Deepwater Horizon MC252

Comprehensive Liquids Waste and Materials Management Plan

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1 INTRODUCTION

1.1 BACKGROUND

In response to the Deepwater Horizon rig incident, originating in the Mississippi Canyon Block 252 (MC 252) of the Gulf of Mexico, emergency response oil spill cleanup activities are being performed that will result in waste generation, in addition to oil recovery and processing. The anticipated waste generation activities may include, but are not limited to: oil skimming, oil collection (e.g., use of absorbents), decontamination of cleanup equipment, as well as other shoreline remediation and wildlife rehabilitation activities related to oil spill cleanup. Solid Waste Management is managed under the *Deepwater Horizon (MC-252) Incident Final Solid Waste Management Plans*, (Houma Sector approved June 14, 2010 and Mobile Sector approved June 24, 2010) and liquids are managed under this Comprehensive Liquid Waste and Material Management Plan (LWMMP) as directed by the EPA in the Recovered Oil, Contaminated Materials and Liquid Solid Wastes Management Directives for Houma Incident Command and Mobile Sector (collectively referred to as the "Waste Directives"), dated June 29, 2010.

The LWMMP outlines the liquid management procedures and expectations to support proper classification, handling, staging, storage, manifesting, transportation, disposal/recycling of the liquids (waste and recovered products) generated from the spill cleanup activities, and potential reuse/recycling opportunities, conducted in support of MC 252 incident clean-up operations. Oil recovery is the preferred management method for oily liquids generated by spill cleanup activities. Under federal and state regulations, oily liquids destined for recovery are not solid wastes until recovery is complete. The point of waste generation for these materials is after oil recovery and residuals are generated for disposal. In most cases the oil recovery facility will be the point of waste generation. Depending on contractual arrangements with the oil recovery facility, either the facility or BP will arrange for waste characterization and disposal of recovery residuals.

For materials that will be disposed of, a waste classification must be determined pursuant to federal and state regulations. Although most of the wastes generated from the spill are exempt from the federal definition of hazardous waste due to the exploration and production (E&P) exemption (see 40 CFR 261.4(b)(5)), these wastes must be sampled to meet facility acceptance criteria and state permit requirements. In addition, sampling and analysis is being performed to provide information to response workers, EPA, states and the public regarding the chemical properties of the materials being managed during the response. Specific sampling and analysis requirements are listed in the *Waste Sampling Plan.*

The LWMMP will be implemented in accordance with applicable local, state and federal laws and regulations. Additional or revised information regarding site-specific waste management activities, procedures, and locations may be provided as revisions to this plan to accommodate the needs of the MC252 clean-up operations. Amendments or revisions to this plan may occur only as specified by the federal on-scene coordinator (FOSC), and procedurally outlined in the Recovered Oil, Contaminated Materials and Liquid and Solid Wastes Management Directive, June 29, 2010 (Waste Directive).

As requested in the Waste Directive the Waste Sampling Plan, Waste Tracking System/Reporting Plan, and the Community Outreach Plan are submitted separately from this document.

1.2 WASTES ADDRESSED

Oily liquid and liquids will be characterized in accordance with requirements of the facilities selected for recycling (primarily oil) or waste disposal, as defined in the facility's permit requirements and applicable federal and state regulations. Classification of the liquid streams will be determined based on generator knowledge, and/or sampling analysis results. The estimated volume of each waste stream and reclaimable/recyclable material, is unknown due to the unique and dynamic conditions of this incident and will depend on the extent of oil spill impact areas, and duration of the cleanup.

2 WASTE STREAM IDENTIFICATION, CHARACTERIZATION, AND MANAGEMENT

Recovery, reuse or recycling of materials will be evaluated and implemented as applicable and practical. As the understanding of the liquid materials being generated is better understood, alternative technologies such as reuse and recycling of the materials will be evaluated through proof-of-concept pilot studies. It is a priority of the Unified Area Incident Command to implement recycling and reuse programs, where appropriate, and to minimize waste disposal. The following preferred hierarchy of liquid waste and materials management will be used, as applicable.

	Examples
Source Reduction	Decanting
Reuse/Recycling	Use of Oil Recovery Facilities
Treatment	POTW, Waste Water Treatment Plants
Disposal	UIC Underground Injection Wells

2.1 WASTE STREAM IDENTIFICATION AND CHARACTERIZATION

The majority of oil-contaminated waste that is generated from clean-up operations related to the MC-252 incident will be classified as E&P exempt. However, in order to comply with the permit requirements of waste/reclamation facilities, wastes will be sampled and analyzed to determine waste characteristics and classifications in order to verify the material meets facility-specific acceptance criteria, understand the constituents of the material, and to complete facility-specific waste profiles. Additional testing may be done to determine the best treatability standards for reclamation facilities. Periodic non-regulatory required waste sampling and analysis will also provide additional information to response workers and the public regarding the chemical and physical properties of materials that are generated and managed during the response.

The general process for materials management flow is presented in Table 2.1-1

Table 2.1-1: Waste/Material Management Flow

Generation Location or Retrieval Activity	Waste/Material Type	Verification / Manifesting	Transport	Quantity and Quality?	Disposition
Operations Staging Areas	Solid Wastes	On-site consolidation, transfer to waste staging area for further consolidation and manifesting	Roll-off box	Generally not sufficient quantity of uniform material to be considered for recycling	Approved landfill
Vessels of Opportunity Deployment Locations	Solid Wastes Oily Solids	On-site consolidation, transfer to waste staging area for further consolidation and manifesting	Roll-off box	Generally not sufficient quantity of uniform material to be considered for recycling	Approved landfill
On-Shore Decontamination Stations	Solid Wastes Oily Solids Liquids Oily Liquids	On-site consolidation, transfer to waste staging area for further consolidation and manifesting	Roll-off box (solids) Vacuum truck (liquids)	Generally not sufficient quantity of uniform material to be considered for recycling	Approved landfill (solids) Approved recycling, treatment, or disposal facility (liquids); water is separated, treated and discharged via POTW.
Shore-line Cleanup Operations	Solid Wastes Oily Solids	On-site consolidation and manifesting, or transfer to waste staging area for further consolidation and manifesting	Roll-off box	Oily solids that are uniform and have sufficient quantity of oil for recovery are sent for recycling	Approved landfill (solids); oily solids may segregated for potential future recovery efforts
Skimming Operations	Oily Solids Liquids Oily Liquids	On-site consolidation, transfer to waste staging area for further consolidation and manifesting	Barge or vessel	Materials that are uniform and have sufficient quantity of oil for recovery are sent for recycling	Approved landfill (solids) Approved recycling facility; oily solids (e.g., sorbent boom) may be centrifuged and separated oil sent for recycling Approved recycling, treatment, or disposal facility (liquids); water is separated, treated and discharged via POTW.

Notes:

- Oily Liquid - Oil and water mixtures or emulsions (e.g., from skimming or oil recovery operations)
- Liquid - Primarily water that may have an oily sheen or contain minor amounts of free oil droplets (e.g., decanted water, storm water, decontamination water, treated water, etc.)
- Oily Solid - Oil-impacted solid materials that may include debris, vegetation, protective clothing, etc., collected during cleanup activities
- Solid Waste - Non-oiled, solid materials that may include household-type garbage, debris, vegetation, protective clothing etc., collected during cleanup activities
- Recyclable Materials - Plastic, metal waste, etc.

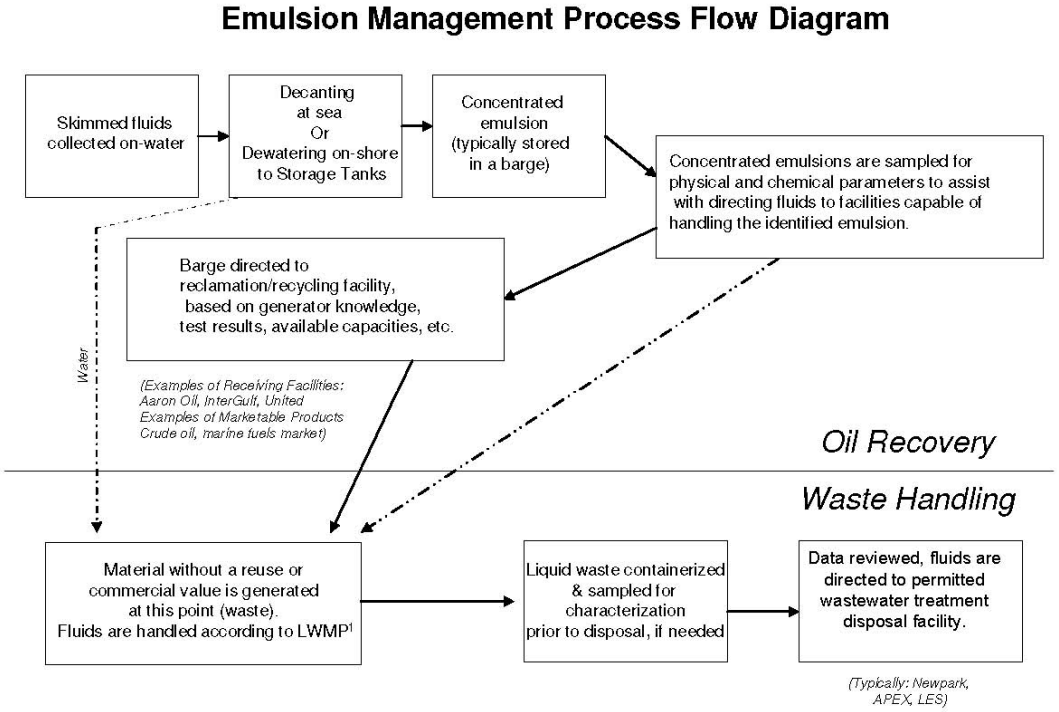
Liquids, including new waste streams, will be analyzed for the constituents identified in the *Waste Sampling Plan* that is being submitted under separate cover in response to the Waste Directives. Additional laboratory analyses for chemical and physical properties will be performed on specific waste streams, depending on the source of generation, treatment and disposal facility requirements, and use of the data for treatability studies or for testing alternative recovery and reuse technologies.

2.1.1 Management of Oily Emulsion Materials

Oil or emulsified oily fluids that are expected to be reclaimed, and not determined to be a waste, analyses will be performed to determine the recovery process and/or type of facility most appropriate to handle the material. Figure 2.1.1-1 illustrates the process flow for

skimming operations to collect and manage recoverable fluids, how data is collected to assist in evaluating the material, how the barges are routed, when waste streams are potentially generated after recovery/reclamation processing, and how wastes are sampled and directed.

Figure 2.1.1-1



[1] On occasion entire contents of a barge are sold to a reclaimer. In such cases the reclaimer is responsible for managing any waste generated and is considered the generator of the waste and is therefore not covered in this plan

Fluids slated for oil recovery by the emulsion breaking process are routed to a variety of oil recovery/reclamation facilities. Each facility is unique in its processes, equipment, procedures, operational constraints, ability to handle certain materials, and their permit conditions and constraints. Continual research is underway to find additional facilities, processes, and capacity. Therefore a simplified table or chart of the process is not possible to present. A generalized description of the process can be summarized as follows:

- Material is heated;
- Emulsion breaking agents are added;
- Material is allowed to settle; and,
- Recovered oil is centrifuged.

These general steps are conducted at different times, configurations, and operating parameters based on the uniqueness of each facility. Also, the uniqueness of each load of fluid that is handled (i.e. viscosity, percent oil, etc.) dictates customization of operational methods. Emulsion breaking agents are selected based on the reclaimer's professional judgment and the data collected for the unique load.

Table 2.1.1-1 outlines some of the physical and chemical testing that takes place to help understand each unique barge of fluids in preparation for the emulsion breaking process.

Table 2.1.1-1 Parameters for the Evaluation of Emulsified Fluids

Standard: run on vessel composites from mixing U-M-L compartment grabs	**General testing required for proper measurement, shipping, and storage decisions**
Test	Method
Density	Various
Hydrogen Sulfide, vapor	D 5705
Hydrogen Sulfide, liquid	UOP-163
Kinematic viscosity @ 2 temps (prefer 30 and 50 C)	Various
Pour Pt	Various
Water content by distillation	D 4006
Sediment by extraction	D 4870
Fuel Oil Test Slate	**Use to test dry oil to determine marketability or identify options**
Test	Method
Test Slate 1	See above
Flash Point	Various
Ash	ISO 6245
TSA	ISO-10307
micro carbon residue	Various
ICP for: sodium, aluminum, calcium, zinc, phosporus	IP-470, etc.
Sulfur	various
Refinery Crude Test Slate	**Use to help refineries determine if recovered oil can be processed at their unique facility**
Test	method
Test Slate 1	see above
Sulfur	Various
Salt	D 6470
ICP for: sodium, aluminum, calcium, zinc, phosphorus	IP-470, etc.
Simulated distillation	D 7169
Organic chlorides	D 4929
Nitrogen	Various
Nickel	Various
vanadium	Various
Iron	Various
asphaltenes, heptane insolubles	D6560
Acid Number	D664
Free Water	BSW

2.1.2 Stormwater and Decontamination Fluids

Most decontamination sites have closed loop water treatment systems that are designed to treat/recycle generated fluids onsite. During rain events excess water may accumulate and may need to be containerized and transported offsite as waste or at some sites discharged through permits to the local POTW.

An example of this is seen at the Theodore Dock south of Mobile, AL. At this location, a modular treatment unit has been constructed (Clean Harbors, Inc. decontamination unit) to treat excess decontamination water and stormwater. Effluent through this system is discharged via a state SID permit to the local POTW.

A second modular system has been constructed at the dock in Theodore by Clean Harbors to handle water generated during offshore skimming operations. This system has been constructed but only recently tested in a closed loop manner where analytical samples were collected in preparation for obtaining a National Pollutant Discharge Elimination System (NPDES) permit from Alabama Department of Environmental Management (ADEM). No discharge from this system has occurred to date and no discharge is planned until a NPDES permit is obtained from ADEM.

2.1.3 Decanted and Dewatered Fluids

During oil skimming operations, the objective is to collect oil with a minimal amount of water. Decanting operations on water are conducted under the approval and permitting of the incident's Unified Command. The mix of oil and water that is collected offshore is stored in an appropriate container and the water that settles out is decanted back to sea while the container is still offshore. Once the container reaches shore fluids are offloaded and either routed as a waste for possible deep well injection or the fluid is transported to a reclamation facility.

2.1.4 Regional POTW Assessment to Handle Increased Loading from the Incident

In June 2010, in preparation for handling liquid wastes related to the MC 252 incident, the C.C. Williams Waste Water Treatment Plant (POTW) in Mobile County, Alabama, was evaluated by its owner the Mobile Area Water and Sewer System (MAWSS) and their engineering firm Tetra Tech (included in Appendix C). The purpose of this study was to evaluate additional loading that their system might be placed under by potential discharge from two industrial treatment facilities (APEX and Liquid Environmental Solutions). The report determined that the plant could handle an additional 200,000 gpd of "high strength" waste without significant effect. It appears that expected salinity levels would not significantly affect plant operations. This study demonstrates that the existing POTWs in Alabama should be able to handle increased loading as long as they evaluate the process, flow, and adjust their sampling procedures to insure effective and efficient operation of the POTW.

2.2 WASTE STREAM MANAGEMENT

Liquid wastes will be managed appropriately from the point it is generated until the final disposal or recycle/reuse of the material. Figure 2.2-1 presents the process flow of likely types of materials and the general management process from generation through the final disposition of the liquid removed from offshore. Subsequently, Figure 2.2-2 addresses the management of nearshore liquids and Figure 2.2-3 addresses the management of onshore liquid processes.

Figure 2.2-1

Offshore Liquids Management

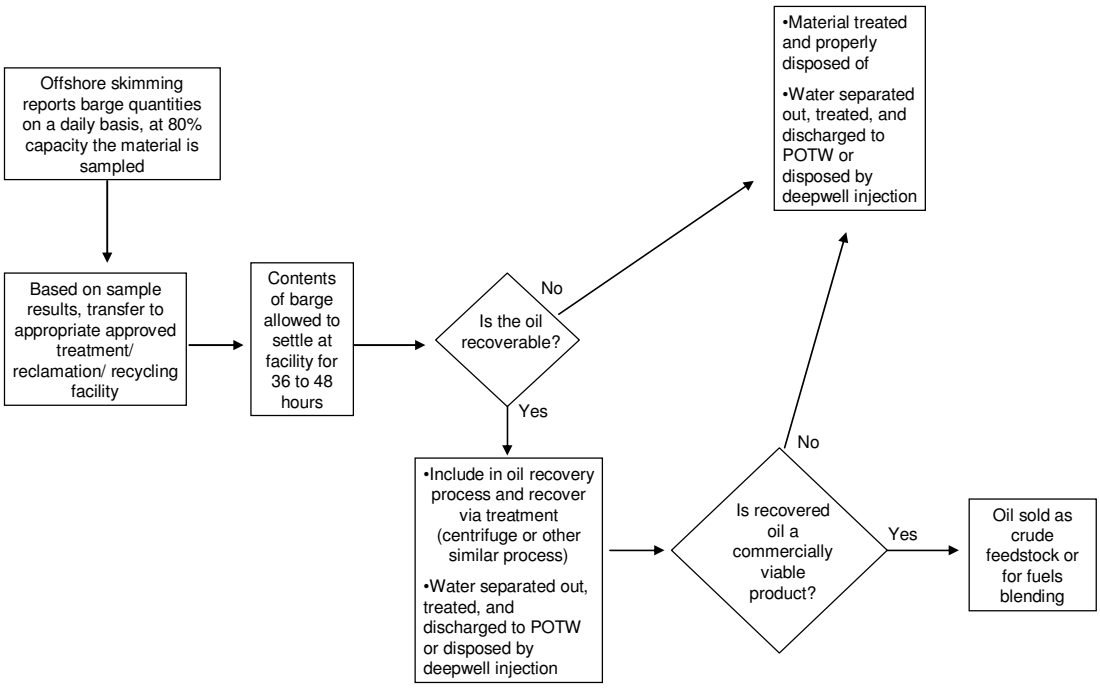


Figure 2.2-2

Nearshore Liquids Management

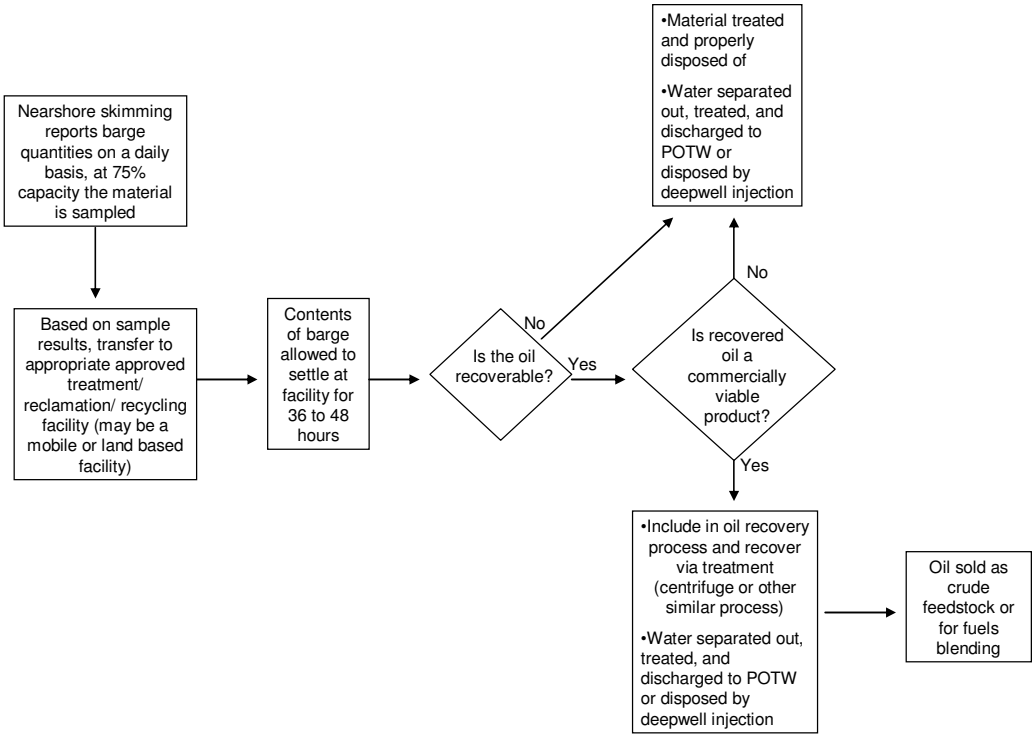
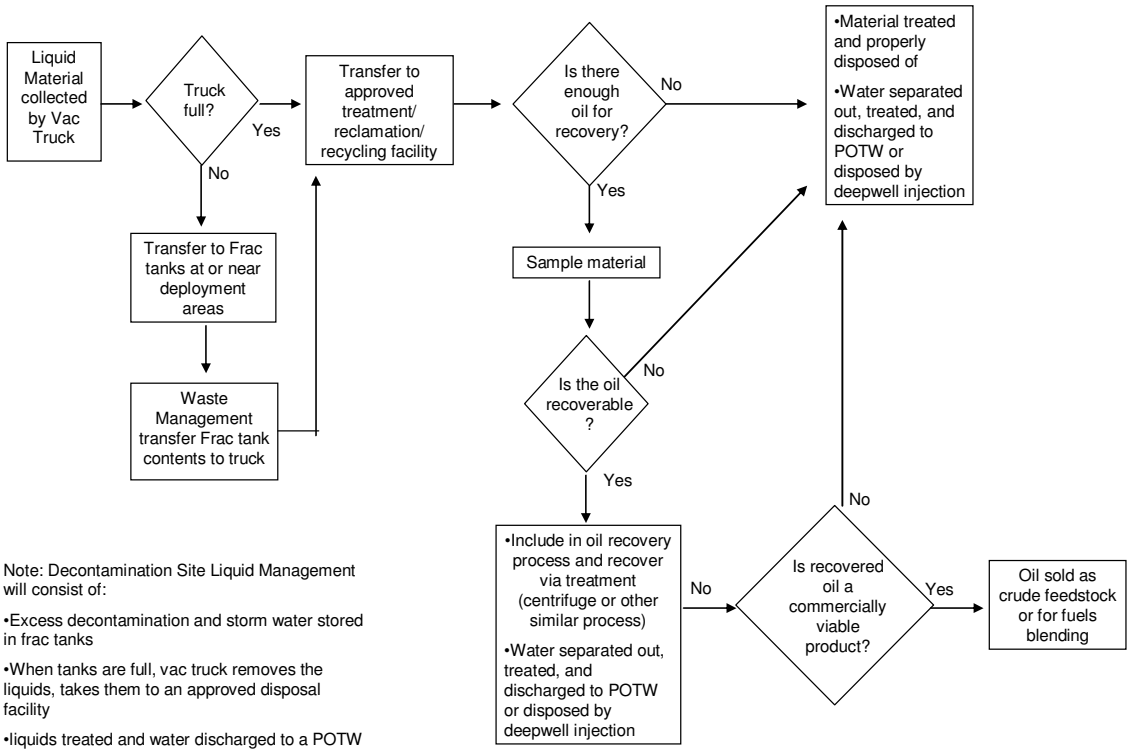


Figure 2.2-3

Onshore Liquids Management



Note: Decontamination Site Liquid Management will consist of:

•Excess decontamination and storm water stored in frac tanks

•When tanks are full, vac truck removes the liquids, takes them to an approved disposal facility

•liquids treated and water discharged to a POTW

3 WASTE TRACKING SYSTEM/REPORTING PLAN

Wastes collected during clean-up operations associated with the MC 252 Incident are tracked and reported using a uniform system. As agreed through the Unified Area Command, the system tracks the five material streams that have been identified and reported on the daily 209 forms for each Incident Command Center namely:

- un-oiled solid wastes (trash)
- oily solids
- recyclables
- oily liquids
- liquids

The tracking system documents the path through which the materials travel, volumes generated, and final location. The unique and dynamic nature of the clean-up does not allow for estimating of volumes, however approximately 90 days of data have been accumulated and capacities are available from these preliminary estimates. The waste and material management tracking process is explained in further detail in the Revised *Waste and Materials Tracking System/Reporting Plan* dated 17 August 2010, submitted as part of the Waste Directive.

4 SAMPLING AND ANALYSIS PLAN FOR LIQUID STREAMS

Oil-impacted materials generated as part of the MC 252 Incident clean-up operations are E&P-exempt from the definition of hazardous waste by federal and state regulations. To ensure proper classification, the materials are being tested for waste characteristics that would be used by receiving facilities to verify that the materials meet facility-specific acceptance criteria, and to complete facility-specific Waste Profiles. Details of which are located in the Waste Sampling Plan, dated 13 August 2010. Sampling and analysis also provides additional information to response workers and the public regarding the chemical and physical properties of materials that were generated and managed during the clean-up operations and that required transportation and disposal. Sampling and analysis procedures including monitoring and reporting are detailed in the *Waste Sampling Plan* submitted as part of the Waste Directive.

5 ON-SHORE TREATMENT AND DISPOSAL/LIQUID MANAGEMENT

Only licensed or permitted waste management, disposal, re-processing or recycling facilities (with the exception of common household type recycle facilities) that are listed in this LWMMP will be used. Additional facilities that are actively being researched for potential use may be added as a revision to this LWMMP if needed. Operation of oil recovery facilities used to process oil and emulsions related to the MC 252 incident is by independent commercial enterprises. BP does not have access to the details of these operations (e.g., chemical additives or proprietary processes). These facilities are permitted by the states in which they operate. The states have reviewed this type of information prior to approving the facility's permit. BP is not the operator of the deepwell disposal facilities that are identified in this plan for disposal.

5.1 FACILITY APPROVAL CRITERIA

A standard Site Evaluation and Approval Process is applied to evaluating potential waste disposal and/or reclamation facilities which are considered for use during this incident. The process is designed to assess and control environmental risks associated with handling of waste and recoverable fluids at third-party commercial sites, and to ensure that only those sites that handle, treat, store, recycle, and dispose of waste responsibly are used. In general the criteria used for facility approval includes the following:

- Operation Type
- Site History
- Financial
- Insurance
- Site Closure Planning
- Permits/Inspection
- Sensitive Receptors
- Adjacent Properties
- Geology/hydrogeology
- Safety
- Facility Operations
- Groundwater
- Stormwater
- Record Keeping
- Drum/Container Storage
- Laboratory
- Community Relations
- Existing Client Base

5.1.1 Scope of Approval Process

Waste site audits are designed to examine the systems and controls in place to ensure waste is properly handled, stored, transferred, treated and/or disposed. Audits also examine waste company financial performance and closure/post closure care assurance, previous history and contamination, environmental factors, environmental monitoring, community relations, personnel, HSSE performance, and use of the facility by other industrial enterprises. To assure that pertinent areas are examined and appropriate information is collected, an audit protocol is used, which contains the information collected from the site visit, records reviews, interviews with appropriate site and regulatory agency personnel, and searches of regulatory and financial databases.

5.1.2 Types and Extent of Review

Depending upon the level of risk and exposure, and based on the previous knowledge of a given waste site, audits may be a review of a CHWMEG® audit, a detailed on-site audit, or may be a limited scope audit, requiring only a facility records review by personnel and/or consultants with knowledge of waste management practices, waste site auditing, and the geographic area under consideration conduct waste site audits with consecutive audit review, scoring and recommendation/approval for use.

1. CHWMEG® - Audits
   CHWMEG® is a non-profit trade association comprised of manufacturing and other "industrial" companies interested in efficiently managing the waste management aspects of their environmental stewardship programs. One aspect of CHWMEG® audits includes conducting comprehensive, independent reviews of commercial facilities that treat, store, dispose, recycle, or transport waste.

2. On-Site Audits
   An on-site audit is required of those facilities where the risk and exposure is considered high and often done when a CHWMEG® audit is not available. This determination is based on the type of facility, history of the facility, type and volume of material disposed at the facility as well as duration of time the facility is expected to be used.

3. Limited-Scope Audits
   A limited scope audit only collects information that is readily available in the public record, supplied by the site, and obtained from telephone interviews with agencies and site personnel. At a minimum, a limited scope review is completed for sites not appearing on the Active list stored on WasteTrak®, a BP database of approved sites utilized for other projects. A limited scope review will also be completed for those sites that had significant modifications and/or changes since the last review.

5.1.3 Facility Scoring and Ratings

Following the waste site audit, factual information is evaluated and ranked utilizing the risk scale. Rationale for each rating is documented. An overall rating is then determined, which serves as the guide for approving use of a facility. These are three possible ratings and their definitions:

- **Recommended** - Overall, the facility offers an operating standard at or above waste industry norms. Sufficient controls ensure proper handling and disposal of wastes and the managing company resources provide reasonable financial assurance for facility cleanup and post-closure care. The "Recommended" rating means no observations were made during the audit of conditions that pose a risk of regulatory noncompliance or of financial instability. Sites with this ranking are available for use.

- **Conditionally Recommended** - Overall, the facility offers an operating standard at or slightly below waste industry norms. There are minor areas that may need improvement in controls to ensure wastes are handled and disposed of properly; and/or the managing company financial resources may be inadequate for facility cleanup and post-closure care. The "Conditionally Recommended" rating means observations were made during the audit of conditions that may pose a limited risk of regulatory noncompliance or of financial instability. Sites with this ranking are available for use.

- **Not Recommended** - Facilities with this ranking are not used. These facilities lack controls that ensure wastes are handled and disposed of properly and/or the managing company financial resources are inadequate for facility cleanup and post-closure care. The "Not Recommended" rating means conditions were observed during the audit that pose a risk of regulatory noncompliance or of financial instability that could reasonably be assumed to result in litigation and/or suspension of operations.

Ratings provide guidance on waste site use. Ratings are suggested or are recommended by the auditor and approved by an appropriate BP waste representative.

5.2 APPROVED FACILITIES

Facilities that have gone through the approval process are presented in Table 5.2-1. Not all approved facilities have been identified in the previously approved sector specific *Waste Management Plans*. If these facilities are needed, the *Waste Management Plans* will be amended to include the additional facilities.

Table 5.2-1: Approved Liquid Management Facilities

Facility Name, Location, Permit Number	Operation/ Material Accepted	Comments
Aaron Oil Saraland, AL IU 41-49-00244 and ALG340304	Oil Recovery Facility Non-hazardous used oil recycling	Estimated oil processing rate is 1,000 to 1,500 bbls per day; Maximum daily discharge to POTW is 50,000 gpd (C.C. Williams) and 25,000 gpd with a 40 gpm limit to Saraland POTW Facility is leasing 20,000 bbl waterfront tank. Facility 2.5 miles from water; truck access only
Acadiana Oil and Environmental New Iberia, LA LAR000070755	Oil Recovery Facility	Not used at the current time
Apex Environmental Services, LLC/CCS Theodore, AL IU 41-49-00429 and AL0080551	Waste Water Treatment & Solidification Non-hazardous oilfield wastes, wastewater treatment, and solidification	Maximum daily discharge to C. C. Williams POTW is 300,000 gpd Storage capacity is approximately 74,000 bbls (barges, plant tanks and frac tanks)
Chemical Waste Management Emelle, AL ALD000622464	Liquids	
Chemical Waste Management	Liquids	

Facility Name, Location, Permit Number	Operation/ Material Accepted	Comments
Lake Charles, LA LAD000777201		
Clean Harbors (Theodore Dock) Theodore, AL *SID Permit Pending*	Modular Wastewater Treatment	Permitted to treat and discharge excess stormwater and treated decontamination water through SID permit. Use of system to treat emulsion fluid water under development. Expected effluent concentrations unknown at this time, testing is ongoing.
Clifton C. Williams POTW Mobile, AL AL0023806	Wastewater Treatment	28 mgd area-wide POTW
FCC Environmental Baytown, TX TX0126471	Non-hazardous Used Oil Recycling & Fuel Recovery	Product recovery
FCC New Orleans, LA PER201001, 2410-00109-01, LAD092096106, LAR05N249, LAR05000, LAG6779102, G-071-55158	Oil Recovery	Not used at the current time
Flextank Channelview, TX TXR000036244	Oil Recovery Facility	Not used at the current time
Holcim (US) Inc./Geocycle Theodore, AL	Waste Water Treatment	
Intergulf Corporation Pasadena, TX TXR000031286 Haz Waste Permit 39068	Waste Water Treatment & Oil Recovery	Being used to recover product from barges
Liquid Environmental Solutions Mobile, AL	Waste Water Treatment & Oil Recovery Facility	Maximum daily discharge to C.C.Williams POTW is 100,000 gpd. Has rail access.

Facility Name, Location, Permit Number	Operation/ Material Accepted	Comments
IU 41-49-00418	Non-hazardous (wastewater treatment and oil recovery)	
NewPark Fannett, TX	E&P Deep Injection Well & Solidification	Permitted Class II injection wells Salt Cavern Disposal Well; 2CW UIC permit no. 12580 Salt Cavern Brine Return Well 1CW UIC permit no. 12501 Caprock NOGW Disposal Well, 11 UIC permit no. 12139 Caprock NOGW Disposal Well, 12 UIC permit no. 12138 Caprock Brine Return Well, 13 UIC permit no. 12630 Well 11 (10,000 barrels/day); Well 12 (10,000 barrels/day); Well 2CW (10,000 barrels/day)
NewPark Big Hill, TX	Deep Well Injection	Permitted Class II injection well Caprock NOGW Disposal Well, TEC 1-A UIC permit no. 101010 (7,500 barrels/day)
NewPark Venice, LA LAG530963 and LAG531086	Transfer facility E&P Exempt waste	Collects E&P exempt waste in barges that are shipped to Port Arthur, TX where the waste is transferred to Fannett, TX for deep well injection
NewPark Morgan City, LA LA0000037630, PER2003001, and LDNR permit	Transfer facility E&P Exempt waste	Capacity is limited by barge capacity Typically can transfer 15Kbbls/day Collects E&P exempt waste in barges that are shipped to Port Arthur, TX where the waste is transferred to Fannett, TX for deep well injection Can support barge or truck transfer directly into transport barge
NewPark Cameron, LA LAR05M545 (former permit)	Transfer facility E&P Exempt waste	Transfer facility
NewPark Ingleside, TX TXD980870364	Transfer facility E&P Exempt waste	Transfer facility

Facility Name, Location, Permit Number	Operation/ Material Accepted	Comments
NewPark Abbeville, LA LAG530962	Transfer facility E&P Exempt waste	Capacity is limited by barge capacity Typically can transfer 15Kbbls/day Collects E&P exempt waste in barges that are shipped to Port Arthur, TX where the waste is transferred to Fannett, TX for deep well injection Can support barge or truck transfer directly into transport barge
NewPark Environmental Processing Facility Port Arthur, TX	WWT/Transfer facility E&P Exempt Waste	Collects E&P exempt waste in barges that are shipped to Port Arthur, TX where the waste is transferred to Fannett, TX for deep well injection Can support barge or truck transfer directly into transport barge
NewPark Port Fourchon, LA LAG530964	Transfer Station	Capacity is limited by barge capacity Typically can transfer 20Kbbls/day Can support barge or truck transfer directly into transport barge
Omega Recycling Patterson, LA AI #22224/PER20060001 TP-101-5757/P-0324	Grease/Cooking Oil Recycling	
P.S.C. Industrial Outsourcing LP Jeanerette, LA LAG533138, LAR05P142, LAU005489, LAU009467, and LAD982305625	E&P exempt waste - crude recovery	Not used at the current time
River Birch Avondale, LA Supplemental Order Number 2006-02WD	Industrial Waste Landfill and Injection Well	Permitted Class I Injection Well, 18 million gal per month Serial no. 973394 API no. 17051881080000 Operator Code R191 Site Code 2602

Facility Name, Location, Permit Number	Operation/ Material Accepted	Comments
Saraland WWTP Saraland, AL AL0055786	Wastewater Treatment	2.6 mgd POTW
United Environmental Services Baytown, TX Vertex Baytown, TX Air Permit # 47083 TPDES MSG Permit # TXR 05V206 Used Oil Handler A85548 Wastewater Permit 1725	Oil Recovery Facility Oil Recovery Facility	Being used to recover product from barges

NOTES:

- Approved Waste Management Plan (WMP) as posted on EPA website (Houma or Mobile Incident Command)
- Liquid site is accepted for both Houma and Mobile.
- Approved Mobile WMP does not include liquid disposal sites in its current version.
- Contact information is included in Appendix A
- Capacities of the facilities to receive/store/treat the materials are dynamic due to changing needs of the clean-up and are determined by each facility on a daily basis
- Facilities are responsible for following their pre-treatment limit permits and adequately addressing potential salinity differences from dewatering activities.

5.3 ADDITIONAL EVALUATED FACILITIES

As needed, other properly permitted facilities may be added to the list of approved facilities. Each facility will be reviewed to assure that they have the appropriate permits to receive the recovered materials for disposal and/or reuse/recycle. Any new waste alternative technologies or sites will follow this process. The appropriate sector Unified Command will be notified when new alternative technologies are identified for use. Appendix A presents facilities that have been identified for review and are actively being evaluated for possible inclusion if needed.

If the operational situation presents itself where existing approved facilities do not have capacity to handle the volume of wastes being generated, the sites on the Appendix A list will be evaluated at an accelerated pace. If they are found to be appropriate and are approved, they will be added to the list of approved sites. As a contingency, daily tracking of on water storage (barges and vessels) has been developed. A consolidated inventory of available barges and their storage capacity, current at the time of this plan, is presented as Appendix B. Additionally, onshore Frac tank storage is available at some staging areas. A partial inventory of Frac Tanks is presented in Appendix B.

6 OCEAN DISCHARGING

At the current time the option for discharging liquid waste off-shore under a Marine Protection, Research and Sanctuaries Act (MPRSA) permit is not being considered. Therefore an evaluation of the MPRSA permitting process and requirements is not needed. In the future if conditions change, a request may be submitted to Unified Command for the initiation of this possible disposal option, per the Waste Directive.

APPENDIX A
Current and Potential Materials Management Facilities

Appendix A: Current and Potential Materials Management Facilities

Facility Name	Facility Type - Primary	State	City	Address	Phone #	Facility Type - Secondary	Port within 100 Miles	Material Accepted	Material Prohibited
Aaron Oil Company	Oil Reclaimer	AL	Saraland	713 Bill Myles Dr.	251-479-1616	Waste water treatment		crude oil, used oil, oily sludge, oily WW	
Apex Environmental	Oil Reclaimer	AL	Theodore	7455 Rangeline Rd	251-443-6324	Waste water treatment		drilling fluids/mud, oily sludge, tank bottoms	crude/used oil
BFI Timberlands Landfill	Industrial waste landfill	AL	Brewton	22800 Hwy 41	334-867-8921			oily sludge	crude oil, used oil
Bodin Oil	Oil Reclaimer	LA	Abbeville	18101 W. LA Hwy 330	337-893-3972			crude oil, used oil	oily sludge
CEMEX Inc.	Oil Reclaimer	FL	Miami	1200 NW 137th Ave	305-229-2924			used oil	crude oil, oily sludge
Chemical Waste Management	Hazardous waste landfill	LA	Sulphur	7170 John Brannon Rd	337-583-2169	Oil Reclaimer	Yes	crude oil, used oil, oily sludge	
Chemical Waste Mngt	Hazardous waste landfill	AL	Emelle	36964 Alabama Hwy 17	205-652-9721	Oil Reclaimer		crude oil, used oil, oily sludge	
Clean Harbors	Hazardous waste landfill	LA	Baton Rouge	13351 Scenic Hwy	225-778-1234	Waste water treatment	Yes	crude oil, used oil, oily sludge	
Clean Harbors Deer park	Hazardous waste landfill	TX	Deer Park	2027 Independence Pkwy South	281-930-2300	Oil Reclaimer		crude oil, used oil, oily sludge	
Cliff Berry Inc.	Oil Reclaimer	FL	Miami	3033 NW North River Dr	800-899-7745	Waste water treatment	Yes	crude oil, used oil, oily sludge	
Enviro Solutions	Oil Reclaimer	TX	Mont Belvieu	11005 E I-10 Ste A	877-664-4645	Waste water treatment		crude oil, used oil, oily sludge	
Environmental Operators	Industrial waste landfill	LA	Venice	Coast Guard Rd	985-534-7886		Yes	oily sludge	crude oil, used oil
FCC Environmental	Oil Reclaimer	LA	New Orleans	14890 Intracoastal Dr	504-254-2982	Waste water treatment	No	oily sludge, used oil	crude oil
FCC Environmental	Oil Reclaimer	TX	Baytown	4415 E Greenwood St	281-383-1460	Waste water treatment	Yes	crude oil, used oil, oily sludge	
FCC Environmental	Oil Reclaimer	TX	Kilgore	2800 Wicks St	903-984-5761	Waste water treatment		crude oil, used oil, oily sludge	
FCC Environmental	Oil Reclaimer	TX	Springtown	320 Scroggins Rd	817-523-4938	Waste water treatment		used oil, absorbent oily material	crude oil, oily sludge (CC)
FCC Environmental	Oil Reclaimer	LA	Opelousas	697 Hwy 167	337-826-8001			crude oil, used oil, oily sludge	
Flextank	Oil Reclaimer	TX	Channelview	16514 DeZavala Road	281-862-2900		Yes	used oil	
Geocycle	Industrial waste landfill	MS	Artesia	8677 Hwy 45 Alternate S		Hazardous waste landfill		crude oil, used oil, oily sludge	
Golden Triangle Landfill	Industrial waste landfill	TX	Beaumont	6433 LaBelle Rd	409-842-5091			oily sludge	crude oil, used oil
Gulf Coast Waste Disposal Authority	Industrial waste landfill	TX	Texas City	1600 Campbell Bayou Rd	409-945-2230			oily sludge	crude oil, used oil
Industrial Water Services	Oil Reclaimer	FL	Jacksonville	1640 Talleyrand Ave	800-447-3592	Waste water treatment		used oil, oily sludge/water	crude oil
Inland Products	Oil Reclaimer	TX	Kilgore	2217 Industrial Blvd	903-983-3361			crude oil, oily sludge	used/refined oil
Intergulf Corp	Oil Reclaimer	TX	Pasadena	10020 Bayport Blvd	281-474-4210	Waste water treatment		crude oil, used oil, oily sludge	
Liquid Environmental Solutions	Oil Reclaimer	TX	Houston	250 Gellhorn Dr	713-673-2995	Waste water treatment		crude oil, used oil, oily sludge	

Facility Name	Facility Type - Primary	State	City	Address	Phone #	Facility Type - Secondary	Port within 100 Miles	Material Accepted	Material Prohibited
MacLand Disposal Center, Inc	Industrial waste landfill	MS	Moss Point	11300 Hwy 63	228-475-9747			oily sludge	crude oil, used oil
Perma-Fix	Oil Reclaimer	FL	Davie	3670 SW 47th Ave	954-583-3795	Waste water treatment		crude oil, used oil, oily sludge	
Republic CSC Landfill	Industrial waste landfill	TX	Avalon	101 Republic Way	800-256-9278			oily sludge	crude oil, used oil
Republic McCarty Rd Landfill	Industrial waste landfill	TX	Houston	5757 A Oates Rd	713-675-6101			oily sludge	crude oil, used oil
Republic Services Colonial Landfill	Industrial waste landfill	LA	Sorrento	5328 Hwy 70	225-675-8021		Yes	crude oil, oily sludge	used oil
Republic Services Gulf West Landfill	Industrial waste landfill	TX	Anahuac	2601 S Jenkins Rd	409-267-6666			crude oil, oily sludge	used oil
Republic Services Itasca Landfill	Industrial waste landfill	TX	Itasca	2559 FM 66	254-687-2511			oily sludge	crude oil, used oil
River Birch Landfill	Class 1 Injection Well	LA	Avondale	2000 S Kenner Rd	504-436-1288		Yes	water	crude oil, used oil, oily sludge
Seabreeze Environmental Services	Industrial waste landfill	TX	Angleton	10310 FM 523	979-864-4442			oily sludge	crude oil, used oil
Siemens Hydrocarbon Services	Oil Reclaimer	FL	Plant City	105 S. Alexander St	813-754-1504	Waste water treatment		crude oil, used oil, oily sludge	
Siemens Water Technologies	Oil Reclaimer	FL	Pompano Beach	1280 NE 48th St	800-235-0189	Waste water treatment		crude oil, used oil, oily sludge	
TCI of Alabama	Oil Reclaimer	AL	Pell City	101 Parkway East	205-338-9997			used oil	crude oil, oily sludge
Teris LLC	Oil Reclaimer	TX	Dallas	4460 Singleton Blvd	214-637-6434	Waste water treatment		crude oil, used oil, oily sludge, solvents	
Thermo Fluids	Oil Reclaimer	TX	Brownfield	2800 N US Hwy 62	806-637-9336			used oil	crude oil, oily sludge
TXI Operations	Industrial waste landfill	TX	Midlothian	245 Ward Rd	972-647-4942			oily sludge, used oil	crude oil
United Environmental	Oil Reclaimer	TX	Baytown	8010 Needlepoint Road	832-695-1534			used oil	
US Ecology Texas	Industrial waste landfill	TX	Robstown	3277 County Rd 69	361-387-3518	Hazardous waste landfill		crude oil, used oil, oily sludge	
USFilter Recovery Services	Oil Reclaimer	TX	Corsicana	2124 E Hwy 31	903-984-5761			crude oil	oily sludge, used oil?
Waste Control Specialists	Hazardous waste landfill	TX	Andrews	9998 Hwy 176 West	888-789-2783	Industrial waste landfill		oily sludge, used oil	crude oil
Water Recovery, Inc.	Oil Reclaimer	FL	Jacksonville	1819 Akbert St	914-475-9320	Waste water treatment		crude oil, used oil, oily sludge	
WMI Coastal Plains RDF	Industrial waste landfill	TX	Alvin	21000 E Hwy 6	281-388-1708			crude oil, used oil, oily sludge	
WMI Jefferson Parish Sanitary Landfill	Industrial waste landfill	LA	Avondale	5800 Hwy 90 West	504-436-0152		NA	oily sludge	crude oil, used oil
WMI Magnolia Disposal Facility	Industrial waste landfill	LA	Monroe	1000 Russel Sage Rd	318-343-5636		No	oily sludge	crude oil, used oil
WMI of North Texas	Industrial waste landfill	TX	Lewisville	1601 S Railroad St	972-315-5421			oily sludge	crude oil, used oil
WMI Tunica Landfill	Industrial waste landfill	MS	Robinsonville	6035 Bowdre Rd	662-363-2282			oily sludge	crude oil, used oil
WMI Western Waste of TX Newton Complex	Industrial waste landfill	TX	Deweyville	2372 County Rd				oily sludge	crude oil, used oil

Facility Name	Facility Type - Primary	State	City	Address	Phone #	Facility Type - Secondary	Port within 100 Miles	Material Accepted	Material Prohibited
WMI Woodside Landfill	Industrial waste landfill	LA	Walker	29340 Woodside Dr	225-667-3358		No	oily sludge	crude oil, used oil

Appendix B
Barge and Frac Tank Inventory Lists

Appendix B
Barge and Frac Tank Inventory Lists

Data Current For: Tuesday, July 20, 2010 | **Revision Date:** Monday, July 19, 2010 | **Revised By:** Carey Neal

Tracking Entity	Offshore / Near Shore	Skim Group	Barge	Tug	Deployed / Standby	Maximum Capacity (bbls)	Current Volume (bbls)	Available Volume (bbls)	Dimensions (L x W x D)	Maximum Draft	Current Location	Comments
MSRC	Offshore	2 & 4	Endeavor	M/V Martin Spririt	deployed	42,000	16,500	25,500	285x64x30	18'	On-scene MC-252	
	Offshore	2 & 4	Carribean	M/V Lucia	deployed	115,000	26,248	88,752	NA	29'6"	On-scene MC-252 28-50.3N/088-09.3W	0 bbls loaded last 24 hours-reported by vessel to Steve A.
	Offshore	2	MSRC 570	Crosby/Clipper	deployed	57,000	3,235	53,765	335x61x22.6	18'	On-scene MC-252	Current volume unknown
	Offshore	2	K-Sea DBL 155	Rebel	deployed	155,000	3,074	151,926	NA	27'	On-scene MC-252 29-00.0N/088-14.1W	0 bbls loaded last 24 hours-reported by vessel to Steve A.
	Offshore	2	MSRC 452	Tara/Crosby	Standby	45,000	0	45,000	310x60x19.9	NA	Fort Jackson, LA	
	Offshore	2	MSRC 402	Kimberly/Colle	Standby	40,300	0	40,300	300x62x20	NA	Pilottown, LA	Empty. Awaiting orders.
	Offshore	2	Energy 13501	N/A	Standby	135,380	0	135,380	445X78X28.5	27.7'	NA	Being converted with centrifuges - should be ready first week of August.
unassigned	Offshore	unk	KTC-55	Bering Sea	deployed	53,000	unk	--	NA	NA	East of Source	unassigned-location reported by Coast Guard
Coast Guard	Offshore	1	NRC Valient	Angelica E	deployed	15,000	0	15,000	199X52X15	10'5"	SE of source 29-00N 88-47W	
	Offshore	1	TV 2602	Clinton Cenac	deployed	26,000	2,000	24,000	NA	NA	SE of source 29-00N 88-47W	
	Offshore	1	TV GCS-236	Mary Gellatly	Standby	37,000	0	37,000	NA	NA	SE of source 29-00N 88-47W	Waiting for Jason K McCall
	Offshore	1	TV Connecticut	Joan Moran	deployed	36,000	4,743	31,257	NA	NA	SE of source 29-00N 88-47W	current volume data reported by vessel 7-19-10. Currently lightering skimming vessel Callais Navigator
NRC Command Vessel-Queen Bee Matt Dempsey-Obrien's Chris Hensel-USCG M# (504) 620-5988 Sat.#(337) 513-4688	Offshore	3	NRC Defender	Helene Maria	deployed	10,000	9,350	650	198X46X13	12'5"	At Fourchon to off-load. Estimated date to be completed 7-20-10	
	Offshore	2, 3 & 4	Energy-8001	Superior Service	deployed	75,000	4,700	70,300	350X76X24	19.8'	On-scene Northwest of Source	
	Offshore	3	TV 2404	Todd Damos	deployed	18,000	11,682	6,318	295x54x12	9'6"	At Fourchon to off-load. Estimated date to be start 7-21-10	At Trussco Dock in Fourchon. Intertech to gauge and collect samples
	Offshore	3	Columbia	Mckinley Sea	deployed	55,000	3,085	51,915			On-scene Northwest of source	29-03.0N-088-34.1W Unloaded oily water from the NRC Guardian
	Offshore	3	Brusco 402	Arthur Brusco	deployed	11,000	2,000	9,000			On-scene Northwest of Source	
	Offshore	3	TV 2601	Dirk Damos	deployed	18,000	10,500	7,500	295x54x12	9'6"	On Scene Northwest of Source	Will be enroute to Fourchon to off-load 7-20-10

Appendix B
Barge and Frac Tank Inventory Lists

Data Current For:	Revision Date:	Revised By:
Tuesday, July 20, 2010	Monday, July 19, 2010	Carey Neal

Tracking Entity	Offshore / Near Shore	Skim Group	Barge	Tug	Deployed / Standby	Maximum Capacity (bbls)	Current Volume (bbls)	Available Volume (bbls)	Dimensions (L x W x D)	Maximum Draft	Current Location	Comments
BP Shipping	Near shore		CTCO-323	NORAH LYNN	deployed	23,200	21,747	1,453	297x54x132	10	APEX TERMINAL THEODORE, AL TO LIGHTER TO 802 BARGE. 802 BARGE TO TRANIST TO AARON TERMINAL SARALAND, AL	Arrived 7/17/10 @ 1500hrs. Hoses on at 7/18/10. Waiting more tests for H2S and water.
	Near shore		CTCO-324	Xena	deployed	23,206	23,206	0	297x54x132	10'	Marathon dock, Venice, LA. Awaiting orders	Send to Pilottown after MMI 3049 takes approximately 21,000 bbls
	Near shore		CTCO-331	GREGORY CENAC	Standby	22,000	19,546	2,454	297x54x132	10'	Marathon dock, Venice, LA. Awaiting orders	May go to FCC. Waiting for confirmation
	Near shore		MMI-3048	CAPTAIN JERRY ORGERON	deployed	22,000	21,427	573	297x54x132	10.5'	STOLT DOCK LIGHTERED 1 ACL BARGE COMPLETED CALEB RE-SAMPLING BALANCE OF BARGE AS A RESULT OF SLOW PUMPING RATE	3048 to lighter at Solt on 2 10,000 barrels barges to take to united (they will take 19,500 bbls on July 17 in AM. Approximately 2,000 barrels will go to FCC after sampling of remaining volume on 3048 to occur July 21.
	Near shore		MMI-3049	CAPTAIN GEORGE H. THOMAS	deployed	22,000	0	22,000	297x54x132	8'6"	NEWPARK DOCK VENICE, LA	Empty. Awaiting orders.
	Near Shore		FMT1008	HB-1	deployed	10,000	0	10,000	200X35	10'	Enroute to Fourchon, LA	Unloaded. Heading back to Fourchon.
	Near Shore		FMT1062	Irene Frazier	deployed	10,000	0	10,000	200X35	10'	Enroute to Fourchon, LA	Unloaded. Heading back to Fourchon.
	Near shore		HTC 3013	Madonna Ann	deployed	22,000	14,231	7,769		10' 5"	Loading at Texaco Pilottown off the MSRC 402	fixed 8-10 hrs to Pilottown (Texaco). Took balance off of 402. Enroute to Houston, TX.
	Near shore		HTC3014	Karl R. Andren	deployed	22,000	0	22,000		10' 5"	Standby at Pilottown	fixed 8-10 hrs to Pilottown (Texaco)

	TOTAL:	**1,120,086**	**197,274**	**869,812**
Offshore	**TOTAL:**	**943,680**	**97,117**	**793,563**
Nearshore	**TOTAL:**	**176,406**	**100,157**	**76,249**

Appendix B
Barge and Frac Tank Inventory Lists

Data Current For:	Previous Revision Date:	Revised By:
Tuesday, July 20, 2010	Monday, July 19, 2010	Carey Neal

Staging Area - Grand Isle

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Operations	260735	476	320	156
2	Operations	259994	476	70	406
		Subtotal:	952	390	562

Staging Area - Cocodrie

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Coco Marina	259907	476	120	356
2	Coco Marina	265325	476	200	276
3	IBR 228	S684SD	476	0	476
4	OB 803	1300SD	476	0	476
5	B. Beth	S1490SD	476	0	476
6	IBR 808	1916SD	476	0	476
7	IBR 337	657NSD	476	0	476
8	IBR 235	1659SD	476	0	476
		Subtotal:	3808	320	3488

Staging Area - Dulac

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Dulac	SV23161RLM	476	0	476
2	Dulac	SV23022RLM	476	0	476
		Subtotal:	952	0	952

Appendix B
Barge and Frac Tank Inventory Lists

Data Current For:	Previous Revision Date:	Revised By:
Tuesday, July 20, 2010	Monday, July 19, 2010	Carey Neal

Staging Area - Fourchon

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Fourchon	259549	476	25	451
2	Fourchon	265537	476	25	451
3	Fourchon	239421	476	25	451
4	Fourchon	239922	476	25	451
5	Fourchon	259404	476	25	451
6	Fourchon	259300	476	0	476
7	Fourchon	F-129	476	0	476
8	Fourchon	F10	476	0	476
9	Fourchon	F-2	476	0	476
10	Fourchon	F-118	476	0	476
11	Fourchon	255465	476	0	476
12	Fourchon	259584	476	0	476
13	Fourchon	239600	476	0	476
14	Fourchon	259995	476	0	476
15	Fourchon	254221	476	0	476
		Subtotal:	7140	125	7015

Staging Area - Venice

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Area 51	237	476	145	331
2	Fort Jackson	F-9	476	0	476
3	Premier Staging Site	256401	476	0	476
4	Premier Staging Site	265771	476	0	476
5	Premier Staging Site	F-5	476	0	476
6	Premier Staging Site	F-31	476	0	476
7	Premier Staging Site	F-70	476	0	476
8	Premier Staging Site	F-99	476	0	476
9	Omni Dock	NA	476	0	476
10	Omni Dock	NA	476	0	476
11	Omni Dock	NA	476	0	476
12	Omni Dock	NA	476	0	476
13	Omni Dock	NA	476	0	476
14	Omni Dock	NA	476	0	476
15	Omni Dock	NA	476	0	476
16	Omni Dock	NA	476	0	476
17	Omni Dock	NA	476	0	476
18	Omni Dock	NA	476	0	476
		Subtotal:	8568	145	8423

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Barge and Frac Tank Inventory Lists

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Staging Area - Slidell

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Middle River Site	259991	476	476	0
2	Middle River Site	239492	476	0	476
3	Middle River Site	F162	476	0	476
		Subtotal:	1428	476	952

Staging Area - Hopedale

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Hopedale	260734	476	55	421
2	Hopedale	259348	476	0	476
		Subtotal:	952	55	897

Staging Area - Lafitte

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Lafitte	4207	476	75	401
		Subtotal:	476	75	401

Staging Area - St. Mary's

No.	Staging Area/Location	Frac Tank Number	Maximum Storage Volume (bbls.)	Current Storage Volume (bbls.)	Available Storage Volume (bbls.)
1	Horshoe	T1	476	10	466
		Subtotal:	476	10	466

TOTALS				
52		**24752**	**1596**	**23156**

Notes:
IBR-Deck Barge
OB-Deck Barge

Appendix C
Oil Spill Response Evaluation for the C.C. Williams WWTP

TETRA TECH

TECHNICAL MEMORANDUM

TO: Tony Fisher, MAWSS

FROM: Joe R. Tamburini, Mike Schmidt, and Christian Dunaway

DATE: June 1, 2010

SUBJECT: Oil Spill Response Evaluation for the C.C. Williams WWTP

EXECUTIVE SUMMARY

Tetra Tech has evaluated the C.C. Williams WWTP for its ability to handle an increase in loading resulting from clean-up of the BP oil spill in the Gulf of Mexico. Tetra Tech evaluated the following areas with respect to treatment capacity to determine the additional oil spill load that can be accepted at the WWTP:

- HPO reactor capacity
- Oxygen delivery system capacity
- Solids handling capacity

This analysis determined that the C.C. Williams WWTP could accept an additional 0.20 MGD (200,000 gallons per day) of high strength waste combined from Apex Environmental and Liquid Environmental. This would represent an increase of approximately 3 times the current hydraulic loading to the facility from these two industries.

Tetra Tech recommends implementing this addition by accepting an additional 100,000 gallons per day (gpd) initially and evaluating its effect over the period of one week. The evaluation period should include monitoring the DO to make sure it can be kept within normal limits along with secondary clarifier settleometer tests, SVI, and effluent BOD and TSS concentrations. If there is no deterioration in any of these parameters, Tetra Tech recommends increasing the loading by an additional 50,000 gpd and evaluating for one week, followed by another 50,000 gpd increase the following week. This would bring the total additional flow to 200,000 gpd combined.

While receiving the additional high strength flow, it is recommended that MAWSS continue to closely monitor the parameters listed above. Should MAWSS observe that the additional high strength flow is stressing the treatment process, it could elect to implement enhanced primary

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clarification (with the addition of ferric chloride coagulant to optimize BOD removal in the primary clarifiers), and hence, allow an increase in the influent organic loading to the WWTP.

INTRODUCTION

The purpose of this technical memorandum is to evaluate the existing C.C. Williams WWTP for its ability to handle an increase in loading resulting from clean-up of the BP oil spill in the Gulf of Mexico. The goal of this study was to determine the effect on the treatment system of accepting significant quantities of pretreated seawater oil spill waste. This was a fast track project and Tetra Tech was able to successfully pull together a team that was able to respond quickly, and has presented those findings verbally to Mobile Area Water and Sewer System (MAWSS) staff. This memorandum summarizes those findings.

Table 1 – Influent Data Analysis (Jan 2009- Apr 2010)

Parameter	Average	Max Month
Flow, MGD	21.1	40.86
BOD, mg/L	234	384
BOD, lbs/day	41,526	72,597
TSS, mg/L	222	329
TSS, lbs/day	41,970	44,389
NH_3-N, mg/L	22.79	37.40
NH_3-N, lbs/day	4,645	7,928

ANTICIPATED WASTEWATER CHARACTERISTICS

The additional wastewater from the oil spill cleanup efforts is expected to come to the C.C. Williams WWTP from two different sources: Apex and Liquid Environmental. The anticipated flowrate from these CWTs is not high compared to the influent flow to the WWTP; however, the expected BOD loading is considerably higher than domestic wastewater. The loading characteristics from all five CWTs in the area are summarized in Table 2.

Table 2 – CWT Influent Loading Summary

Wastewater Contributor	Current Flow (MGD)	Current BOD (mg/L)
Oil Recovery Co.	0.014	15,976
Apex Environmental	0.056	3,420[1]
Aaron Oil	0.010	25,765
Liquid Environmental	0.022	3,670[2]
IWS, Inc.	0.027	3,854[2]

Note 1: Since only one month's data (April 2010) was available, this number represents the maximum value recorded during that month. For reference, the average BOD load for that month was 2,400 mg/L.

Note 2: Maximum month value.

The evaluation of treatment plant capacity only considered additional wastewater loadings from Apex Environmental and Liquid Environmental since they were the only two companies to commit prior to commencing the evaluation.

CAPACITY – HIGH PURITY OXYGEN (HPO) REACTORS

Each HPO reactor has two parallel trains the length of the basin with a dividing wall in the middle. Each train has four equally sized cells with a mixer in each cell of varying horsepower motors to mix the oxygen into the mixed liquor and transfer oxygen to create a dissolved oxygen concentration. Since there are four individual process trains that can be isolated, one train could be taken offline for maintenance without devastating consequences to the treatment process as long as maintenance is only for a short period. For the purposes of this evaluation, one train was assumed to be out of service. The design criteria for the HPO reactors are provided in Table 3.

Table 3– HPO Design Specifications

Parameter	Value
Number of Reactors	2
Size of Reactor, L x W x H, ft	200 x 92 x 12.8
Total Reactor Volume, MG	3.52
Number of Trains in each Reactor	2
Number of Cells in each Train	4
Mixer Motor Sizes, hp	Cell 1: 75 Cell 2: 60 Cell 3: 60 Cell 4: 50

Since the additional flowrate is not anticipated to be large compared to the current MAWSS influent flowrate, Tetra Tech did not evaluate the HPO reactors in terms of hydraulic capacity. However, since the influent BOD concentration is significant, the most important parameter for evaluating these aeration tanks is the space loading, which is the mass of BOD per day per 1,000 cubic feet of reactor volume (lbs BOD/1000 ft^3). This parameter tells us how much of an organic load the organisms in the reactor can consume per day. The criteria for evaluating space loading vary depending on the HPO reactor configuration, the design dissolved oxygen (DO) concentration, the size of the motors on the mixers, and the design mixed liquor concentration. High purity oxygen activated sludge systems generally operate between 80 and 200 lbs BOD/1000 ft^3. For the short term investigation being performed here, it would be acceptable to allow for 140 lbs BOD/1000 ft^3 to be processed by these reactors.

Assuming that there are three of the four trains in service, and an allowable space loading of 140 lbs BOD/1000 ft^3/day, the HPO reactors could handle an increase of approximately 3 times the influent flow from Apex Environmental and from Liquid Environmental, bringing the allowable flowrate from those users to 0.16 MGD and 0.06 MGD, respectively.

HPO Reactors Conclusion

Assuming that there are three of the four trains in service, the HPO reactors could handle an increase of approximately **three times (3x)** the influent flow from Apex Environmental and from Liquid Environmental, bringing the allowable flowrate from those users to **0.16 MGD and 0.06 MGD**, respectively.

CAPACITY – OXYGEN DELIVERY SYSTEM

The HPO reactors are supplied with high purity oxygen from an on-site oxygen generation system that can produce approximately 20 tons per day of oxygen. There is also a liquid oxygen storage and delivery system with a storage capacity of 50 tons that can be used to supplement the oxygen generation system.

The evaluation assumed that the on-site generation system would be used to meet the average oxygen demands. During maximum month and peak day oxygen demand periods, the liquid oxygen system would be used to supplement the oxygen generation system in order to meet the system's overall oxygen demands.

Oxygen Delivery System Conclusions

Based on historical influent BOD loadings and primary clarifier removal efficiencies, there is approximately 2.8 tons per day of oxygen generation capacity available on average to treat additional loading. Assuming an average oxygen demand of 1.0 pound of oxygen per pound of BOD removed and a BOD concentration of 3,500 mg/L for the additional waste from Apex Environmental and Liquid Environmental, this is equivalent to approximately **0.2 MGD of additional treatment capacity**.

During maximum month loading conditions, it is estimated that between 6 to 9 tons per day of liquid oxygen will be required to supplement the oxygen generation system. Based on the storage capacity of 50 tons, this will require **refilling the liquid oxygen storage tank approximately once a week during periods of peak BOD loading**.

CAPACITY – SOLIDS HANDLING:

The following discussion covers the solids handling facilities and their limitations relative to handling current and future solids production at the C.C. Williams WWTP. The evaluation is based on the operating data, previous reports, review of plans, and communication with plant personnel.

Tetra Tech has reviewed data from the C.C. Williams WWTP between January 2009 and April 2010. The data analysis focused on influent loadings and how they affect the downstream solids processing facilities. The influent data was already summarized in Table 1 previously.

Solids Balance Evaluation

An Excel spreadsheet model was developed and calibrated to the actual solids production at the C.C. Williams WWTP. This solids balance was developed for the average daily and maximum month flowrates. The results of the solids balance are summarized in Table 4. The solids balance estimates were used to evaluate the existing solids handling facility capacity.

Table 4– Solids Balance Summary

Parameter	Current	
	Average	Max. Month
Influent WWTP Flow, MGD	24.44	40.86
Raw Sludge, gal/d	29,894	49,965
Raw Sludge, lbs/d	12,740	21,294
Waste Activated Sludge, gal/d	345,650	577,838
Waste Activated Sludge, lbs/d	36,247	60,596
Gravity Thickened Sludge, gal/d	23,481	39,248
Gravity Thickened Sludge, lbs/d	12,729	21,276
Thickening Centrifuge TWAS, gal/d	76,498	127,885
Thickening Centrifuge TWAS, lb/d	29,904	49,992
Anaerobically Digested Solids, gal/day	136,523	309,376
Anaerobically Digested Solids, lb/d	25,097	41,283
Dewatering Centrifuge Cake, dt/d	11.4	18.8
Dewatering Centrifuge Cake, cy/d	57	94

Existing Solids handling facilities

Major C.C. Williams solids handling process components include:

- Gravity thickeners: Primary solids (PS) are pumped directly from the primary clarifiers to the gravity thickeners to remove some water prior to anaerobic digestion.
- Centrifuge thickening: Wasted activated sludge is pumped from the secondary clarifiers to the centrifuges for thickening prior to anaerobic digestion.
- Anaerobic digestion: Thickened primary sludge and TWAS are pumped to the anaerobic digesters for stabilization.
- Centrifuges: Anaerobically digested biosolids are pumped from the anaerobic digesters to the centrifuges for dewatering prior to agricultural land application.

Gravity Thickener

At the average daily flow operating condition, the raw primary sludge flowrate is approximately 29,894 gallons per day at a concentration of approximately 5.11 percent, for an average of 12,740 pounds of primary sludge per day. Raw primary sludge is pumped to a gravity thickener where it further settles and thickens to a solids concentration of 6.5 percent. The gravity

thickener has a surface area of approximately 2,730 ft^2. The solids loading rate and overflow loading rate to the gravity thickener are 4.66 lb/ft^2/day and 10.93 gal/ft^2/day, respectively, which are far below the typical loading rates for a gravity thickener (20 lb/ft^2/day and 400 gal/ft^2/day, respectively). Therefore, the gravity thickener has significant capacity available.

Centrifuge Thickening

At the average daily flow operating condition, the WAS flowrate has averaged 345,650 gallons per day at a concentration of approximately 1.26 percent for an average of 36,247 pounds of WAS per day. Waste activated sludge is pumped to the thickening centrifuges and thickened to an average concentration of 5.5 percent. There are two thickening centrifuges typically operated at 24 hours per day, 7 days per week. The centrifuges are capable of operating at up to 160 gpm. The two centrifuges have a combined nameplate capacity of 320 gpm. At the average daily flow operating condition, the hydraulic loading rate to the thickening centrifuges is 240 gpm. Therefore, the thickening centrifuges have enough capacity to receive additional WAS loading from secondary clarifiers for thickening. At the maximum monthly flow operating condition, the hydraulic loading rate to the thickening centrifuges is 400 gpm, which is much higher than the centrifuge maximum capacity. One additional thickening centrifuge will be required for this condition.

Primary Digesters

Thickened raw primary sludge and thickened WAS are pumped to the three primary anaerobic digesters. The primary anaerobic digesters are 68 feet in diameter with a 26-foot side-water depth, for a volume of 0.71 MG per digester and a total of 2.12 MG. The average volatile solids concentration of the sludge entering the digesters averaged 63 percent for the January 2009 to April 2010 time period. The volatile solids concentration leaving the digesters averages approximately 62 percent from the same period.

According to the USEPA, the minimum recommended conditions for anaerobic digestion are 15 days solids residence time (SRT) at a temperature of 35 degrees Celsius (°C). At the average daily flow operating condition, the average SRT in the primary digesters at the WWTP is 15.8 days, which is just above the 15-day USEPA SRT recommendation. This demonstrates that the digesters are adequate to meet the current sludge production requirements, but should be evaluated in the near future to assure adequate capacity in the future.

Secondary Digesters

After the primary digesters, sludge overflows to one of two secondary digesters. The secondary digesters are each approximately 55 feet in diameter with a 26-foot side-wall depth for a volume of 0.46 MG each and a total volume of 0.92 MG. The secondary digesters are mixed with recirculation pumps, but not heated. The levels in the secondary digesters vary depending on if the digester is being filled or pumped to the sludge holding tanks. Secondary digesters are also typically used to store digester gas in a floating or gas storage digester cover.

Centrifuge Dewatering

Digested sludge from the secondary digesters averages approximately 1.0 percent solids at an average flowrate of 188,074 gallons per day, or approximately 131 gpm. The maximum month flowrate to the dewatering centrifuges between January 2009 and April 2010 was 309,376 gpd or 215 gpm. The digested sludge is pumped to the two dewatering centrifuges that are typically both operated 12 hours per day, 7 days per week. Each centrifuge is designed to be operated at a maximum hydraulic loading rate of 160 gpm, but is typically operated between 100 and 120 gpm. Therefore, the dewatering centrifuges are at approximately 40 percent capacity at the average solids production and 67 percent capacity at the maximum month solids production if operated 12 hours per day and 7 days per week. Therefore, the dewatering centrifuges have enough capacity to handle much more biosolids from anaerobic digesters for dewatering.

Solids Handling Conclusions

At the average daily flow condition, the gravity thickener, thickening centrifuges, and dewatering centrifuges have enough capacity to receive additional solids loading for treatment. However, the existing primary digesters are small but adequate for the current solids production and do not have capability to treat significant additional solids loading. One additional primary digester will likely be required in the future to handle increased loadings.

SALINITY INVESTIGATION

Surprisingly, there is not very much information in the literature regarding total dissolved solids (TDS) concentration and its effect on the microorganisms involved in treating wastewater. Tetra Tech has evaluated a paper from 1983 showing that there is no effect on microorganisms when the TDS concentration (salinity, in particular) is less than 6,000 mg/L, a very small effect was noticed between 6,000 and 12,000 mg/L, and progressively greater effect was seen up to 35,000 mg/L.

Tetra Tech performed a rough mass balance for dissolved solids and found that if Apex Environmental and Liquid Environmental increased their contribution by a factor of 3, then the TDS concentration would rise to approximately 1,800 mg/L. Since this is well below the 6,000 mg/L limit, we feel comfortable that the increased salinity will not negatively impact the microorganisms.

Since most of the increased TDS will be sodium chloride, there may be an imbalance in the divalent to monovalent cation ratio. This is a relatively new field of study. The theory says that more divalent cations (Ca^{2+} and Mg^{2+}) in wastewater are a large benefit to sludge settleability because the two positive charges can help bridge floc particles (which tend to be negatively charged) together and help them form bigger floc, which settle well in a clarifier. If there are too many monovalent cations (Na^{+} and K^{+}), these cannot bridge floc particles, and in fact repel them apart. This results in smaller floc particles, and hence they do not settle as well.

The divalent to monovalent cation ratio may not be much of an issue at the C.C. Williams WWTP, even if additional sodium chloride (a monovalent cation) is introduced in the form of salt

water. This is because the floc particles from a pure oxygen system tend to be larger than typical activated sludge system to begin with, so the effect is not as pronounced. We do not feel that the divalent to monovalent cation ratio is a reason not to accept additional wastewater from the CWTs under consideration.

Salinity Investigation Conclusion

Tetra Tech does not see a problem with the increased salinity from the oil spill waste in terms of microorganism function.

OPTIONAL SYSTEM IMPROVEMENTS

Tetra Tech performed an "on paper" evaluation of the WWTP, and also considered any improvements that could be made to enhance the treatment capacity. Since the time-frame on this project is so short, enhancements requiring significant construction projects are not feasible and were not considered. One optional enhancement that could be easily accomplished would be to implement enhanced primary clarification by adding a chemical coagulant (such as ferric chloride or even a coagulant polymer) to the primary clarifiers. This would improve the particulate BOD removal in the primary clarifiers, which would mean less BOD would need to be treated in the HPO reactors.

Properly sized primary clarifiers typically remove between 35 and 45 percent of the influent BOD. According to the Lab Data spreadsheet provided Tetra Tech, the primary clarifiers are currently removing between 12 and 24 percent of the influent BOD. Enhanced primary clarification may be able to increase this removal efficiency up to a total BOD removal as high as 35 percent. However, due to the condition of the primary clarifiers, it is difficult to rely on a ten percent increase in BOD removal, even with chemical addition. It is also difficult to determine the acceptable dose of chemical, since the detention time, and the surface area loading rate in the clarifier is significantly less than a typical primary clarifier.

System Improvement Conclusion

The evaluation indicated that system improvements are not required to accept and treat additional high strength waste at the C.C. Williams WWTP. However, if deterioration in the performance of the treatment system is observed upon receiving and treating the additional high strength waste, an optional strategy available to MAWSS would be to implement enhanced primary clarification to increase particulate BOD removal in the primary clarifiers, thereby reducing the overall BOD load going to the HPO reactors. Additional information and/or implementation assistance can be provided by Tetra Tech should MAWSS choose to implement this optional treatment enhancement.

TREATING ADDITIONAL WASTE AT WRIGHT SMITH JR. WWTP

C.C. Williams WWTP has sufficient capacity to treat up to 0.2 MGD of additional wastewater from the two identified CWTs. This is likely more wastewater than those industries can produce. Therefore, it does not appear that treatment at the Wright Smith Jr. WWTP will be necessary.

However, if some of the other CWTs wish to increase their contributions with oil spill waste, then MAWSS may need to evaluate that potential by utilizing additional capacity at the Wright Smith WWTP.

Since it depends greatly on which of the other CWTs would be discharging additional wastewater, Tetra Tech has not completed a capacity analysis of the Wright Smith WWTP, so that analysis would need to be completed if/when another CWT wishes to participate in the oil spill cleaning.

Wright Smith WWTP Conclusion:

At this time, Tetra Tech does not see any need to process additional oil spill waste at the Wright Smith Jr. WWTP. This can be re-evaluated if other CWTs wish to contribute oil spill waste.

BOD SURCHARGE

In a previous study completed by Tetra Tech. it was identified that the BOD surcharge assessed at the time ($0.23 per pound of BOD over 280 mg/L) did not adequately cover the operation and maintenance expense associated with that additional BOD. In that previous analysis, Tetra Tech recommended increasing the surcharge to $0.33 per pound of BOD. This would cover the cost of treating additional oil spill waste using the oxygen generation capacity that is currently available on average.

BOD Surcharge Conclusions

Therefore, Tetra Tech recommends a minimum BOD surcharge of $0.33 per pound of BOD over 280 mg/L to recover the additional operation and maintenance costs associated with treating the additional BOD from the oil spill waste.

Note that during periods of peak BOD loading, there will also be an increase in the usage of supplemental liquid oxygen associated with the oil spill waste. The costs for the additional liquid oxygen are not fully captured by the recommended BOD surcharge, which is based on using the oxygen generation system. However, Tetra Tech is currently unable to quantify these additional liquid oxygen costs, as they will be dictated by actual operating conditions and loadings. Therefore, if the oil spill waste is accepted for an extended period of time (say longer than 3 to 6 months), it is also recommended that MAWSS evaluate the usage of liquid oxygen before and after accepting the additional oil spill waste. If an increase in the usage of liquid oxygen can be established and quantified, it is also recommended that MAWSS re-evaluate the BOD surcharge and revise if needed in order to fully capture the additional costs for liquid oxygen.