INTERIM RESPONSE REPORT

Samuel B. Jolly Site
3445 West Warren
Detroit, Wayne County, MI
Site ID #000038192

PREPARED FOR:

Michigan DNRE
natural resources & environment

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EXECUTIVE SUMMARY

The Mannik & Smith Group (MSG) has been retained by the Michigan Department of Management and Budget (DMB) to perform interim response measures for the Department of Natural Resources and Environment (DNRE) formerly known as the Department of Environmental Quality (DNRE) under the Architectural and Engineering (A&E) Indefinite Scope-Indefinite Delivery (ISID) Discretionary Contract (No. 00233) as the Professional Service Contractor at the Samuel B. Jolly Property (site), located at 3445 West Warren Avenue, Detroit, Wayne County, Michigan. The Samuel B. Jolly site is listed by the DNRE as an "Open" leaking underground storage tank (LUST) (Facility ID: 00038192 and Release #C-0327-06) site regulated under Part 213, Leaking Underground Storage Tanks of the Natural Resources and Environmental Protection Act (NREPA), 1994 P.A. 451, as amended (Part 213). Prior to Interim Response activities, The DNRE LUST database indicated three (3) tanks were present on the property, all having an 8,000 gallon capacity and used for gasoline storage. In 2005 an electromagnetic survey conducted by the DNRE identified the presence of three suspect underground storage tank (UST) locations on the property. Soil samples subsequently collected by the DNRE indicated the surficial and subsurface soils at the property were impacted with contamination from petroleum products.

The property tax-reverted to the State in 2005 and is currently owned by the Michigan Land Bank Fast Track Authority (MLBFTA). In 2009, to facilitate the property sale and redevelopment the MLBFTA, through the DNRE and an USEPA Brownfield Cleanup Program grant, has requested MSG's professional services to remove the USTs and, to the extent practical, impacted soils from the property.

To achieve this objective, MSG prepared bid specifications and assisted the State with selection of the trade contractor for the project. Technical Service Professionals, LLC. (TSP) of Livonia Michigan was selected to conduct UST removal and impacted soil excavation activities. Three 8,000-gallon USTs that stored gasoline and diesel fuel were removed in October 2009. Approximately, 23,000 gallons of petroleum impacted water were removed for off-site disposal from the UST systems. Approximately 1,082 tons of petroleum impacted soils were excavated for proper off-site disposal. Ground water was not encountered within the excavation; however approximately 901 gallons of rain runoff were removed and disposed offsite.

A pathway evaluation was completed that identify relevant exposure pathways and appropriate risk based screening levels (RBSLs) for the Site. All Part 213 exposure pathways were deemed reasonable and relevant to the site. However, if further investigation demonstrates shallow ground water is not present or only present as "ground water not in an aquifer" the drinking water pathway may then be considered irrelevant and the DWPC and the DWC would no longer be applicable to the site.

All individual parameters detected at the post-abatement confirmation samples were below their respective most stringent Part 213 RBSLs. However, laboratory analysis for petroleum chemical mixtures (diesel/oil/gasoline range organics, a.k.a. DRO/ORO/GRO) exceeded the draft DNRE chemical mixture Csat screening value of 50,000 ug/kg.

In accordance with RRD Operational Memorandum No. 3, Part 213 LUST Site Classification System (Op Memo 3), and the results of the pathway exposure evaluation, MSG has classified the Samuel B. Jolly Lust Site, located at 3445 West Warren Avenue, Detroit, as a Class 4 Site because no individual compounds exceeded their most stringent RBSLs and no other evidence of residual free product (or Csat conditions) was observed in the post IR excavation, even though soils are impacted at levels above the draft DNRE chemical mixture Csat screening value of 50,000 ug/kg.

MSG recommends that DNRE consider the Site for a Part 213 closure based on the confirmation analytical results meeting the most stringent RBSLs for individual compounds and observed soil conditions.

1.0 INTRODUCTION

The Mannik & Smith Group (MSG) has been retained by the Michigan Department of Management and Budget (DMB) to perform interim response (IR) measures for the Department of Natural Resources and Environment (DNRE) formerly known as the Department of Environmental Quality (DEQ) under the Architectural and Engineering (A&E) Indefinite Scope-Indefinite Delivery (ISID) Discretionary Contract (No. 00233) as the Professional Service Contractor at the Samuel B. Jolly Property (site), located at 3445 West Warren Avenue, Detroit, Wayne County, Michigan. The Samuel B. Jolly site is a leaking underground storage tank (LUST) site (Facility ID: 00038192).

The site is currently listed as an "Open" LUST site on the DNRE database (Release #C-0327-06). The database indicates three (3) tanks are present on site, all having an 8,000 gallon capacity and used for gasoline storage. The database identifies the tank status as temporarily out of use. An electromagnetic survey conducted by the DNRE identified the presence of three suspect underground storage tank (UST) locations on the property. Soil samples collected by the DNRE indicate the surficial and subsurface soils are impacted with contamination from petroleum products.

The property tax-reverted to the State and is currently owned by the Michigan Land Bank Fast Track Authority (MLBFTA). To facilitate the property sale and redevelopment the MLBFTA, through the DNRE and a USEPA Brownfield Cleanup Program grant, has requested MSG's professional services to remove the USTs and, to the extent practical, impacted soils from the property.

1.1 Site Description

The Samuel B. Jolly property is currently a vacant lot located at 3445 West Warren Ave in Wayne County, Michigan. The site is bordered by West Warren Avenue to the north and residential properties to the south and east. The site is bordered to the west by 24th St., beyond which are residences. The site as referenced to nearby roads and major topographical features is shown in *Figure 1, Site Location Map*.

Formerly, the property was occupied by a gasoline service station which operated at the site from the 1970s through 1997. The site is currently unoccupied and the former gasoline service station structure(s) have been removed with its cement slab foundation and pavement remaining in place. The area is serviced by municipal water and sewer services supplied by the City of Detroit. The property and prominent site feature are depicted on *Figure 2, Site Schematic.*

1.2 Project Background

The project background information presented in the following subsections was compiled using available historical information from the following documents:

- *Brownfield Redevelopment Assessment Report, DEQ Pre-Remedial Group, December 20, 2005.*
- *Electromagnetic Survey Report, DEQ RRD Division, August 11, 2005.*

In preparation and completion of this project, MSG had to rely on information obtained and interpreted by others and therefore, cannot attest to the veracity of such data. As such, MSG has accepted the work previously performed by others at face value.

1.3 Site History

The site is a closed gas station located in the City of Detroit. Historically, the site was used as a delivery service, dwelling, furniture store, and a gas station. The gas station was known to be in operation from at

least 1977 continuing through 1997. The site is currently listed by the DNRE as an "Open" LUST site regulated under Part 213, Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act (NREPA), 1994 P.A. 451, as amended (Part 213). On October 25, 2005, a confirmed release (C-0327-06) at the site was reported to the DNRE.

A DNRE electromagnetic survey conducted in 2005 indicated the presence of three (3) USTs in the central portion of the property.

In September 2005, the DNRE via cooperative agreement with the USEPA conducted a Brownfield Redevelopment Assessment (BFRA) for the site. Surficial soil and soil boring results confirmed the site is a "facility" with concentrations of several petroleum based compounds exceeding Part 213 risk based screening levels (RBSLs) as revised January 23, 2006 (a.k.a.Part 201/213 Generic Residential & Commercial I Cleanup Criteria). The BFRA sample locations and RBSLs exceedance call outs are depicted on *Figure 3, Pre-Abatement Soil Sample Locations*. The soils samples collected by DNRE indicated the presences of petroleum compounds exceeding RBSLs in the vicinity of the USTs and pump islands. Metals (aluminum, arsenic, chromium, cobalt, iron, lithium, magnesium, manganese, and zinc) were also detected above RBSLs in surface and sub-surface soil samples, however, they were concluded to be within typical background range of soils and not a threat to drinking water or surface water.

The BFRA report recommended the removal of the USTs and surrounding petroleum-contaminated soil. Furthermore, the report recommended evaluation of any residual soil contamination remains above RBSLs and determining what restrictions may be necessary to prevent unacceptable exposure to the residual impacts.

1.4 Hydrogeological Setting

Based on the USGS 7.5-minute Series Topographic Map *Detroit, Michigan – Ontario Quadrangle* (dated 1968, photorevised 1973 and 1980), the site is located approximately 600 feet above mean sea level (msl). The site topography is relatively flat, with a regional slope downwards to the southeast. The nearest surface water body is the Detroit River which is approximately 2.5 miles southeast from the site. Shallow ground water flow typically mimics surface topography and would be anticipated to flow to the southeast of the site, towards the Detroit River. However, based on the Detroit area regional geology, shallow ground water would likely be of limited extent and its flow highly controlled by anthropogenic features such as storm drains and utility corridors.

A surficial geology map titled *Quaternary Geology of Southern Michigan,* compiled in 1982 by W.R. Farrand and published by the Michigan Geological Survey, depicts the surficial geology in the vicinity of the site to be composed of lacustrine clay and gray to dark reddish brown silt. A bedrock map titled *Bedrock Geology of Southern Michigan,* compiled in 1987 by Randall L. Milstein and published by the Michigan Geological Survey indicates bedrock beneath the site is comprised of the Middle Devonian Dundee Limestone.

2.0 OBJECTIVES AND SCOPE OF WORK

MSG developed project objectives and a scope of work pursuant to Part 213 as identified in MSG's Work Plan. The following subsections summarize the project objectives and scope of work employed during the completion of the IR construction activities at the site conducted in October of 2009.

2.1 Objectives

The primary objective of this project was to remove three (3) USTs and petroleum hydrocarbon impacted soils at the site to the extent possible as allowed for by the project budget. The mitigation goal was to obtain a Part

213 Site classification of 3 or less in accordance with RRD Operational Memorandum 3. The initial proposed area of soil excavation is depicted on Figure 3.

2.2 Scope of Work

To fulfill objectives, MSG developed the following scope of work:

1) Identify and properly abandon all utilities that were located within the excavation area.
2) Remove the three (3) 8,000-gallon USTs.
3) Excavate impacted soils and dispose off-site.
4) Collect site assessment (pre-abatement) samples from beneath each UST system piping and tanks.
5) Collect soil confirmation (post-abatement) samples from the sidewalls and floor of the excavation area, and beneath pump islands and associated piping runs.
6) Backfill and compact the excavation with MDOT Class II or Class III sand from a clean off-site source.
7) Restore site, including placement of MDOT 21A, 21AA, 22A or 22AA crushed stone over compacted backfill.

3.0 METHODOLOGIES AND FIELD ACTIVITIES

MSG prepared bid specifications to assist the State with selection of a trade contractor for this project. The State contracted with Technical Service Professionals, LLC. (TSP) of Livonia Michigan to conduct the IR activities. MSG on behalf of DNRE oversaw and documented the IR activities and collected confirmation samples from the soil excavations. The following subsections provide a detailed description of the field methodologies employed by TSP during the completion of IR activities. A photographic log of the field activities is provided in *Appendix A, Photographic Log.*

3.1 UST Systems Removal

On October 6, 2009, a hydraulic excavator was used to remove concrete and soils to expose three (3) 8,000-gallon steel USTs. Petroleum impacted soils were observed directly over the USTs presumably from tank over fills or piping leaks. The tanks measured approximately eight (8) feet in diameter by twenty-one (21) feet in length. The contents of each tank were removed by Usher Oil (Usher) of Detroit, Michigan by suctioning the liquids via tanker truck. Approximately, 23,000 gallons of petroleum impacted water were removed from the USTs and properly disposed of by Usher. Waste manifest records can be found in *Appendix B, Disposal Records.* All three (3) tanks were in relatively good condition with no visible holes observed. The interior of the tanks were field screened with a four-gas meter for the lower explosive limit (LEL), oxygen, hydrogen sulfide, and carbon monoxide. Dry ice was poured into the tanks and the tanks were vented until they were deemed safe for cleaning and dismantling for off-site recycling of the steel. The tank registrations were updated on October 21, 2009. A copy of the DNRE tank registration update form EQP 3821 is provided in *Appendix C, DNRE Forms*.

After the USTs were removed, MSG field screened the soils directly beneath each of the tanks with a calibrated photoionization detector (PID) for the presence of volatile organic compounds (VOCs). PID readings were measured at approximately 600 parts per million (ppm) from beneath the northern UST, approximately 1,000 ppm beneath the middle UST, and 1,246 ppm beneath the southern UST. A small amount of water with a slight sheen was present at the bottom of the tank cavity.

One pre-abatement excavation sample was collected from the soils directly below each of the UST locations and submitted to the DNRE Environmental Laboratory for analysis of benzene, toluene, ethylbenzene and xylenes (BTEX) methyl-tert-butyl-ether (MTBE) and trimethylbenzenes (TMBs) by USEPA method 8260, polynuclear aromatic hydrocarbons (PNAs) by USEPA method 8270, lead by USEPA method 6020, gasoline

range organics (GRO), oil range organics (ORO), and diesel range organics (DRO). Laboratory reports are provided in *Appendix D, Laboratory Data Sheets.*

3.2 Soil Excavation

On October 5 through October 16, 2009, a Caterpillar© 325L hydraulic excavator with a two (2) cubic yard bucket was utilized by TSP to conduct the excavation activities. MSG directed the soil removal based on field screening of soils around the USTs using a calibrated PID, visual staining, and olfactory evidence of impacts. The excavator loaded the petroleum hydrocarbon impacted soil directly into gravels train for off-site transport and disposal. The petroleum hydrocarbon impacts extended through a fine-medium grained sand that had been used as backfill around the USTs and a short distance into a gray-green silty clay with some areas of black staining. Approximately 2,500 square feet of concrete pavement was removed to expose the UST system (including USTs, pump islands and fuel piping runs) and associated petroleum impacted soil.

During soil excavation activities vent piping and copper piping conduit was encountered southeast of the UST location running in an approximate east-west direction. MSG observed trace amounts of liquid inside the vent piping. However, this liquid did not exhibit a petroleum odor. Fuel lines and vent piping were observed north of the former northern UST running in a north-south direction towards the middle and north pump islands. All encountered fuel lines and vent piping were removed. The approximate location of the fuel lines and vent piping are shown on *Figure 4, Interim Response Soil Confirmation Sample Locations*. Photographs of the UST removal activities are included in Appendix A.

The soil excavation focused on removal of soils exhibiting signs of the greatest petroleum hydrocarbon impacts. The final remedial excavation covered an area of approximately 2,620 square feet and extended to depths up to 12 feet below ground level in the former tank cavity area and five (5) feet below ground level in the northern portion of the excavation beneath the fuel lines, vent piping, and the former north and middle pump islands. Approximately 1,082 tons of impacted soils were excavated and properly disposed of at Veolia Arbor Hills Landfill in Northville, MI. Waste disposal records and manifests for each gravel train that left the site are included in Appendix B. The approximate area of excavation is shown on Figure 4.

3.3 Excavation Dewatering

With the exception of a small amount of water that had collected in the UST cavity prior to the tank removals, ground water was not present within the excavation area. However, as a result of precipitation during the IR activities, additional water accumulated in the excavation tank cavity that necessitated dewatering to remove impacted soil. The water that collected in the excavation had a sheen however, no free product was observed. On October 12, 2009, approximately 901 gallons of water were removed from the excavation by Birks Works Environmental of Detroit, Michigan. Birks Works Environmental extracted and disposed of the excavation water at the Usher recycling facility in Detroit, Michigan. Liquid disposal manifests are included in Appendix B.

3.4 Confirmation Sample Collection

Concurrent with the soil excavation activities, MSG collected confirmatory soil samples to assess residual soil impacts that were left in place consistent with the soil remediation verification guidance found in DEQ, *Sampling Strategies and Statistics Training Materials for Part 201 Cleanup Criteria* document dated 2002. In total, thirteen (13) post-abatement confirmation soil samples were collected from the excavation including five (5) sidewall samples, and eight (8) floor samples. The confirmation samples were collected from the former UST cavity excavation area (eight samples), former pump island excavation areas (three samples), and piping run excavation areas (three samples). Confirmation samples were collected by hand (when safely accessible) or by using the excavator bucket to acquire a grab sample. Confirmation soil sample locations

are depicted on Figure 4. Soil samples were submitted to the DNRE Environmental Laboratory for analysis of BTEX, MTBE, TMB, PNAs, lead, and DRO/ORO/GRO. Analytical results for the soil samples are included in *Table 1, Pre-Abatement Soil Impacts Analytical Detection Summary*.

3.5 Excavation Backfill and Site Restoration

Upon completion of soil confirmation sampling, MDOT Class II fill sand obtained from Ashley Land Development Company (Muir Pit) was installed in 2-foot lifts and compacted. TSP utilized a Caterpillar© 325L hydraulic excavator to spread the MDOT Class II fill in 2-foot lifts and level the fill for compaction. Once the lift was in place, TSP used a plate compacter to compact the fill to the satisfaction of the MSG on-site geologist (approximately 95 % of its maximum dry unit weight). A total of 1,066 tons of MDOT Class II sand were used during the backfilling operations.

Four (4) inches of MDOT 21A crushed stone (approximately 50 tons) also obtained from Muir Pit was placed over the excavation area to bring the excavated areas back up to the original grade. TSP used the hydraulic excavator to move and grade the stone and then compact the crushed stone using a plate compactor. Sidewalks, curbs, or other pavements were not damaged during the IR actions. All remaining areas on site covered with pavement were swept. Photographs of the final site restoration conditions are included in Appendix A.

On October 21, 2009, representatives from MSG and the DNRE were on site to conduct an inspection of the IR activities completed by the contractor. Based on the site inspection, a punch list was created including several work items to be completed by the contractor. Following completion of these tasks, a Certificate of Substantial Completion was signed on October 27, 2009 verifying that all work items were conducted to the satisfaction of the DNRE.

4.0 RISK BASED CORRECTIVE ACTION EVALUATION

As part of this IR, MSG completed a contaminant exposure pathway evaluation in general accordance with Section 21307(2) (a),(e) and (3)(c); ASTM standard E 1739, *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*, dated 1995 (re-authorized 2002); and the DEQ *Remediation and Redevelopment Division Cleanup Criteria Training* guidance document dated Summer 2007. The exposure pathway evaluation is used to identify reasonable and relevant pathways as they relate to specific site conditions for determining applicable cleanup criteria. All cleanup criteria associated with a reasonable and relevant exposure pathway are applicable to a site unless the exposure route is reliably restricted.

Figure 5, Exposure Pathway Evaluation presents the results of the contaminant pathway evaluation for the site based on data gathered by MSG as part of the IR activities and the findings of previous investigations conducted by the DNRE. The pathway evaluation was completed by 1) identifying primary and secondary sources of hazardous substance; 2) evaluating the exposure routes and transport mechanisms if the exposure point is not the source; and 3) identifying potential receptors. Based on the results of this pathway evaluation, analytical results were compared to all Part 213 RBSLs with reasonable and relevant pathways.

4.1 Source of Hazardous Substance

Primary source of hazardous substance on the Samuel B. Jolly property is three 8.000-gallon gasoline or diesel USTs and their distribution systems. Secondary sources of hazardous substances include soils that are grossly impacted with petroleum hydrocarbons that were encountered in the vicinity of the UST cavity, piping runs and pump islands. The former service station was located in the southeastern corner of the property. The tanks were located in the south central portion of the property. One pump island was located west of the tanks adjacent to 24th Street and two pump islands were located north of the tanks adjacent to

Warren Avenue. The approximate former locations of these primary and secondary sources of hazardous substance are depicted on Figure 3.

4.2 Pathway Evaluation

The relevance of each exposure pathway was evaluated based on the physical setting, taking into account current and potential future site conditions and mechanisms that may expose a receptor to chemical impacts originating at the site. Figure 5 summarizes the exposure evaluation, the exposure pathways relevance to the site conditions, and applicable Part 213 Tier I RBSLs. The exposure pathways and applicable Part 213 RBSLs for each pathway evaluated are specified below:

- Acute fire and explosion hazards and non-systemic inhalation hazards.
- Soil Leaching to Ground Water used for Drinking Water.
- Soil Leaching to Ground Water Venting to Surface Water.
- Soil Leaching to Ground Water Protective of Ground Water Direct Contact.
- Soil Volatilization to Indoor Air.
- Soil Volatilization to Ambient Air.
- Soil Inhalation of Particulate Matter.
- Soil Direct Contact.
- Ground Water Direct Contact.
- Ground Water Ingestion as Drinking Water.
- Ground Water Volatilization to Indoor Air.
- Ground Water Venting to Surface Water.

Acute Fire and Explosion Hazards and Inhalation Hazards

The presence of free product and/or soil or ground water grossly impacted by VOCs may pose a fire and explosion risk or non-systemic (acute) inhalation risk. Soil saturation concentration screening levels (Csat) have been developed by DNRE for individual parameters and draft screening values for chemical mixtures that may indicate the presence of free product in pore space of soil. Acute screening levels for flammability explosivity (FESLs) and inhalation (AISL) for ground water have also been developed by DNRE.

Historically, the USTs contained free product and a mixture of free product a water was removed from one or more of the USTs during IR activities. A release from the UST systems has occurred and grossly impacted soil were removed during the IR excavation. Based on the historic presence free product of free product in the USTs, and encountered grossly impacted soils during IR activities, there is a potential for acute hazards to be present. Therefore, acute hazards pathways may become complete making it relevant and analytical results will be compared to their respective acute hazard RBSLs.

Soil Leaching to Ground Water used for Drinking Water

The soil leaching to ground water used for drinking water pathway identifies the potential of a chemical to leach from soil and impact ground water at concentrations greater than the corresponding drinking water criteria (DWC). The RBSLs for the soil leaching to ground water used for drinking water are the drinking water protection criteria (DWPC).

Ground water was not encountered during the excavation activities and based on regional hydrogeology is not likely to be found in significant quantities. Currently, all area residences and businesses are serviced by the City of Detroit municipal water supply system and therefore the soil leaching to ground water used for drinking water pathway is currently incomplete. However, if a vulnerable aquifer is present in the area and a drinking water supply well was installed in the aquifer the DWPC pathway may be completed and therefore the soil leaching to ground water used for drinking water pathway is relevant until, proven otherwise, and analytical results will be compared to the DWPC.

Soil Leaching to Ground Water Venting to Surface Water

The soil leaching to ground water venting to surface water pathway identifies the potential of a chemical to leach from soil and impact ground water at concentrations greater than the corresponding ground water surface water interface criteria (GSIC). The RBSLs for the soil leaching to ground water venting to surface water pathway are the ground water surface water interface protection criteria (GSIPC).

The Detroit River is the nearest major surface water body and is located approximately 2.5 miles southeast of the site. The Detroit area is serviced by a combined storm/sanitary sewer system. Therefore, the soil leaching to ground water venting to surface water pathway is currently incomplete. However the pathway could become complete if a surface water body was installed (i.e. pond) or a storm drain that discharges to a surface water body was constructed in the vicinity of the impacted soils. Therefore the soil leaching to ground water venting to surface water pathway may become complete, making it relevant and analytical results will be compared to the GSIPC.

Soil Leaching to Ground Water Protective of Direct Contact

The soil leaching to ground water protective of direct contact pathway identifies the potential of a chemical to leach from soil and impact ground water at concentrations greater than the corresponding ground water contact criteria (GCC). The RBSLs for the soil leaching to ground water protective of the direct contact pathway are the ground water contact protection criteria (GCPC).

Ground water may be present in thin sand seams or utility corridors beneath the site and utility or construction workers may reasonably come into contact with impacted water. Therefore, soil leaching to ground water protective of direct contact is or may reasonably become complete making it a relevant pathway for the site and analytical results will be compared to GCPC.

Soil Volatilization to Indoor Air

The soil volatilization to indoor air inhalation pathway identifies the potential for a chemical to volatilize from soil and impact indoor air at a concentration that adversely affects human health. The RBSLs for the volatilization from soil to indoor air are the soil volatilization to indoor air inhalation criteria (SVIIC).

Currently, no structures are present on site; however, construction of future structures may occur on the site property. Therefore, the soil volatilization to indoor air pathway may become complete making it a relevant pathway and analytical results will be compared to SVIIC.

Soil Volatilization to Ambient Air

The soil volatilization to ambient air pathway identifies the potential for a chemical to volatilize from soil and impact ambient (outdoor) air at a concentration that adversely affects human health. The RBSLs for the soil volatilization to ambient air pathway are the volatile soil inhalation criteria (VSIC). Because the amount of the impact source influences the amount to vapors released, the DNRE has developed three criteria based on the source thickness; infinite source VSIC, finite source VSIC for five meter source thickness, and finite source VSIC for two meter source thickness.

The site is unoccupied unrestricted property. Therefore, soil volatilization to ambient air is a pathway that is or may reasonably become complete, making it a relevant pathway. The finite source VSIC for 2 meter source thickness is the criteria for the soil volatilization to ambient air pathway relevant to the site and will be used as the default RBSLs for comparison to the analytical results.

Soil Inhalation of Particulate Matter

The soil inhalation of particulate matter pathway identifies the potential for a chemical to yield particulates at a concentration that would adversely affect human health. The RBSLs for the soil inhalation of particulate matter pathway are the particulate soil inhalation criteria (PSIC).

Soil excavation by utility and construction workers could expose occupants and workers at the site to impacted soil particulate inhalation (dust). Therefore, the soil inhalation of particulate matter is or may become complete making it a relevant pathway and analytical results will be compared to PSIC.

Soil Direct Contact Criteria

The soil direct contact pathway identifies the potential for adverse health effects due to long-term ingestion of and dermal exposure to impacted soils. The RBSLs for the soil direct contact pathway are the soil direct contact criteria (SDCC).

Utility and construction workers at the site could be exposed to impacted soils. Therefore, the soil direct contact is or may become complete making it a relevant pathway and analytical results will be compared to SDCC.

Ground Water Direct Contact

The ground water direct contact pathway identifies the potential for a chemical to occur in ground water at a concentration that would cause adverse health effects resulting from dermal exposures. The RBSLs for the ground water direct contact pathway are the GCC.

Ground water may be present in thin sand seams or utility corridors beneath the site and utility or construction workers may reasonably come into contact with impacted water. Therefore, ground water direct contact is or may reasonably become complete making it a relevant pathway for the site and analytical results will be compared to GCC.

Ground Water Ingestion as Drinking Water

The ground water ingestion as drinking water pathway identifies the potential for a chemical in ground water to cause adverse health effects when ingested. The RBSLs for the ground water ingestion as drinking water pathway are the DWC.

Ground water was not encountered during the excavation activities and based on regional hydrogeology is not likely to be found in significant quantities. The drinking water pathway will continue to be considered relevant unless further investigation verifies shallow groundwater is not present or if present is demonstrated to be "ground water not in an aquifer". Until the drinking water pathway is demonstration to be irrelevant, ground water (if encountered) sample analytical results will be compared to DWC.

Ground Water Volatilization to Indoor Air

The ground water volatilization to indoor air pathway identifies the potential for a chemical to volatilize from ground water and impact indoor air at a concentration that adversely affects human health. The RBSLs for the ground water volatilization to indoor air pathway are the ground water volatilization to indoor air inhalation criteria (GVIIC).

Ground water may be present in thin sand seams or utility corridors beneath the site; therefore, the ground water volatilization to indoor air pathway is or may reasonably become complete making it a relevant pathway and analytical results will be compared to GVIIC.

Ground Water Venting to Surface Water

The ground water venting to surface water pathway identifies the potential of a chemical in ground water to adversely affect surface waters where the ground water vents to the surface water. The RBSLs for the ground water venting to surface water pathway are the GSIC.

Ground water was not encountered during the excavation activities and based on regional hydrogeology is not likely to be found in significant quantities; however, ground water may be present in thin sand seams or utility corridors beneath the site. The Detroit River is located approximately four miles southeast of the site and the Detroit area is serviced by a combined storm/sanitary sewer system. Therefore, the ground water venting to surface water pathway is currently incomplete; however, if a surface water body (i.e. pond) or storm drain discharging to a surface water body was constructed, the ground water venting to surface water pathway could reasonably become complete making it a relevant pathway. Therefore, soil analytical results will be compared to GSIC.

4.3 Potential Receptors

MSG conducted an assessment to determine the potential receptors that could be exposed to chemicals impacting the site. The potential receptor assessment included a review of the current site conditions, the foreseeable future intended use of the site, and foreseeable human and ecological receptors both on-site and off-site. Based on these factors, potentially exposed receptors at the site include:

- Current and future residential inhabitants, and/or commercial/industrial workers who may be exposed to impacted subsurface soil, ground water and vapors.
- Construction and/or utility workers that are installing, maintaining or improving utilities or new construction activities in the vicinity of the site that may be exposed to impacted subsurface soil, ground water and vapors.
- Ecological receptors (flora and fauna), that may come in direct contact with impacted soil or ground water.

4.4 Selection of Appropriate RBSLs for Analytical Data Comparison

Based on the available information, all Part 213 exposure pathways were deemed reasonable and relevant to the site. However, if further investigation demonstrates shallow ground water is not present or only present as "ground water not in an aquifer" the drinking water pathway may then be considered irrelevant and the DWPC and the DWC would no longer be applicable to the site.

Potential receptors included residential inhabitants, commercial/industrial/construction/utility workers and ecological receptors. The Part 201/213 Generic Residential & Commercial I Cleanup Criteria is the most stringent of the land use based cleanup criteria. Therefore the Part 201/213 Generic Residential & Commercial I Cleanup Criteria for all of the associated relevant exposure pathways will be used as the RBSLs for comparison to the analytical results. Additionally, draft Csat screening values for total petroleum hydrocarbons (TPH) as presented in the DEQ Remediation and Redevelopment Division Summer 2007 Training were compared to petroleum chemical mixture laboratory analytical results.

5.0 ANALYTICAL RESULTS

The following subsections include a discussion of pre-excavation analytical results, post remedial confirmation sample results and residual contaminant distribution from the soil sampling conducted during the 2009 IR activities. Ground water was not encountered during IR activities; therefore, laboratory analysis is limited to soils. MSG submitted a total of 16 soil samples for laboratory analysis including three soil samples collected directly beneath each of the removed

USTs prior to IR soil excavation and 13 post IR excavation confirmation samples. Laboratory data sheets are contained in Appendix D.

MSG compared soil analytical results collected during MSG's IR activities to the applicable RBSLs as identified in Section 4.2. In areas where residual chemical concentrations exceed RBSLs, implementation of corrective action may be appropriate if the exposure pathway is not reliably restricted.

5.1 Pre-Abatement Sample Analytical Results

MSG collected pre-abatement soil samples beneath all three USTs (UST North, UST Middle, and UST South) prior to soil removal activities. MSG submitted the pre-abatement samples to the DNRE Environmental Laboratory for analysis of BTEX, MTBE, TMB, PNAs, lead, and DRO/ORO/GRO. Laboratory analysis of the samples indicate the presence of VOC and PNA compounds in soil at concentrations above their respective RBSLs. Laboratory analysis did not detect the presence of MTBE, a common additive to unleaded gasoline since 1978, in any of the pre-abatement soil samples. Lead was detected was detected beneath one of the tanks (UST North) sample above the default state background level [21,000 micrograms per kilogram (µg/kg)] but below all RBSLs. The GRO concentration detected beneath all three tanks and the DRO concentration detected from the UST Middle sample exceed the draft DNRE chemical mixture Csat screening value of 50,000 ug/kg

During the BFRA investigation the DNRE submitted soil sample to the DNRE Environmental Laboratory for analysis of VOCs, semi volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), multiple metals and other inorganic compounds. As mentioned above, laboratory analysis of the samples indicate the presence of VOC and SVOCs in soil at concentrations above their respective RBSLs. Laboratory analysis of the pre-abatement soil samples collected by DNRE detected metal (arsenic, chromium, cobalt, cyanide, iron, lithium, magnesium, mercury, selenium, and zinc) concentrations exceeding one or more of their respective RBSLs for DWCP, GSIP, or SDCC. Lead was detected in the DNRE soil samples above the default state background level (21,000 µg/kg) but below all RBSLs. The elevated metal concentrations detected in DNRE soil samples do not appear to be associated with a release from the UST systems.

Analytical results from pre-abatement activities, including the DNRE assessment sampling, are compared to Part 213 RBSLs in Table 1. The distribution of petroleum compounds (VOC and PNAs) that exceed RBSLs in the pre-abatement soil samples is depicted on Figure 3.

5.2 Confirmation Sample Results

Post-Abatement Analytical Results

MSG collected thirteen (13) post-abatement soil confirmation samples to assess the residual soil impacts that were left in place. These samples were collected from the excavation sidewalls and floor, and below former pump islands and piping runs associated with the USTs. MSG submitted the confirmation samples to the DNRE Environmental Laboratory for analysis of BTEX, MTBE, TMB, PNAs, lead, and DRO/ORO/GRO. Post IR excavation soil confirmation sample results are summarized and compared to Part 213 RBSLs in *Table 2, Interim Response Soil Analytical Detection Summary* and depicted on Figure 4. Soil sample laboratory analytical data sheets are located in Appendix D.

All VOCs, SVOCs, and lead detected at the post-abatement samples were below their respective most stringent Part 213 RBSLs. The detected DRO/ORO/GRO exceeded the draft DNRE chemical mixture Csat screening value of 50,000 ug/kg at confirmation sample locations NE Sidewall (S2), East Sidewall (S3), West Sidewall (S5) and North Pump Island Piping (F6). However, no individual compounds exceeded their most stringent RBSLs.

- The detected DRO concentrations detected at sidewall samples S3 and S5 were 190,000 ug/kg and 140,000 ug/kg, respectively.
- ORO concentrations detected at sidewall sample S5 and at the north pump island piping run (PR1) were 3,600,000 ug/kg and 65,000 ug/kg, respectively.
- GRO concentrations detected at sidewall samples S2 and S3 were 63,000 ug/kg and 76,000 ug/kg, respectively.

6.0 SITE CLASSIFICATION

In accordance with RRD Operational Memorandum No. 3, Part 213 LUST Site Classification System (Op Memo 3), and the results of the pathway exposure evaluation, MSG has classified the Samuel B. Jolly LUST Site, located at 3445 West Warren Avenue, Detroit, as a Class 4 Site because no individual compounds exceeded their most stringent RBSLs and no other evidence of residual free product (or Csat conditions) was observed in the post IR excavation, even though soils are impacted at levels above the draft DNRE chemical mixture Csat screening value of 50,000 ug/kg. Figure 5 depicts the relevant pathways, RBSLs exceeded and includes a site classification score for each pathway with criteria exceeded.

7.0 SUMMARY & CONCLUSIONS

Based on the results of the IR activities conducted on site, MSG concludes the following:

- The three 8,000-gallon USTs were removed from October 8 through October 12, 2009. The tank contents included mainly impacted water and a small amount of sand. Once the tanks were removed and properly cleaned out, they were sent to Mars Industries of Detroit, Michigan for recycling of the steel.
- Approximately 1,082 tons of soil grossly impacted with petroleum hydrocarbons were excavated and properly disposed at Veolia Landfill Arbor Hills in Northville, Michigan.
- During the excavation dewatering activities, approximately 901 gallons of impacted water was removed and disposed at Usher's recycling facility in Detroit, Michigan.
- Laboratory analytical results from pre-abatement soil samples collected beneath the USTs contained concentrations of VOCs and SVOCs (naphthalene) exceeding Part 213 generic DWPC and/or GSIPC RBSLs. Concentrations of DRO, ORO, and GRO at several soil sample locations exceeded the DNRE screening value of 50,000 ug/kg.
- Laboratory results from post-abatement soil samples collected at excavation sidewalls and beneath the north pump island piping run contained concentrations of DRO, ORO, and GRO that exceed the draft DNRE chemical mixture Csat screening level of 50,000 ug/kg; however, no individual compounds exceeded their most stringent RBSLs and no other evidence of residual free product (or Csat conditions) was observed in the post IR excavation.
- In accordance with RRD Op Memo 3 the site has been classified as a Part 213 Class 4 Site.
- Site restoration has been completed to the satisfaction of the DNRE.

7.0 RECOMMENDATIONS

Based on the results of the IR soil excavation activities, confirmation sampling results, MSG has the following recommendations:

- DNRE should consider the site for a Part 213 closure based on the confirmation analytical results meeting the most stringent RBSLs for individual compounds and observed soil conditions.

Table 1
Pre-Abatement Soil Impacts Analytical Detection Summary

Samuel B. Jolly Site
Detroit, MI

			Volatile Organic Compounds (VOCs)											Semivolatile Organic Compounds (SVOCs)										
SOIL: Part 201/213 Generic Residential & Commercial I Cleanup CriteriaRevised January 23, 2006 Units: ug/Kg			Benzene	n-Butylbenzene	sec-Butylbenzene	Ethylbenzene	Isopropylbenzene	p-Isopropyl toluene	Toluene	1,2,3-Trimethylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Total Xylenes	Acenaphthene	Anthracene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluornathene	Benzo(g,h,i)perylene	Benzo(a)pyrene	Chrysene	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene
Statewide Default Background Levels (X)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Drinking Water Protection Criteria (XI)			100	1,600	1,600	1,500	91,000	NA	16,000	NA	2,100	1,800	5,600	3.0E+05	41,000	NLL	NLL	NLL	NLL	NLL	NLL	7.3E+05	3.9E+05	NLL
Groundwater/Surface Water Interface Protection Criteria (XII)			4,000 (X)	ID	ID	360	ID	NA	2,800	NA	570	1,100	700	4,400	ID	NLL	NLL	NLL	NLL	NLL	NLL	5,500	5,300	NLL
Groundwater Contact Protection Criteria (XIII)			2.2E+05	1.2E+05	88,000	1.4E+05 (C)	3.9E+05 (C)	NA	2.5E+05 (C)	NA	1.1E+05 (C)	94,000 (C)	1.5E+05 (C)	9.7E+05	41,000	NLL	NLL	NLL	NLL	NLL	NLL	7.3E+05	8.9E+05	NLL
Soil Volatilization to Indoor Air Inhalation (XIV)			1,600	ID	ID	87,000	3.9E+05 (C)	NA	2.5E+05 (C)	NA	1.1E+05 (C)	94,000 (C)	1.5E+05 (C)	1.9E+08	1.0E+09 (D)	NLV	ID	NLV	NLV	NLV	ID	1.0E+09 (D)	5.8E+08	NLV
Infinite Source Volatile Soil Inhalation Criteria (XV)			13,000	ID	ID	7.2E+05	1.7E+06	NA	2.8E+06	NA	2.10E+07	1.6E+07	4.6E+07	8.1E+07	1.4E+09	NLV	ID	NLV	NLV	NLV	ID	7.4E+08	1.3E+08	NLV
Finite Source Source Volatile Soil Inhalation Criteria (5 m) (XVI)			34,000	ID	ID	1.0E+06	1.7E+06	NA	5.1E+06	NA	5.0E+08	3.8E+08	6.1E+07	8.1E+07	1.4E+09	NLV	ID	NLV	NLV	NLV	ID	7.4E+08	1.3E+08	NLV
Finite Source Source Volatile Soil Inhalation Criteria (2 m) (XVII)			79,000	ID	ID	2.2E+06	2.8E+06	NA	1.2E+07	NA	5.0E+08	3.8E+08	1.3E+08	8.1E+07	1.4E+09	NLV	ID	NLV	NLV	NLV	ID	7.4E+08	1.3E+08	NLV
Particulate Soil Inhalation Criteria (XVIII)			3.8E+08	ID	ID	1.0E+10	5.8E+09	NA	2.7E+10	NA	8.2E+10	8.2E+10	2.9E+11	1.4E+10	6.7E+10	ID	ID	ID	8.0E+08	1.5E+06	ID	9.3E+09	9.3E+09	ID
Direct Contact Criteria (XIX)			1.8E+05	2.5E+06	2.5E+06	1.4E+05 (C)	3.9E+05 (C)	NA	2.5E+05 (C)	NA	1.1E+05 (C)	94,000 (C)	1.5E+05 (C)	4.1E+07	2.3E+08	20,000	20,000	2.0E+05	2.5E+06	2,000	2.0E+06	4.6E+07	2.7E+07	20,000
Soil Saturation Concentration Screening Levels (Csat) (XX)			4.0E+05	1.0E+07	1.0E+07	1.40E+05	3.90E+05	NA	2.5E+05	NA	1.10E+05	94,000	1.5E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SAMPLE ID	Depth	SAMPLE DATE																						
SS-1	0-3"	9/7/2005	<53	<53	<53	<53	<53	<53	72	<53	<53	<53	<163	<100	<100	300	400	<210	410	280	310	640	<100	<210
SS-2	0-1'	9/7/2005	<51	<51	<51	<51	<51	<51	<51	<51	<51	<51	<151	<100	<100	<200	<200	<200	<200	<200	<100	<100	<100	<200
SS-3	0-1'	9/7/2005	<61	<61	<61	<61	<61	<61	<61	<61	<61	<61	<181	<100	<100	<100	<200	<200	<200	<200	<100	<100	<100	<200
SS-4	0-6"	9/7/2005	<51	<51	<51	<51	<51	<51	<51	<51	<51	<51	<151	<100	<100	110	<200	<200	<200	<200	120	210	<100	<200
SB-1	4-8'	9/7/2005	<65	<65	<65	<65	<65	<65	<65	<65	<65	<65	<195	<120	<120	<230	<230	<230	<230	<230	<120	<120	<120	<230
SB-2	4-8'	9/7/2005	<72	<72	<72	<72	<72	<72	100	<72	<72	<72	<212	<120	<120	<250	<250	<250	<250	<250	<120	<120	<120	<250
SB-3	0-8'	9/7/2005	<72	<72	<72	<72	<72	<72	97	<72	<72	<72	<212	<120	<120	290	270	<240	<240	<240	240	460	<120	<240
SB-4	4-8'	9/7/2005	<81	<81	<81	<81	120	<81	120	<81	<81	<81	<241	<130	<130	180	<260	<260	<260	<260	180	430	<130	<260
SB-5	0-4'	9/7/2005	180	1,000	630	130	950	120	130	<67	93	<67	240	180	140	440	560	<240	<240	380	500	890	230	<240
SB-6	4-8'	9/7/2005	130	<74	1,200	15,000	2,600	520	490	<74	47,000	17,000	13,550	<120	<120	<120	<250	<250	<250	<250	<120	<120	<120	<250
SB-7	4-8'	9/7/2005	<74	<74	<74	<74	<74	<74	100	<74	<74	<74	<212	<130	<130	<130	<250	<250	<250	<250	<130	<130	<130	<250
SB-8	0-8'	9/7/2005	<87	<87	<87	<87	<87	<87	<87	<87	<87	<87	<257	<130	<130	<130	<250	<250	<250	<250	<130	<130	<130	<250
SB-9	4-8'	9/7/2005	<69	<69	<69	<69	<69	<69	<69	<69	<69	<69	<209	<120	<120	<240	<240	<240	<240	<240	<120	<120	180	<240
SB-10	4-8'	9/7/2005	<83	<83	<83	<83	<83	<83	<83	<83	<83	<83	<253	<120	<120	<240	<240	<240	<240	<240	<120	140	<120	<250
UST North	10'	10/8/2009	<290	NA	NA	9,200	NA	NA	310	2,400	3,200	1,300	3,450	120	<250	390	380	250	<500	360	460	920	130	530
UST Middle	10'	10/8/2009	<69	NA	NA	650	NA	NA	81	800	1,900	710	2,110	200	160	<120	<230	<230	<230	<230	<120	200	300	<230
UST South	10'	10/8/2009	<66	NA	NA	1,200	NA	NA	110	920	1,500	640	1,900	850	1,600	510	250	240	<230	300	460	2,600	1,200	290

Notes:
Roman numerals indicate DEQ criterion number
Exceeds Generic Drinking Water Protection Cleanup Criteria (XI)
Exceeds Groundwater Surface Water Interface Protection Cleanup Criteria (XII)
Exceeds Direct Contact Cleanup Criteria (XIX)
Exceeds Generic Drinking Water Protection (XI) and Groundwater Surface Water Interface Protection (XII) Cleanup Criteria
Exceeds Generic Drinking Water Protection (XI) and Soil Volatilization to Indoor Air Cleanup (XIV) Criteria
Exceeds Generic Drinking Water Protection (XI), Ground Water Surface Water Interface Protection (XII), and Soil Volatilization to Indoor Air (XIV) Cleanup Criteria
Exceeds Four or More Cleanup Criteria
Equals or Exceeds Soil Saturation Concentration Screening Level (XX)

* DEQ Remediation and Redevelopment Division Summer 2007 Training, Soil Saturation Concentration (C_{sat}), Draft TPH screening levels

Table 1
Pre-Abatement Soil Impacts Analytical Detection Summary

Samuel B. Jolly Site
Detroit, MI

			Semivolatile Organic Compounds (SVOCs)					Metals														
SOIL: Part 201/213 Generic Residential & Commercial I Cleanup CriteriaRevised January 23, 2006 Units: ug/Kg			2-Methylnaphthalene	Naphthalene	n-Propoylbenzene	Phenanthrene	Pyrene	Aluminum (B)	Arsenic	Barium (B)	Beryllium	Cadmium (B)	Calcium	Chromium	Cobalt	Copper (B)	Cyanide (P,R)	Iron (B)	Lead (B)	Lithium	Magnesium (B)	Mercury (B,Z)	Nickel (B)
Statewide Default Background Levels (X)			NA	NA	NA	NA	NA	6.9E+06	5,800	75,000	NA	1,200	NA	18,000	6,800	32,000	390 (total)	1.2E+07	21,000	9,800	NA	130	20,000
Drinking Water Protection Criteria (XI)			57,000	35,000	1,600	56,000	4.8E+05	1,000	4,600	1.3E+06	51,000	6,000	NA	30,000	800	5.8E+06	4,000	6,000	7.0E+05	3,400	8.0E+06	1,700	1.0E+05
Groundwater/Surface Water Interface Protection Criteria (XII)			ID	870	NA	5,300	ID	NA	70,000 (X)	(G,X)	(G)	3,600 (G,X)	NA	3,300	2,000	75,000 (G)	100	NA	(G,X)	1,900	NA	50 (M); 1.2	(G)
Groundwater Contact Protection Criteria (XIII)			5.5E+06	2.1E+06	3.0E+05	1.1E+06	4.8E+05	1.0E+09 (D)	2.0E+06	1.0E+09 (D)	1.0E+09 (D)	2.3E+08	NA	1.4E+08	4.8E+07	1.0E+09 (D)	2.5E+05	1.0E+09 (D)	ID	1.1E+08	1.0E+09 (D)	47,000	1.0E+09 (D)
Soil Volatilization to Indoor Air Inhalation (XIV)			ID	2.5E+05	ID	2.8E+06	1.0E+09 (D)	NLV	NLV	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	48,000	NLV
Infinite Source Volatile Soil Inhalation Criteria (XV)			ID	3.0E+05	ID	1.6E+05	6.5E+08	NLV	NLV	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	52,000	NLV
Finite Source Source Volatile Soil Inhalation Criteria (5 m) (XVI)			ID	3.0E+05	ID	1.6E+05	6.5E+08	NLV	NLV	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	52,000	NLV
Finite Source Source Volatile Soil Inhalation Criteria (2 m) (XVII)			ID	3.0E+05	ID	1.6E+05	6.5E+08	NLV	NLV	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	52,000	NLV
Particulate Soil Inhalation Criteria (XVIII)			ID	2.0E+08	1.3E+09	6.7E+06	6.7E+09	ID	7.2E+05	3.3E+08	1.3E+06	1.7E+06	NA	2.6E+05	1.3E+07	1.3E+08	2.5E+05	ID	1.0E+08	ID	6.7E+09	2.0E+07	1.3E+07
Direct Contact Criteria (XIX)			8.1E+06	1.6E+07	2.5E+06	1.6E+06	2.9E+07	5.0E+7 (DD)	7,600	3.7E+07	4.1E+05	5.5E+05	NA	2.5E+06	2.6E+06	2.0E+07	12,000	1.6E+08	4.0E+05	4.2E+06 (DD)	1.0E+09 (D)	1.6E+05	4.0E+07
Soil Saturation Concentration Screening Levels (Csat) (XX)			NA	NA	1.0E+07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SAMPLE ID	Depth	SAMPLE DATE																					
SS-1	0-3"	9/7/2005	<260	<100	<53	390	510	5,300,000	5,900	62,000	360	<2000	623,000	13,000	4,300	21,000	<200	12,000,000	98,000	8,500	22,200,000	20	16,000
SS-2	0-1'	9/7/2005	<260	<100	<51	<100	<100	1,900,000	3,000	8,600	<200	<2000	67,300,000	4,600	2,300	6,300	<200	5,600,000	<5000	3,100	14,900,000	<50	6,900
SS-3	0-1'	9/7/2005	<300	<100	<61	<100	<100	1,900,000	2,600	8,200	<200	<2000	64,700,000	4,500	2,200	6,000	<200	5,200,000	<5000	3,200	14,700,000	<50	6,100
SS-4	0-6"	9/7/2005	<260	<260	<51	120	180	4,200,000	3,600	32,000	430	<2000	67,300,000	8,400	3,100	19,000	<200	7,800,000	58,000	6,700	20,800,000	<50	10,000
SB-1	4-8'	9/7/2005	<330	<330	<120	<120	<120	17,000,000	12,000	89,000	820	<2000	15,600,000	24,000	14,000	22,000	<200	38,000,000	13,000	28,000	11,500,000	<50	33,000
SB-2	4-8'	9/7/2005	<360	<120	<120	<120	<120	17,000,000	4,300	94,000	9,400	<2000	5,640,000	26,000	9,700	13,000	<200	32,000,000	12,000	30,000	450,000	<50	24,000
SB-3	0-8'	9/7/2005	<300	<120	170	220	380	16,000,000	10,300	78,000	7,700	<2000	8,770,000	23,000	13,000	17,000	<200	37,000,000	15,000	29,000	7,450,000	<50	29,000
SB-4	4-8'	9/7/2005	<400	<130	190	330	330	13,000,000	6,000	92,000	680	<2000	14,500,000	20,000	8,900	20,000	<200	26,000,000	390,000	21,000	6,330,000	70	21,000
SB-5	0-4'	9/7/2005	12,000	7,000	3,400	930	1,100	9,400,000	6,000	120,000	5,200	<2000	23,500,000	15,000	7,000	23,000	480	18,000,000	180,000	19,000	7,620,000	790	18,000
SB-6	4-8'	9/7/2005	1,900	1,500	11,000	<120	<120	17,000,000	12,100	91,000	800	<2000	23,200,000	25,000	13,000	22,000	<200	40,000,000	14,000	34,000	12,500,000	<50	35,000
SB-7	4-8'	9/7/2005	<370	<130	<74	<130	<130	17,000,000	4,300	95,000	820	<2000	3,920,000	23,000	9,800	11,000	<200	30,000,000	13,000	28,000	4,620,000	80	22,000
SB-8	0-8'	9/7/2005	<330	<130	<87	<130	<130	20,000,000	4,700	110,000	930	<2000	4,490,000	25,000	9,600	15,000	<200	29,000,000	15,000	30,000	4,530,000	<50	23,000
SB-9	4-8'	9/7/2005	<350	<120	<69	160	<120	17,000,000	7,300	8,300	960	<2000	16,200,000	26,000	15,000	19,000	<200	35,000,000	13,000	290,000	10,100,000	<50	33,000
SB-10	4-8'	9/7/2005	<410	<120	<83	130	140	17,000,000	6,900	92,000	1,000	<2000	32,300,000	25,000	11,000	27,000	<200	30,000,000	61,000	28,000	12,100,000	70	28,000
UST North	10'	10/8/2009	2,600	2,200	NA	660	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	31,000	NA	NA	NA	NA
UST Middle	10'	10/8/2009	1,400	1,700	NA	1,000	150	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	11,000	NA	NA	NA	NA
UST South	10'	10/8/2009	710	1,300	NA	4,900	1,700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10,000	NA	NA	NA	NA

Table 1
Pre-Abatement Soil Impacts Analytical Detection Summary

Samuel B. Jolly Site
Detroit, MI

			Metals							Pesticides/Herbicides					Total Pertroleum Hydrocarbons (TPH)		
SOIL: Part 201/213 Generic Residential & Commercial I Cleanup CriteriaRevised January 23, 2006 Units: ug/Kg			Potassium	Selenium (B)	Silver (B)	Sodium	Titanium	Vanadium	Zinc (B)	4,4'-DDD	4,4'-DDE	4,4'-DDT	Dieldrin	Total PCBs	Diesel Range Organic Compounds DRO	Oil Range Organic Compounds ORO	Gas Range Organic Compounds GRO
Statewide Default Background Levels (X)			NA	410	1,000	NA	NA	NA	47,000	NA	NA	NA	NA	NA	NA	NA	NA
Drinking Water Protection Criteria (XI)			NA	4,000	4,500	2.5E+06	NA	72,000	2.4E+06	NLL	NLL	NLL	NLL	NLL	NA	NA	NA
Groundwater/Surface Water Interface Protection Criteria (XII)			NA	400	100 (M); 27	NA	NA	190,000	170,000 (G)	NLL	NLL	NLL	NLL	NLL	NA	NA	NA
Groundwater Contact Protection Criteria (XIII)			NA	7.8E+07	2.0E+08	1.0E+09 (D)	NA	1.0E+09 (D)	1.0E+09 (D)	NLL	NLL	NLL	NLL	NLL	NA	NA	NA
Soil Volatilization to Indoor Air Inhalation (XIV)			NA	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	1.4E+05	3.0E+06	NA	NA	NA
Infinite Source Volatile Soil Inhalation Criteria (XV)			NA	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	19,000	2.4E+05	NA	NA	NA
Finite Source Source Volatile Soil Inhalation Criteria (5 m) (XVI)			NA	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	19,000	7.9E+06	NA	NA	NA
Finite Source Source Volatile Soil Inhalation Criteria (2 m) (XVII)			NA	NLV	NLV	NLV	NA	NLV	NLV	NLV	NLV	NLV	19,000	7.9E+06	NA	NA	NA
Particulate Soil Inhalation Criteria (XVIII)			NA	1.3E+08	6.7E+06	ID	NA	ID	ID	4.4E+07	3.2E+07	3.2E+07	6.8E+05	5.2E+06	NA	NA	NA
Direct Contact Criteria (XIX)			NA	2.6E+06	2.5E+06	1.0E+09 (D)	NA	7.5E+05 (DD)	1.7E+08	9.5E+04	4.5E+04	5.7E+04	1,100	(T)	NA	NA	NA
Soil Saturation Concentration Screening Levels (Csat) (XX)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50000 *	50000 *	50000 *
SAMPLE ID	Depth	SAMPLE DATE															
SS-1	0-3"	9/7/2005	780,000	<500	<250	<50000	100,000	14,000	260,000	<21	<21	<21	<21	<900	NA	NA	NA
SS-2	0-1'	9/7/2005	175,000	<500	<250	<50000	130,000	7,400	30,000	<20	<20	<20	<20	<900	NA	NA	NA
SS-3	0-1'	9/7/2005	168,000	<500	<250	54,000	110,000	6,600	27,000	<20	<20	<20	<20	<900	NA	NA	NA
SS-4	0-6"	9/7/2005	440,000	<500	500	69,000	120,000	11,000	100,000	<20	<20	<20	<20	<900	NA	NA	NA
SB-1	4-8'	9/7/2005	1,660,000	<500	<250	329,000	140,000	42,000	59,000	<23	<23	<23	<23	<1080	NA	NA	NA
SB-2	4-8'	9/7/2005	1,750,000	<500	<250	174,000	110,000	32,000	83,000	<25	<25	<25	<25	<1080	NA	NA	NA
SB-3	0-8'	9/7/2005	1,630,000	<500	<250	198,000	140,000	42,000	59,000	<24	<24	<24	<24	<1080	NA	NA	NA
SB-4	4-8'	9/7/2005	1,330,000	<500	<250	111,000	110,000	29,000	130,000	<26	<26	<26	<26	<1080	NA	NA	NA
SB-5	0-4'	9/7/2005	1,320,000	600	<250	79,000	120,000	22,000	400,000	<24	<24	<24	<24	<1080	NA	NA	NA
SB-6	4-8'	9/7/2005	1,860,000	<500	<250	66,000	150,000	40,000	66,000	<25	<25	<25	<25	<1270	NA	NA	NA
SB-7	4-8'	9/7/2005	1,540,000	<500	<250	221,000	95,000	28,000	87,000	<25	<25	<25	<25	<1080	NA	NA	NA
SB-8	0-8'	9/7/2005	1,610,000	<500	<250	702,000	76,000	32,000	90,000	<27	<27	<27	<27	<1080	NA	NA	NA
SB-9	4-8'	9/7/2005	1,570,000	<500	<250	68,000	150,000	38,000	69,000	<24	<24	<24	<24	<1080	NA	NA	NA
SB-10	4-8'	9/7/2005	1,410,000	<500	<250	333,000	170,000	39,000	97,000	<25	<25	<25	<25	<1080	NA	NA	NA
UST North	10'	10/8/2009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	48,000	<50000	1,400,000
UST Middle	10'	10/8/2009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	71,000	<23000	170,000
UST South	10'	10/8/2009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34,000	<23000	160,000

Table 2
Interim Response Soil Analytical Detection Summary

Samuel B. Jolly Site
Detroit, MI

			Volatile Organic Compounds (VOCs)								Semivolatile Organic Compounds (SVOCs)								
SOIL: Part 201/213 Generic Residential & Commercial I Cleanup CriteriaRevised January 23, 2006 Units: ug/Kg			Benzene	Ethylbenzene	Methyl-tert-butyl-ether (MTBE)	Toluene	1,2,3-Trimethylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Total Xylenes	Acenaphtnene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(g,h,i)perylene	Benzo(a)pyrene	Chrysene
Statewide Default Background Levels (X)			NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Drinking Water Protection Criteria (XI)			100	1,500	800	16,000	NA	2,100	1,800	5,600	3.0E+05	5,900	41,000	NLL	NLL	NLL	NLL	NLL	NLL
Groundwater/Surface Water Interface Protection Criteria (XII)			4,000 (X)	360	15,000 (X)	2,800	NA	570	1,100	700	4,400	ID	ID	NLL	NLL	NLL	NLL	NLL	NLL
Groundwater Contact Protection Criteria (XIII)			2.2E+05	1.4E+05 (C)	5.9E+06 (C)	2.5E+05 (C)	NA	1.1E+05 (C)	94,000 (C)	1.5E+05 (C)	9.7E+05	4.4E+05	41,000	NLL	NLL	NLL	NLL	NLL	NLL
Soil Volatilization to Indoor Air Inhalation (XIV)			1,600	87,000	5.9E+06 (C)	2.5E+05 (C)	NA	1.1E+05 (C)	94,000 (C)	1.5E+05 (C)	1.9E+08	1.6E+06	1.0E+09 (D)	NLV	ID	NLV	NLV	NLV	ID
Infinite Source Volatile Soil Inhalation Criteria (XV)			13,000	7.2E+05	2.5E+07	2.8E+06	NA	2.10E+07	1.6E+07	4.6E+07	8.1E+07	2.2E+06	1.4E+09	NLV	ID	NLV	NLV	NLV	ID
Finite Source Source Volatile Soil Inhalation Criteria (5 m) (XVI)			34,000	1.0E+06	3.9E+07	5.1E+06	NA	5.0E+08	3.8E+08	6.1E+07	8.1E+07	2.2E+06	1.4E+09	NLV	ID	NLV	NLV	NLV	ID
Finite Source Source Volatile Soil Inhalation Criteria (2 m) (XVII)			79,000	2.2E+06	8.7E+07	1.2E+07	NA	5.0E+08	3.8E+08	1.3E+08	8.1E+07	2.2E+06	1.4E+09	NLV	ID	NLV	NLV	NLV	ID
Particulate Soil Inhalation Criteria (XVIII)			3.8E+08	1.0E+10	2.0E+11	2.7E+10	NA	8.2E+10	8.2E+10	2.9E+11	1.4E+10	2.3E+09	6.7E+10	ID	ID	ID	8.0E+08	1.5E+06	ID
Direct Contact Criteria (XIX)			1.8E+05	1.4E+05 (C)	1.5E+06	2.5E+05 (C)	NA	1.1E+05 (C)	94,000 (C)	1.5E+05 (C)	4.1E+07	1.6E+06	2.3E+08	20,000	20,000	2.0E+05	2.5E+06	2,000	2.0E+06
Soil Saturation Concentration Screening Levels (Csat) (XX)			4.0E+05	1.40E+05	5.9E+06	2.5E+05	NA	1.10E+05	94,000	1.5E+05	NA	NA	NA	NA	NA	NA	NA	NA	NA
SAMPLE ID	Depth	SAMPLE DATE																	
NW Floor (F1)	10'	10/14/2009	<62	<62	<62	<62	<62	<62	<62	<182	<110	<110	<110	<120	<230	<230	<230	<230	<110
NE Floor (F2)	10'	10/14/2009	<71	<71	<71	<71	<71	<71	<71	<211	<120	<120	<120	<120	<240	<240	<240	<240	<120
North Sidewall (S1)	6'	10/15/2009	81	250	<66	<66	<66	100	<66	342	<110	<110	<110	<110	<230	<230	<230	<230	<110
NE Sidewall (S2)	8'	10/15/2009	<72	88	<72	<72	87	250	110	552	<120	<120	<120	<120	<240	<240	<240	<240	<120
East Sidewall (S3)	4'	10/13/2009	<86	<86	<86	<86	<86	<86	<86	<256	<130	<130	<130	<130	<260	<260	<260	<260	<130
South Sidewall (S4)	6'	10/13/2009	<76	<76	<76	<76	<76	<76	<76	<226	<120	<120	<120	<120	<240	<240	<240	<240	<120
West Sidewall (S5)	5'	10/15/2009	<73	<73	<73	<73	<73	<73	<73	<323	<120	<120	<120	110	<250	<250	<250	<250	<120
North Pump Island (F3)	4.5'	10/14/2009	<76	<76	<76	<76	<76	<76	<76	<226	<130	<130	<130	<130	<250	<250	<250	<250	<130
Middle Pump Island (F4)	4.5'	10/14/2009	<75	<75	<75	<75	<75	<75	<75	<225	<120	<120	<120	<120	<240	<240	<240	<240	<120
South Pump Island (F5)	3.5'	10/13/2009	<68	<68	<68	<68	<68	<68	<68	<208	<120	<120	<120	<120	<230	<230	<230	<230	<120
North Pump Island Piping (F6)	4.5'	10/14/2009	<71	180	<71	73	90	230	73	361	<120	<120	<120	310	400	<240	<240	280	320
Middle Pump Island Piping (F7)	5'	10/14/2009	<72	<72	<72	<72	<72	<72	<72	<212	<120	<120	<120	<120	<240	<240	<240	<240	<120
East Piping Run (F8)	2.5'	10/13/2009	<81	<81	<81	<81	<81	<81	<81	<241	<120	<120	<120	<120	<240	<240	<240	<240	100

Notes:
Roman numerals indicate DEQ criterion number

Exceeds Generic Drinking Water Protection Cleanup Criteria (XI)
Exceeds Groundwater Surface Water Interface Protection Cleanup Criteria (XII)
Exceeds Direct Contact Cleanup Criteria (XIX)
Exceeds Generic Drinking Water Protection (XI) and Groundwater Surface Water Interface Protection (XII) Cleanup Criteria
Exceeds Generic Drinking Water Protection (XI) and Soil Volatilization to Indoor Air Cleanup (XIV) Criteria
Exceeds Generic Drinking Water Protection (XI), Ground Water Surface Water Interface Protection (XII), and Soil Volatilization to Indoor Air (XIV) Cleanup Criteria
Exceeds Four or More Cleanup Criteria
Equals or Exceeds Soil Saturation Concentration Screening Level (XX)

* DEQ Remediation and Redevelopment Division Summer 2007 Training, Soil Saturation Concentration (C_{sat}), Draft TPH screening levels

Table 2
Interim Response Soil Analytical Detection Summary

Samuel B. Jolly Site
Detroit, MI

			Semivolatile Organic Compounds (SVOCs)							Metals	Total Pertroleum Hydrocarbons (TPH)		
SOIL: Part 201/213 Generic Residential & Commercial I Cleanup CriteriaRevised January 23, 2006 Units: ug/Kg			Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene	Lead (B)	Diesel Range Organic Compounds DRO	Oil Range Organic Compounds ORO	Gas Range Organic Compounds GRO
Statewide Default Background Levels (X)			NA	NA	NA	NA	NA	NA	NA	21,000	NA	NA	NA
Drinking Water Protection Criteria (XI)			7.3E+05	3.9E+05	NLL	57,000	35,000	56,000	4.8E+05	7.0E+05	NA	NA	NA
Groundwater/Surface Water Interface Protection Criteria (XII)			5,500	5,300	NLL	ID	870	5,300	ID	(G,X)	NA	NA	NA
Groundwater Contact Protection Criteria (XIII)			7.3E+05	8.9E+05	NLL	5.5E+06	2.1E+06	1.1E+06	4.8E+05	ID	NA	NA	NA
Soil Volatilization to Indoor Air Inhalation (XIV)			1.0E+09 (D)	5.8E+08	NLV	ID	2.5E+05	2.8E+06	1.0E+09 (D)	NLV	NA	NA	NA
Infinite Source Volatile Soil Inhalation Criteria (XV)			7.4E+08	1.3E+08	NLV	ID	3.0E+05	1.6E+05	6.5E+08	NLV	NA	NA	NA
Finite Source Source Volatile Soil Inhalation Criteria (5 m) (XVI)			7.4E+08	1.3E+08	NLV	ID	3.0E+05	1.6E+05	6.5E+08	NLV	NA	NA	NA
Finite Source Source Volatile Soil Inhalation Criteria (2 m) (XVII)			7.4E+08	1.3E+08	NLV	ID	3.0E+05	1.6E+05	6.5E+08	NLV	NA	NA	NA
Particulate Soil Inhalation Criteria (XVIII)			9.3E+09	9.3E+09	ID	ID	2.0E+08	6.7E+06	6.7E+09	1.0E+08	NA	NA	NA
Direct Contact Criteria (XIX)			4.6E+07	2.7E+07	20,000	8.1E+06	1.6E+07	1.6E+06	2.9E+07	4.0E+05	NA	NA	NA
Soil Saturation Concentration Screening Levels (Csat) (XX)			NA	NA	NA	NA	NA	NA	NA	NA	50000 *	50000 *	50000 *
SAMPLE ID	Depth	SAMPLE DATE											
NW Floor (F1)	10'	10/14/2009	<110	<110	<230	<280	<110	<110	<110	6,200	<5700	<23000	<7700
NE Floor (F2)	10'	10/14/2009	<120	<120	<240	<300	<120	<120	<120	7,100	<5900	<24000	<7100
North Sidewall (S1)	6'	10/15/2009	110	<110	<230	<280	100	94	130	20,000	41,000	<23000	38,000
NE Sidewall (S2)	8'	10/15/2009	<120	<120	<240	480	170	<120	<120	13,000	25,000	<24000	63,000
East Sidewall (S3)	4'	10/13/2009	<130	130	<260	1,000	210	560	<130	12,000	190,000	<26000	76,000
South Sidewall (S4)	6'	10/13/2009	<120	<120	<240	<300	<120	<120	<120	7,000	19,000	<24000	30,000
West Sidewall (S5)	5'	10/15/2009	120	<120	<250	<310	<120	110	260	79,000	140,000	3,600,000	25,000
North Pump Island (F3)	4.5'	10/14/2009	<130	<130	<250	<310	<130	<130	<130	19,000	<6300	<25000	<7600
Middle Pump Island (F4)	4.5'	10/14/2009	<120	<120	<240	<300	<120	<120	<120	10,000	<6100	<24000	<7500
South Pump Island (F5)	3.5'	10/13/2009	<120	<120	<230	<290	<120	<120	<120	6,700	<5800	<23000	<6800
North Pump Island Piping (F6)	4.5'	10/14/2009	600	<120	<240	750	500	410	680	230,000	7,400	65,000	33,000
Middle Pump Island Piping (F7)	5'	10/14/2009	<120	<120	<240	<300	<120	<120	<120	10,000	<6100	<24000	<7200
East Piping Run (F8)	2.5'	10/13/2009	190	<120	<240	<300	<120	<120	180	21,000	<6000	<24000	<8100