vacuum stripper discharge from the chlordane chlorinator in the production of chlordane.				
K098		4	K098	1 (0.454)
Untreated process wastewater from the production of toxaphene.				
K099		4	K099	10 (4.54)
Untreated wastewater from the production of 2,4-D.				
K100		4	K100	10 (4.54)
Waste leaching solution from acid leaching of emission control dust/sludge from secondary lead smelting.				
K101		4	K101	1 (0.454)
Distillation tar residues from the distillation of aniline-based compounds in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.				
K102		4	K102	1 (0.454)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Residue from the use of activated carbon for decolorization in the production of veterinary pharmaceuticals from arsenic or organo-arsenic compounds.				
K103		4	K103	100 (45.4)
Process residues from aniline extraction from the production of aniline.				
K104		4	K104	10 (4.54)
Combined wastewater streams generated from nitrobenzene/aniline production.				
K105		4	K105	10 (4.54)
Separated aqueous stream from the reactor product washing step in the production of chlorobenzenes.				
K106		4	K106	1 (0.454)
Wastewater treatment sludge from the mercury cell process in chlorine production.				
K107		4	K107	10 (4.54)
Column bottoms from product separation from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazines.				
K108		4	K108	10 (4.54)
Condensed column overheads from product separation and condensed reactor vent gases from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazides.				
K109		4	K109	10 (4.54)
Spent filter cartridges from product purification from the production of 1,1-dimethylhydrazine (UDMH) from carboxylic acid hydrazides.				
K110		4	K110	10 (4.54)
Condensed column overheads from intermediate separation from the production of 1,1- dimethylhydrazine (UDMH) from carboxylic acid hydrazides.				
K111		4	K111	10 (4.54)
Product washwaters from the production of dinitrotoluene via nitration of toluene.				
K112		4	K112	10 (4.54)
Reaction by-product water from the drying column in the production of toluenediamine via hydrogenation of dinitrotoluene.				
K113		4	K113	10 (4.54)
Condensed liquid light ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.				
K114		4	K114	10 (4.54)
Vicinals from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.				
K115		4	K115	10 (4.54)
Heavy ends from the purification of toluenediamine in the production of toluenediamine via hydrogenation of dinitrotoluene.				
K116		4	K116	10 (4.54)
Organic condensate from the solvent recovery column in the production of toluene diisocyanate via phosgenation of toluenediamine.				
K117		4	K117	1 (0.454)
Wastewater from the reactor vent gas scrubber in the production of ethylene dibromide via bromination of ethene.				
K118		4	K118	1 (0.454)
Spent adsorbent solids from purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.				
K123		4	K123	10 (4.54)
Process wastewater (including supernates, filtrates, and washwaters) from the production of ethylenebisdithiocarbamic acid and its salts.				
K124		4	K124	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Reactor vent scrubber water from the production of ethylenebisdithiocarbamic acid and its salts.				
K125		4	K125	10 (4.54)
Filtration, evaporation, and centrifugation solids from the production of ethylenebisdithiocarbamic acid and its salts.				
K126		4	K126	10 (4.54)
Baghouse dust and floor sweepings in milling and packaging operations from the production or formulation of ethylenebisdithiocarbamic acid and its salts.				
K131		4	K131	100 (45.4)
Wastewater from the reactor and spent sulfuric acid from the acid dryer from the production of methyl bromide.				
K132		4	K132	1000 (454)
Spent absorbent and wastewater separator solids from the production of methyl bromide.				
K136		4	K136	1 (0.454)
Still bottoms from the purification of ethylene dibromide in the production of ethylene dibromide via bromination of ethene.				
K141		4	K141	1 (0.454)
Process residues from the recovery of coal tar, including, but not limited to, collecting sump residues from the production of coke from coal or the recovery of coke by-products produced from coal. This listing does not include K087 (decanter tank tar sludges from coking operations).				
K142		4	K142	1 (0.454)
Tar storage tank residues from the production of coke from coal or from the recovery of coke by-products produced from coal.				
K143		4	K143	1 (0.454)
Process residues from the recovery of light oil, including, but not limited to, those generated in stills, decanters, and wash oil recovery units from the recovery of coke by- products produced from coal.				
K144		4	K144	1 (0.454)
Wastewater sump residues from light oil refining, including, but not limited to, intercepting or contamination sump sludges from the recovery of coke by-products produced from coal.				
K145		4	K145	1 (0.454)
Residues from naphthalene collection and recovery operations from the recovery of coke by-products produced from coal.				
K147		4	K147	1 (0.454)
Tar storage tank residues from coal tar refining.				
K148		4	K148	1 (0.454)
Residues from coal tar distillation, including, but not limited to, still bottoms.				
K149		4	K149	10 (4.54)
Distillation bottoms from the production of alpha-(or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups. [This waste does not include still bottoms from the distillation of benzyl chloride.]				
K150		4	K150	10 (4.54)
Organic residuals, excluding spent carbon adsorbent, from the spent chlorine gas and hydrochloric acid recovery processes associated with the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.				
K151		4	K151	10 (4.54)

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Wastewater treatment sludges, excluding neutralization and biological sludges, generated during the treatment of waste-waters from the production of alpha- (or methyl-) chlorinated toluenes, ring-chlorinated toluenes, benzoyl chlorides, and compounds with mixtures of these functional groups.				
K156	.....	4	K156	10 (4.54)
Organic waste (including heavy ends, still bottoms, light ends, spent solvents, filtrates, and decantates) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)				
K157	.....	4	K157	10 (4.54)
Wastewaters (including scrubber waters, condenser waters, washwaters, and separation waters) from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)				
K158	.....	4	K158	10 (4.54)
Bag house dusts and filter/separation solids from the production of carbamates and carbamoyl oximes. (This listing does not apply to wastes generated from the manufacture of 3-iodo-2-propynyl n-butylcarbamate.)				
K159	.....	4	K159	10 (4.54)
Organics from the treatment of thiocarbamate wastes.				
K161	.....	4	K161	1 (0.454)
Purification solids (including filtration, evaporation, and centrifugation solids), bag-house dust and floor sweepings from the production of dithiocarbamate acids and their salts. (This listing does not include K125 or K126).				
K169[f]	.....	4	K169	10 (4.54)
Crude oil storage tank sediment from petroleum refining operations.				
K170[f]	.....	4	K170	1 (0.454)
Clarified slurry oil tank sediment and/or in-line filter/separation solids from petroleum refining operations.				
K171[f]	.....	4	K171	1 (0.454)
Spent hydrotreating catalyst from petroleum refining operations. (This listing does not include inert support media.)				
K172[f]	.....	4	K172	1 (0.454)
Spent hydrorefining catalyst from petroleum refining operations. (This listing does not include inert support media.)				
K174[f]	.....	4	K174	1 (0.454)
K175[f]	.....	4	K175	1 (0.454)
K176.				
Baghouse filters from the production of antimony oxide, including filters from the production of intermediates (e.g., antimony metal or crude antimony oxide)	.....	4	K176	1 (0.454)
K177.				
Slag from the production of antimony oxide that is speculatively accumulated or disposed, including slag from the production of intermediates (e.g., antimony metal or crude antimony oxide)	.....	4	K177	5,000 (2270)
K178	.....	4	K178	1000 (454)
Residues from manufacturing and manufacturing-site storage of ferric chloride from acids formed during the production of titanium dioxide using the chloride-ilmenite process.				
K181	.....	4	K181	##

TABLE 302.4—LIST OF HAZARDOUS SUBSTANCES AND REPORTABLE QUANTITIES—Continued

[Note: All Comments/Notes Are Located at the End of This Table]

Hazardous substance	CASRN	Statutory code†	RCRA waste No.	Final RQ pounds (Kg)
Nonwastewaters from the production of dyes and/or pigments (including nonwastewaters commingled at the point of generation with nonwastewaters from other processes) that, at the point of generation, contain mass loadings of any of the constituents identified in paragraph (c) of section 261.32 that are equal to or greater than the corresponding paragraph (c) levels, as determined on a calendar year basis				

† Indicates the statutory source defined by 1, 2, 3, and 4, as described in the note preceding Table 302.4.
† Indicates the statutory source defined by 1,2,3, and 4, as described in the note preceding Table 302.4.
†† No reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is larger than 100 micrometers (0.004 inches).
††† The RQ for asbestos is limited to friable forms only.
The Agency may adjust the statutory RQ for this hazardous substance in a future rulemaking; until then the statutory one-pound RQ applies.
§ The adjusted RQs for radionuclides may be found in appendix B to this table.
** Indicates that no RQ is being assigned to the generic or broad class.
[a] Benzene was already a CERCLA hazardous substance prior to the CAA Amendments of 1990 and received an adjusted 10-pound RQ based on potential carcinogenicity in an August 14, 1989, final rule (54 FR 33418). The CAA Amendments specify that ''benzene (including benzene from gasoline)'' is a hazardous air pollutant and, thus, a CERCLA hazardous substance.
[b] The CAA Amendments of 1990 list DDE (3547–04–4) as a CAA hazardous air pollutant. The CAS number, 3547–04–4, is for the chemical, p,p′dichlorodiphenylethane. DDE or p,p′-dichlorodiphenyldichloroethylene, CAS number 72–55–9, is already listed in Table 302.4 with a final RQ of 1 pound. The substance identified by the CAS number 3547–04–4 has been evaluated and listed as DDE to be consistent with the CAA section 112 listing, as amended.
[c] Includes mineral fiber emissions from facilities manufacturing or processing glass, rock, or slag fibers (or other mineral derived fibers) of average diameter 1 micrometer or less.
[d] Includes mono- and di-ethers of ethylene glycol, diethylene glycol, and triethylene glycol R-(OCH2CH2)n-OR′ where:
n = 1, 2, or 3;
R = alkyl C7 or less; or
R = phenyl or alkyl substituted phenyl;
R′= H or alkyl C7 or less; or
OR′ consisting of carboxylic acid ester, sulfate, phosphate, nitrate, or sulfonate.
[e] Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 °C.
[f] See 40 CFR 302.6(b)(1) for application of the mixture rule to this hazardous waste.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES

CASRN	Hazardous substance
50000	Formaldehyde.
50077	Azirino[2′,3′:3,4]pyrrolo[1,2-a]indole-4,7-dione,6-amino-8-[[(aminocarbonyl)oxy]methyl]-1,1a,2,8,8a, 8b-hexahydro-8a-methoxy-5-methyl-, [1aS-(1aalpha, 8beta,8aalpha,8balpha)]-
	Mitomycin C.
50180	Cyclophosphamide.
	2H-1,3,2-Oxazaphosphorin-2-amine, N,N-bis(2-chloroethyl)tetrahydro-, 2-oxide.
50293	Benzene, 1,1′-(2,2,2- trichloroethylidene)bis[4-chloro-.
	DDT.
	4,4′-DDT.
50328	Benzo[a]pyrene.
	3,4-Benzopyrene.
50555	Reserpine.
	Yohimban-16-carboxylic acid,11,17-dimethoxy-18-[(3 ,4,5-trimethoxybenzoyl)oxy]-, methyl ester (3beta, 16beta,17alpha,18beta,20alpha)- .
51285	Phenol, 2,4-dinitro-.
	2,4-Dinitrophenol.
51434	Epinephrine.
	1,2-Benzenediol,4-[1-hydroxy-2-(methylamino) ethyl]-.
51796	Carbamic acid, ethyl ester.
	Ethyl carbamate.
	Urethane.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
52686	Trichlorfon.
52857	Famphur.
	Phosphorothioic acid, O-[4-[(dimethylamino) sulfonyl]phenyl] O,O-dimethyl ester.
53703	Dibenz[a,h]anthracene.
	Dibenzo[a,h]anthracene.
	1,2:5,6-Dibenzanthracene.
53963	Acetamide, N-9H-fluoren-2-yl-.
	2-Acetylaminofluorene.
54115	Nicotine, & salts.
	Pyridine, 3-(1-methyl-2-pyrrolidinyl)-, (S)-, & salts.
55185	Ethanamine, N-ethyl-N-nitroso-.
	N-Nitrosodiethylamine.
55630	Nitroglycerine.
	1,2,3-Propanetriol, trinitrate.
55914	Diisopropylfluorophosphate (DFP).
	Phosphorofluororidic acid, bis(1-methylethyl) ester.
56042	Methylthiouracil.
	4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-.
56235	Carbon tetrachloride.
	Methane, tetrachloro-.
56382	Parathion.
	Phosphorothioic acid, O,O-diethyl O-(4-nitrophenyl) ester.
56495	Benz[j]aceanthrylene, 1,2-dihydro-3-methyl-.
	3-Methylcholanthrene.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
56531	Diethylstilbestrol.
	Phenol, 4,4′-(1,2-diethyl-1,2-ethenediyl)bis-, (E).
56553	Benz[a]anthracene.
	Benzo[a]anthracene.
	1,2-Benzanthracene.
56724	Coumaphos.
57147	Hydrazine, 1,1-dimethyl-.
	1,1-Dimethylhydrazine.
57249	Strychnidin-10-one, & salts.
	Strychnine, & salts.
57476	Physostigmine.
	Pyrrolo[2,3-b]indol-5-ol, 1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethyl-, methylcarbamate (ester), (3aS-cis)-.
57578	beta-Propiolactone.
57647	Benzoic acid, 2-hydroxy-, compd. with (3aS-cis)-1,2,3,3a,8,8a-hexahydro-1,3a,8-trimethylpyrrolo[2,3-b]indol-5-yl methylcarbamate ester (1:1).
	Physostigmine salicylate.
57749	Chlordane.
	Chlordane, alpha & gamma isomers.
	CHLORDANE (TECHNICAL MIXTURE AND METABOLITES).
	4,7-Methano-1H-indene, 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-.
57976	Benz[a]anthracene, 7,12-dimethyl-.
	7,12-Dimethylbenz[a]anthracene.
58899	γ-BHC.
	Cyclohexane, 1,2,3,4,5,6-hexachloro-(1α,2α,3β,4α,5α,6β)-.
	Lindane.
	Lindane (all isomers).
58902	Phenol, 2,3,4,6-tetrachloro-.
	2,3,4,6-Tetrachlorophenol.
59507	p-Chloro-m-cresol.
	Phenol, 4-chloro-3-methyl-.
59892	N-Nitrosomorpholine.
60004	Ethylenediamine-tetraacetic acid (EDTA).
60117	Benzenamine, N,N-dimethyl-4-(phenylazo)-.
	Dimethyl aminoazobenzene.
	p-Dimethylaminoazobenzene.
60297	Ethane, 1,1′-oxybis-.
	Ethyl ether.
60344	Hydrazine, methyl-.
	Methyl hydrazine.
60355	Acetamide.
60515	Dimethoate.
	Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.
60571	Dieldrin.
	2,7:3,6-Dimethanonaphth[2,3-b]oxirene, 3,4,5,6,9,9-hexachloro-1a,2, 2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2aalpha,3beta,6beta, 6aalpha,7beta, 7aalpha)-.
61825	Amitrole.
	1H-1,2,4-Triazol-3-amine.
62384	Mercury, (acetato-O)phenyl-.
	Phenylmercury acetate.
62442	Acetamide, N-(4-ethoxyphenyl)-.
	Phenacetin.
62500	Ethyl methanesulfonate.
	Methanesulfonic acid, ethyl ester.
62533	Aniline.
	Benzenamine.
62555	Ethanethioamide.
	Thioacetamide.
62566	Thiourea.
62737	Dichlorvos.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
62748	Acetic acid, fluoro-, sodium salt.
	Fluoroacetic acid, sodium salt.
62759	Methanamine, N-methyl-N-nitroso-.
	N-Nitrosodimethylamine.
63252	Carbaryl.
	1-Naphthalenol, methylcarbamate.
64006	m-Cumenyl methylcarbamate.
	3-Isopropylphenyl N-methylcarbamate.
	Phenol, 3-(1-methylethyl)-, methyl carbamate.
64006	Phenol, 3-(1-methylethyl)-, methyl carbamate (m-Cumenyl methylcarbamate).
64186	Formic acid.
64197	Acetic acid.
64675	Diethyl sulfate.
65850	Benzoic acid.
66751	Uracil mustard.
	2,4-(1H,3H)-Pyrimidinedione, 5-[bis(2-chloroethyl) amino]-.
67561	Methanol.
	Methyl alcohol.
67641	Acetone.
	2-Propanone.
67663	Chloroform.
	Methane, trichloro-.
67721	Ethane, hexachloro-.
	Hexachloroethane.
68122	Dimethylformamide.
70257	Guanidine, N-methyl-N′-nitro-N-nitroso-.
	MNNG.
70304	Hexachlorophene.
	Phenol, 2,2′-methylenebis[3,4,6-tri- chloro-.
71363	n-Butyl alcohol.
	1-Butanol.
71432	Benzene.
71556	Ethane, 1,1,1-trichloro-.
	Methyl chloroform.
	1,1,1-Trichloroethane.
72208	Endrin.
	Endrin, & metabolites.
	2,7:3.6-Dimethanonaphth[2,3-b]oxirene,3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-, (1aalpha,2beta,2abeta,3alpha, 6alpha,6abeta,7beta,7aalpha)-, & metabolites.
72435	Benzene, 1,1′-(2,2,2-trichloroethylidene)bis[4-methoxy-.
	Methoxychlor.
72548	Benzene, 1,1′-(2,2-dichloroethylidene)bis[4-chloro-.
	DDD.
	TDE.
	4,4′-DDD.
72559	DDE
	4,4′-DDE.
72571	Trypan blue.
	2,7-Naphthalenedisulfonic acid, 3,3′-[(3,3′-dimethyl-(l,1′-biphenyl)-4,4′-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.
74839	Bromomethane.
	Methane, bromo-.
	Methyl bromide.
74873	Chloromethane.
	Methane, chloro-.
	Methyl chloride.
74884	Iodomethane
	Methane, iodo-.
	Methyl iodide.
74895	Monomethylamine.
74908	Hydrocyanic acid.
	Hydrogen cyanide.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
74931	Methanethiol.
	Methyl mercaptan.
	Thiomethanol.
74953	Methane, dibromo-.
	Methylene bromide.
75003	Chloroethane.
	Ethyl chloride.
75014	Ethene, chloro-.
	Vinyl chloride.
75047	Monoethylamine.
75058	Acetonitrile.
75070	Acetaldehyde.
	Ethanal.
75092	Dichloromethane.
	Methane, dichloro-.
	Methylene chloride.
75150	Carbon disulfide.
75207	Calcium carbide.
75218	Ethylene oxide.
	Oxirane.
75252	Bromoform.
	Methane, tribromo-.
75274	Dichlorobromomethane.
75343	Ethane, 1,1-dichloro-.
	Ethylidene dichloride.
	1,1-Dichloroethane.
75354	Ethene, 1,1-dichloro-.
	Vinylidene chloride.
	1,1-Dichloroethylene.
75365	Acetyl chloride.
75445	Carbonic dichloride.
	Phosgene.
75503	Trimethylamine.
75558	Aziridine, 2-methyl-.
	2-Methyl aziridine.
	1,2-Propylenimine.
75569	Propylene oxide.
75605	Arsinic acid, dimethyl-.
	Cacodylic acid.
75649	tert-Butylamine.
75694	Methane, trichlorofluoro-.
	Trichloromonofluoromethane.
75718	Dichlorodifluoromethane.
	Methane, dichlorodifluoro-.
75865	Acetone cyanohydrin.
	Propanenitrile, 2-hydroxy-2-methyl-.
	2-Methyllactonitrile.
75876	Acetaldehyde, trichloro-.
	Chloral.
75990	2,2-Dichloropropionic acid.
76017	Ethane, pentachloro-.
	Pentachloroethane.
76448	Heptachlor.
	4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-.
77474	Hexachlorocyclopentadiene.
	1,3-Cyclopentadiene, 1,2,3,4,5,5-hexa- chloro-.
77781	Dimethyl sulfate.
	Sulfuric acid, dimethyl ester.
78002	Plumbane, tetraethyl-.
	Tetraethyl lead.
78591	Isophorone.
78795	Isoprene.
78819	iso-Butylamine.
78831	Isobutyl alcohol.
	1-Propanol, 2-methyl-.
78875	Propane, 1,2-dichloro-.
	Propylene dichloride.
	1,2-Dichloropropane.
78886	2,3-Dichloropropene.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
78933	2-Butanone.
	MEK.
	Methyl ethyl ketone.
78999	1,1-Dichloropropane.
79005	Ethane, 1,1,2-trichloro-.
	1,1,2-Trichloroethane.
79016	Ethene, trichloro-.
	Trichloroethylene.
79061	Acrylamide.
	2-Propenamide.
79094	Propionic acid.
79107	Acrylic acid.
	2-Propenoic acid.
79118	Chloroacetic acid.
79196	Hydrazinecarbothioamide.
	Thiosemicarbazide.
79221	Carbonochloridic acid, methyl ester.
	Methyl chlorocarbonate.
79312	iso-Butyric acid.
79345	Ethane, 1,1,2,2-tetrachloro-.
	1,1,2,2-Tetrachloroethane.
79447	Carbamic chloride, dimethyl-.
	Dimethylcarbamoyl chloride.
79469	Propane, 2-nitro-.
	2-Nitropropane.
80159	alpha,alpha-Dimethylbenzylhydroperoxide.
	Hydroperoxide, 1-methyl-1-phenylethyl-.
80626	Methyl methacrylate.
	2-Propenoic acid, 2-methyl-, methyl ester.
81812	Warfarin, & salts.
	2H-1-Benzopyran-2-one, 4-hydroxy-3-(3-oxo-1-phenylbutyl)-, & salts.
82688	Benzene, pentachloronitro-.
	PCNB.
	Pentachloronitrobenzene.
	Quintobenzene.
83329	Acenaphthene.
84662	Diethyl phthalate.
	1,2-Benzenedicarboxylic acid, diethyl ester.
84742	Di-n-butyl phthalate.
	Dibutyl phthalate.
	n-Butyl phthalate.
	1,2-Benzenedicarboxylic acid, dibutyl ester.
85007	Diquat.
85018	Phenanthrene.
85449	Phthalic anhydride.
	1,3-Isobenzofurandione.
85687	Butyl benzyl phthalate.
86306	N-Nitrosodiphenylamine.
86500	Guthion.
86737	Fluorene.
86884	alpha-Naphthylthiourea.
	Thiourea, 1-naphthalenyl-.
87650	Phenol, 2,6-dichloro-.
	2,6-Dichlorophenol.
87683	Hexachlorobutadiene.
	1,3-Butadiene, 1,1,2,3,4,4-hexachloro-.
87865	Pentachlorophenol.
	Phenol, pentachloro-.
88062	Phenol, 2,4,6-trichloro-.
	2,4,6-Trichlorophenol.
88722	o-Nitrotoluene.
88755	o-Nitrophenol.
	2-Nitrophenol.
88857	Dinoseb.
	Phenol, 2-(1-methylpropyl)-4,6-dinitro-.
90040	o-Anisidine.
91087	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
91203	Naphthalene.
91225	Quinoline.
91587	beta-Chloronaphthalene.
	Naphthalene, 2-chloro-.
	2-Chloronaphthalene.
91598	beta-Naphthylamine.
	2-Naphthalenamine.
91667	N,N-Diethylaniline.
91805	Methapyrilene.
	1,2-Ethanediamine, N,N-dimethyl-N′-2-pyridinyl-N′- (2-thienylmethyl)-.
91941	[1,1′-Biphenyl]-4,4′-diamine,3,3′-dichloro-.
	3,3′-Dichlorobenzidine.
92524	Biphenyl.
92671	4-Aminobiphenyl.
92875	Benzidine.
	[1,1′-Biphenyl]-4,4′-diamine.
92933	4-Nitrobiphenyl.
	Propanoic acid, 2-(2,4,5-trichlorophenoxy)-.
	Silvex (2,4,5-TP).
	2,4,5-TP acid.
93765	Acetic acid, (2,4,5-trichlorophenoxy)-.
93721	2,4,5-T.
	2,4,5-T acid.
93798	2,4,5-T esters.
94111	2,4-D Ester.
94586	Dihydrosafrole.
	1,3-Benzodioxole, 5-propyl-.
94597	Safrole.
	1,3-Benzodioxole, 5-(2-propenyl)-.
94791	2,4-D Ester.
94804	2,4-D Ester.
95476	o-Xylene.
95487	o-Cresol.
95501	Benzene, 1,2-dichloro-.
	o-Dichlorobenzene.
	1,2-Dichlorobenzene.
95534	Benzenamine, 2-methyl-.
	o-Toluidine.
95578	o-Chlorophenol.
	Phenol, 2-chloro-.
	2-Chlorophenol.
95807	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
95943	Benzene, 1,2,4,5-tetrachloro-.
	1,2,4,5-Tetrachlorobenzene.
95954	Phenol, 2,4,5-trichloro-.
	2,4,5-Trichlorophenol.
96093	Styrene oxide.
96128	Propane, 1,2-dibromo-3-chloro-.
	1,2-Dibromo-3-chloropropane.
96457	Ethylenethiourea.
	2-Imidazolidinethione.
97632	Ethyl methacrylate.
	2-Propenoic acid, 2-methyl-, ethyl ester.
98011	Furfural.
	2-Furancarboxaldehyde.
98077	Benzene, (trichloromethyl)-.
	Benzotrichloride.
98099	Benzenesulfonic acid chloride.
	Benzenesulfonyl chloride.
98828	Benzene, (1-methylethyl)-.
	Cumene.
98862	Acetophenone.
	Ethanone, 1-phenyl-.
98873	Benzal chloride.
	Benzene, (dichloromethyl)-.
98884	Benzoyl chloride.
98953	Benzene, nitro-.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Nitrobenzene.
99081	m-Nitrotoluene.
99354	Benzene, 1,3,5-trinitro-.
	1,3,5-Trinitrobenzene.
99558	Benzenamine, 2-methyl-5-nitro-.
	5-Nitro-o-toluidine.
99650	m-Dinitrobenzene.
99990	p-Nitrotoluene.
100016	Benzenamine, 4-nitro-.
	p-Nitroaniline.
100027	p-Nitrophenol.
	Phenol, 4-nitro-.
	4-Nitrophenol.
100254	p-Dinitrobenzene.
100414	Ethylbenzene.
100425	Styrene.
100447	Benzene, (chloromethyl)-.
	Benzyl chloride.
100470	Benzonitrile.
100754	N-Nitrosopiperidine.
	Piperidine, 1-nitroso-.
101144	Benzenamine, 4,4′-methylenebis[2-chloro-.
	4,4′-Methylenebis(2-chloroaniline).
101279	Barban.
	Carbamic acid, (3-chlorophenyl)-, 4-chloro-2-butynyl ester.
101553	Benzene, 1-bromo-4-phenoxy-.
	4-Bromophenyl phenyl ether.
101688	MDI.
	Methylene diphenyl diisocyanate.
101779	4,4′-Methylenedianiline.
103855	Phenylthiourea.
	Thiourea, phenyl-.
105464	sec-Butyl acetate.
105679	Phenol, 2,4-dimethyl-.
	2,4-Dimethylphenol.
106423	p-Xylene.
106445	p-Cresol.
106467	Benzene, 1,4-dichloro-.
	p-Dichlorobenzene.
	1,4-Dichlorobenzene.
106478	Benzenamine, 4-chloro-.
	p-Chloroaniline.
106490	Benzenamine, 4-methyl-.
	p-Toluidine.
106503	p-Phenylenediamine.
106514	p-Benzoquinone.
	2,5-Cyclohexadiene-1,4-dione.
	Quinone.
106887	1,2-Epoxybutane.
106898	1-Chloro-2,3-epoxypropane.
	Epichlorohydrin.
	Oxirane, (chloromethyl)-.
106934	Dibromoethane.
	Ethane, 1,2-dibromo-.
	Ethylene dibromide.
106990	1,3-Butadiene.
107028	Acrolein.
	2-Propenal.
107051	Allyl chloride.
107062	Ethane, 1,2-dichloro-.
	Ethylene dichloride.
	1,2-Dichloroethane.
107108	n-Propylamine.
	1-Propanamine.
107120	Ethyl cyanide.
	Propanenitrile.
107131	Acrylonitrile.
	2-Propenenitrile.
107153	Ethylenediamine.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
107186	Allyl alcohol.
	2-Propen-1-ol.
107197	Propargyl alcohol.
	2-Propyn-1-ol.
107200	Acetaldehyde, chloro-.
	Chloroacetaldehyde.
107211	Ethylene glycol.
107302	Chloromethyl methyl ether.
	Methane, chloromethoxy-.
107493	Diphosphoric acid, tetraethyl ester.
	Tetraethyl pyrophosphate.
107926	Butyric acid.
108054	Vinyl acetate.
	Vinyl acetate monomer.
108101	Hexone.
	Methyl isobutyl ketone.
	4-Methyl-2-pentanone.
108247	Acetic anhydride.
108316	Maleic anhydride.
	2,5-Furandione.
108383	m-Xylene.
108394	m-Cresol.
108463	Resorcinol.
	1,3-Benzenediol.
108601	Dichloroisopropyl ether.
	Propane, 2,2″-oxybis[2-chloro-.
108883	Benzene, methyl-.
	Toluene.
108907	Benzene, chloro-.
	Chlorobenzene.
108941	Cyclohexanone.
108952	Phenol.
108985	Benzenethiol.
	Thiophenol.
109068	Pyridine, 2-methyl-.
	2-Picoline.
109739	Butylamine.
109773	Malononitrile.
	Propanedinitrile.
109897	Diethylamine.
109999	Furan, tetrahydro-.
	Tetrahydrofuran.
110009	Furan.
	Furfuran.
110167	Maleic acid.
110178	Fumaric acid.
110190	iso-Butyl acetate.
110543	Hexane.
110758	Ethene, (2-chloroethoxy)-.
	2-Chloroethyl vinyl ether.
110805	Ethanol, 2-ethoxy-.
	Ethylene glycol monoethyl ether.
110827	Benzene, hexahydro-.
	Cyclohexane.
110861	Pyridine.
111422	Diethanolamine.
111444	Bis(2-chloroethyl) ether.
	Dichloroethyl ether.
	Ethane, 1,1′-oxybis[2-chloro-.
111546	Carbamodithioic acid, 1,2-ethanediylbis-, salts & esters.
	Ethylenebisdithiocarbamic acid, salts & esters.
111911	Bis(2-chloroethoxy) methane.
	Dichloromethoxyethane.
	Ethane, 1,1′-[methylenebis(oxy)]bis(2-chloro-.
114261	Phenol, 2-(1-methylethoxy)-, methylcarbamate.
	Propoxur (Baygon).
115026	Azaserine.
	L-Serine, diazoacetate (ester).
115297	Endosulfan.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	6,9-Methano-2,4,3-benzodioxathiepin, 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-, 3-oxide.
115322	Dicofol.
116063	Aldicarb.
	Propanal, 2-methyl-2-(methylthio)-, O-[(methylamino)carbonyl]oxime.
117806	Dichlone.
117817	1,2-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester.
	Bis(2-ethylhexyl)phthalate.
	DEHP.
	Diethylhexyl phthalate.
117840	Di-n-octyl phthalate.
	1,2-Benzenedicarboxylic acid, dioctyl ester.
118741	Benzene, hexachloro-.
	Hexachlorobenzene.
119380	Carbamic acid, dimethyl-, 3-methyl-1-(1-methylethyl)-1H-pyrazol-5-yl ester.
	Isolan.
119904	[1,1′-Biphenyl]-4,4′-diamine,3,3′-dimethoxy-.
	3,3′-Dimethoxybenzidine.
119937	[1,1′-Biphenyl]-4,4′-diamine,3,3′- dimethyl-.
	3,3′-Dimethylbenzidine.
120127	Anthracene.
120581	Isosafrole.
	1,3-Benzodioxole, 5-(1-propenyl)-.
120809	Catechol.
120821	1,2,4-Trichlorobenzene.
120832	Phenol, 2,4-dichloro-.
	2,4-Dichlorophenol.
121142	Benzene, 1-methyl-2,4-dinitro-.
	2,4-Dinitrotoluene.
121211	Pyrethrins.
121299	Pyrethrins.
121448	Ethanamine, N,N-diethyl-.
	Triethylamine.
121697	N,N-Dimethylaniline.
121755	Malathion.
122098	alpha,alpha-Dimethylphenethylamine.
	Benzeneethanamine, alpha,alpha-dimethyl-.
122429	Carbamic acid, phenyl-, 1-methylethyl ester.
	Propham.
122667	Hydrazine, 1,2-diphenyl-.
	1,2-Diphenylhydrazine.
123319	Hydroquinone.
123331	Maleic hydrazide.
	3,6-Pyridazinedione, 1,2-dihydro-.
123386	Propionaldehyde.
123626	Propionic anhydride.
123637	Paraldehyde.
	1,3,5-Trioxane, 2,4,6-trimethyl-.
123739	Crotonaldehyde.
	2-Butenal.
123864	Butyl acetate.
123911	1,4-Diethyleneoxide.
	1,4-Dioxane.
123922	iso-Amyl acetate.
124049	Adipic acid.
124403	Dimethylamine.
	Methanamine, N-methyl-.
124414	Sodium methylate.
124481	Chlorodibromomethane.
126727	Tris(2,3-dibromopropyl) phosphate.
	1-Propanol, 2,3-dibromo-, phosphate (3:1).
126987	Methacrylonitrile.
	2-Propenenitrile, 2-methyl-.
126998	Chloroprene.
127184	Ethene, tertrachloro-.
	Perchloroethylene.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Tetrachloroethylene.
127822	Zinc phenolsulfonate.
129000	Pyrene.
130154	1,4-Naphthalenedione.
	1,4-Naphthoquinone.
131113	Dimethyl phthalate.
	1,2-Benzenedicarboxylic acid, dimethyl ester.
131748	Ammonium picrate.
	Phenol, 2,4,6-trinitro-, ammonium salt.
131895	Phenol, 2-cyclohexyl-4,6-dinitro-.
	2-Cyclohexyl-4,6-dinitrophenol.
132649	Dibenzofuran.
133062	Captan.
133904	Chloramben.
134327	alpha-Naphthylamine.
	1-Naphthalenamine.
137268	Thioperoxydicarbonic diamide ([H2N)C(S)]2S2, tetramethyl-.
	Thiram.
137304	Zinc, bis(dimethylcarbamodithioato-S,S')-.
	Ziram.
140885	Ethyl acrylate.
	2-Propenoic acid, ethyl ester.
141786	Acetic acid, ethyl ester.
	Ethyl acetate.
142289	1,3-Dichloropropane.
142712	Cupric acetate.
142847	Dipropylamine.
	1-Propanamine, N-propyl-.
143339	Sodium cyanide Na(CN).
143500	Kepone.
	1,3,4-Metheno-2H-cyclobuta[cd]pentalen-2-one,1,1a,3,3a,4,5,5,5a,5b,6-decachlorooctahydro-.
145733	Endothall.
	7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid.
148823	L-Phenylalanine, 4-[bis(2-chloroethyl)amino]-.
	Melphalan.
151508	Potassium cyanide K(CN).
151564	Aziridine.
	Ethylenimine.
152169	Diphosphoramide, octamethyl-.
	Octamethylpyrophosphoramide.
156605	Ethene, 1,2-dichloro- (E).
	1,2-Dichloroethylene.
156627	Calcium cyanamide.
189559	Benzo[rst]pentaphene.
	Dibenzo[a,i]pyrene.
191242	Benzo[ghi]perylene.
193395	Indeno(1,2,3-cd)pyrene.
205992	Benzo[b]fluoranthene.
206440	Fluoranthene.
207089	Benzo(k)fluoranthene.
208968	Acenaphthylene.
218019	Chrysene.
225514	Benz[c]acridine.
297972	O,O-Diethyl O-pyrazinyl phosphorothioate.
	Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester.
298000	Methyl parathion.
	Phosphorothioic acid, O,O-dimethyl O-(4-nitrophenyl) ester.
298022	Phorate.
	Phosphorodithioic acid, O,O-diethyl S-[(ethylthio) methyl] ester.
298044	Disulfoton.
	Phosphorodithioic acid, O,O-diethyl S-[2-(ethylthio)ethyl] ester.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
300765	Naled.
301042	Acetic acid, lead(2 +) salt.
	Lead acetate.
302012	Hydrazine.
303344	Lasiocarpine.
	2-Butenoic acid, 2-methyl-, 7-[[2,3-dihydroxy-2-(1-methoxyethyl)-3-methyl-1-oxobutoxy]methyl]-2,3,5,7a-tetrahydro-1H-pyrrolizin-1-yl ester, [1S-[1alpha(Z),7(2S*,3R*), 7aalpha]]-.
305033	Benzenebutanoic acid, 4-[bis(2-chloroethyl)amino]-.
	Chlorambucil.
309002	Aldrin.
	1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5alpha,8alpha, 8abeta)-.
311455	Diethyl-p-nitrophenyl phosphate.
	Phosphoric acid, diethyl 4-nitrophenyl ester.
315184	Mexacarbate.
	Phenol, 4-(dimethylamino)-3,5-dimethyl-, methylcarbamate (ester).
319846	alpha—BHC.
319857	beta—BHC.
319868	delta—BHC.
329715	2,5-Dinitrophenol.
330541	Diuron.
333415	Diazinon.
334883	Diazomethane.
353504	Carbon oxyfluoride.
	Carbonic difluoride.
357573	Brucine.
	Strychnidin-10-one, 2,3-dimethoxy-.
460195	Cyanogen.
	Ethanedinitrile.
463581	Carbonyl sulfide.
465736	Isodrin.
	1,4:5,8-Dimethanonaphthalene,1,2,3,4,10,10-hexachloro-1,4,4a,5,8,8a-hexahydro-, (1alpha,4alpha,4abeta,5beta,8beta, 8abeta)-.
492808	Auramine.
	Benzenamine, 4,4′-carbonimidoylbis[N,N-dimethyl-.
494031	Chlornaphazine.
	Naphthalenamine, N,N′-bis(2-chloroethyl)-.
496720	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
504245	4-Aminopyridine.
	4-Pyridinamine.
504609	1-Methylbutadiene.
	1,3-Pentadiene.
506616	Argentate(1-), bis(cyano-C)-, potassium.
	Potassium silver cyanide.
506649	Silver cyanide Ag(CN).
506683	Cyanogen bromide (CN)Br.
506774	Cyanogen chloride (CN)Cl.
506876	Ammonium carbonate.
506967	Acetyl bromide.
509148	Methane, tetranitro-.
	Tetranitromethane.
510156	Benzeneacetic acid, 4-chloro-α- (4-chlorophenyl)-α-hydroxy-, ethyl ester.
	Chlorobenzilate.
513495	sec-Butylamine.
528290	o-Dinitrobenzene.
532274	2-Chloroacetophenone.
534521	4,6-Dinitro-o-cresol, and salts.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
	Phenol, 2-methyl-4,6-dinitro-, & salts.
540738	Hydrazine, 1,2-dimethyl-.
	1,2-Dimethylhydrazine.
540841	2,2,4-Trimethylpentane.
540885	tert-Butyl acetate.
541093	Uranyl acetate.
541537	Dithiobiuret.
	Thioimidodicarbonic diamide [(H2N)C(S)]2NH.
541731	Benzene, 1,3-dichloro-.
	m-Dichlorobenzene.
	1,3-Dichlorobenzene.
542621	Barium cyanide.
542756	1-Propene, 1,3-dichloro-.
	1,3-Dichloropropene.
542767	Propanenitrile, 3-chloro-.
	3-Chloropropionitrile.
542881	Bis(chloromethyl)ether.
	Dichloromethyl ether.
	Methane, oxybis(chloro-.
543908	Cadmium acetate.
544183	Cobaltous formate.
544923	Copper cyanide Cu(CN).
554847	m-Nitrophenol.
557197	Nickel cyanide $Ni(CN)_2$.
557211	Zinc cyanide $Zn(CN)_2$.
	Zinc cyanide Zn(CN)2.
557346	Zinc acetate.
557415	Zinc formate.
563122	Ethion.
563688	Acetic acid, thallium(1 +) salt.
	Thallium(I) acetate.
573568	2,6-Dinitrophenol.
584849	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
591082	Acetamide, N-(aminothioxomethyl)-.
	1-Acetyl-2-thiourea.
592018	Calcium cyanide $Ca(CN)_2$.
592041	Mercuric cyanide.
592858	Mercuric thiocyanate.
592870	Lead thiocyanate.
593602	Vinyl bromide.
594423	Methanesulfenyl chloride, trichloro-.
	Trichloromethanesulfenyl chloride.
598312	Bromoacetone.
	2-Propanone, 1-bromo-.
606202	Benzene, 2-methyl-1,3-dinitro-.
	2,6-Dinitrotoluene.
608731	HEXACHLOROCYCLOHEXANE (all isomers).
608935	Benzene, pentachloro-.
	Pentachlorobenzene.
609198	3,4,5-Trichlorophenol.
610399	3,4-Dinitrotoluene.
615532	Carbamic acid, methylnitroso-, ethyl ester.
	N-Nitroso-N-methylurethane.
621647	Di-n-propylnitrosamine.
	1-Propanamine, N-nitroso-N-propyl-.
624839	Methane, isocyanato-.
	Methyl isocyanate.
625161	tert-Amyl acetate.
626380	sec-Amyl acetate.
628637	Amyl acetate.
628864	Fulminic acid, mercury(2 +)salt.
	Mercury fulminate.
630104	Selenourea.
630206	Ethane, 1,1,1,2-tetrachloro-.
	1,1,1,2-Tetrachloroethane.
631618	Ammonium acetate.
636215	Benzenamine, 2-methyl-, hydrochloride.
	o-Toluidine hydrochloride.
640197	Acetamide, 2-fluoro-.
	Fluoroacetamide.
644644	Carbamic acid, dimethyl-,1-[(dimethylamino)carbonyl]-5-methyl-1H-pyrazol-3-yl ester.
	Dimetilan.
680319	Hexamethylphosphoramide.
684935	N-Nitroso-N-methylurea.
	Urea, N-methyl-N-nitroso-.
692422	Arsine, diethyl-.
	Diethylarsine.
696286	Arsonous dichloride, phenyl-.
	Dichlorophenylarsine.
757584	Hexaethyl tetraphosphate.
	Tetraphosphoric acid, hexaethyl ester.
759739	N-Nitroso-N-ethylurea.
	Urea, N-ethyl-N-nitroso-.
764410	1,4-Dichloro-2-butene.
	2-Butene, 1,4-dichloro-.
765344	Glycidylaldehyde.
	Oxiranecarboxyaldehyde.
815827	Cupric tartrate.
822060	Hexamethylene-1,6-diisocyanate.
823405	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
924163	N-Nitrosodi-n-butylamine.
	1-Butanamine, N-butyl-N-nitroso-.
930552	N-Nitrosopyrrolidine.
	Pyrrolidine, 1-nitroso-.
933755	2,3,6-Trichlorophenol.
933788	2,3,5-Trichlorophenol.
959988	alpha-Endosulfan.
1024573	Heptachlor epoxide.
1031078	Endosulfan sulfate.
1066304	Chromic acetate.
1066337	Ammonium bicarbonate.
1072351	Lead stearate.
1111780	Ammonium carbamate.
1116547	Ethanol, 2,2′-(nitrosoimino)bis-.
	N-Nitrosodiethanolamine.
1120714	1,2-Oxathiolane, 2,2-dioxide.
	1,3-Propane sultone.
1129415	Carbamic acid, methyl-, 3-methylphenyl ester.
	Metolcarb.
1185575	Ferric ammonium citrate.
1194656	Dichlobenil.
1300716	Xylenol.
1303282	Arsenic oxide As2O5.
	Arsenic pentoxide.
1303328	Arsenic disulfide.
1303339	Arsenic trisulfide.
1309644	Antimony trioxide.
1310583	Potassium hydroxide.
1310732	Sodium hydroxide.
1314325	Thallic oxide.
	Thallium oxide Tl2O3.
1314621	Vanadium oxide V2O5.
	Vanadium pentoxide.
1314803	Phosphorus pentasulfide.
	Phosphorus sulfide.
	Sulfur phosphide.
1314847	Zinc phosphide Zn_3P_2.
1314870	Lead sulfide.
1319728	2,4,5-T amines.
1319773	Cresol (cresylic acid).
	Cresols (isomers and mixture).
	Cresylic acid (isomers and mixture).
	Phenol, methyl-.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
1320189	2,4-D Ester.
1321126	Nitrotoluene.
1327533	Arsenic oxide As2O3.
	Arsenic trioxide.
1330207	Benzene, dimethyl-.
	Xylene.
	Xylene (mixed).
	Xylenes (isomers and mixture).
1332076	Zinc borate.
1332214	Asbestos.
1333831	Sodium bifluoride.
1335326	Lead subacetate.
	Lead, bis(acetato-O)tetrahydroxytri.
1336216	Ammonium hydroxide.
1336363	Aroclors.
	PCBs.
	POLYCHLORINATED BIPHENYLS.
1338234	Methyl ethyl ketone peroxide.
	2-Butanone peroxide.
1338245	Naphthenic acid.
1341497	Ammonium bifluoride.
1464535	1,2:3,4-Diepoxybutane.
	2,2′-Bioxirane.
1563388	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-.
	Carbofuran phenol.
1563662	7-Benzofuranol, 2,3-dihydro-2,2-dimethyl-, methylcarbamate.
	Carbofuran.
1582098	Trifluralin.
1615801	Hydrazine, 1,2-diethyl-.
	N,N′-Diethylhydrazine.
1634044	Methyl tert-butyl ether.
1646884	Aldicarb sulfone.
	Propanal, 2-methyl-2-(methyl-sulfonyl)-, O-[(methylamino)carbonyl] oxime.
1746016	TCDD.
	2,3,7,8-Tetrachlorodibenzo-p-dioxin.
1762954	Ammonium thiocyanate.
1863634	Ammonium benzoate.
1888717	Hexachloropropene.
	1-Propene, 1,1,2,3,3,3-hexachloro-.
1918009	Dicamba.
1928387	2,4-D Ester.
1928478	2,4,5-T esters.
1928616	2,4-D Ester.
1929733	2,4-D Ester.
2008460	2,4,5-T amines.
2032657	Mercaptodimethur.
	Methiocarb.
	Phenol, (3,5-dimethyl-4-(methylthio)-, methylcarbamate.
2303164	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3-dichloro-2-propenyl) ester.
	Diallate.
2303175	Carbamothioic acid, bis(1-methylethyl)-, S-(2,3,3-trichloro-2-propenyl) ester.
	Triallate.
2312358	Propargite.
2545597	2,4,5-T esters.
2631370	Phenol, 3-methyl-5-(1-methylethyl)-, methyl carbamate.
	Promecarb.
2763964	3(2H)-Isoxazolone, 5-(aminomethyl)-.
	5-(Aminomethyl)-3-isoxazolol.
2764729	Diquat
2921882	Chlorpyrifos.
2944674	Ferric ammonium oxalate.
2971382	2,4-D Ester.
3012655	Ammonium citrate, dibasic.
3164292	Ammonium tartrate.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
3165933	Benzenamine, 4-chloro-2-methyl-, hydrochloride.
	4-Chloro-o-toluidine, hydrochloride.
3251238	Cupric nitrate.
3288582	O,O-Diethyl S-methyl dithiophosphate.
	Phosphorodithioic acid, O,O-diethyl S-methyl ester.
3486359	Zinc carbonate.
3547044	DDE.
3689245	Tetraethyldithiopyrophosphate.
	Thiodiphosphoric acid, tetraethyl ester.
3813147	2,4,5-T amines.
4170303	Crotonaldehyde.
	2-Butenal.
4549400	N-Nitrosomethylvinylamine.
	Vinylamine, N-methyl-N-nitroso-.
5344821	Thiourea, (2-chlorophenyl)-.
	1-(o-Chlorophenyl)thiourea.
5893663	Cupric oxalate.
5952261	Ethanol, 2,2′-oxybis-, dicarbamate.
	Diethylene glycol, dicarbamate.
5972736	Ammonium oxalate.
6009707	Ammonium oxalate.
6369966	2,4,5-T amines.
6369977	2,4,5-T amines.
6533739	Carbonic acid, dithallium(1 +) salt.
	Thallium(I) carbonate.
7005723	4-Chlorophenyl phenyl ether.
7421934	Endrin aldehyde.
7428480	Lead stearate.
7439921	Lead.
7439976	Mercury.
7440020	Nickel.
7440224	Silver.
7440235	Sodium.
7440280	Thallium.
7440360	Antimony.
7440382	Arsenic.
7440417	Beryllium.
	Beryllium powder.
7440439	Cadmium.
7440473	Chromium.
7440508	Copper.
7440666	Zinc.
7446084	Selenium dioxide.
	Selenium oxide.
7446142	Lead sulfate.
7446186	Sulfuric acid, dithallium(1 +) salt.
	Thallium(I) sulfate.
7446277	Lead phosphate.
	Phosphoric acid, lead(2 +) salt (2:3).
7447394	Cupric chloride.
7488564	Selenium sulfide SeS_2.
7550450	Titanium tetrachloride.
7558794	Sodium phosphate, dibasic.
7601549	Sodium phosphate, tribasic.
7631892	Sodium arsenate.
7631905	Sodium bisulfite.
7632000	Sodium nitrite.
7645252	Lead arsenate.
7646857	Zinc chloride.
7647010	Hydrochloric acid.
	Hydrogen chloride.
7647189	Antimony pentachloride.
7664382	Phosphoric acid.
7664393	Hydrofluoric acid.
	Hydrogen fluoride.
7664417	Ammonia.
7664939	Sulfuric acid.
7681494	Sodium fluoride.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
7681529	Sodium hypochlorite.
7697372	Nitric acid.
7699458	Zinc bromide.
7705080	Ferric chloride.
7718549	Nickel chloride.
7719122	Phosphorus trichloride.
7720787	Ferrous sulfate.
7722647	Potassium permanganate.
7723140	Phosphorus.
7733020	Zinc sulfate.
7738945	Chromic acid.
7758943	Ferrous chloride.
7758954	Lead chloride.
7758987	Cupric sulfate.
7761888	Silver nitrate.
7773060	Ammonium sulfamate.
7775113	Sodium chromate.
7778394	Arsenic acid H_3AsO_4.
7778441	Calcium arsenate.
7778509	Potassium bichromate.
7778543	Calcium hypochlorite.
7779864	Zinc hydrosulfite.
7779886	Zinc nitrate.
7782414	Fluorine.
7782492	Selenium.
7782505	Chlorine.
7782630	Ferrous sulfate.
7782823	Sodium selenite.
7782867	Mercurous nitrate.
7783008	Selenious acid.
7783064	Hydrogen sulfide H_2S.
7783359	Mercuric sulfate.
7783462	Lead fluoride.
7783495	Zinc fluoride.
7783508	Ferric fluoride.
7783564	Antimony trifluoride.
7784341	Arsenic trichloride.
7784409	Lead arsenate.
7784410	Potassium arsenate.
7784465	Sodium arsenite.
7786347	Mevinphos.
7786814	Nickel sulfate.
7787475	Beryllium chloride.
7787497	Beryllium fluoride.
7787555	Beryllium nitrate.
7788989	Ammonium chromate.
7789006	Potassium chromate.
7789062	Strontium chromate.
7789095	Ammonium bichromate.
7789426	Cadmium bromide.
7789437	Cobaltous bromide.
7789619	Antimony tribromide.
7790945	Chlorosulfonic acid.
7791120	Thallium chloride TlCl.
7803512	Hydrogen phosphide. Phosphine.
7803556	Ammonium vanadate. Vanadic acid, ammonium salt.
8001352	Chlorinated camphene. Toxaphene.
8003198	Dichloropropane—Dichloropropene (mixture).
8003347	Pyrethrins.
8014957	Sulfuric acid.
10022705	Sodium hypochlorite.
10025873	Phosphorus oxychloride.
10025919	Antimony trichloride.
10026116	Zirconium tetrachloride.
10028225	Ferric sulfate.
10031591	Sulfuric acid, dithallium(1 +) salt. Thallium(I) sulfate.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
10039324	Sodium phosphate, dibasic.
10043013	Aluminum sulfate.
10045893	Ferrous ammonium sulfate.
10045940	Mercuric nitrate.
10049055	Chromous chloride.
10099748	Lead nitrate.
10101538	Chromic sulfate.
10101630	Lead iodide.
10101890	Sodium phosphate, tribasic.
10102064	Uranyl nitrate.
10102188	Sodium selenite.
10102439	Nitric oxide. Nitrogen oxide NO.
10102440	Nitrogen dioxide. Nitrogen oxide NO2.
10102451	Nitric acid, thallium(1 +) salt. Thallium(I) nitrate.
10102484	Lead arsenate.
10108642	Cadmium chloride.
10124502	Potassium arsenite.
10140655	Sodium phosphate, dibasic.
10192300	Ammonium bisulfite.
10196040	Ammonium sulfite.
10361894	Sodium phosphate, tribasic.
10380297	Cupric sulfate, ammoniated.
10415755	Mercurous nitrate.
10421484	Ferric nitrate.
10544726	Nitrogen dioxide. Nitrogen oxide NO2.
10588019	Sodium bichromate.
10605217	Carbamic acid, 1H-benzimidazol-2-yl, methyl ester. Carbendazim.
11096825	Aroclor 1260.
11097691	Aroclor 1254.
11104282	Aroclor 1221.
11115745	Chromic acid.
11141165	Aroclor 1232.
12002038	Cupric acetoarsenite.
12039520	Selenious acid, dithallium(1 +) salt. Thallium (I) selenite.
12054487	Nickel hydroxide.
12125018	Ammonium fluoride.
12125029	Ammonium chloride.
12135761	Ammonium sulfide.
12672296	Aroclor 1248.
12674112	Aroclor 1016.
12771083	Sulfur monochloride.
13463393	Nickel carbonyl $Ni(CO)_4$, (T–4)-.
13560991	2,4,5-T salts.
13597994	Beryllium nitrate.
13746899	Zirconium nitrate.
13765190	Calcium chromate. Chromic acid H2CrO4, calcium salt.
13814965	Lead fluoborate.
13826830	Ammonium fluoborate.
13952846	sec-Butylamine.
14017415	Cobaltous sulfamate.
14216752	Nickel nitrate.
14258492	Ammonium oxalate.
14307358	Lithium chromate.
14307438	Ammonium tartrate.
14639975	Zinc ammonium chloride.
14639986	Zinc ammonium chloride.
14644612	Zirconium sulfate.
15339363	Manganese, bis(dimethylcarbamodithioato-S,S')-. Manganese dimethyldithiocarbamate.
15699180	Nickel ammonium sulfate.
15739807	Lead sulfate.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
15950660	2,3,4-Trichlorophenol.
16721805	Sodium hydrosulfide.
16752775	Ethanimidothioic acid, N-[[(methylamino)carbonyl] oxy]-, methyl ester.
	Methomyl.
16871719	Zinc silicofluoride.
16919190	Ammonium silicofluoride.
16923958	Zirconium potassium fluoride.
17702577	Formparanate.
	Methanimidamide, N,N-dimethyl-N'-[2-methyl-4-[[(methylamino)carbonyl]oxy]phenyl]-.
17804352	Benomyl.
	Carbamic acid, [1-[(butylamino)carbonyl]-1H-benzimidazol-2-yl]-, methyl ester.
18883664	D-Glucose, 2-deoxy-2[[(methylnitrosoamino)-carbonyl]amino]-.
	Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-, D-.
	Streptozotocin.
20816120	Osmium oxide OsO_4, (T–4)-.
	Osmium tetroxide.
20830813	Daunomycin.
	5,12-Naphthacenedione, 8-acetyl-10-[(3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-, (8S-cis)-.
20859738	Aluminum phosphide.
22781233	Bendiocarb.
	1,3-Benzodioxol-4-ol, 2,2-dimethyl-, methyl carbamate.
22961826	Bendiocarb phenol.
	1,3-Benzodioxol-4-ol, 2,2-dimethyl-.
23135220	Ethanimidothioic acid, 2-(dimethylamino)-N-[[(methylamino)carbonyl]oxy]-2-oxo-, methyl ester.
	Oxamyl.
23422539	Methanimidamide, N,N-dimethyl-N'-[3-[[(methylamino)-carbonyl]oxy]phenyl]-, monohydrochloride.
	Formetanate hydrochloride.
23564058	Carbamic acid, [1,2-phenylenebis(iminocarbonothioyl)]bis-, dimethyl ester.
	Thiophanate-methyl.
23950585	Benzamide, 3,5-dichloro-N-(1,1- dimethyl-2-propynyl)-.
	Pronamide.
25154545	Dinitrobenzene (mixed).
25154556	Nitrophenol (mixed).
25155300	Sodium dodecylbenzenesulfonate.
25167822	Trichlorophenol.
25168154	2,4,5-T esters.
25168267	2,4-D Ester.
25321146	Dinitrotoluene.
25321226	Dichlorobenzene.
25376458	Benzenediamine, ar-methyl-.
	Toluenediamine.
	2,4-Toluene diamine.
25550587	Dinitrophenol.
26264062	Calcium dodecylbenzenesulfonate.
26419738	1,3-Dithiolane-2-carboxaldehyde, 2,4-dimethyl-, O-[(methylamino)-carbonyl]oxime.
	Tirpate.
26471625	Benzene, 1,3-diisocyanatomethyl-.
	Toluene diisocyanate.
	2,4-Toluene diisocyanate.
26628228	Sodium azide.
26638197	Dichloropropane.
26952238	Dichloropropene.
27176870	Dodecylbenzenesulfonic acid.

APPENDIX A TO § 302.4—SEQUENTIAL CAS REGISTRY NUMBER LIST OF CERCLA HAZARDOUS SUBSTANCES—Continued

CASRN	Hazardous substance
27323417	Triethanolamine dodecylbenzene sulfonate.
27774136	Vanadyl sulfate.
28300745	Antimony potassium tartrate.
30525894	Paraformaldehyde.
30558431	Ethanimidothioic acid, 2-(dimethylamino)-N-hydroxy-2-oxo-, methyl ester.
	A2213.
32534955	2,4,5-TP esters.
33213659	beta - Endosulfan.
36478769	Uranyl nitrate.
37211055	Nickel chloride.
39196184	Thiofanox.
	2-Butanone, 3,3-dimethyl-1-(methylthio)-,O-[(methylamino)carbonyl] oxime.
42504461	Isopropanolamine dodecylbenzenesulfonate.
52628258	Zinc ammonium chloride.
52652592	Lead stearate.
52740166	Calcium arsenite.
52888809	Carbamothioic acid, dipropyl-, S-(phenylmethyl) ester.
	Prosulfocarb.
53467111	2,4-D Ester.
53469219	Aroclor 1242.
55285148	Carbamic acid, [(dibutylamino)-thio]methyl-, 2,3-dihydro-2,2-dimethyl-7-benzofuranyl ester.
	Carbosulfan.
55488874	Ferric ammonium oxalate.
56189094	Lead stearate.
59669260	Ethanimidothioic acid, N,N'-[thiobis[(methylimino)carbonyloxy]]bis-, dimethyl ester.
	Thiodicarb.
61792072	2,4,5-T esters.

APPENDIX B TO § 302.4—RADIONUCLIDES

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Radionuclides@		1&(3.7E 10)
Actinium-224	89	100 (3.7E 12)
Actinium-225	89	1 (3.7E 10)
Actinium-226	89	10 (3.7E 11)
Actinium-227	89	0.001 (3.7E 7)
Actinium-228	89	10 (3.7E 11)
Aluminum-26	13	10 (3.7E 11)
Americium-237	95	1000 (3.7E 13)
Americium-238	95	100 (3.7E 12)
Americium-239	95	100 (3.7E 12)
Americium-240	95	10 (3.7E 11)
Americium-241	95	0.01 (3.7E 8)
Americium-242m	95	0.01 (3.7E 8)
Americium-242	95	100 (3.7E 12)
Americium-243	95	0.01 (3.7E 8)
Americium-244m	95	1000 (3.7E 13)
Americium-244	95	10 (3.7E 11)
Americium-245	95	1000 (3.7E 13)
Americium-246m	95	1000 (3.7E 13)
Americium-246	95	1000 (3.7E 13)
Antimony-115	51	1000 (3.7E 13)
Antimony-116m	51	100 (3.7E 12)
Antimony-116	51	1000 (3.7E 13)
Antimony-117	51	1000 (3.7E 13)
Antimony-118m	51	10 (3.7E 11)
Antimony-119	51	1000 (3.7E 13)
Antimony-120 (16 min)	51	1000 (3.7E 13)
Antimony-120 (5.76 day)	51	10 (3.7E 11)
Antimony-122	51	10 (3.7E 11)
Antimony-124m	51	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Antimony-124	51	10 (3.7E 11)
Antimony-125	51	10 (3.7E 11)
Antimony-126m	51	1000 (3.7E 13)
Antimony-126	51	10 (3.7E 11)
Antimony-127	51	10 (3.7E 11)
Antimony-128 (10.4 min)	51	1000 (3.7E 13)
Antimony-128 (9.01 hr)	51	10 (3.7E 11)
Antimony-129	51	100 (3.7E 12)
Antimony-130	51	100 (3.7E 12)
Antimony-131	51	1000 (3.7E 13)
Argon-39	18	1000 (3.7E 13)
Argon-41	18	10 (3.7E 11)
Arsenic-69	33	1000 (3.7E 13)
Arsenic-70	33	100 (3.7E 12)
Arsenic-71	33	100 (3.7E 12)
Arsenic-72	33	10 (3.7E 11)
Arsenic-73	33	100 (3.7E 12)
Arsenic-74	33	10 (3.7E 11)
Arsenic-76	33	100 (3.7E 12)
Arsenic-77	33	1000 (3.7E 13)
Arsenic-78	33	100 (3.7E 12)
Astatine-207	85	100 (3.7E 12)
Astatine-211	85	100 (3.7E 12)
Barium-126	56	1000 (3.7E 13)
Barium-128	56	10 (3.7E 11)
Barium-131m	56	1000 (3.7E 13)
Barium-131	56	10 (3.7E 11)
Barium-133m	56	100 (3.7E 12)
Barium-133	56	10 (3.7E 11)
Barium-135m	56	1000 (3.7E 13)
Barium-139	56	1000 (3.7E 13)
Barium-140	56	10 (3.7E 11)
Barium-141	56	1000 (3.7E 13)
Barium-142	56	1000 (3.7E 13)
Berkelium-245	97	100 (3.7E 12)
Berkelium-246	97	10 (3.7E 11)
Berkelium-247	97	0.01 (3.7E 8)
Berkelium-249	97	1 (3.7E 10)
Berkelium-250	97	100 (3.7E 12)
Beryllium-7	4	100 (3.7E 12)
Beryllium-10	4	1 (3.7E 10)
Bismuth-200	83	100 (3.7E 12)
Bismuth-201	83	100 (3.7E 12)
Bismuth-202	83	1000 (3.7E 13)
Bismuth-203	83	10 (3.7E 11)
Bismuth-205	83	10 (3.7E 11)
Bismuth-206	83	10 (3.7E 11)
Bismuth-207	83	10 (3.7E 11)
Bismuth-210m	83	0.1 (3.7E 9)
Bismuth-210	83	10 (3.7E 11)
Bismuth-212	83	100 (3.7E 12)
Bismuth-213	83	100 (3.7E 12)
Bismuth-214	83	100 (3.7E 12)
Bromine-74m	35	100 (3.7E 12)
Bromine-74	35	100 (3.7E 12)
Bromine-75	35	100 (3.7E 12)
Bromine-76	35	10 (3.7E 11)
Bromine-77	35	100 (3.7E 12)
Bromine-80m	35	1000 (3.7E 13)
Bromine-80	35	1000 (3.7E 13)
Bromine-82	35	10 (3.7E 11)
Bromine-83	35	1000 (3.7E 13)
Bromine-84	35	100 (3.7E 12)
Cadmium-104	48	1000 (3.7E 13)
Cadmium-107	48	1000 (3.7E 13)
Cadmium-109	48	1 (3.7E 10)
Cadmium-113m	48	0.1 (3.7E 9)
Cadmium-113	48	0.1 (3.7E 9)
Cadmium-115m	48	10 (3.7E 11)
Cadmium-115	48	100 (3.7E 12)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Cadmium-117m	48	10 (3.7E 11)
Cadmium-117	48	100 (3.7E 12)
Calcium-41	20	10 (3.7E 11)
Calcium-45	20	10 (3.7E 11)
Calcium-47	20	10 (3.7E 11)
Californium-244	98	1000 (3.7E 13)
Californium-246	98	10 (3.7E 11)
Californium-248	98	0.1 (3.7E 9)
Californium-249	98	0.01 (3.7E 8)
Californium-250	98	0.01 (3.7E 8)
Californium-251	98	0.01 (3.7E 8)
Californium-252	98	0.1 (3.7E 9)
Californium-253	98	10 (3.7E 11)
Californium-254	98	0.1 (3.7E 9)
Carbon-11	6	1000 (3.7E 13)
Carbon-14	6	10 (3.7E 11)
Cerium-134	58	10 (3.7E 11)
Cerium-135	58	10 (3.7E 11)
Cerium-137m	58	100 (3.7E 12)
Cerium-137	58	1000 (3.7E 13)
Cerium-139	58	100 (3.7E 12)
Cerium-141	58	10 (3.7E 11)
Cerium-143	58	100 (3.7E 12)
Cerium-144	58	1 (3.7E 10)
Cesium-125	55	1000 (3.7E 13)
Cesium-127	55	100 (3.7E 12)
Cesium-129	55	100 (3.7E 12)
Cesium-130	55	1000 (3.7E 13)
Cesium-131	55	1000 (3.7E 13)
Cesium-132	55	10 (3.7E 11)
Cesium-134m	55	1000 (3.7E 13)
Cesium-134	55	1 (3.7E 10)
Cesium-135m	55	100 (3.7E 12)
Cesium-135	55	10 (3.7E 11)
Cesium-136	55	10 (3.7E 11)
Cesium-137	55	1 (3.7E 10)
Cesium-138	55	100 (3.7E 12)
Chlorine-36	17	10 (3.7E 11)
Chlorine-38	17	100 (3.7E 12)
Chlorine-39	17	100 (3.7E 12)
Chromium-48	24	100 (3.7E 12)
Chromium-49	24	1000 (3.7E 13)
Chromium-51	24	1000 (3.7E 13)
Cobalt-55	27	10 (3.7E 11)
Cobalt-56	27	10 (3.7E 11)
Cobalt-57	27	100 (3.7E 12)
Cobalt-58m	27	1000 (3.7E 13)
Cobalt-58	27	10 (3.7E 11)
Cobalt-60m	27	1000 (3.7E 13)
Cobalt-60	27	10 (3.7E 11)
Cobalt-61	27	1000 (3.7E 13)
Cobalt-62m	27	1000 (3.7E 13)
Copper-60	29	100 (3.7E 12)
Copper-61	29	100 (3.7E 12)
Copper-64	29	1000 (3.7E 13)
Copper-67	29	100 (3.7E 12)
Curium-238	96	1000 (3.7E 13)
Curium-240	96	1 (3.7E 10)
Curium-241	96	10 (3.7E 11)
Curium-242	96	1 (3.7E 10)
Curium-243	96	0.01 (3.7E 8)
Curium-244	96	0.01 (3.7E 8)
Curium-245	96	0.01 (3.7E 8)
Curium-246	96	0.01 (3.7E 8)
Curium-247	96	0.01 (3.7E 8)
Curium-248	96	0.001 (3.7E 7)
Curium-249	96	1000 (3.7E 13)
Dysprosium-155	66	100 (3.7E 12)
Dysprosium-157	66	100 (3.7E 12)
Dysprosium-159	66	100 (3.7E 12)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Dysprosium-165	66	1000 (3.7E 13)
Dysprosium-166	66	10 (3.7E 11)
Einsteinium-250	99	10 (3.7E 11)
Einsteinium-251	99	1000 (3.7E 13)
Einsteinium-253	99	10 (3.7E 11)
Einsteinium-254m	99	1 (3.7E 10)
Einsteinium-254	99	0.1 (3.7E 9)
Erbium-161	68	100 (3.7E 12)
Erbium-165	68	1000 (3.7E 13)
Erbium-169	68	100 (3.7E 12)
Erbium-171	68	100 (3.7E 12)
Erbium-172	68	10 (3.7E 11)
Europium-145	63	10 (3.7E 11)
Europium-146	63	10 (3.7E 11)
Europium-147	63	10 (3.7E 11)
Europium-148	63	10 (3.7E 11)
Europium-149	63	100 (3.7E 12)
Europium-150 (12.6 hr)	63	1000 (3.7E 13)
Europium-150 (34.2 yr)	63	10 (3.7E 11)
Europium-152m	63	100 (3.7E 12)
Europium-152	63	10 (3.7E 11)
Europium-154	63	10 (3.7E 11)
Europium-155	63	10 (3.7E 11)
Europium-156	63	10 (3.7E 11)
Europium-157	63	10 (3.7E 11)
Europium-158	63	1000 (3.7E 13)
Fermium-252	100	10 (3.7E 11)
Fermium-253	100	10 (3.7E 11)
Fermium-254	100	100 (3.7E 12)
Fermium-255	100	100 (3.7E 12)
Fermium-257	100	1 (3.7E 10)
Fluorine-18	9	1000 (3.7E 13)
Francium-222	87	100 (3.7E 12)
Francium-223	87	100 (3.7E 12)
Gadolinium-145	64	100 (3.7E 12)
Gadolinium-146	64	10 (3.7E 11)
Gadolinium-147	64	10 (3.7E 11)
Gadolinium-148	64	0.001 (3.7E7)
Gadolinium-149	64	100 (3.7E 12)
Gadolinium-151	64	100 (3.7E 12)
Gadolinium-152	64	0.001 (3.7E 7)
Gadolinium-153	64	10 (3.7E 11)
Gadolinium-159	64	1000 (3.7E 13)
Gallium-65	31	1000 (3.7E 13)
Gallium-66	31	10 (3.7E 11)
Gallium-67	31	100 (3.7E 12)
Gallium-68	31	1000 (3.7E 13)
Gallium-70	31	1000 (3.7E 13)
Gallium-72	31	10 (3.7E 11)
Gallium-73	31	100 (3.7E 12)
Germanium-66	32	100 (3.7E 12)
Germanium-67	32	1000 (3.7E 13)
Germanium-68	32	10 (3.7E 11)
Germanium-69	32	10 (3.7E 11)
Germanium-71	32	1000 (3.7E 13)
Germanium-75	32	1000 (3.7E 13)
Germanium-77	32	10 (3.7E 11)
Germanium-78	32	1000 (3.7E 13)
Gold-193	79	100 (3.7E 12)
Gold-194	79	10 (3.7E 11)
Gold-195	79	100 (3.7E 12)
Gold-198m	79	10 (3.7E 11)
Gold-198	79	100 (3.7E 12)
Gold-199	79	100 (3.7E 12)
Gold-200m	79	10 (3.7E 11)
Gold-200	79	1000 (3.7E 13)
Gold-201	79	1000 (3.7E 13)
Hafnium-170	72	100 (3.7E 12)
Hafnium-172	72	1 (3.7E 10)
Hafnium-173	72	100 (3.7E 12)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Hafnium-175	72	100 (3.7E 12)
Hafnium-177m	72	1000 (3.7E 13)
Hafnium-178m	72	0.1 (3.7E 9)
Hafnium-179m	72	100 (3.7E 12)
Hafnium-180m	72	100 (3.7E 12)
Hafnium-181	72	10 (3.7E 11)
Hafnium-182m	72	100 (3.7E 12)
Hafnium-182	72	0.1 (3.7E 9)
Hafnium-183	72	100 (3.7E 12)
Hafnium-184	72	100 (3.7E 12)
Holmium-155	67	1000 (3.7E 13)
Holmium-157	67	1000 (3.7E 13)
Holmium-159	67	1000 (3.7E 13)
Holmium-161	67	1000 (3.7E 13)
Holmium-162m	67	1000 (3.7E 13)
Holmium-162	67	1000 (3.7E 13)
Holmium-164m	67	1000 (3.7E 13)
Holmium-164	67	1000 (3.7E 13)
Holmium-166m	67	1 (3.7E 10)
Holmium-166	67	100 (3.7E 12)
Holmium-167	67	100 (3.7E 12)
Hydrogen-3	1	100 (3.7E 12)
Indium-109	49	100 (3.7E 12)
Indium-110 (69.1 min)	49	100 (3.7E 12)
Indium-110 (4.9 hr)	49	10 (3.7E 11)
Indium-111	49	100 (3.7E 12)
Indium-112	49	1000 (3.7E 13)
Indium-113m	49	1000 (3.7E 13)
Indium-114m	49	10 (3.7E 11)
Indium-115m	49	100 (3.7E 12)
Indium-115	49	0.1 (3.7E 9)
Indium-116m	49	100 (3.7E 12)
Indium-117m	49	100 (3.7E 12)
Indium-117	49	1000 (3.7E 13)
Indium-119m	49	1000 (3.7E 13)
Iodine-120m	53	100 (3.7E 12)
Iodine-120	53	10 (3.7E 11)
Iodine-121	53	100 (3.7E 12)
Iodine-123	53	10 (3.7E 11)
Iodine-124	53	0.1 (3.7E 9)
Iodine-125	53	0.01 (3.7E 8)
Iodine-126	53	0.01 (3.7E 8)
Iodine-128	53	1000 (3.7E 13)
Iodine-129	53	0.001 (3.7E 7)
Iodine-130	53	1 (3.7E 10)
Iodine-131	53	0.01 (3.7E 8)
Iodine-132m	53	10 (3.7E 11)
Iodine-132	53	10 (3.7E 11)
Iodine-133	53	0.1 (3.7E 9)
Iodine-134	53	100 (3.7E 12)
Iodine-135	53	10 (3.7E 11)
Iridium-182	77	1000 (3.7E 13)
Iridium-184	77	100 (3.7E 12)
Iridium-185	77	100 (3.7E 12)
Iridium-186	77	10 (3.7E 11)
Iridium-187	77	100 (3.7E 12)
Iridium-188	77	10 (3.7E 11)
Iridium-189	77	100 (3.7E 12)
Iridium-190m	77	1000 (3.7E 13)
Iridium-190	77	10 (3.7E 11)
Iridium-192m	77	100 (3.7E 12)
Iridium-192	77	10 (3.7E 11)
Iridium-194m	77	10 (3.7E 11)
Iridium-194	77	100 (3.7E 12)
Iridium-195m	77	100 (3.7E 12)
Iridium-195	77	1000 (3.7E 13)
Iron-52	26	100 (3.7E 12)
Iron-55	26	100 (3.7E 12)
Iron-59	26	10 (3.7E 11)
Iron-60	26	0.1 (3.7E 9)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Krypton-74	36	10 (3.7E 11)
Krypton-76	36	10 (3.7E 11)
Krypton-77	36	10 (3.7E 11)
Krypton-79	36	100 (3.7E 12)
Krypton-81	36	1000 (3.7E 13)
Krypton-83m	36	1000 (3.7E 13)
Krypton-85m	36	100 (3.7E 12)
Krypton-85	36	1000 (3.7E 13)
Krypton-87	36	10 (3.7E 11)
Krypton-88	36	10 (3.7E 11)
Lanthanum-131	57	1000 (3.7E 13)
Lanthanum-132	57	100 (3.7E 12)
Lanthanum-135	57	1000 (3.7E 13)
Lanthanum-137	57	10 (3.7E 11)
Lanthanum-138	57	1 (3.7E 10)
Lanthanum-140	57	10 (3.7E 11)
Lanthanum-141	57	1000 (3.7E 13)
Lanthanum-142	57	100 (3.7E 12)
Lanthanum-143	57	1000 (3.7E 13)
Lead-195m	82	1000 (3.7E 13)
Lead-198	82	100 (3.7E 12)
Lead-199	82	100 (3.7E 12)
Lead-200	82	100 (3.7E 12)
Lead-201	82	100 (3.7E 12)
Lead-202m	82	10 (3.7E 11)
Lead-202	82	1 (3.7E 10)
Lead-203	82	100 (3.7E 12)
Lead-205	82	100 (3.7E 12)
Lead-209	82	1000 (3.7E 13)
Lead-210	82	0.01 (3.7E 8)
Lead-211	82	100 (3.7E 12)
Lead-212	82	10 (3.7E 11)
Lead-214	82	100 (3.7E 12)
Lutetium-169	71	10 (3.7E 11)
Lutetium-170	71	10 (3.7E 11)
Lutetium-171	71	10 (3.7E 11)
Lutetium-172	71	10 (3.7E 11)
Lutetium-173	71	100 (3.7E 12)
Lutetium-174m	71	10 (3.7E 11)
Lutetium-174	71	10 (3.7E 11)
Lutetium-176m	71	1000 (3.7E 13)
Lutetium-176	71	1 (3.7E 10)
Lutetium-177m	71	10 (3.7E 11)
Lutetium-177	71	100 (3.7E 12)
Lutetium-178m	71	1000 (3.7E 13)
Lutetium-178	71	1000 (3.7E 13)
Lutetium-179	71	1000 (3.7E 13)
Magnesium-28	12	10 (3.7E 11)
Manganese-51	25	1000 (3.7E 13)
Manganese-52m	25	1000 (3.7E 13)
Manganese-52	25	10 (3.7E 11)
Manganese-53	25	1000 (3.7E 13)
Manganese-54	25	10 (3.7E 11)
Manganese-56	25	100 (3.7E 12)
Mendelevium-257	101	100 (3.7E 12)
Mendelevium-258	101	1 (3.7E 10)
Mercury-193m	80	10 (3.7E 11)
Mercury-193	80	100 (3.7E 12)
Mercury-194	80	0.1 (3.7E 9)
Mercury-195m	80	100 (3.7E 12)
Mercury-195	80	100 (3.7E 12)
Mercury-197m	80	1000 (3.7E 13)
Mercury-197	80	1000 (3.7E 13)
Mercury-199m	80	1000 (3.7E 13)
Mercury-203	80	10 (3.7E 11)
Molybdenum-90	42	100 (3.7E 12)
Molybdenum-93m	42	10 (3.7E 11)
Molybdenum-93	42	100 (3.7E 12)
Molybdenum-99	42	100 (3.7E 12)
Molybdenum-101	42	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Neodymium-136	60	1000 (3.7E 13)
Neodymium-138	60	1000 (3.7E 13)
Neodymium-139m	60	100 (3.7E 12)
Neodymium-139	60	1000 (3.7E 13)
Neodymium-141	60	1000 (3.7E 13)
Neodymium-147	60	10 (3.7E 11)
Neodymium-149	60	100 (3.7E 12)
Neodymium-151	60	1000 (3.7E 13)
Neptunium-232	93	1000 (3.7E 13)
Neptunium-233	93	1000 (3.7E 13)
Neptunium-234	93	10 (3.7E 11)
Neptunium-235	93	1000 (3.7E 13)
Neptunium-236 (1.2 E 5 yr)	93	0.1 (3.7E 9)
Neptunium-236 (22.5 hr)	93	100 (3.7E 12)
Neptunium-237	93	0.01 (3.7E 8)
Neptunium-238	93	10 (3.7E 11)
Neptunium-239	93	100 (3.7E 12)
Neptunium-240	93	100 (3.7E 12)
Nickel-56	28	10 (3.7E 11)
Nickel-57	28	10 (3.7E 11)
Nickel-59	28	100 (3.7E 12)
Nickel-63	28	100 (3.7E 12)
Nickel-65	28	100 (3.7E 12)
Nickel-66	28	10 (3.7E 11)
Niobium-88	41	100 (3.7E 12)
Niobium-89 (66 min)	41	100 (3.7E 12)
Niobium-89 (122 min)	41	100 (3.7E 12)
Niobium-90	41	10 (3.7E 11)
Niobium-93m	41	100 (3.7E 12)
Niobium-94	41	10 (3.7E 11)
Niobium-95m	41	100 (3.7E 12)
Niobium-95	41	10 (3.7E 11)
Niobium-96	41	10 (3.7E 11)
Niobium-97	41	100 (3.7E 12)
Niobium-98	41	1000 (3.7E 13)
Osmium-180	76	1000 (3.7E 13)
Osmium-181	76	100 (3.7E 12)
Osmium-182	76	100 (3.7E 12)
Osmium-185	76	10 (3.7E 11)
Osmium-189m	76	1000 (3.7E 13)
Osmium-191m	76	1000 (3.7E 13)
Osmium-191	76	100 (3.7E 12)
Osmium-193	76	100 (3.7E 12)
Osmium-194	76	1 (3.7E 10)
Palladium-100	46	100 (3.7E 12)
Palladium-101	46	100 (3.7E 12)
Palladium-103	46	100 (3.7E 12)
Palladium-107	46	100 (3.7E 12)
Palladium-109	46	1000 (3.7E 13)
Phosphorus-32	15	0.1 (3.7E 9)
Phosphorus-33	15	1 (3.7E 10)
Platinum-186	78	100 (3.7E 12)
Platinum-188	78	100 (3.7E 12)
Platinum-189	78	100 (3.7E 12)
Platinum-191	78	100 (3.7E 12)
Platinum-193m	78	100 (3.7E 12)
Platinum-193	78	1000 (3.7E 13)
Platinum-195m	78	100 (3.7E 12)
Platinum-197m	78	1000 (3.7E 13)
Platinum-197	78	1000 (3.7E 13)
Platinum-199	78	1000 (3.7E 13)
Platinum-200	78	100 (3.7E 12)
Plutonium-234	94	1000 (3.7E 13)
Plutonium-235	94	1000 (3.7E 13)
Plutonium-236	94	0.1 (3.7E 9)
Plutonium-237	94	1000 (3.7E 13)
Plutonium-238	94	0.01 (3.7E 8)
Plutonium-239	94	0.01 (3.7E 8)
Plutonium-240	94	0.01 (3.7E 8)
Plutonium-241	94	1 (3.7E 10)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Plutonium-242	94	0.01 (3.7E 8)
Plutonium-243	94	1000 (3.7E 13)
Plutonium-244	94	0.01 (3.7E 8)
Plutonium-245	94	100 (3.7E 12)
Polonium-203	84	100 (3.7E 12)
Polonium-205	84	100 (3.7E 12)
Polonium-207	84	10 (3.7E 11)
Polonium-210	84	0.01 (3.7E 8)
Potassium-40	19	1 (3.7E 10)
Potassium-42	19	100 (3.7E 12)
Potassium-43	19	10 (3.7E 11)
Potassium-44	19	100 (3.7E 12)
Potassium-45	19	1000 (3.7E 13)
Praseodymium-136	59	1000 (3.7E 13)
Praseodymium-137	59	1000 (3.7E 13)
Praseodymium-138m	59	100 (3.7E 12)
Praseodymium-139	59	1000 (3.7E 13)
Praseodymium-142m	59	1000 (3.7E 13)
Praseodymium-142	59	100 (3.7E 12)
Praseodymium-143	59	10 (3.7E 11)
Praseodymium-144	59	1000 (3.7E 13)
Praseodymium-145	59	1000 (3.7E 13)
Praseodymium-147	59	1000 (3.7E 13)
Promethium-141	61	1000 (3.7E 13)
Promethium-143	61	100 (3.7E 12)
Promethium-144	61	10 (3.7E 11)
Promethium-145	61	100 (3.7E 12)
Promethium-146	61	10 (3.7E 11)
Promethium-147	61	10 (3.7E 11)
Promethium-148m	61	10 (3.7E 11)
Promethium-148	61	10 (3.7E 11)
Promethium-149	61	100 (3.7E 12)
Promethium-150	61	100 (3.7E 12)
Promethium-151	61	100 (3.7E 12)
Protactinium-227	91	100 (3.7E 12)
Protactinium-228	91	10 (3.7E 11)
Protactinium-230	91	10 (3.7E 11)
Protactinium-231	91	0.01 (3.7E 8)
Protactinium-232	91	10 (3.7E 11)
Protactinium-233	91	100 (3.7E 12)
Protactinium-234	91	10 (3.7E 11)
Radium-223	88	1 (3.7E 10)
Radium-224	88	10 (3.7E 11)
Radium-225	88	1 (3.7E 10)
Radium-226Φ	88	0.1 (3.7E 9)
Radium-227	88	1000 (3.7E 13)
Radium-228	88	0.1 (3.7E 9)
Radon-220	86	0.1 (3.7E 9)
Radon-222	86	0.1 (3.7E 9)
Rhenium-177	75	1000 (3.7E 13)
Rhenium-178	75	1000 (3.7E 13)
Rhenium-181	75	100 (3.7E 12)
Rhenium-182 (12.7 hr)	75	10 (3.7E 11)
Rhenium-182 (64.0 hr)	75	10 (3.7E 11)
Rhenium-184m	75	10 (3.7E 11)
Rhenium-184	75	10 (3.7E 11)
Rhenium-186m	75	10 (3.7E 11)
Rhenium-186	75	100 (3.7E 12)
Rhenium-187	75	1000 (3.7E 13)
Rhenium-188m	75	1000 (3.7E 13)
Rhenium-188	75	1000 (3.7E 13)
Rhenium-189	75	1000 (3.7E 13)
Rhodium-99m	45	100 (3.7E 12)
Rhodium-99	45	10 (3.7E 11)
Rhodium-100	45	10 (3.7E 11)
Rhodium-101m	45	100 (3.7E 12)
Rhodium-101	45	10 (3.7E 11)
Rhodium-102m	45	10 (3.7E 11)
Rhodium-102	45	10 (3.7E 11)
Rhodium-103m	45	1000 (3.7E 13)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Rhodium-105	45	100 (3.7E 12)
Rhodium-106m	45	10 (3.7E 11)
Rhodium-107	45	1000 (3.7E 13)
Rubidium-79	37	1000 (3.7E 13)
Rubidium-81m	37	1000 (3.7E 13)
Rubidium-81	37	100 (3.7E 12)
Rubidium-82m	37	10 (3.7E 11)
Rubidium-83	37	10 (3.7E 11)
Rubidium-84	37	10 (3.7E 11)
Rubidium-86	37	10 (3.7E 11)
Rubidium-88	37	1000 (3.7E 13)
Rubidium-89	37	1000 (3.7E 13)
Rubidium-87	37	10 (3.7E 11)
Ruthenium-94	44	1000 (3.7E 13)
Ruthenium-97	44	100 (3.7E 12)
Ruthenium-103	44	10 (3.7E 11)
Ruthenium-105	44	100 (3.7E 12)
Ruthenium-106	44	1 (3.7E 10)
Samarium-141m	62	1000 (3.7E 13)
Samarium-141	62	1000 (3.7E 13)
Samarium-142	62	1000 (3.7E 13)
Samarium-145	62	100 (3.7E 12)
Samarium-146	62	0.01 (3.7E 8)
Samarium-147	62	0.01 (3.7E 8)
Samarium-151	62	10 (3.7E 11)
Samarium-153	62	100 (3.7E 12)
Samarium-155	62	1000 (3.7E 13)
Samarium-156	62	100 (3.7E 12)
Scandium-43	21	1000 (3.7E 13)
Scandium-44m	21	10 (3.7E 11)
Scandium-44	21	100 (3.7E 12)
Scandium-46	21	10 (3.7E 11)
Scandium-47	21	100 (3.7E 12)
Scandium-48	21	10 (3.7E 11)
Scandium-49	21	1000 (3.7E 13)
Selenium-70	34	1000 (3.7E 13)
Selenium-73m	34	100 (3.7E 12)
Selenium-73	34	10 (3.7E 11)
Selenium-75	34	10 (3.7E 11)
Selenium-79	34	10 (3.7E 11)
Selenium-81m	34	1000 (3.7E 13)
Selenium-81	34	1000 (3.7E 13)
Selenium-83	34	1000 (3.7E 13)
Silicon-31	14	1000 (3.7E 13)
Silicon-32	14	1 (3.7E 10)
Silver-102	47	100 (3.7E 12)
Silver-103	47	1000 (3.7E 13)
Silver-104m	47	1000 (3.7E 13)
Silver-104	47	1000 (3.7E 13)
Silver-105	47	10 (3.7E 11)
Silver-106m	47	10 (3.7E 11)
Silver-106	47	1000 (3.7E 13)
Silver-108m	47	10 (3.7E 11)
Silver-110m	47	10 (3.7E 11)
Silver-111	47	10 (3.7E 11)
Silver-112	47	100 (3.7E 12)
Silver-115	47	1000 (3.7E 13)
Sodium-22	11	10 (3.7E 11)
Sodium-24	11	10 (3.7E 11)
Strontium-80	38	100 (3.7E 12)
Strontium-81	38	1000 (3.7E 13)
Strontium-83	38	100 (3.7E 12)
Strontium-85m	38	1000 (3.7E 13)
Strontium-85	38	10 (3.7E 11)
Strontium-87m	38	100 (3.7E 12)
Strontium-89	38	10 (3.7E 11)
Strontium-90	38	0.1 (3.7E 9)
Strontium-91	38	10 (3.7E 11)
Strontium-92	38	100 (3.7E 12)
Sulfur-35	16	1 (3.7E 10)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Tantalum-172	73	100 (3.7E 12)
Tantalum-173	73	100 (3.7E 12)
Tantalum-174	73	100 (3.7E 12)
Tantalum-175	73	100 (3.7E 12)
Tantalum-176	73	10 (3.7E 11)
Tantalum-177	73	1000 (3.7E 13)
Tantalum-178	73	1000 (3.7E 13)
Tantalum-179	73	1000 (3.7E 13)
Tantalum-180m	73	1000 (3.7E 13)
Tantalum-180	73	100 (3.7E 12)
Tantalum-182m	73	1000 (3.7E 13)
Tantalum-182	73	10 (3.7E 11)
Tantalum-183	73	100 (3.7E 12)
Tantalum-184	73	10 (3.7E 11)
Tantalum-185	73	1000 (3.7E 13)
Tantalum-186	73	1000 (3.7E 13)
Technetium-93m	43	1000 (3.7E 13)
Technetium-93	43	100 (3.7E 12)
Technetium-94m	43	100 (3.7E 12)
Technetium-94	43	10 (3.7E 11)
Technetium-96m	43	1000 (3.7E 13)
Technetium-96	43	10 (3.7E 11)
Technetium-97m	43	100 (3.7E 12)
Technetium-97	43	100 (3.7E 12)
Technetium-98	43	10 (3.7E 11)
Technetium-99m	43	100 (3.7E 12)
Technetium-99	43	10 (3.7E 11)
Technetium-101	43	1000 (3.7E 13)
Technetium-104	43	1000 (3.7E 13)
Tellurium-116	52	1000 (3.7E 13)
Tellurium-121m	52	10 (3.7E 11)
Tellurium-121	52	10 (3.7E 11)
Tellurium-123m	52	10 (3.7E 11)
Tellurium-123	52	10 (3.7E 11)
Tellurium-125m	52	10 (3.7E 11)
Tellurium-127m	52	10 (3.7E 11)
Tellurium-127	52	1000 (3.7E 13)
Tellurium-129m	52	10 (3.7E 11)
Tellurium-129	52	1000 (3.7E 13)
Tellurium-131m	52	10 (3.7E 11)
Tellurium-131	52	1000 (3.7E 13)
Tellurium-132	52	10 (3.7E 11)
Tellurium-133m	52	1000 (3.7E 13)
Tellurium-133	52	1000 (3.7E 13)
Tellurium-134	52	1000 (3.7E 13)
Terbium-147	65	100 (3.7E 12)
Terbium-149	65	100 (3.7E 12)
Terbium-150	65	100 (3.7E 12)
Terbium-151	65	10 (3.7E 11)
Terbium-153	65	100 (3.7E 12)
Terbium-154	65	10 (3.7E 11)
Terbium-155	65	100 (3.7E 12)
Terbium-156m (5.0 hr)	65	1000 (3.7E 13)
Terbium-156m (24.4 hr)	65	1000 (3.7E 13)
Terbium-156	65	10 (3.7E 11)
Terbium-157	65	100 (3.7E 12)
Terbium-158	65	10 (3.7E 11)
Terbium-160	65	10 (3.7E 11)
Terbium-161	65	100 (3.7E 12)
Thallium-194m	81	100 (3.7E 12)
Thallium-194	81	1000 (3.7E 13)
Thallium-195	81	100 (3.7E 12)
Thallium-197	81	100 (3.7E 12)
Thallium-198m	81	100 (3.7E 12)
Thallium-198	81	10 (3.7E 11)
Thallium-199	81	100 (3.7E 12)
Thallium-200	81	10 (3.7E 11)
Thallium-201	81	1000 (3.7E 13)
Thallium-202	81	10 (3.7E 11)
Thallium-204	81	10 (3.7E 11)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Thorium-226	90	100 (3.7E 12)
Thorium-227	90	1 (3.7E 10)
Thorium-228	90	0.01 (3.7E 8)
Thorium-229	90	0.001 (3.7E 7)
Thorium-230	90	0.01 (3.7E 8)
Thorium-231	90	100 (3.7E 12)
Thorium-232Φ	90	0.001 (3.7E 7)
Thorium-234	90	100 (3.7E 12)
Thulium-162	69	1000 (3.7E 13)
Thulium-166	69	10 (3.7E 11)
Thulium-167	69	100 (3.7E 12)
Thulium-170	69	10 (3.7E 11)
Thulium-171	69	100 (3.7E 12)
Thulium-172	69	100 (3.7E 12)
Thulium-173	69	100 (3.7E 12)
Thulium-175	69	1000 (3.7E 13)
Tin-110	50	100 (3.7E 12)
Tin-111	50	1000 (3.7E 13)
Tin-113	50	10 (3.7E 11)
Tin-117m	50	100 (3.7E 12)
Tin-119m	50	10 (3.7E 11)
Tin-121m	50	10 (3.7E 11)
Tin-121	50	1000 (3.7E 13)
Tin-123m	50	1000 (3.7E 13)
Tin-123	50	10 (3.7E 11)
Tin-125	50	10 (3.7E 11)
Tin-126	50	1 (3.7E 10)
Tin-127	50	100 (3.7E 12)
Tin-128	50	1000 (3.7E 13)
Titanium-44	22	1 (3.7E 10)
Titanium-45	22	1000 (3.7E 13)
Tungsten-176	74	1000 (3.7E 13)
Tungsten-177	74	100 (3.7E 12)
Tungsten-178	74	100 (3.7E 12)
Tungsten-179	74	1000 (3.7E 13)
Tungsten-181	74	100 (3.7E 12)
Tungsten-185	74	10 (3.7E 11)
Tungsten-187	74	100 (3.7E 12)
Tungsten-188	74	10 (3.7E 11)
Uranium-230	92	1 (3.7E 10)
Uranium-231	92	1000 (3.7E 13)
Uranium-232	92	0.01 (3.7E 8)
Uranium-233	92	0.1 (3.7E 9)
Uranium-234φ	92	0.1 (3.7E 9)
Uranium-235φ	92	0.1 (3.7E 9)
Uranium-236	92	0.1 (3.7E 9)
Uranium-237	92	100 (3.7E 12)
Uranium-238φ	92	0.1& (3.7E 9)
Uranium-239	92	1000 (3.7E 13)
Uranium-240	92	1000 (3.7E 13)
Vanadium-47	23	1000 (3.7E 13)
Vanadium-48	23	10 (3.7E 11)
Vanadium-49	23	1000 (3.7E 13)
Xenon-120	54	100 (3.7E 12)
Xenon-121	54	10 (3.7E 11)
Xenon-122	54	100 (3.7E 12)
Xenon-123	54	10 (3.7E 11)
Xenon-125	54	100 (3.7E 12)
Xenon-127	54	100 (3.7E 12)
Xenon-129m	54	1000 (3.7E 13)
Xenon-131m	54	1000 (3.7E 13)
Xenon-133m	54	1000 (3.7E 13)
Xenon-133	54	1000 (3.7E 13)
Xenon-135m	54	10 (3.7E 11)
Xenon-135	54	100 (3.7E 12)
Xenon-138	54	10 (3.7E 11)
Ytterbium-162	70	1000 (3.7E 13)
Ytterbium-166	70	10 (3.7E 11)
Ytterbium-167	70	1000 (3.7E 13)
Ytterbium-169	70	10 (3.7E 11)

APPENDIX B TO § 302.4—RADIONUCLIDES—Continued

Radionuclide	Atomic Number	Final RQ Ci (Bq)
Ytterbium-175	70	100 (3.7E 12)
Ytterbium-177	70	1000 (3.7E 13)
Ytterbium-178	70	1000 (3.7E 13)
Yttrium-86m	39	1000 (3.7E 13)
Yttrium-86	39	10 (3.7E 11)
Yttrium-87	39	10 (3.7E 11)
Yttrium-88	39	10 (3.7E 11)
Yttrium-90m	39	100 (3.7E 12)
Yttrium-90	39	10 (3.7E 11)
Yttrium-91m	39	1000 (3.7E 13)
Yttrium-91	39	10 (3.7E 11)
Yttrium-92	39	100 (3.7E 12)
Yttrium-93	39	100 (3.7E 12)
Yttrium-94	39	1000 (3.7E 13)
Yttrium-95	39	1000 (3.7E 13)
Zinc-62	30	100 (3.7E 12)
Zinc-63	30	1000 (3.7E 13)
Zinc-65	30	10 (3.7E 11)
Zinc-69m	30	100 (3.7E 12)
Zinc-69	30	1000 (3.7E 13)
Zinc-71m	30	100 (3.7E 12)
Zinc-72	30	100 (3.7E 12)
Zirconium-86	40	100 (3.7E 12)
Zirconium-88	40	10 (3.7E 11)
Zirconium-89	40	100 (3.7E 12)
Zirconium-93	40	1 (3.7E 10)
Zirconium-95	40	10 (3.7E 11)
Zirconium-97	40	10 (3.7E 11)

Ci—Curie. The curie represents a rate of radioactive decay. One curie is the quantity of any radioactive nuclide which undergoes 3.7E 10 disintegrations per second.

Bq—Becquerel. The becquerel represents a rate of radioactive decay. One becquerel is the quantity of any radioactive nuclide which undergoes one disintegration per second. One curie is equal to 3.7E 10 becquerel.

@—Final RQs for all radionuclides apply to chemical compounds containing the radionuclides and elemental forms regardless of the diameter of pieces of solid material.

&—The adjusted RQ of one curie applies to all radionuclides not otherwise listed. Whenever the RQs in table 302.4 and this appendix to the table are in conflict, the lowest RQ shall apply. For example, uranyl acetate and uranyl nitrate have adjusted RQs shown in table 302.4 of 100 pounds, equivalent to about one-tenth the RQ level for uranium-238 listed in this appendix.

E—Exponent to the base 10. For example, 1.3E 2 is equal to 130 while 1.3E 3 is equal to 1300.

m—Signifies a nuclear isomer which is a radionuclide in a higher energy metastable state relative to the parent isotope.

φ—Notification requirements for releases of mixtures or solutions of radionuclides can be found in § 302.6(b) of this rule. Final RQs for the following four common radionuclide mixtures are provided: radium-226 in secular equilibrium with its daughters (0.053 curie); natural uranium (0.1 curie); natural uranium in secular equilibrium with its daughters (0.052 curie); and natural thorium in secular equilibrium with its daughters (0.011 curie).

[54 FR 33449, Aug. 14, 1989]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 302.4, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.

§ 302.5 Determination of reportable quantities.

(a) *Listed hazardous substances.* The quantity listed in the column ''Final RQ'' for each substance in table 302.4, or in appendix B to table 302.4, is the reportable quantity (RQ) for that substance. The RQs in table 302.4 are in units of pounds based on chemical toxicity, while the RQs in appendix B to table 302.4 are in units of curies based on radiation hazard. Whenever the RQs in table 302.4 and appendix B to the table are in conflict, the lowest RQ shall apply.

(b) *Unlisted hazardous substances.* Unlisted hazardous substances designated by 40 CFR 302.4(b) have the reportable quantity of 100 pounds, except for those unlisted hazardous wastes which exhibit toxicity identified in 40 CFR 261.24. Unlisted hazardous wastes which exhibit toxicity have the reportable quantities listed in Table 302.4 for the contaminant on which the characteristic of toxicity is based. The reportable quantity applies to the waste itself, not merely to the toxic contaminant. If an unlisted hazardous waste exhibits toxicity on the basis of more than one contaminant, the reportable quantity for that waste shall be the lowest of the reportable quantities listed in Table 302.4 for those contaminants. If an unlisted hazardous waste exhibits the characteristic of toxicity and one or more of the other characteristics referenced in 40 CFR 302.4(b), the reportable quantity for that waste shall be the lowest of the applicable reportable quantities.

[51 FR 34547, Sept. 29, 1986, as amended at 54 FR 22538, May 24, 1989; 67 FR 45356, July 9, 2002]

§ 302.6 Notification requirements.

(a) Any person in charge of a vessel or an offshore or an onshore facility shall, as soon as he or she has knowledge of any release (other than a federally permitted release or application of a pesticide) of a hazardous substance from such vessel or facility in a quantity equal to or exceeding the reportable quantity determined by this part in any 24-hour period, immediately notify the National Response Center (1–800–424–8802; in Washington, DC 202–267–2675; the facsimile number is 202–267–1322).

(b) Releases of mixtures or solutions (including hazardous waste streams) of

(1) Hazardous substances, except for radionuclides, are subject to the following notification requirements:

(i) If the quantity of all of the hazardous constituent(s) of the mixture or solution is known, notification is required where an RQ or more of any hazardous constituent is released;

(ii) If the quantity of one or more of the hazardous constituent(s) of the mixture or solution is unknown, notification is required where the total amount of the mixture or solution released equals or exceeds the RQ for the hazardous constituent with the lowest RQ; or

(iii) For waste streams K169, K170, K171, K172, K174, and K175, knowledge of the quantity of all of the hazardous constituent(s) may be assumed, based on the following maximum observed constituent concentrations identified by EPA:

Waste	Constituent	max ppm
K169	Benzene	220.0
K170	Benzene	1.2
	Benzo (a) pyrene	230.0
	Dibenz (a,h) anthracene	49.0
	Benzo (a) anthracene	390.0
	Benzo (b) fluoranthene	110.0
	Benzo (k) fluoranthese	110.0
	3-Methylcholanthrene	27.0
	7, 12-Dimethylbenz (a) anthracene.	1,200.0
K171	Benzene	500.0
	Arsenic	1,600.0
K172	Benzene	100.0
	Arsenic	730.0
K174	2,3,7,8-TCDD	0.000039
	1,2,3,7,8-PeCDD	0.0000108
	1,2,3,4,7,8,-HxCDD	0.0000241
	1,2,3,6,7,8,-HxCDD	0.000083
	1,2,3,7,8,9,-HxCDD	0.000062
	1,2,3,4,6,7,8-HpCDD	0.00123
	OCDD	0.0129
	2,3,7,8-TCDF	0.000145
	1,2,3,7,8-PeCDF	0.0000777
	2,3,4,7,8-PeCDF	0.000127
	1,2,3,4,7,8-HxCDF	0.001425
	1,2,3,6,7,8-HxCDF	0.000281
	1,2,3,7,8,9-HxCDF	0.00014
	2,3,4,6,7,8-HxCDF	0.000648
	1,2,3,4,6,7,8-HpCDF	0.0207
	1,2,3,4,7,8,9-HpCDF	0.0135
	OCDF	0.212
K175	Mercury	9200

(2) Radionuclides are subject to this section's notification requirements only in the following circumstances:

(i) If the identity and quantity (in curies) of each radionuclide in a released mixture or solution is known, the ratio between the quantity released (in curies) and the RQ for the radionuclide must be determined for each radionuclide. The only such releases subject to this section's notification requirements are those in which the sum of the ratios for the radionuclides in the mixture or solution released is equal to or greater than one.

(ii) If the identity of each radionuclide in a released mixture or solution is known but the quantity released (in curies) of one or more of the radionuclides is unknown, the only such releases subject to this section's notification requirements are those in which the total quantity (in curies) of the mixture or solution released is equal to or greater than the lowest RQ of any individual radionuclide in the mixture or solution.

(iii) If the identity of one or more radionuclides in a released mixture or solution is unknown (or if the identity of a radionuclide released by itself is unknown), the only such releases subject to this section's notification requirements are those in which the total quantity (in curies) released is equal to or greater than either one curie or the lowest RQ of any known individual radionuclide in the mixture or solution, whichever is lower.

(c) The following categories of releases are exempt from the notification requirements of this section:

(1) Releases of those radionuclides that occur naturally in the soil from land holdings such as parks, golf courses, or other large tracts of land.

(2) Releases of naturally occurring radionuclides from land disturbance activities, including farming, construction, and land disturbance incidental to extraction during mining activities, except that which occurs at uranium, phosphate, tin, zircon, hafnium, vanadium, monazite, and rare earth mines. Land disturbance incidental to extraction includes: land clearing; overburden removal and stockpiling; excavating, handling, transporting, and storing ores and other raw (not beneficiated or processed) materials; and replacing in mined-out areas coal ash, earthen materials from farming or construction, or overburden or other raw materials generated from the exempted mining activities.

(3) Releases of radionuclides from the dumping and transportation of coal

and coal ash (including fly ash, bottom ash, and boiler slags), including the dumping and land spreading operations that occur during coal ash uses.

(4) Releases of radionuclides from piles of coal and coal ash, including fly ash, bottom ash, and boiler slags.

(d) Except for releases of radionuclides, notification of the release of an RQ of solid particles of antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel, selenium, silver, thallium, or zinc is not required if the mean diameter of the particles released is larger than 100 micrometers (0.004 inches).

(e) The following releases are exempt from the notification requirements of this section:

(1) Releases in amounts less than 1,000 pounds per 24 hours of nitrogen oxide to the air which are the result of combustion and combustion-related activities.

(2) Releases in amounts less than 1,000 pounds per 24 hours of nitrogen dioxide to the air which are the result of combustion and combustion-related activities.

(3) Air emissions from animal waste (including decomposing animal waste) at a farm.

[50 FR 13474, Apr. 4, 1985, as amended at 54 FR 22538, May 24, 1989; 54 FR 33481, Aug. 14, 1989; 63 FR 13475, Mar. 19, 1998; 63 FR 42189, Aug. 6, 1998; 64 FR 13114, Mar. 17, 1999; 65 FR 67132, Nov. 8, 2000; 67 FR 45356, July 9, 2002; 71 FR 58533, Oct. 4, 2006; 73 FR 76959, Dec. 18, 2008; 76 FR 9666, Feb. 22, 2011; 77 FR 10390, Feb. 22, 2012; 83 FR 37446, Aug. 1, 2018]

§ 302.7 Penalties.

(a) Any person—

(1) In charge of a vessel from which a hazardous substance is released, other than a federally permitted release, into or upon the navigable waters of the United States, adjoining shorelines, or into or upon the waters of the contiguous zone,

(2) In charge of a vessel from which a hazardous substance is released, other than a federally permitted release, which may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (including resources under the Fishery Conservation and Management Act of 1976), and who is otherwise subject to the jurisdiction of the United States at the time of the release, or

(3) In charge of a facility from which a hazardous substance is released, other than a federally permitted release, in a quantity equal to or greater than that reportable quantity determined under this part who fails to notify immediately the National Response Center as soon as he or she has knowledge of such release or who submits in such a notification any information which he knows to be false or misleading shall be subject to all of the sanctions, including criminal penalties, set forth in section 103(b) of the Act.

(b) Notification received pursuant to this section or information obtained by the exploitation of such notification shall not be used against any such person in any criminal case, except a prosecution for perjury or for giving a false statement.

(c) This section shall not apply to the application of a pesticide product registered under the Federal Insecticide, Fungicide, and Rodenticide Act or to the handling and storage of such a pesticide product by an agricultural producer.

[50 FR 13474, Apr. 4, 1985, as amended at 67 FR 45356, July 9, 2002]

§ 302.8 Continuous releases.

(a) Except as provided in paragraph (c) of this section, no notification is required for any release of a hazardous substance that is, pursuant to the definitions in paragraph (b) of this section, continuous and stable in quantity and rate.

(b) *Definitions.* The following definitions apply to notification of continuous releases:

Continuous. A continuous release is a release that occurs without interruption or abatement or that is routine, anticipated, and intermittent and incidental to normal operations or treatment processes.

Normal range. The normal range of a release is all releases (in pounds or kilograms) of a hazardous substance reported or occurring over any 24-hour period under normal operating conditions during the preceding year. Only releases that are both continuous and

stable in quantity and rate may be included in the normal range.

Routine. A routine release is a release that occurs during normal operating procedures or processes.

Stable in quantity and rate. A release that is stable in quantity and rate is a release that is predictable and regular in amount and rate of emission.

Statistically significant increase. A statistically significant increase in a release is an increase in the quantity of the hazardous substance released above the upper bound of the reported normal range of the release.

(c) *Notification.* The following notifications shall be given for any release qualifying for reduced reporting under this section:

(1) Initial telephone notification;

(2) Initial written notification within 30 days of the initial telephone notification;

(3) Follow-up notification within 30 days of the first anniversary date of the initial written notification;

(4) Notification of a change in the composition or source(s) of the release or in the other information submitted in the initial written notification of the release under paragraph (c)(2) of this section or the follow-up notification under paragraph (c)(3) of this section; and

(5) Notification at such times as an increase in the quantity of the hazardous substance being released during any 24-hour period represents a statistically significant increase as defined in paragraph (b) of this section.

(d) *Initial telephone notification.* Prior to making an initial telephone notification of a continuous release, the person in charge of a facility or vessel must establish a sound basis for qualifying the release for reporting under CERCLA section 103(f)(2) by:

(1) Using release data, engineering estimates, knowledge of operating procedures, or best professional judgment to establish the continuity and stability of the release;

(2) Reporting the release to the National Response Center for a period sufficient to establish the continuity and stability of the release; or

(3) When a person in charge of the facility or vessel believes that a basis has been established to qualify the release for reduced reporting under this section, initial notification to the National Response Center shall be made by telephone. The person in charge must identify the notification as an initial continuous release notification report and provide the following information:

(i) The name and location of the facility or vessel; and

(ii) The name(s) and identity(ies) of the hazardous substance(s) being released.

(e) *Initial written notification.* Initial written notification of a continuous release shall be made to the appropriate EPA Regional Office for the geographical area where the releasing facility or vessel is located. (Note: In addition to the requirements of this part, releases of CERCLA hazardous substances are also subject to the provisions of SARA title III section 304, and EPA's implementing regulations codified at 40 CFR part 355, which require initial telephone and written notifications of continuous releases to be submitted to the appropriate State emergency response commission and local emergency planning committee.)

(1) Initial written notification to the appropriate EPA Regional Office shall occur within 30 days of the initial telephone notification to the National Response Center, and shall include, for each release for which reduced reporting as a continuous release is claimed, the following information:

(i) The name of the facility or vessel; the location, including the latitude and longitude; the case number assigned by the National Response Center or the Environmental Protection Agency; the Dun and Bradstreet number of the facility, if available; the port of registration of the vessel; the name and telephone number of the person in charge of the facility or vessel.

(ii) The population density within a one-mile radius of the facility or vessel, described in terms of the following ranges: 0–50 persons, 51–100 persons, 101–500 persons, 501–1,000 persons, more than 1,000 persons.

(iii) The identity and location of sensitive populations and ecosystems within a one-mile radius of the facility

or vessel (e.g., elementary schools, hospitals, retirement communities, or wetlands).

(iv) For each hazardous substance release claimed to qualify for reporting under CERCLA section 103(f)(2), the following information must be supplied:

(A) The name/identity of the hazardous substance; the Chemical Abstracts Service Registry Number for the substance (if available); and if the substance being released is a mixture, the components of the mixture and their approximate concentrations and quantities, by weight.

(B) The upper and lower bounds of the normal range of the release (in pounds or kilograms) over the previous year.

(C) The source(s) of the release (e.g., valves, pump seals, storage tank vents, stacks). If the release is from a stack, the stack height (in feet or meters).

(D) The frequency of the release and the fraction of the release from each release source and the specific period over which it occurs.

(E) A brief statement describing the basis for stating that the release is continuous and stable in quantity and rate.

(F) An estimate of the total annual amount that was released in the previous year (in pounds or kilograms).

(G) The environmental medium(a) affected by the release:

(*1*) If surface water, the name of the surface water body;

(*2*) If a stream, the stream order or average flowrate (in cubic feet/second) and designated use;

(*3*) If a lake, the surface area (in acres) and average depth (in feet or meters);

(*4*) If on or under ground, the location of public water supply wells within two miles.

(H) A signed statement that the hazardous substance release(s) described is(are) continuous and stable in quantity and rate under the definitions in paragraph (b) of this section and that all reported information is accurate and current to the best knowledge of the person in charge.

(f) *Follow-up notification.* Within 30 days of the first anniversary date of the initial written notification, the person in charge of the facility or vessel shall evaluate each hazardous substance release reported to verify and update the information submitted in the initial written notification. The follow-up notification shall include the following information:

(1) The name of the facility or vessel; the location, including the latitude and longitude; the case number assigned by the National Response Center or the Environmental Protection Agency; the Dun and Bradstreet number of the facility, if available; the port of registration of the vessel; the name and telephone number of the person in charge of the facility or vessel.

(2) The population density within a one-mile radius of the facility or vessel, described in terms of the following ranges: 0–50 persons, 51–100 persons, 101–500 persons, 501–1,000 persons, more than 1,000 persons.

(3) The identity and location of sensitive populations and ecosystems within a one-mile radius of the facility or vessel (e.g., elementary schools, hospitals, retirement communities, or wetlands).

(4) For each hazardous substance release claimed to qualify for reporting under CERCLA section 103(f)(2), the following information shall be supplied:

(i) The name/identity of the hazardous substance; the Chemical Abstracts Service Registry Number for the substance (if available); and if the substance being released is a mixture, the components of the mixture and their approximate concentrations and quantities, by weight.

(ii) The upper and lower bounds of the normal range of the release (in pounds or kilograms) over the previous year.

(iii) The source(s) of the release (e.g., valves, pump seals, storage tank vents, stacks). If the release is from a stack, the stack height (in feet or meters).

(iv) The frequency of the release and the fraction of the release from each release source and the specific period over which it occurs.

(v) A brief statement describing the basis for stating that the release is continuous and stable in quantity and rate.

(vi) An estimate of the total annual amount that was released in the previous year (in pounds or kilograms).

(vii) The environmental medium(a) affected by the release:

(A) If surface water, the name of the surface water body;

(B) If a stream, the stream order or average flowrate (in cubic feet/second) and designated use;

(C) If a lake, the surface area (in acres) and average depth (in feet or meters);

(D) If on or under ground, the location of public water supply wells within two miles.

(viii) A signed statement that the hazardous substance release(s) is(are) continuous and stable in quantity and rate under the definitions in paragraph (b) of this section and that all reported information is accurate and current to the best knowledge of the person in charge.

(g) *Notification of changes in the release.* If there is a change in the release, notification of the change, not otherwise reported, shall be provided in the following manner:

(1) *Change in source or composition.* If there is any change in the composition or source(s) of the release, the release is a new release and must be qualified for reporting under this section by the submission of initial telephone notification and initial written notification in accordance with paragraphs (c) (1) and (2) of this section as soon as there is a sufficient basis for asserting that the release is continuous and stable in quantity and rate;

(2) *Change in the normal range.* If there is a change in the release such that the quantity of the release exceeds the upper bound of the reported normal range, the release must be reported as a statistically significant increase in the release. If a change will result in a number of releases that exceed the upper bound of the normal range, the person in charge of a facility or vessel may modify the normal range by:

(i) Reporting at least one statistically significant increase report as required under paragraph (c)(7) of this section and, at the same time, informing the National Response Center of the change in the normal range; and

(ii) Submitting, within 30 days of the telephone notification, written notification to the appropriate EPA Regional Office describing the new normal range, the reason for the change, and the basis for stating that the release in the increased amount is continuous and stable in quantity and rate under the definitions in paragraph (b) of this section.

(3) *Changes in other reported information.* If there is a change in any information submitted in the initial written notification or the followup notification other than a change in the source, composition, or quantity of the release, the person in charge of the facility or vessel shall provide written notification of the change to the EPA Region for the geographical area where the facility or vessel is located, within 30 days of determining that the information submitted previously is no longer valid. Notification shall include the reason for the change, and the basis for stating that the release is continuous and stable under the changed conditions.

(4) Notification of changes shall include the case number assigned by the National Response Center or the Environmental Protection Agency and also the signed certification statement required at (c)(2)(xi) of this section.

(h) *Notification of a statistically significant increase in a release.* Notification of a statistically significant increase in a release shall be made to the National Response Center as soon as the person in charge of the facility or vessel has knowledge of the increase. The release must be identified as a statistically significant increase in a continuous release. A determination of whether an increase is a ''statistically significant increase'' shall be made based upon calculations or estimation procedures that will identify releases that exceed the upper bound of the reported normal range.

(i) *Annual evaluation of releases.* Each hazardous substance release shall be evaluated annually to determine if changes have occurred in the information submitted in the initial written notification, the followup notification, and/or in a previous change notification.

(j) *Use of the SARA Title III section 313 form.* In lieu of an initial written report

or a followup report, owners or operators of facilities subject to the requirements of SARA title III section 313 may submit to the appropriate EPA Regional Office for the geographical area where the facility is located, a copy of the Toxic Release Inventory form submitted under SARA Title III section 313 the previous July 1, provided that the following information is added:

(1) The population density within a one-mile radius of the facility or vessel, described in terms of the following ranges: 0–50 persons, 51–100 persons, 101–500 persons, 501–1,000 persons, more than 1,000 persons.

(2) The identity and location of sensitive populations and ecosystems within a one-mile radius of the facility or vessel (e.g., elementary schools, hospitals, retirement communities, or wetlands).

(3) For each hazardous substance release claimed to qualify for reporting under CERCLA section 103(f)(2), the following information must be supplied:

(i) The upper and lower bounds of the normal range of the release (in pounds or kilograms) over the previous year.

(ii) The frequency of the release and the fraction of the release from each release source and the specific period over which it occurs.

(iii) A brief statement describing the basis for stating that the release is continuous and stable in quantity and rate.

(iv) A signed statement that the hazardous substance release(s) is(are) continuous and stable in quantity and rate under the definitions in paragraph (b) of this section and that all reported information is accurate and current to the best knowledge of the person in charge.

(k) *Documentation supporting notification*. Where necessary to satisfy the requirements of this section, the person in charge may rely on recent release data, engineering estimates, the operating history of the facility or vessel, or other relevant information to support notification. All supporting documents, materials, and other information shall be kept on file at the facility, or in the case of a vessel, at an office within the United States in either a port of call, a place of regular berthing, or the headquarters of the business operating the vessel. Supporting materials shall be kept on file for a period of one year and shall substantiate the reported normal range of releases, the basis for stating that the release is continuous and stable in quantity and rate, and the other information in the initial written report, the followup report, and the annual evaluations required under paragraphs (e), (f), and (i), respectively. Such information shall be made available to EPA upon request as necessary to enforce the requirements of this section.

(l) *Multiple concurrent releases*. Multiple concurrent releases of the same substance occurring at various locations with respect to contiguous plants or installations upon contiguous grounds that are under common ownership or control may be considsred separately or added together in determining whether such releases constitute a continuous release or a statistically significant increase under the definitions in paragraph (b) of this section; whichever approach is elected for purposes of determining whether a release is continuous also must be used to determine a statistically significant increase in the release.

(m) *Penalties for failure to comply*. The reduced reporting requirements provided for under this section shall apply only so long as the person in charge complies fully with all requirements of paragraph (c) of this section. Failure to comply with respect to any release from the facility or vessel shall subject the person in charge to all of the reporting requirements of §302.6 for each such release, to the penalties under §302.7, and to any other applicable penalties provided for by law.

[55 FR 30185, July 24, 1990, as amended at 67 FR 45357, July 9, 2002]

PART 303—CITIZEN AWARDS FOR INFORMATION ON CRIMINAL VIOLATIONS UNDER SUPERFUND

Subpart A—General

Sec.

GHD.com

The Power of Commitment

Attachment 3 - Field Sampling Plan - Northern Impoundment

Provided As Part of Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

July 17, 2024

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1. Introduction

This Field Sampling Plan (FSP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company and McGinnes Industrial Maintenance Corporation for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (work site). This FSP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Remedial Design for the Northern Impoundment (Northern Impoundment RD) submittal to the EPA.

This FSP describes procedures for confirmation sampling of soil, sampling of treated water from the wastewater treatment system, sampling of the historic berm material that may be reused on-site, and sampling of any imported material that may be used during implementation of the Northern Impoundment remedial action (RA). It outlines the procedures for collection of samples during the course of the RA. This FSP was prepared in accordance with *Sampling and Analysis Plan Guidance and Template, Version 4*, General Projects R9QA/009.1 May 2014 EPA. Prior to initiation of Northern Impoundment RA activities, each remedial contractor (RC) selected by the party(ies) implementing the Northern Impoundment RD will, as applicable, either update this FSP or develop its own FSP to address the components outlined in this document. References below in this FSP to "the RC" are intended to refer to the selected RC with responsibility for that aspect of the Northern Impoundment RA. References in this FSP to the "work site" are to the Northern Impoundment and staging/lay down areas, including the area in which the water treatment system will be located.

1.1 Relationship to Supporting Plans

The FSP should be considered in conjunction with other supporting plans. The Site-Wide Monitoring Plan (SWMP) describes the procedures for monitoring to prevent the potential spread of dust generated during construction and monitoring of the best management practices with respect to stormwater and turbidity. Field and analytical quality procedures are described in the Quality Assurance Project Plan (QAPP). The Construction Quality Assurance/Quality Control Plan (CQA/QCP) describes the procedures to verify that excavation objectives are achieved during implementation. The Transportation and Off-Site Disposal Plan (TODP) describes the procedures for on-site management and loading of excavated material to be disposed of off-site during the Northern Impoundment RA, the transportation routes for off-site shipments, and measures to be implemented, if needed, to protect communities that may be affected by the shipments.

2. Confirmation Soil Sampling

The 2021 Supplemental Design Investigation (SDI) resulted in an expanded dataset to further define the extent of removal of material required to meet the clean-up level at locations within the Northern Impoundment. The current dataset consists of sample data collected from 79 subsurface soil borings from 0 to 24 feet below ground surface (ft bgs) over an approximate 14-acre area. This robust dataset was used to indicate the elevations of material to be excavated and to identify initial elevations for collection of confirmation samples.

In order to minimize stand-by time during excavation activities, confirmation sampling will be completed after the best management practice (BMP) wall installation but prior to the commencement of excavation and mechanical dredging activities. This FSP includes sampling procedures that will result in data demonstrating that the post-RA surface concentrations meet the clean-up level.

This section describes the use of composite sampling across decision units (DU) to demonstrate compliance with the clean-up level. This section includes procedures for collection of samples and preparation of composites.

2.1 Establishing Decision Units

DUs were developed by overlaying a grid system on the NI and Northwest Corner. Given that the NI and the Northwest Corner are not a uniform size and shape, this resulted in some variability in the size and shape of DUs. Except in the Northwest Corner, the Historic Berm Material areas were excluded from the DUs as Historic Berm Material will be segregated and evaluated separately, as discussed in Section 3 below.

2.1.1 Sampling Locations within a DU

Within each DU, nine discrete samples will be collected from sample locations as evenly spaced across the DU as possible, given the irregular shape of some of the DUs. Prior to sampling, the sample location will be surveyed by a licensed surveyor and the depth of the confirmation sample will be based upon the initial excavation elevation.

One discrete sample will be collected from each sample location, as further described in Section 2.2.1. In addition, a portion of each discrete sample will be utilized to create a composite sample for each DU. These samples are to be packed and labeled in the field and then sent to the approved analytical laboratory (Approved Laboratory) for analysis.

As a result of three pre-design investigations, there is an extensive dataset to give confidence in the horizontal and vertical extent of impacted material in the Northern Impoundment, which formed the basis for the initial excavation elevation. Figure 2.1 below illustrates the location of confirmation samples across the entire Northern Impoundment and Northwest Corner with existing RI/PDI/SDI historical sampling locations. Figure 2.2 below illustrates the location of confirmation samples, only, across the entire Northern Impoundment and Northwest Corner. Figure 2.3 provides an example of DU-level detail.

Figure 2.1 Confirmation Sampling Locations with Existing RI/PDI/SDI Locations

Figure 2.2 Confirmation Sampling Locations

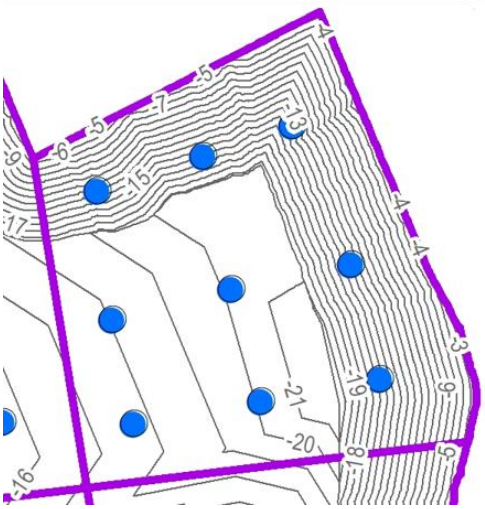

Figure 2.3 Example of DU Level Confirmation Sampling Locations

2.2 Sampling Procedures

2.2.1 Sample Collection and Compositing Procedures

A drill rig will be used to collect a sample from each surveyed location. In order to minimize the potential for soil from a shallower depth to slough into the boring, an outer casing will be set to the depth of the initial excavation elevation prior to sample collection.

At each sample location within the DU, approximately 6 ounces (oz) of soil will be collected from the boring at 0 to 1 feet depth below the initial excavation elevation. The 6-oz discrete sample will be thoroughly homogenized in a clean bowl using a clean trowel. Following homogenization, approximately 4-oz from the discrete sample will be placed into a laboratory-supplied sampling container, sealed, and labeled. This will be repeated for each of the nine sampling locations in the DU.

The remaining approximately 2-oz from each of the nine discrete samples will then all be combined into one clean bowl for preparation of the composite sample for that DU. The combined soil will be thoroughly homogenized using a clean trowel. Following homogenization, approximately 4-oz of the homogenized mixture will be placed into a laboratory-supplied sampling container, sealed, and labeled. Alternately, the Approved Laboratory (as defined in the QAPP) may prepare the composite samples in the laboratory. In that case, all 6-oz of the material from each discrete sample will be homogenized in the field and sent to the Approved Laboratory where a portion will be utilized for the composite sample and a portion will be held as the discrete sample for that location. Sample equipment will be decontaminated between samples, per Section 7.2.

Additional discrete samples will be collected and held from 1 to 2 ft below the initial excavation elevation.

Any remaining material not placed in sample containers will be staged in the excavation area of the NI for off-site disposal. Samples will be labeled, packed, and shipped as outlined in the procedures in Section 7.

2.2.2 Sample Analysis

Once at the Approved Laboratory, the discrete sample from each of the locations within the DU will be held by the Approved Laboratory pending the results of the total DU composite sample analysis. The composite sample for a DU will be tested for the analytical parameters listed in Table 2.1, pursuant to EPA Test Methods for Evaluating Solid Waste: Physical/Chemical Methods (SW-846). Analytical test methods and quality assurance/quality control procedures (QA/QC) are outlined in the QAPP.

Table 2.1 Analytical Testing Method for Confirmation Sampling

Analytical Parameters	Analytical Method[1]
Dioxins and Furans	SW-846 1613B

Note:
[1] EPA SW-846.

2.3 Data Analysis

Following laboratory analysis of the 0 to 1 ft composite sample, the result will be compared to the clean-up level. Results will be evaluated, as described below. A flow-chart below (Figure 2.4) provides a summary of the evaluation procedures.

– If the result of the composite sample for a DU from 0 to 1 ft below the initial excavation elevation is below the clean-up level, the remedial action objective has been met and the DU will be excavated to the initial excavation elevation.
– If the result of the composite sample for a DU from 0 to 1 ft below the initial excavation elevation is above the clean-up level, the composite sample for the DU from the 1 to 2 ft interval below the initial excavation elevation will be analyzed by the Approved Laboratory.

- If the result of the 1 to 2 ft composite sample from the DU is below the clean-up level the remedial action objective will be met by either:
  - The discrete samples from the 0 to 1 ft interval for the DU will be analyzed by the Approved Laboratory and discrete locations above the clean-up level will be excavated; OR
  - The entire DU will be excavated to 1 ft below the initial excavation elevation.
- If the result of the 1 to 2 ft composite sample from the DU is above the clean-up level:
  - Analysis of the discrete samples from the 1 to 2 ft interval will be evaluated for the DU; and
  - The path-forward for that DU will be determined pending risk management evaluation with the EPA. The path-forward will consider if additional excavation may compromise the BMP, excavation integrity, or poses a worker safety risk.
- For the Northwest Corner, a 6-inch overcut will be performed in that DU to serve as a final pass and remove any settled residuals.

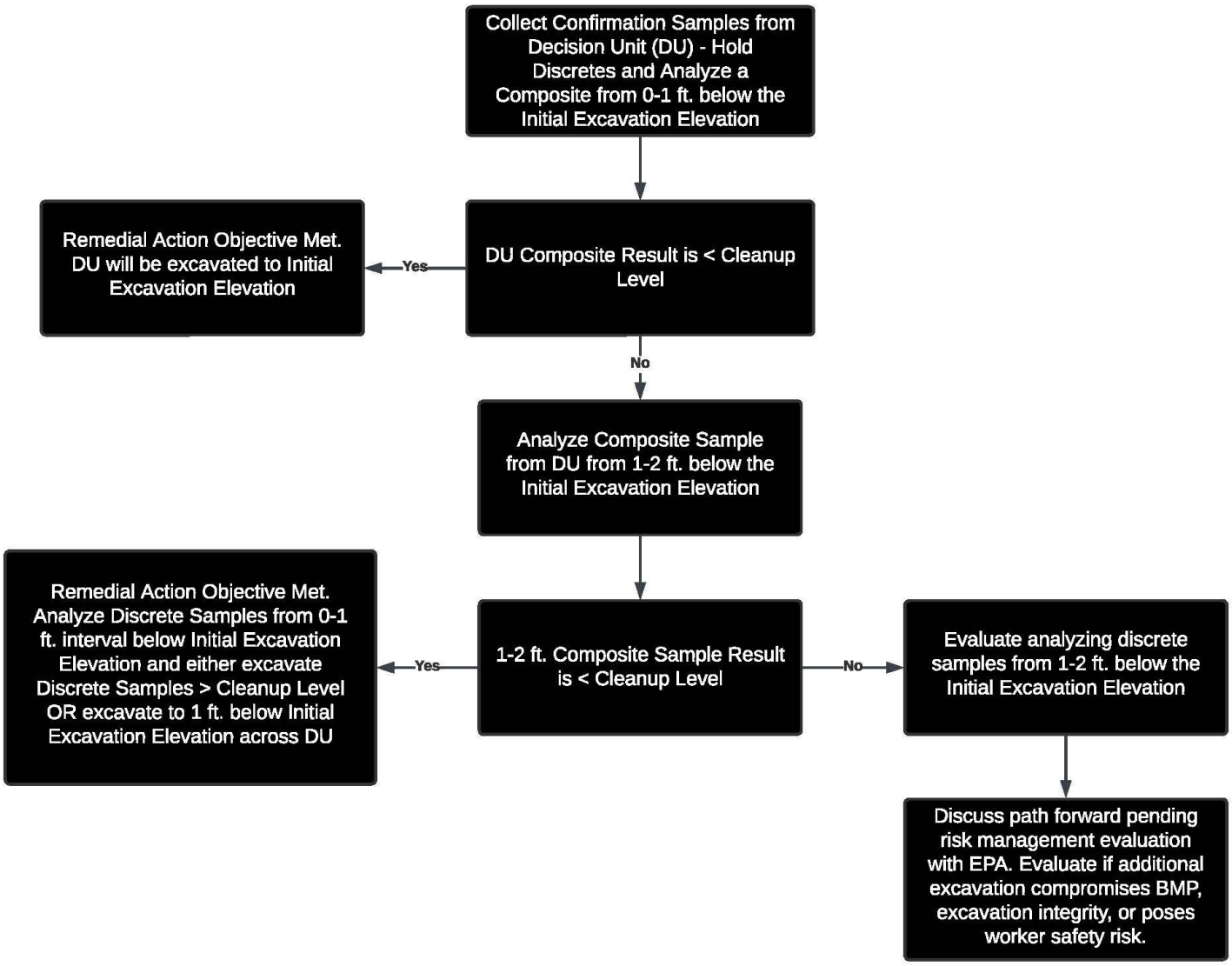

Figure 2.4 Confirmation Sampling Decision Flow Chart

3. Historic Berm Material Sampling

It is anticipated that during the Northern Impoundment RA, approximately 25,000 cubic yards (CY) of unimpacted material from the historic central and southern berms (Figure 2.1) at the Northern Impoundment will be excavated. Based upon characterization data from the pre-design investigations (included in Appendix A), these berms contain native material with dioxins concentrations below the clean-up level. During the Northern Impoundment RA, this unimpacted material may be reused for various work site activities, construction of work site features, cover, etc. Prior to reuse of this material, sampling will be conducted as discussed in Section 3.2.1. While laboratory analytical results are pending, the berm material will remain segregated from material slated for off-site disposal and from material previously determined suitable for reuse on-site.

3.1 Sampling Rationale

Soil samples from the excavated material from the central and southern berms will be collected and analyzed per Table 3.1. Laboratory analytical results will be compared to the clean-up level prior to reuse.

3.2 Sampling Procedures

3.2.1 Sample Collection Procedures

During excavation activities, material from the unimpacted central and southern berm areas will be segregated from the excavated waste material to the extent possible. One composite sample of the unimpacted berm material will be collected for each 500 CY for analysis. Samples will be placed into a laboratory-supplied sampling container, sealed, and labeled. Sample equipment will be decontaminated between samples, per Section 7.2.

Samples will be labeled, packed, and shipped as outlined in the procedures in Section 7.

3.3 Sample Analysis

The composite sample from each 500 CY will be tested for the analytical parameters listed in Table 3.1, pursuant to EPA Test Methods SW-846. Analytical test methods and QA/QC are outlined in the QAPP.

Table 3.1 Analytical Testing Method for Historic Berm Confirmation Sampling

Analytical Parameters	Analytical Method[1]
Dioxins and Furans	SW-846 1613B

Note:
[1] EPA SW-846.

3.4 Data Analysis

If the analytical results for a composite sample are above the clean-up level, that 500 CY of soil would be handled in the same manner as the impacted material to be trucked off-site for disposal. If the analytical result is below the clean-up level, the soil can be reused on-site and will be segregated and staged in a designated location for material determined suitable for reuse.

4. Off-Site Fill Characterization Sampling

It is anticipated that during the Northern Impoundment RA approximately 25,000 CY of imported fill from an off-site source will be used to backfill the interior slope along the south side of the impoundment. Another approximately 40,000 CY of material from an off-site source will be utilized as fill between the two parallel sheetpile walls that comprise the BMP and when the BMP is removed, that fill material may be used as cover over portions of the excavated areas. Prior to importing cover or fill material to the work site, the material to be imported will be sampled to confirm that it does not contain constituents of potential concern (COPCs) above the EPA Regional Screening Levels (RSL) for resident soil (EPA RSL Table, May 2020) or the Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP) Tier 1 Residential Soil protective concentration levels (PCLs; for total petroleum hydrocarbons [TPH]). Texas-specific soil background concentrations will additionally be taken into consideration according to 30 Texas Administrative Code (TAC) 350.51. Site-specific allowable metal concentrations may also be calculated based on risk assessments previously performed for the work site.

4.1 Sampling Rationale

A six-point composite soil sample from each imported fill source will be collected and analyzed to confirm that the imported material does not contain COPCs above the specified levels. Only one sample per imported fill source is required, as long as the general location of the source of material does not change or there has not been any identified change in the composition of the imported material. The RC would be required to periodically monitor the imported material through visual inspections to confirm that no changes in composition have occurred.

4.2 Sample Collection Objective

The objective of collecting imported fill soil samples will be to ensure that the sample is representative of the material from that source as a whole. Soil samples will be composited from different locations and elevations of imported fill material from the source. Soil samples will be collected directly from the source material and analyzed at the Approved Laboratory prior to material delivery to the Northern Impoundment.

4.3 Sample Analysis

Each off-site imported fill soil sample is to be tested for the analytical parameters listed in Table 4.1, pursuant to EPA Test Methods SW-846 and Target Compound List (TCL)/Target Analyte List (TAL) and the other analytical methods listed in Table 4.1. Analytical test methods and QA/QC are outlined in the QAPP. Additional analyses for off-site fill soil samples are outlined in Sections 31 23 23 of the RD specifications.

Table 4.1 Analytical Testing Methods for Source Sampling

Analytical Parameters	Analytical Methods[1]
TAL[3] Metals	SW-846 6020A/7471A
Hexavalent Chromium	SW-846 7196A
Cyanide	SW-846 9010/9012
TCL[2] Volatiles	SW-846 8260B
TCL Semi-Volatiles	SW-846 8270D
TCL Pesticides	SW-846 8081B
Polychlorinated Biphenyls	SW-846 8082A
Herbicides	SW-846 8151A
Dioxins and Furans	SW-846 1613B
Total Petroleum Hydrocarbons	TX 1005/1006[4]

Notes:
[1] EPA SW-846.
[2] TCL: Target Compound List.
[3] TAL: Target Analyte List.
[4] TCEQ Methods 1005 and 1006.

4.4 Sampling Procedures

All source sample collection activities are to be performed using clean hand tools, such as a trowel or sharpshooter shovel, as access allows. It is intended that the samples will be collected in accordance with the procedures set forth below and those governing the collection and shipment of samples contained in the QAPP. Samples will be labeled, packed, and shipped as outlined in the procedures in Section 7.

5. Water Sampling

During the Northern Impoundment RA, water that accumulates in an open excavation (through precipitation or seepage) will be treated through an on-site water treatment system prior to discharge to the San Jacinto River. The water treatment process, the results of treatability testing, and the calculated discharge criteria are detailed in the Northern Impoundment RD.

5.1 Sample Collection Objective

The water treatment system has been designed to remove suspended solids and COPCs associated with those solids, including dioxins/furans and metals. Sampling will be required for purposes of compliance with discharge criteria for total suspended solids (TSS), pH, dioxins/furans, and metals, as discussed in the Northern Impoundment RD.

5.2 Sample Type, Location, and Frequency of Compliance Sampling

The compliance sampling location with respect to the water treatment system is identified on the design drawings (Appendix G). The location would be downstream of the Service Water Storage tank, as identified on Drawing P-01, and prior to the point of discharge to the San Jacinto River. Monitoring frequencies and sample types from 30 Texas Administrative Code (TAC) 319.9 (c) Table 3 (for treatment units with effluent flow from 0.50 to less than 2.00 million gallons a day [MGD]) are identified in Table 5.1, below. The discharge of treated water is expected to be sporadic. Therefore, the sampling frequency applies to time periods when a discharge is occurring. Two different discharge scenarios have been considered, as detailed in Sections 5.2.1 and 5.2.2.

5.2.1 Continuous Discharge

Under a continuous discharge scenario, effluent samples will be collected from the compliance sampling point and analyzed in compliance with Table 5.1.

Table 5.1 Continuous Discharge Sample Analysis and Frequency

Parameter	Minimum Frequency of Measurement[3]	Analytical TAT (business days)[4, 5]	Sample Type
Flow	1 per operating shift	---	Instantaneous
pH	1 per day	---	Grab
TSS	2 per week	3-5 days	Composite
Metals[1]	1 per week	3-5 days	Composite

Parameter	Minimum Frequency of Measurement[3]	Analytical TAT (business days)[4, 5]	Sample Type
Dioxin/Furans[2]	1 per week	3-5 days	Composite

Notes:

[1] The most conservative frequency for metals included in TAC 319.9 Table 3 (Copper, Lead, Nickel, Silver, Zinc) is twice per week, but based on characterization, dissolved metals in the untreated contact water were significantly less than discharge criteria. Therefore, the collection of weekly samples is proposed.
[2] Dioxin/Furans are not specified in TAC 319.9 Table 3.
[3] Samples will be collected only while discharging.
[4] Flow rate and pH data will be collected on-site using real-time in-line monitors.
[5] Assumes an expedited TAT but dependent on analytical laboratory capability and availability.

If analyses of the discharge sample indicates that effluent does not meet discharge criteria for a certain parameter a second sample of treated water will be collected and analyzed for that parameter as soon as practical. The water treatment process, the results of the treatability testing, and the calculated discharge criteria are detailed, further, in the 100% RD. Additionally, performance checks may be conducted on the treatment system, including but not limited to, appropriate modifications with respect to chemical dose, checking to determine whether GAC and/or filter media and bag filters should be replaced, etc.

5.2.2 Batch Discharge

Under a batch discharge scenario, effluent samples will be collected downstream of the last treatment unit but before the effluent tank and analyzed prior to discharge in compliance with Table 5.2.

Table 5.2 Batch Discharge Sample Analysis and Frequency

Parameter	Minimum Frequency of Measurement[2]	Analytical TAT (business days)[3,4]	Sample Type
Flow	1 per discharge batch	---	Instantaneous
pH	1 per discharge batch	---	Grab
TSS	1 per discharge batch	3-5 days	Composite
Metals	1 per discharge batch	3-5 days	Composite
Dioxin/Furans[1]	1 per discharge batch	3-5 days	Composite

Notes:

[1] Dioxin/Furans are not specified in TAC 319.9 Table 3.
[2] Samples will be collected only while discharging.
[3] Flow rate and pH data will be collected on-site using real-time in-line monitors.
[4] Assumes an expedited TAT but dependent on analytical laboratory capability and availability.

If analyses of the discharge sample indicates that effluent does not meet discharge criteria for a certain parameter, the effluent would be recirculated, retreated, and the re-treated water will be collected and analyzed for that parameter prior to discharge. The water treatment process, the results of the treatability testing, and the calculated discharge criteria are detailed, further, in the 100% RD. Additionally, performance checks may be conducted on the treatment system, including but not limited to, appropriate modifications with respect to chemical dose, checking to determine whether GAC and/or filter media and bag filters should be replaced, etc.

5.3 Sampling Procedures

5.3.1 Equipment Calibration

The pH meter will be calibrated following instrument manufacturer instructions. A two-point calibration will be conducted at a minimum. Records of pH meter calibration will be maintained at the work site during the Northern Impoundment RA, as specified in the QAPP.

5.3.2 Sampling Procedure

It is recommended that the following procedures be followed for collection of water samples:

- Obtain sample cooler, bottles, and container from the Approved Laboratory.
- Inspect sample containers for cleanliness, integrity, and the presence and suitability of any required preservatives.
- Flush line at sample port to clear water standing in line in order to obtain a representative sample. Containerize the flush water and return to treatment system.
- Collect fresh grab samples in a clean bucket. If possible, samples will be collected directly into sample containers. Volume should be sufficient to fill all bottles. Stir bucket, if used, to suspend solids. Divide each sample between containers, such that essentially identical samples are collected and submitted to the Approved Laboratory during each sampling event.
- Collect composite samples for a 24-hour period or over the length of the discharge period (if the discharge occurs for less than 24 hours). A composite sampler may be used to collect flow-weighted composite sample. Alternatively, a series of grab samples may be composited in volumes proportional to flow and collected at the intervals required by 30 Texas Administrative Code (TAC) 319.9.
- If possible, sufficient equipment will be sent to the field so that all sampling can be conducted without the need for field decontamination. Decontamination of field equipment will be conducted, as specified in the QAPP. Sample collectors will change gloves after each sampling event.

Samples will be labeled, packed, and shipped as outlined in the procedures in Section 7.

6. Investigation Derived Wastes

Investigation derived waste (IDW) from sampling and decontamination activities will be either treated in the on-site water treatment system (for liquid IDW) or incorporated into the excavated waste material for off-site disposal (solid IDW).

All disposable materials used for sample collection and processing, such as paper towels and gloves, will be placed in heavyweight garbage bags or other appropriate containers. Disposable supplies that do not contain IDW will be placed in a normal refuse container for disposal at a solid waste landfill.

All IDW will be disposed of in accordance with all applicable regulations and guidelines as specified in the TODP.

7. Equipment, Decontamination, Sample Labeling, Packing, and Shipping

7.1 List of Equipment Needed

7.1.1 Confirmatory and Source Material Sampling Equipment

- Sample Containers.
- Trowels.
- Nitrile Gloves.
- Mixing Bowls.

– Laboratory-grade Detergent.
– Deionized Water.
– Abrasion Brush.
– Buckets.
– Sharpie.
– Cooler.
– Ice.

Sampling equipment will either be disposed or be decontaminated between samples, if it is reused, as described in Section 7.2.

7.1.2 Water Sampling Equipment

– Sample Containers.
– Bucket and Stirrer (if collecting multiple samples at same location).
– Nitrile Gloves.
– pH Meter and Calibration Standards.

Sampling equipment will be decontaminated between samples, as described in Section 7.2.

7.2 Decontamination of Sampling Equipment

All drilling and sample collection equipment that is not disposable will be decontaminated before and after sample collection at each sample location. Equipment cleaning procedures may include the following:

– Initial rinse with laboratory-grade deionized water to remove soil adhered to the equipment.
– Apply a non-phosphate laboratory-grade detergent to the equipment and scrub using an abrasion brush to thoroughly clean the sampling equipment.
– Triple rinse the equipment with laboratory-grade deionized water.
– Air-dry the rinsed equipment and wrap in clean, protective plastic, until used.

7.3 Sample Labeling

Labels will be secured to the sample containers and be written in indelible inks. Sample containers will be packaged and shipped on ice within an insulated ice chest to the Approved Laboratory for analysis following proper Chain-of-Custody protocol.

Labels will contain the following information:

– Sample identification (this includes a sample number and may include a sample container number).
– Initials of sample collector(s).
– Date and time of sample collection.
– Location or source of sample collection.
– Analysis to be performed.
– Preservative utilized.

7.4 Sample Packing and Shipping

When possible, sample container preparation and packing for shipment will be completed in a well-organized and clean area, free of any potential for cross-contamination of the samples. Sample containers will be prepared for shipment as follows:

1. Containers are to be wiped clean of all debris/water using paper towels (paper towels must be disposed of with other potentially impacted materials).
2. Steps are to be taken to ensure that the sample labelling protocol outlined above has been completed.
3. The entire contents of the cooler are to be sealed in a large plastic bag.
4. The trip blank and the temperature blank are to be included with shipments of samples for volatiles analysis.
5. Chain-of-custody documentation is to be completed. A Chain-of-Custody form is to be placed in a separate plastic bag placed on top of the samples for shipment with a copy retained for reference. If a copy is not available, a photograph of the form will be taken as a record.
6. Custody seals are to be placed on each cooler and covered with clear tape.
7. Cooler lids and drain holes are to be sealed with packaging tape.
8. All prior stickers/markings or any prior shipping labels are to be removed from coolers prior to shipment or sample custody release.
9. Samples should be shipped on the same day as sampling. If samples cannot be shipped on the same day, the cooler will be drained periodically, and ice replaced. Samples will arrive at the Approved Laboratory within hold times provided by the Approved Laboratory.
10. The Approved Laboratory will be notified as to when the samples should arrive.

8. References

– EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, CERCLA Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.

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→ The Power of Commitment

Attachment 4 - Quality Assurance Project Plan - Northern Impoundment

Provided as part of Final 100% Remedial Design - Northern Impoundment

San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

July 17, 2024

→ The Power of Commitment

Quality Assurance Project Plan
Signature Page

Site Name:	San Jacinto River Waste Pits Superfund Site		
Location Address:	18001 East Freeway Market St., Channelview, Texas 77530		
Anticipated Start Date:	TBD	Anticipated Project Duration:	TBD
Prepared By:		Date:	
Project Coordinator:		Date:	
Quality Assurance Officer:		Date:	

This signature page must be completed prior to Northern Impoundment RA activities and be available on site for review.

Acronyms and Abbreviations

ANSI/ASQC	American National Standards Institute/American Society for Quality Control
AOC	Administrative Settlement Agreement and Order of Consent
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
DQOs	Data Quality Objectives
EDDs	Electronic Data Deliverables
EPA	United States Environmental Protection Agency
FSP	Field Sampling Plan
GC/MS	Gas Chromatography/Mass Spectrometry
GHD	GHD Services Inc.
HAZWOPER	Hazardous Waste Operations and Emergency Response
IPC	International Paper Company
LCS	Laboratory Control Sample
LIMS	Laboratory Information Management System
MIMC	McGinnes Industrial Maintenance Corporation
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness, Sensitivity
PE	Performance Evaluation
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RPD	Relative Percent Difference
SOP	Standard Operating Procedure
SOW	Statement of Work
SWMP	Site-Wide Monitoring Plan
TCEQ	Texas Commission on Environmental Quality

Contents

Table index

1. Introduction

This Quality Assurance Project Plan (QAPP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (work site). This QAPP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06 02 18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Final 100% Remedial Design for the Northern Impoundment (Northern Impoundment 100% RD) submittal to the EPA.

This QAPP was developed to augment the Field Sampling Plan (FSP) and the Site-Wide Monitoring Plan (SWMP) and to address sample analysis and data handling during implementation of the remedial action (RA) for the Northern Impoundment. This QAPP was prepared in accordance with the EPA Requirements for Quality Assurance Project Plans, QA/R 5, EPA/240/B 01003 (March 2001, reissued May 2006); Guidance for Quality Assurance Project Plans, QA/G 5, EPA/240/R 02/009 (December 2002); and Uniform Federal Policy for Quality Assurance Project Plans, Parts 1 3, EPA/505/B 04/900A through 900C (March 2005). References in this QAPP to the “work site” are to the Northern Impoundment and references to “Implementing Party” are to the entity(ies) implementing the RA for the Northern Impoundment.

Prior to initiation of Northern Impoundment RA activities, the selected remedial contractor(s) (RC) will update this QAPP or develop a separate QAPP that addresses the components outlined in this document.

In accordance with the EPA guidance listed above, there are four main topics that must be included in a QAPP.

Those four topics are:

– Project Management - project management, project objectives, and project history
– Data Generation and Acquisition - descriptions of the design and implementation of all measurement systems that will be used during the project
– Assessment/Oversight - the procedures used to ensure proper implementation of the QAPP
– Data Validation and Usability - the quality assurance (QA) activities that occur after the data collection phase of the project is completed

Components of tasks associated with these four topics and suggested responsibilities for project management, data generation and acquisition, assessment/oversight, and data validation and usability are outlined in this QAPP.

This QAPP is a dynamic document, and it will be updated with specific addenda, if necessary, to reflect new scopes of work or changes in the current scope of required sampling. Any necessary modifications will be made by the Quality Assurance Officer (QA Officer) to be designated by the Implementing Party and will be reviewed by the Project Coordinator (as defined below in Section 2.1.1). This QAPP should be reviewed on a routine basis by the QA Officer to determine if it should be modified to reflect any work being conducted at the work site.

1.1 Relationship to Supporting Plans

The QAPP should be considered in combination with the other supporting plans. The SWMP describes the procedures for ongoing monitoring during the RA (i.e., dust, stormwater, odor, and turbidity). The FSP provides the procedures for collection of samples during the RA (i.e., treated effluent water, excavation confirmation samples, off-site backfill samples, and waste profile samples). The Construction Quality Assurance/Quality Control Plan (CQA/QCP) describes the procedures to verify that the excavation objectives are achieved during implementation. The Transportation and Off-Site Disposal Plan (TODP) describes procedures for on-site management and loading of excavated material to be

disposed of off-site during the RA, the transportation routes for off-site shipments, and measures to be implemented, if needed, to protect communities that may be affected by the shipments.

2. Project Management

2.1 Project Organization

It is anticipated that, for purposes of the Northern Impoundment RA, project management and safety responsibilities may be assigned as described below. The role and, if applicable, proposed responsibilities of the EPA, the Implementing Party, QA personnel, field personnel, and laboratory personnel are described in the following subsections. Additionally, any recommended training/certification requirements related to implementation of the Northern Impoundment RA are identified.

2.1.1 Roles and Responsibilities

United States Environmental Protection Agency

The EPA is the lead agency with respect to the Northern Impoundment RA. The EPA has designated a Remedial Project Manager (RPM) to oversee the Northern Impoundment RD/RA.

Project Coordinator

The Project Coordinator will be designated by the Implementing Party to ensure that the Northern Impoundment RA is implemented in accordance with the approved Northern Impoundment 100% RD. It is anticipated that the Project Coordinator would have technical responsibility for data collection activities. The Project Coordinator's responsibilities include, but are not limited to, reviewing QA reports, approving and authorizing actions necessary to accomplish QA objectives, and acting as liaison between agencies and field staff.

Laboratory Project Manager

Analytical laboratory options for the Northern Impoundment RA are still under consideration. The analytical laboratory selected to perform environmental analyses for the Northern Impoundment RA will hereafter in this document be identified as the "Approved Laboratory". The Approved Laboratory is expected to be a full-service chemical analytical laboratory accredited under the National Environmental Laboratory Accreditation Program (NELAP) and certified in Texas. More than one Approved Laboratory may be selected.

The Laboratory Project Manager will be a person designated by an Approved Laboratory.

The Laboratory Project Manager is anticipated to act as the primary point of contact between the Approved Laboratory and the Project Coordinator and will have responsibility to address technical issues relating to generated analytical data.

The responsibilities of the Laboratory Project Manager include, but are not limited to, the following:

– Ensure that resources of the Approved Laboratory are available on an as-required basis
– Review of scope of work and planned analyses and methods
– Review of final analytical reports
– Approval of final reports prior to submission

2.1.2 Quality Assurance Roles and/or Responsibilities

Project team members with QA responsibilities include the Implementing Party Quality Assurance Officer (Implementing Party QA Officer) and the person designated by each Approved Laboratory as its Quality Assurance Officer (Laboratory QA Officer). Responsibilities of these individuals include, but are not limited to, the following:

Implementing Party QA Officer

- Manage field activities and field quality assurance/quality control (QA/QC)
- Conduct oversight and review of field QA/QC
- Prepare Standard Operating Procedures (SOPs) for field activities
- Advise on appropriate sampling procedures and methods for field activities
- Review of laboratory QA/QC
- Coordination and review of data validation and assessment
- Advise on laboratory corrective action procedures
- Prepare and review QA reports
- Implement and document field corrective actions, if required

Laboratory QA Officer

- Coordinate and perform overview of laboratory systems audits
- Perform overview of QA/QC documentation
- Conduct detailed data review
- Implement and document Approved Laboratory's corrective actions, if required
- Oversee compliance with Approved Laboratory's quality assurance plans.
- Oversee preparation of Approved Laboratory's SOPs

2.1.3 Field Responsibilities

A selected RC will conduct all field sampling and obtain field measurements related to sampling during the RA, as described in the FSP and the SWMP. The specific procedures for field sample collection and field measurements will be developed in compliance with applicable SOPs for fieldwork, as determined by the selected RC. These procedures will include requiring the RC's field team leader to document any field-related non-conformances that are identified or reported by the leader or field team members and to implement and document any corrective actions.

2.1.4 Laboratory Responsibilities

Laboratory analyses for the RA will be performed by an Approved Laboratory. The shipping address and contact information for the Approved Laboratory will be provided prior to samples being collected. The roles and specific responsibilities of the Approved Laboratory's personnel involved in the project include, but are not limited to, the following:

Laboratory Project Manager

- Coordinate laboratory analyses
- Supervise in-house Chain-of-Custody
- Subcontract sample analyses, as needed
- Schedule sample analyses
- Oversee data review
- Oversee preparation of analytical reports

Sample Custodian

– Receive and inspect incoming sample containers
– Record the condition of incoming sample containers
– Sign appropriate documents
– Verify correctness of Chain-of-Custody documentation
– Notify Laboratory Project Manager of any non-conformances identified during sample receipt and inspection
– Assign a unique identification number to each sample, and enter the client identification number and sample identification numbers into the sample receiving log
– Initiate transfer of the samples to appropriate laboratory sections
– Control and monitor access/storage of samples and extracts

2.2 Quality Objectives and Criteria

Data quality objectives (DQOs) are qualitative and quantitative statements derived from the outputs of each step of the DQOs process. The DQOs process is a series of planning steps based on the scientific method that is designed to ensure that the type, quantity, and quality of environmental data used in decision making are appropriate for the intended application. A systematic planning process will be used to develop DQOs for purposes of this QAPP. That process, as described in *EPA's Guidance on Systematic Planning Using the DQOs Process* (EPA, 2006), is designed to ensure that environmental data are of the appropriate type and quality for the intended use, and lead to logical conclusions and defensible decisions or estimates. DQOs are developed through a seven-step process that is both sequential and iterative, depending upon the complexity of the problem. The steps involve both qualitative and quantitative criteria. The overarching outcomes of the DQOs process are described below.

There seven steps in the DQOs process are:

1. Stating the problem
2. Identifying the goal of the study
3. Identifying information inputs
4. Defining the boundaries of the study
5. Developing the analytical approach
6. Specifying performance or acceptance criteria
7. Developing the plan for obtaining data

The resulting statements and DQOs are summarized as follows:

1	Problem	The Northern Impoundment 100% RD calls for a RA that involves removal of waste material and off-site disposal.
2	Goal	The goal is to collect the data necessary to ensure the excavation boundaries satisfy the requirements contained in the approved Northern Impoundment 100% RD, to characterize excavated materials and wastes, and to ensure that the discharges from the wastewater treatment system meet applicable regulatory standards.
3	Inputs	Analytical chemistry data will be collected to ensure that excavation has been conducted as provided for in the approved Northern Impoundment 100% RD and that applicable regulatory standards for water discharges are met.
4	Boundaries	Impacted material, sediment, water, and imported fill samples from the Northern Impoundment will be collected.
5	Analytical Approach	The analytical approach is to generate usable data in accordance with this QAPP.
6	Acceptance Criteria	Laboratory acceptance criteria are presented in this QAPP for the RA activities to generate validated data to address data needs and identified data gaps.
7	Plan	The plan for sample collection activities is provided in the FSP, presented as part of the Northern Impoundment 100% RD.

2.2.1 Measurement Performance Criteria

The measurement performance criteria for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) will be determined by the Implementing Party, the RC, and the Approved Laboratory prior to the RA. All required guidelines and recommendations will be used to determine these criteria.

2.3 Special Training Requirements/Certifications

Field sampling team members will be required to have successfully completed relevant field training protocols and to follow the Health and Safety Plan (HASP) for the Northern Impoundment RD. They will also, if appropriate, be required to have received the 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) safety training and annual 8-hour refresher courses required by 29 Code of Federal Regulations (CFR) Parts 1910 and 1926. The RC will be required to maintain employee training documentation.

Laboratory personnel training records will be maintained by the Approved Laboratory. The Approved Laboratory must be accredited through the NELAP and the Texas Commission on Environmental Quality (TCEQ) for the methods that it will perform, as applicable to demonstrate compliance with EPA's requirement that the Approved Laboratory have a documented quality system that complies with American National Standards Institute/American Society for Quality Control (ANSI/ASQC) E4-94 ("Specifications and Guidelines for Quality System for Environmental Data Collection and Environmental Technology Programs", January 1995), and EPA QA/R-2 ("EPA Requirements for Quality Management Plans", March 2001). Prior to laboratory selection, these requirements will be verified.

2.4 Documentation and Records

The documents, records, and reports that are expected to be generated during Northern Impoundment RA activities are identified in the following subsections. The Project Coordinator will ensure the most current version of the QAPP is available prior to each sampling event.

2.4.1 Field and Laboratory Records

Documents and records generated are expected to include sample collection records, Quality Control (QC) sample records, laboratory records, and data handling records. A brief description of these documents and records is provided below.

Sample collection records to be used during RA sampling activities include field logbooks and/or project standard field forms, stratigraphic logs, Chain-of-Custody records, field narratives, and shipping papers.

QC sample records to be used to document the generation of QC samples include field logbooks and/or project standard field forms recording field blank samples, and field duplicate samples. The Approved Laboratory will maintain quality records for all analytical blank samples (i.e.: trip blank, equipment blank, and/or field blank samples).

Calibration data, where applicable, should be recorded in these logbooks and/or on project standard field forms.

Laboratory records to be maintained for the project include sample receipt documentation, laboratory narratives, field and laboratory Chain-of-Custody documentation, sample container cleanliness certifications, reagent and standard reference material certifications, sample preparation records, sample analysis records (i.e., run logs), instrument/raw data, QC data, calibration data, corrective action reports, and final reports.

Data handling records to be maintained include records verifying the accuracy of computer programs used to process or reduce raw data into final results and data validation reports. The Approved Laboratory will be expected to maintain documentation of data verification and reduction procedures as necessary for the analyses used during the Northern Impoundment RA.

The RC will also maintain checklists, notes, and reports generated during the external data validation process.

2.4.2 Data Reporting Format

Field data is expected to be recorded in field logbooks and/or on project standard field forms. Field data will likely be generated primarily from observations. This information will be included in project reports or submittals.

Laboratory reports for sampling and monitoring activities will include data deliverables, which include some or all of the following:

1. Case narrative for each analyzed batch of samples
2. Cross referencing of laboratory sample to project sample identification numbers
3. Description of data qualifiers to be used
4. Methods of sample preparation and analyses for samples
5. Sample results
6. Raw data for sample results and laboratory QC samples
7. Results of (dated) initial and continuing calibration checks and Gas Chromatography/Mass Spectrometry (GC/MS) tuning results
8. Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries, Laboratory Control Sample (LCS), method blank results, surrogate recoveries, calibration check compounds and system performance check compound results (organics)
9. MS recoveries and matrix duplicate Relative Percent Difference (RPDs), LCS, serial dilutions, method blank results, and reagent blank results (inorganics)
10. Labelled and dated chromatograms/spectra of sample results and laboratory QC checks

Any data package prepared in connection with the Northern Impoundment RA should be an EPA "Contract Laboratory Program-like (CLP-like)" data package consisting of all the information presented in a CLP data package but not necessarily on CLP forms.

The Approved Laboratory will maintain validation and calibration data, which include raw instrument data (including calibration data and instrument performance checks), method detection limit (MDL) studies, and method performance and validation studies. Summaries of the results of these studies should be included in the data packages.

2.4.3 Data Archiving and Retrieval

Procedures will be put in place regarding retention of records. It is anticipated that records would be maintained, taking into account, the Approved Laboratory's and the RC’s record retention policies and applicable EPA or other agency requirements.

3. Data Generation and Acquisition

The RC will define requirements for design and implementation of the measurement systems to be used during the RA activities. These will include sampling procedures, analytical procedures, and data handling and documentation requirements that are detailed in the following subsections.

3.1 Sampling Program

The rationale for the sampling activities to be conducted during the RA is described in the Northern Impoundment 100% RD, the FSP, and the SWMP.

3.2 Sampling Methods

SOPs for sample collection will be provided by the RC prior to the start of RA activities.

3.3 Sample Handling and Custody Requirements

The procedures for sample handling, labelling, shipping, and Chain-of-Custody documentation that is to be adopted in connection with RA activities are provided in the subsections that follow.

3.3.1 Sample Handling and Packaging

The procedures used to collect and handle the samples will be provided in the RC's SOPs. The sample identification procedure will be determined prior to the start of RA activities by the RC. Unique sample numbers will be assigned to samples. Procedures will be put in place to record information such as sample identifications, sample locations, and sample depths in field logbooks or field forms.

Samples will be required to be placed in shipping coolers containing ice following collection, and then shipped or delivered to an Approved Laboratory.

3.3.2 Chain-of-Custody

Chain-of-custody is the sequence of possession of an item. Field, laboratory, and final evidence files custody procedures that is to be used during RA activities are described in the subsections that follow.

3.3.2.1 Field Custody Procedures

Logbooks and/or project standard field forms are to be used to record field data collection activities. Field logbooks are bound field survey books or notebooks with consecutively numbered pages. Each logbook should be identified by a project-specific document number.

The RC should develop a standard format for the logbooks prior to the RA to ensure that the date, start time, weather, names of all sampling team members present, and the signature of the person making the entry are recorded.

All field measurements and sample collection information should be recorded in a logbook and/or on a project standard field form. Project standard field forms should be specifically prepared for each project sampling location. These forms should be used to record all field measurements/information and samples collected for each location. All entries in such forms should be completed in ink, without any erasures. If an incorrect entry is made, the incorrect information should be crossed out with a single strike mark. The correct information should then be entered adjacent to the original entry. The forms are to be signed and dated.

Whenever a sample is collected, an identification and a detailed description (if necessary) of the location should be recorded in the logbook and/or on a project standard field form. Photographs taken at a location, if any, should be noted in the logbook. All equipment used to obtain field measurements should be recorded in the field logbook and/or on a project standard field form. In addition, the calibration data for all field measurement equipment should be recorded in the field logbook or on standard field forms.

Samples should be collected according to the applicable sampling procedures documented in the FSP or other project-appropriate planning document. The equipment used to collect samples, time of sample collection, sample description, volume and number of containers, and preservatives added (if applicable) should be recorded in the field logbook and/or on a project standard field form. A deviation from sampling procedures in the FSP, QAPP, or other project-appropriate planning document should be documented in the field logbook and/or on a project standard field form. Each sample should be uniquely identified by the procedure determined by the RC.

3.3.2.2 Laboratory Custody Procedures

The Approved Laboratory's sample custody begins when the samples are received at the laboratory. The Approved Laboratory's sample custodian should assign a unique laboratory sample identification number to each incoming sample. The field sample identification numbers, laboratory sample identification numbers, date and time of sample collection, date and time of sample receipt, and requested analyses will be entered into the sample receiving log. The Approved Laboratory's sample log-in, custody, and document control procedures should be consistent with its standard operating procedure for handling samples.

Following log-in, all samples should be stored within an access-controlled location and should be maintained properly preserved until completion of all laboratory analyses. Unused sample aliquots and sample extracts should be maintained properly preserved for a minimum of 30 days following receipt of the final report by the RC, or as agreed upon by the RC and the Approved Laboratory. The Approved Laboratory will be responsible for the disposal of unused sample aliquots, sample containers, and sample extracts in accordance with all applicable local, state, and federal regulations.

3.3.2.3 Final Evidence Files Custody Procedures

All records will be maintained consistent with the Approved Laboratory's and the RC's record retention policies and applicable EPA or other agency requirements.

3.4 Analytical Method Requirements

The laboratory analytical methods that are anticipated to be used are included in Table 1.

The turnaround time required for the analyses required for each batch of samples is to be noted on the Chain-of-Custody documents submitted with the samples and will be communicated to the Approved Laboratory prior to the sampling event, as necessary.

3.5 Quality Control Requirements

The field and laboratory QC requirements that are to be adopted for the Northern Impoundment RA are discussed in the following subsections. Specific QC checks and acceptance criteria are identified in the discussion of the referenced analytical methods.

3.5.1 Field Sampling Quality Control

Field QC requirements include analyzing reference standards for instrument calibration and for routine calibration checks. Field QC samples for this project include use of equipment blank samples to determine the existence and magnitude of sample contamination resulting from sample containers or sampling procedures and field duplicate samples to assess the overall precision of the sampling and analysis event.

3.5.2 Analytical Quality Control

The laboratory QC requirements for the analyses include analyzing method blanks, instrument performance checks, initial calibration standards, calibration verification standards, internal standards, surrogate compound spikes, and LCS. The acceptance criteria for LCS and surrogate compounds should be generated by the Approved Laboratory and included in the Approved Laboratory's reports.

3.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Procedures to verify that instruments and equipment are functional and properly maintained will be established by the RC and will include those described in the following subsections.

3.6.1 Field Equipment Maintenance

Field equipment should be inspected and tested prior to use in the field and maintenance logs maintained. Prior to use in the field, the equipment should be checked again, and the performance information recorded. All equipment returned from the field should be inspected and tested. Any required maintenance should be performed and documented prior to the equipment being returned to service.

3.6.2 Field Equipment and Sampling Container Cleaning/Decontamination Procedures

Equipment cleaning/decontamination procedures will be addressed in SOPs developed by the RC. Sample containers are expected to be provided by the Approved Laboratory. All containers will be required to be pre-cleaned in accordance with the EPA guidance document entitled "Specifications and Guidance for Contaminant-Free Sample Containers", EPA 540/R-93/051. Certificates of analysis for each lot of containers will be maintained by the Approved Laboratory or be available from the vendor upon request.

3.6.3 Laboratory Instrument Maintenance

As part of its QA/QC program, the Approved Laboratory will be expected to conduct routine preventive maintenance (including maintaining instruments based on the manufacturer’s specifications) to minimize the occurrence of instrument failure and other system malfunctions and to document all maintenance that is performed, which should be documented in the Approved Laboratory's maintenance logbooks or other records.

3.7 Calibration Procedures and Frequency

Procedures for calibrating and maintaining the accuracy of all the instruments and measuring equipment that will be used for conducting field sampling and laboratory analyses will be established by the RC and will include those described in the following subsections.

3.7.1 Field Instruments/Equipment

Instruments and equipment used to gather, generate, or measure environmental data are to be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during field sampling should be examined to confirm that it is in operating condition.

3.7.2 Laboratory Instruments

There should be approved written procedures for calibration of laboratory equipment. Records of calibration, repairs, or replacement should be filed and maintained by the designated laboratory personnel performing QC activities and be available for a QA audit. The Approved Laboratory will have trained staff and in-house spare parts available for instrument repair or should maintain service contracts with vendors. Specific calibration procedures and frequencies are to be detailed in the referenced methods.

3.8 Inspection/Acceptance Criteria for Supplies and Consumables

Procedures will be established by the RC to ensure that supplies and consumables used in the field and laboratory will be available as needed and free of contaminants and will include the procedures detailed in the following subsections.

3.8.1 Field Supplies and Consumables

Supplies and consumables for field sampling will be obtained from various vendors and should include sample containers, detergent and water for equipment decontamination, and field blank water. Additional field supplies and consumables include pump tubing and personal protective equipment. These materials should not introduce contaminants into the samples or interfere with the analyses. All field supplies should be consumed or replaced with sufficient frequency to prevent deterioration or degradation that may interfere with the analyses.

3.8.2 Laboratory Supplies and Consumables

The Approved Laboratory's vendors for general labware, reagents, chromatography supplies, and organic standards should be certified and meet the requirements of the analytical method or the Approved Laboratory's QAPP. The lot numbers of reagents and standards should be recorded and dates of receipt, first use, and expiration will be documented by the Approved Laboratory. Certificates of analysis should be maintained on file to document reagent/standard purity.

3.9 Data Management

Procedures for managing data from generation to final use and storage will be established by the RC and will include the procedures detailed in the subsections that follow.

3.9.1 Data Recording

Field information should be recorded in field logbooks, on project standard field forms or by other means, and should include measurements from direct reading instruments or direct measurements. Field staff will be responsible for recording field data and identifying and correcting recording errors.

Laboratory data should be recorded in a variety of formats. Data from instruments is to be recorded on magnetic media, strip charts, or bench sheets or by other means. Data recording requirements should be identified for each preparation and analysis method.

3.9.2 Data Validation

3.9.2.1 Field Data

Procedures for validation of field data will be established by the RC and will primarily consist of checking for transcription errors and reviewing information recorded in field logbooks. Data transcribed from the field logbook into summary tables for reporting purposes will need to be verified for correctness by the Implementing Party QA Officer or designee, with any limitations on the use of field data should be identified.

3.9.2.2 Environmental Laboratory Generated Data

A full validation (or Stage 4 validation equivalent) will be performed on data collected during the RA. The full validation process would include a review of all technical holding times, instrument performance check sample results, initial and continuing calibration results, and all batch and matrix QC (including equipment blanks, field duplicates, MS/MSD, laboratory duplicates, surrogate recoveries, method blanks, LCS results, continuing and initial calibration checks, and

the identification and quantitation of specific analytes of interest), and review of raw and supporting documentation. Assessment of analytical data would include checks on data consistency by looking for comparability of duplicate analyses, adherence to accuracy and precision control criteria detailed in this QAPP and anomalously high or low parameter values. The results of these data validations would be reported to the Laboratory Project Manager, with notations as to any discrepancies and their effect upon acceptability of the data. The procedure should include data validation reports that summarize the samples reviewed, parameters reviewed, any nonconformance with the established criteria, and validation actions (including data qualifiers).

3.9.3 Data Transformation/ Calculations

Field data calculation procedures may be different in scope compared to those implemented for laboratory data. Direct reading instrumentation is to be employed in the field, if needed. The use of field instruments would generate data read directly from the meters following calibration, which would then be recorded into field logbooks, project standard field forms or other records immediately after the measurements are obtained. Laboratory data calculations would be made to produce final results from raw data.

3.9.4 Data Transmittal/Transfer

Field data should be entered into a standard spreadsheet format or documented by some other means. It is expected to be the QA Officer's responsibility to verify the correctness of the field data after the data are transferred.

The Approved Laboratory is expected to provide data in electronic format as electronic data deliverables (EDDs), which are generated directly from the laboratory information management system (LIMS). Laboratory EDDs can be imported into the database, and the data can be maintained in the database for manipulation and presentation.

It is expected to be the QA Officer's responsibility to verify the correctness of the analytical database after the laboratory data for each event have been imported, such as by comparing the data from the database to the hard copy analytical reports for a specified percentage (such as 10 percent) of the sample results and addressing any discrepancies between the database and analytical reports.

3.9.5 Data Assessment

Assessment of laboratory data is expected to be performed using the procedures established for different analytical methods. These assessments performed will include determining the mean, standard deviation, relative standard deviation, percent difference, RPD, and percent recovery for certain QC elements.

Assessment of QC data for data validation purposes should also include determining the percent recovery, RPD, and percent completeness.

3.9.6 Data Tracking

Data generated in the field, such as water level measurements, is to be recorded in field logbooks, on project standard field forms or by other means, as there are no unique or special tracking requirements for these data. The data should be transcribed for analysis and reporting and included as part of a final evidence file.

Tracking of analytical data in a database should include recording the Approved Laboratory generating the data, the date when the EDD was received and imported, the date when qualifiers were applied to the results, the level of data review performed, and the data review guidance used to evaluate the data.

3.9.7 Data Storage and Retrieval

Laboratory data and electronic instrument data should be stored in hard copy and/or electronic format in accordance with applicable data retention requirements established by the Implementing Party and/or the RC.

3.9.8 Data Security

The laboratory data security is expected to be the responsibility of the Laboratory Project Manager. Data security measures to be implemented will include prohibitions on access to archived data without authorization.

4. Assessment and Oversight

Procedures for assessment and oversight to ensure implementation of this QAPP and of QA/QC activities will be established by the RC and will include the procedures detailed in the following subsections.

4.1 Assessments and Response Actions

Assessments consisting of internal and external audits are to be performed during the project. Internal technical system audits of both field and laboratory procedures will be conducted to verify that sampling and analysis are being performed in accordance with the procedures established in the FSP, SWMP, and this QAPP.

An internal field technical system audit of field activities will be conducted by the QA Officer or designee at the beginning of the field sampling activities to identify deficiencies in the field sampling and documentation procedures. The field technical system audit will include examining field sampling records and Chain-of-Custody documentation. In addition, sample collection, handling, and packaging in compliance with the established procedures will be reviewed during the field audit. Any deficiencies identified should be documented and corrective actions should then be taken and documented.

Follow-up audits will be performed as necessary to verify that deficiencies have been corrected and that the QA/QC procedures described in this QAPP, and the approved Northern Impoundment RD have been followed.

An internal laboratory technical system audit is to be conducted by the Approved Laboratory's QA Officer or designee. The laboratory technical system audit will include examining laboratory documentation regarding sample receiving, sample log-in, storage and tracking, Chain-of-Custody procedures, sample preparation and analysis, instrument operating records, data handling and management, data tracking and control, and data reduction and verification.

Corrective action resulting from deficiencies identified during the internal laboratory technical system audit should be implemented immediately. The Approved Laboratory will ensure implementation and documentation of the corrective action. All problems requiring corrective action and the corrective action taken will be reported to the Laboratory Project Manager. Follow-up audits will be performed as necessary to verify that deficiencies have been corrected.

External laboratory audits, if conducted, will include, but not be limited to, reviewing laboratory analytical procedures, laboratory on-site audits, and/or submitting performance evaluation samples to the laboratory for analysis.

4.2 Reports

Quality assurance information should be summarized following completion of RA activities. This information should consist of the results of external performance evaluations, results of periodic data quality validation and assessment, data use limitations, and any significant QA problems identified, and corrective actions taken.

5. Data Validation and Usability

Procedures for QA activities to be performed to ensure that the data are scientifically defensible, properly documented, of known quality, and meet the project objectives will be established by the RC and will include those procedures described in the following sections.

5.1 Data Review, Verification, and Validation

All field and laboratory data are to be reviewed, verified, and validated. These terms are defined as follows:

– Data review is the in-house examination to ensure that the data have been recorded, transmitted, and processed correctly.
– Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications.
– Data validation is an analyte and sample-specific process that extends the evaluation of data beyond method, procedure, or contractual compliance (i.e., data verification) to determine the quality of a specific data set relative to the end use.

The procedures and criteria that will be used to verify and validate field and laboratory data are presented in Section 5.2.

Laboratory data review should consist of raw data being reduced to results and checked by the responsible analyst. A second review of the data reduction procedure may be conducted by another analyst or senior chemist. After the data are verified, a draft report will be reviewed by the Laboratory Project Manager. Final reports are generated, signed, and transmitted after approval of the draft by the Laboratory Project Manager.

5.2 Validation and Verification Methods

Field data should be verified by reviewing field documentation and Chain-of-Custody records. Data from direct reading field instruments should be verified by reviewing calibration and operating records and QC data.

Verification of sample collection procedures should consist of reviewing sample collection documentation for compliance with the requirements of the work plan and QAPP. If alternate sampling procedures were used, the acceptability of the procedure would need to be evaluated to determine the effect on the usability of the data. Data usability should not be affected if the procedure that was used is determined to be an acceptable alternative that fulfills the measurement performance criteria.

The Approved Laboratory should internally verify its data by reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), and data reduction and reporting. Any deviations from the acceptance criteria, corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) should be noted in the laboratory reports.

Data validation should be conducted by the RC. The results of the data validation procedure should identify data that do not meet the measurement performance criteria. Data validation should determine whether the data are acceptable, of limited usability (qualified as estimated), or rejected. Data qualified as estimated should be reviewed and a discussion of the usability of estimated data should be included in the data validation report. The results of data verification/validation should be summarized in data validation reports provided to the Project Coordinator for use in interpreting the results and for use in project reports.

Data determined to be unusable will require corrective action, such as resampling by the field team or reanalysis of samples by the laboratory.

5.3 Usability/Reconciliation with Data Quality Objectives

The overall usability of the data from the RA should be assessed by evaluating the PARCCS of the data set as compared to the measurement performance criteria using basic statistical quantities, as applicable. The procedures and statistical formulas to be used for these evaluations will be determined by the RC prior to the RA.

6. References

EPA, 2006. EPA's Guidance on Systematic Planning Using the DQOs Process. United States Environmental Protection Agency. February 2006.

EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, CERCLA Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Excavation Confirmation Sampling Soil and Sediment		
Dioxins and Furans		
2,3,7,8-TCDD	EPA Method 1613B	Laboratory MDL
1,2,3,7,8-PeCDD	EPA Method 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDD	EPA Method 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDD	EPA Method 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDD	EPA Method 1613B	Laboratory MDL
2,3,7,8-TCDF	EPA Method 1613B	Laboratory MDL
1,2,3,7,8-PeCDF	EPA Method 1613B	Laboratory MDL
2,3,4,7,8-PeCDF	EPA Method 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDF	EPA Method 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDF	EPA Method 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDF	EPA Method 1613B	Laboratory MDL
Waste Characterization		
Total cyanide, reactive	SW846 9012B	Laboratory MDL
Total sulfide, reactive	SW846 9034	Laboratory MDL
TCLP VOC	SW846 1311/8260D/5030B	Laboratory MDL
TCLP SVOC	SW846 1311/8270D	Laboratory MDL
TCLP RCRA 8 Metals	SW846 1311/6010/7470	Laboratory MDL
TPH 1005/1006	TX-1005 / TX-1006[2]	Laboratory MDL
PCB	SW846 8082A/3510C	Laboratory MDL
Water and Contact Water		
Dioxins/Furans		
2,3,7,8-TCDD	EPA Method 1613B	Laboratory MDL
1,2,3,7,8-PeCDD	EPA Method 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDD	EPA Method 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDD	EPA Method 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDD	EPA Method 1613B	Laboratory MDL
2,3,7,8-TCDF	EPA Method 1613B	Laboratory MDL
1,2,3,7,8-PeCDF	EPA Method 1613B	Laboratory MDL
2,3,4,7,8-PeCDF	EPA Method 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDF	EPA Method 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDF	EPA Method 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDF	EPA Method 1613B	Laboratory MDL
TSS	SM 2540D	Laboratory MDL

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Excavation Confirmation Sampling Soil and Sediment		
Metals		
Antimony	SW-846 6020A	Laboratory MDL
Arsenic	SW-846 6020A	Laboratory MDL
Barium	SW-846 6020A	Laboratory MDL
Beryllium	SW-846 6020A	Laboratory MDL
Boron	SW-846 6020A	Laboratory MDL
Cadmium	SW-846 6020A	Laboratory MDL
Calcium	SW-846 6020A	Laboratory MDL
Chromium	SW-846 6020A	Laboratory MDL
Cobalt	SW-846 6020A	Laboratory MDL
Copper	SW-846 6020A	Laboratory MDL
Iron	SW-846 6020A	Laboratory MDL
Lead	SW-846 6020A	Laboratory MDL
Magnesium	SW-846 6020A	Laboratory MDL
Manganese	SW-846 6020A	Laboratory MDL
Molybdenum	SW-846 6020A	Laboratory MDL
Nickel	SW-846 6020A	Laboratory MDL
Phosphorus	SW-846 6020A	Laboratory MDL
Potassium	SW-846 6020A	Laboratory MDL
Selenium	SW-846 6020A	Laboratory MDL
Silver	SW-846 6020A	Laboratory MDL
Sodium	SW-846 6020A	Laboratory MDL
Strontium	SW-846 6020A	Laboratory MDL
Thallium	SW-846 6020A	Laboratory MDL
Tin	SW-846 6020A	Laboratory MDL
Titanium	SW-846 6020A	Laboratory MDL
Vanadium	SW-846 6020A	Laboratory MDL
Zinc	SW-846 6020A	Laboratory MDL
Off-Site Backfill Sampling		
Hexavalent Chromium	SW-846 7196A	Laboratory MDL
TPH	TX-1005 / TX-1006[2]	Laboratory MDL

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Excavation Confirmation Sampling Soil and Sediment		
Dioxins and Furans		
2,3,7,8-TCDD	EPA Method 1613B	Laboratory MDL
1,2,3,7,8-PeCDD	EPA Method 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDD	EPA Method 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDD	EPA Method 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDD	EPA Method 1613B	Laboratory MDL
2,3,7,8-TCDF	EPA Method 1613B	Laboratory MDL
1,2,3,7,8-PeCDF	EPA Method 1613B	Laboratory MDL
2,3,4,7,8-PeCDF	EPA Method 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDF	EPA Method 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDF	EPA Method 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDF	EPA Method 1613B	Laboratory MDL
Target Analyte List Volatiles		
1,1,1-Trichloroethane	SW-846 8260B	Laboratory MDL
1,1,2,2-Tetrachloroethane	SW-846 8260B	Laboratory MDL
1,1,2-Trichloro-1,2,2-trifluoroethane	SW-846 8260B	Laboratory MDL
1,1,2-Trichloroethane	SW-846 8260B	Laboratory MDL
1,1-Dichloroethane	SW-846 8260B	Laboratory MDL
1,1-Dichloroethylene	SW-846 8260B	Laboratory MDL
1,2,4-Trichlorobenzene	SW-846 8260B	Laboratory MDL
1,2-Dibromo-3-chloropropane	SW-846 8260B	Laboratory MDL
1,2-Dibromoethane	SW-846 8260B	Laboratory MDL
1,2-Dichloroethane	SW-846 8260B	Laboratory MDL
1,2-Dichloropropane	SW-846 8260B	Laboratory MDL
2-Butanone	SW-846 8260B	Laboratory MDL
2-Hexanone	SW-846 8260B	Laboratory MDL
4-Methyl-2-pentanone	SW-846 8260B	Laboratory MDL
Acetone	SW-846 8260B	Laboratory MDL
Benzene	SW-846 8260B	Laboratory MDL
Bromodichloromethane	SW-846 8260B	Laboratory MDL
Bromoform	SW-846 8260B	Laboratory MDL
Bromomethane	SW-846 8260B	Laboratory MDL
Carbon disulfide	SW-846 8260B	Laboratory MDL
Carbon tetrachloride	SW-846 8260B	Laboratory MDL
Chlorobenzene	SW-846 8260B	Laboratory MDL
Chloroethane	SW-846 8260B	Laboratory MDL
Chloroform	SW-846 8260B	Laboratory MDL
Chloromethane	SW-846 8260B	Laboratory MDL
cis-1,2-Dichloroethylene	SW-846 8260B	Laboratory MDL
cis-1,3-Dichloropropene	SW-846 8260B	Laboratory MDL
Cyclohexane	SW-846 8260B	Laboratory MDL
Dibromochloromethane	SW-846 8260B	Laboratory MDL

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Excavation Confirmation Sampling Soil and Sediment		
Dichlorodifluoromethane	SW-846 8260B	Laboratory MDL
Ethylbenzene	SW-846 8260B	Laboratory MDL
Isopropylbenzene	SW-846 8260B	Laboratory MDL
m-Dichlorobenzene	SW-846 8260B	Laboratory MDL
Methyl Acetate	SW-846 8260B	Laboratory MDL
Methyl tert-Butyl Ether	SW-846 8260B	Laboratory MDL
Methylcyclohexane	SW-846 8260B	Laboratory MDL
Methylene chloride	SW-846 8260B	Laboratory MDL
o-Dichlorobenzene	SW-846 8260B	Laboratory MDL
p-Dichlorobenzene	SW-846 8260B	Laboratory MDL
Styrene	SW-846 8260B	Laboratory MDL
Tetrachloroethylene	SW-846 8260B	Laboratory MDL
Toluene	SW-846 8260B	Laboratory MDL
trans-1,2-Dichloroethylene	SW-846 8260B	Laboratory MDL
trans-1,3-Dichloropropene	SW-846 8260B	Laboratory MDL
Trichloroethylene	SW-846 8260B	Laboratory MDL
Trichlorofluoromethane	SW-846 8260B	Laboratory MDL
Vinyl chloride	SW-846 8260B	Laboratory MDL
Xylene(total)	SW-846 8260B	Laboratory MDL
Target Compound List Semi-Volatiles		
1,1'-Biphenyl	SW-846 8270D	Laboratory MDL
2,2'-oxybis(1-Chloropropane)	SW-846 8270D	Laboratory MDL
2,4,5-Trichlorophenol	SW-846 8270D	Laboratory MDL
2,4,6-Trichlorophenol	SW-846 8270D	Laboratory MDL
2,4-Dichlorophenol	SW-846 8270D	Laboratory MDL
2,4-Dimethylphenol	SW-846 8270D	Laboratory MDL
2,4-Dinitrophenol	SW-846 8270D	Laboratory MDL
2,4-Dinitrotoluene	SW-846 8270D	Laboratory MDL
2,6-Dinitrotoluene	SW-846 8270D	Laboratory MDL
2-Chloronaphthalene	SW-846 8270D	Laboratory MDL
2-Chlorophenol	SW-846 8270D	Laboratory MDL
2-Methylnaphthalene	SW-846 8270D	Laboratory MDL
3,3'-Dichlorobenzidine	SW-846 8270D	Laboratory MDL
4,6-Dinitro-o-cresol	SW-846 8270D	Laboratory MDL
4-Bromophenyl-phenylether	SW-846 8270D	Laboratory MDL
4-Chlorophenyl phenyl ether	SW-846 8270D	Laboratory MDL
Acenaphthene	SW-846 8270D	Laboratory MDL
Acenaphthylene	SW-846 8270D	Laboratory MDL
Acetophenone	SW-846 8270D	Laboratory MDL

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Excavation Confirmation Sampling Soil and Sediment		
Anthracene	SW-846 8270D	Laboratory MDL
Atrazine	SW-846 8270D	Laboratory MDL
Benzaldehyde	SW-846 8270D	Laboratory MDL
Benzo[a]anthracene	SW-846 8270D	Laboratory MDL
Benzo[a]pyrene	SW-846 8270D	Laboratory MDL
Benzo[b]fluoranthene	SW-846 8270D	Laboratory MDL
Benzo[ghi]perylene	SW-846 8270D	Laboratory MDL
Benzo[k]fluoranthene	SW-846 8270D	Laboratory MDL
Bis(2-chloroethoxy)methane	SW-846 8270D	Laboratory MDL
Bis(2-chloroethyl)ether	SW-846 8270D	Laboratory MDL
Bis(2-ethylhexyl) phthalate	SW-846 8270D	Laboratory MDL
Butyl benzyl phthalate	SW-846 8270D	Laboratory MDL
Caprolactam	SW-846 8270D	Laboratory MDL
Carbazole	SW-846 8270D	Laboratory MDL
Chrysene	SW-846 8270D	Laboratory MDL
Dibenz[a,h]anthracene	SW-846 8270D	Laboratory MDL
Dibenzofuran	SW-846 8270D	Laboratory MDL
Diethyl phthalate	SW-846 8270D	Laboratory MDL
Dimethyl phthalate	SW-846 8270D	Laboratory MDL
Di-n-butyl phthalate	SW-846 8270D	Laboratory MDL
Di-n-octyl phthalate	SW-846 8270D	Laboratory MDL
Fluoranthene	SW-846 8270D	Laboratory MDL
Fluorene	SW-846 8270D	Laboratory MDL
Hexachlorobenzene	SW-846 8270D	Laboratory MDL
Hexachlorobutadiene	SW-846 8270D	Laboratory MDL
Hexachlorocyclopentadiene	SW-846 8270D	Laboratory MDL
Hexachloroethane	SW-846 8270D	Laboratory MDL
Indeno(1,2,3 cd)pyrene	SW-846 8270D	Laboratory MDL
Isophorone	SW-846 8270D	Laboratory MDL
m-Nitroaniline	SW-846 8270D	Laboratory MDL
Naphthalene	SW-846 8270D	Laboratory MDL
Nitrobenzene	SW-846 8270D	Laboratory MDL
N-Nitrosodiphenylamine	SW-846 8270D	Laboratory MDL
N-Nitrosodipropylamine	SW-846 8270D	Laboratory MDL
o-Cresol	SW-846 8270D	Laboratory MDL
o-Nitroaniline	SW-846 8270D	Laboratory MDL
o-Nitrophenol	SW-846 8270D	Laboratory MDL
p-Chloroaniline	SW-846 8270D	Laboratory MDL
p-Chloro-m-cresol	SW-846 8270D	Laboratory MDL
p-Cresol	SW-846 8270D	Laboratory MDL

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Excavation Confirmation Sampling Soil and Sediment		
Pentachlorophenol	SW-846 8270D	Laboratory MDL
Phenanthrene	SW-846 8270D	Laboratory MDL
Phenol	SW-846 8270D	Laboratory MDL
p-Nitroaniline	SW-846 8270D	Laboratory MDL
p-Nitrophenol	SW-846 8270D	Laboratory MDL
Pyrene	SW-846 8270D	Laboratory MDL
Target Compound List Pesticides		
alpha-BHC	SW-846 8081B	Laboratory MDL
beta-BHC	SW-846 8081B	Laboratory MDL
delta-BHC	SW-846 8081B	Laboratory MDL
gamma-BHC (Lindane)	SW-846 8081B	Laboratory MDL
Heptachlor	SW-846 8081B	Laboratory MDL
Aldrin	SW-846 8081B	Laboratory MDL
Heptachlor epoxide	SW-846 8081B	Laboratory MDL
Endosulfan I	SW-846 8081B	Laboratory MDL
Dieldrin	SW-846 8081B	Laboratory MDL
4,4'-DDE	SW-846 8081B	Laboratory MDL
Endrin	SW-846 8081B	Laboratory MDL
Endosulfan II	SW-846 8081B	Laboratory MDL
4,4'-DDD	SW-846 8081B	Laboratory MDL
Endosulfan sulfate	SW-846 8081B	Laboratory MDL
4,4'-DDT	SW-846 8081B	Laboratory MDL
Methoxychlor	SW-846 8081B	Laboratory MDL
Endrin ketone	SW-846 8081B	Laboratory MDL
Endrin aldehyde	SW-846 8081B	Laboratory MDL
alpha-Chlordane	SW-846 8081B	Laboratory MDL
gamma-Chlordane	SW-846 8081B	Laboratory MDL
Toxaphene	SW-846 8081B	Laboratory MDL
Polychlorinated Biphenyls		
Aroclor-1016	SW-846 8082A	Laboratory MDL
Aroclor-1221	SW-846 8082A	Laboratory MDL
Aroclor-1232	SW-846 8082A	Laboratory MDL
Aroclor-1242	SW-846 8082A	Laboratory MDL
Aroclor-1248	SW-846 8082A	Laboratory MDL
Aroclor-1254	SW-846 8082A	Laboratory MDL
Aroclor-1260	SW-846 8082A	Laboratory MDL

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Excavation Confirmation Sampling Soil and Sediment		
Target Compound List Metals		
Aluminum	SW-846 6020A	Laboratory MDL
Antimony	SW-846 6020A	Laboratory MDL
Arsenic	SW-846 6020A	Laboratory MDL
Barium	SW-846 6020A	Laboratory MDL
Beryllium	SW-846 6020A	Laboratory MDL
Cadmium	SW-846 6020A	Laboratory MDL
Calcium	SW-846 6020A	Laboratory MDL
Chromium	SW-846 6020A	Laboratory MDL
Cobalt	SW-846 6020A	Laboratory MDL
Copper	SW-846 6020A	Laboratory MDL
Iron	SW-846 6020A	Laboratory MDL
Lead	SW-846 6020A	Laboratory MDL
Magnesium	SW-846 6020A	Laboratory MDL
Manganese	SW-846 6020A	Laboratory MDL
Mercury	SW-846 7471	Laboratory MDL
Nickel	SW-846 6020A	Laboratory MDL
Potassium	SW-846 6020A	Laboratory MDL
Selenium	SW-846 6020A	Laboratory MDL
Silver	SW-846 6020A	Laboratory MDL
Sodium	SW-846 6020A	Laboratory MDL
Thallium	SW-846 6020A	Laboratory MDL
Vanadium	SW-846 6020A	Laboratory MDL
Zinc	SW-846 6020A	Laboratory MDL
Cyanide	SW-846 9010/9012	Laboratory MDL

Notes:

EPA = United States Environmental Protection Agency

1 - SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846, 3rd Edition with Updates I through IVB.

2 - Texas Natural Resource Conservation Commission, "Total Petroleum Hydrocarbons" (TNRCC Method 1005) and "Characterization of Nc_6 to Nc_{35} Petroleum Hydrocarbons in Environmental Samples" (TNRCC Method 1006), Revision 03, 06/01/2001

Parameter	Analysis Method	Laboratory
Dioxins and Furans	SW-846 8290 [1]	Approved Laboratory
TCLP VOC	EPA-SW846-1311/8260D/5030B [1]	Approved Laboratory
TCLP Pesticides	EPA-SW846-1311/8081B/3510C[1]	Approved Laboratory
TCLP - PCB	EPA SW846 1311/8082A/3550C[1]	Approved Laboratory
TCLP - PCDD/PCDF	EPA SW846 1311/1613B/3510C HRMS Specific[1]	Approved Laboratory
Total Cyanide	EPA-SW846-9012B[1]	Approved Laboratory
Total Sulfide	EPA-SW846-9034[1]	Approved Laboratory
Ignitability	EPA-SW846-1020B[1]	Approved Laboratory
TCLP Nonhalogenated Organics	EPA-SW846-1311/8015[1]	Approved Laboratory
TCLP Herbicides	EPA-SW846-1311/8151A/3510C[1]	Approved Laboratory
TCLP HPLC/TS/MS or UV	EPA-SW846-1311/8321[1]	Approved Laboratory
PCB	EPA-SW846-8082A/3510C[1]	Approved Laboratory
Pesticides	EPA -SW-846-8081[1]	Approved Laboratory
Herbicides	EPA-SW-846-8151[1]	Approved Laboratory
Dioxins and Furans	EPA SW-846 8290 [1]	Approved Laboratory
Ammonia Nitrogen	EPA 350.2[2]	Approved Laboratory
Biochemical Oxygen Demand	SM 5210B[3]	Approved Laboratory
Chloride, Bromide, Sulfate	EPA 300.0[2]	Approved Laboratory
Alkalinity	EPA S 310.2[2]	Approved Laboratory

Notes:

1 - SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846, 3rd Edition with Updates I through IVB.

2 - EPA - U.S. Environmental Protection Agency. Analytical Methodology (February 1999)

3 - "Standard Methods for the Examination of Water and Wastewater", 20th Edition, 1998 (with all subsequent revisions).

Location
Approved Laboratory
Approved Laboratory
Approved Laboratory
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Analysis	Sample Containers[1]	Preservation	Maximum Holding Times	Shipping Means	Comments
Soil and Sediment					
Dioxins and Furans	One 4 oz. Amber glass jar	Cool to 0° to 6°C	30 days from collection to extraction/ 45 days from extraction to analysis	Courier or Federal Express	Fill completely
TCLP VOC	1 - 16 oz. jar	Cool to 0° to 6°C	14 days from collection to TCLP extraction/ 14 days from TCLP extraction to analysis	Courier or Federal Express	Fill completely
TCLP Pesticides	1 - 16 oz. jar	Cool to 0° to 6°C	14 days from collection to TCLP extraction/ 7 days from TCLP extraction to preparative extraction / 40 days from	Courier or Federal Express	Fill completely
TCLP PCB	1 - 16 oz. jar	Cool to 0° to 6°C	1 year	Courier or Federal Express	Fill completely
TCLP Dioxins and Furans	1 - 16 oz. jar	Cool to 0° to 6°C	30 days from collection to TCLP extraction / 30 days from TCLP extraction to preparative extraction / 45 days from preparative extraction to analysis	Courier or Federal Express	Fill completely
Total Cyanide	1 - 16 oz. jar	Cool to 0° to 6°C	14 days	Courier or Federal Express	Fill completely
Total Sulfide	1 - 16 oz. jar	Cool to 0° to 6°C	7 days	Courier or Federal Express	Fill completely
Ignitability	1 - 16 oz. jar	Cool to 0° to 6°C	28 days	Courier or Federal Express	Fill completely
TCLP SVOC expanded parameter list	1 - 16 oz. jar	Cool to 0° to 6°C	14 days from collection to TCLP extraction/ 7 days from TCLP extraction to preparative extraction / 40 days from	Courier or Federal Express	Fill completely
TCLP Non-halogenated organics	1 - 16 oz. jar	Cool to 0° to 6°C	14 days from collection to TCLP extraction/	Courier or Federal Express	Fill completely
TCLP HPLC/TS/MS or UV	1 - 16 oz. jar	Cool to 0° to 6°C	14 days from collection to TCLP extraction/	Courier or Federal Express	Fill completely
TCLP Herbicides	1 - 16 oz. jar	Cool to 0° to 6°C	14 days from collection to TCLP extraction/ 7 days from TCLP extraction to preparative extraction / 40 days from	Courier or Federal Express	Fill completely

Analysis	Sample Containers[1]	Preservation	Maximum Holding Times	Shipping Means	Comments
Soil and Sediment					
Dioxins and Furans	One 4 oz. Amber glass jar	Cool to 0° to 6°C	30 days from collection to extraction/ 45 days from extraction to analysis	Courier or Federal Express	Fill completely
TCLP Metals expanded parameter list	1 - 16 oz. jar	Cool to 0° to 6°C	180 days from collection to TCLP extraction/ 180 days from TCLP extraction to	Courier or Federal Express	Fill completely
Surface and Contact Water					
PCB	Two 1 L amber glass	Cool to 0° to 6°C	1 year	Courier or Federal Express	Fill completely
Pesticides	Two 1 L amber glass	Cool to 0° to 6°C	7 days from collection to extraction/40 days from extraction to analysis	Courier or Federal Express	Fill completely
Herbicides	Two 1 L amber glass	Cool to 0° to 6°C	7 days from collection to extraction/40 days from extraction to analysis	Courier or Federal Express	Fill completely
Dioxins and Furans	Two 1 L amber glass	Cool to 0° to 6°C	30 days from collection to extraction/ 45 days from extraction to analysis	Courier or Federal Express	Fill completely
Ammonia-nitrogen	One 500 mL plastic	Cool to 0° to 6°C, H_2SO_4 to pH <2	28 days from collection to analysis	Courier or Federal Express	Fill completely
Biochemical oxygen demand (BOD)	One 1 L plastic	Cool to 0° to 6°C	48 hours from collection to analysis	Courier or Federal Express	Fill completely
Chloride, bromide, sulfate	One 500 mL plastic	Cool to 0° to 6°C	28 days from collection to analysis	Courier or Federal Express	Fill completely
Alkalinity	One 500 mL plastic	Cool to 0° to 6°C	14 days from collection to analysis	Courier or Federal Express	Fill completely

Note:
[1] The laboratory may choose to combine analyses in the same bottles, at their discretion. Alternative bottles may be used by the lab, at their discretion.

Table 2.1

Summary of Sampling and Analysis Program
Phase II Predesign Investigation
Harris County, Texas

Description	Sample Matrix	Laboratory Parameters[1]	No. of Samples Per Event	QC Samples[4] Equipment Blanks[2]	Trip Blanks	Field Duplicates	MS/ MSD[3]
Phase II Pre-Design Investigation							
Characterization Sampling							
- Soil and Sediment Environmental Samplir	Soil/Sediment	Dioxans and Furans	328	17	-	-	17
Treatability Sampling							
- Surface Water Sampling	Surface Water	PCB					
		Pesticides					
		Herbicides					
		Dioxins and Furans	1	1	-	1	1
		Ammonia-nitrogen					
		Biochemical oxygen demand (BOD)					
- Contact Water Sampling	Contact Water	PCB	19				
		Pesticides	19				
		Herbicides	9				
		Dioxins and Furans	9				
		Ammonia-nitrogen	19	1	-	1	1
		Biochemical oxygen demand (BOD)	19				
		Chloride, bromide, sulfate	9				
		Alkalinity	9				
- Soil and Sediment Sampling	Soil/Sediment	TCLP VOC	112				
		TCLP Pesticides	112				
		TCLP PCB	112				
		TCLP Dioxins and Furans	112				
		Total Cyanide	112				
		Total Sulfide	112				
		Ignitability	112	-	-	-	-
		TCLP SVOC expanded parameter list	63				
		TCLP Non-halogenated organics	63				
		TCLP Herbicides	63				
		TCLP HPLC/TS/MS or UV	63				

Notes:

1 Refer to Table 2.2 for specific analytes and quantitation limits.

2 No equipment blank collection is necessary if dedicated sampling equipment is used.

3 Double the normal sample volume is collected for soil and sediment samples/triple for water samples.

4 QC samples may be combined for same analytes.

"-" Not applicable.

Table 3.3

Routine Preventive Maintenance Procedures and Schedules
Phase II Predesign Investigation
Harris County, Texas

Gas Chromatograph/Mass Spectrometer (GC/MS)	1. Replace pump oil as needed. 2. Change septa weekly or as often as needed. 3. Change gas line dryers as needed. 4. Replace electron multiplier as often as needed. 5. Replace gas jet splitter as needed. 6. Replace GC injector glass liner weekly or as often as needed. 7. Replace GC column as needed. 8. Check daily to ensure that gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP. 9. Check daily to ensure the pressure on the primary regulator is sufficient. 10. Clean source as needed.	1. Syringes 2. Septa 3. Various electronic components 4. Glass jet splitter 5. GC column 6. Glass liners
Purge and Trap Sample Concentrator	1. Replace trap as needed. 2. Decontaminate the system after running high concentration samples or as required by blank analysis. 3. Leak check system daily and as often as needed 4. Check daily to ensure the gas supply is sufficient for the day's activity, and the delivery pressures are set as described in the SOP. 5. Check daily to ensure the pressure on the primary regulator is sufficient.	1. Spare traps 2. Spare sparger vessels 3. Various electronic components/ circuits 4. Plumbing supplies - tubing, fittings
Gas Chromatograph	1 Change septa weekly or as often as needed. 2 Change gas line dryers as needed. 3 Replace GC injector glass liner weekly or as often as needed.	1 Syringes 2 Septa 3 Detectors 4 Glass liner

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The Power of Commitment

Attachment 5 - Site-Wide Monitoring Plan - Northern Impoundment

Provided As Part of Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

July 17, 2024

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Attachments

1. Introduction

1.1 Background

This Site-Wide Monitoring Plan (SWMP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company and McGinnes Industrial Maintenance Corporation, for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). This SWMP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Remedial Design for the Northern Impoundment (Northern Impoundment RD) submittal to the EPA.

This SWMP describes the framework to monitor certain conditions during Northern Impoundment RD implementation, including: the potential spread of dust generated during construction; the monitoring of stormwater controls, required as part of a construction Stormwater Pollution Prevention Plan (SWPPP) that a remedial contractor (RC) will prepare to manage stormwater; monitoring to be performed by a RC to control and monitor turbidity in the river during the installation and removal of the wall to be constructed outside the boundaries of the Northern Impoundment (referred to herein as the Best Management Practice [BMP] wall) and outside of the Time Critical Removal Action (TCRA) cap limits; and monitoring noise during RA activities (primarily the installation of sheet piles). This SWMP also identifies options that an RC may elect to implement to control odors should they occur during construction of the Northern Impoundment Remedial Action (RA).

References in this SWMP to the “work site” are to the Northern Impoundment and staging/lay down areas, including the area in which the water treatment system will be located. Prior to initiation of Northern Impoundment RA activities, each RC selected by the party(ies) implementing the Northern Impoundment RA will either update this SWMP or develop its own SWMP to address the applicable components outlined in this document. References below in this SWMP to “the RC” are intended to refer to the selected RC with responsibility for that aspect of the Northern Impoundment RA.

1.2 Relationship to Supporting Plans

The SWMP should be considered in combination with the other supporting plans. The Field Sampling Plan (FSP) defines the procedures related to excavation confirmation sampling, sampling of treated effluent water, imported fill material, and sampling of historical berm material that will be completed during the Northern Impoundment RA. The Construction Quality Assurance/Quality Control Plan (CQA/QCP) describes the procedures to verify that the excavation objectives are achieved during implementation. Field and analytical quality procedures are described in the Quality Assurance Project Plan (QAPP). The Transportation and Off-Site Disposal Plan (TODP) describes the procedures for on-Site management and loading of excavated material to be disposed of off-Site during the Northern Impoundment RA, the transportation routes for off-Site shipments from the work site, and measures to be implemented, if needed to protect communities that may be affected by the shipments.

This SWMP is supported by an air monitoring plan for the work site (Attachment 1) that details how dust will be monitored and as needed, suppressed. The Air Monitoring Plan may be revised by the RC as appropriate to incorporate the RC means and methods, A SWPPP will also be developed by the RC following the requirements described in this SWMP.

2. Site-Wide Monitoring Approach

2.1 Soils

Excavation limits will be targeted during the Northern Impoundment RA based upon data collected during the investigations conducted under the AOC. Those excavation limits will be confirmed by collecting excavation confirmation bottom samples. The methodology and procedures for excavation confirmation sampling are detailed in the FSP. During construction, monitoring of excavation activities will include delineation of excavation boundaries. As each excavation is completed, surveying will be performed to verify the extent of excavation (both vertical and horizontal) and to clearly mark the boundaries of the excavation for the subsequent area to be excavated. These associated monitoring activities to be performed in relation to the excavation work are addressed in the CQA/QCP.

2.2 Dust

The waste material in the Northern Impoundment should have a high moisture content so dust generation during excavation activities should be minimal. A reagent, such as Portland cement, may be mixed with some of the waste material to solidify it so that it passes the paint filter test for landfill acceptance. Solidification and loading activities will be performed in a controlled manner to minimize the generation of dust. An Air Monitoring Plan, included as Attachment 1, describes procedures for dust mitigation and control. Following RC selection, the RC may revise the Air Monitoring Plan, as appropriate, to incorporate the means and methods of its work.

2.3 Stormwater

During the Northern Impoundment RA, the excavation area will be isolated from the surrounding San Jacinto River by a BMP wall, which is described in the Northern Impoundment RD as a double wall BMP system where the outer wall will be constructed to a height of +10 feet North American Vertical Datum of 1988 (NAVD88). A ramp will be constructed over the south-central portion of the BMP wall to allow access into and out of the excavation area during RA activities.

Detailed plans for soil erosion and sediment controls are provided on design drawings C-4 through C-6 (Appendix G). The RC will be required to follow these plans and the stormwater management and control requirements described below in Section 3.4 to develop and implement a SWPPP to manage stormwater and address run-on and run-off from the work site. The SWPPP must meet the substantive requirements of the applicable or relevant and appropriate requirements (ARARs) for stormwater management. Stormwater controls will be implemented to prevent migration of impacted material out of the specific area(s) in which excavation is taking place, and also to control and segregate unimpacted stormwater and impacted contact water within the excavation area(s) inside the BMP wall. Water treatment and storage equipment will also be placed in secondary containment.

Preventative measures included in the SWPPP may include grading the area surrounding the excavation to drain surface water away from any open excavations, and/or constructing berms to prevent water from entering an excavation. Additional measures may include diverting surface water in areas adjacent to an excavation to existing surface drainage systems within the BMP wall and requiring that these surface drainage systems be kept open and operational.

Even with surface water run-on controls, water from precipitation and perched water infiltration will accumulate within the excavation area(s). The RC will develop procedures to manage this contact water by operating and maintaining necessary dewatering equipment to remove the water from the excavations and convey it to a water treatment system.

2.4 Turbidity

During the installation of sheet piles to construct the BMP wall, construction-related turbidity may occur in areas outside the exterior of the BMP wall. During the installation and removal of the BMP, turbidity controls will be

implemented to mitigate migration of turbidity from these locations. Upstream and downstream turbidity monitoring will also be implemented to confirm the effectiveness of the turbidity controls. Turbidity monitoring and controls are discussed in Section 3.4. These procedures may be detailed further, as needed, by the selected RC.

2.5 Noise

At the time of the RA, the RC may perform baseline worker exposure noise monitoring to evaluate noise levels during work activities relative to worker exposure thresholds. Impacts of noise to the surrounding community is expected to be minimal, and it may be possible to address any such potential noise impacts through the timing of work activities. The selected RC will further detail plans for noise monitoring and controls (including any necessary personal protective equipment for the RC's employees).

2.6 Odors

It is possible that nuisance odors could occur during the RA excavation activities at the work site. Section 3.6 summarizes some potential odor mitigation and/or control methods that could be utilized, if necessary. The plan for odor monitoring and controls will be detailed further by the selected RC.

3. Data Collection and Monitoring Procedures

Per the AOC, the purpose of Site-wide monitoring during the RA is to monitor the extent and potential migration of contaminated media on-Site and to determine whether performance standards are being achieved. The RC will adopt procedures for collecting baseline data on affected media within the work site during construction.

3.1 Excavation Performance Verification

The procedures for collecting excavation confirmation samples during the RA with respect to the approved clean-up level are described in the FSP. The CQA/QCP also includes procedures to verify that the excavation limits have been achieved.

3.2 Dust Monitoring

Dust monitoring will be performed, as specified in the Air Monitoring Plan, which is included as Attachment 1. Following RC selection, the RC may revise or provide a separate Air Monitoring Plan for use during RA. Monitoring and mitigation activities that the RC must consider are summarized below. It is anticipated that activities related to other projects (including the Interstate-10 [I-10] Bridge project) could cause or contribute to dust present at the work site, and may need to be taken into account by the RC in its evaluation of monitoring and mitigation measures.

3.2.1 Monitoring Instruments and Procedures

Real-time air monitoring for dust will be performed using dust monitors placed at the perimeter of the work site, typically upwind and downwind of Northern Impoundment RA activities. All instruments will be calibrated and operated in accordance with the manufacturer's specifications or applicable test/method specifications.

3.2.2 Monitor Design and Frequency

Data from the dust monitors will be collected throughout Northern Impoundment RA activities that involve ground disturbance and during solidification activities. If concentrations of dust are above the thresholds defined in the Air

Monitoring Plan, RC personnel will be required to implement dust suppression measures. The Air Monitoring Plan discusses the dust action level and how it was developed.

3.2.3 Suppression and Mitigation Measures

The RC will be required to implement dust suppression and mitigation measures at the work site, as needed, to minimize airborne dust produced from construction activities. The Air Monitoring Plan identifies dust suppression measures that may be implemented.

3.3 Stormwater

Stormwater monitoring will be performed in accordance with the SWPPP, which will be developed by the RC based on the requirements below and the soil erosion and sediment control plans in Appendix G. The intent of the RC's SWPPP will be to identify controls that will be implemented to minimize stormwater impacts from their work activities. These controls may include, but would not be limited to, the following:

- Minimize the disturbed area and protect natural features and soil:
  - Limit access to the impacted area.
  - Use only approved access roads.
- Control stormwater flowing onto and through the work site.
- Stabilize disturbed soils promptly.
- Establish perimeter controls.
- Retain any potential pollutants within the work site.
- Inspect and maintain all controls.
- Immediately repair or remove any leaking equipment.
- Inspect equipment prior to entering or leaving the jobsite to ensure that it is free of soils, vegetation, and trapped debris.

3.3.1 Stormwater Construction Components

The anticipated sequences of construction activities and options for stormwater controls include the following:

- Silt fencing, straw wattles or similar devices may be installed around the perimeter of work site excavation areas before any stripping of the TCRA cap and liner.
- Straw/hay bales or wattles may be installed in drainage ways present throughout the work site.
- Construction entrance(s) may be constructed to minimize the tracking of sediment from the work site and onto adjacent roadways.
- Straw/hay bales and filter fabric or filter bags may be used for filtration.
- Secondary containment should be utilized around the wastewater treatment system.
- Secondary containment and/or berms and silt fencing may be utilized around the staging and/or dewatering areas for excavated and stockpiled material.

3.3.2 Stormwater Monitoring and Maintenance Procedures

Stormwater monitoring and maintenance procedures will be outlined in the SWPPP. Procedures may be identified in the SWPPP and, as applicable, used to monitor stormwater controls within the BMP wall and other areas of the work site to ensure compliance with the construction SWPPP. Those procedures may include but are not limited to the following:

- Identify areas where maintenance of stormwater controls is needed.

– Remove sediment from any installed commercial grade silt fences when sediment buildup reaches 1/3 the height of the fence.
– Re-anchor and/or repair commercial grade silt fences, hay/straw bales, and other stormwater controls, as necessary.
– Conduct follow-up inspections to determine the success of stabilization measures.
– Remove sediment from construction entrances, if the rock becomes clogged, and re-grade and add additional rock, as necessary to retain efficiency.

3.3.3 Stormwater Inspection Procedures

Under the SWPPP, a qualified person who is knowledgeable regarding work site conditions will be designated to conduct inspections during Northern Impoundment RA activities. This inspector, subject to the provisions of the SWPPP, will be given authority to address deficiencies.

The responsibilities of the inspector may include, but would not be limited to:

– Verifying compliance with the requirements of the SWPPP and any other applicable ARARs.
– Verifying that the limits of authorized project work areas and locations of access roads are properly marked before clearing.
– Verifying the location of drainage and irrigation systems.
– Identifying stabilization needs in all areas.
– Verifying that temporary erosion controls are properly installed and maintained daily, as necessary.
– Inspecting and verifying restoration of areas of disturbed or bare soil.
– Inspecting areas used for storage of materials that are exposed to stormwater.
– Inspecting temporary structural erosion and sediment control devices/measures.
– Inspecting areas where vehicles enter or exit the work site.
– Verifying the repair of all ineffective, temporary, erosion control measures, as soon as reasonably practicable but no longer than one working day after identification.

3.3.4 Responses to Changed Conditions

The RC will be required to amend the SWPPP, as needed, during the Northern Impoundment RA.

3.4 Turbidity Monitoring During Construction

The Northern Impoundment RD includes a BMP wall to be constructed so that all excavation activities will take place within the area protected by the BMP. The BMP will be placed outside the TCRA cap, and thus will not be driven through waste material to be excavated. Turbidity controls (e.g., turbidity curtains) will be utilized during installation and removal of the BMP wall as a construction best practice to limit the potential for turbidity outside the BMP wall associated with such activities. Turbidity monitoring will be performed during installation and removal of the BMP as an additional construction best practice, in which downstream turbidity values will be compared to upstream values. The turbidity monitoring program is an additional conservative measure being implemented with respect to BMP wall installation and removal. Health and safety procedures for monitoring activities will be followed during work in the field. Details of the monitoring are presented below.

3.4.1 Ambient Turbidity Monitoring

To develop this turbidity monitoring plan to be utilized during BMP installation/removal, the Respondents collected and evaluated data to understand spatial and temporal variability in ambient turbidity. Ambient turbidity data were collected in accordance with the *Supplemental Data Collection- Ambient Turbidity Measurements Plan* (Ambient Turbidity Work

Plan) dated October 6, 2021 (GHD, 2021). Prior to its finalization, elements of the Ambient Turbidity Work Plan were discussed with the EPA, the Texas Commission on Environmental Quality (TCEQ), and the U.S. Army Corps of Engineers (USACE) at Technical Working Group (TWG) Meetings held on June 4, August 5, and August 30, 2021. After addressing EPA comments on an initial draft plan, the Ambient Turbidity Work Plan was submitted to EPA on October 6, 2021, and was approved by EPA in a letter dated October 15, 2021 (EPA, 2021).

3.4.1.1 Equipment and Methods

The ambient turbidity monitoring equipment consisted of a buoy with solar charging capabilities, a sonde for collecting turbidity readings, and a dual anchor to the riverbed. The equipment also contained a built-in Global Positioning System (GPS) to record and transmit its location. A total of four monitors were deployed in December 2021 to collect turbidity measurements in Nephelometric Turbidity Units (NTUs) using a data logger transmitted in 10-minute intervals to a database using cellular telemetry. The turbidity monitors (A, B, C, and D) were deployed at selected locations around the Northern Impoundment, based upon Site-specific considerations, as presented on Figure 3.1. The location of two velocity monitors is also depicted on Figure 3.1.

Figure 3.1 Monitoring Locations

GHD sought guidance from the United States Coast Guard on the placement of the monitors and with respect to measures necessary to maintain the visibility of the monitors and avoid disruption of navigation. In addition, GHD coordinated with the Texas Department of Transportation (TxDOT) to minimize interference with planned TxDOT projects in the immediate area. Notification of the proposed locations of the monitors was also provided to the Port of Houston Authority (POHA).

3.4.1.2 Data Review

Data were collected at each of the four locations (A, B, C, and D) from December 1, 2021, to March 28, 2022. The transmitted data were downloaded to a laptop computer for review and processing. The data for each monitor were refined by removing unusable data arising from potentially clogged sensors, not reporting data from periods when no data were transmitted, and not including data collected when the sensor had been unintentionally moved to an inappropriate location (e.g., by barge traffic). Statistics for the refined datasets were calculated. Statistical parameters included the number of samples and minimum, maximum, mean, mode, median and standard deviation. All velocity and turbidity data relied on in the analysis have been provided to the EPA in monthly progress reports submitted per the AOC.

The data were found to be lognormally distributed. The data frequency distribution for Ambient Monitor C shown below on Figure 3.2 is provided as an example. Data obtained from the other three ambient monitors followed a similar distribution.

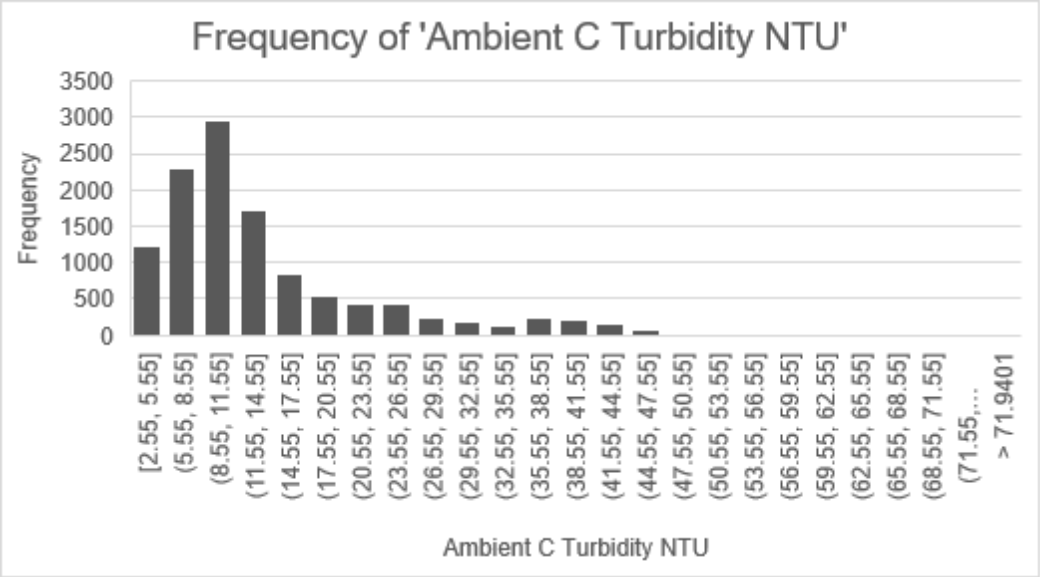

Figure 3.2 Lognormal Distribution of Turbidity for Ambient C Monitor

Therefore, the mean and standard deviations were calculated (Table 3.1) according to Contaminated Sites Statistical Applications (CSSA, 2001) guidance using the equations, below.

$$m = exp\left(\alpha + \frac{\beta^2}{2}\right)$$

$$\alpha = log(m) - \left(\frac{\beta^2}{2}\right)$$

$$s = m\sqrt{exp\,(\beta^2) - 1}$$

$$\beta = \sqrt{log\,(1 + (\frac{s}{m})^2)}$$

Where all logarithms are natural (base e), and
m = mean
s = standard deviation
α = mean of the logarithms
β = standard deviation of the logarithms

Table 3.1 Derivation of Mean and Standard Deviation for Lognormally Distributed Data

Device	Mean of the Logarithmic Values, α	Standard Deviation of the Logarithmic Values, β	Data Mean, m	Data Standard Deviation, s
Ambient A	4.05	0.61	69.13	46.42
Ambient B	2.87	0.69	22.38	17.47
Ambient C	2.45	0.58	13.71	8.67
Ambient D	2.64	0.62	16.98	11.63

3.4.2 Remedial Action Monitoring Locations

Turbidity in NTUs will be monitored multiple times per day during BMP installation and removal activities. As evidenced from data from the ambient velocity monitors deployed concurrently with the ambient turbidity monitors,

surface water flow in the vicinity of the TCRA cap is predominantly along the northern edge in a south-easterly direction and along the eastern edge in a southerly direction. The southern edge is connected to the Interstate Highway-10 (I-10) road embankment and the western edge is a backwater area with little to no discernible flow, especially to its south. Barring any extreme events, these flows are expected to be similar during BMP installation and removal activities. Proposed turbidity monitoring locations for use during the RA are depicted on Figure 3.3 and are described below.

When BMP installation and removal activities are being performed outside of the western edge and northern edges of the TCRA cap, the background location will be located approximately 500 feet upstream (towards the north) of the northwest corner of the cap at approximately Location A. This is within the range noted for other sites, such as 985 feet in the Hudson River and 1,000 feet during work on the Passaic River in 2013. When BMP installation and removal activities are being performed outside of the eastern edge of the TCRA cap, the background location will be upstream of the northeast corner of the TCRA cap at approximately Location B. Additionally, the monitor that was installed at Location A will be moved to the new Location A' (see Figure 3.3) and the data collected from that monitor will be used as reference information.

When BMP construction and removal activities are being performed outside of the western edge and northern edges of the TCRA cap, the monitoring location will be downstream (towards the east) of the northeast corner of the cap at approximately Location B. When BMP construction and removal activities are being performed outside of the eastern edge of the TCRA cap, the monitoring location will be downstream (towards the south) just below the I-10 Bridge on the eastern side of the River at approximately Location C. A fourth monitor designated D, will be an early indication monitor that will be maintained in close proximity to the BMP installation and removal work as it progresses. The data from this monitor will be used internally by the RC to provide an early indication of changes in typical turbidity readings as part of an adaptive management approach.

If any nearby water activities are expected to impact the turbidity monitoring locations (i.e., TxDOT I-10 Bridge replacement), the above-described turbidity monitoring locations may be adjusted accordingly.

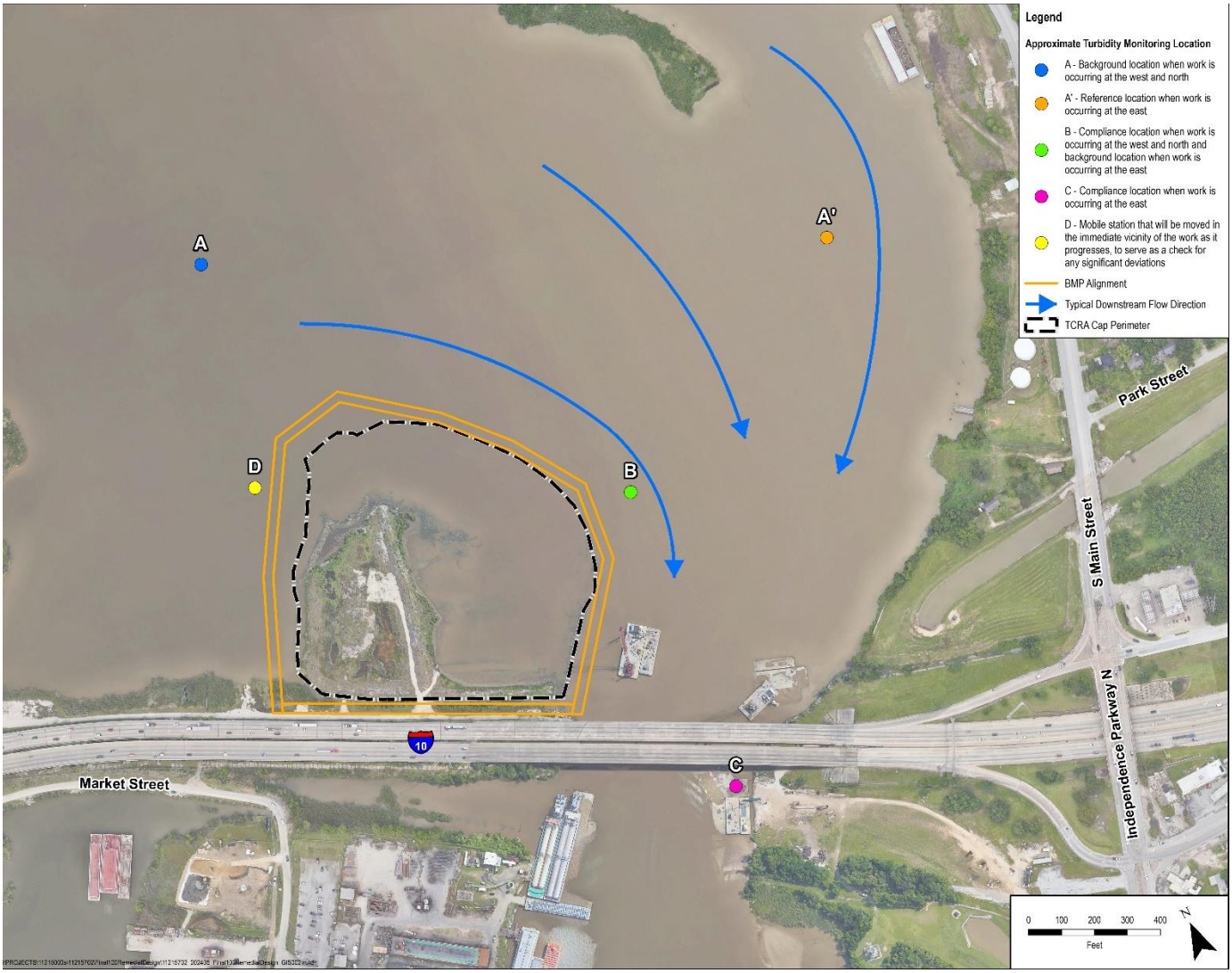

Figure 3.3 Proposed RA Turbidity Monitoring Locations

3.4.3 Turbidity Monitoring Threshold

The turbidity monitoring threshold presented in this section will form the basis for evaluating turbidity levels at the applicable monitoring location during BMP installation and removal activities. The State of Texas does not have a quantitative surface water quality standard for turbidity. Ambient turbidity data collection was performed, as described above to characterize local ambient turbidity levels and distribution. The results from the ambient investigation are presented in Table 3.2, below.

Table 3.2 Ambient Turbidity Monitoring Data Summary and Statistics

Device	Data Interval	Number of Data Points	Minimum (NTU)	Maximum (NTU)	Mode (NTU)	Median (NTU)	Mean (NTU)	Standard Deviation	3X Standard Deviation
Ambient A	12/1/21 - 3/20/22	11,823	3.85	873	55	50	69.13	46.42	139
Ambient B	12/1/21 - 2/23/22	10,080	3.25	569	12	17	22.38	17.47	52.4
Ambient C	12/1/21 - 1/6/22 & 2/11/22 - 3/28/22	11,682	2.55	245	12	11	13.71	8.67	26.0
Ambient D	12/1/21 - 2/24/22	12,175	2.85	103	10	14	16.98	11.63	34.9

Notes:
NTU - Nephelometric Turbidity Units
Average standard deviation for mean > 50 = 46.42 NTU (Ambient A).
Average standard deviation for means < 50 = 12.57 NTU (Ambient B, C, and D).
Three times the average (of Ambient B, C, and D) standard deviation for means < 50 = 37.71 = ~ 38 NTU.

The data in Table 3.2 were used to inform the turbidity threshold that is proposed to be utilized during BMP installation and removal associated with the Northern Impoundment RA. The downstream turbidity threshold when background turbidity is less than 500 NTUs was based on background plus three standard deviations of the data collected during implementation of the ambient turbidity monitoring program (Table 3.2). The use of three standard deviations in establishing a threshold is based on a suggestion made by the USACE representative during the August 5, 2021, TWG meeting in which the ambient turbidity monitoring program was discussed.

The turbidity thresholds that will apply at the monitoring location are as follows:

– Turbidity should not be greater than 38 NTUs above background if background is less than 50 NTUs. This represents three times the average of the standard deviations for Ambient Monitors B, C, and D because the mean ambient turbidity for all three monitors were less than 50 NTUs.
– Turbidity should not be greater than 139 NTUs above background if background is equal to, or greater than, 50 NTUs but less than 500 NTUs. This represents three times the standard deviation for Ambient Monitor A because the mean ambient turbidity for this monitor was greater than 50 NTUs.
– Turbidity should not be greater than 10 percent above background if background is equal to, or greater than, 500 NTUs. This approach was based on levels utilized for the TCRA and at other sites and guidance from other states (e.g., Washington).

Turbidity levels at the monitoring location will trigger response actions, as specified in Section 3.4.6. As stated in Section 3.4.2, if any nearby water activities are expected to impact the turbidity monitoring locations (i.e., TxDOT I-10 bridge replacement), the turbidity monitoring locations may be adjusted, accordingly.

3.4.4 Flow Reversals and Sampling Depth

Flow reversals as a result of tides are common in this area of the San Jacinto River. During BMP installation and removal activities, the RC will use a tide chart to help determine flow direction and this will be taken into consideration when comparing turbidity data from a monitoring location with that of background. The data suggests that there are not levels of downstream turbidity that are sufficiently high as to materially affect the upstream readings when flow reverses.

At each station, monitoring will only occur at one depth because the turbidity monitoring instrument can only be attached at a fixed depth to the buoy. Therefore, the monitors will be placed at mid-depth. Also, they will not be deployed in water that is less than 10 ft in depth to avoid becoming stuck in the riverbed if the water level drops significantly.

3.4.5 Monitoring Frequency and Schedules

The turbidity monitoring instrument will measure and record turbidity levels at a minimum every hour and the data will be reviewed multiple times per day during BMP installation and removal, when potentially disturbing activities are

occurring. In addition, the equipment will be outfitted to alert the RC if the turbidity levels exceed the threshold. At that time, the reason for the alert and source for the turbidity will be investigated.

3.4.6 Responses to Monitored Turbidity Levels

If turbidity values at the monitoring location are above the specified threshold, the RC will immediately investigate the source of the turbidity and address it as appropriate (if associated with RC's work).

3.4.7 Quality Assurance and Maintenance

The quality assurance objective for turbidity monitoring is to collect data that are of known and acceptable quality so that the goals of the monitoring plan can be achieved. Appropriate field quality control procedures will be followed. These procedures include following standard instrument operation procedures, monitoring the equipment on a routine basis and routinely cleaning the glass face over the sensor. The data will also be periodically reviewed on behalf of the RC by a person with the appropriate qualifications.

3.4.8 Methods and Equipment

The same or similar turbidity monitoring equipment utilized in the ambient data collection activities will be utilized during the RA. Turbidity measurements will be collected using a data logger and transmitted to a database using cellular telemetry in NTUs. The transmitted data will be downloaded to a laptop computer for review and processing. This will serve as documentation of the collected turbidity readings. Additional documentation will include weather conditions and descriptions of any actions taken in response to consistently elevated turbidity readings.

3.5 Noise

The *Preliminary (30%) Remedial Design - Northern Impoundment submittal* (30% RD; GHD, 2020), identified the potential for high noise and vibration levels during the installation of the BMP wall. The pile types being considered in the 30% RD were very robust (H-piles and 6-ft diameter king piles) and were being driven to significant tip depths (as deep as -93 ft [NAVD88]). The type of pile driver necessary for those conditions would have been very large and would have resulted in significant noise and vibration levels. The pile types specified in the Final (100%) Remedial Design - Northern Impoundment submittal are common sheet piles, AZ36-700 and AZ42-700, driven to much shallower depths (-51 ft NAVD88). These piles will be driven using lower vibration/noise installation methods such as a silent/press-in method driver, resonance or vibratory head, or similar. Thus, the associated noise and vibration to install them should be at acceptable levels.

3.5.1 Baseline Noise Monitoring

While noise is not anticipated to be a concern, the selected RC will conduct baseline noise monitoring at the start of RA construction work, consistent with typical construction best practices. Baseline monitoring will include installing sensor stations in the vicinity of the work site for up to 2 weeks to collect data and establish baseline noise levels. These data will be used to evaluate noise levels at the work site to determine whether any adjustments in equipment selection and/or operation activities are warranted to control noise.

3.6 Odors

There is the potential that Northern Impoundment RA excavation activities may result in odors. Odors are most likely to occur during excavation activities when previously buried material and soils are unearthed and exposed to air. The main concern with respect to odors is the potential impact to workers, adjacent businesses, and the neighboring community.

If odors are present that would create a concern for worker health and safety or a nuisance to the public, the RC will implement on-Site measures to counter, suppress, or mask the associated nuisance, as outlined in the RC's Air Monitoring Plan. These measures may include, but would not be limited to the following:

– Deploying odor suppressing foams (Safety Data Sheets would be evaluated as part of the selection and approval of foams).
– Perimeter misting systems.
– Perimeter masking desiccants.
– Minimizing the number and/or size of stockpiles and covering of stockpiles.
– Minimizing the size of open excavations.

4. Documentation

This section addresses the monitoring documentation requirements for the environmental media to be monitored. The RC will be required to maintain necessary documentation, including survey records related to the excavation areas and records required by plans the RC adopts. Dust monitoring records and notes regarding the maintenance of stormwater controls will also be maintained at the work site. The frequency and types of documentation required for dust and stormwater monitoring will be outlined by the RC in the Air Monitoring Plan and the SWPPP, respectively. Turbidity monitoring records and notes regarding maintenance of the monitoring devices and/or the turbidity controls will be maintained at the work site. Noise and odor field documentation will also be maintained at the work site.

5. References

– CSSA. Contaminated Sites Statistical Applications Guidance Document No. 12-4. DISTRIBUTION MODELS -A guide for reviewers, data analysts and interpreters on the statistical properties of common distribution models, April 2001.
– EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.
– EPA, 2021. Letter to C. Munce, GHD Services Inc., regarding approval of Supplemental Data Collection -Ambient Turbidity Measurements Plan, dated October 15, 2021. U.S. Environmental Protection Agency.
– GHD, 2020. *Preliminary 30% Remedial Design - Northern Impoundment*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. May 28, 2020.
– GHD, 2021. *Supplemental Data Collection -Ambient Turbidity Measurements Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. October 6, 2021.

Attachments

Attachment 1

Air Monitoring Plan

Attachment 1 - Air Monitoring Plan – Northern Impoundment

Provided as Part of Final 100% Remedial Design – Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

May 10, 2024

→ **The Power of Commitment**

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1. Introduction

This Air Monitoring Plan (AMP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company and McGinnes Industrial Maintenance Corporation, for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). This AMP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Remedial Design for the Northern Impoundment (Northern Impoundment RD) submittal to the EPA.

The AMP was developed to address air monitoring to be implemented by the remedial contractor (RC) during the remedial action (RA) at the Northern Impoundment. This AMP discusses the development of site-specific action levels protective of potential exposures to dust generated at the Northern Impoundment RA (Work Site), in which dioxins and furans could potentially be present, and the methods for monitoring airborne dust. This AMP was developed to assist in protecting the health and safety of personnel working at the Work Site and off-site personnel working in the surrounding industrial area.

2. Development of Work Site Action Levels

Work Site action levels (WSALs) were developed based on established exposure guidelines and standards, site-specific risk-based screening levels, and equivalent airborne dust concentrations as discussed in the subsections below. The WSALs are designed to provide early indication for the need to implement dust control measures; an exceedance of the WSALs does not necessarily indicate a health concern.

2.1 Occupational Exposure Guidelines and Standards

GHD used established guidelines and limits to establish the WSALs. The US Occupational Safety and Health Administration has established Permissible Exposure Limits (PELs) for workers to dust, based upon a lifetime workplace exposure, 8 hours per day and 40 hours per week for 30 years. These levels are intended to be health protective for potential for long-term exposures and are not an indication of health concerns from a short-term perspective.

Table 1 Exposure Guidelines and Standards for Dust

Contaminant of Interest	Occupational Exposure Limit	Basis	Units
Total Dust	15	OSHA PEL	mg/m^3
Respirable Dust	5	OSHA PEL	mg/m^3
Notes: mg/m^3 – milligram per kilogram			

2.2 Screening Level Development for Dioxins and Furans

GHD used the United States Environmental Protection Agency (USEPA) Regional Screening Level (RSL) calculator to derive a site-specific risk-based Screening Level (SL)[1]. A cancer target risk of 10^{-5} and non-cancer hazard quotient of 1 were used in the calculation. The outdoor worker air scenario was selected, which includes default USEPA exposure

[1] **https://www.epa.gov/risk/regional-screening-levels-rsls**. Accessed 5/08/2024.

assumptions for an outdoor worker: Exposure Time (ET) = 8 hours/day, and Averaging Time (AT) = 365 days. Remedial Actions may occur up to nine consecutive months per year (November - July), therefore an Exposure Frequency (EF) of 169 days/year was chosen. The EF of 169 days/year is based on the USEPA default exposure assumption for an outdoor worker of 225 days/year adjusted for 9 months (225 /1.3). These exposure assumptions represent a good faith attempt to estimate the potential exposure to dust generated during excavation activities for both a worker on-site and an off-site worker in the surrounding industrial areas. A SL of 0.00000006 mg/m^3 for 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) was calculated. This represents the concentration that would have to be sustained for 8 hours per day for 169 days a year to represent a potential risk of developing an adverse health effect. Instantaneous or short-term airborne concentrations above this SL do not necessarily indicate a health concern, only that mitigation activities are warranted. Results from the RSL Calculator are summarized in Attachment 1.

2.3 Dioxin and Furan Equivalent Airborne Dust Concentration Development

There is currently not an available real-time method for directly measuring dioxin and furans in air. However, because dust generated from the Work Site could potentially contain dioxins and furans, dust concentrations can conservatively be used as an indicator for potential exposures to these compounds. This assumption is overly conservative because it assumes that all soil that could become airborne would contain dioxins and furans, which is not the case. Based on this conservative assumption that all of the excavation areas contain the highest detected concentration of total dioxins and furans (total TEQ), GHD calculated the dioxin and furan Equivalent Airborne Dust Concentration ($EADC_{SL}$); i.e., the total dust concentration that would contain a dioxin and furan concentration equal to the SL.

The $EADC_{SL}$ calculation shows this relationship. The equation for calculating the $EADC_{SL}$ is shown below.

$$EADC_{SL} = SL \times Conc^{-1}_{Contaminated\ soil} \times 10^6$$

Where: SL = Screening Level, mg/m^3
$Conc^{-1}_{Contaminated\ soil}$= Inverse of the soil concentration, kilograms per milligram (kg/mg)

The peak total TEQ soil concentration detected was 0.087 mg/kg$_{soil}$. Using the equation above, the $EADC_{SL}$ was calculated as shown below:

$$\text{Total dust} = \text{EADC}_{SL} = \frac{mg_{soil}}{m^3_{air}} = \left(\frac{0.00000006\ mg}{m^3_{air}}\right)\left(\frac{kg_{soil}}{0.087\ mg}\right)\left(\frac{10^6 mg_{soil}}{kg_{soil}}\right) = 0.57\ \text{mg/m}^3$$

Where: SL = The screening level of 0.00000006 mg/m^3
$Conc^{-1}_{Contaminated\ soil}$ = One kg of soil contains 0.087 mg of total TEQ
10^6 = The amount (in mg) of soil in a kg of soil

Therefore, assuming the highest detected total TEQ concentration is present equally in all Work Site soil (which is known to not be the case), airborne dust concentrations above 0.7 mg/m^3 averaged over an 8-hour period would be required to potentially exceed the calculated SL for Total TEQ. This concentration is the basis for the WSALs for the Northern Impoundment RA, as discussed in Section 3 below.

Table 2 Equivalent Airborne Dust Concentration

Compound of Interest	Soil Concentration (mg/kg)	Work Area Guideline (mg/m^3)	Work Area	Units
			$EADC_{SL}$ measured as total dust sustained for 8-hours to reach the guideline.	
Total TEQ	0.087	0.00000006	0.7	mg/m^3

3. Work Site Action Levels

After consideration of the occupational exposure guidelines and limits and the site-specific screening levels of other compounds of interest, the more conservative WSAL of 0.7 mg/m^3, averaged over 1 hour, will be used at the Work Site during the RA. The WSALs are designed to provide early indication for the need to implement dust control measures; an exceedance of the WSALs does not necessarily indicate a health concern. The RC will perform real-time total dust air monitoring on-site and on the perimeter of the Work Site during the RA. The WSALs are summarized in Table 3.

Table 3 Work Site Action Levels

Chemical of Interest	Location	Action Level[1]	Duration	Description of Action
Total Dust Concentrations (Total Dust)	On-site near Work Areas and Perimeter of the Work Site	< 0.7 mg/m^3	1-Hour Average	No action required
		> 0.7 mg/m^3	1-Hour Average	Notify the Project Manager, implement dust suppressant and mitigation measures to reduce dust concentrations below the action level.
Notes: [1]Action levels are based on real-time average concentrations of total dust				

If the WSAL is exceeded, dust suppression and mitigation measures on-site to minimize airborne dust produced from work activities may include, but would not be limited to:

– Reduction of speed of reagent addition during potential solidification mixing,
– Reduction of on-site traffic,
– Reduction in speed of on-site traffic,
– Watering or misting on-site roads,
– Use of appropriate truck covers, and
– Applying or maintaining aggregate, or similar, for on-site roads.

4. Air Monitoring Methods

Real-time air monitoring for total dust will be performed using TSI Dustrak aerosol or equivalent monitoring instruments. Dust monitors will be placed around the perimeter of the Work Site both downwind and upwind of the work area. Additionally, air monitoring will be conducted on-site near work areas. All instruments will be calibrated and operated in accordance with the manufacturer's specifications or applicable test or method specifications.

Attachments

Attachment 1

RSL Calculator Results

Site-specific
Outdoor Worker Air Inputs

Variable	Outdoor Worker Air Default Value	Site-Specific Value
AT_{out} (averaging time - outdoor worker)	365	365
ED_{out} (exposure duration - outdoor worker) yr	25	2
EF_{out} (exposure frequency - outdoor worker) day/yr	225	169
ET_{out} (exposure time - outdoor worker) hr	8	8
THQ (target hazard quotient) unitless	0.1	1
LT (lifetime) yr	70	70
TR (target cancer risk) unitless	1.0E-06	1.0E-05

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Site-specific

Outdoor Worker Risk-Based Regional Screening Levels (RSL) for Air

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; T = ATSDR DRAFT; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; D = OW; R = ORD; N = WI; W = TEF applied; E = RPF applied; G = see user guide; U = user provided; ca = cancer; nc = noncancer; * = where: nc SL < 100X ca SL; ** = where nc SL < 10X ca SL; SSL values are based on DAF=1; max = ceiling limit exceeded; sat = Csat exceeded.

Chemical	CAS Number	Mutagen?	Volatile?	Chemical Type	IUR ($(ug/m^3)^{-1}$)	IUR Ref	RfC (mg/m^3)	RfC Ref	Carcinogenic SL TR=1E-05 (ug/m^3)	Noncarcinogenic SL THI=1 (ug or $fibers/m^3$)	Screening Level (ug or $fibers/m^3$)
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	3.80E+01	U	4.00E-08	U	5.97E-05	2.59E-04	5.97E-05 ca**

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Attachment 6 - Construction Quality Assurance/Quality Control Plan (CQA/QCP) - Northern Impoundment

Provided As Part of Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

July 17, 2024

Contents

Table index

1. Introduction

The Construction Quality Assurance/Quality Control Plan (CQA/QCP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). This CQA/QCP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Final 100% Remedial Design for the Northern Impoundment (Northern Impoundment 100% RD) submittal to the EPA.

The CQA/QCP describes activities to be used to verify that the construction of the Northern Impoundment remedial action (RA) will satisfy applicable plans, specifications, and related requirements, including quality objectives. This CQA/QCP identifies construction quality control (CQC) activities that will take place during the Northern Impoundment RA. The remedial contractor (RC) will implement such CQC activities to measure and control the characteristics of the materials and the construction methods during the Northern Impoundment RA to demonstrate that the materials and construction meet the requirements of the RD technical specifications and drawings. CQC activities to be implemented by the RC during the Northern Impoundment RA are identified in the individual specification sections provided in the technical specifications, included as Appendix H to the Northern Impoundment 100% RD.

References in this CQA/QCP to the "work site" are to the Northern Impoundment and references to "Implementing Party" are to the entity(ies) implementing the RA for the Northern Impoundment. Prior to initiation of Northern Impoundment RA activities, each selected RC will either update this CQA/QCP or develop its own CQA/QCP to address the components outlined in this document.

1.1 Relationship to Supporting Plans

The CQA/QCP should be considered in combination with the other supporting plans. The Site-Wide Monitoring Plan (SWMP) describes the procedures for monitoring to prevent the potential spread of dust generated during construction, procedures to control and monitor turbidity in the river during the installation and removal of the sheet pile wall to be constructed outside the boundaries of the Northern Impoundment (referred to herein as the Best Management Practice [BMP] wall), monitoring of stormwater controls, and monitoring of noise and odor during RA activities. Field and analytical quality procedures are described in the Quality Assurance Project Plan (QAPP). The Field Sampling Plan (FSP) provides the procedures for excavation confirmation soil sampling, as well as the sampling procedures for the treated water from the water treatment system, the historic berm material that may be re-used on-site, and the imported fill that will be used during implementation of the Northern Impoundment RA. The Transportation and Off-Site Disposal Plan (TODP) describes the procedures for on-site management and loading of excavated material to be disposed of off-site during the Northern Impoundment RA, the transportation routes for off-site shipments from the Northern Impoundment, and measures to be implemented, if needed, to protect communities that may be affected by the shipments.

2. Project Organization

The CQA team will implement the QA functions independently of the other aspects of the construction effort. The team members collectively should possess all required credentials, capabilities, and experience required to provide QA support with respect to Northern Impoundment RA activities. The project organization will be identified after the RC is

selected and therefore the roles and responsibilities have not been completely defined in this plan. However, the CQA team will likely be comprised of personnel with the following roles and general responsibilities:

- ***CQA Engineering Project Manager*** - Provide overall construction QA project oversight.
- ***Engineer*** - Provide field management of CQA/CQC activities.
- ***Quality Assurance Official (QA Official)*** - Perform CQA audits.
- ***CQA/CQC Support Personnel*** - Conduct CQA tests and inspections as directed by the Engineer.
- ***QA/QC Laboratories*** - These will each be an Approved Laboratory (as described in the QAPP) that will provide QA/QC testing of materials used in the construction activities, as requested by the Engineer.
- ***RC*** - Carry out construction activities according to technical specifications and design drawings and implement the CQC requirements specified in the technical specifications.

It is contemplated that a single member of the CQA team may serve in multiple roles (for example, that the QA Official may also be the CQA Engineering Project Manager and/or Engineer).

3. Inspection and Testing Activities

3.1 Inspections

Throughout the period of construction, the quality of work completed and material used for each of the work tasks is to be confirmed through regular inspections of the work, conducted by the RC and verified by the Engineer and CQA support personnel, on a periodic basis.

The exact inspections to be conducted will be determined by the RC and Engineer and incorporated into the updated CQA/QCP, but suggested inspections are included in Table 1 and outlined below:

i. Daily inspections of the work in progress.
ii. Inspection of material as it is delivered to the work site to check for damage during delivery.
iii. Comparison of the material delivered to the work site to the design specifications to ensure that the proper material has been delivered to the work site.
iv. Inspections of materials after they have been installed to ensure that there has not been damage during installation and that the materials have been installed in accordance with the construction specifications.
v. Inspections of backfill placement and compaction in accordance with the appropriate specifications.
vi. Inspections of post-construction survey data to ensure the excavation extents are meeting the site clean-up standards.
vii. A pre-construction inspection should be performed prior to beginning work on any major work task. A pre-construction inspection may include the following:
    a. A review of contract and specification requirements to ensure that all materials and/or equipment have been tested according to applicable standards and specifications.
    b. Steps to ensure that provisions have been made to provide required quality control testing.
    c. An examination of the Work Site to ascertain that all applicable/necessary preliminary work tasks have been completed/performed.
viii. General inspections should be performed by the Engineer periodically as the amount of work completed warrants an inspection. A general inspection may include the following:
    a. Examination of the quality of workmanship.
    b. Testing of materials for compliance with the technical specifications/requirements.
    c. Identification of any omissions.

d. Assessment of general progress of work performed.

The inspections performed by the Engineer will be recorded in the work site logbook as described in Sections 4.1 and 7.0 and copies of inspection reports will be maintained on-site.

The components of each work task to be inspected, the types of inspections required, and the frequency of the inspections are summarized in Table 1.

3.2 Testing

In addition to the daily inspections of the construction progress, material testing is to be carried out as required. Material testing should be performed to ensure compliance with manufacturer specifications and design criteria as presented in the technical specifications. The exact testing to be conducted will be determined by the RC and Engineer and incorporated into the updated CQA/QCP, but suggested testing is included in Table 2.

Table 2 includes suggested testing requirements, methods of testing, testing frequency, key acceptance criteria, test sample sizes and locations, and potential corrective measures for each of these work task components and submittals (i.e., test reports, certificates verifying material quality/workmanship, etc.). For convenience, the Northern Impoundment RA QC requirements specified in the technical specifications and the CQA requirements are also included in Table 2. It is suggested that CQA testing be conducted at a frequency of testing that is equal to ten percent of the Northern Impoundment RA QC testing requirements. If a particular test of a material or work activity fails more than twice, the Engineer should increase the rate of QA testing, based on the Engineer's professional judgement, as deemed appropriate for the material/activity.

Northern Impoundment RA QC testing should be performed by the RC to measure and control the characteristics of the materials and installation procedures used during the Northern Impoundment RA activities in order to demonstrate that the materials and installations meet the requirements of the technical specifications. Details of the Northern Impoundment RA QC requirements are specified in the technical specifications.

4. Inspection Documentation

This section details the recommended documentation requirements for the CQA/QCP.

4.1 Work Site Logbook

The Engineer will record construction quality control activities in a work site logbook to be kept on-site.

4.2 Photographic Documentation

As part of the log, and in accordance with Section 3.6(d) of the SOW, photographs will be taken and date-stamped showing significant construction activities. Daily photographs will be submitted to the Engineer weekly, at a minimum. A separate photographic log will be maintained by the Engineer, with Contractor photographs included where not duplicative.

4.3 CQA Instrument Calibration

The CQA support personnel will record calibrations of testing equipment in an instrument calibration inspection logbook, maintained on-site by the Engineer. Actions taken as a result of recalibration will be recorded in the inspection logbook, as described in the next section.

4.4 Inspection and Test Logbook

It is recommended that all observations and CQA quality control field tests be recorded by the CQA support personnel into an inspection and test logbook and that such logbooks be numbered sequentially. Separate logbooks may be kept for various work task components (i.e., soil, liners). These logbooks will be kept on-site and maintained by the Engineer. For efficiency, the RC will formulate necessary inspection items into checklist forms for completion in the field.

5. Problem/Corrective Action Reports

A problem is defined as material or workmanship that does not meet the technical specifications or drawings. Any problem/corrective action reports prepared with respect to such a problem will be cross-referenced to specific inspection entries in the inspection and test logbook in which the problem was identified. The RC will devise a process for identifying and addressing any problem, as defined above, to the satisfaction of the Engineer and the Implementing Party.

6. Project Meetings

Project meetings will be held during the construction period as a measure intended to ensure that all tasks are accomplished according to schedule and are completed in accordance with the technical specifications and drawings. As discussed below, these project meetings may be attended by the QA Engineering Project Manager, Engineer, CQA support personnel, RC, the Implementing Party, EPA and/or Texas Commission on Environmental Quality (TCEQ) (subject to availability), and other agencies, subcontractors or project support personnel, as appropriate. The timing and attendance, at such meetings will be determined by the RC and the Engineer and incorporated into the updated CQA/QCP, but suggested project meetings and their purposes are included below:

- ***Pre-Construction Meeting*** - To review the general project scope, resolve any uncertainties in the technical specifications and construction drawings, and to review levels of responsibility, reporting requirements, and health and safety requirements.
- ***Daily Progress Meetings*** - To review daily work schedule, plans, and progress. This meeting is intended to be an informal meeting held at the start and/or at the end of each workday.
- ***Weekly Progress Meetings*** - To provide an update of work schedule progress on a weekly basis and identify schedule slippages and efforts required to get back onto schedule, if required.
- ***Monthly Progress Meetings*** - To provide a construction progress update to EPA and/or TCEQ. May be conducted informally by conference call and may be combined with a weekly meeting, if appropriate.
- ***Problem or Work Deficiency Meetings (As Needed)*** - To address any problems or deficiencies which have occurred or are likely to occur.

The detailed topics to be discussed and the attendees for these meetings will be determined based on the activities that are occurring and the overall project structure and organization. For all meetings held during the Northern Impoundment RA, with the exception of the daily progress meetings, minutes will be prepared and distributed to all attendees.

7. QA/QC Documentation and Storage of Records

Prior to initiation of Northern Impoundment RA activities, the RC will be required to establish a process for creation and retention of QA/QC documentation. Documentation that will be retained on-site includes the following:

– RD and design drawings.
– Technical specifications.
– CQA and Northern Impoundment RA QC inspection and test results.
– RC submittals.
– RC's work site logbook including photo documentation.
– CQA inspection logbook.
– Problem/corrective action reports.

CQA documentation for an excavation season will be submitted to EPA at the completion of each excavation season or at the completion of the RA for review and approval. Once the construction is complete, all CQA documents (originals) will be maintained following the records retention requirements applicable to the Northern Impoundment RA.

8. References

– EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. USEPA Region 6, CERCLA Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
A. Temporary Traffic Control				
• Traffic Control	• Has a Temporary Traffic Control Plan been provided as specified?	• Check Section 01 35 00	• Continuous	• Temporary Traffic Control Plan
• Traffic Control Devices	• Have signs been inspected for legibility, damage, suitability, and location? • Are signs clean, repaired, or replaced to maintain clarity and reflectiveness?	• Check Section 01 35 00	• Continuous	• None
B. Health and Safety				
• Health and Safety Planning	• Are health and safety procedures in place, including equipment, work area and excavation inspections?	• Check Section 1 35 29	• Continuous	• Health and Safety Plan
C. Temporary Facilities and Controls				
• Utilities	• Have utilities been provided as specified and coordinated with local utility providers?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Construction Facilities	• Have temporary construction facilities been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Vehicular Access and Parking	• Has vehicular access and parking been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Barriers and Enclosures	• Have barriers and enclosures been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Temporary Controls	• Have temporary controls been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
D. Temporary Soil Erosion and Sediment Control				
• Erosion Control Items	• Is depth of silt fence embedment in accordance with drawings?	• Visual & check drawings	• Continuous	• Soil Erosion & Sediment Control Plan
	• Are tears or holes present in silt fence fabric?	• Visual	• Continuous	• Product Data
	• Is erosion around and under silt fence present?	• Visual	• Continuous	• None
	• Is sagging or collapse evident?	• Visual	• Continuous	• None
	• Has a Soil Erosion and Sediment Control Plan been provided as specified?	• Check permit	• Continuous	• Soil Erosion and Sediment Control Plan
E. Waste Material Solidification				
• Waste Material Solidification	• Has waste material been dewatered and solidified as specified?	• Check Section 02 55 00	• Continuous	• Solidification Plan • Daily Field Installation Reports • Quality Assurance/Quality Control Plan

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
F. Material Handling and Transportation				
• Material Handling and On-Site Transportation	• Has a Material Handling and On-Site Transportation Plan been provided as specified?	• Check Section 02 61 14	• Continuous	• Material Handling and On-Site Transportation Plan
G. Transportation and Disposal				
• Disposal Equipment	• Is equipment provided as specified?	• Check Section 02 61 16	• Upon delivery	• Operating licenses and permits
	• Is equipment being decontaminated properly?	• Check Section 02 61 16	• Prior to leaving Site and changing to lower impacted waste type	• Transportation and Disposal Plan
	• Are vehicles maintained properly in accordance with 49 CFR 393?	• Visual	• Daily (Periodically)	• Transportation and Disposal Plan
	• Do motor vehicle operator(s) perform a safety inspection of each motor vehicle before it is used and at least once a day?	• Visual	• Continuous	• None
• Disposal of Materials	• Has a Transportation and Disposal Plan been provided as specified?	• Check Section 02 61 16	• Continuous	• Transportation and Disposal Plan
	• Has a Transportation Emergency Response Plan been provided as specified?	• Check Section 02 61 16	• Continuous	• Transportation and Disposal Plan
	• Are materials transported and disposed of to satisfy requirements as specified?	• Check Section 02 61 16	• Continuous	• Transportation and Disposal Proposal • Shipping and Disposal Documents • TSDF Weigh Scale documents
	• Are trucks inspected prior to leaving the Site to transport for disposal at approved TSDFs?	• Visual	• Continuous	• Shipping and Disposal Documents
H. Excavation				
• Excavation Equipment	• Is equipment inspected daily by a qualified person?	• Visual	• Continuous	• Excavation Plan
• Sediment/Soil	• Are excavations being conducted as specified?	• Check Section 31 23 16 and Drawings • Visual	• Periodic during excavation	• Excavation Plan
• Material Handling and Stockpiling	• Is material being handled and stockpiled as specified?	• Check Section 31 23 16 • Visual	• During excavation and stockpiling	• Material Handling and On-Site Transportation Plan
	• Is load packaged, labelled etc. as specified?	• Check Section 31 23 16	• After loading and before leaving Site	• Material Handling and On-Site Transportation
I. Dewatering				
• Dewatering Equipment	• Does equipment meet specifications?	• Check Section 31 23 19 • Visual	• Upon delivery	• Dewatering Plan
	• Has system been installed as specified?	• Check Section 31 23 19 and Drawings	• Periodic during installation	• Dewatering Plan
	• Has equipment and surplus raw materials been removed?	• Visual	• Daily as required	• Dewatering Plan

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
I. Dewatering (cont'd)				
• Sediment/Soil Dewatering	• Is dewatering procedure adequate to contain impacted groundwater?	• Check Section 31 23 19 • Visual	• Periodic during operation	• Dewatering Plan
	• Is material being dewatered as specified?	• Check Section 31 23 19 • Visual	• During staging	• Dewatering Plan
	• Is settlement being detected where critical structures or facilities exist immediately adjacent to areas of proposed dewatering.	• Check Section 31 23 19 • Visual	• Periodic during operation	• None
J. Fill				
• Existing Berm Material	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Fill for Between Sheet Pile Walls	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Structural Fill	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results • Analytical data • Product data
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Common Fill	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results • Analytical data • Product data
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Sand	• Does sand meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of sand	• Geotechnical testing results • Analytical data • Product data
	• Has sand been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Topsoil	• Does topsoil meet specifications?	• Check Section 31 23 23 • Visual	• Each source of topsoil	• Geotechnical testing results • Analytical data • Product data

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
J. Fill (cont'd)				
• Coarse Aggregate	• Does aggregate meet specifications?	• Check Section 31 23 23	• Each source of aggregate	• Source of aggregate • Geotechnical data • Samples • Suppliers' Certificates
	• Has aggregate been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Clearstone	• Does clearstone meet specifications?	• Check Section 31 23 23 • Visual	• Each source of clearstone	• Geotechnical testing results • Analytical data • Product data
• Backfilling Excavations	• Are excavations being backfilled as specified?	• Check Section 31 23 23 and Drawings	• During backfilling	• Geotechnical data • Survey
	• Has horizontal and vertical control been maintained?	• Check Section 31 23 23 • Visual	• After placement	• Analytical results • Test reports
K. Synthetic Materials				
• Materials	• Do materials provided meet specifications?	• Check Section 31 35 26.16	• Each source of geotextile and geomembrane (liner)	• Product data • Manufacture's instructions • Samples
	• Are materials being stored properly?	• Visual	• Upon delivery to Site	• Manufacturer's instructions
• Installation	• Have materials been placed as specified?	• Visual • Survey	• Periodic during installation	• Manufacturer's instructions
	• Are there any visible defects with materials?	• Visual	• After installation is completed	• None
L. Riprap				
• Materials	• Do materials provided meet specifications?	• Check Section 31 37 00	• prior to delivery	• Source Quality Control testing
• Installation	• Have materials been placed to the proper location and depth	• Survey	• Continuous during work	• None
M. Sheet Piles				
• Materials	• Do materials provided meet specifications?	• Check Section 31 41 16	• Upon delivery	• Product data • Mix Design • Test samples in accordance with AI MS-2 • Records
• Installation	• Have sheet piles been inspected prior to and after installation?	• Check Section 31 41 16 and Drawings	• After installation	• Records
	• Have sheet piles been installed as specified?	• Check Section 31 41 16 and Drawings	• After installation	• Certifications

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
N. Chain Link Fences and Gates				
• Materials	• Do materials provided meet specifications?	• Check Section 32 31 13	• Upon delivery	• Product data • Manufacture's instructions
• Installation	• Have chain link fences and gates been installed as specified?	• Check Section 32 31 13 and Drawings	• After installation	• Certifications
	• Has a final inspection taken place?	• Check Section 32 31 13 and Drawings	• Upon Substantial Performance	• Records
O. Seeding				
• Topsoil Placement	• Has topsoil been placed as specified?	• Check Section 31 23 23 • Visual	• Periodic during placement	• None
	• Has topsoil been lightly surface compacted following seeding?	• Visual	• Periodic following seeding	• None
	• Horizontal and vertical control	• Visual • Survey	• Following placement	• Survey
• Seeding	• Are materials stored properly?	• Visual	• Periodic during storage	• Manufacturer's instructions
	• Does seed, lime, fertilizer, and mulch meet specifications?	• Check Section 32 92 19	• Prior to application	• Source of materials • Product data
	• Has hydroseed, fertilizer, and mulch been applied as specified?	• Check Section 32 92 19 • Visual	• Periodic during application	• Seeding and Erosion Control Plan
	• Have correct quantities of hydroseed, fertilizer, and mulch been placed?	• Check Section 32 92 19 • Visual	• Periodic during placement	• Seed certificates • Fertilizer certificates
	• Have bare spots been rehydroseeded?	• Visual	• Periodic during installation	• None
	• Is height of grass as specified?	• Check Section 32 92 19	• Periodically during maintenance	• None
P. Turbidity Curtain				
• Material	• Have materials been joint inspected upon delivery?	• Visual	• Upon delivery to Work Site	• None
	• Are materials being stored properly?	• Visual	• Periodic during storage	• Manufacturer's instructions
	• Do materials meet specifications?	• Check Section 31 05 19 • Check material property sheets and quality control certificates	• Each source of geotextile • Upon delivery to Work Site	• Product data • Manufacturer's certificates • Samples
• Placement	• Have materials been placed as specified?	• Visual • Survey	• Periodic during installation	• Manufacturer's instructions
	• Are there any visible defects, tears or overlaps with materials?	• Visual	• After installation is completed	• None

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
Q. Process Equipment				
• Materials	• Do materials provided meet specifications?	• Check Division 40 Sections	• Upon delivery	• Product data • Shop drawings • Certifications and Reports
• Installation	• Has process equipment been installed as specified?	• Check Division 40 Sections and Drawings	• After installation	• Records
	• Has a final inspection taken place?	• Check Division 40 Sections and Drawings	• Upon Substantial Performance	• Records
R. Wastewater Treatment System				
• Materials	• Do materials provided meet specifications?	• Check Section 46 07 01	• Upon delivery	• Product data • Shop drawings • Certifications and Reports
• Installation	• Has process equipment been installed as specified?	• Check Section 46 07 01 and Drawings	• After installation	• Records
	• Has a final inspection taken place?	• Check Section 46 07 01	• Upon Substantial Performance	• Records

Notes:
*Frequencies of inspections are considered minimum and will be increased or added to as determined necessary by the Engineer.
1. The quality assurance/quality control inspections included herein are suggested in accordance with the technical specifications.

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
A. Health and Safety (Section 01 00 00)									
• Reportable Quantities	• Identification of hazardous chemicals	• State accredited method	• Throughout the Works	• In accordance with State accredited criteria	• As determined by Engineer	• See Section 01 35 29	• On Site	• 50	• 50
B. Waste Material Sonification (Section 02 55 13)									
• Waste Material Solidification	• In accordance with accepted QA/QC Plan	• State accredited method	• Throughout the Works	• In accordance with State accredited criteria	• As determined by Engineer	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
C. Geotextiles for Earthwork (Section 31 05 19.13)									
• Geotextile G1									
Material	• Tensile Strength	• ASTM D4632/D4632M	• See standard	• 220	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Elongation at Break	• ASTM D4632/D4632M	• See standard	• 50	• As above	• As above	• As above	• 100	• 0
	• Static CBR Puncture	• ASTM D4632/D4632M	• See standard	• 575	• As above	• As above	• As above	• 100	• 0
	• Trapezoid Tear Strength	• ASTM D4533	• See standard	• 90	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 80	• Minimum once every month	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 1.26	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Permeability	• ASTM D4491	• See standard	• 0.30	• As above	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 95	• As above	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
• Geotextile G2									
Material	• Tensile Strength	• ASTM D4632/D4632M	• See standard	• 320	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Elongation at Break	• ASTM D4632/D4632M	• See standard	• 50	• As above	• As above	• As above	• 100	• 0
	• Static CBR Puncture	• ASTM D4632/D4632M	• See standard	• 900	• As above	• As above	• As above	• 100	• 0
	• Trapezoid Tear Strength	• ASTM D4533	• See standard	• 125	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 100	• Minimum once every month	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 0.80	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Permeability	• ASTM D4491	• See standard	• 0.29	• As above	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 60	• As above	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
• Geotextile G3									
Material	• Tensile Strength @ 2% strain (MD)	• ASTM D4595	• See standard	• 720 (typical) 600 MARV	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Tensile Strength @ 2% strain (CD)	• ASTM D4595	• See standard	• 1200 (typical) 1020 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Tensile Strength @ 5% strain (MD)	• ASTM D4595	• See standard	• 2100 (typical) 1800 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Tensile Strength @ 5% strain (CD)	• ASTM D4595	• See standard	• 2580 (typical) 2256 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 50 (typical) 40 (MARV)	• Minimum once every month	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 1.2 (typical) 0.9 (MARV)	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 85 (typical) 75 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
	• Pore Size	• ASTM D6767	• See standard	• 85 (typical) 75 (MARV)	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Interaction Coefficient	• ASTM D6706	• See standard	• 0.89	• As above	• As above	• As above	• 100	• 0
	• Factory Sewn Seam	• ASTM D4884.D4884M	• See standard	• 2700	• As above	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
D. Fill (Section 31 23 23)									
• Existing Berm Material	• Particle Size	• ASTM D6913/D6913M and D7928	• Minimum 1 test per 2,500 cu yd	• Per ASTM standard	• Sample size per ASTM collected at stockpile	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
Material	• Soil Classification	• ASTM D2487	• Minimum 1 test per 2,500 cu yd	• Any except poorly graded and except CH, MH, OL, and OH	• As above	• As above	• Analytical Laboratory	• 100	• 0
	• Chemical Analysis	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List.	• Minimum 1 test per 500 cu yd	• In accordance with State accredited criteria	• Sample collected from stockpile	• As above	• Analytical Laboratory	• 100	• 0
	Parameter	*Methods*							
	TAL[3] Metals	SW-846 6020A/7471A							
	Hexavalent Chromium	SW-846 7196A							
	Cyanide	SW-846 9010/9012							
	TCL[2] Volatiles	SW-846 8260B							
	TCL Semi-Volatiles	SW-846 8270D							
	TCL Pesticides	SW-846 8081B							
	Polychlorinated Biphenyls	SW-846 8082A							
	Herbicides	SW-846 8151A							

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
D. Fill (Section 31 23 23) cont'd									
• Aggregate Types A1 and A2 (Course Aggregate and Clear Stone)									
Material	• Grain Size	• ASTM C117, C136/C136M, and D6913/D6913M	• Minimum 1 test per 1,000 cu yd	• Per ASTM standard	• Sample size per ASTM collected at source	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• Chemical Analysis	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List.	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
		Parameter / *Methods* TAL[3] Metals / SW-846 6020A/7471A Hexavalent Chromium / SW-846 7196A Cyanide / SW-846 9010/9012 TCL[2] Volatiles / SW-846 8260B TCL Semi-Volatiles / SW-846 8270D TCL Pesticides / SW-846 8081B Polychlorinated Biphenyls / SW-846 8082A Herbicides / SW-846 8151A							
• Soil Type S1 and S2 (Fill Between Sheet Pile Walls and Structural Fill)									
Material	• Particle Size	• ASTM D6913/D6913M and D7928	• Minimum 1 test per 2,500 cu yd (clay)	• Per ASTM standard	• Sample size per ASTM collected at source	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• Soil Classification	• ASTM D2487	• Minimum 1 test per 2,500 cu yd (clay)	• Any except poorly graded and except CH, MH, OL, and OH	• As above	• As above	• Analytical Laboratory	• 100	• 0
	• Chemical Analysis	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List.	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
		Parameter / *Methods* TAL[3] Metals / SW-846 6020A/7471A Hexavalent Chromium / SW-846 7196A Cyanide / SW-846 9010/9012 TCL[2] Volatiles / SW-846 8260B TCL Semi-Volatiles / SW-846 8270D TCL Pesticides / SW-846 8081B Polychlorinated Biphenyls / SW-846 8082A Herbicides / SW-846 8151A							
• Soil Type S3 (Common Fill) and Sand	• Chemical Analysis	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List.	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
		Parameter / *Methods* TAL[3] Metals / SW-846 6020A/7471A Hexavalent Chromium / SW-846 7196A Cyanide / SW-846 9010/9012 TCL[2] Volatiles / SW-846 8260B TCL Semi-Volatiles / SW-846 8270D TCL Pesticides / SW-846 8081B Polychlorinated Biphenyls / SW-846 8082A Herbicides / SW-846 8151A							
• Imported Topsoil									
Material	• Particle Size	• ASTM D422	• Minimum 1 test per 2,500 cu yd	• Per ASTM standard	• Sample size per ASTM collected at source	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• pH	• ASTM D4972	• Minimum 1 test per 2,500 cu yd	• Per ASTM standard	• Sample size per ASTM	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• Organic Content	• ASTM D2974	• Minimum 1 test per 2,500 cu yd	• Per ASTM standard					
	• Phosphorus, potassium, calcium, and magnesium	• In accordance with State accredited criteria	• Minimum 1 test per 2,500 cu yd						
	• Chemical Analysis	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List.	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
		Parameter / *Methods* TAL[3] Metals / SW-846 6020A/7471A Hexavalent Chromium / SW-846 7196A Cyanide / SW-846 9010/9012 TCL[2] Volatiles / SW-846 8260B TCL Semi-Volatiles / SW-846 8270D TCL Pesticides / SW-846 8081B Polychlorinated Biphenyls / SW-846 8082A Herbicides / SW-846 8151A							

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
D. Fill (Section 31 23 23) cont'd									
• Imported Common Fill, Topsoil and Aggregate *Placement*	• Particle Size Analysis	• ASTM DD6913/D6913M and ASTM D7928 or ASTM C117 and ASTM C136	• Minimum 1 test per source	• Per ASTM standard	• Sample size per ASTM	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
E. Geomembranes (Section 31 35 26.16)									
• LLDPE Liner *Material*	• Thickness	• ASTM D5199	• As above	• nominal 60 mil • lowest individual of 10 values (-10% or 54 mil)	• As per GRI GM 17	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 0	• 0
	• Formulated Density	• ASTM D1505/D792	• As above	• 0.939 g/cu cm MARV *	• As above	• As above	• As above	• 0	• 0
	• Break Strength	• ASTM D6693, Type IV	• As above	• 152 pounds per inch	• As above	• As above	• As above	• 0	• 0
	• Break Elongation	• ASTM D6693, Type IV	• As above	• 800 pounds per inch	• As above	• As above	• As above	• 0	• 0
	• 2% Modulus (max.)	• ASTM D1004	• As above	• 2400 pounds per inch	• As above	• As above	• As above	• 0	• 0
	• Tear resistance	• ASTM D1004	• As above	• 22 pounds	• As above	• As above	• As above	• 0	• 0
	• Puncturing resistance	• ASTM D4833/D4833M	• As above	• 56 pounds	• As above	• As above	• As above	• 0	• 0
	• Carbon Black Content	• ASTM D5596	• As above	• 2 to 3 percent	• As above	• As above	• As above	• 0	• 0
	• Oxidation Induction Time Standard High Pressure	• ASTM D8117 • ASTM D5885/D5885M	• As above • As above	• 100 minutes • 400 minutes	• As above • As above	• As above • As above	• As above • As above	• 0 • 0	• 0 • 0
	• Oven Aging at 85 degrees Celsius Standard High Pressure	• ASTM D5721 and ASTM D8117 • ASTM D5885/D5885M	• As above • As above	• 35 percent • 60 percent	• As above • As above	• As above • As above	• As above • As above	• 0 • 0	• 0 • 0
	• UV Resistance	• ASTM D7238 and D5885/D5885M	• As above	• 2 to 3 percent	• As above	• As above	• As above	• 0	• 0
Installation	• Seam shear test on test seam	• Field tensiometer	• Minimum 2 times per day for each seaming equipment. Minimum once per day per seamer.	• 1,200 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• Sample coupons to be 1 inch wide, collected from test seam	• As above	• On Site	• 100	• Engineer will observe Contractor QC Tests
	• Seam peel test on test seam	• Field tensiometer	• Minimum 2 times per day for each seaming equipment. Minimum once per day per seamer.	• 1,000 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• As above.	• As above	• On Site	• 100	• Engineer will observe Contractor QC Tests
	• Destructive seam shear test	• Field tensiometer	• Minimum 1 test per approximately 500 L.F. of production seam or at least one per seam	• 1,200 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• As above.	• As above	• As above	• 100	• Engineer will observe Contractor QC Tests
	• Destructive seam peel test	• Field tensiometer	• Minimum 1 test per approximately 500 L.F. of production seam or at least one per seam	• 1,000 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• As above.	• As above	• As above	• 100	• Engineer will observe Contractor QC Tests
	• Non-destructive pressure test	• Pressure test GRI Test Method GM6	• 100% of production seams	• Pressurize air channel to between a min. 20 psi and max. 30psi • Maintain pressure for a 2 minute stabilization period • Maximum allowable pressure drop is 4 psi over 2 minutes	• 100% of production seams	• As above	• In-place	• 100	• Engineer will observe Contractor QC Tests
	• Destructive seam shear test (if field test acceptable)	• ASTM D4437 (Mod.) per NSF Std. 54	• Minimum one test per approximately 500 L.F. of production seam or at least one per seam	• 1,200 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• Sample size per ASTM. Sample locations on fixed 500-foot increments; possible intermediate locations	• As above	• Geosynthetic laboratory	• 0	• 100
	• Destructive seam peel test (if field test acceptable)	• ASTM D4437 (Mod.) per NSF Std. 54	• Minimum one test per approximately 500 L.F. of production seam or at least one per seam	• 1,000 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• Sample size per ASTM. Sample locations on fixed 500-foot increments; possible intermediate locations	• As above	• Geosynthetic laboratory	• 0	• 100
F. Riprap (Section 31 37 00)									
Riprap (Section 31 37 00) *Material*									
	• Gradation Testing	• Per Spec	• As per specification	• Per ASTM standard	• 1 sample per stone type	• As per specification	• Geosynthetic laboratory	• 0	• 100
	• Bulk Specific Gravity	• ASTM C127	• As per specification	• Per ASTM standard	• 1 sample per stone type	• As per specification	• Geosynthetic laboratory	• 0	• 100
G. Sheet Piles (Section 31 41 16)									
• Sheet Piles *Material*	• Material Testing	• ASTM A6/A6M	• See standard	• Per ASTM standard	• Sample size per ASTM	• Per ASTM standard	• Per ASTM standard	• 100	• 0

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
H. Seeding (Section 32 92 19)									
• Seed									
Material									
	• Nitrogen	• Per spec	• As per specification	• As per specification	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Phosphorus	• Per spec	• As per specification	• As per specification	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Potash	• Per spec	• As per specification	• As per specification	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Soluble Salt Content	• Per spec	• As per specification	• As per specification	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Organic Matter Content	• ASTM D2974	• As per specification	• 2% to 10%	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Acidity Range (pH)	• ASTM D4972	• As per specification	• 5.5 to 7.5	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Clay	• ASTM D2487	• As per specification	• 10% to 15%	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Lime	• ASTM DC602	• As per specification	• 80% calcium carbonate (min.)	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
I. Turbidity Curtain (Section 35 49 25)									
• Geosynthetics									
Material									
	• Tensile Strength	• ASTM D4632/D4632M	• See standard	• (Wrap) 350, (Fill) 250	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Elongation at Break	• ASTM D4632/D4632M	• See standard	• 34	• As above	• As above	• As above	• 100	• 0
	• Mullen Burst Strength	• ASTM D3786/D3786M	• See standard	• 510	• As above	• As above	• As above	• 100	• 0
	• Trapezoid Tear Strength	• ASTM D4533	• See standard	• 65	• As above	• As above	• As above	• 100	• 0
	• Puncture Strength	• ASTM D4833/D4833M	• See standard	• 140	• As above	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 0.04	• As above	• As above	• As above	• 100	• 0
	• Permeability	• ASTM D4491	• See standard	• 0.01	• As above	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 5	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 80/500	• As above	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• Minimum once every 100,000 sq ft	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50

Notes:
* Minimum criteria, unless identified otherwise.
1. The quality assurance/quality control tests included herein are suggested in accordance with the technical specifications.
MARV = Minimum Average Roll Value
AI = Asphalt Institute
ASTM = ASTM International


GHD

Attachment 7 - Institutional Controls Implementation and Assurance Plan - Sand Separation Area

Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

June 17, 2024

Contents

Figure index

1. Introduction

This Institutional Control Implementation and Assurance Plan (ICIAP) for the Sand Separation Area (SSA) of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (work site) was prepared by GHD Services Inc. (GHD), on behalf of the International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents). This ICIAP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06 02 18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables, including this plan, to accompany the Final 100% Remedial Design for the Northern Impoundment (Northern Impoundment 100% RD) submittal to the EPA.

This ICIAP describes a plan to implement, maintain and monitor institutional controls (ICs) at the SSA. *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0- 89, EPA/540/R- 09/001 (EPA, 2012a), Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites*, OSWER 9200.0-77, EPA/540/R-09/02 (EPA 2012b), and as applicable, Texas Commission on Environmental Quality (TCEQ) guidance, were considered in developing this ICIAP.

The ICIAP is a dynamic document that is expected to require updating at or before the conclusion of the Northern Impoundment Remedial Action (RA).

1.1 Plan Objectives

The overall objectives of the ICIAP are to:

– Identify ICs to meet requirements applicable to the SSA as referenced in the 2017 Record of Decision (ROD; EPA, 2017) and in the SOW that is part of the AOC (EPA, 2018).

– Establish and document the activities and entities responsible for implementing, maintaining, enforcing, terminating, and/or modifying the ICs, as appropriate.

2. Overview

2.1 Background

The SSA is located northwest of the Northern Impoundment in the San Jacinto River along the east bank of the property now owned by Houston Fleeting Services, LLC (Houston Fleeting; see Figure 1). This area is where sand was separated from dredged material during historical sand mining operations.

The Remedial Investigation (RI) conducted in 2010 and 2011 identified two locations in the SSA in which concentrations of dioxins and furans in surface sediment were above 100 nanograms per kilograms (ng/kg) $TEQ_{DF,M.}$ The ROD identified Monitored Natural Recovery (MNR) as the preferred remedial alternative for river sediments in the SSA. MNR occurs through physical, chemical, and biological processes that transform, immobilize, isolate, and/or remove contaminants in sediment until they no longer pose risk to human and/or ecological receptors. Deposition of uncontaminated sediment is expected to be the primary process for MNR for the SSA. The rationale for selection of MNR as the preferred alternative was that the $TEQ_{DF,M}$ concentrations in the SSA are relatively low and there are data indicating that the area is subject to sediment deposition. Modeling of hydrodynamics and sediment transport conducted as part of the Remedial Investigation/Feasibility Study (RI/FS) suggests that the reach of the river adjacent to the SSA is an area of sediment deposition. The selected remedy for the SSA also includes the use of ICs to prevent

disturbance of the area to enable the success of MNR. MNR is expected to effectively maintain concentrations of dioxins and furans in the SSA below concentrations protective of human health and the aquatic environment.

Analytical and isotopic sampling were conducted in the SSA during the 2019 Second Phase Pre-Design Investigation (PDI-2), as further described in Section 6 of the Design Criteria Report in the Northern Impoundment 100% RD package. Concentrations of $TEQ_{DF, M}$ in the nine analytical sampling locations were found to be below the risk-based protective level of 30 ng/kg, which the ROD identified as protective of both human health and the aquatic environment, in the top 24 inches of all but one of the SSA sampling locations. This is consistent with the results observed during the RI.

2.2 Selected Remedial Alternative

As specified in the ROD, MNR will be implemented as the remedy in the SSA, as detailed in the SSA MNR Plan (Appendix J, Attachment 9). MNR activities moving forward will include additional monitoring at the nine locations sampled during PDI-2 to confirm that concentrations of $TEQ_{DF,M}$ remain below 30 ng/kg. Samples will be collected from four depth intervals: 0 to 15 centimeters (cm), 15 to 30 cm, 30 to 45 cm, and 45 to 60 cm.

The SSA MNR Plan proposes four monitoring events, pending the first Five Year Review. The first monitoring event will be completed prior to the RA and the subsequent events within one year, three years, and five years following the completion of the RA. With 2010/2011 RI data and 2019 PDI-2 identifying concentrations of $TEQ_{DF,M}$ as protective of human health and aquatic environment, the additional sampling events will provide datasets spanning a minimum of 20 years (assuming Northern Impoundment remedial activities are completed by 2030) that will be available to assess the effectiveness of MNR. If the clean-up level concentrations are not achieved at the four depth intervals for post remediation monitoring events, the MNR program will be reviewed and modified, as appropriate.

2.3 Potential for Disturbance and Perturbation

Propeller wash from boat traffic in the San Jacinto River and in the vicinity of the SSA could potentially disturb sediments during the monitoring period. Hurricanes and high-energy- storm events are natural events that could perturb sediment of the SSA. These anthropogenic and natural sources of disturbances and perturbation could deposit sediment contaminated with dioxins and furans from upstream and other off-site sources and/or scour surface sediment to depths that expose deeper sediments that may contain elevated concentrations of dioxins and furans.

It is Respondents' understanding that the owner of the neighboring property, Houston Fleeting, operates under a US Army Corps of Engineers (USACE) Fleeting Permit dated April 6, 2020 (SWG-2010-00364), issued to a prior owner of the property, San Jacinto River Fleet LLC. That permit identifies seven "tiers" in which fleeting of barges is permitted. A portion of the Tier 4 fleeting area, shown on Figure 2 attached, directly overlaps with the boundary of the SSA.

2.4 Key Stakeholders

Coordination with several key stakeholders with ownership/interest in this area will be necessary to determine the appropriate mechanism to establish ICs in the SSA.

- Port of Houston Authority (POHA) - The majority of the approximately nine-acre SSA is located in Tax Assessor Parcel Number (APN) 97, which is owned by the POHA
- USACE
- US Coast Guard (USCG)
- Houston Fleeting, which currently operates an active barge fleeting operation in the vicinity of the Northern Impoundment and owns the upland property to the west of the SSA. Respondents understand that it conducts those operations under the USACE Fleeting Permit referenced above
- EPA
- TCEQ

2.5 Existing Institutional Controls (E.G., Zoning)

There are no current ICs in place for the SSA. There is, however, an agreement between the EPA, USACE, and TCEQ that any sort of dredging activities or activities conducted under the Clean Water Act Section 404 and Rivers and Harbors Action Section 10 within a defined watershed area around the Northern Impoundment (including the SSA) be reviewed and approved by the joint parties.

3. Planned Remedial Action Institutional Controls

Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and protect the integrity of a remedy by limiting land or resource use. The ROD contemplates that a special sampling and analysis protocol will be established with respect to activities in the SSA. The ROD states as follows:

> *"A special sampling and analysis protocol will be required for each permittee conducting activities under the Clean Water Act Section 404 and Rivers and Harbors Action Section 10 within a defined watershed area around the remediated areas. This protocol will be monitored and enforced by a joint EPA, USACE, and TCEQ agreement and will ensure that permitted dredging activities do not impact site cleanup. These restrictions will protect the integrity of the sand separation area and limit potential disturbance and resuspension of buried sediment. Alert property owners of the presence of subsurface materials exceeding cleanup levels in the sand separation area. As a result of the long-term persistence of dioxin, it is anticipated that the institutional controls will be essentially permanent measures."*

The primary IC for the SSA will be the protocol referenced in the ROD. The TCEQ's Restrictive Covenant template will be utilized and, once signed by the relevant parties, recorded in Harris County property records. The Respondents contemplate working with the applicable stakeholders to develop the protocol, and after it has been approved by EPA, addressing steps required to implement the protocol.

The Respondents will also evaluate whether additional administrative controls (i.e., USCG-imposed restrictions to maritime activities in the area) may be required. Those controls could involve restrictions on maritime activity or possible signage as an engineering control. It is anticipated that these administrative and engineering controls would be discussed with the larger group of stakeholders prior to completion of the RA.

4. Enforcement

Restrictions on access and maritime activity will require coordination with the POHA and coordination with and enforcement through the USCG and the USACE. Assistance from the EPA, TCEQ, and/or USACE and USCG will be needed to enforce physical and administrative restrictions to the area.

5. Reporting

Reporting will be required as outlined in the SSA MNR Plan, which is Appendix J, Attachment 9 of the Northern Impoundment 100% RD package.

6. References

– EPA. 2012a. Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001.

– EPA. 2012b. Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02.

– EPA, 2017. Record of Decision, San Jacinto River Waste Pits. Harris County, Texas. EPA ID: TXN000606611. U.S. Environmental Protection Agency, Region 6. Dallas, Texas. October 2017.

– EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, CERCLA Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.

Note:
TCRA = Time Critical Removal Action

Sand Separation Area

Northern Impoundment

Interstate-10

Legend
- TCRA Cap Perimeter
- Sand Separation Area

Paper Size ANSI B

0 60 120 180 240

Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

N

GHD

SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS

SAND SEPARATION AREA

Project No. **11215702**
Revision No. **-**
Date **Jun 3, 2024**

FIGURE 1

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Paper Size ANSI B

0 75 150 225 300

Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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GHD

SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
NORTHERN IMPOUNDMENT

SAND SEPARATION AREA AND FLEETING OPERATIONS

Project No. **11215702**
Revision No. **-**
Date **May 24, 2024**

FIGURE 2

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Attachment 8 - Transportation and Off-Site Disposal Plan - Northern Impoundment

Provided as Part of Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

June 17, 2024

Contents

Figure Index

1. Introduction

This Transportation and Off-Site Disposal Plan (TODP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (work site). This TODP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Final 100% Remedial Design for the Northern Impoundment (Northern Impoundment 100% RD) submittal to the EPA.

This TODP provides the procedures for management and loading of excavated material at the work site for the Northern Impoundment RA which will be disposed of off-site, the transportation routes for off-site shipments from the work site, and measures to be implemented, if needed, to protect communities that may be affected by the shipments. It also addresses the management of other wastes generated during implementation of the Northern Impoundment RA (collectively, Wastes). References in this TODP to the "work site" are to the Northern Impoundment and references to "Implementing Party" are to the entity(ies) implementing the RA for the Northern Impoundment. Prior to initiation of Northern Impoundment RA activities, the selected remedial contractor (RC) will either update this TODP or develop its own TODP to address the components outlined in this document. The TODP developed by the RC will be revised and submitted to EPA for review and approval if changes to it are required during implementation of the RA, such as changes to truck haul routes, access to and from the work site, and any other necessary changes.

1.1 Relationship to Supporting Plans

The TODP should be considered in combination with the other supporting plans. The Construction Quality Assurance/Quality Control Plan (CQA/QCP) describes the procedures to verify that the excavation objectives are achieved during implementation. The Site-Wide Monitoring Plan (SWMP) describes the procedures for ongoing monitoring during the RA (i.e., dust, stormwater, odor, and turbidity). The field and analytical quality procedures are described in the Quality Assurance Project Plan (QAPP). The Field Sampling Plan (FSP) provides the procedures for collection of samples during the RA (i.e., treated effluent water, post-confirmation samples, off-site backfill samples, and waste profile samples).

2. Roles and Responsibilities

Roles and responsibilities of those involved in activities addressed by this TODP is to be defined in the plan to be developed by the RC, but are expected to include the following:

– ***Generator*** - The Implementing Party or some other party involved in the Northern Impoundment RA will be the generator of the Wastes. The Generator will be responsible for characterizing the waste and signing the waste profiles and the manifests. The Generator's signatory authority may be delegated to another representative at the work site.

– ***Engineer or Implementing Party's Representative*** - The Engineer or Implementing Party's Representative will be responsible for inspecting and documenting the work for conformance with the specifications and other contract documents, including the loading and transportation of excavated materials for disposal off-site. This role may include a waste coordinator to track waste-related activities and prepare the documentation of the kind described in Section 7.0.

- ***Remedial Contractor (RC)*** - The RC will be responsible for managing and loading the excavated materials for transportation to the disposal facility and management and disposal of other Wastes generated during the Northern Impoundment RA.
- ***Transporter*** - The Transporter will have responsibility for transporting Waste to the selected disposal facility(ies). The Transporter will sign the waste manifests as the Transporter.
- ***Disposal Facility*** - The Disposal Facility(ies) will be responsible for approving waste profiles, receiving the waste shipments, documenting the weight/volume, and disposing of the Waste properly according to its permits. The disposal facility(ies) will sign the waste manifests as the disposal facility and return the completed manifest to the Generator.

3. Compliance with Off-Site Disposal Rule

Section 121(d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) applies to any CERCLA response action involving the off-site transfer of any hazardous substance, pollutant, or contaminant (CERCLA wastes). That section requires that CERCLA wastes may only be placed in a facility operating in compliance with the Resource Conservation and Recovery Act (RCRA) or other applicable Federal or State requirements. It further prohibits the transfer of CERCLA wastes to a land disposal facility that is releasing contaminants into the environment and requires that any releases from other waste management units must be controlled. These principles are the basis for the Off-Site Rule (OSR), set forth in the National Contingency Plan (NCP), at 40 Code of Federal Regulations (CFR) 300.440.

The OSR establishes the criteria and procedures for determining whether facilities are acceptable for the receipt of CERCLA wastes from response actions authorized or funded under CERCLA. The OSR establishes compliance criteria and release criteria, as well as a process for determining whether facilities are acceptable based on those criteria. The OSR also establishes procedures for notification of unacceptability, reconsideration of unacceptability determinations, and re-evaluation of unacceptability determinations.

It is anticipated that the Implementing Party will be required to obtain the EPA's certification that a proposed disposal facility is operating in compliance with CERCLA OSR requirements before shipping any CERCLA waste to it. The Implementing Party will contact the EPA Region 6 regional off-site contact (ROC) to inquire about the status of each selected disposal facility. Confirmation that a disposal facility is able to receive CERCLA waste will be documented in correspondence sent to the EPA Remedial Project Manager (RPM) prior to shipping material to the disposal facility.

4. Waste Classification Procedures

The Northern Impoundment 100% RD describes the waste determination process for Impacted Material (as defined below). Prior to off-site disposal, the plan to be developed by the RC will identify in more detail waste classification procedures and the disposal options with respect to the different waste streams to be managed during the Northern Impoundment RA. The different waste categories and procedures that may be included are described below.

4.1 Waste Stream Categories and Disposal Options

It is anticipated that the following waste categories may be generated during the Northern Impoundment RA:

- ***Impacted Material (Soil, Debris, and Vegetation)*** - Impacted soil that is excavated will be solidified, as necessary, to remove free liquids and transported to an off-site disposal facility. Any impacted debris and vegetation that is generated will also be disposed of under these profiles. Impacted debris includes materials that may have contacted the waste including, but not limited to tarps, plastic, wood, metal, rock, discarded treatment

filters, and discarded personal protective equipment (PPE). The excavated materials will be characterized as described in the Northern Impoundment 100% RD.

– ***Non-Impacted Debris and Vegetation*** - Non-impacted debris and vegetation could include any cleared vegetation, work site preparation debris, and/or other debris encountered at the surface. These materials may be managed as Class 3 non-hazardous waste under the regulations governing classification of non-hazardous industrial solid waste in Texas (30 Texas Administrative Code [TAC] §335.505, §335.506, and §335.508), or can be managed with the excavated materials as Class 2 non-hazardous waste.

– ***Water Treatment System Residuals***

  - ***Spent Media from Water Treatment System*** - The spent carbon and other spent media from any wastewater treatment system may be transferred to a vendor for recycling or regeneration. If the spent carbon or other spent media cannot be recycled/regenerated for other uses, the material would be characterized and transported off-site for disposal. The media will need to be characterized at the time it is generated but is expected to be a Class 2 non-hazardous waste.
  - **WTS Influent and Effluent Tank Liners** - The liners from the Lake Tanks will need to be disposed of at the conclusion of each excavation season. The liner material will need to be characterized at the time that it is generated but is expected to be a Class 2 non-hazardous waste.
  - **Solids in Lake Tanks** - Solids that collect in the Lake Tanks will need to be disposed of at the conclusion of each excavation season. The media will need to be characterized at the time that it is generated but is expected to be a Class 2 non-hazardous waste.
  - **Chemical Sludge** - The contact water is expected to contain solids from the waste material in the excavation. It is anticipated that coagulants, organosulfides, and/or polymers will result in the precipitation of metals and removal of suspended solids. The resulting sludge will be withdrawn as the underflow of the inclined plate clarifier. The settled solids will be directed to sludge dewatering boxes where it will be gravity-thickened to a solids concentration of up to 6 to 8 percent (mass basis). Once dewatered, the sludge dewatering boxes will be trucked back to the dewatering areas for solidification and off-site disposal. It is expected that the material will be disposed of as Class 2 non-hazardous waste.

– ***General Trash and Sanitary Sewage*** - General trash and sanitary sewage will need to be handled through service companies that specialize and are licensed for these activities or through some other means adopted by the RC.

The applicable waste classifications will be updated during the Northern Impoundment RA. Waste disposal facility(ies) will be selected to accept the appropriately classified types of waste generated during the RA.

4.2 Waste Sampling and Classification

Waste sampling and classification will be completed in accordance with the disposal facility(ies) requirements. Excavated materials will be further characterized utilizing the guidance provided in Chapter Nine “Sampling Plan” of the *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA, 1986) and in *RCRA Waste Sampling Draft Technical Guidance* (EPA, 2002) during the Northern Impoundment RA. The applicable sampling and analytical methods are addressed in the FSP and in the QAPP.

Profiles for several waste streams are expected as part of the Northern Impoundment RA. The Implementing Party and/or RC will work with the selected disposal facility(ies) to develop sampling procedures to confirm that the impacted soil generated throughout the removal area as the work progresses is consistent with the profiles that are developed. The sampling confirmation procedures are as follows:

– In advance of shipping material to the disposal facility(ies), confirmatory waste characterization samples will be collected.

– Confirmatory waste characterization samples will be analyzed for selected constituents included in Title 30 of the TAC Chapter 335, Subchapter R (Waste Classification) Appendix 1, Table 1 for Class 1 Non-Hazardous Industrial Waste using the following methods:

- TCLP Dioxins and Furans - EPA Methods 1311 (TCLP) and 1613B.
- Analytical data will be reviewed in accordance with TAC 335.505-506 to confirm the Non-Hazardous classification (Class 1 or Class 2).
- The waste characterization information will be submitted to the selected disposal facility(ies) prior to shipping material for disposal.
- If the result from the waste characterization sample exceeds the limits of the profile (i.e. non-hazardous Class 2), material will not be shipped to the disposal facility(ies) until that material has been further characterized, and if necessary, a newly created Non-Hazardous Industrial Class 1 waste profile for the material has been approved by the disposal facility(ies).

5. On-Site Management and Loading

The plan to be developed by the RC will identify procedures for on-site management of the Impacted Material and other Wastes and their transportation off-site for disposal. The RC's plan is expected to address the elements below.

5.1 Transportation Truck/Container Requirements

It is expected that Wastes will be loaded into trucks, such as 20-ton end dump trucks and will be transported to the off-site disposal facility(ies) via surface streets and highways. The Wastes may be loaded into smaller trucks or placed in roll-off containers that will be loaded onto trucks for transportation to the disposal facility(ies). The trucks and containers will be inspected as they arrive at the work site and must be in good shape, free of defects or damage/corrosion that could result in release of the contents. The truck beds and containers must have sturdy, fully intact, tarps with straps that are of sufficient size and strength to cover, secure, and keep all loaded waste contained. Any truck that does not meet these requirements will not be used on the project.

5.2 Truck Staging and Loading Requirements

5.2.1 Lining Trucks and Securing Loads

The truck beds and containers will be lined with a minimum 4-mil liner prior to placing any Waste and/or the truck beds may be self-contained. Wastes placed in the trucks may not contain any free liquids. If free liquids are observed, they will be addressed (i.e., addition of solidification agents) prior to off-site shipment. After loading, tarps will be placed over the loads and secured prior to trucks leaving the work site.

5.2.2 Control and Mitigation of Tracking Waste Beyond Work Areas

An inspection/cleaning station will be established at a location by which all trucks will be required to pass before leaving the work site. The trucks will be cleaned at this location, as necessary, prior to allowing them to enter the public roadways. The inspection/cleaning area will be constructed to allow cleaning of the trucks and containment of the soils and fluids that are generated. Cleaning techniques shall include dry decontamination methods, such as sweeping and/or vacuuming. If dry cleaning techniques are not effective, wet decontamination methods, such as pressure washing, will be implemented. A worker will be located at the inspection/cleaning station and designated to inspect the trucks before they can leave the work site. If any mud or Waste is tracked beyond the limits of the work site, the tracked material will be cleaned up immediately.

6. Transportation

The plan to be developed by the RC will be required to address safety procedures to be followed to control access and egress to the work site by vehicles, including signage and the use of flaggers, if appropriate. A preliminary map showing the route from the Northern Impoundment to Interstate Highway 10 (I-10) is also provided as Figure 1. It is anticipated that the RC will put in place a transportation plan with each Transporter that will confirm the truck routes to the selected disposal facility(ies) and describe the safety procedures that will be employed to protect the public.

There will be a strong emphasis during the project to maintain safety and minimize disturbance in the community as described below:

- The objective will be to use only well-qualified transportation firms and drivers on the project. Transporters will be required to submit proof of the transporter's valid hauler registration and ensure that all vehicles utilized for transport of Waste are properly registered, operated, and placarded (if necessary) in compliance with local, state, and federal requirements. Drivers will be required to provide proof of a valid driver's license and evidence of insurance.
- To the extent practicable, dedicated drivers will be used on the project.
- Prior to the first shipment of Waste to the disposal facility(ies), representatives of the project team will drive the routes to the disposal facility(ies) and make any adjustments to the route that are necessary to promote safety and minimize traffic disturbances, where feasible.
- Prior to the excavation work, the neighboring businesses that may be affected by the truck traffic will be notified of the timing and the expected volume of truck traffic. There will also be communication with these businesses during the work if there is expected to be any appreciable modifications to the scheduled activities that could affect them.
- Consideration will be given to the periods during the day when Waste is shipped and the spacing of the trucks to minimize disruption to the neighboring businesses and communities.
- Coordinate with the Texas Department of Transportation (TxDOT) and if applicable, Harris County regarding permitting, signage, and the timing and volume of truck traffic.

7. Document and Reporting

The plan to be developed by the RC will address documentation requirements related to the management of the Waste and will include the elements identified below.

7.1 Waste Profiles

Waste profiles will be developed and maintained on-site by the RC for the different waste types listed in Section 4.0 and for the disposal facility(ies) designated to receive the waste. Profiles will also be developed for any additional waste streams that are identified during the Northern Impoundment RA. The waste profiles will describe the waste and provide the disposal facility(ies) with the information it needs to ensure the waste can be managed at its facility under that profile. Waste profiles will also include waste codes and other information consistent with RCRA (40 CFR Parts 261 and 268) and TAC Chapter 335, Subchapter R. Copies of the profiles will be maintained on-site and any changes to a profile will require the approval by both the Generator and the disposal facility(ies), after which the profile will be updated to reflect the approved changes.

7.2 Manifests

Based on the waste characterization samples collected to date, hazardous waste is not expected to be generated during the Northern Impoundment RA. In the unlikely event that hazardous waste, as defined in 40 CFR Part 261, is generated it will be managed and disposed of in accordance with applicable RCRA regulations.

Most disposal facilities utilize a non-hazardous waste manifest or shipping document to track waste custody, quantities (wet tons), and to document that the waste was received and disposed of at the facility. The quantity and type of waste will be logged and tracked during the Northern Impoundment RA utilizing whatever mechanism is employed by the disposal facility(ies).

7.3 Waste Reporting

There is not expected to be any Hazardous or Texas Class I Industrial waste generated during the project. Therefore, there are not any requirements for an Annual Waste Summary (AWS) per 30 TAC §335.9(a)(2). However, all Waste generated and shipped off-site will be closely tracked and reported as part of the project requirements. The waste tracking for each load transported off-site will include:

- Transporter Name.
- Date of Shipment.
- Load No. - Internal Sequential Load number.
- Truck No. - Number that uniquely identifies the truck (such as the license number).
- Manifest/Shipping Document Tracking Number - preprinted number on waste documentation.
- Waste Type - Either Waste Profile Number or other unique waste identifier.
- Disposal Facility.
- Quantity - Typically weight, but some waste may be tracked as volume.
- Date Received at Disposal Facility.

8. References

- EPA, 1986. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Updates I to V. SW-846. NTIS Publication No. PB97-156111 or GPO Publication No. 955-001-00000-1. Office of Solid Waste. September 1986 (with all subsequent revisions).
- EPA, 2002. RCRA Waste Sampling Draft Technical Guidance - Planning, Implementation, and Assessment. EPA530-D-02-002. Office of Solid Waste. August 2002.
- EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, CERCLA Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.
- TCEQ, 1999. 30 Texas Administrative Code [TAC], Part 1 Texas Commission on Environmental Quality, Chapter 335 Industrial Solid Waste and Municipal Hazardous Waste, Subchapter R Waste Classification, §335.505, §335.506, and §335.508.

Paper Size ANSI B

0 125 250 375 500

Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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GHD

SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
NORTHERN IMPOUNDMENT

TRANSPORTATION ROUTES

Project No. **11215702**
Revision No. **-**
Date **May 24, 2024**

FIGURE 1

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Data source: ©2024 Google, Imagery Date 2/9/2023
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The Power of Commitment

Attachment 9 - Monitored Natural Recovery Plan - Sand Separation Area

Provided as Part of Final 100% Remedial Design - Northern Impoundment
San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

June 17, 2024

Acronyms

AOC	Administrative Settlement Agreement and Order on Consent
BAZ	Biologically Active Zone
BERA	Baseline Ecological Risk Assessment
cm	Centimeters
COC	Contaminant of Concern
^{137}Cs	Cesium-137
DF,M	Dioxins/Furans, Mammals
DOD	Department of Defense
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
ESTCP	Environmental Security Technology Certification Program
f_{oc}	Fraction Organic Carbon
GHD	GHD Services Inc.
K_d	Adsorption-Desorption Distribution Coefficient
kg	Kilogram
K_{oc}	Organic Carbon-Water Partition Coefficient
IPC	International Paper Company
MIMC	McGinnes Industrial Maintenance Corporation
MNR	Monitored Natural Recovery
ng	Nanogram
O&M	Operations and Maintenance
OMMP	Operations, Maintenance, and Monitoring Plan
OSWER	Office of Solid Waste and Emergency Response
PAH	Polycyclic Aromatic Hydrocarbons
^{210}Pb	Lead-210
PCL	Protective Concentration Level
PDI-2	Second Phase Pre-Design Investigation
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SOW	Statement of Work
SSA	Sand Separation Area
TCDD	2,3,7,8-Tetrachlorodibenzo-p-Dioxin
TEF	Toxicity Equivalency Factor
TEQ	Toxic Equivalents
TOC	Total Organic Carbon
UCL	Upper Confidence Limit
UTL	Upper Trophic Level

Contents

Figure index

1. Introduction

This Monitored Natural Recovery Plan (MNR Plan) is for the Sand Separation Area (SSA) of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). The MNR Plan was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents). References in this MNR Plan to the "work site" are to the Northern Impoundment and references to the "Implementing Party" are to the entity(ies) implementing the remedial action (RA) for the Northern Impoundment. This MNR Plan was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018).

1.1 Background

The Record of Decision (ROD) issued by the EPA, Region 6 in October 2017 identified Monitored Natural Recovery (MNR) as the remedy for sediment in the SSA (Selected Remedy). EPA selected MNR as a remedy for the SSA that would protect the aquatic environment based on the relatively low concentrations of dioxins and furans in sediment in the SSA compared to sediments in the Northern Impoundments, low potential for risk to human and ecological receptors, and evidence of net deposition of sediment. The AOC includes a Statement of Work (SOW), which requires that an Operations and Maintenance Plan (O&M Plan) be provided as part of the Remedial Design (RD) for the Northern Impoundment. This MNR Plan serves as the O&M Plan for the SSA.

1.2 Purpose

The purpose of this MNR Plan is to discuss the technical basis of MNR; identify the parameters to be monitored, the number and locations at which data are to be collected, and the frequency and duration of monitoring; describe the methods for data evaluation; and define the decision rule for evaluating the effectiveness of MNR.

1.3 Relationship to Supporting Plans

Supporting plans relevant to this MNR Plan are provided in Appendix J of the Final 100% Remedial Design – Northern Impoundment (100% RD) and include the Emergency Response Plan (Attachment 2), Field Sampling Plan (Attachment 3), Quality Assurance Project Plan (Attachment 4), Site-Wide Monitoring Plan (Attachment 5), and Institutional Controls Implementation and Assurance Plan (Attachment 8).

2. Regulatory Framework

Currently, there are no regulations specific to MNR or which establish performance criteria for MNR. There are, however, guidance documents that provide a framework for developing MNR plans. In preparing this MNR Plan, the following guidance documents were consulted:

– Environmental Security Technology Certification Program (ESTCP). 2009. Technical Guide. Monitored Natural Recovery at Contaminated Sediment Sites. ESTCP Project ER-0622. May 2009.

– EPA. 2002. Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. OSWER Directive 9285.6-08. February 12, 2002.

– EPA. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. EPA-540-R-05-012. OSWER 9355.0-85. December 2005.

– EPA. 1989. Office of Emergency and Remedial Response. Risk Assessment Guidance for Superfund. Volume I, Human Health Evaluation Manual (Part A). Washington, DC. EPA/540-1-89-002. OSWER Directive 9285.701a. December 1989.

3. Monitored Natural Recovery

3.1 Overview

MNR occurs through physical, chemical, and biological processes that transform, immobilize, isolate, and/or remove contaminants in sediment until they no longer pose risk to human and/or ecological receptors. Reduction or management of risk is achieved through a decrease in the concentration of contaminants, reduction in bioavailability, elimination of a complete exposure pathway, and/or reduction in toxicity.

3.2 Physical Processes

Deposition of sediment from uncontaminated sources is the primary physical process contributing to MNR. The highest potential for risk occurs in the biologically active zone (BAZ), generally the upper 15 centimeters (cm) of the sediment profile, where benthic organisms can be exposed. In addition to risk posed by direct contact, dioxins and furans have a potential to bioaccumulate in fish and shellfish, which can be consumed by humans and upper trophic level (UTL) ecological receptors. Deposition of uncontaminated sediment creates a new BAZ, which isolates benthic organisms and other receptors from dioxins and furans. Deposition is expected to be the primary process for MNR for the SSA.

Dispersion is another physical process that contributes to MNR. Dispersion occurs when contaminated sediment is eroded and transported downstream. Dispersion is not expected to be a contributing process for MNR in the SSA.

3.3 Chemical Processes

For dioxins and furans, adsorption is the primary chemical process of MNR. Adsorption is the partitioning of the dissolved form of a contaminant onto the surface of a solid phase (i.e., sediment particle). Adsorption reduces the bioavailability, and thus, toxicity by removing hydrophobic contaminants from pore water, the exposure medium for benthic organisms. Adsorption is a function of the chemical properties of the contaminant and fraction of organic carbon (f_{oc}) in sediment. The contaminant specific adsorption desorption distribution coefficient (K_d) is the ratio of the concentration of the contaminant adsorbed to sediment to the concentration dissolved in pore water at equilibrium. For organic compounds, K_d is normalized for f_{oc} to produce the organic carbon-water partition coefficient (K_{oc}). Given the high hydrophobicity of dioxins and furans, adsorption is expected to be a significant contributing process of MNR to reduce bioavailability in the SSA.

Persistent organic compounds, such as dioxins and furans, are stable in the environment and resistant to chemical degradation. However, some chemical transformations can potentially occur through processes such as electrophilic substitution and oxidation/reduction. Chemical transformation is not expected to be a significant contributing process for MNR in the SSA.

3.4 Biological Processes

Degradation of dioxins and furans through microbiological transformation can occur if the community of benthic organisms includes microorganisms that use dioxins and furans as a source of energy. If present, biological degradation to less toxic forms can occur as mineralization. In addition to the presence of an appropriate microbial community, factors that can influence biological degradation include oxygen availability, pH, and specific conductivity. Biological degradation is not expected to be a significant contributing process for MNR in the SSA.

4. Considerations in Developing the Monitoring Program

4.1 Record of Decision

The ROD identified MNR as the Selected Remedy for the SSA. MNR, as well as the Selected Remedy for other areas of the work site, is identified as compliant with all applicable or relevant and appropriate requirements (ARARs), reducing risks within a reasonable time frame, providing for long-term reliability, and minimizing reliance on institutional controls.

The rationale for MNR as the Selected Remedy for the SSA is that, due to substantially lower concentrations of dioxins and furans in the SSA than in the Northern Impoundment and data indicating that the SSA is subject to sediment deposition, MNR is more cost-effective than excavation. The ROD identifies MNR as protective of the aquatic environment of the SSA. The clean-up level for the Northern Impoundment is 30 nanograms per kilogram (ng/kg) 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent for mammals ($TEQ_{DF,M}$), which was selected to be protective of a youth recreational fisher.

The ROD does not specifically identify a clean-up level for the SSA. In the absence of a specific value, a clean-up level for the aquatic environment of 30 ng/kg $TEQ_{DF,M}$ will be assumed. This is the clean-up level for sediment for the Northern Impoundment, which the ROD identifies as being protective of both human and ecological receptors. Achievement of an arithmetic mean of 30 ng/kg $TEQ_{DF,M}$ for samples collected throughout the SSA will be considered to be protective.

4.2 Remedial Investigation

The Remedial Investigation (RI) presents results of chemical analysis of sediment collected from the SSA and a summary of the baseline ecological risk assessment (BERA). The Remedial Investigation (RI), conducted in 2010 and 2011, identified two locations in the SSA in which concentrations of dioxins and furans in surface sediment were above 100 nanograms per kilograms (ng/kg) $TEQ_{DF,M.}$ As discussed above, the ROD identified MNR as the preferred remedial alternative for sediments in the SSA. The selected remedy for the SSA also includes the use of Institutional Controls (ICs), as discussed in the Institutional Controls Implementation and Assurance Plan – Sand Separation Area (provided in Appendix J of the 100% RD), to prevent disturbance of the area to enable the success of MNR. MNR is expected to effectively maintain concentrations of dioxins and furans in the SSA below concentrations protective of human health and the aquatic environment.

The BERA evaluated risk to benthic invertebrates (mollusks and clams), fish, reptiles, birds, and mammals. The assessment endpoints for the BERA were those protective of ecological populations. The mean $TEQ_{DF,M}$ for the area within EPA's Preliminary Site Perimeter was reported as 12.5 ng/kg $TEQ_{DF,M}$. Although concentrations of $TEQ_{DF,M}$ at some locations outside of the Northern Impoundment exceeded 30 ng/kg $TEQ_{DF,M}$, the BERA concluded that, on a site-wide basis, baseline concentrations of $TEQ_{DF,M}$ in sediment were protective of populations of all receptor groups.

4.3 Second Phase Pre-Design Investigation

Sampling of sediment in the SSA to establish baseline conditions was conducted in 2019 as part of the Second Phase Pre-Design Investigation (PDI-2). Data specific to establishing a baseline for MNR consisted of concentrations of dioxins and furans, cesium-137 (^{137}Cs), and lead-210 (^{210}Pb) at nine sample locations.

Sediment for analysis of dioxins and furans was collected at depth intervals of 0-30 cm (0-12 inches), 30 to 60 cm (12-24 inches), 60 to 120 cm (24-48 inches), and 120 to 180 cm (48 to 72 inches) below the sediment/surface water interface. Samples were analyzed for 17 dioxins and furans and percent solids. Toxic equivalents were calculated using toxicity equivalency factors (TEF) for mammalian receptors ($TEQ_{DF,M}$).

Samples for analysis of ^{137}Cs and ^{210}Pb were collected at depth intervals of 2.5 cm from the sediment/surface water interface to a depth of 82.5 cm. Eleven intervals were sampled. ^{137}Cs was released into the environment as a result of atmospheric testing of nuclear devices beginning in 1954 with a peak in 1963. Because natural occurrence is extremely rare and its presence can be related to a specific period of time, ^{137}Cs is useful in dating sediments. ^{210}Pb is naturally occurring and radioactivity of ^{210}Pb is used to estimate relative time and rates of sediment deposition.

Radioactivity of ^{137}Cs was below detection limits at all depths at all sample locations, which suggests that sediment in the depth intervals sampled (82.5 cm) has been deposited since the mid-1960s. Accumulation of 82.5 cm of sediment over the period from 1963 to 2019 (56 years) indicates an overall deposition rate of 1.5 cm per year (cm/year). Radioactivity of ^{210}Pb indicates that deposition is occurring in areas of the SSA away from the shore, whereas little, if any, deposition is occurring along the shoreline. Estimated deposition rates range from 0.77 cm/year to 3.5 cm/year. Radioactivity of ^{210}Pb suggests that some areas may be subject to dispersion rather than depositional.

Data for $TEQ_{DF,M}$ indicate that, with the exception of one near-shore sample location, concentrations of $TEQ_{DF,M}$ are below the clean-up level of 30 ng/kg $TEQ_{DF,M}$ at depth intervals at which exposure pathways are complete (0 to 30 cm). The near-shore location with concentrations of $TEQ_{DF,M}$ higher than 30 ng/kg $TEQ_{DF,M}$ does not appear to be a depositional area. However, mean $TEQ_{DF,M}$ concentrations for the 0 to 30 cm and 30 to 60 depth intervals are 22.9 ng/kg $TEQ_{DF,M}$ and 20.6 ng/kg $TEQ_{DF,M}$, respectively. As exposure of ecological receptors in aquatic environments is primarily in the upper 15 cm (BAZ), dispersion is not expected to result in exposure point concentrations (EPCs) that pose risk to human and ecological receptors.

The 2019 sediment sampling program is presented in more detail in Section 6.0 and Appendix K of the 100% RD, which includes a summary of laboratory analytical data, historical sampling locations, and historical aerial images with the SSA overlain.

4.4 Case Studies

The United States Department of Defense (DOD), ESTCP funded and published a technical guide on MNR at contaminated sediment sites (ESTCP, 2009). In addition to providing guidance considered in developing this MNR Plan, the publication presents case studies for 13 sites throughout the United States where MNR was the selected remedy for at least some areas of the site. Of the 13 case studies, the results of MNR were mixed for only one site in South Carolina. The case studies for the other 12 sites indicated that MNR has been effective.

One of the 13 case studies is the Lacava Bay Superfund Site (Lacava Bay) in Point Comfort, Texas. Physical isolation (i.e., deposition) is identified as the primary process of MNR. Modeling identified deposition rates of 0.30 to 2.0 cm/year in the areas of MNR. In comparison, data collected for PDI2 identified sedimentation rates of 0.77 cm/year to 3.5 cm/year for the SSA, with an overall deposition rate of 1.5 cm/year. The deposition rates for the SSA are within, and for some locations, higher than the deposition rates for Lacava Bay. MNR was determined to be effective at Lavaca Bay.

The Operations, Maintenance, and Monitoring Plan (OMMP) for Lavaca Bay stated that monitoring could be discontinued if remedial levels for mercury and polycyclic aromatic hydrocarbons (PAHs) were achieved for two consecutive years.

4.5 Chemical Properties of Dioxins and Furans

Of the processes of MNR discussed in Section 3, physical deposition and chemical absorption are expected to be the primary processes in the SSA. Chemical and biological degradation and dispersion are not expected to be significant processes of MNR.

4.6 Receptors at Risk

The RI included baseline human health and ecological risk assessments. Both risk assessments concluded that, excluding the Northern Impoundment, site-wide concentrations of dioxins and furans in sediment pose negligible risk

to human health and the aquatic environment. Human receptors evaluated included recreational fishers, subsistence fishers, and recreational visitors. Ecological receptors evaluated included benthic invertebrate populations and communities and populations of benthic omnivorous fish, benthic insectivorous fish, benthic piscivorous fish, wading birds, diving birds, mammals, and reptiles. MNR for the SSA is the Selected Remedy for protection of the aquatic environment. Because risk in the SSA is negligible for all groups of ecological receptors, monitoring of dioxins and furans in tissue is not necessary. If concentrations of dioxins and furans in sediment do not exceed the clean-up level of an arithmetic mean of 30 ng/kg $TEQ_{DF,M}$, concentrations in tissue will also remain below protective concentrations.

4.7 Source Control

The presence of dioxins and furans in sediment of the SSA addressed by the Selected Remedy is associated with historical sand mining and dredging activities, conducted by Mega Sand and entities associated with the adjacent property (which is now owned by Houston Fleeting Services, LLC). Those activities ended approximately 20 years ago and no longer act as a source of dioxins and furans in sediment of the SSA. The Selected Remedy for the work site includes excavation and off-site disposal of waste containing dioxins and furans from the Northern Impoundment in and adjacent to the San Jacinto River and institutional controls to prevent disturbance of remediated areas. Any dioxins and furans associated with those areas will be eliminated as potential sources of dioxins and furans in the SSA. Therefore, MNR is expected to effectively maintain concentrations of dioxins and furans in the SSA below concentrations protective of human health and the aquatic environment. It is recognized, however, that dioxins and furans may be present in the San Jacinto River and/or adjacent upland areas from background and sources other than those areas that are to be remediated.

4.8 Potential for Disturbance and Perturbation

Propeller wash from boat traffic in the San Jacinto River and in the vicinity of the SSA could potentially disturb sediments during the monitoring period. Hurricanes and high-energy storm events are natural events that could perturb sediment of the SSA. These anthropogenic and natural sources of disturbances and perturbation could deposit sediment contaminated with dioxins and furans from off-site sources and/or scour surface sediment to depths that expose deeper sediment with elevated concentrations of dioxins and furans. These types of events will be considered in evaluating data collected during the monitoring period.

5. Monitoring Program

5.1 Sampling Locations and Depth Intervals

Sediment samples will be collected at the nine locations (polygons) identified on Figure 61. Within each polygon, samples will be collected from five locations. Four depth intervals will be sampled from each location: 0 to 15 cm, 15 to 30 cm, 30 to 45 cm, and 45 to 60 cm below the sediment/surface water interface. A composite sample consisting of sediment from each of the five locations will be prepared for each sampling interval. This will mean that each of the nine polygons will have one composited sample that includes the 0 to 15 cm interval, one composited sample that includes the 15 to 30 cm interval, one composited sample that includes the 30 to 45 cm interval, and one composited sample that includes the 45 to 60 cm interval. These are the same locations sampled in 2019 during PDI2.

The 0 to 15 cm interval represents the primary BAZ where benthic organisms are consumed by fish, UTL ecological receptors, and human consumers of aquatic biota can bioaccumulate dioxins and furans. Biological activity potentially occurs in the 15 to 30 cm interval, as well. Sampling at 30 to 45 cm and 45 to 60 cm is proposed to account for disturbances and perturbances that could expose deeper sediments in the SSA.

Composite samples are proposed as they will provide EPCs that are more representative of a polygon than a single discrete sample. Figure 5.1 below illustrates a hypothetical representation of the location of confirmation samples across the SSA.

Figure 5.1 Conceptual MNR Sampling Locations

5.2 Parameters

Samples will be analyzed for 17 dioxins and furans, total organic carbon (TOC), percent solids, and grain size distribution. For each sample, $TEQ_{DF,M}$ will be calculated. As dioxins and furans are highly hydrophobic and preferentially adsorb to organic matter, TOC and percent solids will be used to estimate bioavailability. Grain size distribution will provide information on changes in sediment characteristics indicative of deposition or erosion.

Analysis of ^{137}Cs and ^{210}Pb is not proposed. ^{137}Cs was not detected during the PDI2 sampling event, which suggests that sediment in the SSA at the depths sampled has been deposited since the mid1960s. Additional analysis of ^{137}Cs is likely to produce the same result. Radioactivity of ^{210}Pb for PDI2 samples was useful in documenting that deposition is occurring in a major portion of the SSA. With one exception, concentrations of $TEQ_{DF,M}$ in areas where deposition is not occurring are below concentrations protective of human health and the aquatic environment. Because concentrations of $TEQ_{DF,M}$ in the upper depth intervals are currently protective of human and ecological receptors, with the exception of one near shore sample location, the focus of monitoring MNR is documenting that concentrations of $TEQ_{DF,M}$ remain below protective concentrations. Collection of additional data to monitor deposition rates is not necessary at this time.

5.3 Sampling Frequency

Sampling conducted in 2019 during PDI2 established baseline for the SSA. Future sampling will be completed as follows:

– Prior to the RA (i.e, prior to installation of the BMP);
– Within one year following completion of the RA;
– Within three years following completion of the RA; and
– Within five years following completion of the RA.

No additional monitoring of the SSA is proposed after the first Five Year Review if the mean concentration of samples collected in the SSA are below 30 ng/kg $TEQ_{DF,M}$ for the last two sampling events of the first Five Year Review period.

5.4 Data Evaluation

For each monitoring event, the arithmetic mean of the nine composite samples will be calculated for each of the four depth intervals. While some of the composite sample locations from the 2019 PDI-2 had detectable concentrations of dioxins and furans that were below cleanup criteria, all (9) locations are deemed suitable for inclusion in arithmetic mean concentration calculations because all are within the area designated for Institutional Controls. If some of the locations were not included within the Institutional Control area, then their exclusion from the arithmetic mean concentration calculation would be deemed appropriate. The mean $TEQ_{DF,M}$ from each depth interval will be compared to the clean-up level of an arithmetic mean of 30 ng/kg $TEQ_{DF,M}$, which the ROD identified as protective of both human health and the aquatic environment. Concentrations will also be carbon-normalized to assess bioavailability.

As discussed in Section 5.1, the 0 to 15 cm depth interval is the primary BAZ, whereas the 15 to 30 cm interval potentially supports ecological receptors. Although the RI and PDI2 indicated that the majority of the SSA is depositional, the 30 to 45 cm and 45 to 60 cm intervals are to be sampled to represent EPCs in the event that significant dispersion was to occur.

Data on grain size distribution for the post-remediation monitoring events will be evaluated to identify changes indicative of deposition or dispersion.

5.5 Decision Rule

Five years is recommended by ESTCP (2009) as the minimum amount of time to document long-term stability of MNR as a remedy. As discussed in Sections 4.2 and 4.3, data from the RI and PDI2 indicate that mean $TEQ_{DF,M}$ concentrations in the SSA have been below the clean-up level of 30 ng/kg $TEQ_{DF,M}$ since 2010 (RI) with additional sampling completed in 2019 (PDI2). With the current schedule for the Northern Impoundment, RA post-remediation monitoring is not expected to begin until approximately 2030; however, the sampling frequency noted in Section 5.3 will provide additional sediment data points for the SSA spanning over a 20-year monitoring period.

Little biological activity is expected below 30 cm of the sediment/surface water interface. Establishing 60 cm as the bottom depth for sampling accounts for dispersion or disturbances that could expose deeper sediment.

Based upon these timeframes and depths of biological activity, the decision rule for MNR is as follows:

– Mean concentrations of dioxins and furans below 30 ng/kg $TEQ_{DF,M}$ for the 0 to 15 cm, 15 to 30 cm, 30 to 45 cm, and 45 to 60 cm depth intervals of the sediment profile of the SSA for the last two sampling events of the first Five Year Review period.

5.6 Sampling Duration

The SSA MNR Plan proposes four monitoring events, pending the first Five Year Review. The first monitoring event will be completed prior to the RA and the subsequent events within one year, three years, and five years following the completion of the RA.

With 2010 RI data and 2019 PDI2 identifying concentrations of $TEQ_{DF,M}$ as protective of human health and aquatic environment, additional datasets spanning a minimum of 20 years (assuming Northern Impoundment remedial activities are completed by 2030) will be available to assess the effectiveness of MNR.

The decision rule for success of MNR at Lavaca Bay, which is also in EPA Region 6, was achievement of clean-up levels for two consecutive years. Consistent with the Lacava Bay decision rule, no additional monitoring of the SSA is proposed after the first Five Year Review if the mean concentration of samples collected in the SSA are below 30 ng/kg $TEQ_{DF,M}$ for the last two sampling events.

6. Adaptive Management

Adaptive management is a systematic approach to risk management that incorporates data and information gained throughout the life of a project and defines a pathway forward. Results of the post-remediation monitoring events could potentially indicate that modifications to the monitoring program could more effectively assess the effectiveness of MNR.

7. Reporting

Technical memoranda will be submitted to EPA upon completion of each monitoring event. The memoranda will describe the methods and present the results of the analysis for dioxins and furans, TOC, and grain size distribution. The memorandum for the post-remediation monitoring event to be conducted within five years following completion of the RA will provide a comprehensive evaluation of the data for the RI, PDI-2, and post-RA monitoring events; assess the effectiveness of MNR; and present recommendations for discontinuing or extending monitoring.

8. References

– Environmental Security Technology Certification Program. 2009. Technical Guide. Monitored Natural Recovery at Contaminated Sediment Sites. ESTCP Project ER0622. May 2009.
– United States Environmental Protection Agency. 2002. Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. OSWER Directive 9285.608. February 12, 2002.
– United States Environmental Protection Agency. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. EPA540R05012. OSWER 9355.085. December 2005.

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The Power of Commitment

Attachment 10 - High-Water Preparedness Plan – Northern Impoundment

Provided As Part of Final 100% Remedial Design – Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

International Paper Company and McGinnes Industrial Maintenance Corporation

June 17, 2024

→ **The Power of Commitment**

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Appendices

1. Introduction

This High-Water Preparedness Plan (HWPP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). This HWPP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06 02 18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018) and EPA's letter dated April 18, 2024, as part of the Final 100% Remedial Design for the Northern Impoundment (Northern Impoundment 100% RD) submittal to the EPA. References in this HWPP to the "work site" are to the Northern Impoundment, the Texas Department of Transportation (TxDOT) right of way (ROW) that provides the only means of land access to the Northern Impoundment, and the associated locations to be used for staging, office trailers and activities such as wastewater treatment. Each remedial contractor (RC) selected by the party(ies) implementing the Northern Impoundment RD will, as applicable, either update this HWPP or develop its own HWWP to address the components outlined in this document. References in this HWPP to "the RC" are intended to refer to the selected RC with responsibility for that aspect of the Northern Impoundment RD.

The objective of this HWPP is to define specific procedures to be followed during the Northern Impoundment Remedial Action (RA) for the protection of equipment, employees, and the environment during high-water, flooding, or severe weather events at the work site.

This plan includes:

- Monitoring of short-term and long-term weather conditions.
- Protecting active work areas and equipment during excavation and non-excavation seasons, as defined in Section 3.2 below.
- Preparing for severe weather events, hurricanes, etc. during excavation and non-excavation seasons.

This HWPP addresses minor flooding events, major flooding events, and larger "named storms," like tropical storms and hurricanes.

2. Storm Types and Definitions

There are two types of storm systems that typically affect the local region. The first type is a "pop-up storm," such as thunderstorms, which include heavy rains and potential flash flooding. This type of storm tends to form quickly and is often localized to a specific area. The second type is a named storm event, such as a tropical depression, tropical storm, or a hurricane. Named storm events typically form in the ocean, sometimes hundreds or thousands of miles away, and are slower to make landfall. For the purposes of this plan, we have differentiated between "typical high-water events" and "named storm events." However, depending on the events leading up to and during a high-water event, the actions stated in this plan may need to be modified, as appropriate, to adjust to the specific conditions present. Moreover, due to the complexity and size of the work site and the nature of the storm or other conditions, it may not be possible to accomplish specific tasks identified in this plan.

Typical high-water events include weather events that cause sudden, localized minor flooding but in certain situations may result in major flooding. While major flooding is commonly associated with a named storm, there are instances when major flooding can occur outside of tropical storm season due to heavy rain events.

This plan uses the following definitions of "minor flooding" and "major flooding."

Minor Flooding: Rain event where water is expected to rise to an approximate elevation of +4.0 ft North American Vertical Datum 1988 (NAVD88), leading to flooding of the San Jacinto River, the TxDOT ROW that provides work site

access, and the main roadway necessary to access areas within the work site used for staging, office trailers, and water treatment (i.e., East Freeway Street).

Major Flooding: Rain event where water is expected to rise to a river stage that exceeds +4.0 ft NAVD88, leading to more extreme flooding of the San Jacinto River, effectively eliminating work site access for an extended period of time, and potentially compromising on-site facilities and equipment. Major flooding events are often the result of named storms such as tropical storms and hurricanes, but may also be the result of prolonged rain events impacting the San Jacinto River Basin.

2.1 Named Storm Definitions

A hurricane is a tropical storm with winds that have reached a constant speed of 74 miles per hour (mph) or more. Dangers associated with hurricanes include torrential rain, high wind, and storm surges. The Atlantic hurricane season begins June 1 and ends November 30 of each year, but historically, the most active time for hurricane development is mid-August through mid-October. Tropical storms and hurricanes also have the potential to form tornados.

Tropical Depression: Organized weather system with sustained winds of less than 39 mph.

Tropical Storm Watch: Tropical storm conditions are possible in the specified 'Watch' area; usually within 48 hours.

Tropical Storm Warning: Tropical storm conditions are expected in the specified 'Warning' area; usually within 36 hours.

Hurricane Watch: Hurricane conditions are possible in the specified 'Watch' area; usually within 48 hours.

Hurricane Warning: Hurricane conditions are expected in the specified 'Warning' area; usually within 36 hours.

Hurricanes are classified into five categories based on their wind speed, central pressure, and damage potential. The following table lists the five categories of hurricanes and their respective wind speed, storm surge, and damage potential. Category 3 and higher hurricanes are considered major hurricanes, but Category 1 and 2 hurricanes can still be extremely dangerous and warrant full attention.

Table 2-A Storm Definitions

Category	Wind Speed	Storm Surge	Damage Potential
Tropical Depression	<39 mph	2.0 ft to 3.0 ft	No damage to vegetation and signs; minor flooding near stormwater ditches or low spots; no structural damage.
Tropical Storm	39 to 73 mph	3.0 ft to 4.0 ft	Little or no damage to vegetation and signs; some flooding near stormwater ditches or low areas; no structural damage.
1 (Weak)	74 to 95 mph	4.0 ft to 5.0 ft	Minimal damage to vegetation and signs; some flooding; little or no structural damage.
2 (Moderate)	96 to 110 mph	6.0 ft to 8.0 ft	Moderate damage to mobile homes; roof damage; coastal roads flooding.
3 (Strong)	111 to 130 mph	9.0 ft to 12.0 ft	Extensive damage to small buildings; mobile homes destroyed; severe flooding.
4 (Very strong)	131 to 155 mph	13.0 ft to 18.0 ft	Extreme structural damage; severe flooding inland; trees down; some roofs ripped off.
5 (Devastating)	Greater than 155 mph	Greater than 18.0 ft	Catastrophic building failures possible; vegetation destroyed; severe flooding farther inland; serious damage to most wooden structures.

Notes:
http://www.nhc.noaa.gov/.
mph = miles per hour
ft = feet

3. Site Information

3.1 Working Areas

The work site is located in Harris County, Texas, east of the City of Houston, between two unincorporated areas known as Channelview and Highlands. The Northern Impoundment is located immediately north of the Interstate 10 (I-10) bridge over the San Jacinto River. The term “work site” as used in this plan includes the Northern Impoundment, the TxDOT ROW that is necessary for land access to the Northern Impoundment, and the associated locations used for staging, office trailers and activities such as wastewater treatment.

Excavation activities for the Northern Impoundment RA are scheduled to take place during the “Excavation Season” currently planned to occur from November through April, with the possibility of extending the excavation season through July. The remaining months of the year are referred to as the “Non-Excavation Season” in this HWPP. During the Non-Excavation Season, there will be a limited scope of work which is not expected to include any excavation of waste material. A description of the work activities that may be completed during Excavation and Non-Excavation Seasons is provided in Section 3.2. The RA is currently projected to take approximately 7 years to complete, assuming that conditions associated with weather as well as access to the work site via the TxDOT ROW and coordination with the planned TxDOT I-10 bridge replacement project will allow projected levels of excavation to be achieved.

Work site features and work areas are identified on Figure 3-1. Work site features and work areas will be relocated throughout the course of the project as the excavation progresses. Excavation areas will be protected by a Best Management Practice Double-Walled Cofferdam (BMP). There will be active work areas inside the BMP which may be susceptible to major flooding and work areas outside the BMP which may be susceptible to minor and major flooding.

Work Areas Outside the BMP

Truck Staging/Laydown Area and Office Trailers/Parking

Truck staging/laydown areas, office trailers, and parking areas will be located outside of the BMP. Efforts will be made to locate these facilities in areas with an elevation or within berms protective against minor flooding.

Access Road / TxDOT Right of Way

The access road to the areas of the work site to be excavated during the RA is a continuation of E Freeway Service Road directly north of I-10, located on the TxDOT ROW. As shown on Figure 3-2, the elevation of the access road ranges from +3 to +5 feet (ft) NAVD88 and is susceptible to flooding from the San Jacinto River. High-water events, even those involving minor flooding (+ 4 ft NAVD88), may temporarily cut off any access to work areas within the Northern Impoundment.

Water Storage and Treatment Area

Water from the excavation area will be pumped and contained in large, aboveground lake tanks with a minimum of 10-ft tall walls. These lake tanks and the Water Treatment System (WTS) will be staged within a secondary containment area. Efforts will be made to locate this system at a ground elevation protective against minor flooding. In addition, the secondary containment will be constructed of earthen berms to a minimum elevation of +10 ft NAVD88 to provide protection against more severe flooding.

Work Areas Within the BMP

Active Excavation Area

Excavation and dredging activities will occur exclusively within the BMP, as shown on Figure 3-1. The BMP will be built to an outer wall elevation of +10 ft NAVD88.

Soil Handling Area

The soil handling area will be where impacted materials are decanted and solidified, if necessary, prior to loading waste into haul trucks for off-site disposal. The entire soil handling area is planned to be located within the +10 ft NAVD88 BMP, which will be protective against minor and most major flooding events.

Clean Borrow Material

Clean borrow material will be staged, if possible, in an area accessible to work areas in which active excavation is taking place, such that it can be readily placed over impacted material in preparation for a high-water event. However, there may be circumstances in which clean borrow material would have to be staged outside of the BMP.

3.2 Seasonal Work Activities

3.2.1 Non-Excavation Season

During the non-excavation season and during the first and last year of construction, the RC will perform necessary work activities that do not involve managing impacted material. This work will include, but not be limited to: installing and removing the BMP, developing infrastructure for the project along the TxDOT ROW, constructing and then demobilizing or partially demobilizing the WTS at the end of each excavation season, re-installing the portions of the WTS that were demobilized prior to the next excavation season, dewatering excess water within the BMP and treating and discharging the remaining water in the BMP, water sampling, protecting office trailers and truck laydown equipment from flooding, visual inspections of the BMP and work site properties, importing and staging clean fill material, mobilizing and demobilizing trucks scales and washes, and mobilizing and demobilizing heavy equipment.

No impacted material will be handled during the non-excavation season, apart from treatment and discharge of the remaining water in the BMP.

3.2.2 Excavation Season

During the excavation season, the RC will conduct excavation and during some seasons, mechanical dredging of impacted material, loading and off-site disposal of excavated material, water treatment and discharge, environmental sampling and any other activities necessary for management of the impacted material. The activities listed above in the non-excavation season may also take place during the excavation season.

3.3 Equipment

The following list identifies the typical equipment[1], or categorically similar equipment, that is planned for use on-site and the measures that would be taken, to the extent possible, to secure and/or protect such equipment in the event of a high-water event during the excavation season.

Within the BMP

- Excavators: demobilize or move to high ground within the BMP.
- Dozers: demobilize or move to high ground within the BMP.
- Compactors: demobilize or move to high ground within the BMP.
- Dump Trucks: demobilize or move to high ground within the BMP.
- Loader: demobilize or move to high ground within the BMP.
- Diesel tanks (double walled): demobilize.
- Water Truck: demobilize or move to high ground within the BMP.

[1] Equipment may change throughout the course of the project.

- Storage Trailers: demobilize, move to high ground within the BMP, or remove paperwork and equipment from trailer.

The locations within the BMP to which equipment could be moved in the event of a highwater event will change over the course of the RA. Limitations on such locations, together with circumstances associated with the specific highwater event, may impact the ability of the RC to take such steps.

Outside the BMP

- Street Sweeper: demobilize or move to high ground.
- Water Truck: demobilize or move to high ground.
- Generators: demobilize or move to high ground.
- Office Trailers: demobilize, move to high ground, or remove paperwork and equipment from trailers.
- Storage Trailers: demobilize, move to high ground, or remove paperwork and equipment from trailers.
- Diesel tanks (double walled): demobilize.
- WTS: if possible, treat and discharge contact water. Shut down the WTS, close hatches and valves, and ensure vessels have adequate ballast to maintain structural integrity. Small containers of chemicals and products should be demobilized from the work site.
- Truck Scales and wheel wash: demobilize or tie-down.

4. Monitoring Procedures

Due to the low elevation of the work site and the proximity to the river, high-water events and storms could have major effects on RA activities. It is imperative that robust monitoring procedures are followed to identify and anticipate storm and flooding events ahead of time so that mitigation actions can, if possible, be implemented.

The on-site field office will be equipped with internet access and the RC will designate a HWPP Coordinator to be responsible for reviewing the weather daily for both the potential for short-term storms and long-term events that require advance preparation. The HWPP Coordinator will brief the work site representative each morning on the potential for storm events and they will discuss together the logistics for preparing for a high-water event. A phone-based weather app, or similar digital information dashboard, will be utilized to track the weather forecast. If heavy rains or a severe weather event are forecasted, the RC will also track the river level from the up-stream United States Geological Service (USGS) gages and downstream tidal gages. During the Northern Impoundment RA, the HWPP Coordinator will be documenting weather events and delays due to weather events.

If a major storm (tropical storm or hurricane) enters the Gulf of Mexico, the RC will coordinate with the EOR and Respondents on whether to stop work, implement actions required by this HWWP and evacuate the work site. Further information on monitoring and forecasting are summarized below.

The following are a key list of websites that may be monitored:

United States Geological Survey (USGS):

Lake Houston Watershed Levels:

https://waterdata.usgs.gov/monitoring-location/08072000/#parameterCode=00065&period=P7D.

Sheldon Gauge:

https://waterdata.usgs.gov/monitoring-location/08072050/#parameterCode=00065&period=P7D**.**

Livingston Reservoir:

https://waterdata.usgs.gov/monitoring-location/08066190/#parameterCode=62614&period=P7D.

Cedar Bayou (Highway 90):

https://waterdata.usgs.gov/monitoring-location/08067500/#parameterCode=00065&period=P7D.

Cedar Bayou (I-10):

https://waterdata.usgs.gov/monitoring-location/08067505/#parameterCode=00065&period=P7D.

Harris Country Flood Control Warning System (FWS):

Cedar Bayou (FM 1960):

https://www.harriscountyfws.org/GageDetail/Index/1745?From=4/19/2023%2011:06%20AM&span=24%20Hours&r=1&v=surfaceBox&selIdx=0.

Cedar Bayou (FM 1942):

https://www.harriscountyfws.org/GageDetail/Index/1730?From=4/19/2023%2011:55%20AM&span=7%20Days&r=1&v=surfaceBox&selIdx=0.

New Caney (East Fork):

https://www.harriscountyfws.org/GageDetail/Index/790?From=4/20/2023%2010:26%20AM&span=7%20Days&r=1&v=surfaceBox&selIdx=0.

National Oceanic and Atmospheric Administration (NOAA):

Flood Prevention Maps:

https://water.weather.gov/ahps/forecasts.php.

The National Oceanic and Atmospheric Administration's National Hurricane Center

https://www.nhc.noaa.gov.

Tidal Prediction:

https://water.noaa.gov/?wfo=hgx&wfoid=18770&riverid=208364&pt%5B%5D=154759&allpoints=154759%2C154761%2C154762%2C154763%2C154764%2C154766%2C154767%2C154768%2C154770%2C154771%2C154772%2C154776%2C154765&data%5B%5D=all#@=-94.8252036,29.6828489,10.9521346&b=topographic&g=obsFcst,1!1!1!1!1!1!1!1!1!1!1!1!1!1!1!1!0!0!0!0!0,0.5,1!1!1!1!0,0,0&ab=0,0,#D94B4A,1,1,1,#cccccc,1,0,0,#B243B1,1,0,0,#98E09A,1&a=hydrologic,0.35&s=0,0,0.9,0.9&n=false,#72afe9,0.9,0,0.9,0,0.9&p=false,0.75,0,7,0,1,2024,6,13,0&d=0,0,1,1,1,1,1,1,#006EFF,1,#006EFF,1,#006EFF&q=.

San Jacinto River Authority (SJRA):

https://www.sjra.net/.

Lake Conroe:

https://sanjacinto.onerain.com/dashboard/?dashboard=c03aab24-7518-419b-9dfa-b151879a06c8&refresh=60&scroll=0.

Texas Water Development Board Water Data for Lake Houston Reservoir Storage

https://waterdatafortexas.org/reservoirs/individual/houston.

4.1 Rainfall Forecasting

Weather and rainfall forecasting will be checked daily using a combination of weather apps from publicly-available local and national institutions along with more localized weather station data near the work site and the upstream Lake Houston watershed. The more localized weather station data will be critical to monitoring the predicted and actual rainfall being collected by the Lake Houston watershed. Rainfall that is collected in the Lake Houston watershed will have a direct effect on the Lake Houston stage and ultimately the downriver flow and river stage coming from the Lake Houston Flood Control Structure (LHFCS).

In 2019, during the Pre-Design Investigation, the Respondents installed a transducer on a staff gauge in the San Jacinto River to the west of the Northern Impoundment. Data from this transducer was used in conjunction with the publicly-available data from the Sheldon gage to develop a model to hindcast water surface elevations at the work site. The past flooding events in which the river stage was hindcasted to have been greater than +4 ft NAVD88 at the work site are shown in Table 4-1.

To establish a threshold forecasted rain amount that could serve as a trigger to initiate flood mitigation actions at the work site, the historic rain gauge data from 11 rain gauges located in the Lake Houston Watershed were analyzed. The rainfall totals from each of the gauges were calculated for dates correlating to 28 known historic flooding events in which the river elevation at the work site was hindcasted to be over +4 ft NAVD88 (see Table 4-1). The average total rainfall measured per flooding event recorded from the 11 rainfall gauges ranged from 0.12 inches to 22.16 inches (Hurricane Harvey) with an average over the 28 events of 6.5 inches. The rainfall gauge locations are included in Figure 4-1 and the average rain gauge totals are included in Table 4-2.

Based upon analysis and trends of this rainfall data, a forecast of four or more inches of rain predicted over a period of 48 hours or less in the Lake Houston watershed would trigger flood mitigation measures at the work site. This data should be evaluated in conjunction with HWPP Coordinator data from Lake Houston to inform response actions (see Section 4.2). To best anticipate storm events that could result in downstream flooding, the HWPP Coordinator in conjunction with a representative of the EOR will monitor the forecasts of the following municipalities located within the Lake Houston Watershed:

Cleveland, Texas.
Cypress, Texas.
Huntsville, Texas.
Magnolia, Texas.
Montgomery, Texas.
New Caney, Texas.
Spring, Texas.
Tomball, Texas.
Waller, Texas.
Willis, Texas.

4.2 Lake Houston Monitoring

The LHFCS consists of a series of radial gates and spillway (overtopping weir) to control the lake's water elevation and control the discharge into the San Jacinto River. The LHFCS has a service spillway crest elevation of +42.38 ft. Once water inside the lake reaches this elevation, the water begins to flow over the spillway at an uncontrolled rate. The LHFCS has a maximum design elevation of +54.23 ft NAVD88. While it is not uncommon for the Lake Houston water levels to exceed the spillway crest elevation, the maximum design elevation of the structure will allow water levels to continually build in the reservoir while overflowing the spillway, causing increased flow downstream. This potential for a heavy influx of water into the San Jacinto River is one of the main reasons high river stages are observed downstream towards the work site with little to no warning.

The HWPP Coordinator will monitor the USGS gauge at Lake Houston daily to assist in predicting when Lake Houston levels are, or are forecasted to be, elevated above the spillway crest elevation. If there is a forecast of an average of four or more inches of rain in the Lake Houston Watershed and the water level in the Lake Houston Watershed (see Section 4.1) is at or above the spillway elevation, downstream flooding is likely. The HWPP Coordinator will closely monitor the water level in Lake Houston and factor that information into decisions to implement mitigation activities.

4.3 Lake Conroe Monitoring

In addition to monitoring the USGS gauge at Lake Houston, the HWPP Coordinator will monitor the San Jacinto River Authority's Lake Conroe gauge, which is located approximately 40 miles to the northwest of the LHFCS. Water released from the flood control structure on Lake Conroe enters the West Fork San Jacinto River and eventually discharges into Lake Houston. A high-flow release at Lake Conroe will likely contribute to elevated water volumes observed in the Lake Houston Watershed. The HWPP Coordinator will closely monitor the discharge rates in Lake Conroe and monitor these effects on Lake Houston and factor that information into decisions to implement mitigation activities.

4.4 River Stage Monitoring

The closest USGS river level gage to the work site is the Sheldon gage located approximately 10 river-miles up-river close to the Highway 90 river crossing. There is also the transducer located in the river to the west of the Northern Impoundment that tracks the river levels in the vicinity of the work site. Both resources will be consulted to track trends in rising water levels if there is significant rain in the forecast. The river is narrower at the location of the Sheldon gage than it is at the work site, so river levels tend to be higher there than the corresponding river levels at the work site. While the correlation between the upstream Sheldon gage and the transducer located to the west of the Northern Impoundment is close during normal river stage conditions, during a high-water event, the river level at the Sheldon gage has been observed to be more than 10 ft higher than the level at the work site. The Sheldon gage can be used as a predictor of rising river levels before they reach the work site, and the Northern Impoundment transducer data will be indicative of actual conditions at the work site. Both can be seen on Figure 4-1. These gauges provide useful data on rising river levels but will not be used exclusively to predict flood events, as there would not be sufficient time to react once these gauges reach trigger levels.

South of the work site, near the entrance to Trinity Bay, there is a tidal station at Morgan's Point. While the tidal station at Morgan's Point does not necessarily forecast upstream trends, it does track the emptying of the San Jacinto River into Trinity Bay and ultimately the Gulf of Mexico. During high tides, strong winds out of the south, and during storm surge events there is often an increase in tidal level at Morgan's Point predicating an increase in the river stage upstream. The Morgan's Point tidal station is shown on Figure 4-1.

The thresholds and triggers to initiate mitigation measures identified in the sections above serve as a starting point for storm preparedness at the work site. These procedures and thresholds will likely be modified and refined as the RA progresses.

5. High Water Preparedness and Response

5.1 Best Practices

During the RA, best practices will be utilized to minimize the time it takes work site personnel to prepare the work site for severe weather or flooding events. Some of the work site best practices are summarized below.

Staging/Laydown Area and Office Trailers/Parking

Good housekeeping will be maintained around the entire work site but especially around staging and laydown areas along with the office trailers and parking areas. This includes storing equipment and materials when not in use, staging equipment and vehicles efficiently in parking areas, maintaining good roadway conditions when leaving the work site, keeping office trailers tidy and picked-up, routinely disposing of trash, and having materials and supplies on-hand to secure the work site before a severe storm event arises.

Active Excavation Areas

The excavation area will be protected from minor flooding events with the BMP at +10 ft NAVD88. As preparation for a high-water event with projected major flooding, such as an approaching hurricane/tropical storm, that requires demobilization from the work site, clean backfill will be staged on-site and/or near the BMP in sufficient quantities to cover any open excavation areas. Water will be removed from active excavations and pumped to the WTS, to minimize the amount of contact water within the BMP.

Stockpiles of impacted material will be staged within secondary containment within the BMP. The amount of impacted material stockpiled on-site will be kept to a volume such that full removal can be achieved in a relatively short timeframe (assuming trucks to transport the stockpiled material can access the BMP via the TxDOT ROW). Solidification materials and equipment (i.e., supersacks) will also be staged in a manner to facilitate moving them outside of the limits of the BMP to higher ground.

Water Storage and Treatment Area

When the RC preventatively shuts down excavation activities in anticipation of a minor high-water event, it may be decided that water treatment and discharge should continue. This will lower the water elevation in the storage tanks, so they may accommodate stormwater falling within the open excavations and containment areas when work resumes.

In the event of a major flooding event or approaching hurricane/tropical storm, best efforts will be made to treat and discharge all remaining contact water. At this point the WTS will be shut down and ballast water will be added to the influent lake tanks as necessary to maintain structural stability, as it is not feasible for the lake tanks to be removed from the work site on short notice. Shutdown procedures will include removing all treatment chemical containers and transporting off-site, closing all hatches and locking down all valves in the pipeline, filling all vessels that cannot be moved to higher ground with clean water to act as ballast, if necessary, adding additional ballast to the Solids Removal System (SRS) (e.g., sandbags, tie-downs), and disconnecting electrical power.

5.2 Minor Flooding Event Preparedness

The rise in river stage can happen with little to no warning. Minor flooding could occur due to heavy localized rainfall or more general rainfall across the Lake Houston watershed.

In the event of a potential minor flooding event (river stage anticipated to be up to +4 ft NAVD88), depending on site activities and severity of forecasted flooding, the RC will evaluate implementing the following response actions:

- Notify the United States Environmental Protection Agency (EPA).
- Suspend all non-essential work site activities and deliveries.
- Cease excavation activities.
- Transport all excavated, impacted material in soil handling areas off-site for disposal.
- Decontaminate heavy equipment, if needed, and stage on the high ground.
- Remove any contact water from excavations that have not been sampled and determined to be clean. Pump water to the WTS for treatment. Run the WTS for as long as practicable to minimize the volume of contact water in the WTS influent tank(s).
- Cover open excavations that have not been sampled and determined to be clean with a layer of clean fill to prevent the generation of contact water.
- Demobilize non-essential personnel from the work site until the RC deems it safe and necessary to return to work.
- Continue monitoring the forecast near the work site, the river level gauges, and Lake Houston water level.
- Secure loose materials to prevent potential damage and move all chemicals into secondary containment.
- Move equipment to high ground and prepare for possible demobilization.

- Verify that all supplies needed to secure the work site are available.

5.3 Major Flooding Event Preparedness

In the event of a potential major flooding event (river stage anticipated to be over +4 ft NAVD88) or if conditions are forecasted to worsen from a minor to major flooding event, the RC will evaluate implementing the following response actions, depending on site activities and severity of forecasted flooding (i.e. +4 ft NAVD88 versus +8 ft NAVD88), in addition to the response actions outlined in the Minor Flooding Event Preparedness section above that the RC has implemented:

- Notify the EPA.
- If the RC is in the process of pre-season dewatering, these activities will be suspended until the weather event passes.
- If the RC is in the process of treating and discharging water, continue to do so as long as safely possible to reduce the volume of water in the WTS influent tank.
- Pump ballast water into the WTS lake tanks, if necessary, to provide additional structural support.
- Decontaminate all heavy equipment and, if possible, arrange collection by rental companies to be taken off-site. If heavy equipment cannot be taken off-site, equipment should be stored at the highest elevations possible.
- Demobilize all chemical and petroleum products from the work site, if possible.
- Apply chemical additives (polymer and/or coagulant) to active dredging areas that have not been covered to settle potential suspended solids and/or apply a cover layer.
- If possible, demobilize office trailers. If this is not possible, the RC will be responsible for securing and removing all documents and critical equipment/materials from the office trailers.
- Inspect scour protection around the interior wall of the BMP with the EOR. If the RC or EOR determine that additional scour protection is required, spare riprap stockpiled on-site or from a nearby location will be used to supplement the existing scour protection.

5.4 Hurricane Preparation

The RC will administer two different hurricane preparation phases if a tropical depression, tropical storm, or hurricane is anticipated to make landfall in southeast Texas or the general vicinity of the work site (i.e., Gulf of Mexico). Work site personnel will also follow the procedures as outlined in the ERP as applicable. The phases and associated procedures are defined below and should be followed to protect the work site and personnel in the event of a hurricane. It should be noted that the phases and associated procedures below are guidelines and should be considered for initial planning. The RC, in coordination with EOR and Respondents, may decide to modify the procedures based on site-specific conditions and human health and safety considerations, present at that time.

Phase I Preparations

Phase I preparations would begin 7 days in advance of an expected tropical depression, tropical storm, or hurricane landfall which is predicted to have 50+ mph winds and will affect the general vicinity of the work site. In the event of a named storm scenario, the RC would begin to execute major flooding preparedness measures listed in Section 5.3.

In addition to transporting all impacted excavated material off-site within the initial preparation for a named storm event, the liner for the Soil Handling Area should, if possible, be removed and transported off-site for disposal.

- Develop a schedule for a complete suspension of work.
- Suspend all non-essential work and cancel all deliveries.
- Cease excavation activities.
- Cover/backfill any open excavations where clean confirmation samples have not yet been received.

- To the extent possible, secure or remove equipment/materials that could be damaged by the storm (i.e., small totes, drums, vehicles, monitoring instruments, etc.).
- To the extent possible, transport excavated waste material for off-site disposal.
- To the extent possible, treat all WTS influent.
- Secure all documents and records and remove from the work site.

Phase II Preparations

The RC will continue to execute the procedures outlined in Phase I and, in addition, will execute the following procedures if the tropical depression, tropical storm, or hurricane is predicted to make landfall in the southeast Texas vicinity within 72 hours:

- Notify the EPA.
- Verify all excavated materials, residuals (liners), and chemical or petroleum products have been removed from the work site.
- Verify all components of the office trailers, generators, and the WTS, that can be demobilized, have been removed from the work site. For those items that cannot be demobilized, secure to protect from hurricane force winds.
- Verify all WTS influent has been treated.
- Verify backfill and covering excavations has been completed.
- Verify scour protection is in-place and adequate to protect against potential overtopping of the BMP.
- Evacuate all personnel from the work site.

5.5 Re-Entry Procedure

The RC, in coordination with the EOR and the Respondents, will be responsible for determining the appropriate time for personnel and equipment to return to the work site. Work site personnel will not be permitted to access the work site until the RC approves re-entry.

5.6 Site Inspection

Once it is determined that the work site is safe to access, selected staff from the RC and EOR will mobilize to the work site to complete a post-severe weather work site inspection, utilizing the Re-Entry Checklist included in Appendix A. The RC will be responsible for determining how such personnel should document work site conditions, including with photographs and field notes, Re-Entry Checklist, and notifying EPA. In addition, the RC may have such personnel note any damage or impact to materials or equipment, determine approximate high-water levels, and/or obtain relevant information from any local residents or business owners that may have stayed in the area during the storm.

6. Communications Protocols with Emergency Agencies

In the event of an emergency during a high-water event or named storm, on-site personnel will follow the same procedures outlined in the ERP to coordinate and communicate an emergency response with emergency agencies. Depending on the nature of the emergency, the appropriate local law enforcement and/or fire and rescue agencies will be notified, along with EPA.

Table 4-1

Historic High-Water Events
San Jacinto River Waste Pits - Northern Impoundment
Channelview, Texas

Month	Starting Date of Event	Date of Maximum River Stage	Duration of Event (days)	Hindcasted Maximum River Stage
Above +4 feet NAVD88				
April	4/19/2016	4/21/2016	4	+6.07'
August	8/27/2017	8/30/2017	6	+14.15'
June	6/10/2001	6/10/2001	3	+6.92'
May	5/3/2024	5/6/2024	3	+7.47'
	5/28/2016	5/30/2016	4	+8.38'
November	11/14/1998	11/15/1998	5	+8.71'
	11/7/2002	11/7/2002	2	+5.73'
October	10/19/1994	10/19/1994	1	+13.10'
	10/19/1998	10/20/1998	4	+6.60'
September	9/13/2008	9/13/2008	1	+4.52'
	9/15/2008	9/15/2008	1	+5.26'
	9/19/2019	9/20/2019	3	+8.40'

Notes:

NAVD88 = North American Vertical Datum of 1988

1) United States Geological Survey (USGS) historical San Jacinto River data, spanning 1996 to 2024, collected from the Sheldon gage upstream of the site was utilized to hindcast localized river elevations on site. In addition, the USGS issued a Fact Sheet which reported a major flood event in October 1994.

2) Additional localized river elevation data from July 2019 to May 2024 was collected by a transducer installed in the San Jacinto River adjacent to the Northern Impoundment.

3) Localized river stage data represented above is based on the Hindcasted River Stage model outputs: Version 4. The Hindcasted River Stage model uses a Multivariate Adaptive Regression Splines (MARS) algorithm to correlate Northern Impoundment data with the Sheldon gage.

4) A high-water event/Major Flood is defined as when the hindcasted river stage was equal to or above +4 feet NAVD88, as stated on the table above.

5) Events hindcasted above +10 feet NAVD88 are highlighted.

Table 4-2

Historic Rain Gauge Totals
San Jacinto River Waste Pits - Northern Impoundment
Channelview, Texas

Storm Events	Rain Gauge Totals (inches)												River Stage Levels (feet NAVD88)		
	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	Station 8	Station 9	Station 10	Station 11				
	1320 Willow Creek @ Kuykendahl Road	1110 Cypress Creek @ Cypresswood Drive	790 East Fork San Jacinto @ FM 1485	1190 Little Mound Creek @ Creek Mathis Road	Site 43308 Lake Creek @ Egypt	1170 Cypress Creek @ Huffmeister Road	Site 43307 Lake Creek at Dobbin	Site 43303 2600 Danville	Site 43305 West Fork San Jacinto @ HWY 30	Huntsville 1.3 SSE, TX	Cleveland 3.6 S, TX	Avg Total Inches Measured per Event	Lake Houston Gage Water Level	Sheldon Gage Water Level	Hindcasted Maximum River Stage per Event
	Tomball, TX	Spring, TX	New Caney, TX	Waller, TX	Magnolia, TX	Cypress, TX	Montgomery, TX	Willis, TX	Huntsville, TX	Huntsville, TX	Cleveland, TX				
10/19/1994	7.44	8.94	10.46	9.32	-	6.04	-	-	-	-	-	8.44	+52.80'	+27.09'	+13.21'
1/7/1998	3.32	2.79	1.68	0.84	-	2.58	-	-	-	-	-	2.24	-	-	+6.6'
10/19/1998	9.31	3.44	15.14	8.88	-	4.08	-	-	-	-	-	8.17	-	-	8.14
11/13/1998	8.19	2.94	8.34	2.64	-	3.12	-	-	-	-	-	5.05	-	-	+9.78'
6/9/2001	12.84	17.16	10.16	4.72	-	13.23	-	-	-	-	-	11.62	-	-	8.38
10/26/2002	0.04	6.28	14.48	3.80	-	2.72	-	-	-	-	-	5.46	-	-	6.73
11/5/2002	6.75	10.60	18.24	7.48	-	10.79	-	-	-	-	-	10.77	-	-	7.46
11/18/2003	4.20	8.00	7.44	3.44	-	4.63	-	-	-	-	-	5.54	-	-	5.88
10/16/2006	9.12	12.52	12.36	7.73	-	11.60	-	-	-	-	-	10.67	-	-	5.11
9/13/2008	0.00	13.22	12.15	0.55	-	7.98	-	-	-	-	-	6.78	+48.29'	+14.51'	7.21
4/19/2009	4.00	4.35	4.04	6.31	2.24	5.08	3.52	1.96	3.56	-	-	3.90	+46.40'	+8.02'	5.33
5/1/2009	0.00	0.04	0.51	0.00	0.00	0.52	0.00	0.00	0.00	-	-	0.12	+47.26'	+10.51'	+4.20'
5/26/2015	11.20	15.48	16.48	12.88	13.79	12.96	14.55	13.88	13.20	2.08	4.89	11.94	+44.74'	+11.05'	5.55
6/1/2015	0.16	3.32	3.40	1.20	1.20	0.48	0.48	0.40	0.80	0.41	0.00	1.08	+44.44'	+9.72'	+4.66'
10/31/2015	3.20	5.68	7.04	2.08	2.12	2.36	0.96	1.08	1.00	0.37	4.76	2.79	+43.51'	+8.29'	+4.20'
3/11/2016	4.76	3.36	3.48	5.72	5.84	5.88	5.92	7.28	0.96	6.12	6.14	5.04	+44.81'	+11.07'	5.56
4/18/2016	10.48	10.80	6.52	17.68	4.36	14.80	7.26	3.76	0.68	4.60	10.27	8.29	+46.06'	+15.51'	7.72
5/28/2016	5.00	3.64	3.28	3.60	7.96	3.92	11.38	6.76	2.40	6.73	7.96	5.69	+47.86'	+19.31'	+9.53'
6/1/2016	19.60	16.64	14.20	9.04	17.28	10.16	14.66	9.16	5.48	3.78	0.75	10.98	+45.29'	+13.25'	6.6
8/27/2017	18.16	23.08	16.08	23.36	17.20	19.56	21.12	21.68	23.48	23.63	36.42	22.16	+53.12'	+28.72'	+14.03'
3/31/2018	5.72	3.60	3.92	3.72	4.28	5.20	4.16	4.72	0.00	6.20	4.79	4.21	+44.34'	+8.94'	+4.25'
12/9/2018	5.04	4.48	4.76	3.64	3.64	4.92	3.40	3.28	5.16	8.56	4.86	4.70	+43.95'	+7.21'	+4.04'
5/8/2019	9.08	11.04	15.92	5.92	7.64	3.80	4.64	6.80	5.44	1.74	6.69	7.16	+44.88'	+10.45'	5.26
9/19/2019	2.20	9.96	14.52	0.16	3.12	3.12	1.52	3.48	1.20	5.12	22.40	6.07	+48.27'	+19.37'	+9.54'
5/3/2021	5.72	2.64	2.04	4.84	4.20	4.08	7.72	2.04	5.04	5.07	2.00	4.13	+44.13'	+7.94'	+4.16'
5/20/2021	5.88	6.08	5.44	4.52	4.96	5.44	3.92	2.96	2.00	3.04	0.00	4.02	+43.90'	+7.36'	+4.06'
5/25/2021	4.04	3.16	4.04	3.08	3.60	3.72	1.40	2.84	1.92	3.74	0.00	2.87	+44.14'	+8.32'	+4.24'
9/14/2021	2.88	3.60	3.08	1.00	2.28	2.88	0.64	-	0.04	0.41	5.37	2.22	+42.69'	+6.99'	+4.00'

Notes:
1) Rain gauge data taken from: https://www.harriscountyfws.org.
2) Lake Houston Gage water level data taken from: https://waterdata.usgs.gov/monitoring-location/08072000/#parameterCode=00065&period=P7D.
3) Sheldon Gage water level data taken from: https://waterdata.usgs.gov/monitoring-location/08072050/#parameterCode=00065&period=P7D.
4) 1994 Storm data taken from: https://semspub.epa.gov/work/06/9108108.pdf and https://pubs.usgs.gov/fs/fs-073-94/pdf/FS-94-073.pdf.
5) Localized river stage data represented above is based on the Hindcasted River Stage model outputs: Version 4. The Hindcasted River Stage model uses a Multivariate Adaptive Regression Splines (MARS) algorithm to correlate Northern Impoundment data with the Sheldon gage.
6) Station 10 rain gauge data taken from: https://www.weather.gov/wrh/Climate?wfo=hgx.

Notes:
1. ASSUMED TxDOT RIGHT OF WAY IS BASED ON INFORMATION PROVIDED BY THE HARRIS COUNTY APPRAISAL DISTRICT.
2. LOCATION OF OVERBURDEN STOCKPILE, DECONTAMINATION PAD, SOLIDIFICATION PAD, AND DEWATERING FACILITY ARE SUBJECT TO CHANGE AND CAN VARY FROM SEASON TO SEASON.

Paper Size ANSI B
0 40 80 120 160
Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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GHD

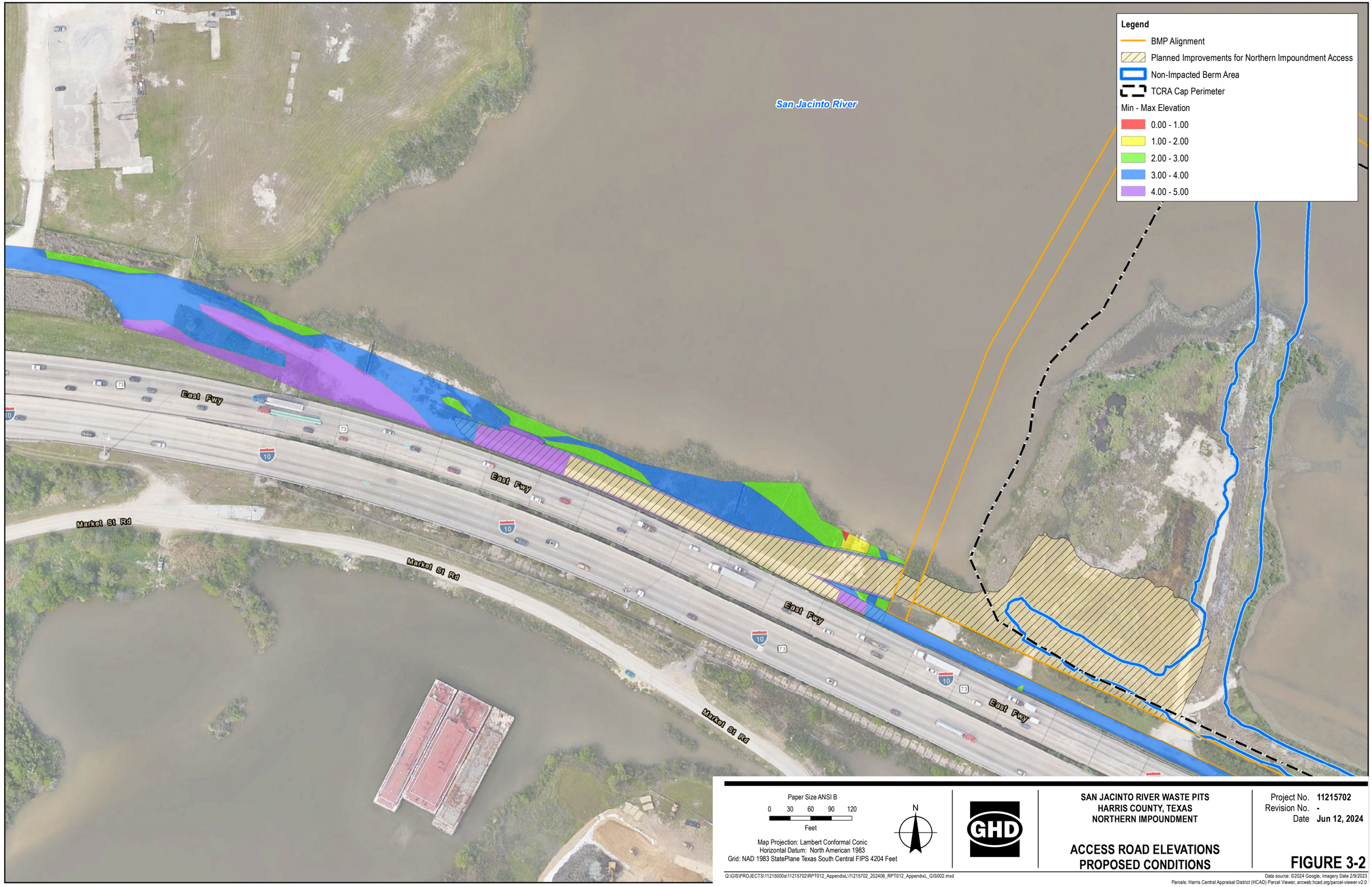
SAN JACINTO RIVER WASTE PITS
HARRIS COUNTY, TEXAS
NORTHERN IMPOUNDMENT

SITE LAYOUT

Project No. **11215702**
Revision No. **-**
Date **Jun 12, 2024**

FIGURE 3-1

O:\GIS\PROJECTS\11215000s\11215702\RPT012_AppendixL\11215702_202406_RPT012_AppendixL_GIS001.mxd



Paper Size ANSI B

0 30 60 90 120

Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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SAN JACINTO RIVER WASTE PITS
HARRIS COUNTY, TEXAS
NORTHERN IMPOUNDMENT

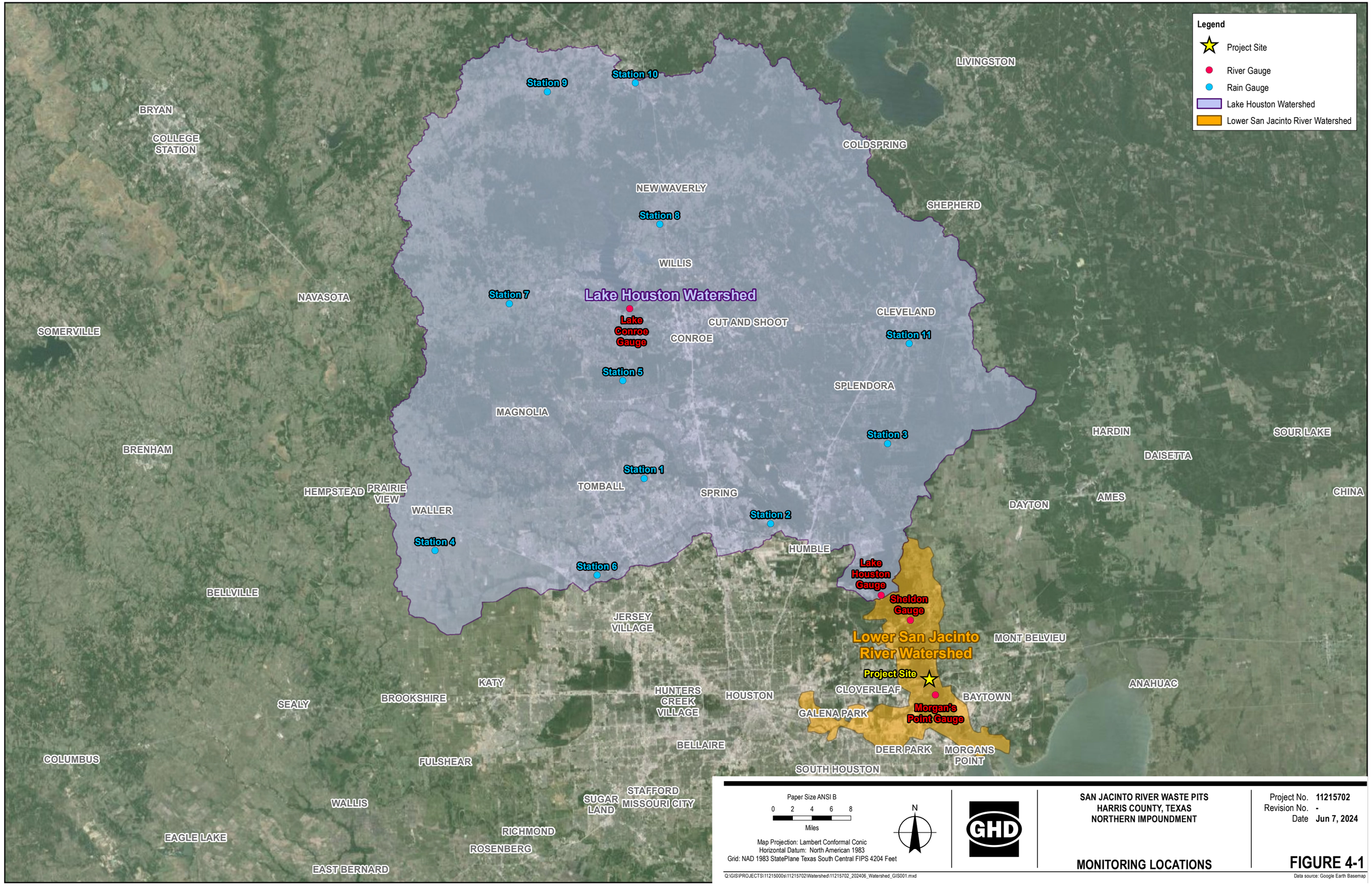
ACCESS ROAD ELEVATIONS
PROPOSED CONDITIONS

Project No. **11215702**
Revision No. **-**
Date **Jun 12, 2024**

FIGURE 3-2

Q:\GIS\PROJECTS\11215000s\11215702\RPT012_AppendixL\11215702_202406_RPT012_AppendixL_GIS002.mxd

Data source: ©2024 Google, Imagery Date 2/9/2023
Parcels: Harris Central Appraisal District (HCAD) Parcel Viewer, arcweb.hcad.org/parcel-viewer-v2.0



Paper Size ANSI B

0 2 4 6 8

Miles

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

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GHD

SAN JACINTO RIVER WASTE PITS
HARRIS COUNTY, TEXAS
NORTHERN IMPOUNDMENT

Project No. 11215702
Revision No. -
Date Jun 7, 2024

MONITORING LOCATIONS

FIGURE 4-1

Q:\GIS\PROJECTS\11215000s\11215702\Watershed\11215702_202406_Watershed_GIS001.mxd

Data source: Google Earth Basemap

Appendices

Appendix A

Re-Entry Checklist

Hurricane Project Status Report

Project Information

Site Name:

Address:

Project Manager Name:

Site Primary Contact Name, Phone, and Email:

Site Alternate Contact Name, Phone, and Email:

Damage and Release Assessment

Does the project have stockpiles? (Yes/No)

Are the stockpiles damaged? (Yes/No)

If yes, please provide photographs. Has the damage been repaired? (Yes/No)

Did soil from the project site move offsite? (Yes/No)

If yes, please describe the approximate volume, nature of impact and area of impact (mud in roads, etc.). Also provide photograph.

Was there any erosion damage? (Yes/No)

If yes, please provide photographs. Has the damage been repaired? (Yes/No)

Are there any onsite contaminant exposures caused by the storm?

Status of stockpiles:

Was the excavation damaged? (Yes/No)

If yes, please provide photographs. Has the damage been repaired? (Yes/No)

Were there any onsite spill or other releases not described above?

Spill reported to EPA yet?

Have all active remedial systems (water treatment system, pipelines, decontamination area, etc.) been checked and verified to be operating properly?

Was any remedial equipment (excavators, clarifier, GAC units, WTS filters, scaffolding, etc.) flooded/damaged by the storm?

What corrective actions have been implemented?

What corrective actions are planned?

What is the schedule for corrective actions?

Any other pertinent information to report?

Please complete this report and email it back with **PHOTOGRAPHS** of impacted areas to your assigned Project Manager.


GHD