Appendix J

Supporting Deliverables

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Appendix J - Attachments

Attachment 1	Health and Safety Plan - Northern Impoundment
Attachment 2	Emergency Response Plan - Northern Impoundment
Attachment 3	Field Sampling Plan - Northern Impoundment
Attachment 4	Quality Assurance Project Plan - Northern Impoundment
Attachment 5	Site-Wide Monitoring Plan - Northern Impoundment
Attachment 6	Construction Quality Assurance/Quality Control Plan - Northern Impoundment
Attachment 7	Institutional Controls Implementation and Assurance Plan - Sand Separation Area
Attachment 8	Transportation and Off-Site Disposal Plan - Northern Impoundment
Attachment 9	Monitored Natural Recovery Monitoring Plan - Sand Separation Area

Attachments

Attachment 1

Health and Safety Plan - Northern Impoundment

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

→ The Power of Commitment

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

1. Introduction

This Health and Safety Plan (HASP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (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

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 is it 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.
- Bumblebees.
- Mud dauber wasps.
- Africanized killer bees.
- Cicada killer wasps.
- Giant hornets.
- Honeybees.
- Paper wasps.
- 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 *hematoxic* 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	FP - Flash Point	PEL	PEL - OSHA Permissible Exposure Limit
IDLH	IDLH - Immediately Dangerous to Life ord Health	STEL	STEL - Short Term Exposure Limit
IP	IP - Ionization Potential	TLV	TLV - ACGIH Threshold Limit Value
NE	NE - Not Established (Information Not Available)	VP	VP - Vapor Pressure
NA	NA - Not Applicable	C	C - Ceiling Exposure Limit
CNS	CNS - Central Nervous System	[skin]	[skin] - potential for dermal absorption
PNS	PNS - Peripheral Nervous System	mm	mm - milimeters Hg (mercury)
ppm	ppm - parts per million	eV	eV - electrovolts
mg/m3	mg/m3 - miligrams per cubic meter		

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Attachment 2

Emergency Response Plan - Northern Impoundment

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

→ **The Power of Commitment**

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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: Harris County Constable Baytown Police Department	911 (713) 637-0014 (281) 422-8371	Northern Impoundment: 18001 East Freeway Service Road Channelview, Texas 77530 (29.795230, -95.066734)
Local Fire Department: Channelview Fire Department	911 (281) 452-5782	
Ambulance	911	
Stakeholders		
EPA Region 6	(800) 887-6063 or (214) 665-2760	
National Response Center	(800) 424-8802	
Harris County Hazardous Materials Response Team 24-Hour Emergency Line	(800) 590-0005	
Texas Commission on Environmental Quality (TCEQ)	(713) 767-3500	
Texas State Emergency Response Commission	(800) 832-8224	
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 Non-Emergency Dispatch	 (713) 670-3611 (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	– 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	– 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 LD_{50} 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 LD_{50} less than 50 mg/kg. A signal to notify on-Site personnel to evacuate the work site in case of major releases requiring evacuation of the work site will be established prior to the Northern Impoundment RA. Site evacuation would be initiated by the 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.

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Attachment 3

Field Sampling Plan - Northern Impoundment

Attachment 3 - Field Sampling 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

May 31, 2022

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1. Introduction

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

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

1.1 Relationship to Supporting Plans

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

2. Post-Excavation Confirmation Soil Sampling

The 2021 Supplemental Design Investigation (SDI) resulted in an expanded dataset for locations within the Northern Impoundment that further defined the nature and extent of removal of material to meet the clean-up level. The current dataset consists of 79 subsurface soil borings collected from 0 to 24 feet below ground surface (ft bgs) over an approximately 14-acre area. This robust dataset will be used to indicate the elevations of material to be excavated and to identify initial elevations for collection of post-excavation confirmation samples. One objective of this FSP is to provide post-excavation sampling procedures that will result in data demonstrating that the post-excavation surface concentrations meet the clean-up level across each seasonal cell, as well as, among and between all cells (i.e., across the excavated areas). These data will be used to show that the reasonable maximum exposure concentration of the post-excavation surface meets the clean-up level.

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

preparation of composites. It also describes the use of confirmation sampling in areas where hydraulic heave is or may be a significant safety concern and over-excavation is technically impractical.

2.1 Establishing Decision Units

The nature of the seasonal excavation of a cell to be located within the best management practice (BMP) wall requires the size and shape of individual DUs to be dynamic and established by the on-site engineer for the party(ies) implementing the Northern Impoundment RA. However, it is anticipated that approximately three (3) acres could be excavated during a given excavation season. Ideally, each DU would be established as an approximately 1/2-acre area within a seasonal cell.

DUs do not need to have regular or consistent shapes. A 1/2-acre DU also may prove to be impractically large if over-excavation is necessary (i.e., the clean-up levels are not met with sampling results). Therefore, DUs may be smaller than 1/2-acre (e.g., 1/4-acre or 1/3-acre), to facilitate over-excavation where necessary. In such instances where the DU is smaller, the number of discrete samples collected will remain the same as it would be for a 1/2 acre DU.

2.1.1 Sampling Locations within a DU

Within each 1/2-acre DU, six to eight (6 to 8) discrete samples will be collected from sample locations evenly spaced across the DU. Other than in the deeper locations discussed below, sample locations will be visually marked with pinflags and surveyed. However, because excavation in the Northern Impoundment will occur within the BMP wall, and sampling will, in many locations, occur tens of feet below the natural surface of the water, the pinflag approach may present health and safety concerns to workers. Therefore, in deeper excavations, the sample locations may be identified and sampled using GPS on the excavator bucket. In either scenario, one discrete sample will be collected from each sample location, as further described in Section 2.2.1. These samples are to be homogenized, composited, packed, and labeled in the field and then sent to the approved analytical laboratory (Approved Laboratory) for analysis. Figure 2.1 below, illustrates a conceptual approach for collection of six (6) discrete samples across a 1/2-acre DU in a seasonal cell. Figure 2.2 below illustrates a hypothetical representation of the location of confirmation samples across the entire Northern Impoundment (with the exception of the northwest corner). This figure is purely conceptual, as the Northern Impoundment RD will not predefine the boundaries of seasonal cells, DUs, or confirmation sampling locations.

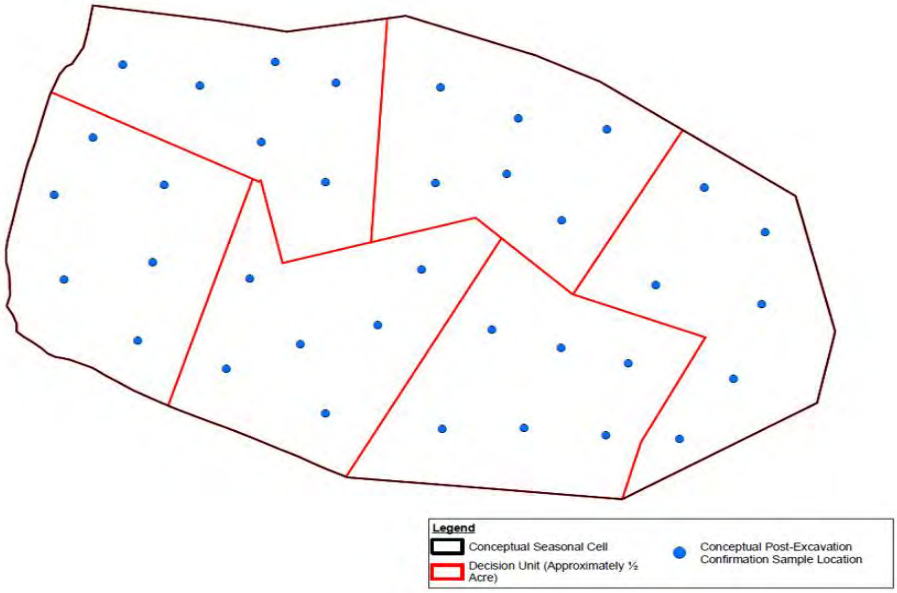

Figure 2.1 Conceptual Seasonal Cell and Decision Units

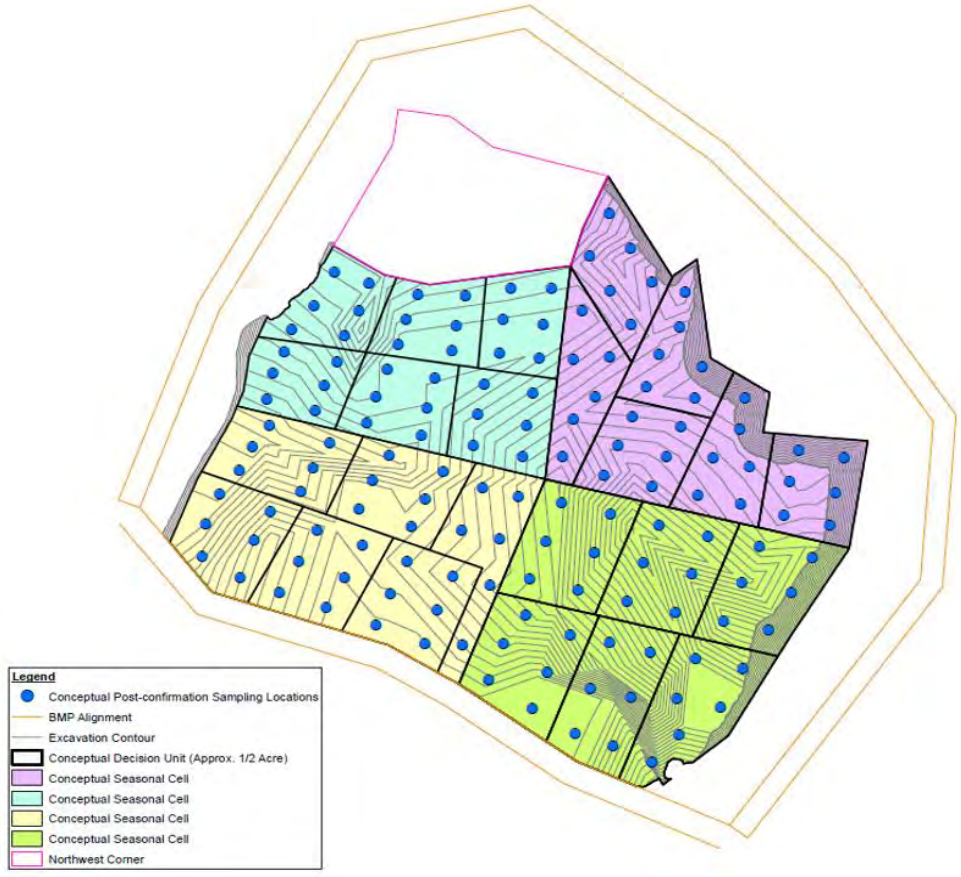

Figure 2.2 Conceptual Post-Excavation Confirmation Sampling Locations

2.2 Sampling Procedures

2.2.1 Sample Collection and Compositing Procedures

At the completion of the excavation of a DU to the target excavation elevations, the bottom surface of the DU will be sampled. For efficiency, parts of the DU may also be sampled as the excavation progresses rather than waiting for the excavation of the entire DU to be completed. Sampling personnel employed by the RC would collect the samples. At each sample location within the DU, approximately 6-ounces (oz) of surface soil would be collected from the top 4 to 6 inches of the excavation surface either using a clean trowel or in deeper locations, the excavator bucket. Each sample would be placed into its own decontaminated stainless-steel bowl. Each 6-oz discrete sample would then be thoroughly homogenized in that bowl using a clean trowel. Following homogenization, approximately 4 oz from the discrete sample would be placed into a laboratory-supplied sampling container, sealed, and labeled. This will be repeated for each of the sampling location in the DU.

The remaining approximately two oz from each of the six to eight discrete samples would then all be combined into one clean bowl for preparation of the composite sample. The combined soil would be thoroughly homogenized using a clean trowel. Following homogenization, approximately 4-oz of the homogenized mixture would be placed into a laboratory-supplied sampling container, sealed, and labeled. Alternately, the RC may opt to have the Approved Laboratory (as defined in the QAPP) prepare the composite samples in the laboratory. In that case, all 6 oz of the material from each discrete sample would be homogenized in the field and sent to the Approved Laboratory where a portion will be utilized for the composite sample and a portion will be held as the discrete sample for that location. Sample equipment will be decontaminated between samples, per Section 7.1.

As referenced in Section 2.1.2, due to concerns for worker safety in deeper excavations, samples from some DUs may be collected using an excavator bucket. In this scenario, the excavator bucket will scrape the surface soil of the excavated surface at each sample location (approximately 4 to 6 inches) and bring the material to sampling personnel located in an area on higher ground. Sampling personnel will then collect the material needed to prepare the discrete and composite samples, as described above.

Any remaining material not placed in sample containers would be added to the excavated waste material for off-Site disposal. Samples are to be labeled, packed, and shipped as outlined in the procedures in Section 7.

2.2.2 Sample Analysis

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

Table 2.1 Analytical Testing Method for Post-Excavation Confirmation Sampling

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

Note:
[1] EPA SW-846.

2.3 Data Analysis

Following laboratory analysis of the composite sample, the result would be compared to the clean-up level. Results are to be evaluated, as described below. A flow-chart below (Figure 2.3) provides a summary of the evaluation procedures.

– If the result of a composite sample is below the clean-up level, the excavation of that DU is complete.

– If the result of a composite sample is above the clean-up level, the discrete samples that the Approved Laboratory are holding may be analyzed to better pinpoint the location(s) within the DU at which the exceedances may be located. This will allow for targeted over-excavation.

– If discrete samples are analyzed, and if one or more of the discrete samples yields a result that would cause the calculated average of the discrete samples in that DU to be above the clean-up level, that portion of the DU may be over-excavated. Prior to over-excavation, the health and safety risks associated with over-excavation in that location would be evaluated.

  - If there is no health and safety risk associated with over-excavation, that portion of the DU would be over-excavated by up to one additional foot (delineated using locations which are halfway between sample locations).
  - Following over-excavation of that portion of the DU, a new discrete sample representing that portion would be collected and a new mathematical average would be calculated using the results from the original discrete samples but replacing the result of that portion with the new post-excavation result. This process would continue until the calculated average of the discrete samples in the DU is below the clean-up level. At that point, the excavation of that DU would be complete.
  - If it is deemed that over-excavation may compromise the BMP or excavation integrity (as in the case of hydraulic heave, described in Section 2.4 below) or poses worker safety risk, a risk management decision for that area will be made in coordination with the EPA.

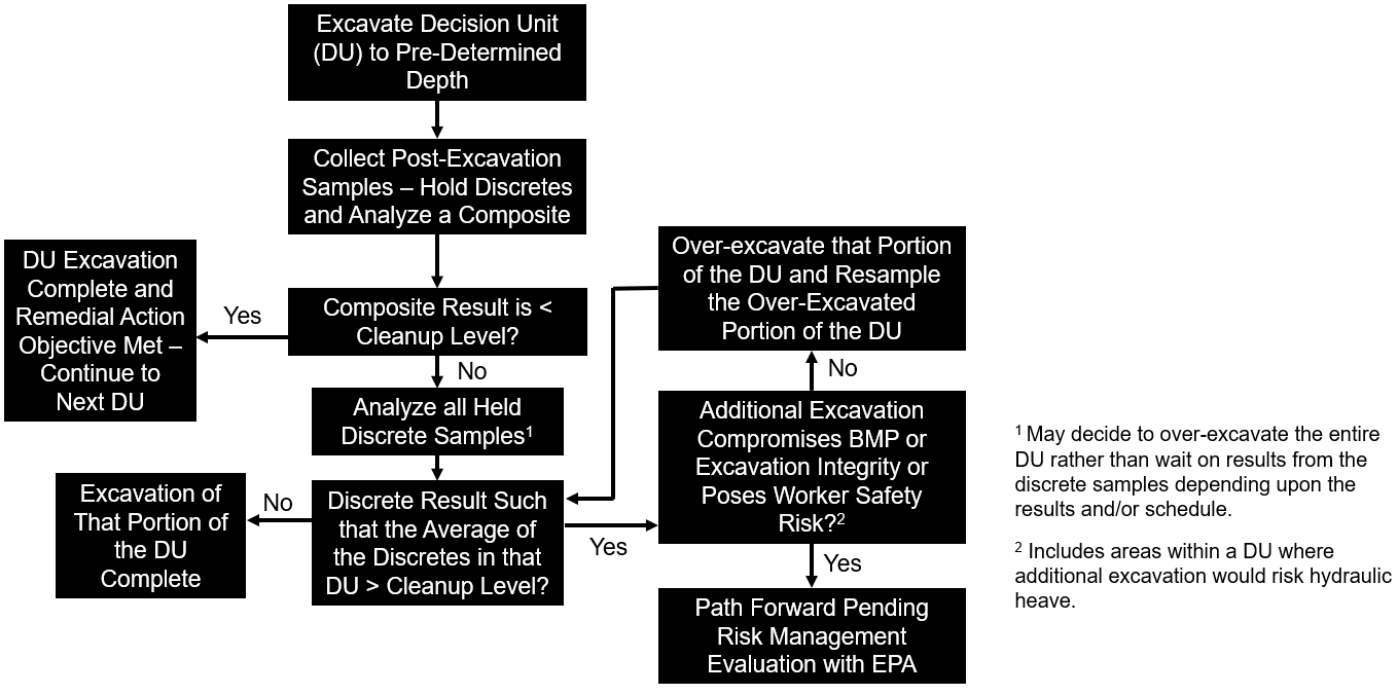

Figure 2.3 Post-Excavation Confirmation Sampling Decision Flow Chart

2.4 Areas Sensitive to Hydraulic Heave

Following receipt of data from the SDI, a thorough geotechnical evaluation was performed to evaluate the potential for hydraulic heave while excavating the Northern Impoundment to the target depths of known impact above the clean-up level. This evaluation, detailed in the *Hydraulic Heave Analysis* report (GHD, 2021), determined that there are several areas across the Northern Impoundment in which there would be significant risk of hydraulic heave if material is removed to the currently known elevations that meet the clean-up level. The evaluation indicated a total stress analysis factor of safety (FS) below 1.25 for removal of material in these areas. A total stress analysis FS of 1.25 is

considered protective of hydraulic heave and is in accordance with United States Army Corps of Engineers (USACE) guidance.

The most significant risk of hydraulic heave is in the northwest corner of the Northern Impoundment, which is not addressed in this Northern Impoundment 90% RD or this document. However, in addition to the northwest corner, several areas covering large portions of the Northern Impoundment were identified that are at risk of or sensitive to hydraulic heave if excavation were to occur to the deepest elevations of impact that have been identified. This makes post-excavation confirmation sampling challenging in these areas as any deeper excavation based upon an exceedance in a post-excavation confirmation sample could trigger hydraulic heave and/or result in the potential for undermining the stability of the BMP wall. In some locations, extending the excavation even an additional one foot would put the location at risk of hydraulic heave. Figure 2.4 below shows the areas across the Northern Impoundment that are at risk of or are sensitive to hydraulic heave. The figure has been color coded to indicate how many additional feet (if any) could be excavated before hydraulic heave becomes a significant risk (FS < 1.25). Red shading indicates an area in which an additional one to two (1 to 2) feet of excavation (as could be required based upon post-excavation confirmation sampling) would put the area at risk of hydraulic heave. Orange shading indicates areas in which excavating an additional two to four (2 to 4) additional feet would put the area at risk, and so on.

Since the size and shapes of DUs will not be predetermined and will instead be based upon access and the pace of work, there is a high likelihood that a portion of a DU will include an area that is sensitive to hydraulic heave. For DUs which include areas at risk for or sensitive to hydraulic heave, the same sampling approach described above will be performed. However, if the data analysis indicates that over-excavation is necessary in a portion of the DU, the figure below and the design engineer will be consulted to determine if the area can be over-excavated, and if so, to what depth.

Assuming a situation in which all discrete samples being held are analyzed and identify concentrations greater than the clean-up level across the entire DU, if the entire DU is sensitive to hydraulic heave, then over-excavation would not be performed because it would present an unacceptable additional health and safety risk. In such instances where only a portion of a DU can be over-excavated due to hydraulic heave sensitivity, the situation will be discussed with the EPA, and a path forward will be determined on a case-by-case basis.

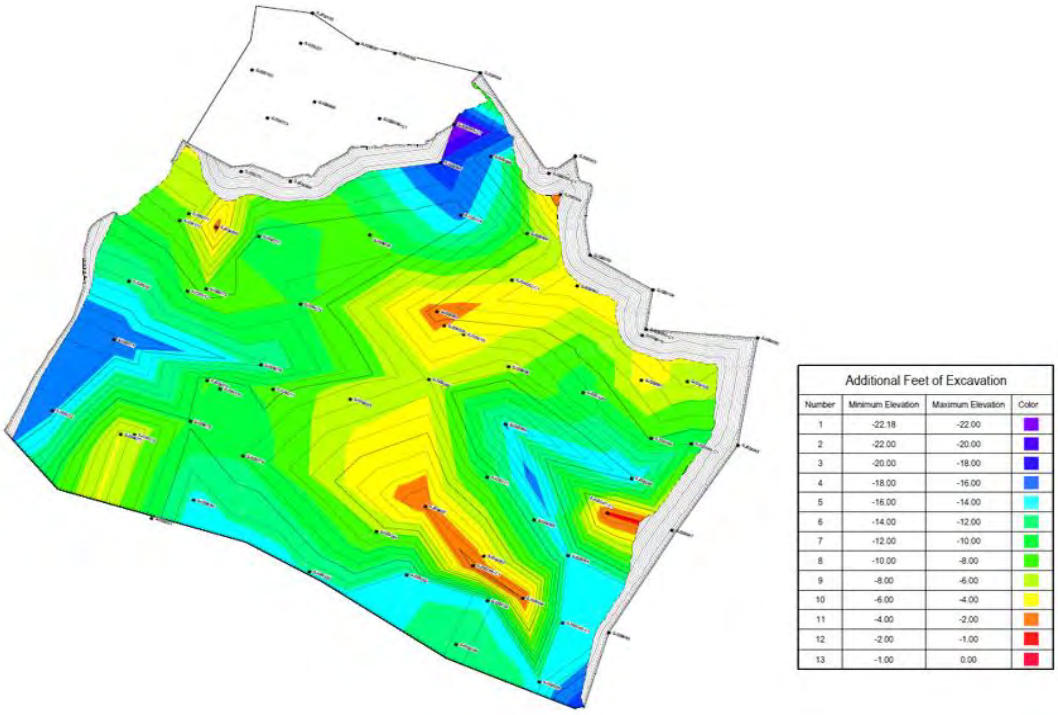

Figure 2.4 Areas Sensitive to Hydraulic Heave

3. Historic Berm Material Sampling

It is anticipated that during the Northern Impoundment RA, approximately 25,000 cubic yards (CY) of unimpacted material from the historic central and southern berms at the Northern Impoundment will be excavated. Based upon characterization data from the pre-design investigations (included in Appendix A), these berms contain native material with dioxins concentrations below the clean-up level. During the Northern Impoundment RA, this unimpacted material may be reused for various work site activities, construction of work site features, cover, etc. Prior to reuse of this material, a sample will be collected for every 1,000 CY and analyzed for parameters established in Table 3.1.

3.1 Sampling Rationale

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

3.2 Sampling Procedures

3.2.1 Sample Collection Procedures

During excavation activities, material from the unimpacted central and southern berm areas may be segregated from the excavated waste material to the extent possible. One composite sample of the unimpacted berm material would be collected for each 1,000 CY for analysis. To create the composite sample, a minimum of six discrete aliquots would be collected, ensuring that the resulting sample is representative of the material. The discrete aliquots would then be combined into a clean stainless steel bowl and thoroughly homogenized using a clean trowel. Following homogenization, approximately 4-oz of the homogenized mixture would be placed into a laboratory-supplied sampling container, sealed, and labeled. Sample equipment will be decontaminated between samples, per Section 7.1.

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

3.3 Sample Analysis

The composite sample from each 1,000 CY would be tested for the analytical parameters listed in Table 3.1, pursuant to EPA Test Methods SW-846. Analytical test methods and QA/QC are outlined in the QAPP.

Table 3.1 Analytical Testing Method for Post-Excavation Confirmation Sampling

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

Note:
[1] EPA SW-846.

3.4 Data Analysis

If the analytical results for a composite sample are above the clean-up level, that 1,000 CY of soil would be handled in the same manner as the impacted material to be trucked off-Site for disposal. If the analytical result is below the clean-up level, the soil can be reused on-Site.

4. Off-Site Fill Characterization Sampling

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

4.1 Sampling Rationale

A soil sample from each imported fill source would be collected and analyzed to confirm that the imported material does not contain COPCs above the specified levels. Only one sample per imported fill source is required, as long as the general location of the source of material does not change or there has not been any identified change in the composition of the imported material. The RC would be required to periodically monitor the imported material through visual inspections to confirm that no changes in composition have occurred. If the material appears to have altered or changed in physical composition via visual inspection, additional characterization samples may be required.

4.2 Sample Collection Objective

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

4.3 Sample Analysis

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

Table 4.1 Analytical Testing Methods for Source Sampling

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

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

4.4 Sampling Procedures

All source sample collection activities are to be performed using clean hand tools, such as a trowel or sharp shooter shovel, as access allows. It is intended that the samples would be collected in accordance with the procedures set forth below and those governing the collection and shipment of samples contained in the QAPP. Samples should be labeled, packed, and shipped as outlined in the procedures in Section 7.

5. Water Sampling

During the Northern Impoundment RA, water that accumulates in an open excavation (through precipitation or seepage) will be treated through an on-Site water treatment system prior to discharge to the San Jacinto River. The water treatment process, the results of treatability testing, and the calculated discharge criteria are detailed in the Northern Impoundment RD.

5.1 Sample Collection Objective

The water treatment system has been designed to remove suspended solids and COPCs associated with those solids, including dioxins/furans and metals. Sampling will be required for purposes of compliance with discharge criteria for total suspended solids (TSS), pH, dioxins/furans, and metals, as discussed in the Northern Impoundment RD.

5.2 Sample Type, Location, and Frequency of Compliance Sampling

The compliance sampling location with respect to the water treatment system is identified on the design drawings (Appendix G). The location would be downstream of the Service Water Storage tank, as identified on Drawing P-01, and prior to the point of discharge to the San Jacinto River. Monitoring frequencies and sample types from 30 Texas Administrative Code (TAC) 319.9 (c) Table 3 (for treatment units with effluent flow from 0.50 to less than 2.00 million gallons a day [MGD]) are identified in Table 5.1, below. The discharge of treated water is expected to be sporadic. Therefore, the sampling frequency applies to time periods when a discharge is occurring.

Table 5.1 Sample Analysis and Frequency

Parameter	Minimum Frequency of Measurement[3]	Standard Analytical TAT (business days)[4]	Sample Type
Flow	1 per operating shift	---	Instantaneous
pH	1 per day	---	Grab
TSS	2 per week	10 days	Composite
Metals[1]	1 per week	10 days	Composite
Dioxin/Furans2	1 per week	15 days	Composite

Notes:

[1] The most conservative frequency for metals included in Table 3 (Copper, Lead, Nickel, Silver, Zinc) is twice per week, but based on characterization, dissolved metals in the untreated contact water were significantly less than discharge criteria. Therefore, the collection of weekly samples is proposed.
[2] Dioxin/Furans are not specified in Table 3.
[3] Samples will be collected only while discharging.
[4] Flow rate and pH data will be collected on-Site using real-time in-line monitors.

If analyses of the discharge indicate that effluent does not met discharge criteria for a certain parameter, a second sample of treated water is to be collected and analyzed for that parameter, as soon as practical.

5.3 Sampling Procedures

5.3.1 Equipment Calibration

The pH meter should be calibrated following instrument manufacturer instructions. A two-point calibration should be conducted at a minimum. Records of pH meter calibration should be maintained at the work site during the Northern Impoundment RA, as specified in the QAPP.

5.3.2 Sampling Procedure

It is recommended that the RC update this SWMP to include the following procedures for collection of water samples:

- Obtain sample cooler, bottles, and container from the Approved Laboratory.
- Inspect sample containers for cleanliness, integrity, and the presence and suitability of any required preservatives.
- Flush line at sample port to clear water standing in line in order to obtain a representative sample. Containerize the flush water and return to treatment system.
- Collect fresh grab samples in a clean bucket. If possible, samples will be collected directly into sample containers. Volume should be sufficient to fill all bottles. Stir bucket, if used, to suspend solids. Divide each sample between containers, such that essentially identical samples are collected and submitted to the Approved Laboratory during each sampling event.
- Collect composite samples for a 24-hour period or over the length of the discharge period (if the discharge occurs for less than 24 hours). A composite sampler may be used to collect flow-weighted composite sample. Alternatively, a series of grab samples may be composited in volumes proportional to flow and collected at the intervals required by 30 Texas Administrative Code (TAC) 319.9.
- If possible, sufficient equipment will be sent to the field so that all sampling can be conducted without the need for field decontamination. Decontamination of field equipment should be conducted as specified in the QAPP. Sample collectors should change gloves after each sampling event.

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

6. Investigation Derived Wastes

Investigation derived waste (IDW) from sampling and decontamination activities will be either treated in the on-Site water treatment system (for liquid IDW) or incorporated into the excavated waste material for off-Site disposal (solid IDW).

All disposable materials used for sample collection and processing, such as paper towels and gloves, should be placed in heavyweight garbage bags or other appropriate containers. Disposable supplies that do not contain IDW should be removed from the Northern Impoundment by sampling personnel and placed in a normal refuse container for disposal at a solid waste landfill.

All IDW will be disposed of in accordance with all applicable regulations and guidelines as specified in the TODP.

7. Equipment, Decontamination, Sample Labeling, Packing, and Shipping

7.1 List of Equipment Needed

7.1.1 Confirmatory and Source Material Sampling Equipment

– Sample Containers.
– Trowels.
– Nitrile Gloves.
– Mixing Bowls.
– Laboratory-grade Detergent.
– Deionized Water.
– Abrasion Brush.
– Buckets.
– Sharpie.
– Cooler.
– Ice.

Sampling equipment should be decontaminated between samples, as described in Section 7.2.

7.1.2 Water Sampling Equipment

– Sample Containers.
– Bucket and Stirrer (if collecting multiple samples at same location).
– Nitrile Gloves.
– pH Meter and Calibration Standards.

Sampling equipment should be decontaminated between samples, as described in Section 7.2.

7.2 Decontamination of Sampling Equipment

All sample collection equipment that is not disposable should be decontaminated before and after sample collection at each sample location. Equipment cleaning procedures may include the following:

– Initial rinse with laboratory-grade deionized water to remove soil adhered to the equipment.
– Apply a non-phosphate laboratory-grade detergent to the equipment and scrub using an abrasion brush to thoroughly clean the sampling equipment.
– Triple rinse the equipment with laboratory-grade deionized water.
– Air-dry the rinsed equipment and wrap in clean, protective plastic, until used.

7.3 Sample Labeling

Labels should be secured to the sample containers and be written in indelible inks. Sample containers should be packaged and shipped on ice within an insulated ice chest to the Approved Laboratory for analysis following proper chain-of-custody protocol.

Labels may contain the following information:

– Sample identification (this includes a sample number and may include a sample container number).
– Initials of sample collector(s).
– Date and time of sample collection.
– Location or source of sample collection.
– Analysis to be performed.
– Preservative utilized.

7.4 Sample Packing and Shipping

When possible, sample container preparation and packing for shipment should be completed in a well-organized and clean area, free of any potential for cross-contamination of the samples. Sample containers may be prepared for shipment as follows:

1. Containers are to be wiped clean of all debris/water using paper towels (paper towels must be disposed of with other potentially impacted materials).
2. Steps are to be taken to ensure that the sample labelling protocol outlined above has been completed.
3. The entire contents of the cooler are to be sealed in a large plastic bag.
4. The trip blank and the temperature blank are to be included with shipments of samples for volatiles analysis.
5. Chain-of-custody documentation is to be completed. A chain-of-custody form is to be placed in a separate plastic bag placed on top of the samples for shipment with a copy retained for reference. If a copy is not available, a photograph of the form should be taken as a record.
6. Custody seals are to be placed on each cooler and covered with clear tape.
7. Cooler lids and drain holes are to be sealed with packaging tape.
8. All prior stickers/markings or any prior shipping labels are to be removed from coolers prior to shipment or sample custody release.
9. Samples should be shipped on the same day as sampling. If samples cannot be shipped on the same day, the cooler should be drained periodically, and ice replaced. Samples should arrive at the Approved Laboratory within hold times provided by the Approved Laboratory.
10. The Approved Laboratory should be notified as to when the samples should arrive.

8. References

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

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The Power of Commitment

Attachment 4

Quality Assurance Project Plan - Northern Impoundment

Attachment 4 - Quality Assurance Project 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

March 31, 2022

→ The Power of Commitment

Quality Assurance Project Plan
Signature Page

Site Name:	San Jacinto River Waste Pits Superfund Site		
Location Address:	18001 East Freeway Market St., Channelview, Texas 77530		
Anticipated Start Date:	TBD	Anticipated Project Duration:	TBD
Prepared By:		Date:	
Project Coordinator:		Date:	
Quality Assurance Officer:		Date:	

This signature page must be completed prior to Northern Impoundment RA activities and be available on site for review.

Acronyms and Abbreviations

ANSI/ASQC	American National Standards Institute/American Society for Quality Control
AOC	Administrative Settlement Agreement and Order of Consent
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
DQOs	Data Quality Objectives
EDDs	Electronic Data Deliverables
EPA	United States Environmental Protection Agency
FSP	Field Sampling Plan
GC/MS	Gas Chromatography/Mass Spectrometry
GHD	GHD Services Inc.
HAZWOPER	Hazardous Waste Operations and Emergency Response
IPC	International Paper Company
LCS	Laboratory Control Sample
LIMS	Laboratory Information Management System
MIMC	McGinnes Industrial Maintenance Corporation
MDL	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NELAP	National Environmental Laboratory Accreditation Program
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness, Sensitivity
PE	Performance Evaluation
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RPD	Relative Percent Difference
SOP	Standard Operating Procedure
SOW	Statement of Work
SWMP	Site-Wide Monitoring Plan
TCEQ	Texas Commission on Environmental Quality

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Table index

Table 1 Analyte List, Analytical Methods, and Quantitation Limits

1. Introduction

This Quality Assurance Project Plan (QAPP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). This QAPP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06 02 18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Pre-Final 90% Remedial Design for the Northern Impoundment (Northern Impoundment 90% RD) submittal to the EPA.

This QAPP was developed to augment the Field Sampling Plan (FSP) and the Site-Wide Monitoring Plan (SWMP) and to address sample analysis and data handling during implementation of the remedial action (RA) for the Northern Impoundment. This QAPP was prepared in accordance with the EPA Requirements for Quality Assurance Project Plans, QA/R 5, EPA/240/B 01003 (March 2001, reissued May 2006); Guidance for Quality Assurance Project Plans, QA/G 5, EPA/240/R 02/009 (December 2002); and Uniform Federal Policy for Quality Assurance Project Plans, Parts 1 3, EPA/505/B 04/900A through 900C (March 2005). References in this QAPP to the “work site” are to the Northern Impoundment and references to “Implementing Party” are to the entity(ies) implementing the RA for the Northern Impoundment.

Prior to initiation of Northern Impoundment RA activities, the selected remedial contractor(s) (RC) will update this QAPP or develop a separate QAPP that addresses the components outlined in this document.

In accordance with the EPA guidance listed above, there are four main topics that must be included in a QAPP.

Those four topics are:

– Project Management - project management, project objectives, and project history
– Data Generation and Acquisition - descriptions of the design and implementation of all measurement systems that will be used during the project
– Assessment/Oversight - the procedures used to ensure proper implementation of the QAPP
– Data Validation and Usability - the quality assurance (QA) activities that occur after the data collection phase of the project is completed

Components of tasks associated with these four topics and suggested responsibilities for project management, data generation and acquisition, assessment/oversight, and data validation and usability are outlined in this QAPP.

This QAPP is a dynamic document, and it will be updated with specific addenda, if necessary, to reflect new scopes of work or changes in the current scope of required sampling. Any necessary modifications will be made by the Quality Assurance Officer (QA Officer) to be designated by the Implementing Party and will be reviewed by the Project Coordinator (as defined below in Section 2.1.1). This QAPP may be reviewed on an annual basis by the QA Officer to determine if it should be modified to reflect any work being conducted at the work site.

1.1 Relationship to Supporting Plans

The QAPP should be considered in combination with the other supporting plans. The SWMP describes the procedures for ongoing monitoring during the RA (i.e., dust, stormwater, odor, and turbidity). The FSP provides the procedures for collection of samples during the RA (i.e., treated effluent water, post-confirmation samples, off-site backfill samples, and waste profile samples). The Construction Quality Assurance/Quality Control Plan (CQA/QCP) describes the procedures to verify that the excavation objectives are achieved during implementation. The Transportation and Off-Site Disposal Plan (TODP) describes procedures for on-site management and loading of excavated material to be

disposed of off-site during the RA, the transportation routes for off-site shipments, and measures to be implemented, if needed, to protect communities that may be affected by the shipments.

2. Project Management

2.1 Project Organization

It is anticipated that, for purposes of the Northern Impoundment RA, project management and safety responsibilities may be assigned as described below. The role and if applicable, proposed responsibilities of the EPA, the Implementing Party, QA personnel, field personnel, and laboratory personnel are described in the following subsections. Additionally, any recommended training/certification requirements related to implementation of the Northern Impoundment RA are identified.

2.1.1 Roles and Responsibilities

United States Environmental Protection Agency

The EPA is the lead agency with respect to the Northern Impoundment RA. It is assumed that the EPA will designate a Remedial Project Manager (RPM) to oversee the Northern Impoundment RA.

Project Coordinator

The Project Coordinator will be designated by the Implementing Party or the RC to ensure that the Northern Impoundment RA is implemented in accordance with the approved Northern Impoundment 90% RD. It is anticipated that the Project Coordinator would have technical responsibility for data collection activities. The Project Coordinator's responsibilities may include reviewing QA reports, approving and authorizing actions necessary to accomplish QA objectives, and acting as liaison between agencies and field staff.

Laboratory Project Manager

Analytical laboratory options for the Northern Impoundment RA are still under consideration. The analytical laboratory selected to perform environmental analyses for the Northern Impoundment RA will hereafter in this document be identified as the "Approved Laboratory". The Approved Laboratory is expected to be a full-service chemical analytical laboratory accredited under the National Environmental Laboratory Accreditation Program (NELAP) and certified in Texas. More than one Approved Laboratory may be selected.

The Laboratory Project Manager will be a person designated by an Approved Laboratory and approved by the RC. The Laboratory Project Manager is anticipated to act as the primary point of contact between the Approved Laboratory and the Project Coordinator and will have responsibility to address technical issues relating to generated analytical data.

The responsibilities of the Laboratory Project Manager may include the following:

– Ensure that resources of the Approved Laboratory are available on an as-required basis
– Review of scope of work and planned analyses and methods
– Review of final analytical reports
– Approval of final reports prior to submission

2.1.2 Quality Assurance Roles and/or Responsibilities

Project team members with QA responsibilities may include the Implementing Party Quality Assurance Officer (Implementing Party QA Officer) and the person designated by each Approved Laboratory as its Quality Assurance Officer (Laboratory QA Officer). Responsibilities of these individuals may include the following:

Implementing Party QA Officer

- Manage field activities and field quality assurance/quality control (QA/QC)
- Conduct oversight and review of field QA/QC
- Prepare Standard Operating Procedures (SOPs) for field activities
- Advise on appropriate sampling procedures and methods for field activities
- Review of laboratory QA/QC
- Coordination and review of data validation and assessment
- Advise on laboratory corrective action procedures
- Prepare and review QA reports
- Implement and document field corrective actions, if required

Laboratory QA Officer

- Coordinate and perform overview of laboratory systems audits
- Perform overview of QA/QC documentation
- Conduct detailed data review
- Implement and document Approved Laboratory's corrective actions, if required
- Oversee compliance with Approved Laboratory's quality assurance plans.
- Oversee preparation of Approved Laboratory's SOPs

2.1.3 Field Responsibilities

A selected RC will conduct all field sampling and obtain field measurements related to sampling during the RA, as described in the FSP and the SWMP. The specific procedures for field sample collection and field measurements will be developed in compliance with applicable SOPs for fieldwork, as determined by the selected RC. These procedures may include requiring the RC's field team leader to document any field-related non-conformances that are identified or reported by the leader or field team members and to implement and document any corrective actions.

2.1.4 Laboratory Responsibilities

Analyses for the RA will be performed by an Approved Laboratory. The shipping address and contact information for Approved Laboratory will be provided prior to samples being collected. The roles and specific responsibilities of the Approved Laboratory's personnel involved in the project may include the following:

Laboratory Contact

- Coordinate laboratory analyses
- Supervise in-house chain-of-custody
- Subcontract sample analyses, as needed
- Schedule sample analyses
- Oversee data review
- Oversee preparation of analytical reports

Sample Custodian

– Receive and inspect incoming sample containers
– Record the condition of incoming sample containers
– Sign appropriate documents
– Verify correctness of chain-of-custody documentation
– Notify Laboratory Contact of any non-conformances identified during sample receipt and inspection
– Assign a unique identification number to each sample, and enter the client identification number and sample identification numbers into the sample receiving log
– Initiate transfer of the samples to appropriate laboratory sections
– Control and monitor access/storage of samples and extracts

2.2 Quality Objectives and Criteria

Data quality objectives (DQOs) are qualitative and quantitative statements derived from the outputs of each step of the DQOs process. The DQOs process is a series of planning steps based on the scientific method that is designed to ensure that the type, quantity, and quality of environmental data used in decision making are appropriate for the intended application. A systematic planning process will be used to develop DQOs for purposes of this QAPP. That process, as described in *EPA's Guidance on Systematic Planning Using the DQOs Process* (EPA, 2006), is designed to ensure that environmental data are of the appropriate type and quality for the intended use, and lead to logical conclusions and defensible decisions or estimates. DQOs are developed through a seven-step process that is both sequential and iterative, depending upon the complexity of the problem. The steps involve both qualitative and quantitative criteria. The overarching outcomes of the DQO process are described below.

There are seven steps in the DQO process that include:

1. Stating the problem
2. Identifying the goal of the study
3. Identifying information inputs
4. Defining the boundaries of the study
5. Developing the analytical approach
6. Specifying performance or acceptance criteria
7. Developing the plan for obtaining data

The resulting statements and DQOs are summarized as follows:

1	Problem	The Northern Impoundment 90% RD calls for a RA that involves removal of waste material and off-site disposal.
2	Goal	The goal is to collect the data necessary to ensure the excavation boundaries satisfy the requirements contained in the approved Northern Impoundment RD, to characterize excavated materials and wastes, and to ensure that the discharges from the wastewater treatment system meet applicable regulatory standards.
3	Inputs	Analytical chemistry data will be collected to ensure that excavation has been conducted as provided for in the approved Northern Impoundment RD and that applicable regulatory standards for air and water discharges are met.
4	Boundaries	Impacted material, sediment, water, imported fill, and air (if necessary) samples from the Northern Impoundment will be collected.
5	Analytical Approach	The analytical approach is to generate usable data in accordance with this QAPP.
6	Acceptance Criteria	Laboratory acceptance criteria are presented in this QAPP for the RA activities to generate validated data to address data needs and identified data gaps.

1	Problem	The Northern Impoundment 90% RD calls for a RA that involves removal of waste material and off-site disposal.
7	Plan	The plan for sample collection activities is provided in the FSP, presented as part of the Northern Impoundment 90% RD.

2.2.1 Measurement Performance Criteria

The measurement performance criteria for precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS) will be determined by the Implementing Party, the RC, and the Approved Laboratory prior to the RA. All required guidelines and recommendations will be used to determine these criteria.

2.3 Special Training Requirements/Certifications

Field sampling team members will be required to have successfully completed relevant field training protocols and to follow the Health and Safety Plan for the Northern Impoundment RD. They will also, if appropriate, be required to have received the 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) safety training and annual 8-hour refresher courses required by 29 Code of Federal Regulations (CFR) Parts 1910 and 1926. The RC will be required to maintain employee training documentation.

Laboratory personnel training records will be maintained by the Approved Laboratory. The Approved Laboratory must be accredited through the NELAP and the Texas Commission on Environmental Quality (TCEQ) for the methods that it will perform, as applicable to demonstrate compliance with EPA's requirement that the Approved Laboratory have a documented quality system that complies with American National Standards Institute/American Society for Quality Control (ANSI/ASQC) E4-94 ("Specifications and Guidelines for Quality System for Environmental Data Collection and Environmental Technology Programs", January 1995), and EPA QA/R-2 ("EPA Requirements for Quality Management Plans", March 2001). Prior to laboratory selection, these requirements will be verified.

2.4 Documentation and Records

The documents, records, and reports that are expected to be generated during Northern Impoundment RA activities are identified in the following subsections. The Project Coordinator will ensure the most current version of the QAPP is available prior to each sampling event.

2.4.1 Field and Laboratory Records

Documents and records generated are expected to include sample collection records, Quality Control (QC) sample records, laboratory records, and data handling records. A brief description of these documents and records are provided below.

Sample collection records to be used during RA sampling activities may include field logbooks and/or project standard field forms, stratigraphic logs, chain-of-custody records, field narratives, and shipping papers.

QC sample records to be used to document the generation of QC samples may include field logbooks and/or project standard field forms recording field blank samples, and field duplicate samples. The Approved Laboratory will maintain quality records for all analytical blank samples (i.e.: trip blank, equipment blank, and/or field blank samples).

Calibration data, where applicable, should be recorded in these logbooks and/or on project standard field forms.

Laboratory records to be maintained for the project may include sample receipt documentation, laboratory narratives, field and laboratory chain-of-custody documentation, sample container cleanliness certifications, reagent and standard reference material certifications, sample preparation records, sample analysis records (i.e., run logs), instrument/raw data, QC data, calibration data, corrective action reports, and final reports.

Data handling records to be maintained may include records verifying the accuracy of computer programs used to process or reduce raw data into final results and data validation reports. The Approved Laboratory will be expected to

maintain documentation of data verification and reduction procedures as necessary for the analyses used during the Northern Impoundment RA.

The RC may also maintain checklists, notes, and reports generated during the external data validation process.

2.4.2 Data Reporting Format

Field data is expected to be recorded in field logbooks and/or on project standard field forms. Field data will likely be generated primarily from observations. This information will be included in project reports or submittals.

Laboratory reports for sampling and monitoring activities will include data deliverables, which may include some or all of the following:

1. Case narrative for each analyzed batch of samples
2. Cross referencing of laboratory sample to project sample identification numbers
3. Description of data qualifiers to be used
4. Methods of sample preparation and analyses for samples
5. Sample results
6. Raw data for sample results and laboratory QC samples
7. Results of (dated) initial and continuing calibration checks and Gas Chromatography/Mass Spectrometry (GC/MS) tuning results
8. Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries, Laboratory Control Sample (LCS), method blank results, surrogate recoveries, calibration check compounds and system performance check compound results (organics)
9. MS recoveries and matrix duplicate Relative Percent Difference (RPDs), LCS, serial dilutions, method blank results, and reagent blank results (inorganics)
10. Labeled and dated chromatograms/spectra of sample results and laboratory QC checks

Any data package prepared in connection with the Northern Impoundment RA should be an EPA "Contract Laboratory Program-like (CLP-like)" data package consisting of all the information presented in a CLP data package but not necessarily on CLP forms.

The Approved Laboratory will maintain validation and calibration data, which may include raw instrument data (including calibration data and instrument performance checks), method detection limit (MDL) studies, and method performance and validation studies. Summaries of the results of these studies should be included in the data packages.

2.4.3 Data Archiving and Retrieval

Procedures will be put in place regarding retention of records. It is anticipated that records would be maintained, taking into account, the Approved Laboratory's and the RC’s record retention policies and applicable EPA or other agency requirements.

3. Data Generation and Acquisition

The RC will define requirements for design and implementation of the measurement systems to be used during the RA activities. These may include sampling procedures, analytical procedures, and data handling and documentation requirements that are detailed in the following subsections.

3.1 Sampling Program

The rationale for the sampling activities to be conducted during the RA is described in the Northern Impoundment 90% RD, the FSP, and the SWMP.

3.2 Sampling Methods

SOPs for sample collection will be provided by the RC prior to the start of RA activities.

3.3 Sample Handling and Custody Requirements

The procedures for sample handling, labeling, shipping, and chain-of-custody documentation that may be adopted in connection with RA activities are provided in the subsections that follow.

3.3.1 Sample Handling and Packaging

The procedures used to collect and handle the samples will be provided in the RC's SOPs. The sample identification procedure will be determined prior to the start of RA activities by the RC. Unique sample numbers will be assigned to samples. Procedures will be put in place to record information such as sample identifications, sample locations, and sample depths in field logbooks or field forms.

Samples will be required to be placed in shipping coolers containing ice following collection, and then shipped or delivered to an Approved Laboratory.

3.3.2 Chain of Custody

Chain-of-custody is the sequence of possession of an item. Field, laboratory, and final evidence files custody procedures that may be used during RA activities are described in the subsections that follow.

3.3.2.1 Field Custody Procedures

Log books and/or project standard field forms may be used to record field data collection activities. Field log books are bound field survey books or notebooks with consecutively numbered pages. Each log book should be identified by a project-specific document number.

The RC should develop a standard format for the logbooks prior to the RA to ensure that the date, start time, weather, names of all sampling team members present, and the signature of the person making the entry are recorded. The names of individuals visiting the Northern Impoundment and the purpose of their visit should also be recorded in the field logbook.

All field measurements and sample collection information should be recorded in a logbook and/or on a project standard field form. Project standard field forms should be specifically prepared for each project sampling location. These forms should be used to record all field measurements/information and samples collected for each location. All entries in such forms should be completed in ink, without any erasures. If an incorrect entry is made, the incorrect information should be crossed out with a single strike mark. The correct information should then be entered adjacent to the original entry. The forms are to be signed and dated.

Whenever a sample is collected, an identification and a detailed description (if necessary) of the location should be recorded in the logbook and/or on a project standard field form. Photographs taken at a location, if any, should be noted in the logbook. All equipment used to obtain field measurements should be recorded in the field logbook and/or on a project standard field form. In addition, the calibration data for all field measurement equipment should be recorded in the field logbook or on standard field forms.

Samples should be collected according to the applicable sampling procedures documented in the FSP or other project-appropriate planning document. The equipment used to collect samples, time of sample collection, sample

description, volume and number of containers, and preservatives added (if applicable) should be recorded in the field logbook and/or on a project standard field form. A deviation from sampling procedures in the FSP, QAPP, or other project-appropriate planning document should be documented in the field logbook and/or on a project standard field form. Each sample should be uniquely identified by the procedure determined by the RC.

3.3.2.2 Laboratory Custody Procedures

The Approved Laboratory's sample custody begins when the samples are received at the laboratory. The Approved Laboratory's sample custodian should assign a unique laboratory sample identification number to each incoming sample. The field sample identification numbers, laboratory sample identification numbers, date and time of sample collection, date and time of sample receipt, and requested analyses will be entered into the sample receiving log. The Approved Laboratory's sample log-in, custody, and document control procedures should be consistent with its standard operating procedure for handling samples.

Following log-in, all samples should be stored within an access-controlled location and should be maintained properly preserved until completion of all laboratory analyses. Unused sample aliquots and sample extracts should be maintained properly preserved for a minimum of 30 days following receipt of the final report by the RC, or as agreed upon by the RC and the Approved Laboratory. The Approved Laboratory will be responsible for the disposal of unused sample aliquots, sample containers, and sample extracts in accordance with all applicable local, state, and federal regulations.

3.3.2.3 Final Evidence Files Custody Procedures

All records will be maintained consistent with the Approved Laboratory's and the RC's record retention policies and applicable EPA or other agency requirements.

3.4 Analytical Method Requirements

The laboratory analytical methods that are anticipated to be used are included in Table 1.

The turnaround time required for the analyses required for each batch of samples is to be noted on the chain-of-custody documents submitted with the samples and will be communicated to the Approved Laboratory prior to the sampling event, as necessary.

3.5 Quality Control Requirements

The field and laboratory QC requirements that may be adopted for the Northern Impoundment RA are discussed in the following subsections. Specific QC checks and acceptance criteria are identified in the discussion of the referenced analytical methods.

3.5.1 Field Sampling Quality Control

Field QC requirements include analyzing reference standards for instrument calibration and for routine calibration checks. Field QC samples for this project include use of equipment blank samples to determine the existence and magnitude of sample contamination resulting from sample containers or sampling procedures and field duplicate samples to assess the overall precision of the sampling and analysis event.

3.5.2 Analytical Quality Control

The laboratory QC requirements for the analyses include analyzing method blanks, instrument performance checks, initial calibration standards, calibration verification standards, internal standards, surrogate compound spikes, and LCS. The acceptance criteria for LCS and surrogate compounds should be generated by the Approved Laboratory and included in the Approved Laboratory's reports.

3.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Procedures to verify that instruments and equipment are functional and properly maintained will be established by the RC and may include those described in the following subsections.

3.6.1 Field Equipment Maintenance

Field equipment should be inspected and tested prior to use in the field and maintenance logs maintained. Prior to use in the field, the equipment should be checked again, and the performance information recorded. All equipment returned from the field should be inspected and tested. Any required maintenance should be performed and documented prior to the equipment being returned to service.

3.6.2 Field Equipment and Sampling Container Cleaning/Decontamination Procedures

Equipment cleaning/decontamination procedures will be addressed in SOPs developed by the RC. Sample containers are expected to be provided by the Approved Laboratory. All containers will be required to be pre-cleaned in accordance with the EPA guidance document entitled "Specifications and Guidance for Contaminant-Free Sample Containers", EPA 540/R-93/051. Certificates of analysis for each lot of containers will be maintained by the Approved Laboratory or be available from the vendor upon request.

3.6.3 Laboratory Instrument Maintenance

As part of its QA/QC program, the Approved Laboratory will be expected to conduct routine preventive maintenance (including maintaining instruments based on the manufacturer’s specifications) to minimize the occurrence of instrument failure and other system malfunctions and to document all maintenance that is performed, which should be documented in the Approved Laboratory's maintenance logbooks or other records.

3.7 Calibration Procedures and Frequency

Procedures for calibrating and maintaining the accuracy of all the instruments and measuring equipment that will be used for conducting field sampling and laboratory analyses will be established by the RC and may include those described in the following subsections.

3.7.1 Field Instruments/Equipment

Instruments and equipment used to gather, generate, or measure environmental data are to be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during field sampling should be examined to confirm that it is in operating condition.

3.7.2 Laboratory Instruments

There should be approved written procedures for calibration of laboratory equipment. Records of calibration, repairs, or replacement should be filed and maintained by the designated laboratory personnel performing QC activities and be available for a QA audit. The Approved Laboratory should have trained staff and in-house spare parts available for instrument repair or should maintain service contracts with vendors. Specific calibration procedures and frequencies are to be detailed in the referenced methods.

3.8 Inspection/Acceptance Criteria for Supplies and Consumables

Procedures will be established by the RC to ensure that supplies and consumables used in the field and laboratory will be available as needed and free of contaminants and may include the procedures detailed in the following subsections.

3.8.1 Field Supplies and Consumables

Supplies and consumables for field sampling will be obtained from various vendors and should include sample containers, detergent and water for equipment decontamination, and field blank water. Additional field supplies and consumables may include pump tubing and personal protective equipment. These materials should not introduce contaminants into the samples or interfere with the analyses. All field supplies should be consumed or replaced with sufficient frequency to prevent deterioration or degradation that may interfere with the analyses.

3.8.2 Laboratory Supplies and Consumables

The Approved Laboratory's vendors for general labware, reagents, chromatography supplies, and organic standards should be certified and meet the requirements of the analytical method or the Approved Laboratory's QAPP. The lot numbers of reagents and standards should be recorded and dates of receipt, first use, and expiration will be documented by the Approved Laboratory. Certificates of analysis should be maintained on file to document reagent/standard purity.

3.9 Data Management

Procedures for managing data from generation to final use and storage will be established by the RC and may include the procedures detailed in the subsections that follow.

3.9.1 Data Recording

Field information should be recorded in field logbooks, on project standard field forms or by other means, and should include measurements from direct reading instruments or direct measurements. Field staff will be responsible for recording field data and identifying and correcting recording errors.

Laboratory data should be recorded in a variety of formats. Data from instruments is to be recorded on magnetic media, strip charts, or bench sheets or by other means. Data recording requirements should be identified for each preparation and analysis method.

3.9.2 Data Validation

3.9.2.1 Field Data

Procedures for validation of field data will be established by the RC and may consist of checking for transcription errors and reviewing information recorded in field logbooks. Data transcribed from the field logbook into summary tables for reporting purposes will need to be verified for correctness by the Implementing Party QA Officer or designee, with any limitations on the use of field data should be identified.

3.9.2.2 Environmental Laboratory Generated Data

A full validation (or Stage 4 validation equivalent) may be performed on data collected during the RA. The full validation process would include a review of all technical holding times, instrument performance check sample results, initial and continuing calibration results, and all batch and matrix QC (including equipment blanks, field duplicates,

MS/MSD, laboratory duplicates, surrogate recoveries, method blanks, LCS results, continuing and initial calibration checks, and the identification and quantitation of specific analytes of interest), and review of raw and supporting documentation. Assessment of analytical data would include checks on data consistency by looking for comparability of duplicate analyses, adherence to accuracy and precision control criteria detailed in this QAPP and anomalously high or low parameter values. The results of these data validations would be reported to the Laboratory Project Manager, with notations as to any discrepancies and their effect upon acceptability of the data. The procedure should include data validation reports that summarize the samples reviewed, parameters reviewed, any nonconformance with the established criteria, and validation actions (including data qualifiers).

3.9.3 Data Transformation/ Calculations

Field data calculation procedures may be different in scope compared to those implemented for laboratory data. Direct reading instrumentation may be employed in the field, if needed. The use of field instruments would generate data read directly from the meters following calibration, which would then be recorded into field logbooks, project standard field forms or other records immediately after the measurements are obtained. Laboratory data calculations would be made to produce final results from raw data.

3.9.4 Data Transmittal/Transfer

Field data should be entered into a standard spreadsheet format or documented by some other means. It is expected to be the QA Officer's responsibility to verify the correctness of the field data after the data are transferred.

The Approved Laboratory is expected to provide data in electronic format as electronic data deliverables (EDDs), which are generated directly from the laboratory information management system (LIMS). Laboratory EDDs can be imported into the database, and the data can be maintained in the database for manipulation and presentation.

It is expected to be the QA Officer's responsibility to verify the correctness of the analytical database after the laboratory data for each event have been imported, such as by comparing the data from the database to the hard copy analytical reports for a specified percentage (such as 10 percent) of the sample results and addressing any discrepancies between the database and analytical reports.

3.9.5 Data Assessment

Assessment of laboratory data is expected to be performed using the procedures established for different analytical methods. These assessments performed may include determining the mean, standard deviation, relative standard deviation, percent difference, RPD, and percent recovery for certain QC elements.

Assessment of QC data for data validation purposes should also include determining the percent recovery, RPD, and percent completeness.

3.9.6 Data Tracking

Data generated in the field, such as water level measurements, is to be recorded in field logbooks, on project standard field forms or by other means, as there are no unique or special tracking requirements for these data. The data should be transcribed for analysis and reporting and included as part of a final evidence file.

Tracking of analytical data in a database should include recording the Approved Laboratory generating the data, the date when the EDD was received and imported, the date when qualifiers were applied to the results, the level of data review performed, and the data review guidance used to evaluate the data.

3.9.7 Data Storage and Retrieval

Laboratory data and electronic instrument data should be stored in hard copy and/or electronic format in accordance with applicable data retention requirements established by the Implementing Party and/or the RC.

3.9.8 Data Security

The laboratory data security is expected to be the responsibility of the Laboratory Project Manager. Data security measures to be implemented may include prohibitions on access to archived data without authorization.

4. Assessment and Oversight

Procedures for assessment and oversight to ensure implementation of this QAPP and of QA/QC activities will be established by the RC and may include the procedures detailed in the following subsections.

4.1 Assessments and Response Actions

Assessments consisting of internal and external audits may be performed during the project. Internal technical system audits of both field and laboratory procedures may be conducted to verify that sampling and analysis are being performed in accordance with the procedures established in the FSP, SWMP, and this QAPP.

An internal field technical system audit of field activities may be conducted by the QA Officer or designee at the beginning of the field sampling activities to identify deficiencies in the field sampling and documentation procedures. The field technical system audit may include examining field sampling records and chain-of-custody documentation. In addition, sample collection, handling, and packaging in compliance with the established procedures may be reviewed during the field audit. Any deficiencies identified should be documented and corrective actions should then be taken and documented.

Follow-up audits may be performed as necessary to verify that deficiencies have been corrected and that the QA/QC procedures described in this QAPP, and the approved Northern Impoundment RD have been followed.

An internal laboratory technical system audit may be conducted by the Approved Laboratory's QA Officer or designee. The laboratory technical system audit may include examining laboratory documentation regarding sample receiving, sample log-in, storage and tracking, chain-of-custody procedures, sample preparation and analysis, instrument operating records, data handling and management, data tracking and control, and data reduction and verification.

Corrective action resulting from deficiencies identified during the internal laboratory technical system audit should be implemented immediately. The Approved Laboratory will ensure implementation and documentation of the corrective action. All problems requiring corrective action and the corrective action taken will be reported to the Laboratory Project Manager. Follow-up audits will be performed as necessary to verify that deficiencies have been corrected.

External laboratory audits, if conducted, may include, but not be limited to, reviewing laboratory analytical procedures, laboratory on-site audits, and/or submitting performance evaluation samples to the laboratory for analysis.

4.2 Reports

Quality assurance information should be summarized following completion of RA activities. This information should consist of the results of external performance evaluations, results of periodic data quality validation and assessment, data use limitations, and any significant QA problems identified, and corrective actions taken.

5. Data Validation and Usability

Procedures for QA activities to be performed to ensure that the data are scientifically defensible, properly documented, of known quality, and meet the project objectives will be established by the RC and may include those procedures described in the following sections.

5.1 Data Review, Verification, and Validation

All field and laboratory data are to be reviewed, verified, and validated. These terms are defined as follows:

– Data review is the in-house examination to ensure that the data have been recorded, transmitted, and processed correctly.
– Data verification is the process for evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual specifications.
– Data validation is an analyte and sample-specific process that extends the evaluation of data beyond method, procedure, or contractual compliance (i.e., data verification) to determine the quality of a specific data set relative to the end use.

The procedures and criteria that may be used to verify and validate field and laboratory data are presented in Section 5.2.

Laboratory data review should consist of raw data being reduced to results and checked by the responsible analyst. A second review of the data reduction procedure may be conducted by another analyst or senior chemist. After the data are verified, a draft report may be reviewed by the Laboratory Project Manager. Final reports are generated, signed, and transmitted after approval of the draft by the Laboratory Project Manager.

5.2 Validation and Verification Methods

Field data should be verified by reviewing field documentation and chain of custody records. Data from direct reading field instruments should be verified by reviewing calibration and operating records and QC data.

Verification of sample collection procedures should consist of reviewing sample collection documentation for compliance with the requirements of the work plan and QAPP. If alternate sampling procedures were used, the acceptability of the procedure would need to be evaluated to determine the effect on the usability of the data. Data usability should not be affected if the procedure that was used is determined to be an acceptable alternative that fulfills the measurement performance criteria.

The Approved Laboratory should internally verify its data by reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), and data reduction and reporting. Any deviations from the acceptance criteria, corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) should be noted in the laboratory reports.

Data validation should be conducted by the RC. The results of the data validation procedure should identify data that do not meet the measurement performance criteria. Data validation should determine whether the data are acceptable, of limited usability (qualified as estimated), or rejected. Data qualified as estimated should be reviewed and a discussion of the usability of estimated data should be included in the data validation report. The results of data verification/validation should be summarized in data validation reports provided to the Project Coordinator for use in interpreting the results and for use in project reports.

Data determined to be unusable may require corrective action, such as resampling by the field team or reanalysis of samples by the laboratory.

5.3 Usability/Reconciliation with Data Quality Objectives

The overall usability of the data from the RA should be assessed by evaluating the PARCCS of the data set as compared to the measurement performance criteria using basic statistical quantities, as applicable. The procedures and statistical formulas to be used for these evaluations will be determined by the RC prior to the RA.

6. References

EPA, 2006. EPA's Guidance on Systematic Planning Using the DQOs Process. United States Environmental Protection Agency. February 2006.

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

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Post-Confirmation Sampling Soil and Sediment		
Dioxins and Furans		
2,3,7,8-TCDD	SW-846 1613B	Laboratory MDL
1,2,3,7,8-PeCDD	SW-846 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDD	SW-846 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDD	SW-846 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDD	SW-846 1613B	Laboratory MDL
2,3,7,8-TCDF	SW-846 1613B	Laboratory MDL
1,2,3,7,8-PeCDF	SW-846 1613B	Laboratory MDL
2,3,4,7,8-PeCDF	SW-846 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDF	SW-846 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDF	SW-846 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDF	SW-846 1613B	Laboratory MDL
Waste Characterization		
Total cyanide, reactive	SW846 9012B	Laboratory MDL
Total sulfide, reactive	SW846 9034	Laboratory MDL
TCLP VOC	SW846 1311/8260D/5030B	Laboratory MDL
TCLP SVOC	SW846 1311/8270D	Laboratory MDL
TCLP RCRA 8 Metals	SW846 1311/6010/7471	Laboratory MDL
TPH 1005/1006	TX-1005 / TX-1006[2]	Laboratory MDL
PCB	SW846 8082A/3510C	Laboratory MDL
Water and Contact Water		
Dioxins/Furans		
2,3,7,8-TCDD	SW-846 1613B	Laboratory MDL
1,2,3,7,8-PeCDD	SW-846 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDD	SW-846 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDD	SW-846 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDD	SW-846 1613B	Laboratory MDL
2,3,7,8-TCDF	SW-846 1613B	Laboratory MDL
1,2,3,7,8-PeCDF	SW-846 1613B	Laboratory MDL
2,3,4,7,8-PeCDF	SW-846 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDF	SW-846 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDF	SW-846 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDF	SW-846 1613B	Laboratory MDL
TSS	SM 2540D	Laboratory MDL

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Metals		
Antimony	SW-846 6020A	Laboratory MDL
Arsenic	SW-846 6020A	Laboratory MDL
Barium	SW-846 6020A	Laboratory MDL
Beryllium	SW-846 6020A	Laboratory MDL
Boron	SW-846 6020A	Laboratory MDL
Cadmium	SW-846 6020A	Laboratory MDL
Calcium	SW-846 6020A	Laboratory MDL
Chromium	SW-846 6020A	Laboratory MDL
Cobalt	SW-846 6020A	Laboratory MDL
Copper	SW-846 6020A	Laboratory MDL
Iron	SW-846 6020A	Laboratory MDL
Lead	SW-846 6020A	Laboratory MDL
Magnesium	SW-846 6020A	Laboratory MDL
Manganese	SW-846 6020A	Laboratory MDL
Molybdenum	SW-846 6020A	Laboratory MDL
Nickel	SW-846 6020A	Laboratory MDL
Phosphorus	SW-846 6020A	Laboratory MDL
Potassium	SW-846 6020A	Laboratory MDL
Selenium	SW-846 6020A	Laboratory MDL
Silver	SW-846 6020A	Laboratory MDL
Sodium	SW-846 6020A	Laboratory MDL
Strontium	SW-846 6020A	Laboratory MDL
Thallium	SW-846 6020A	Laboratory MDL
Tin	SW-846 6020A	Laboratory MDL
Titanium	SW-846 6020A	Laboratory MDL
Vanadium	SW-846 6020A	Laboratory MDL
Zinc	SW-846 6020A	Laboratory MDL
Off-Site Backfill Sampling		
Hexavalent Chromium	SW-846 7196A	Laboratory MDL
TPH	TX-1005 / TX-1006[2]	Laboratory MDL

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Dioxins and Furans		
2,3,7,8-TCDD	SW-846 1613B	Laboratory MDL
1,2,3,7,8-PeCDD	SW-846 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDD	SW-846 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDD	SW-846 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDD	SW-846 1613B	Laboratory MDL
2,3,7,8-TCDF	SW-846 1613B	Laboratory MDL
1,2,3,7,8-PeCDF	SW-846 1613B	Laboratory MDL
2,3,4,7,8-PeCDF	SW-846 1613B	Laboratory MDL
1,2,3,4,7,8-HxCDF	SW-846 1613B	Laboratory MDL
1,2,3,6,7,8-HxCDF	SW-846 1613B	Laboratory MDL
1,2,3,7,8,9-HxCDF	SW-846 1613B	Laboratory MDL
Target Analyte List Volatiles		
1,1,1-Trichloroethane	SW-846 8260B	Laboratory MDL
1,1,2,2-Tetrachloroethane	SW-846 8260B	Laboratory MDL
1,1,2-Trichloro-1,2,2-trifluoroethane	SW-846 8260B	Laboratory MDL
1,1,2-Trichloroethane	SW-846 8260B	Laboratory MDL
1,1-Dichloroethane	SW-846 8260B	Laboratory MDL
1,1-Dichloroethylene	SW-846 8260B	Laboratory MDL
1,2,4-Trichlorobenzene	SW-846 8260B	Laboratory MDL
1,2-Dibromo-3-chloropropane	SW-846 8260B	Laboratory MDL
1,2-Dibromoethane	SW-846 8260B	Laboratory MDL
1,2-Dichloroethane	SW-846 8260B	Laboratory MDL
1,2-Dichloropropane	SW-846 8260B	Laboratory MDL
2-Butanone	SW-846 8260B	Laboratory MDL
2-Hexanone	SW-846 8260B	Laboratory MDL
4-Methyl-2-pentanone	SW-846 8260B	Laboratory MDL
Acetone	SW-846 8260B	Laboratory MDL
Benzene	SW-846 8260B	Laboratory MDL
Bromodichloromethane	SW-846 8260B	Laboratory MDL
Bromoform	SW-846 8260B	Laboratory MDL
Bromomethane	SW-846 8260B	Laboratory MDL
Carbon disulfide	SW-846 8260B	Laboratory MDL
Carbon tetrachloride	SW-846 8260B	Laboratory MDL
Chlorobenzene	SW-846 8260B	Laboratory MDL
Chloroethane	SW-846 8260B	Laboratory MDL
Chloroform	SW-846 8260B	Laboratory MDL
Chloromethane	SW-846 8260B	Laboratory MDL
cis-1,2-Dichloroethylene	SW-846 8260B	Laboratory MDL
cis-1,3-Dichloropropene	SW-846 8260B	Laboratory MDL
Cyclohexane	SW-846 8260B	Laboratory MDL
Dibromochloromethane	SW-846 8260B	Laboratory MDL

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Dichlorodifluoromethane	SW-846 8260B	Laboratory MDL
Ethylbenzene	SW-846 8260B	Laboratory MDL
Isopropylbenzene	SW-846 8260B	Laboratory MDL
m-Dichlorobenzene	SW-846 8260B	Laboratory MDL
Methyl Acetate	SW-846 8260B	Laboratory MDL
Methyl tert-Butyl Ether	SW-846 8260B	Laboratory MDL
Methylcyclohexane	SW-846 8260B	Laboratory MDL
Methylene chloride	SW-846 8260B	Laboratory MDL
o-Dichlorobenzene	SW-846 8260B	Laboratory MDL
p-Dichlorobenzene	SW-846 8260B	Laboratory MDL
Styrene	SW-846 8260B	Laboratory MDL
Tetrachloroethylene	SW-846 8260B	Laboratory MDL
Toluene	SW-846 8260B	Laboratory MDL
trans-1,2-Dichloroethylene	SW-846 8260B	Laboratory MDL
trans-1,3-Dichloropropene	SW-846 8260B	Laboratory MDL
Trichloroethylene	SW-846 8260B	Laboratory MDL
Trichlorofluoromethane	SW-846 8260B	Laboratory MDL
Vinyl chloride	SW-846 8260B	Laboratory MDL
Xylene(total)	SW-846 8260B	Laboratory MDL
Target Compound List Semi-Volatiles		
1,1'-Biphenyl	SW-846 8270D	Laboratory MDL
2,2'-oxybis(1-Chloropropane)	SW-846 8270D	Laboratory MDL
2,4,5-Trichlorophenol	SW-846 8270D	Laboratory MDL
2,4,6-Trichlorophenol	SW-846 8270D	Laboratory MDL
2,4-Dichlorophenol	SW-846 8270D	Laboratory MDL
2,4-Dimethylphenol	SW-846 8270D	Laboratory MDL
2,4-Dinitrophenol	SW-846 8270D	Laboratory MDL
2,4-Dinitrotoluene	SW-846 8270D	Laboratory MDL
2,6-Dinitrotoluene	SW-846 8270D	Laboratory MDL
2-Chloronaphthalene	SW-846 8270D	Laboratory MDL
2-Chlorophenol	SW-846 8270D	Laboratory MDL
2-Methylnaphthalene	SW-846 8270D	Laboratory MDL
3,3'-Dichlorobenzidine	SW-846 8270D	Laboratory MDL
4,6-Dinitro-o-cresol	SW-846 8270D	Laboratory MDL
4-Bromophenyl-phenylether	SW-846 8270D	Laboratory MDL
4-Chlorophenyl phenyl ether	SW-846 8270D	Laboratory MDL
Acenaphthene	SW-846 8270D	Laboratory MDL
Acenaphthylene	SW-846 8270D	Laboratory MDL
Acetophenone	SW-846 8270D	Laboratory MDL

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Anthracene	SW-846 8270D	Laboratory MDL
Atrazine	SW-846 8270D	Laboratory MDL
Benzaldehyde	SW-846 8270D	Laboratory MDL
Benzo[a]anthracene	SW-846 8270D	Laboratory MDL
Benzo[a]pyrene	SW-846 8270D	Laboratory MDL
Benzo[b]fluoranthene	SW-846 8270D	Laboratory MDL
Benzo[ghi]perylene	SW-846 8270D	Laboratory MDL
Benzo[k]fluoranthene	SW-846 8270D	Laboratory MDL
Bis(2-chloroethoxy)methane	SW-846 8270D	Laboratory MDL
Bis(2-chloroethyl)ether	SW-846 8270D	Laboratory MDL
Bis(2-ethylhexyl) phthalate	SW-846 8270D	Laboratory MDL
Butyl benzyl phthalate	SW-846 8270D	Laboratory MDL
Caprolactam	SW-846 8270D	Laboratory MDL
Carbazole	SW-846 8270D	Laboratory MDL
Chrysene	SW-846 8270D	Laboratory MDL
Dibenz[a,h]anthracene	SW-846 8270D	Laboratory MDL
Dibenzofuran	SW-846 8270D	Laboratory MDL
Diethyl phthalate	SW-846 8270D	Laboratory MDL
Dimethyl phthalate	SW-846 8270D	Laboratory MDL
Di-n-butyl phthalate	SW-846 8270D	Laboratory MDL
Di-n-octyl phthalate	SW-846 8270D	Laboratory MDL
Fluoranthene	SW-846 8270D	Laboratory MDL
Fluorene	SW-846 8270D	Laboratory MDL
Hexachlorobenzene	SW-846 8270D	Laboratory MDL
Hexachlorobutadiene	SW-846 8270D	Laboratory MDL
Hexachlorocyclopentadiene	SW-846 8270D	Laboratory MDL
Hexachloroethane	SW-846 8270D	Laboratory MDL
Indeno(1,2,3 cd)pyrene	SW-846 8270D	Laboratory MDL
Isophorone	SW-846 8270D	Laboratory MDL
m-Nitroaniline	SW-846 8270D	Laboratory MDL
Naphthalene	SW-846 8270D	Laboratory MDL
Nitrobenzene	SW-846 8270D	Laboratory MDL
N-Nitrosodiphenylamine	SW-846 8270D	Laboratory MDL
N-Nitrosodipropylamine	SW-846 8270D	Laboratory MDL
o-Cresol	SW-846 8270D	Laboratory MDL
o-Nitroaniline	SW-846 8270D	Laboratory MDL
o-Nitrophenol	SW-846 8270D	Laboratory MDL
p-Chloroaniline	SW-846 8270D	Laboratory MDL
p-Chloro-m-cresol	SW-846 8270D	Laboratory MDL
p-Cresol	SW-846 8270D	Laboratory MDL

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Pentachlorophenol	SW-846 8270D	Laboratory MDL
Phenanthrene	SW-846 8270D	Laboratory MDL
Phenol	SW-846 8270D	Laboratory MDL
p-Nitroaniline	SW-846 8270D	Laboratory MDL
p-Nitrophenol	SW-846 8270D	Laboratory MDL
Pyrene	SW-846 8270D	Laboratory MDL
Target Compound List Pesticides		
alpha-BHC	SW-846 8081B	Laboratory MDL
beta-BHC	SW-846 8081B	Laboratory MDL
delta-BHC	SW-846 8081B	Laboratory MDL
gamma-BHC (Lindane)	SW-846 8081B	Laboratory MDL
Heptachlor	SW-846 8081B	Laboratory MDL
Aldrin	SW-846 8081B	Laboratory MDL
Heptachlor epoxide	SW-846 8081B	Laboratory MDL
Endosulfan I	SW-846 8081B	Laboratory MDL
Dieldrin	SW-846 8081B	Laboratory MDL
4,4'-DDE	SW-846 8081B	Laboratory MDL
Endrin	SW-846 8081B	Laboratory MDL
Endosulfan II	SW-846 8081B	Laboratory MDL
4,4'-DDD	SW-846 8081B	Laboratory MDL
Endosulfan sulfate	SW-846 8081B	Laboratory MDL
4,4'-DDT	SW-846 8081B	Laboratory MDL
Methoxychlor	SW-846 8081B	Laboratory MDL
Endrin ketone	SW-846 8081B	Laboratory MDL
Endrin aldehyde	SW-846 8081B	Laboratory MDL
alpha-Chlordane	SW-846 8081B	Laboratory MDL
gamma-Chlordane	SW-846 8081B	Laboratory MDL
Toxaphene	SW-846 8081B	Laboratory MDL
Polychlorinated Biphenyls		
Aroclor-1016	SW-846 8082A	Laboratory MDL
Aroclor-1221	SW-846 8082A	Laboratory MDL
Aroclor-1232	SW-846 8082A	Laboratory MDL
Aroclor-1242	SW-846 8082A	Laboratory MDL
Aroclor-1248	SW-846 8082A	Laboratory MDL
Aroclor-1254	SW-846 8082A	Laboratory MDL
Aroclor-1260	SW-846 8082A	Laboratory MDL

Table 1

Analyte List and Quantitation Limits

Analyte List	Analytical Methods	Targeted Quantitation Limits
Target Compound List Metals		
Aluminum	SW-846 6020A	Laboratory MDL
Antimony	SW-846 6020A	Laboratory MDL
Arsenic	SW-846 6020A	Laboratory MDL
Barium	SW-846 6020A	Laboratory MDL
Beryllium	SW-846 6020A	Laboratory MDL
Cadmium	SW-846 6020A	Laboratory MDL
Calcium	SW-846 6020A	Laboratory MDL
Chromium	SW-846 6020A	Laboratory MDL
Cobalt	SW-846 6020A	Laboratory MDL
Copper	SW-846 6020A	Laboratory MDL
Iron	SW-846 6020A	Laboratory MDL
Lead	SW-846 6020A	Laboratory MDL
Magnesium	SW-846 6020A	Laboratory MDL
Manganese	SW-846 6020A	Laboratory MDL
Mercury	SW-846 7470	Laboratory MDL
Nickel	SW-846 6020A	Laboratory MDL
Potassium	SW-846 6020A	Laboratory MDL
Selenium	SW-846 6020A	Laboratory MDL
Silver	SW-846 6020A	Laboratory MDL
Sodium	SW-846 6020A	Laboratory MDL
Thallium	SW-846 6020A	Laboratory MDL
Vanadium	SW-846 6020A	Laboratory MDL
Zinc	SW-846 6020A	Laboratory MDL
Cyanide	SW-846 9010/9012	Laboratory MDL

Notes:

1 - SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846, 3rd Edition with Updates I through IVB.

2 - Texas Natural Resource Conservation Commission, "Total Petroleum Hydrocarbons" (TNRCC Method 1005) and "Characterization of Nc_6 to Nc_{35} Petroleum Hydrocarbons in Environmental Samples" (TNRCC Method 1006), Revision 03, 06/01/2001

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Attachment 5

Site-Wide Monitoring Plan - Northern Impoundment

Attachment 5 - Site-Wide Monitoring 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

May 31, 2022

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1. Introduction

1.1 Background

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

This SWMP describes the framework to monitor certain conditions during Northern Impoundment RD implementation, including: the potential spread of dust generated during construction; the monitoring of stormwater controls, required as part of a construction Stormwater Pollution Prevention Plan (SWPPP) that a remedial contractor (RC) will prepare to manage stormwater; monitoring to be performed by a RC to control and monitor turbidity in the river during the installation and removal of the wall to be constructed outside the boundaries of the Northern Impoundment (referred to herein as the Best Management Practice [BMP] wall); and monitoring noise during RA activities (primarily the installation of sheet piles). This SWMP also identifies options that a RC may elect to implement to control odors should they occur during construction of the Northern Impoundment Remedial Action (RA).

References in this SWMP to the “work site” are to the Northern Impoundment and staging/lay down areas, including the area in which the water treatment system will be located. Prior to initiation of Northern Impoundment RA activities, each RC selected by the party(ies) implementing the Northern Impoundment RA will either update this SWMP or develop its own SWMP to address the applicable components outlined in this document. References below in this SWMP to “the RC” are intended to refer to the selected RC with responsibility for that aspect of the Northern Impoundment RA.

1.2 Relationship to Supporting Plans

The SWMP should be considered in combination with the other supporting plans. The Field Sampling Plan (FSP) defines the procedures related to post-excavation confirmation sampling, sampling of treated effluent water, imported fill material, and sampling of historical berm material that will be completed during the Northern Impoundment RA. The Construction Quality Assurance/Quality Control Plan (CQA/QCP) describes the procedures to verify that the excavation objectives are achieved during implementation. Field and analytical quality procedures are described in the Quality Assurance Project Plan (QAPP). The Transportation and Off-Site Disposal Plan (TODP) describes the procedures for on-Site management and loading of excavated material to be disposed of off-Site during the Northern Impoundment RA, the transportation routes for off-Site shipments from the work site, and measures to be implemented, if needed to protect communities that may be affected by the shipments.

In addition, this SWMP will be supported by an air monitoring plan for the work site (Air Monitoring Plan) which will detail how dust will be monitored and as needed, suppressed. The Air Monitoring Plan will be developed by the RC. A SWPPP will also be developed by the RC that details the measures to be taken to control stormwater run-on and run-off at the work site during the RA.

2. Site-Wide Monitoring Approach

2.1 Soils

Excavation limits will be targeted during the Northern Impoundment RA based upon data collected during the investigations conducted under the AOC. Those excavation limits will be confirmed by collecting post-excavation confirmation bottom samples. The methodology and procedures for post-excavation confirmation sampling are detailed in the FSP. During construction, monitoring of excavation activities will include delineation of excavation boundaries. As each excavation is completed, surveying will be performed to verify the extent of excavation (both vertical and horizontal) and to clearly mark the boundaries of the excavation for the subsequent area to be excavated. These associated monitoring activities to be performed in relation to the excavation work are addressed in the CQA/QCP.

2.2 Dust

The waste material in the Northern Impoundment should have a high moisture content so dust generation during excavation activities should be minimal. A reagent, such as Portland cement may be mixed with the waste material to solidify it so that it passes the paint filter test for landfill acceptance. Solidification and loading activities are to be performed in a controlled manner to minimize the generation of dust. During the Northern Impoundment RA, the RC will prepare and implement an Air Monitoring Plan, or equivalent, which will provide air monitoring procedures for dust. The Air Monitoring Plan will define what steps would be taken if threshold levels are exceeded. The RC-developed Air Monitoring Plan will also include procedures for dust mitigation and control.

2.3 Stormwater

During the Northern Impoundment RA, the excavation area will be isolated from the surrounding San Jacinto River by a BMP wall, which is described in the Northern Impoundment RD as a double wall BMP system constructed to a height of +9 feet North American Vertical Datum of 1988 (NAVD88). A ramp will be constructed over the south-central portion of the BMP wall to allow access into and out of the excavation area during RA activities.

The RC will be required to develop and implement a SWPPP to manage stormwater and address run-on and run-off from the work site that meets the substantive requirements of the applicable or relevant and appropriate requirements (ARARs) for stormwater management. Stormwater controls will be implemented to prevent migration of impacted material out of the specific area(s) in which excavation is taking place, and also to control and segregate unimpacted stormwater and impacted contact water within the excavation area(s) inside the BMP wall. Water treatment and storage equipment will also be placed in secondary containment.

Preventative measures included in the SWPPP may include grading the area surrounding the excavation to drain surface water away from any open excavations, and/or constructing berms to prevent water from entering an excavation. Additional measures may include diverting surface water in areas adjacent to an excavation to existing surface drainage systems within the BMP wall and requiring that these surface drainage systems be kept open and operational.

Even with surface water run-on controls, water from precipitation and perched water infiltration will accumulate within the excavation area(s). The RC will develop procedures to manage this contact water and may do so by operating and maintaining necessary dewatering equipment to remove the water from the excavations and convey it to a water treatment system.

Detailed plans for soil erosion and sediment controls can be found in the design drawings (Appendix G).

2.4 Turbidity

During the installation of sheet piles to construct the BMP wall, construction-related turbidity may occur in areas outside the exterior of the BMP wall. During the installation and removal of the BMP, turbidity controls will be implemented to mitigate migration of turbidity (if any) from these locations. Upstream and downstream turbidity monitoring will also be implemented to confirm the effectiveness of the turbidity controls. Turbidity monitoring and controls will be detailed further by the selected RC.

2.5 Noise

At the time of the RA, the RC may perform some baseline worker exposure noise monitoring to evaluate noise levels during work activities relative to worker exposure thresholds. Impacts of noise to the surrounding community is expected to be minimal, and it may be possible to address any such potential noise impacts through the timing of work activities. The plan for noise monitoring and controls will be detailed further by the selected RC.

2.6 Odors

It is possible that nuisance odors could occur during the RA excavation activities at the work site. Section 3.6 summarizes some potential odor mitigation and/or control methods that could be utilized, if necessary. The plan for odor monitoring and controls will be detailed further by the selected RC

3. Data Collection and Monitoring Procedures

Per the AOC, the purpose of Site-wide monitoring during the RA is to monitor the extent and potential migration of contaminated media on-Site and to determine whether performance standards are being achieved. The RC will adopt procedures for collecting baseline data on affected media within the work site during construction.

3.1 Excavation Performance Verification

The procedures for collecting post-excavation confirmation samples during the RA with respect to the approved clean-up level are described in the FSP. The CQA/QCP also includes procedures to verify that the excavation limits have been achieved.

3.2 Dust Monitoring

Dust monitoring will be performed, as specified in the Air Monitoring Plan to be developed by the RC. Monitoring and mitigation activities that the RC may consider are summarized below.

3.2.1 Monitoring Instruments and Procedures

Real-time air monitoring for dust may be performed using dust monitors placed at the perimeter of the work site, typically upwind and downwind of Northern Impoundment RA activities. All instruments would be calibrated and operated in accordance with the manufacturer's specifications or applicable test/method specifications.

3.2.2 Monitor Design and Frequency

Data from the dust monitors may be collected throughout Northern Impoundment RA activities that involve ground disturbance and during solidification activities. If concentrations of dust are above the thresholds to be defined in the RC's Air Monitoring Plan, RC personnel will be required to implement dust suppression measures. It is anticipated that

the RC would establish action levels based on real-time monitoring to prevent the exceedance of the applicable standard (Occupational Safety and Health Administration [OSHA] permissible exposure limit [PEL] of 15 milligrams per cubic meter over an 8-hour time weighted average [TWA]).

3.2.3 Suppression and Mitigation Measures

The RC will be required to implement dust suppression and mitigation measures at the work site, as needed to minimize airborne dust produced from construction activities. Dust suppression measures may include, but would not be limited to:

– Reduction of speed of reagent addition during potential solidification mixing.
– Reduction of work site traffic.
– Reduction in speed of work site traffic.
– Watering or misting of work site roads.
– Use of appropriate truck covers.
– Applying or maintaining aggregate, or similar, for work site roads.

3.3 Stormwater

Stormwater monitoring will be performed in accordance with the SWPPP which will be developed by the RC. The intent of the RC's SWPPP will be to identify controls that will be implemented to minimize stormwater impacts. These controls may include, but would not be limited to, the following:

– Minimize the disturbed area and protect natural features and soil:
  - Limit access to the impacted area.
  - Use only approved access roads.
– Control stormwater flowing onto and through the work site.
– Stabilize disturbed soils promptly.
– Establish perimeter controls.
– Retain any potential pollutants within the work site.
– Inspect and maintain all controls.
– Immediately repair or remove any leaking equipment.
– Inspect equipment prior to entering or leaving the jobsite to ensure that it is clean and free of soils, vegetation, and trapped debris.

3.3.1 Stormwater Construction Components

The anticipated sequences of construction activities that may be adopted and stormwater controls that may be installed at the work site may include, but would not be limited to, the following:

– Silt fencing, straw wattles or similar devices may be installed around the perimeter of work site excavation areas before any stripping of the Time Critical Removal Action (TCRA) cap and liner.
– Straw/hay bales or wattles may be installed in drainage ways present throughout the work site.
– Construction entrance(s) may be constructed to minimize the tracking of sediment off-Site and onto adjacent roadways.
– Straw/hay bales and filter fabric or filter bags may be used for filtration.
– Secondary containment should be utilized around the wastewater treatment system.
– Secondary containment and/or berms and silt fencing may be utilized around the staging and/or dewatering areas for excavated and stockpiled material.

3.3.2 Stormwater Monitoring and Maintenance Procedures

Stormwater monitoring and maintenance procedures will be outlined in the SWPPP. Procedures may be identified in the SWPPP and as applicable, used to monitor stormwater controls within the BMP wall and other areas of the work site to ensure compliance with the construction SWPPP. Those procedures may include but are not limited to the following:

– Identify areas where maintenance of stormwater controls is needed.
– Remove sediment from any installed commercial grade silt fences that may be installed when sediment buildup reaches one-third the height of the fence.
– Re-anchor and/or repair commercial grade silt fences, hay/straw bales, and other stormwater controls, as necessary.
– Conduct follow-up inspections to determine the success of stabilization measures.
– Remove sediment from construction entrances, if the rock becomes clogged, and re-grade and add additional rock, as necessary to retain efficiency.

3.3.3 Stormwater Inspection Procedures

Under the SWPPP, a qualified person who is knowledgeable regarding work site conditions will be designated to conduct inspections during Northern Impoundment RA activities. This inspector, subject to the provisions of the SWPPP, would be given authority to address activities that may result in non-compliance with the SWPPP.

The responsibilities of the inspector may include, but would not be limited to:

– Verifying compliance with the requirements of the SWPPP and any other applicable ARARs.
– Verifying that the limits of authorized project work areas and locations of access roads are properly marked before clearing.
– Verifying the location of drainage and irrigation systems.
– Identifying stabilization needs in all areas.
– Verifying that temporary erosion controls are properly installed and maintained daily, as necessary.
– Inspecting and verifying restoration of areas of disturbed or bare soil.
– Inspecting areas used for storage of materials that are exposed to stormwater.
– Inspecting temporary structural erosion and sediment control devices/measures.
– Inspecting areas where vehicles enter or exit the work site.
– Verifying the repair of all ineffective, temporary, erosion control measures as soon as reasonably practicable but no longer than 24 hours after identification.

3.3.4 Responses to Changed Conditions

The RC will be required to amend the SWPPP as needed during the Northern Impoundment RA.

3.4 Turbidity Monitoring During Construction

The Northern Impoundment RD will provide for a BMP wall to be constructed with excavation activities to take place within the BMP wall. The BMP will be placed outside the TCRA cap, and thus will not be driven through material to be excavated. Turbidity controls (e.g., turbidity curtains) are planned to be utilized during installation and removal of the BMP wall as a construction best practice to limit the potential for turbidity outside the BMP wall associated with such activities. Turbidity monitoring is also planned to be utilized during installation and removal of the sheet piles as an additional construction best practice, in which downstream turbidity values would be compared to upstream values. The turbidity monitoring program is an additional conservative measure being implemented with respect to BMP wall

installation and removal. Health and safety procedures for monitoring activities will be followed during work in the field. Details of the monitoring are presented below.

3.4.1 Ambient Turbidity Monitoring

To develop the turbidity monitoring plan to be utilized during BMP installation/removal, as described below, the Respondents collected and evaluated data to understand spatial and temporal variability in ambient turbidity. Ambient turbidity data were collected in accordance with the *Supplemental Data Collection - Ambient Turbidity Measurements Plan* (Ambient Turbidity Work Plan) dated October 6, 2021 (GHD, 2021). Prior to its finalization, elements of the Ambient Turbidity Work Plan were discussed with the EPA, the Texas Commission on Environmental Quality (TCEQ), and the U.S. Army Corps of Engineers (USACE) at Technical Working Group (TWG) Meetings held on June 4, August 5, and August 30, 2021. After addressing EPA comments on an initial draft plan, the Ambient Turbidity Work Plan was submitted to EPA on October 6, 2021, and was approved by EPA in a letter dated October 15, 2021 (EPA, 2021).

3.4.1.1 Equipment and Methods

The ambient turbidity monitoring equipment consisted of a buoy with solar charging capabilities, a sonde for collecting turbidity readings, and a dual anchor to the riverbed. The equipment also contained a built-in Global Positioning System (GPS) to record and transmit its location. A total of four monitors were deployed in December 2021 to collect turbidity measurements in Nephelometric Turbidity Units (NTUs) using a data logger transmitted in 10-minute intervals to a database using cellular telemetry. The turbidity monitors (A, B, C, and D) were deployed at selected locations around the Northern Impoundment, based upon site-specific considerations, as presented on Figure 3.1. The location of two velocity monitors is also depicted in Figure 3.1.

Figure 3.1 Monitoring Locations

GHD sought guidance from the United States Coast Guard on the placement of the monitors and with respect to measures necessary to maintain the visibility of the monitors and avoid disruption of navigation. In addition, GHD coordinated with the Texas Department of Transportation (TxDOT) to minimize interference with planned TxDOT projects in the immediate area. Notification of the proposed locations of the monitors was also provided to the Port of Houston Authority (POHA).

3.4.1.2 Data Review

Data were collected at each of the four locations (A, B, C, and D) from December 1, 2021, to March 28, 2022. The transmitted data were downloaded to a laptop computer for review and processing. The data for each monitor were refined by removing unusable data arising from potentially clogged sensors, not reporting data from periods when no data were transmitted, and not including data collected when the sensor had been unintentionally moved to an inappropriate location (e.g., by barge traffic). Statistics for the refined datasets were calculated. Statistical parameters included the number of samples and minimum, maximum, mean, mode, median and standard deviation. All velocity and turbidity data relied on in the analysis have been provided to the EPA in monthly progress reports submitted per the AOC.

The data were found to be lognormally distributed. The data frequency distribution for Ambient Monitor C shown below in Figure 3.2 is provided as an example. Data obtained from the other three ambient monitors followed a similar distribution.

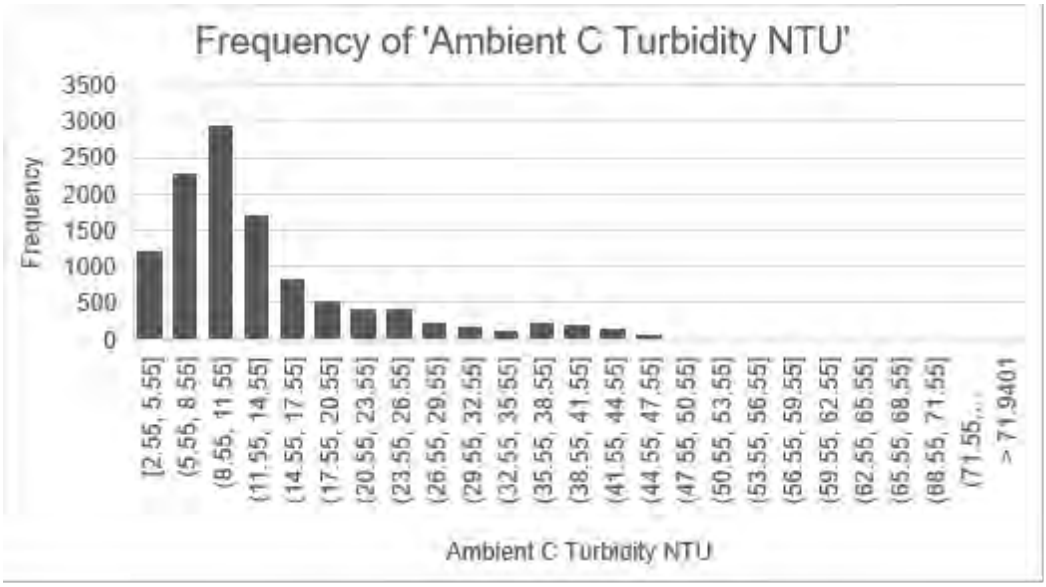

Figure 3.2 Lognormal Distribution of Turbidity for Ambient C Monitor

Therefore, the mean and standard deviations were calculated (Table 3.1) according to Contaminated Sites Statistical Applications (CSSA, 2001) guidance using the equations, below.

$$m = exp\left(\alpha + \frac{\beta^2}{2}\right)$$

$$\alpha = log(m) - \left(\frac{\beta^2}{2}\right)$$

$$s = m\sqrt{exp\,(\beta^2) - 1}$$

$$\beta = \sqrt{log\,(1 + (\frac{s}{m})^2)}$$

Where all logarithms are natural (base e), and
m = mean
s = standard deviation
α = mean of the logarithms
β = standard deviation of the logarithms

Table 3.1 Derivation of Mean and Standard Deviation for Lognormally Distributed Data

Device	Mean of the Logarithmic Values, α	Standard Deviation of the Logarithmic Values, β	Data Mean, m	Data Standard Deviation, s
Ambient A	4.05	0.61	69.13	46.42
Ambient B	2.87	0.69	22.38	17.47
Ambient C	2.45	0.58	13.71	8.67
Ambient D	2.64	0.62	16.98	11.63

3.4.2 Remedial Action Monitoring Locations

Turbidity in NTUs will be monitored twice daily during BMP installation and removal activities. As evidenced from data from the ambient velocity monitors deployed concurrently with the ambient turbidity monitors, surface water flow in the

vicinity of the TCRA cap is predominantly along the northern edge in a south-easterly direction and along the eastern edge in a southerly direction. The southern edge is connected to the Interstate Highway-10 (I-10) road embankment and the western edge is a backwater area with little to no discernible flow, especially to its south. Barring any extreme events, these flows are expected to be similar during BMP installation and removal activities. Proposed turbidity monitoring locations for use during the RA are depicted in Figure 3.3 and are described below.

When BMP installation and removal activities are being performed outside of the western edge and northern edges of the TCRA cap, the background location will be located approximately 500 feet upstream (towards the north) of the northwest corner of the cap at approximately Location A. This is within the range noted for other sites, such as 985 feet in the Hudson River and 1,000 feet during work on the Passaic River in 2013. When BMP installation and removal activities are being performed outside of the eastern edge of the TCRA cap, the background location will be upstream of the northeast corner of the TCRA cap at approximately Location B. Additionally, the monitor that was installed at Location A would be moved to the new Location A and the data collected from that monitor would be used as reference information.

When BMP construction and removal activities are being performed outside of the western edge and northern edges of the TCRA cap, the monitoring location will be downstream (towards the east) of the northeast corner of the cap at approximately Location B. When BMP construction and removal activities are being performed outside of the eastern edge of the TCRA cap, the monitoring location will be downstream (towards the south) just below the I-10 Bridge on the eastern side of the River at approximately Location C. A fourth monitor designated D, would be an early indication monitor that will be maintained in close proximity to the BMP installation and removal work as it progresses. The data from this monitor will be used internally by the RC to provide an early indication of changes in typical turbidity readings as part of an adaptive management approach.

Figure 3.3 Proposed RA Turbidity Monitoring Locations

3.4.3 Turbidity Monitoring Threshold

The turbidity monitoring threshold presented in this section will form the basis for evaluating turbidity levels at the applicable monitoring location during BMP installation and removal activities. The State of Texas does not have a quantitative surface water quality standard for turbidity. Ambient turbidity data collection was performed as described above to characterize local ambient turbidity levels and distribution. The results from the ambient investigation are presented in Table 3.2, below.

Table 3.2 Ambient Turbidity Monitoring Data Summary and Statistics

Device	Data Interval	Number of Data Points	Minimum (NTU)	Maximum (NTU)	Mode (NTU)	Median (NTU)	Mean (NTU)	Standard Deviation	3X Standard Deviation
Ambient A	12/1/21 - 3/20/22	11,823	3.85	873	55	50	69.13	46.42	139
Ambient B	12/1/21 - 2/23/22	10,080	3.25	569	12	17	22.38	17.47	52.4
Ambient C	12/1/21 - 1/6/22 & 2/11/22 - 3/28/22	11,682	2.55	245	12	11	13.71	8.67	26.0
Ambient D	12/1/21 - 2/24/22	12,175	2.85	103	10	14	16.98	11.63	34.9

Notes:
NTU - Nephelometric Turbidity Units
Average standard deviation for mean > 50 = 46.42 NTU (Ambient A).
Average standard deviation for means < 50 = 12.57 NTU (Ambient B, C, and D).
Three times the average (of Ambient B, C, and D) standard deviation for means < 50 = 37.71 = ~ 38 NTU.

The data in Table 3.2 were used to inform the turbidity threshold that is proposed to be utilized during sheet pile installation and removal associated with the Northern Impoundment RA. The downstream turbidity threshold when background turbidity is less than 500 NTUs was based on background plus three standard deviations of the data collected during implementation of the ambient turbidity monitoring program (Table 3.2). The use of three standard deviations in establishing a threshold is based on a suggestion made by the USACE representative during the August 5, 2021, TWG meeting in which the ambient turbidity monitoring program was discussed.

The turbidity threshold that will apply at the monitoring location are as follows:

– Turbidity should not be greater than 38 NTUs above background if background is less than 50 NTUs. This represents three times the average of the standard deviations for Ambient Monitors B, C, and D because the mean ambient turbidity for all three monitors were less than 50 NTUs.

– Turbidity should not be greater than 139 NTUs above background if background is at, or greater than, 50 NTUs but less than 500 NTUs. This represents three times the standard deviation for Ambient Monitor A because the mean ambient turbidity for this monitor was greater than 50 NTUs.

– Turbidity should not be greater than 10 percent above background if background is at, or greater than, 500 NTUs. This approach was based on levels utilized for the TCRA and at other sites and guidance from other states (e.g., Washington).

Turbidity levels at the monitoring location will trigger response actions, as specified in Section 3.4.6.

3.4.4 Flow Reversals and Sampling Depth

Flow reversals as a result of tides are common during low-flow periods. During BMP installation and removal activities, the RC will use a tide chart to help determine flow direction and this will be taken into consideration when comparing turbidity data from a monitoring location with that of background. The data suggests that there are not levels of downstream turbidity that are sufficiently high as to materially affect the upstream readings when flow reverses.

At each station, monitoring will only occur at one depth because the turbidity monitoring instrument can only be attached at a fixed depth to the buoy. Therefore, the monitors will be placed at mid-depth. Also, they will not be deployed in water that is less than 10 feet in depth to avoid becoming stuck in the riverbed if the water level drops significantly.

3.4.5 Monitoring Frequency and Schedules

Monitoring will be conducted twice a day during active construction (sheet pile installation and removal). If turbidity levels are below the thresholds in Section 3.4.3 during the first week of monitoring (during both installation and removal of sheet piles), the monitoring frequency will be reduced to once a day thereafter. The occurrence of turbidity levels above the thresholds in Section 3.4.3 or visual turbidity observations will trigger a transition back to intensive (two times per day) monitoring to evaluate turbidity.

3.4.6 Responses to Monitored Turbidity Levels

If turbidity values at the monitoring location are above the specified threshold, turbidity will be monitored more frequently (e.g., on an hourly basis through the remainder of the work day) and the RC will investigate the source of the turbidity and address it as appropriate (if within RC's control).

3.4.7 Quality Assurance and Maintenance

The quality assurance objective for turbidity monitoring is to collect data that are of known and acceptable quality so that the goals of the monitoring plan can be achieved. Appropriate field quality control procedures will be followed. These procedures include following standard instrument operation procedures, monitoring the equipment on a routine basis and routinely cleaning the glass face over the sensor. The data will also be periodically reviewed on behalf of the RC by a person with the appropriate qualifications.

3.4.8 Methods and Equipment

The same or similar turbidity monitoring equipment utilized in the ambient data collection activities will be utilized during the RA. Turbidity measurements will be collected using a data logger and transmitted to a database using cellular telemetry in NTUs. The transmitted data will be downloaded to a laptop computer for review and processing. This will serve as documentation of the collected turbidity readings. Additional documentation will include weather conditions and descriptions of any actions taken in response to consistently elevated turbidity readings.

3.5 Noise

The *Preliminary (30%) Remedial Design - Northern Impoundment submittal* (30% RD; GHD, 2020), identified the potential for high noise and vibration levels during the installation of the BMP wall. The pile types being considered in the 30% RD were very robust (H-piles and 6-ft diameter king piles) and were being driven to significant tip depths (as deep as -93 ft [NAVD88]). The type of pile driver necessary for those conditions would have been very large and would have resulted in significant noise and vibration levels. The pile types in the current Northern Impoundment RD will likely be smaller piles driven to much shallower depths. Thus, the associated noise and vibration to install them should be at acceptable levels.

3.5.1 Baseline Noise Monitoring

While noise is not anticipated to be a concern, the selected RC may conduct baseline noise monitoring at the start of RA construction work, consistent with typical construction best practices. Baseline monitoring may include installing sensor stations in the vicinity of the work site for up to 2 weeks to collect data and establish baseline noise and vibration levels. This data may be used to inform equipment selection and/or operation activities.

3.6 Odors

There is the potential that Northern Impoundment RA excavation activities may result in odors. Odors are most likely to occur during excavation activities when previously buried material and soils are unearthed and exposed to air. The

main concern with respect to odors is the potential impact on adjacent businesses, the neighboring community, and workers.

If odors are present that would create a nuisance to the public or a concern for worker health and safety, the RC may implement on-Site measures to counter, suppress, or mask the associated nuisance, as outlined in the RC's Air Monitoring Plan. These measures may include, but would not be limited to the following:

– Deployment of odor suppressing foams.
– Perimeter misting systems.
– Perimeter masking desiccants.
– Minimization of the number and/or size of stockpiles.
– Minimization of the size and time excavations remain open.

4. Documentation

This section addresses the monitoring documentation requirements for the environmental media to be monitored. The RC will be required to maintain necessary documentation, including survey records related to the excavation areas and records required by plans the RC adopts. Dust monitoring records and notes regarding the maintenance of stormwater controls should also be maintained at the work site. The frequency and types of documentation required for dust and stormwater monitoring should be outlined by the RC in the Air Monitoring Plan and the SWPPP, respectively. Turbidity monitoring records and notes regarding maintenance of the monitoring devices and/or the turbidity controls should be maintained at the work site.

5. References

– CSSA. Contaminated Sites Statistical Applications Guidance Document No. 12-4. DISTRIBUTION MODELS - A guide for reviewers, data analysts and interpreters on the statistical properties of common distribution models, April 2001.
– EPA, 2018. Administrative Settlement Agreement and Order on Consent for Remedial Design. U.S. EPA Region 6, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Docket. No. 06-02-18. In the matter of: San Jacinto Waste Pits Superfund Site, Harris County, Texas. International Paper Company and McGinnes Industrial Maintenance Corporation, Respondents. April 2018.
– EPA, 2021. Letter to C. Munce, GHD Services Inc., regarding approval of Supplemental Data Collection - Ambient Turbidity Measurements Plan, dated October 15, 2021. U.S. Environmental Protection Agency.
– GHD, 2020. *Preliminary 30% Remedial Design - Northern Impoundment*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. May 28, 2020.
– GHD, 2021. *Supplemental Data Collection - Ambient Turbidity Measurements Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency, Region 6. October 6, 2021.

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Attachment 6

Construction Quality Assurance/Quality Control Plan - Northern Impoundment

Attachment 6 - Construction Quality Assurance/Quality Control Plan (CQA/QCP) - 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

June 27, 2022

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Table index

Table 1 Summary of Construction Quality Assurance and Quality Control Inspections
Table 2 Summary of Construction Quality Assurance and Quality Control Tests

1. Introduction

The Construction Quality Assurance/Quality Control Plan (CQA/QCP) was prepared by GHD Services Inc. (GHD), on behalf of International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents) for the Northern Impoundment of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site). This CQA/QCP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06-02-18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables to accompany the Pre-Final 90% Remedial Design for the Northern Impoundment (Northern Impoundment 90% RD) submittal to the EPA.

The CQA/QCP describes activities to be used to verify that the construction of the Northern Impoundment remedial action (RA) will satisfy applicable plans, specifications, and related requirements, including quality objectives. This CQA/QCP identifies construction quality control (CQC) activities that will take place during the Northern Impoundment RA. The remedial contractor (RC) will implement such CQC activities to measure and control the characteristics of the materials and the construction methods during the Northern Impoundment RA to demonstrate that the materials and construction meet the requirements of the RD technical specifications and drawings, as specified in a plan to be prepared by the RC. CQC activities to be implemented by the RC during the Northern Impoundment RA are identified in the individual specification sections provided in the technical specifications, included as Appendix H to the Northern Impoundment 90% RD.

References in this CQA/QCP to the "work site" are to the Northern Impoundment and references to "Implementing Party" are to the entity(ies) implementing the RA for the Northern Impoundment. Prior to initiation of Northern Impoundment RA activities, each selected RC will either update this CQA/QCP or develop its own CQA/QCP to address the components outlined in this document.

1.1 Relationship to Supporting Plans

The CQA/QCP should be considered in combination with the other supporting plans. The Site-Wide Monitoring Plan (SWMP) describes the procedures for monitoring to prevent the potential spread of dust generated during construction, procedures to control and monitor turbidity in the river during the installation and removal of the sheet pile wall to be constructed outside the boundaries of the Northern Impoundment (referred to herein as the Best Management Practice [BMP] wall), monitoring of stormwater controls, and monitoring of noise and odor during RA activities. Field and analytical quality procedures are described in the Quality Assurance Project Plan (QAPP). The Field Sampling Plan (FSP) provides the procedures for post-excavation confirmation soil sampling, as well as the sampling procedures for the treated water from the water treatment system, the historic berm material that may be re-used on-site, and the imported fill that may be used during implementation of the Northern Impoundment RA. The Transportation and Off-Site Disposal Plan (TODP) describes the procedures for on-site management and loading of excavated material to be disposed of off-site during the Northern Impoundment RA, the transportation routes for off-site shipments from the Northern Impoundment, and measures to be implemented if needed to protect communities that may be affected by the shipments.

2. Project Organization

The CQA team will implement the QA functions independently of the other aspects of the construction effort. The team members collectively should possess all required credentials, capabilities, and experience required to provide QA support with respect to Northern Impoundment construction activities. The project organization will be identified after the RC is selected and therefore the roles and responsibilities have not been completely defined in this plan. However, the CQA team will likely be comprised of personnel with the following roles and general responsibilities:

- ***CQA Engineering Project Manager*** - Provide overall construction QA project oversight.
- ***Engineer*** - Provide field management of CQA/CQC activities.
- ***Quality Assurance Official (QA Official)*** - Perform CQA audits.
- ***CQA/CQC Support Personnel*** - Conduct CQA tests and inspections as directed by the Engineer.
- ***QA/QC Laboratories*** - These will each be an Approved Laboratory (as described in the QAPP) that will provide QA/QC testing of materials used in the construction activities, as requested by the Engineer.
- ***RC*** - Carry out construction activities according to technical specifications and design drawings and implement the CQC requirements specified in the technical specifications.

It is contemplated that a single member of the CQA team may serve in multiple roles (for example, that the QA Official may also be the CQA Engineering Project Manager and/or Engineer).

3. Inspection and Testing Activities

3.1 Inspections

Throughout the period of construction, the quality of work completed and material used for each of the work tasks is to be confirmed through regular inspections of the work, conducted by the RC and verified by the Engineer and CQA support personnel, on a periodic basis.

The exact inspections to be conducted will be determined by the RC and Engineer and incorporated into the updated CQA/QCP, but suggested inspections are included in Table 1 and outlined below:

i. Daily inspections of the work in progress.
ii. Inspection of material as it is delivered to the work site to check for damage during delivery.
iii. Comparison of the material delivered to the work site to the design specifications to ensure that the proper material has been delivered to the work site.
iv. Inspections of materials after they have been installed to ensure that there has not been damage during installation and that the materials have been installed in accordance with the construction specifications.
v. Inspections of backfill placement and compaction in accordance with the appropriate specifications.
vi. Inspections of post-construction survey data to ensure the excavation extents are meeting the site clean-up standards.
vii. A pre-construction inspection should be performed prior to beginning work on any major work task. A pre-construction inspection may include the following:
    a. A review of contract and specification requirements to ensure that all materials and/or equipment have been tested according to applicable standards and specifications.
    b. Steps to ensure that provisions have been made to provide required quality control testing.
    c. An examination of the work area to ascertain that all applicable/necessary preliminary work tasks have been completed/performed.

i. General inspections should be performed by the Engineer periodically as the amount of work completed warrants an inspection. A general inspection may include the following:
    a. Examination of the quality of workmanship.
    b. Testing of materials for compliance with the technical specifications/requirements.
    c. Identification of any omissions.
    d. Assessment of general progress of work performed.

The inspections performed by the Engineer should be recorded in the work site log book as described in Sections 4.1 and 7.0 and copies of inspection reports should be maintained on-site.

The components of each work task to be inspected, the types of inspections required, and the frequency of the inspections are summarized in Table 1.

3.2 Testing

In addition to the daily inspections of the construction progress, material testing is to be carried out, as required. Material testing should be performed to ensure compliance with manufacturer specifications and design criteria as presented in the technical specifications. The exact testing to be conducted will be determined by the RC and Engineer and incorporated into the updated CQA/QCP, but suggested testing is included in Table 2.

Table 2 includes suggested testing requirements, methods of testing, testing frequency, key acceptance criteria, test sample sizes and locations, and potential corrective measures for each of these work task components and submittals (i.e., test reports, certificates verifying material quality/workmanship, etc.). For convenience, the Northern Impoundment RA QC requirements specified in the technical specifications and the CQA requirements are also included in Table 2. It is suggested that CQA testing be conducted at a frequency of testing that is equal to ten percent of the Northern Impoundment RA QC testing requirements. If a particular test of a material or work activity fails more than twice, the Engineer should increase the rate of QA testing, based on their professional judgement, as deemed appropriate for the material/activity.

Northern Impoundment RA QC testing should be performed by the RC to measure and control the characteristics of the materials and installation procedures used during the Northern Impoundment RA activities in order to demonstrate that the materials and installations meet the requirements of the technical specifications. Details of the Northern Impoundment RA QC requirements are specified in the technical specifications.

4. Inspection Documentation

This section details the recommended documentation requirements for the CQA/QCP.

4.1 Work Site Log Book

The Engineer should record construction quality control activities in a work site log book to be kept on-site.

4.2 Photographic Documentation

As part of the log, and in accordance with Section 3.6(d) of the SOW, photographs should be taken and date-stamped showing significant construction activities. Daily photographs should be submitted to the Engineer weekly, at a minimum. A separate photographic log should be maintained by the Engineer, with Contractor photographs included where not duplicative.

4.3 CQA Instrument Calibration

The CQA support personnel should record calibrations of testing equipment in an instrument calibration inspection log book, maintained on-site by the Engineer. Actions taken, as a result of recalibration should be recorded in the inspection log book, as described in the next section.

4.4 Inspection and Test Log Book

It is recommended that all observations and CQA quality control field tests should be recorded by the CQA support personnel into an inspection and test log book and that such log books be numbered sequentially. Separate log books may be kept for various work task components (i.e., soil, liners). These books should be kept on-site and maintained by the Engineer. For efficiency, the RC may formulate necessary inspection items into checklist forms for completion in the field.

5. Problem/Corrective Action Reports

A problem is defined as material or workmanship that does not meet the technical specifications or drawings. Any problem/corrective action reports prepared with respect to such a problem should be cross-referenced to specific inspection entries in the inspection and test log book in which the problem was identified. The RC should devise a process for identifying and addressing any problem, as defined above, to the satisfaction of the Engineer and the Implementing Party.

6. Project Meetings

Project meetings should be held during the construction period as a measure intended to ensure that all tasks are accomplished according to schedule and are completed in accordance with the technical specifications and drawings. As discussed below, these project meetings may be attended by the QA Engineering Project Manager, Engineer, CQA support personnel, RC, the Implementing Party, EPA and/or Texas Commission on Environmental Quality (TCEQ) (subject to availability), and other agencies, subcontractors or project support personnel, as appropriate. The timing and attendance, at such meetings will be determined by the RC and the Engineer and incorporated into the updated CQA/QCP, but suggested project meetings and their purposes are included below:

– ***Pre-Construction Meeting*** - To review the general project scope, resolve any uncertainties in the technical specifications and construction drawings, and to review levels of responsibility, reporting requirements, and health and safety requirements.
– ***Daily Progress Meetings*** - To review daily work schedule, plans, and progress. This meeting is intended to be an informal meeting held at the start and/or at the end of each work day.
– ***Weekly Progress Meetings*** - To provide an update of work schedule progress on a weekly basis, and identify schedule slippages and efforts required to get back onto schedule, if required.
– ***Monthly Progress Meetings*** - To provide a construction progress update to EPA and/or TCEQ. May be conducted informally by conference call and may be combined with a weekly meeting, if appropriate.
– ***Problem or Work Deficiency Meetings (As Needed)*** - To address any problems or deficiencies which have occurred or are likely to occur.

The detailed topics to be discussed and the attendees for these meetings will be determined based on the activities that are occurring and the overall project structure and organization. For all meetings held during the Northern Impoundment RA, with the exception of the daily progress meetings, minutes may be prepared and distributed to all attendees.

7. QA/QC Documentation and Storage of Records

Prior to initiation of Northern Impoundment RA activities, the RC will be required to establish a process for creation and retention of QA/QC documentation. Documentation that may need to be retained on-site includes the following:

– RD and design drawings.
– Technical specifications.
– CQA and Northern Impoundment RA QC inspection and test results.
– RC submittals.
– RC's work site log book including photo documentation.
– CQA inspection log book.
– Problem/corrective action reports.

Once the construction is complete, all CQA documents (originals) will be maintained following the records retention requirements applicable to the Northern Impoundment RA.

8. References

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

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
A. Temporary Traffic Control				
• Traffic Control	• Has a Temporary Traffic Control Plan been provided as specified?	• Check Section 01 35 00	• Continuous	• Temporary Traffic Control Plan
• Traffic Control Devices	• Have signs been inspected for legibility, damage, suitability, and location? • Are signs clean, repaired, or replaced to maintain clarity and reflectiveness?	• Check Section 01 35 00	• Continuous	• None
B. Health and Safety				
• Health and Safety Planning	• Are health and safety procedures in place, including equipment, work area and excavation inspections?	• Check Section 1 35 29	• Continuous	• Health and Safety Plan
C. Temporary Facilities and Controls				
• Utilities	• Have utilities been provided as specified and coordinated with local utility providers?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Construction Facilities	• Have temporary construction facilities been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Vehicular Access and Parking	• Has vehicular access and parking been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Barriers and Enclosures	• Have barriers and enclosures been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
• Temporary Controls	• Have temporary controls been provided as specified?	• Check Section 01 50 00 • Visual	• Periodic during installation	• None
D. Temporary Soil Erosion and Sediment Control				
• Erosion Control Items	• Is depth of silt fence embedment in accordance with drawings?	• Visual & check drawings	• Continuous	• Soil Erosion & Sediment Control Plan
	• Are tears or holes present in silt fence fabric?	• Visual	• Continuous	• Product Data
	• Is erosion around and under silt fence present?	• Visual	• Continuous	• None
	• Is sagging or collapse evident?	• Visual	• Continuous	• None
	• Has a Soil Erosion and Sediment Control Plan been provided as specified?	• Check permit	• Continuous	• Soil Erosion and Sediment Control Plan
E. Waste Material Solidification				
• Waste Material Solidification	• Has waste material been dewatered and solidified as specified?	• Check Section 02 55 13	• Continuous	• Solidification Plan • Daily Field Installation Reports • Quality Assurance/Quality Control Plan

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
F. Material Handling and Transportation				
• Material Handling and On-Site Transportation	• Has a Material Handling and On-Site Transportation Plan been provided as specified?	• Check Section 02 61 14	• Continuous	• Material Handling and On-Site Transportation Plan
G. Transportation and Disposal				
• Disposal Equipment	• Is equipment provided as specified?	• Check Section 02 61 16	• Upon delivery	• Operating licenses and permits
	• Is equipment being decontaminated properly?	• Check Section 02 61 16	• Prior to leaving Site and changing to lower impacted waste type	• Transportation and Disposal Plan
	• Are vehicles maintained properly in accordance with 49 CFR 393?	• Visual	• Daily (Periodically)	• Transportation and Disposal Plan
	• Do motor vehicle operator(s) perform a safety inspection of each motor vehicle before it is used and at least once a day?	• Visual	• Continuous	• None
• Disposal of Materials	• Has a Transportation and Disposal Plan been provided as specified?	• Check Section 02 61 16	• Continuous	• Transportation and Disposal Plan
	• Has a Transportation Emergency Response Plan been provided as specified?	• Check Section 02 61 16	• Continuous	• Transportation and Disposal Plan
	• Are materials transported and disposed of to satisfy requirements as specified?	• Check Section 02 61 16	• Continuous	• Transportation and Disposal Proposal • Shipping and Disposal Documents • TSDF Weigh Scale documents
	• Are trucks inspected prior to leaving the Site to transport for disposal at approved TSDFs?	• Visual	• Continuous	• Shipping and Disposal Documents
H. Excavation				
• Excavation Equipment	• Is equipment inspected daily by a qualified person?	• Visual	• Continuous	• Excavation Plan
• Sediment/Soil	• Are excavations being conducted as specified?	• Check Section 31 23 16 and Drawings • Visual	• Periodic during excavation	• Excavation Plan
• Material Handling and Stockpiling	• Is material being handled and stockpiled as specified?	• Check Section 31 23 16 • Visual	• During excavation and stockpiling	• Material Handling and On-Site Transportation Plan
	• Is load packaged, labelled etc. as specified?	• Check Section 31 23 16	• After loading and before leaving Site	• Material Handling and On-Site Transportation
I. Dewatering				
• Dewatering Equipment	• Does equipment meet specifications?	• Check Section 31 23 19 • Visual	• Upon delivery	• Dewatering Plan
	• Has system been installed as specified?	• Check Section 31 23 19 and Drawings	• Periodic during installation	• Dewatering Plan
	• Has equipment and surplus raw materials been removed?	• Visual	• Daily as required	• Dewatering Plan

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
I. Dewatering (cont'd)				
• Sediment/Soil Dewatering	• Is dewatering procedure adequate to contain impacted groundwater?	• Check Section 31 23 19 • Visual	• Periodic during operation	• Dewatering Plan
	• Is material being dewatered as specified?	• Check Section 31 23 19 • Visual	• During staging	• Dewatering Plan
• Sediment/Soil Dewatering (cont'd)	• Is settlement being detected where critical structures or facilities exist immediately adjacent to areas of proposed dewatering.	• Check Section 31 23 19 • Visual	• Periodic during operation	• None
J. Fill				
• Existing Berm Material	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Fill for Between Sheet Pile Walls	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Structural Fill	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results • Analytical data • Product data
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Common Fill	• Does fill meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of fill	• Geotechnical testing results • Analytical data • Product data
	• Has fill been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Sand	• Does sand meet specifications?	• Check Section 31 23 23 and Drawings	• Each source of sand	• Geotechnical testing results • Analytical data • Product data
	• Has sand been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Topsoil	• Does topsoil meet specifications?	• Check Section 31 23 23 • Visual	• Each source of topsoil	• Geotechnical testing results • Analytical data • Product data

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
J. Fill (cont'd)				
• Coarse Aggregate	• Does aggregate meet specifications?	• Check Section 21 23 23	• Each source of aggregate	• Source of aggregate • Geotechnical data • Samples • Suppliers' Certificates
	• Has aggregate been placed as specified?	• Visual • Survey	• Periodic during installation	• Limits of excavation and thickness measurements
• Clearstone	• Does clearstone meet specifications?	• Check Section 31 23 23 • Visual	• Each source of clearstone	• Geotechnical testing results • Analytical data • Product data
• Backfilling Excavations	• Are excavations being backfilled as specified?	• Check Section 31 23 23 and Drawings	• During backfilling	• Geotechnical data • Survey
	• Has horizontal and vertical control been maintained?	• Check Section 31 23 23 • Visual	• After placement	• Analytical results • Test reports
K. Synthetic Materials				
• Materials	• Do materials provided meet specifications?	• Check Section 31 35 26.16	• Each source of geotextile and geomembrane (liner)	• Product data • Manufacture's instructions • Samples
	• Are materials being stored properly?	• Visual	• Upon delivery to Site	• Manufacturer's instructions
• Installation	• Have materials been placed as specified?	• Visual • Survey	• Periodic during installation	• Manufacturer's instructions
	• Are there any visible defects with materials?	• Visual	• After installation is completed	• None
L. Riprap				
• Materials	• Do materials provided meet specifications?	• Check Section 31 37 00	• prior to delivery	• Source Quality Control testing
• Installation	• Have materials been placed to the proper location and depth	• Survey	• Continuous during work	• None
M. Sheet Piles				
• Materials	• Do materials provided meet specifications?	• Check Section 31 41 16	• Upon delivery	• Product data • Mix Design • Test samples in accordance with AI MS-2 • Records
• Installation	• Have sheet piles been inspected prior to and after installation?	• Check Section 31 41 16 and Drawings	• After installation	• Records
	• Have sheet piles been installed as specified?	• Check Section 31 41 16 and Drawings	• After installation	• Certifications

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
N. Chain Link Fences and Gates				
• Materials	• Do materials provided meet specifications?	• Check Section 32 31 13	• Upon delivery	• Product data • Manufacture's instructions
• Installation	• Have chain link fences and gates been installed as specified?	• Check Section 32 31 13 and s Drawings	• After installation	• Certifications
	• Has a final inspection taken place?	• Check Section 32 31 13 and Drawings	• Upon Substantial Performance	• Records
O. Seeding				
• Topsoil Placement	• Has topsoil been placed as specified?	• Check Section 31 23 23 • Visual	• Periodic during placement	• None
	• Has topsoil been lightly surface compacted following seeding?	• Visual	• Periodic following seeding	• None
	• Horizontal and vertical control	• Visual • Survey	• Following placement	• Survey
• Seeding	• Are materials stored properly?	• Visual	• Periodic during storage	• Manufacturer's instructions
	• Does seed, lime, fertilizer, and mulch meet specifications?	• Check Section 32 92 19	• Prior to application	• Source of materials • Product data
	• Has hydroseed, fertilizer, and mulch been applied as specified?	• Check Section 32 93 00 • Visual	• Periodic during application	• Seeding and Erosion Control Plan
	• Have correct quantities of hydroseed, fertilizer, and mulch been placed?	• Check Section 32 93 00 • Visual	• Periodic during placement	• Seed certificates • Fertilizer certificates
	• Have bare spots been rehydroseeded?	• Visual	• Periodic during installation	• None
	• Is height of grass as specified?	• Check Section 32 93 00	• Periodically during maintenance	• None
P. Turbidity Curtain				
• Material	• Have materials been joint inspected upon delivery?	• Visual	• Upon delivery to Work Site	• None
	• Are materials being stored properly?	• Visual	• Periodic during storage	• Manufacturer's instructions
	• Do materials meet specifications?	• Check Section 31 05 19 • Check material property sheets and quality control certificates	• Each source of geotextile • Upon delivery to Work Site	• Product data • Manufacturer's certificates • Samples
• Placement	• Have materials been placed as specified?	• Visual • Survey	• Periodic during installation	• Manufacturer's instructions
	• Are there any visible defects, tears or overlaps with materials?	• Visual	• After installation is completed	• None

Table 1

Summary of Construction Quality Assurance and Quality Control Inspections
Northern Impoundment Remediation
San Jacinto River Waste Pits Site
Harris County, Texas

Key Work Task Component to be Inspected	Key Items to be Checked During Inspection	Type of Inspection	*Frequency of Inspection	Contractor Submittals to Resident Engineer
Q. Process Equipment				
• Materials	• Do materials provided meet specifications?	• Check Division 40 Sections	• Upon delivery	• Product data • Shop drawings • Certifications and Reports
• Installation	• Has process equipment been installed as specified?	• Check Division 40 Sections and Drawings	• After installation	• Records
	• Has a final inspection taken place?	• Check Division 40 Sections and Drawings	• Upon Substantial Performance	• Records
R. Wastewater Treatment System				
• Materials	• Do materials provided meet specifications?	• Check Section 46 07 01	• Upon delivery	• Product data • Shop drawings • Certifications and Reports
• Installation	• Has process equipment been installed as specified?	• Check Section 46 07 01 and Drawings	• After installation	• Records
	• Has a final inspection taken place?	• Check Section 46 07 01	• Upon Substantial Performance	• Records

Notes:
*Frequencies of inspections are considered minimum and will be increased or added to as determined necessary by the Engineer.
1. The quality assurance/quality control inspections included herein are suggested in accordance with the technical specifications.

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
A. Health and Safety (Section 01 00 00)									
• Reportable Quantities	• Identification of hazardous chemicals	• State accredited method	• Throughout the Works	• In accordance with State accredited criteria	• As determined by Engineer	• See Section 01 35 29	• On Site	• 50	• 50
B. Waste Material Sonification (Section 02 55 13)									
• Waste Material Solidification	• In accordance with accepted QA/QC Plan	• State accredited method	• Throughout the Works	• In accordance with State accredited criteria	• As determined by Engineer	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
C. Geotextiles for Earthwork (Section 31 05 19.13)									
• Geotextile G1									
Material	• Tensile Strength	• ASTM D4632/D4632M	• See standard	• 220	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Elongation at Break	• ASTM D4632/D4632M	• See standard	• 50	• As above	• As above	• As above	• 100	• 0
	• Static CBR Puncture	• ASTM D4632/D4632M	• See standard	• 575	• As above	• As above	• As above	• 100	• 0
	• Trapezoid Tear Strength	• ASTM D4533	• See standard	• 90	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 80	• Minimum once every month	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 1.26	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Permeability	• ASTM D4491	• See standard	• 0.30	• As above	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 95	• As above	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
• Geotextile G2									
Material	• Tensile Strength	• ASTM D4632/D4632M	• See standard	• 320	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Elongation at Break	• ASTM D4632/D4632M	• See standard	• 50	• As above	• As above	• As above	• 100	• 0
	• Static CBR Puncture	• ASTM D4632/D4632M	• See standard	• 900	• As above	• As above	• As above	• 100	• 0
	• Trapezoid Tear Strength	• ASTM D4533	• See standard	• 125	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 100	• Minimum once every month	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 0.80	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Permeability	• ASTM D4491	• See standard	• 0.29	• As above	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 60	• As above	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
• Geotextile G3									
Material	• Tensile Strength @ 2% strain (MD)	• ASTM D4595	• See standard	• 720 (typical) 600 MARV	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Tensile Strength @ 2% strain (CD)	• ASTM D4595	• See standard	• 1200 (typical) 1020 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Tensile Strength @ 5% strain (MD)	• ASTM D4595	• See standard	• 2100 (typical) 1800 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Tensile Strength @ 5% strain (CD)	• ASTM D4595	• See standard	• 2580 (typical) 2256 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 50 (typical) 40 (MARV)	• Minimum once every month	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 1.2 (typical) 0.9 (MARV)	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 85 (typical) 75 (MARV)	• As above	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
	• Pore Size	• ASTM D6767	• See standard	• 85 (typical) 75 (MARV)	• Minimum once every 100,000 sq ft	• As above	• As above	• 100	• 0
	• Interaction Coefficient	• ASTM D6706	• See standard	• 0.89	• As above	• As above	• As above	• 100	• 0
	• Factory Sewn Seam	• ASTM D4884.D4884M	• See standard	• 2700	• As above	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50
D. Fill (Section 31 23 23)									
• Existing Berm Material	• Particle Size	• ASTM D6913/D6913M and D7928	• Minimum 1 test per 2,500 cu yd (clay)	• Per ASTM standard	• Sample size per ASTM collected at source	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
Material	• Soil Classification	• ASTM D2487	• Minimum 1 test per 2,500 cu yd (clay)	• Any except poorly graded and except CH, MH, OL, and OH	• As above	• As above	• Analytical Laboratory	• 100	• 0
	• Chemical Analysis	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List.	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
		Parameter — *Methods*							
		TAL[3] Metals — SW-846 6020A/7471A							
		Hexavalent Chromium — SW-846 7196A							
		Cyanide — SW-846 9010/9012							
		TCL[2] Volatiles — SW-846 8260B							
		TCL Semi-Volatiles — SW-846 8270D							
		TCL Pesticides — SW-846 8081B							
		Polychlorinated Biphenyls — SW-846 8082A							
		Herbicides — SW-846 8151A							

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
D. Fill (Section 31 23 23) cont'd									
• Aggregate Types A1 and A2 (Course Aggregate and Clear Stone) *Material*	• Grain Size	• ASTM C117, C136/C136M, and D6913/D6913M	• Minimum 1 test per 1,000 cu yd	• Per ASTM standard	• Sample size per ASTM collected at source	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• Chemical Analysis *Parameter* TAL[3] Metals Hexavalent Chromium Cyanide TCL[2] Volatiles TCL Semi-Volatiles TCL Pesticides Polychlorinated Biphenyls Herbicides	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List. *Methods* SW-846 6020A/7471A SW-846 7196A SW-846 9010/9012 SW-846 8260B SW-846 8270D SW-846 8081B SW-846 8082A SW-846 8151A	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
• Soil Type S1 and S2 (Fill Between Sheet Pile Walls and Structural Fill) *Material*	• Particle Size	• ASTM D6913/D6913M and D7928	• Minimum 1 test per 2,500 cu yd (clay)	• Per ASTM standard	• Sample size per ASTM collected at source	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• Soil Classification	• ASTM D2487	• Minimum 1 test per 2,500 cu yd (clay)	• Any except poorly graded and except CH, MH, OL, and OH	• As above	• As above	• Analytical Laboratory	• 100	• 0
	• Chemical Analysis *Parameter* TAL[3] Metals Hexavalent Chromium Cyanide TCL[2] Volatiles TCL Semi-Volatiles TCL Pesticides Polychlorinated Biphenyls Herbicides	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List. *Methods* SW-846 6020A/7471A SW-846 7196A SW-846 9010/9012 SW-846 8260B SW-846 8270D SW-846 8081B SW-846 8082A SW-846 8151A	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
• Soil Type S3 (Common Fill) and Sand	• Chemical Analysis *Parameter* TAL[3] Metals Hexavalent Chromium Cyanide TCL[2] Volatiles TCL Semi-Volatiles TCL Pesticides Polychlorinated Biphenyls Herbicides	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List. *Methods* SW-846 6020A/7471A SW-846 7196A SW-846 9010/9012 SW-846 8260B SW-846 8270D SW-846 8081B SW-846 8082A SW-846 8151A	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0
• Imported Topsoil *Material*	• Particle Size	• ASTM D422	• Minimum 1 test per 2,500 cu yd	• Per ASTM standard	• Sample size per ASTM collected at source	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• pH	• ASTM D4972	• Minimum 1 test per 2,500 cu yd	• Per ASTM standard	• Sample size per ASTM	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
	• Organic Content	• ASTM D2974	• Minimum 1 test per 2,500 cu yd	• Per ASTM standard					
	• Phosphorus, potassium, calcium, and magnesium	• In accordance with State accredited criteria	• Minimum 1 test per 2,500 cu yd						
	• Chemical Analysis *Parameter* TAL[3] Metals Hexavalent Chromium Cyanide TCL[2] Volatiles TCL Semi-Volatiles TCL Pesticides Polychlorinated Biphenyls Herbicides	• (1) EPA SW 846. (2) TCL: Target Compound List. (3) TAL: Target Analyte List. *Methods* SW-846 6020A/7471A SW-846 7196A SW-846 9010/9012 SW-846 8260B SW-846 8270D SW-846 8081B SW-846 8082A SW-846 8151A	• Minimum 1 test per source	• In accordance with State accredited criteria	• Sample collected from stockpile at source	• As above	• Analytical Laboratory	• 100	• 0

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
D. Fill (Section 31 23 23) cont'd									
• Imported Common Fill, Topsoil and Aggregate *Placement*	• Particle Size Analysis	• ASTM DD6913/D6913M and ASTM D7928 or ASTM C117 and ASTM C136	• Minimum 1 test per source	• Per ASTM standard	• Sample size per ASTM	• Locate suitable material and re-test	• Analytical Laboratory	• 100	• 0
E. Geomembranes (Section 31 05 20)									
• LLDPE Liner *Material*	• Thickness	• ASTM D5199	• As above	• nominal 60 mil • lowest individual of 10 values (-10% or 54 mil)	• As per GRI GM 17	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 0	• 0
	• Formulated Density	• ASTM D1505/D792	• As above	• 0.939 g/cu cm MARV *	• As above	• As above	• As above	• 0	• 0
	• Break Strength	• ASTM D6693, Type IV	• As above	• 152 pounds per inch	• As above	• As above	• As above	• 0	• 0
	• Break Elongation	• ASTM D6693, Type IV	• As above	• 800 pounds per inch	• As above	• As above	• As above	• 0	• 0
	• 2% Modulus (max.)	• ASTM D1004	• As above	• 2400 pounds per inch	• As above	• As above	• As above	• 0	• 0
	• Tear resistance	• ASTM D1004	• As above	• 22 pounds	• As above	• As above	• As above	• 0	• 0
	• Puncturing resistance	• ASTM D4833/D4833M	• As above	• 56 pounds	• As above	• As above	• As above	• 0	• 0
	• Carbon Black Content	• ASTM D5596	• As above	• 2 to 3 percent	• As above	• As above	• As above	• 0	• 0
	• Oxidation Induction Time Standard High Pressure	• ASTM D8117 • ASTM D5885/D5885M	• As above • As above	• 100 minutes • 400 minutes	• As above • As above	• As above • As above	• As above • As above	• 0 • 0	• 0 • 0
	• Oven Aging at 85 degrees Celsius Standard High Pressure	• ASTM D5721 and ASTM D8117 • ASTM D5885/D5885M	• As above • As above	• 35 percent • 60 percent	• As above • As above	• As above • As above	• As above • As above	• 0 • 0	• 0 • 0
	• UV Resistance	• ASTM D7238 and D5885/D5885M	• As above	• 2 to 3 percent	• As above	• As above	• As above	• 0	• 0
Installation	• Seam shear test on test seam	• Field tensiometer	• Minimum 2 times per day for each seaming equipment. Minimum once per day per seamer.	• 1,200 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• Sample coupons to be 1 inch wide, collected from test seam	• See Section 31 05 20, Article 3.7	• On Site	• 100	• Engineer will observe Contractor QC Tests
	• Seam peel test on test seam	• Field tensiometer	• Minimum 2 times per day for each seaming equipment. Minimum once per day per seamer.	• 1,000 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• As above.	• See Section 31 05 20	• On Site	• 100	• Engineer will observe Contractor QC Tests
	• Destructive seam shear test	• Field tensiometer	• Minimum 1 test per approximately 500 L.F. of production seam or at least one per seam	• 1,200 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• As above.	• See Section 31 05 20	• As above	• 100	• Engineer will observe Contractor QC Tests
	• Destructive seam peel test	• Field tensiometer	• Minimum 1 test per approximately 500 L.F. of production seam or at least one per seam	• 1,000 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• As above.	• See Section 31 05 20	• As above	• 100	• Engineer will observe Contractor QC Tests
	• Non-destructive pressure test	• Pressure test GRI Test Method GM6	• 100% of production seams	• Pressurize air channel to between a min. 20 psi and max. 30psi • Maintain pressure for a 2 minute stabilization period • Maximum allowable pressure drop is 4 psi over 2 minutes	• 100% of production seams	• See Section 31 05 20	• In-place	• 100	• Engineer will observe Contractor QC Tests
	• Destructive seam shear test (if field test acceptable)	• ASTM D4437 (Mod.) per NSF Std. 54	• Minimum one test per approximately 500 L.F. of production seam or at least one per seam	• 1,200 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• Sample size per ASTM. Sample locations on fixed 500-foot increments; possible intermediate locations	• See Section 31 05 20	• Geosynthetic laboratory	• 0	• 100
	• Destructive seam peel test (if field test acceptable)	• ASTM D4437 (Mod.) per NSF Std. 54	• Minimum one test per approximately 500 L.F. of production seam or at least one per seam	• 1,000 psi minimum strength and seam must not delaminate. Four of 5 replicate samples must pass. *	• Sample size per ASTM. Sample locations on fixed 500-foot increments; possible	• See Section 31 05 20	• Geosynthetic laboratory	• 0	• 100
F. Riprap (Section 31 37 00)									
6. Riprap (Section 31 37 00) *Material*									
	• Gradation Testing	• per spec & OPSS.PROV 1004	• As per specification	• Per ASTM standard	• 1 sample per stone type	• See Section 31 05 20	• Geosynthetic laboratory	• 0	• 100
	• Bulk Specific Gravity	• ASTM C127	• As per specification	• Per ASTM standard	• 1 sample per stone type	• See Section 31 05 20	• Geosynthetic laboratory	• 0	• 100
G. Sheet Piles (Section 31 41 16)									
• Sheet Piles *Material*	• Material Testing	• ASTM A6/A6M	• See standard	• Per ASTM standard	• Sample size per ASTM	• Per ASTM standard	• Per ASTM standard	• 100	• 0

Table 2

Summary of Construction Quality Assurance and Quality Control Tests
Northern Impoundment
San Jacinto River Waste Pits Site
Harris County, Texas

Work Task Component to be Tested	Type of Test	Standard	Frequency of Tests per Construction Specifications	Key Acceptance Criteria	Sample Size/Location	Potential Corrective Measures	Test Location	Percentage of Test Frequency by Contractor	Percentage of Test Frequency by Engineer
H. Seeding (Section 32 92 19)									
• Seed									
Material									
	• Nitrogen	• per spec	• As per specification	• Per ASTM standard	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Phosphorus	• per spec	• As per specification	• Per ASTM standard	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Potash	• per spec	• As per specification	• Per ASTM standard	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Soluble Salt Content	• per spec	• As per specification	• Per ASTM standard	• 1 sample per source	• As per specification	• Per ASTM standard	• 100	• 0
	• Organic Matter Content	• ASTM D2974	• As per specification	• Per ASTM standard	• 1 sample per source	• 2% to 10%	• Per ASTM standard	• 100	• 0
	• Acidity Range (pH)	• ASTM D4972	• As per specification	• Per ASTM standard	• 1 sample per source	• 5.5 to 7.5	• Per ASTM standard	• 100	• 0
	• Clay	• ASTM D2487	• As per specification	• Per ASTM standard	• 1 sample per source	• 10% to 15%	• Per ASTM standard	• 100	• 0
	• Lime	• ASTM DC602	• As per specification	• Per ASTM standard	• 1 sample per source	• 80% calcium carbonate (min.)	• Per ASTM standard	• 100	• 0
I. Turbidity Curtain (Section 35 49 25)									
• Geosynthetics									
Material									
	• Tensile Strength	• ASTM D4632/D4632M	• See standard	• (Wrap) 350, (Fill) 250	• Minimum once every 100,000 sq ft	• Removal, reinstallation and re-testing	• Analytical Laboratory	• 100	• 0
	• Elongation at Break	• ASTM D4632/D4632M	• See standard	• 34	• As above	• As above	• As above	• 100	• 0
	• Mullen Burst Strength	• ASTM D3786/D3786M	• See standard	• 510	• As above	• As above	• As above	• 100	• 0
	• Trapezoid Tear Strength	• ASTM D4533	• See standard	• 65	• As above	• As above	• As above	• 100	• 0
	• Puncture Strength	• ASTM D4833/D4833M	• See standard	• 140	• As above	• As above	• As above	• 100	• 0
	• Permittivity	• ASTM D4491	• See standard	• 0.04	• As above	• As above	• As above	• 100	• 0
	• Permeability	• ASTM D4491	• See standard	• 0.01	• As above	• As above	• As above	• 100	• 0
	• Water Flow Rate	• ASTM D4491	• See standard	• 5	• As above	• As above	• As above	• 100	• 0
	• Apparent Opening Size (AOS)	• ASTM D4751	• Once per month minimum	• 70	• Minimum once every month	• As above	• As above	• 100	• 0
	• Ultra Violet Resistance	• ASTM D4355	• Once per month minimum	• 80/500	• As above	• As above	• As above	• 100	• 0
Installation	• Conformance Testing	• ASTM D4354	• See standard	• In accordance with State accredited criteria	• Minimum once every 100,000 sq ft	• As above	• As above	• 50	• 50
	• Acceptance Testing	• ASTM D4759	• See standard	• In accordance with State accredited criteria	• As above	• As above	• As above	• 50	• 50

Notes:

* Minimum criteria, unless identified otherwise.

1. The quality assurance/quality control tests included herein are suggested in accordance with the technical specifications.

MARV = Minimum Average Roll Value
AI = Asphalt Institute
ASTM = ASTM International

GHD

Attachment 7

Institutional Controls Implementation and Assurance Plan - Sand Separation Area

Attachment 7 - Institutional Controls Implemntation and Assurance Plan - Sand Separation Area

Draft 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

June 27, 2022

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Figure index

Figure 1 Sand Separation Area

Figure 2 Sand Separation Area and Fleeting Operations

1. Introduction

This Institutional Control Implementation and Assurance Plan (ICIAP) for the Sand Separation Area (SSA) of the San Jacinto River Waste Pits Superfund Site in Harris County, Texas (Site) was prepared by GHD Services Inc. (GHD), on behalf of the International Paper Company (IPC) and McGinnes Industrial Maintenance Corporation (MIMC; collectively referred to as the Respondents). This ICIAP was prepared pursuant to the requirements of the Administrative Settlement Agreement and Order on Consent for Remedial Design (AOC), Docket No. 06 02 18, with an effective date of April 11, 2018 (United States Environmental Protection Agency [EPA], 2018). The AOC includes a Statement of Work (SOW) which requires supporting deliverables, including this plan, to accompany the Pre-Final 90% Remedial Design for the Northern Impoundment (Northern Impoundment 90% RD) submittal to the EPA.

This ICIAP describes a plan to implement, maintain and monitor institutional controls (ICs) at the SSA. *Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0- 89, EPA/540/R- 09/001 (EPA, 2012a), Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites*, OSWER 9200.0-77, EPA/540/R-09/02 (EPA 2012b), and as applicable, Texas Commission on Environmental Quality (TCEQ) guidance, were considered in developing this ICIAP.

The ICIAP is a dynamic document that is expected to require updating at or before the conclusion of the Northern Impoundment Remedial Action (RA).

1.1 Plan Objectives

The overall objectives of the ICIAP are to:

– Identify ICs to meet requirements applicable to the SSA as referenced in the 2017 ROD (EPA, 2017) and in the SOW that is part of the AOC (EPA, 2018).

– Establish and document the activities and entities responsible for implementing, maintaining, enforcing, terminating, and/or modifying the ICs, as appropriate.

2. Overview

2.1 Background

The SSA is located northwest of the Northern Impoundment in the San Jacinto River along the east bank of the property now owned by Houston Fleeting Services, LLC (Houston Fleeting; See Figure 1). This area is where sand was separated from dredged material during historical sand mining operations.

The Remedial Investigation (RI) conducted in 2010 and 2011 identified two locations in the SSA in which dioxins and furans concentrations in surface sediment were above 100 nanograms per kilograms (ng/kg) $TEQ_{DF,M.}$ The ROD identified Monitored Natural Recovery (MNR) as the preferred remedial alternative for river sediments in the SSA. MNR occurs through physical, chemical, and biological processes that transform, immobilize, isolate, and/or remove contaminants in sediment until they no longer pose risk to human and/or ecological receptors. Deposition of uncontaminated sediment is expected to be the primary process for MNR for the SSA. The rationale for selection of MNR as the preferred alternative was that the $TEQ_{DF,M}$ concentrations in the SSA are relatively low and there are data indicating that the area is subject to sediment deposition. Modeling of hydrodynamics and sediment transport conducted as part of the Remedial Investigation/Feasibility Study (RI/FS) suggests that the reach of the river adjacent to the SSA is an area of sediment deposition. The selected remedy for the SSA also includes the use of ICs to prevent disturbance of the area to enable the success of MNR. MNR is expected to effectively maintain concentrations of dioxins and furans in the SSA below concentrations protective of human health and the aquatic environment.

Analytical and isotopic sampling were conducted in the SSA during the 2019 Second Phase Pre-Design Investigation (PDI-2), as further described in Section 6 of the Design Criteria Report in the Northern Impoundment 90% RD package. Results of the sampling event indicate that the SSA has generally been depositional since the mid-1960s. Concentrations of $TEQ_{DF, M}$ in the nine analytical sampling locations were found to be below the risk-based protective level of 30 ng/kg, which the ROD identified as protective of both human health and the aquatic environment, in the top 24 inches of all but one of the SSA sampling locations. This is consistent with the results observed during the RI.

2.2 Selected Remedial Alternative

As specified in the ROD, MNR will be implemented as the remedy in the SSA, as detailed in the SSA MNR Plan (Appendix J, Attachment 9). MNR activities moving forward will include additional monitoring at the nine locations sampled during PDI-2 to (1) confirm that concentrations of $TEQ_{DF,M}$ remain below 30 ng/kg at depths less than 24 inches at the eight locations identified in PDI-2 and (2) and further monitoring of concentrations at the one location exceeding 30 ng/kg.

This SSA 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, the additional two sampling events should provide four datasets spanning a minimum of 20 years (assuming Northern Impoundment remedial activities are completed by 2030) that will be available to assess the effectiveness of MNR. If the clean-up level concentrations are not achieved at all depth intervals for both post-remediation monitoring events, the MNR program will be reviewed and modified, as appropriate.

2.3 Potential for Disturbance and Perturbation

Propeller wash from boat traffic in the San Jacinto River and in the vicinity of the SSA could potentially disturb sediments during the monitoring period. Hurricanes and high-energy storm events are natural events that could perturb sediment of the SSA. These anthropogenic and natural sources of disturbances and perturbation could deposit sediment contaminated with dioxins and furans from upstream and other off-site sources and/or scour surface sediment to depths that expose deeper sediment with elevated concentrations of dioxins and furans.

It is Respondents' understanding that the owner of the neighboring property, Houston Fleeting Services, LLC (Houston Fleeting), operates under a US Army Corps of Engineers (USACE) Fleeting Permit dated April 6, 2020 (SWG-2010-00364), issued to, a prior owner of the property, San Jacinto River Fleet LLC. That permit identifies seven "tiers" in which fleeting of barges is permitted. A portion of the Tier 4 fleeting area, shown on Figure 2 attached, directly overlaps with the boundary of the SSA.

2.4 Key Stakeholders

Coordination with several key stakeholders with ownership/interest in this area will be necessary to determine the appropriate mechanism to establish ICs in the SSA.

– Port of Houston Authority (POHA) - The majority of the approximately nine-acre SSA is located in Tax Assessor Parcel Number (APN) 97 which is owned by the POHA.
– The US Army Corps of Engineers (USACE)
– US Coast Guard (USCG)
– Houston Fleeting - Houston Fleeting operates an active barge fleeting operation in the vicinity of the Northern Impoundment and owns the upland property to the west of the SSA. Respondents understand that it conducts those operations under the USACE Fleeting Permit referenced above.
– EPA
– TCEQ

2.5 Existing Institutional Controls (E.G., Zoning)

There are no current ICs in place for the SSA. There is, however, an agreement between the EPA, USACE, and TCEQ that any sort of dredging activities or activities conducted under the Clean Water Act Section 404 and Rivers and Harbors Action Section 10 within a defined watershed area around the Northern Impoundment (including the SSA) be reviewed and approved by the joint parties.

3. Planned Remedial Action Institutional Controls

Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and protect the integrity of a remedy by limiting land or resource use. The ROD contemplates that a special sampling and analysis protocol will be established with respect to activities in the SSA. The ROD states as follows:

> *"A special sampling and analysis protocol will be required for each permittee conducting activities under the Clean Water Act Section 404 and Rivers and Harbors Action Section 10 within a defined watershed area around the remediated areas. This protocol will be monitored and enforced by a joint EPA, USACE, and TCEQ agreement and will ensure that permitted dredging activities do not impact site cleanup. These restrictions will protect the integrity of the sand separation area and limit potential disturbance and resuspension of buried sediment. Alert property owners of the presence of subsurface materials exceeding cleanup levels in the sand separation area. As a result of the long-term persistence of dioxin, it is anticipated that the institutional controls will be essentially permanent measures."*

The primary IC for the SSA will be the protocol referenced in the ROD. The Respondents contemplate working with the applicable stakeholders to develop the protocol, and after it has been approved by EPA, addressing steps required to implement the protocol.

The Respondents will also evaluate whether additional administrative controls (i.e., USCG-imposed restrictions to maritime activities in the area) may be required. Those controls could involve restrictions on maritime activity or possible signage as an engineering control. It is anticipated that these administrative and engineering controls would be discussed with the larger group of stakeholders prior to the start of the RA.

4. Enforcement

Restrictions on access and maritime activity will require coordination with the POHA and coordination with and enforcement through the USCG and the USACE. Assistance from the EPA and/or USACE and USCG will be needed to enforce physical and administrative restrictions to the area.

5. Reporting

Reporting will be required as outlined in the SSA MNR Plan, which is Appendix J, Attachment 9 of the Northern Impoundment 90% RD package. At which time the goals of MNR are achieved for the SSA, the need for ICs will be re-evaluated.

6. References

– EPA. 2012a. Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites, OSWER 9355.0-89, EPA/540/R-09/001.

– EPA. 2012b. Institutional Controls: A Guide to Preparing Institutional Controls Implementation and Assurance Plans at Contaminated Sites, OSWER 9200.0-77, EPA/540/R-09/02.

– EPA, 2017. Record of Decision, San Jacinto River Waste Pits. Harris County, Texas. EPA ID: TXN000606611. U.S. Environmental Protection Agency, Region 6. Dallas, Texas. October 2017.

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

Attachment 8

Transportation and Off-Site Disposal Plan - Northern Impoundment

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 track 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 261and 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

0 175 350
Feet

Coordinate System:
NAD 1983 StatePlane Texas South
Central FIPS 4204 Feet

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

GIS File: \\ghdnet\ghd\US\Baton Rouge\Projects\562\11215131\GIS\Maps\Deliverables\MISC001\11215131_202007_MISC001_GIS004.mxd

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Attachment 9

Monitored Natural Recovery Monitoring Plan - Sand Separation Area

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 (^{137}Cs), and lead-210 (^{210}Pb) at nine sample locations.

Sediment for analysis of dioxins and furans was collected at depth intervals of 0-30 cm (0-12 inches), 30 to 60 cm (12-24 inches), 60 to 120 cm (24-48 inches), and 120 to 180 cm (48 to 72 inches) below the sediment/surface water interface. Samples were analyzed for 17 dioxins and furans and percent solids. Toxic equivalents were calculated using toxicity equivalency factors (TEF) for mammalian receptors ($TEQ_{DF,M}$).

Samples for analysis of ^{137}Cs and ^{210}Pb were collected at depth intervals of 2.5 cm from the sediment/surface water interface to a depth of 82.5 cm. Eleven intervals were sampled. ^{137}Cs was released into the environment as a result of atmospheric testing of nuclear devices beginning in 1954 with a peak in 1963. Because natural occurrence is extremely rare and its presence can be related to a specific period of time, ^{137}Cs is useful in dating sediments. ^{210}Pb is naturally occurring and radioactivity of ^{210}Pb is used to estimate relative time and rates of sediment deposition.

Radioactivity of ^{137}Cs was below detection limits at all depths at all sample locations, which suggests that sediment in the depth intervals sampled (82.5 cm) has been deposited since the mid-1960s. Accumulation of 82.5 cm of sediment over the period from 1963 to 2019 (56 years) indicates an overall deposition rate of 1.5 cm per year (cm/year). Radioactivity of ^{210}Pb indicates that deposition is occurring in areas of the SSA away from the shore, whereas little, if any, deposition is occurring along the shoreline. Estimated deposition rates range from 0.77 cm/year to 3.5 cm/year. Radioactivity of ^{210}Pb suggests that some areas may be 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.
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– 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.

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