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January 17, 2022

Ms. Ashley Howard
Environmental Protection Agency Remedial Project Manager
1201 Elm Street, Suite 500
Dallas, Texas 75270

Pre-Final (90%) Remedial Design - Northern Impoundment Staged Deliverables Submittal

Dear Ms. Howard:

GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents), hereby submits to the United States Environmental Protection Agency (EPA) four of the supporting deliverables of the Pre-Final (90%) Remedial Design - Northern Impoundment (Northern Impoundment 90% RD) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site, located in Harris County, Texas.

As required in the January 12, 2022, approval letter from the EPA to the Respondents' October 1, 2021, Request for Extension letter for the Northern Impoundment 90% RD, the following supporting deliverables are enclosed:

- Health and Safety Plan (HASP).
- Emergency Response Plan (ERP).
- Transportation and Off-Site Disposal Plan (TODP).
- Monitored Natural Recovery Plan (Operations & Maintenance [O&M] Plan).

These deliverables are being submitted in advance of the full Northern Impoundment 90% RD. Modifications to these deliverables may be required as the Northern Impoundment 90% RD is developed over the next six months. The Respondents therefore reserve the right to revise or update these deliverables as needed, as the design progresses. The Respondents plan to address any EPA comments on these deliverables in the Northern Impoundment 100% RD package.

Should you have any questions or require additional information regarding this submittal, please contact GHD at (225) 292-9007.

Regards,


GHD



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Encl.: Health and Safety Plan (HASP)
Emergency Response Plan (ERP)
Transportation and Off-Site Disposal Plan (TODP)
Monitored Natural Recovery Plan (Operations & Maintenance [O&M]) Plan)

cc: Lauren Poulos, EPA
Katie Delbecq, Texas Commission on Environmental Quality (TCEQ)
Phil Slowiak, IPC
Brent Sasser, IPC
Judy Armour, MIMC

Health and Safety Plan (HASP)



Attachment 1 - Health and Safety Plan - Northern Impoundment

*Provided as Part of Pre-Final 90% Remedial Design - Northern
Impoundment*

San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

January 17, 2022

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Table 1 Properties of Potential Site Contaminants

Emergency Contact List

Emergency Information		
Contact	Phone Number	Site Location, Hospital & Clinic Directions
Local Police:	911	Northern Impoundment:
Harris County Constable	(713) 637-0014	18001 East Freeway Service Road
Baytown Police Department	(281) 422-8371	Channelview, Texas 77530
Local Fire Department:	911	(29.795230, -95.066734)
Channelview Fire Department	(281) 452-5782	
Ambulance	911	
Local Hospital: Houston Methodist Baytown Hospital		Hospital Directions:
Address: 4401 Garth Road Baytown, Texas 77521	(281) 420-8600	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 1 st cross street (128 ft.) Destination will be on the right Driving Time: 14 minutes Driving Distance: 7.9 miles
Work Care Clinic: Occupational Healthcare		Occupational Healthcare Directions:
Address: 610 S. Main Street Highlands, Texas 77562	(281) 843-2441	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
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	Driving Time: 7 min
United State Coast Guard	(713) 578-3000	Driving Distance: 3.9 miles
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 (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 Pre-Final 90% Remedial Design for the Northern Impoundment (Northern Impoundment 90% RD) submittal to the EPA.

This HASP was developed to outline potential activities to be performed to protect site personnel from physical, chemical, and all other hazards that may be encountered during implementation of the remedial action (RA), which will be described in detail in the Northern Impoundment 90% RD. Prior to initiation of RA activities, each 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 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, each 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 may include, but will not be 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 work site project personnel and subcontractors. These responsibilities may include, but will not be 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 may include responsibility for overall implementation of the HASP and for ensuring that all HSE responsibilities are carried out. These additional responsibilities may include, but will not be 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 may also be assigned responsibility for enforcing safe work practices for project employees. In that role, the SS may 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 may 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.

Employee Safety Responsibility

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:

- Suspend any operations that may cause an imminent health hazard to employees, subcontractors, or others.
- Assist in the development and revision of JSA forms that are appropriate to their current scope of work.
- Inspect tools and other equipment before each use or as manufacturer and/or OSHA dictates.
- Correct work site hazards, when possible, without endangering life or health.
- Report HSE concerns to the SS or PC.

Subcontractors

Subcontractors will each be responsible for the implementation of its own HASP and will be required to agree to comply with its contents. In the event of conflicting safety procedures or requirements, the subcontractor's personnel are to 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 will be responsible for the safe operation of heavy equipment. This may include assigning operators will be assigned responsibility for inspecting equipment on a daily basis 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.

Authorized Visitors

Authorized visitors will be provided with all known information with respect to Northern Impoundment RA operations and hazards as applicable to the purpose of their visit and should be accompanied with personnel familiar with the work site's layout and procedures. All site visitors must comply with personal protective equipment (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 may require a rewrite and review/approval of the HASP.

1.7 Training Requirements

All personnel conducting work at the work site are to be required 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 recommended that an initial work Site-specific training session or briefing be conducted by the PC or SS prior to commencement of Northern Impoundment RA work activities. During this initial training session, employees may 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 meeting 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.

It is recommended that visitors be given a Site-specific briefing to provide information about Site hazards, the Site lay-out including work zones, emergency evacuation procedures, and other pertinent HSE requirements, as appropriate.

1.7.2 Safety Meeting/HASP Review

It is recommended that safety meetings take place each day prior to beginning the day's work and that all Site personnel should 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 Medical Surveillance Program

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

A work site medical surveillance program should 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 Scope of Work

The scope of work for the Northern Impoundment RA will be 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.
- Over-water and near-water activities.
- Heavy equipment spotting.
- Surveying activities.
- Lifting and rigging activities.
- Equipment fueling.
- Soil sampling.
- Decontamination of personnel and equipment.
- Driving.

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 may 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 on-Site 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.

3.1.1 Chemical Hazard Controls

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

- Monitoring air concentrations with appropriate equipment in the breathing zone.
- Revising JSAs to list chemical hazards and associated hazard controls on a task-specific basis.
- Employing dust control measures, such as wetting the immediate area.
- Using PPE, as appropriate, in areas known to have concentrations above the specified action level for each contaminant.

3.1.2 Skin Contact and Absorption Contaminants

Skin contact with chemicals may be controlled by use of the proper PPE and good housekeeping procedures. PPE (e.g., Tyvek®, gloves) as described in Section 4 may be required for all activities where contact with potentially harmful media or materials is anticipated. Any such requirements should utilize manufacturer 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.

3.1.4 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).

Storage

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 Safety

Heavy Equipment

It is recommended that the following practices shall 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 is to be inspected on a daily basis.
- Heavy equipment is only to be operated by authorized, competent operators.
- Seat belts are to be provided 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.
- Before raising any booms, buckets, etc., personnel are to check for overhead obstructions.
- Personnel are to wear high visibility safety vests, steel-toed shoes, safety glasses, hearing protection, and hard hats during heavy equipment operations.
- When moving heavy equipment or when working within 10 feet of a stationary object or in tight quarters, a spotter will be used.

3.2.2 Noise

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), should require the use of hearing protection with a Noise Reduction Rating (NRR) of at least 20. Hearing protection (earplugs/muffs) should be available to personnel and visitors requiring entry into these areas.

Noise monitoring should 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

It is recommended that elevated superstructures (e.g., drill rigs, backhoes, scaffolding, ladders, cranes) be required to remain a distance of 10 feet away from utility lines (<50 kV) and 20 feet away from power lines (>50 kV). Underground utilities, if present, should be clearly marked and identified prior to commencement of work. Local/state/provincial regulations and Implementing Party requirements with regards to utility locating requirements (e.g., One-Call) should be followed.

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 Vehicle Traffic and Control

It is recommended that the following safety measures 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.

The journey planning process is a simple risk assessment to ensure that all identified hazards are understood and managed and that unnecessary trips or those presenting an unreasonable or uncertain risk are not taken. Journey Management Plans (JMPs) should be developed for routine travel and work site access.

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.

3.2.5 Material Handling and Storage

Material handling and storage practices to be conducted at the work site may include manual lifting of materials. Mechanical means for lifting heavy loads should be used whenever possible.

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.

3.2.6 Manual Lifting

Proper lifting reduces the risk associated with moving heavy objects. It is recommended that the following be considered prior to a lift.

- Establish that you can lift the load safely.
- Use a mechanical lifting device, if available.
- Look for any obstructions or spills along route.
- 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.

In addition, it is recommended that in any lift, the body should be positioned so that the weight of the body is centered over the feet (to provide a more powerful line of thrust and also ensures better balance) and that the lift be started with a thrust of the rear foot and to not twist.

3.2.7 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 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 (see Fall Protection Standard Operating Procedure [SOP]).
- 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 RSHM will evaluate current work site conditions to determine if a skiff is required.

3.2.8 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 Types 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 a good idea 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 a 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 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.

Boat Length (feet)	6	8	10	12	14	16	18	20
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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 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.

Anchor the boat, if necessary.

3.2.9 Hoisting and Rigging

It is recommended that wire ropes, chains, ropes, and other rigging equipment be inspected prior to each use and as necessary during use to assure their safety. Defective rigging equipment should be immediately removed from service.

Rigging should not be used unless the weight of the load falls within the rigging’s safe work operating range. This should be verified by the authorized rigger prior to any “pick” or lifting operation.

Only personnel trained in safe rigging procedures should be authorized to engage in rigging procedures. Additionally, the rigger should understand and use recognized crane signals.

3.2.10 Cranes and Hoists

The use of cranes may take place during project activities. If cranes are required during the Northern Impoundment RA, it is recommended that personnel 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 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.

3.2.11 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, eye protection should be used when working with hand tools.
- Wrenches (including adjustable, pipe, end, and socket wrenches) should not 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.
- Portable electric tools should be connected to a Ground Fault Circuit Interrupter (GFCI) when working in wet areas.
- Proper eye protection 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.

3.2.12 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.

3.2.13 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 employees.

The minimum performance requirements to control hazardous energy require that employers develop and implement an energy control program.

It is recommended that 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 follow a RC developed program and written procedures.

3.2.14 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, it is recommended that the following safety guidelines 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.

Daily Inspections

It is recommended that a designated competent person 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.

The competent person will be required to 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.

3.2.15 Slip/Trip/Hit/Fall

Slip/trip/hit/fall injuries are the most frequent of all injuries to workers. It is recommended that the following practices be implemented by work site 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 floors, and uneven surfaces or terrain.
- Carry only loads that you can see over.
- Keep work areas clean and free of clutter, especially in storage rooms and walkways.
- Communicate hazards to on-Site personnel.

3.2.16 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 may 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.).
- Liquids that replace electrolytes, water, and salty foods available during rest.
- Use of buddy system.

3.2.17 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 may 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 you towel off or sweat.
- **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.

3.2.18 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 the employees on-Site, and cold exposures should be immediately terminated for any employee when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

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 employee education.

3.2.19 Adverse Weather Conditions

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 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.

3.3 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 it is recommended 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.

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.”

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 this work site may include:

- | | | |
|---------------------|----------------------------|-------------------|
| – Carpenter bees. | – Africanized killer bees. | – Honeybees. |
| – Bumblebees. | – Cicada killer wasps. | – 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 work site 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.

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 *hematotoxic* 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.

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 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 with specific considerations to the hazards associated with work site activities.

- 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.

4.2.1 Reassessment of Protection Levels

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

5. Air Monitoring Program

Air monitoring should 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. Air monitoring requirements are outlined in the Site-Wide Monitoring Plan (SWMP).

6. Work Site Control

It is recommended that the RC 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 should have the appropriate signage posted. Barricades and warning signs should be placed to warn personnel of potential hazards. The RC may elect to utilize a standby person (spotter) may be utilized 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.

6.2 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).

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.

6.2.1 Aggressive or Menacing Behavior

The RC should adopt procedures for situations in which personnel are confronted by an individual whose behavior becomes aggressive or menacing. Those procedures may 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 Decontamination

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

6.3.1 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).

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 90% RD.

7. Emergency Procedures

7.1 On-Site Emergencies

The PC or SS will likely 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, or property loss will be required to 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 may be required to include determining the cause of the incident and modifying future work activities to eliminate the hazard.

7.3 Emergency Equipment/First Aid

It is recommended that safety equipment be made available for use by Site personnel and be located within 30 feet of the work area(s), and maintained at the work site. The safety equipment may include, but is not limited to, the following:

- 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.
- Fire extinguisher (at a minimum, a 2A/10BC should be on-Site).

7.4 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 should develop and post relevant JMPs showing the routes to the nearest hospital, urgent care facility, and storm shelter.

7.5 Spill and Release Contingencies

If a spill has occurred, the first step is personal safety, then controlling the spread of contamination, if possible. Personnel should follow the procedures outlined in the ERP.

8. Recordkeeping

The SS may 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.

Table 1

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

Chemical Name (Synonyms)	Concentration at Site	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.

Notes:

FP - Flash Point
IDLH - Immediately Dangerous to Life and Health
IP - Ionization Potential
NE - Not Established (Information Not Available)
NA - Not Applicable
CNS - Central Nervous System
PNS - Peripheral Nervous System
ppm - parts per million
mg/m³ - milligrams per cubic meter

PEL - OSHA Permissible Exposure Limit
STEL - Short Term Exposure Limit
TLV - ACGIH Threshold Limit Value
VP - Vapor Pressure
C - Ceiling Exposure Limit
[skin] - potential for dermal absorption
mm - millimeters Hg (mercury)
eV - electrovolts



Emergency Response Plan (ERP)



Attachment 2 - Emergency Response Plan - Northern Impoundment

*Provided as Part of Pre-Final 90% Remedial Design - Northern
Impoundment*

San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

January 17, 2022

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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 Pre-Final 90% Remedial Design for the Northern Impoundment (Northern Impoundment 90% 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. Prior to initiation of Northern Impoundment RA activities, this ERP should be updated by the selected Remedial Contractor (RC).

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 requested and 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 may 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, 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 (whose role is defined in Section 4). The Site Supervisor will be responsible for implementing emergency procedures, if necessary, and for notification of appropriate project specific contacts and local emergency response authorities listed in the below 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 of the work site, 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 at the work site and will be included in the Northern Impoundment HASP.

Table 1 *Emergency Information*

EMERGENCY INFORMATION		
Contact	Phone Number	Site Location
Local Police:	911	Northern Impoundment: 18001 East Freeway Service Road Channelview, Texas 77530 (29.795230, -95.066734)
Harris County Constable	(713) 637-0014	
Baytown Police Department	(281) 422-8371	
Local Fire Department:	911	
Channelview Fire Department	(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	
Texas Railroad Commission (TRRC)	(844) 773-0305 or (512) 463-6788	

EMERGENCY INFORMATION		
Contact	Phone Number	Site Location
Texas Department of Transportation (TxDOT)	(800) 558-9368	
United States Coast Guard (USCG)	(504) 589-6225	
Port of Houston Emergency Dispatch	(713) 670-3611	
Non-Emergency Dispatch	(713) 670-3620	

3. Emergency Recognition and Prevention

This section describes the methods and procedures that may 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 Site Supervisor 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 Site Supervisor.
- The Site Supervisor 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 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 may 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 Site Supervisor 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 should be stored at the work site during activities to immediately respond to releases/emergencies.
- 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 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.

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 may be assigned and communication procedures that may be followed by on-Site personnel involved in responses to incidents or emergencies.

4.1 Site Supervisor

The Site Supervisor (or equivalent) 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 Site Supervisor. Specific duties of the Site Supervisor in the case of an incident may include the following:

- 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 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 provide 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 Site Supervisor. 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 Site Supervisor will be responsible for directing the on-Site personnel in emergency response operations. Specific steps that the Site Supervisor 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. Concentration will be placed on preventing 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 Site Supervisor, until, if necessary, outside emergency response help arrives.

The Site Supervisor may appoint or designate, as necessary, on-Site personnel to assist in the following efforts:

- Notification of local emergency response authorities.
- 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 Preparation

The Site Supervisor 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 Site Supervisor 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 may 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 90% RD, it is anticipated that Northern Impoundment RA activities will be conducted in the months of the year with a lower likelihood for hurricanes and tropical storms, but there could be exceptions in which activities take place during the remaining months of the year. There would be 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 based on the National Hurricane Center advisories. Four phases and associated procedures that may be adopted to protect the work site and personnel in the event of severe weather are described below.

Phase I Preparation

Phase I preparations would be for expected severe weather events, including heavy rains or anticipated high-water events with potential localized flooding, in the southeast Texas vicinity and will affect the Channelview area within 96 hours. In the event of a Phase I scenario, the Site Supervisor would execute the following steps:

- Monitor the weather and San Jacinto River forecasts for updated predictions.
- Consider suspending all non-essential work site activities and deliveries and covering any open excavations.
- List all work necessary to control loose materials/equipment from potential damage (water or wind).
- Verify that all supplies needed to secure the work site are available.

Phase II Preparation

Phase II preparations would be for an expected tropical depression, tropical storm, or hurricane landfall in the southeast Texas vicinity which is predicted to have up to 50 miles per hour (mph) winds and will affect the Channelview area within 96 hours or an anticipated high-water event. In the event of a Phase II scenario, the Site Supervisor would execute the procedures outlined in Phase I and, in addition, execute the following:

- Suspend all non-essential work.
- Consider timing of a complete suspension of work and for covering of any open excavations.
- Secure or remove equipment that could be damaged by the storm (i.e., small totes, drums, vehicles, monitoring instruments, etc.).

Phase III Preparation

Phase III preparations would be for an expected tropical depression, tropical storm, or hurricane landfall in the southeast Texas vicinity which is predicted to have up to 50 mph winds and will affect the Channelview area within 84 hours or an anticipated high-water event. In the event of a Phase III scenario, the Site Supervisor would follow the procedures outlined in Phases I and II and, in addition, execute the following:

- Cancel all deliveries.

- Suspend all work and shutdown and move equipment off-Site, as necessary.
- Take all records off-Site.
- Backfill any open excavations using available on-Site material or clean backfill.

Phase IV Preparation

Phase IV preparations would be for an expected tropical depression, tropical storm, or hurricane landfall in the vicinity of southeast Texas which is predicted to affect the Channelview area within 72 hours or an anticipated high-water event. In the event of a Phase IV scenario, the Site Supervisor would follow the procedures outlined in Phases I, II, and III and, in addition, execute the following:

- Evacuate all personnel from the work site.
- Suspend all work activities and move equipment off-Site, to the extent that has not already been done under Phase III, until the Site Supervisor, in coordination with the Project Coordinator and EPA RPM, determines the work site is safe for re-entry.

5.1 Re-Entry Procedure

The Health and Safety Officer, 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. Work site personnel will not be permitted to access the work site until the Site Supervisor approves entry.

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). 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 have granted access, the Site Supervisor, 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 Site Supervisor will mobilize to the work site to complete a post-severe weather Site inspection. The Site Supervisor will be responsible for determining how such personnel should document work site conditions, including with photographs and field notes. In addition, the Site Supervisor 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 Site Supervisor will also be responsible to, if necessary, direct personnel to prepare a Site inspection report for submittal to the EPA, as required by the terms of any order under which the Northern Impoundment RA is being performed.

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 Site Supervisor may deviate from the procedures to provide a more effective plan for bringing the situation under control. The Site Supervisor will be responsible for determining which situations require evacuation of the work site.

This section describes procedures which may 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. However, the following measures are provided to serve as general guidelines. Table 2 below addresses the criteria for releases.

Table 2 *Criteria for Hazardous Substances Spill/Release Incidents*

Release Classification	Criteria
Minor Release	<ul style="list-style-type: none"> – 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 ≥ 50 percent. – Smoke Investigation.
Major Release	<ul style="list-style-type: none"> – 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 may be defined for this purpose as a compound having an Animal LD₅₀ greater than 50 milligrams/kilograms (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 Site Supervisor, 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 may be defined for this purpose as a compound having an Animal LD₅₀ 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 Site Supervisor, in consultation to the extent practical, with the Project Coordinator, the Implementing Party, and the EPA RPM. However, if necessary, the Site Supervisor would initiate work site evacuation, as necessary, to protect the health and safety of on-Site personnel.

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. 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 work site 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 Site Supervisor or designee.
- The names of emergency response team members and/or other emergency team members involved in emergency response should be reported to the Site Supervisor.
- 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 Site Supervisor. 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 Site Supervisor 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 Site Supervisor will be responsible for determining the proper methods of communication at the work site. The Site Supervisor will also be responsible for instructing all on-Site personnel on the use of the selected communication methods.

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 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 would 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 Site Supervisor 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 on 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 may 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 Site Supervisor. When contacted, the Site Supervisor should obtain information pertaining to the following, to the extent applicable:

- The substance spilled or released.
- Location of the release or spillage of hazardous 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 Site Supervisor 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 other), 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, local emergency response authorities may not be notified. A decision on notifications to local emergency authorities would be made by the Site Supervisor, 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 may 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 Site Supervisor 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 Site Supervisor 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 RC 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 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 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.

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 Site Supervisor 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.



Transportation and Off-Site Disposal Plan (TODP)



Attachment 8 - Transportation and Off-Site Disposal Plan - Northern Impoundment

*Provided as Part of Pre-Final 90% Remedial Design - Northern
Impoundment*

San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

January 17, 2022

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Figure 1 Transportation Routes

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 (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 Pre-Final 90% Remedial Design for the Northern Impoundment (Northern Impoundment 90% RD) submittal to the United States Environmental Protection Agency (EPA).

This TODP provides 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. 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, each selected remedial contractor (RC) will either update this TODP or develop its own TODP to address the components outlined in this document.

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 should 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 RD will be the generator of the Wastes. The Generator will be responsible for signing the waste profiles and the manifests. The Generator's signatory authority may be delegated to another representative on-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** - A 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** - A Disposal Facility 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. A Disposal Facility 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 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, and establishes 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 hazardous substances, pollutants, or contaminants 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 a correspondence sent to the EPA Remedial Project Manager (RPM) prior to shipping material to the Disposal Facility.

4. Waste Classification Procedures

The Northern Impoundment 90% 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** - Impacted material that is excavated (other than Potentially-Impacted Remediation Debris, described below) will be solidified, as necessary, and transported to an off-Site Disposal Facility. The excavated materials will be characterized as described in the Northern Impoundment 90% RD.
- **Potentially Impacted Remediation Debris** - Excavated Materials could include buried debris that, because of its contact with other materials, may have to be characterized for disposal. This also may include tarps, plastic,

wood, discarded treatment filters, discarded personal protective equipment (PPE), and other spent construction materials that may have come into contact with excavated materials.

- **Non-Impacted Remediation Debris** - Non-impacted remediation debris could include any cleared vegetation, 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.
- **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.
- **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.

4.2 Waste Sampling and Classification

The plan developed by the RC will define characterization procedures to be used to profile Waste. Excavated materials (other than those classified as Potentially Impacted Remediation Debris) 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.

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

Trucks, such as 20-ton end-dump trucks, or roll-off containers that will be loaded onto trucks are expected to be used to transport materials off-Site for disposal. The RC’s plan will include requirements for inspection of trucks and containers used for this purpose.

5.2 Truck Staging and Loading Requirements

5.2.1 Lining Trucks and Securing Loads

The trucks beds and containers will be required to have a liner. Procedures will be required to address any free liquids observed after loading, such as the addition of solidification agents. Tarps or other coverings will be required to be placed over the loads and secured prior to trucks leaving the Northern Impoundment.

5.2.2 Control and Mitigation of Tracking Waste Beyond Work Areas

Procedures will be established to prevent any tracking of waste or mud beyond the limits of the Northern Impoundment. This may include an inspection/cleaning station at a location where all trucks are required to pass before leaving the loading area, at which trucks will be inspected and if necessary, cleaned. Cleaning techniques may include dry or wet decontamination methods.

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, and describe the safety procedures that will be employed to protect the public. The plan developed by the RC would include measures for communicating with neighboring businesses regarding the timing and volume of truck traffic leaving the work site, and all required coordination 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 Wastes, and may 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 different Disposal Facilities 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 with the information it needs to ensure the waste can be managed at its facility under that profile. Waste profiles should 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, after which the profile will be updated to reflect the approved changes.

7.2 Manifests

If any hazardous waste as defined in 40 CFR Part 261, is generated during the Northern Impoundment RA, it will be managed and disposed of in accordance with RCRA regulations. Most Disposal Facilities have 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 required by the Disposal Facility.

7.3 Waste Reporting

The plan developed by the RC will be required to track information about Impacted Material and Wastes generated and shipped off-Site as part of the Northern Impoundment RA. In addition, the plan developed by the RC will address

any required regulatory filings, including those under 30 TAC §335.9(a)(2). The waste tracking for each load transported off-Site may include:

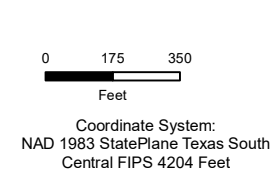
- Transporter Name.
- Date of Shipment.
- Load No. - Internal Sequential Load number.
- Truck No. - Number that uniquely identifies the truck (such as the license number).
- Manifest Tracking Number - preprinted number on waste manifest.
- Waste Type - Either Waste Profile Number or other unique waste 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.



Source: Google Earth Imagery: 12/1/2019



SAN JACINTO RIVER WASTE PITS SITE
HARRIS COUNTY, TEXAS
PRE-FINAL 90% REMEDIAL DESIGN – NORTHERN IMPOUNDMENT
TRANSPORTATION AND OFFSITE DISPOSAL PLAN
TRANSPORTATION ROUTES

11215702
Dec 10, 2021

FIGURE 1



Monitored Natural Recovery Plan (Operations & Maintenance [O&M]) Plan)



Attachment 9 - Monitored Natural Recovery Plan - Sand Separation Area

*Provided as Part of Pre-Final 90% Remedial Design - Northern
Impoundment*

San Jacinto River Waste Pits Site Harris County, Texas

International Paper Company
McGinnes Industrial Maintenance Corporation

January 17, 2022

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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

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). 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, 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 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. Roles and Responsibilities

Personnel responsible for implementation of the MNR Plan include the following:

- **Project Manager:** To be determined. The Project Manager will be responsible for the overall execution of the MNR program.
- **Project Administrator:** To be determined. The Project Administrator will be responsible for management and coordination of activities identified in the MNR Plan.
- **MNR Lead:** To be determined. The MNR Lead will be responsible for ensuring the monitoring program is implemented in accordance with the MNR Plan, review of data, senior technical review of technical memoranda and reports, and technical guidance throughout the MNR program.
- **Project Scientist:** To be determined. The Project Scientist will be responsible for evaluation of data, preparation of technical memoranda and reports, and assisting the MNR Lead.
- **Field Lead:** To be determined. The Field Lead will be responsible for scheduling and implementing sampling activities.

- **Project Chemist:** To be determined. The Project Chemist will be responsible for Quality Assurance/Quality Control (QA/QC) and data validation.
- **Database Manager:** To be determined. The Database Manager will be responsible for entering baseline data and data collected throughout the monitoring program into a database and managing the database.

3. 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.

4. Monitored Natural Recovery

4.1 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.

4.2 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 high 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 contaminants of concern. (COCs). 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 expected to be a minor MNR process in the SSA.

4.3 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 contributing process for MNR in the SSA.

4.4 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 process for MNR in the SSA.

5. Considerations in Developing the Monitoring Program

5.1 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 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.

5.2 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).

Ten sediment samples were collected from Beach Area B/C, which is adjacent to the SSA. Dioxins and furans were detected in all 10 samples. The maximum concentration was 10.9 ng/kg $TEQ_{DF,M}$. The 95 percent upper confidence limit (UCL) was 6.36 ng/kg $TEQ_{DF,M}$. The 95 percent UCL, which is an upper estimate of the true mean, was the exposure point concentration (EPC) for the risk assessments and development of protective concentration levels

(PCLs). Both the maximum and 95 percent UCL concentrations for the SSA are well below the clean-up level of 30 ng/kg TEQ_{DF,M}.

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.

5.3 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 (¹³⁷Cs), and lead-210 (²¹⁰Pb) 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 ¹³⁷Cs and ²¹⁰Pb 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. ¹³⁷Cs 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, ¹³⁷Cs is useful in dating sediments. ²¹⁰Pb is naturally occurring and radioactivity of ²¹⁰Pb is used to estimate relative time and rates of sediment deposition.

Radioactivity of ¹³⁷Cs 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 ²¹⁰Pb 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 ²¹⁰Pb suggests that some areas may be erosional 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), erosion is not expected to result in EPCs that pose risk to human and ecological receptors.

5.4 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 PDI-2 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. This MNR Plan includes the same provision. Monitoring of the SSA will be discontinued if the mean concentration of samples collected in the SSA is below 30 ng/kg TEQ for two consecutive years after submission of the Remedial Action Completion Report for the Northern Impoundment. Current data suggest that monitoring could be discontinued after two monitoring events. The maximum concentration of 10.9 ng/kg TEQ_{DF,M} for Beach Area B/C reported in the RI and the mean concentration of 22.9 ng/kg TEQ_{DF,M} for the samples collected during PDI-2, which characterizes baseline, are both below 30 ng/kg TEQ_{DF,M}.

5.5 Chemical Properties of Dioxins and Furans

Of the processes of MNR discussed in Section 4, physical deposition and dispersal and chemical absorption are expected to be the primary processes in the SSA. Chemical and biological degradation are not expected to be significant processes of MNR.

5.6 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 30 ng/kg TEQ_{DF,M}, concentrations in tissue will also remain below protective concentrations.

5.7 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 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.

5.8 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 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.

6. Monitoring Program

6.1 Sampling Locations and Depth Intervals

Sediment samples will be collected at the nine locations (polygons) identified on Figure 6-1. These are the same locations sampled in 2019 during PDI-2. Samples will be collected at four depth intervals: 0 to 15 cm, 15 to 30 cm, 30 to 45 cm, and 45 to 60 cm below the sediment/surface water interface.

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.

For each of the nine polygons, samples will be collected at each depth interval at five locations within the boundaries of the polygon and composited into a single sample for analysis. Composite samples are proposed as they will provide an EPC more representative of the polygon than a single discrete sample.

6.2 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 PDI-2 sampling event, which suggests that sediment in the SSA at the depths sampled has been deposited since the mid-1960s. Additional analysis of ^{137}Cs is likely to produce the same result. Radioactivity of ^{210}Pb for PDI-2 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 protection concentrations. Collection of additional data to monitor deposition rates is not necessary at this time.

6.3 Sampling Frequency

Sampling conducted in 2019 during PDI-2 established baseline for the SSA. Two sampling events following submission of the Remedial Action Completion Report for the Northern Impoundment are proposed. The first event will be conducted one year after submission of the Remedial Action Completion Report for the Northern Impoundment and the second event the following year. This will allow time for recovery of the SSA from potential effects of the Remedial Action (RA) for the Northern Impoundment on the parameters monitored. The second event will be conducted the following year.

6.4 Data Evaluation

For each monitoring event, the arithmetic mean of the nine composite samples will be calculated for each of the four depth intervals. The mean $TEQ_{DF,M}$ from each depth interval will be compared to the clean-up level 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 6.1, 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 PDI-2 indicated that the majority of the SSA is

depositional, the 30 to 45 cm and 45 to 60 cm intervals are sampled to represent EPCs in the event that significant erosion was to occur.

Data on grain size distribution for the two post-remediation monitoring events will be evaluated to identify changes indicative of deposition or erosion.

6.5 Decision Rule

The decision rule for MNR is:

- 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 two consecutive years following submission of the Remedial Action Completion Report for the Northern Impoundment.

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 5.2 and 5.3, data from the RI and PDI-2 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. With the current schedule for the Northern Impoundment RA, post-remediation monitoring is not expected to begin until approximately 2030. The two post-remediation monitoring events will provide over 20 years of sediment data for the SSA.

Little biological activity is expected below 30 cm of the sediment/surface water interface. Establishing 60 cm as the bottom depth for the decision rule accounts for erosion or disturbances that could expose deeper sediment.

6.6 Sampling Duration

This MNR Plan proposes two monitoring events - the first event one year after submission of the Remedial Action Completion Report for the Northern Impoundment and the second the following year. With 2010 RI data and 2019 PDI-2 identifying concentrations of TEQ_{DF,M} as protective of human health and aquatic environment, four 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, monitoring of the SSA will be discontinued if mean concentrations at all four depth intervals are below 30 ng/kg TEQ_{DF,M} for the two post-remediation monitoring events. Consistent with the rationale for MNR as the Selected Remedy for the SSA, 20 plus years of mean TEQ_{DF,M} concentrations below the clean-up level of 30 ng/kg TEQ_{DF,M} is a reasonable time frame to rely upon to conclude that MNR has been successful in reducing risk to human health and the aquatic environment.

If the clean-up level is not achieved at all depth intervals for both post-remediation monitoring events, the MNR program will be reviewed and modified, as appropriate.

7. 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 two post-remediation monitoring events could potentially indicate that modifications to the monitoring program could more effectively assess the effectiveness of MNR. Based on data from the RI and PDI-2, monitoring could justifiably be discontinued after the two post-remediation events, and future monitoring with modifications would not be required. If required, modifications could include:

- Adding or deleting sample locations and/or depth intervals.

- Employing enhanced MNR.
- Applying sequestering agents to reduce bioavailability.
- Replacing MNR with alternative remedies.

8. 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 second post-remediation monitoring event will provide a comprehensive evaluation of the data for the RI, PDI-2, and the two post-remediation monitoring events; assess the effectiveness of MNR; and present recommendations for discontinuing or extending monitoring.

9. References

- Environmental Security Technology Certification Program. 2009. Technical Guide. Monitored Natural Recovery at Contaminated Sediment Sites. ESTCP Project ER-0622. May 2009.
- United States Environmental Protection Agency. 2002. Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. OSWER Directive 9285.6-08. February 12, 2002.
- United States Environmental Protection Agency. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. EPA-540-R-05-012. OSWER 9355.0-85. December 2005.

