

Expert Report

Evaluation of US EPA Site Characterization and Remedial Assessment Data

For use in:

Residents of Gordon Plaza, Inc. v. City of New Orleans
United States District Court for the Eastern District of Louisiana

Submitted by:

EnviroForensics, LLC 825 N. Capitol Avenue Indianapolis, IN 46204

Prepared by:

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Exhibits

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Exhibit B: Soil Sample Result – May 3, 2019

Exhibit C: Site Characterization Work Plan – EnviroForensics



I. Qualifications

- 1. I am an expert in the fields of environmental project management and environmental investigations and remediation.
- 2. I have been a Senior Manager on well over one hundred environmental investigations, involving soil and groundwater quality issues and the area of vapor intrusion.
- 3. I provide technical direction and supervise a staff of geologists, engineers, hydrogeologists and scientists on projects associated with site characterization, screening and selection of remedial alternatives, remedial design and implementation, and long-term monitoring and stewardship.
- 4. I have over 35 years of experience, specializing in the analysis and acquisition of contaminated properties, legal and forensic support, regulatory compliance, soil and groundwater investigations, the design and operation of remediation systems, management of long-tail liabilities, and human health and ecological risk assessments.
- 5. I am a registered geologist in the State of Louisiana and have extensive experience with environmental investigations and cleanups in residential communities impacted with hazardous constituents, including heavy metals (including lead, arsenic, cadmium, and chromium), pesticides and chlorinated solvents.
- 6. My expertise includes a strong knowledge of industrial operations, past and current industry practices and procedures, and a hands-on, practical understanding of the fate and transport of chemicals in soil, groundwater, and soil-gas (vapor).
- 7. I have worked as a testifying expert on behalf of innocent landowners and facility operators at several sites impacted by past industrial activities and have provided technical and litigation support on RCRA and CERCLA cost recovery matters.
- 8. I have attached an accurate copy of my curriculum vitae as Exhibit A to this report, incorporated by reference, which includes a listing of my publications in the last ten (10) years as well as all cases in which, during the previous four (4) years, I have provided deposition or trial testimony as an expert.
- 9. My billing rate for work on this matter is \$210.00/hour.



II. Expert Report Purpose

- 10. I have been asked to opine on whether the site characterization and resulting data relied upon by the United States Environmental Protection Agency (EPA) is sufficient to assess risks to residents living on the Agriculture Street Landfill and to support development of adequate safeguards to protect those residents.
- 11. Further, I have been asked to opine on the thoroughness of the remedial investigations and subsequent testing performed through 2018.
- 12. Finally, I have been asked, if I found inadequacies in existing information, to develop an appropriate Site Characterization Work Plan that should be conducted to adequately determine the site conditions to support a risk assessment, and to support development of appropriate measures to protect human health and the environment from risks and exposures posed to people living on top of the Agriculture Street Landfill, as necessary.

III. Summary of Opinions

- 13. The investigative work conducted by EPA falls short of the work necessary to support an assessment of current health risks posed to residents living on top of the Agriculture Street Landfill and to support development of adequate safeguards to protect those residents.
- 14. Not enough soil sampling has been conducted to determine the extent to which hazardous constituents are present beneath yards and homes.
- 15. Not enough groundwater quality and hydrogeological data have been collected to determine the extent of groundwater impacts and no ongoing monitoring has been conducted to determine whether the groundwater quality is being further degraded and impacted by contaminants present in the dump site material. Insufficient data exist to know if flooding during severe storms, including Hurricane Katrina, mobilized groundwater contaminants from water bearing units within the abandoned dump to the overlying cover material where people live. This is a particular concern to the extent that climate change can be expected to increase the incidence and severity of storms and flooding.
- 16. Not enough investigative work has been conducted to determine the potential effects on people that eat produce from trees, bushes and gardens located on top of the abandoned dump site, particularly where roots would encounter landfill material. For example, it is estimated that the roots of orange trees grow on average between 7 and 12 feet below ground surface, which is well into the incinerator ash found in the residential yards located on the Agriculture Street Landfill Superfund Site.



- 17. Not enough data have been collected to understand the extent to which ground subsidence has occurred beneath houses located on top of the dump site and how such subsidence effects the mobilization of vapors and allows them to collect beneath structures.
- 18. Not enough data have been collected to know if utilities (e.g. gas and water lines) in the area have been compromised due to subsidence caused by the settling of material in the dump.
- 19. Not enough data have been collected to understand the vapor intrusion risks of organic contaminants, including methane gas, migrating from the abandoned dump site and collecting beneath the housing foundations and ultimately migrating into homes.
- 20. Because of these significant data gaps, contaminants present beneath yards and homes located on top of the Agriculture Street Landfill Superfund Site may pose an unreasonable risk to human health.
- 21. Implementation of the Site Characterization Work Plan prepared under my supervision by EnviroForensics, LLC for the Agriculture Street Landfill Superfund Site New Orleans, Orleans Parish, Louisiana, is the appropriate next step toward assessing risks to residents of the Agriculture Street Landfill and developing a plan to abate those risks as necessary.

IV. Basis for My Opinions

Background History

- 22. The City of New Orleans opened the Agriculture Street Dump in approximately 1909 and operated it for more than 50 years. The dump eventually encompassed 95 acres in size and received municipal waste, ash from the incineration of municipal waste, construction debris and ash from open burning, as described in the EPA *Remedial Removal Integrated Investigation* (RRII) Report (RRII, ES-1).
- 23. As early as 1913, disinfectants were applied to the garbage in the dump and oil was used to burn the garbage. (New Orleans Division of Public Works 1913-1914 (RRII, 1-24)). In 1922, 400 tons of garbage produced each day were disposed of at the Agriculture Street Dump. (Times Picayune 1922 (RRII, 1-25)). The City of New Orleans started incinerating garbage in the 1920's and the incinerator ash was disposed of in the Agriculture Street Dump. The Agriculture Street Dump was the principal disposal area for the greater New Orleans commercial refuse up until 1934.



- 24. In the late 1940's a portion of the site became a sanitary landfill and the term Agriculture Street Landfill was adopted. It was also reported that during the 1940's and 1950's, the dump/landfill area was routinely sprayed with DDT, a pesticide. (Times Picayune 1994 (RRII, 1-26)). The landfill continued to receive increasing quantities of waste until the Florida Avenue and South Street incinerators were constructed in 1957 (Appendix B (RRII, 1-20)). In the report on Refuse Disposal Study for New Orleans by Schneider in 1951, he stated, "the constant increase in commercial refuse delivered there led to numerous fires, from which smoke and odors were constant and grave nuisance to a large surrounding area" (RRII, 1-27). The landfill was reportedly closed around 1957 or 1958. In 1962, a newspaper reported that a subsurface fire at the Agriculture Street Landfill continued to contribute to smog and a high incidence of asthma in the area. (New Orleans States Item 1962 (RRII, 1-27)). In 1965 and 1966 the Agriculture Street Landfill was reopened to accept material generated as a result of the flooding from Hurricane Betsy. Approximately 300 truckloads per day were disposed of in Agriculture Street Landfill for a 6-month period (McFarland 1994 (RRII, 1-28)). Open fires were set to burn much of the debris; the area was covered with ash and compacted (Stant 1983 (RRII, 1-28)).
- 25. From the 1970's into the late 1980's, approximately 47 acres of the landfill (dump) site were developed for private and public use that included: private single-family homes, multiple-family private and public housing units, Press Park Community Center, a recreation center, retail businesses, Moton Elementary School, and an electrical substation (RRII, ES-1).
- 26. In April 1976, the Gillen Engineering Company submitted a report stating that fill material ranging from 2.5 to 33 feet below ground surface was observed in the area of the Gordon Plaza Housing Development Project. Because of the amount of and variation in depth of the fill, the report indicated that a large amount of subsidence could occur (RRII, 1-29). The report stated, "most of the fill material, if not all, should be removed" (Gillen 1976 (White 1985 (RRII, 1-29)). An April 1980 report from J.J. Krebs and Sons, Inc. emphasized that the building foundations would have to be designed properly and special construction features for driveways and sidewalks should be employed (RRII, 1-29). Recommendations were offered for construction of residential foundations, driveways, sidewalks and walkways, installation of gas venting systems for addressing potential methane gas migration and for the suspension of utilities below building slabs. (Hansel 1980 (White 1985 (RRII, 1-29))). A January 1984 subsoil investigation by Gore Engineering noted that flammable gas was encountered during its soil investigation on the Moton School property and recommended a gas collection or treatment system (RRII, 1-30). In May 1984, J.J. Krebs and Sons, Inc. made several recommendations regarding ventilation at the Moton School to address gases below buildings (Hansel 1980 (White 1985 (RRII, 1-29))).



- 27. The houses are built on top of dump material and surface and subsurface soil containing elevated concentrations of metals and polynuclear aromatic hydrocarbons (PAHs). Urban anthropogenic (man-made) contaminants, especially pesticides, were widespread across the site (RRII, ES-2). After completion of the 1994 investigation activities, the EPA concluded that arsenic and benzo(a)pyrene exceeded the 1x10⁻⁴ cumulative cancer risk level at locations throughout the site (RRII, ES-3).
- 28. No records have been found that document whether or not a layer of soil fill material was placed on top of the compacted incinerator ash of the dump site prior to the construction of the houses. A soil sample collected at 2900 Benefit Street on May 3, 2019 encountered the compacted incinerator ash at 2.0 feet below the grass (Exhibit B). Note that this property was one of the nine properties where soil was not excavated by EPA.
- 29. No records have been found that suggest gas venting systems or similar protective measures were installed at residential properties.
- 30. Shallow zone groundwater from the dump site contains lead and other metals at concentrations above the levels defined by the Safe Drinking Water Act (RRII, ES-3).
- 31. Following an outcry from those living in the residential community and community leaders, EPA became involved in the project and conducted an investigation, collecting soil samples in 1994 and 1995.

Investigation and Response Actions

- 32. Based on a review of technical reports prepared by the EPA and its contractors, the following has been summarized:
- 33. The EPA established potential contaminants of concern (COC) for all future soil sampling based on data collected in 1994 and 1995. At this time, there were no established soil cleanup levels or specific cleanup criteria and EPA used the limited risk data available to establish preliminary, "to be considered" (TBC) levels for the contaminants it detected. When EPA evaluated risks, it based its evaluation on discrete concentrations for particular chemicals and not on the cumulative or additive concentrations for the suite of chemicals detected in the environmental matrix (e.g. soil and groundwater samples). EPA has repeatedly revised the risk levels and methodology associated with chemicals like those detected at the site and across the board, the acceptable levels of hazardous constituents in the environment are lower today than they were when the EPA conducted its



- investigations in the 1990's and when the Record of Decision was completed in April 2002.
- 34. The spatial distribution of the sampling performed by EPA in 1994 and 1995 was inadequate, in that EPA collected samples on 200-foot grid nodes (one every 40,000 square feet). To put this into context, a football field is 100 yards (300 ft) by 53 1/3 yards (160 ft) or 48,000 square feet in size. Therefore, approximately one (1) soil sample was collected per "football field" sized area across the Site.
- 35. EPA made the determination that the constituents of concern (COC) found in the soil were arsenic, lead, and PAH compounds, and all future sampling was limited to those COCs.
- 36. The data suggest that EPA only collected one round of groundwater samples from monitoring wells during the investigation. EPA also determined that the groundwater did not have a beneficial use because it was not used as potable drinking water. EPA eliminated it from further action in a record of decision in 1997. No documentation could be found to determine whether or not the monitoring wells are still in existence, or if they have been abandoned and in what manner. Thus, there are no access points to collect groundwater samples at the site and to determine whether the groundwater is currently impacted with COCs. Further, if the groundwater is impacted with hazardous constituents, there are no access points to determine the horizontal and vertical extent of such impacts.
- 37. EPA and the State of Louisiana now have established protocols for assessing the risk of vapor intrusion. This includes paired sub-slab/indoor air sampling over at least two events to take into account varying HVAC use and natural weather-related conditions. These protocols were not applied to the site.

Fourth Five-Year Review

- 38. The Five-Year Reviews are designed to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. Due to actions already performed or conditions at the site, EPA concluded in its most recent review that its prior determinations and removal actions are "considered protective of human health and the environment". The work conducted in EPA's determination was inadequate to make such a determination.
- 39. The last Five-Year review was conducted on October 2, October 3 and November 27, 2017. Based on a review of the report, entitled Fourth Five-Year Review Report for Agriculture Street Landfill Superfund Site, New Orleans, Orleans Parish, Louisiana, EPA collected soil samples from 33 locations, but only four (4) of the samples were collected in residential yards.



- 40. Soil samples were collected from the top three (3) inches of soil. More samples should have been collected and samples should have been taken to depths greater than three (3) inches below ground surface because children and adult residents can easily come in contact with soil from a depth greater than three (3) inches below ground surface.
- 41. Samples were only analyzed for arsenic, lead and selected PAHs, even though other metals and organic constituents associated with the Agriculture Street Landfill Superfund Site may be present in those shallow surface soils. Note that only eight (8) of the 33 samples were analyzed for PAHs and PAHs were detected in half of those samples.
- 42. Lead was detected in the only soil sample collected beneath a house. The sample was collected in a void space that appears to be the result of soil subsidence beneath that structure. Note that odors were also identified in this void space.
- 43. EPA has not conducted a risk assessment since 1995, before Hurricanes Rita and Katrina. A 2006 Health Consultation by the U.S. Agency for Toxic Substances and Disease Registry suggested that PAH concentrations pose an indeterminate public health hazard.
- 44. No chemical testing was conducted on produce from the residential yards, even though fruit trees are present on residential properties and the roots of such trees would almost certainly grow into the compacted incinerator ash beneath the residential yards.
- 45. No measurements were conducted to assess the subsidence of soil beneath the houses.
- 46. Except as discussed below (with respect to a single residence), no vapor sampling for VOCs or methane was conducted beneath the houses or in the houses.

Vapor Intrusion Investigation

- 47. Vapor intrusion sampling was conducted by CH2MHill in October of 2018 in a single house identified as Property No. 1. Samples were collected from four locations in the house and naphthalene, 1,2-dichlorethane, 1,4-dichlorobenzene, and acrolein were detected in all four samples, while those same constituents were not detected in the outdoor sample collected in parallel with this investigation.
- 48. CH2MHill concluded the positive test results by stating that the detected hazardous constituents were likely the result of contamination from the use of household products (CH2MHill Inc, 2018). EPA's Fourth Five-Year Report state that "[t]o be conservative, EPA recommends collection of air samples from inside the house to verify the findings of the risk evaluation," but no follow up testing was conducted.



V. Conclusion

- 49. Further soil, groundwater and soil-gas (vapor) sampling and investigative work should be conducted of both the underlying landfill material and overlying material to determine:
 - Whether hazardous constituents pose current health risks to occupants of the neighborhood;
 - Whether groundwater is contaminated by historical landfill activities, and to determine the fate and transport of the groundwater impacts should the groundwater be impacted;
 - Whether the soil cover continues to meet the original design specifications; and
 - Whether VOCs, SVOCs or methane gases are present beneath building structures and are causing vapor intrusion risks.

EnviroForensics, LLC has developed a Site Characterization Work Plan that in my opinion will adequately characterize the environmental conditions at the site. The work scope is attached as Appendix C and is summarized to include:

- 50. Collecting soil samples from 237 soil borings established on a 100-foot grid across the residential properties (not in the roadways or beneath building foundations), plus two additional samples to be collected on each residential property;
- 51. Collecting two (2) samples per boring (a composite sample of the soil cover and a discrete sample at the top of the compacted ash unit);
- 52. Analyzing the soil samples for RCRA metals, pesticides, VOCs, PAHs, PCBs, and dioxins;
- 53. Measuring the soil cover thickness in each soil boring;
- 54. Installing nine (9) monitoring wells, development and sampling of the groundwater from these wells quarterly for the period of one year;
- 55. Analyzing the groundwater samples for RCRA metals, pesticides, VOCs, PAHs, PCBs, and dioxins;
- 56. Collecting paired sub-slab and indoor air samples from at least one location in every residential structure at least twice (one sample collected during the winter and one during the summer);
- 57. Analyzing the vapor samples for VOCs and PAHs;
- 58. Inspecting each building structure for voids associated with the subsidence of the ground under the structures;



- 59. Conducting appropriate public meetings for the purpose of soliciting public participation; and
- 60. Completing a comprehensive Site Investigation report.

VI. Referenced Documents

61. In preparing this report, I have considered the following:

CH2MHill, Inc., Vapor Intrusion Investigation, Property No. 1 Results, Technical Memorandum, Agriculture Street Landfill Superfund Site, New Orleans, Louisiana (November 12, 2018)

CH2MHill, Inc., *Hurricane Katrina Response*, *Agriculture Street Landfill, New Orleans*, *Louisiana*, *Site Inspection and Sampling Results* (January 30, 2006)

Di Giulio, Richard Thomas Ph.D., Expert Declaration – Evaluation of EPA Fourth Five-Year Review Report for Agriculture Street Landfill Superfund Site, New Orleans, Orleans Parish, Louisiana. (February, 2019)

ENVision Laboratory Report for Project Number: 2019-1019, ENVision Laboratories, Inc., Indianapolis, Indiana.

EPA, Fourth Five-Year Review Report for the Agriculture Street Landfill Superfund Site, New Orleans, Orleans Parish, Louisiana (July 2018)

EPA, Record of Decision, Agriculture Street Landfill Superfund Site, New Orleans, Louisiana, Operable Unit 1 – Undeveloped Property; Operable Unity 2 – Residential Property; Operable Unit 3 – Shirley Jefferson Community Center (April 2002)

EPA, Phase II Close Out Report, Agriculture Street Landfill Superfund Site, New Orleans, Louisiana (June 2001)

EPA, Record of Decision, Agriculture Street Landfill Superfund Site, New Orleans, Louisiana, Operable Unit 4 – Moton Elementary School; Operable Unity 5 – Groundwater (September 2, 1997)

EPA, Remedial Removal Integrated Investigation Report, Volumes 1 through 4, Agriculture Street Landfill, New Orleans, Orleans Parish, Louisiana (March 1995)



EPA, *RCRA Corrective Actions Plan (Final)*. Office of Waste Programs Enforcement, Office of Solid Waste. OSWER Directive 9902.3-2A. (May 1994)

EPA, Data Quality Objectives Process for Superfund: Interim Final Guidance. EPA 540-R-93-071. (1993)

EPA, Test Methods for Evaluating Solid Waste, Physical and Chemical Methods (SW-846). Final Update II (1994)

EPA, Record of Decision for Agriculture Street Landfill Superfund Site Operable Unit 4 and Operable Unit 5 (1997)

EPA, Record of Decision for Agriculture Street Landfill Superfund Site Operable Unit 1, Operable Unit 2, and Operable Unit 3 (2002)

EPA, OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air. OSWER Publication 9200.2-154 (2015)

EPA, Best Practices for Data Management Technical Guide. EPA ID#542-F-18-003 (2018) Agency for Toxic Substances and Disease Registry, Health Consultation – Review of Louisiana Tumor Registry Cancer Incidence Data (2009) https://www.atsdr.cdc.gov/hac/pha/index.asp.

Gillen, G.J., Jr., P.E., Subsoil Investigation, Proposed Gordon Plaza Housing Development Project, Ferdinand Street and Press Street, New Orleans, Louisiana. Gillen Engineering Company (1976)

Louisiana Department of Environmental Quality, *Risk Evaluation/Corrective Action Program Guidance Document.* (October 20, 2003)

Office of the Federal Register National Archives and Records Administration, 40 Code of Federal Regulations (CFR) Part 136, Appendix B (1994)

U.S. Department of Health and Human Services – Agency for Toxic Substances and Disease Registry, *Health Consultation, Hurricane Response Sampling Assessment for the Agriculture Street Landfill, New Orleans, Orleans Parish, Louisana* (August, 2006)



EXHIBIT A

Curriculum Vitae



ABOUT

Entrepreneur and expert on environmental liability, Steve Henshaw has 30+ years facilitating the transaction of contaminated properties. Working with buyers, sellers, banks holding chattel paper on nonperforming loans, municipalities and tax delinguent properties, Henshaw uses historical general liability insurance policies to find the funding to pay for environmental investigations, cleanups and associated legal fees. Henshaw holds professional geology registrations in numerous states. As CEO, Henshaw has served as a client and technical manager on hundreds of projects associated with site characterization, remedial design, remedial implementation and operation, litigation support and insurance coverage matters. Henshaw founded EnviroForensics in 1996 and built it into a nationally recognized environmental consulting and insurance archelogy firm. He started Stratified Management Group to acquire contaminated properties and The Cordillera Group to manage environmental claims for his clients and properties.

EXPERTISE

- Environmental engineering
- Contaminant fate and transport
- Brownfields redevelopment
- Land use zoning and entitlements
- Claim management
- Insurance recovery
- Litigation support

STEPHEN HENSHAW, PG

CHIEF EXECUTIVE OFFICER



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EDUCATION

POST GRADUATE STUDIES, ENVIRONMENTAL ENGINEERING

1987 | Oregon Graduate Institute

BS, GEOLOGY

1984 | Oregon State University

CERTIFICATIONS

Professional Geologist: California, Oregon, Idaho, Arizona, Washington, Indiana

AFFILIATIONS

Water For Empowerment, Co-Founder & Board Member Indy Parks Foundation, Board Member

EXPERIENCE

FOUNDER, CEO & PRESIDENT

2016 - Present | Stratified Management Group

FOUNDER & CEO

1996 - Present | EnviroForensics & PolicyFind

Professional environmental consultant since 1983



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REPRESENTATIVE PROJECTS

BROWNFIELDS AND REDEVELOPMENT



Former Industrial Facility Redevelopment, Indiana

Facilitated the acquisition of contaminated property with EnviroForensics and an investor group. The property included a 180,000 sq. foot building located on 5-acres with chlorinated solvent-contaminated soil and groundwater beneath the building. Delineated contamination and are currently pursuing the former owners for reimbursement of the cleanup costs through an Environmental Legal Action (ELA) claim. Following building demolition, worked with the City and the developer to create a remediation plan, and are pursuing Tax Increment Financing (TIF) for the new development and Industrial Recovery Tax Credits (DINO) through the Indiana Finance Authority.



Former Industrial Facility Redevelopment, Indiana

Worked with a developer and prospective purchaser to perform environmental investigation and remediation efforts in a compressed time frame to allow for the financing and construction time constraints to be met and the planned senior living community. The site is a major component of a larger redevelopment plan that the city has developed with the assistance of EnviroForensics.



Redevelopment Corridor, Indiana

After the City acquired a large property as part of a City-wide effort to redevelop the corridor for its community, they realized they had a contaminated piece of property to manage. As part of the City's rehabilitation efforts, EnviroForensics was engaged to characterize site impacts and to develop a quantifiable regulatory closure strategy so that a settlement could be negotiated between the City and the former occupant's insurance carriers. The Site was enrolled in the IDEM VRP in late 2017 and the Remediation Completion Report and Request for Closure will be submitted by September 2019.



Former Plating Facility Redevelopment, Indiana

An an old plating company went into bankruptcy and left thousands of gallons of plating waste in a decrepit building and, following the removal of the waste, the building stood vacant for several years. Enviroforensics partnered with a local developer and the City to work with the County to obtain the rights to the site. Historic insurance policies were located and these policies are currently being used to pursue cost recovery for the cost to closure for the site.



City of New Albany, Indiana

During the demolition of a historic building, orphan underground storage tanks were discovered that brought redevelopment construction activities to a halt. The City Redevelopment Commission engaged EnviroForensics to perform investigation activities and to work collaboratively with the developer to ensure that the remedial strategy is sufficient to continue to redevelop the abandoned commercial property for mixed-use loft residential and commercial purposes.



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REPRESENTATIVE PROJECTS



City-Wide Environmental Services, Indiana

The City of Hammond retained EnviroForensics as its trusted consultant to address lead contamination of residential properties caused by the fugitive emissions from a former metal smelting and recovery facility. In addition to working with the City, EnviroForensics will serve as the liaison between the remaining stakeholders of the project to communicate schedules and risks to the public, including private property owners, the regulatory agency, subcontractors, and the landfills. An estimated 100 residential properties will be accessed to remove lead-contaminated soil from the front and backyards to prevent future exposure to the residents.

EnviroForensics is also working with the city and its redevelopment agencies to address contamination on properties they own and are looking to sell. EnviroForensics has been providing strategic consulting to ensure the sites are remediated to IDEMs satisfaction, while be mindful of the costs and the ultimate end land use.



Lead-Impacted Residential Properties, Indiana

The City retained EnviroForensics as its consultant to address lead contamination of residential properties caused by the fugitive emissions from a former metal smelting and recovery facility. EnviroForensics is responsible for conducting the soil sampling and designing and overseeing the excavation of nearly 600 homes. EnviroForensics will be working with the City, the property owners, the regulatory agencies, the subcontractors and the landfills to complete the work.



City of Franklin, Indiana

The City of Franklin and the Franklin Community School District retained EnviroForensics to serve as its technical consultant to address soil and groundwater contamination caused by historical manufacturing businesses, many that no longer operate within the city. Legacy contamination has caused environmental impacts that resulted in vapor migration of solvents under elementary schools and beneath residential houses. EnviroForensics collected soil, groundwater and air sampling activities that was the basis for designing mitigation systems of several schools and they work hand in hand with IDEM and EPA to ensure that the contamination is cleaned up and does not pose a threat to human health and the environment.

SITE CHARACTERIZATION / SOIL AND GROUNDWATER REMEDIATION



Chemical Manufacturer, California

Project Director and client manager responsible for completion of a Resource Conservation and Recovery Act (RCRA) Facility Investigation and Corrective Measures Study, under a 3008h Order, of the 14-acre solvent recycling facility. Involved with RCRA Part B permitting and environmental impact studies under California Environmental Quality Act (CEQA). The RFI and CMS were conducted in a manner that minimized disruption of production activities and capital outlay.

Implemented a program that utilized existing facility resources and expertise to construct remedial systems and collect specific investigatory data. In depth understanding of the facility operations and corporate philosophy enabled the development of a unique strategic plan that greatly reduced project costs.



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REPRESENTATIVE PROJECTS

SITE CHARACTERIZATION / SOIL AND GROUNDWATER REMEDIATION



Sewer Sludge Lagoon, Indiana

Program Manager for the Gary Sanitary District on the remedial alternatives a 20+ acre lagoon impacted with PCB contaminated municipal sludge. The sludge thickness of approximately 25 feet and the associated solids content of less than 17% made the project one of the most challenging with respect to implementation of a cost effective site closure strategy. Responsibilities included providing technical review of the feasibility study, workplans and engineering contractors, interaction with the Gary Sanitary District Board, US EPA and Indiana Department of Environmental Management, and developing and overseeing Bench Scale Studies designed to evaluate the effectiveness of utilizing locally available materials as a product for mixing and stabilization.



Industrial Transportation Canal, Indiana

Technical consultant for the East Chicago Waterway Management District on construction, operation and maintenance of a confined disposal facility at a former refinery and the associated dredging of the Indiana Harbor Canal (IHC) sediment. Responsibilities included interacting and negotiating with the various stake holders including a national energy company, US EPA, Indiana Department of Environmental Management, US Department of Justice, Army Corp of Engineers, and US Fish and Wildlife, calculating the tipping fees for local service areas (neighboring businesses generating non-navigational solid waste) to be disposed into the CDF, and providing project strategy regarding the disposal of PCBs from the IHC dredging operations and permitting of the CDF.



Aerospace Electronics Manufacturer, California

Project director responsible for overall project strategy, regulatory negotiations and evaluation and implementation of investigation and remedial measures at this former aerospace manufacturing facility. The site activities were conducted under an Administrative Order and a lawsuit. This project required evaluation of past operating history, retrofitting and optimizing existing remediation system, implementing in situ remedial alternatives, and providing litigation support. Our services were directly responsible for savings of several millions of dollars and provided the client with strict cost control and project management measures.



Flare and Ammunition Manufacturer Facility, Indiana

Project manager for a soil and groundwater investigation at a flare manufacturing facility impacted with perchlorate. Investigation including evaluating historical operations and distribution of perchlorate to determine the source areas, the extent of the impacts and the development of remedial alternatives.



Paint Manufacturer, California

Project manager for a soil and groundwater investigation at a paint manufacturing facility, under a RCRA 3008h Order. The facility operations dated back to the late 1800's. The project involved the evaluation of past facility operations, closure of surface impoundments and SWMUs, remediation of lead and SVOC impacted soil and evaluation of ecological risks to sensitive wetland and bay margin environments. Innovative regulatory approach utilized the CAMU policy to stabilize impacted soils and save the client nearly a million dollars in remedial costs.



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REPRESENTATIVE PROJECTS



Industrial Hydraulic and Plating Manufacturer, California

Project director responsible for implementing project strategy and conducting regulatory interface of soil and ground water investigation and remediation activities at the former pneumatic cylinder manufacturing and chrome plating facility. This NCP compliant RI/FS required implementation of Interim Remedial Measures, the development of an RI/FS workplan and the implementation of the approved workplan within a defined set of financial resources. We were successful in controlling the monthly costs to accommodate all of the required goals. The project involved complex litigation from neighbors in the form of citizen suits.



Commercial Shopping Center, California

Project manager responsible for all field oversight activities associated with an NCP compliant RI/FS at a prominent shopping center where chlorinated solvents from dry cleaning operations impacted the soil and groundwater beneath the site. Our services included providing litigation support that resulted in a guaranteed remediation at no out of pocket cost to our client. Additionally, the litigation resulted in all oversight costs being repaid to our client. These oversight responsibilities included the review of comprehensive project plans, extensive monitoring of the fieldwork (most of which was completed during night-time hours) and the evaluation of project data and remedial activities.



Solvent Blending Facility, California

Project manager on a former chemical blending facility impacted with chlorinated solvents. Project has included site investigation, remedial design, and treatment system operation and maintenance. Our involvement has saved the client tens of thousands of dollars by implementing a low cost, low maintenance system that has efficiently reduced the chlorinated solvents in the soil and groundwater and brought them to asymptotic levels for closure using risk based cleanup standards.



Municipality, California

Worked as the client manager to the City Manager and City Attorney responsible for overall project deliverables, data collection, data synthesis, agency interactions, litigation support and community relations. Project involved determining the fate and transport of chlorinated solvents present in the City's municipal supply well and pursuing the parties responsible for the cleanup. Responsibilities have included the identification of over 180 PRPs and historical owners and operators that may have caused or contributed to the contamination, conducting the environmental investigation, and providing litigation support to the City of numerous matters.



Jacksonville Ash Sites, Florida

Project director and expert witness on a class action lawsuit for medical monitoring and property damage. Case involved the exposure of residences, workers, and students to concentrations of hazardous substances well above established background levels. The exposures were the result of contaminants generated during the incineration of waste in the form of ash and fugitive emissions generated from the stacks of the incinerators. EnviroForensics was responsible for providing litigation support that included collecting soil and ash samples from residential neighborhoods, evaluating available technical reports, analyzing the historical operations of the incinerators, and developing trial exhibits.



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REPRESENTATIVE PROJECTS

LEGAL AND FORENSIC SUPPORT AND ASSET MANAGEMENT



Former Lead Battery Recycling Facility, Michigan

Expert witness on the distribution of lead impacted soil in a residential neighborhood emanating from a former lead battery recycling facility. EnviroForensics collected soil samples and analyzed the samples for heavy metals to determine the distribution of contamination and evaluate the effectiveness of remedial activities employed under the direction of the United States Environmental Protection Agency.



Contaminated Property Transactions, Locations throughout the United States

Client manager and project lead on numerous projects involving the purchase and sale of contaminated properties. EnviroForensics has represented both buyers and sellers to facilitate property transactions. Responsibilities have included developing cleanup costs and negotiating site remediation objectives with regulatory agencies, providing guaranteed cleanup financing, and maximizing the assets of environmentally impaired property. Many of the projects involved identifying historical owners and operators, and their insurers, working with legal counsel to conduct due diligence activities, conducting site investigation and cleanup activities, and conducting technical and fact finding research to develop project upside.



Global Insurance Recovery, National Program

Lead forensic and fact-finding expert on a global insurance litigation associated with eleven test cases from sites located across the United States. Project involved collecting information from all of the manufacturing facilities, evaluating the existing soil and ground water conditions, identifying significant spills and releases that impacted the environment, identifying key witnesses, reviewing depositions, and assisting counsel in the technical presentation of the case.



Innocent Landowners, Locations throughout United States

Lead technical and forensic expert on numerous contaminated properties that are owned by corporations, LLCs and LLPs that have not contributed to the environmental impact. The projects have involved evaluating the existing soil and groundwater conditions, the identification of responsible parties, collecting historical site information (e.g. waste handling practices, building plans, and regulatory records), identifying key witnesses, and assisting legal counsel in building and supporting the technical merits of a case. The litigation would force the responsible parties to cleanup the site. These efforts maximize the value of the property while minimizing our clients out of pocket expenses and reducing their liability and exposure.



Foundry, Wisconsin

Technical expert, providing litigation support on a former pump manufacturing facility that was historically part of a foundry. Site conditions include fill materials consisting of foundry sands and soil and groundwater impact from historical releases of solvents and petroleum hydrocarbons.



Shipyard, California

Project director responsible for evaluating site conditions, negotiating with redevelopment and regulatory agencies, and preparing and evaluating remedial alternatives at a former shipyard. EnviroForensics characterized the soil and groundwater conditions at the site and successfully developed a plan to effectively remediate the site to standards acceptable to the interested parties.



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REPRESENTATIVE PROJECTS



Metal Recycling Facility, Indiana

Project director for the site investigation and cleanup of a former metal salvage yard contaminated with PCBs and heavy metals. The project involved the prospective purchase of the property by the City of Evansville for use as a park following site cleanup. EnviroForensics conducted an exhaustive search of the company records to locate historical insurance policies and identify parties responsible for the contamination. The historical insurance carriers have funded investigation and remedial activities with no out-of-pocket expenses to our client.



Numerous Dry Cleaners

Project manager and/or project director for dry cleaning businesses and property owners to investigate and remediate contaminated soil and groundwater and develop facts necessary in developing cost effective risk based closures and allocating project costs among responsible parties and their insurance carriers. Insurance carriers that provided historical insurance to the dry cleaners or property owners have funded most of the projects.



Responsible Party Searches, Various Matters

Project director on numerous investigations associated with identifying responsible parties that may have caused or contributed to environmental contamination. The investigations include identifying generators and transporters (companies, owners, and operators) that were likely to have used chemicals that are present in soil and groundwater at a specific location, or taken chemicals to specific locations or facilities for disposal. The investigations generally include, identifying responsible companies, identifying key employees, locating documents and evidence to support a litigation, evaluating technical documents associated with environmental investigations, researching corporate history and financial standings and locating and interpreting historical CGL insurance policies.



Printing Company, California

Project director and testifying expert on the historical operations of a former printing company and the associated environmental impacts caused by those historical activities.

RESOURCE MANAGEMENT



Spring and Well Interference Studies, Oregon

Hydrogeologist responsible for evaluating interconnectivity of surface water springs and water wells. Conducted extensive aquifer tests, water usage assessments, recharge evaluations and analysis of geophysical logs to determine the interference issues. Project had significant importance pertaining to water rights standing and priorities within the region.



Groundwater Decline Investigation, Oregon

Hydrogeologist responsible for investigating groundwater declines in basalt aquifers heavily used by local and corporate farming operations. Studies included the long-term recording and gauging of groundwater levels in numerous wells across specific water basins, evaluating water usage and estimating evaporation, evapotranspiration, and acre yield utilization. Study resulted in declaration of specific aguifers as critical and restricted future uses.



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REPRESENTATIVE PROJECTS



Geothermal Spring Network, Oregon

Hydrogeologist responsible for establishing geothermal well and spring observation network for the State of Oregon. Work included locating geothermal springs and wells, collecting analytical data, and establishing monitoring criteria for each station.



Water Supply Investigations, Indiana & Ohio

Project manager responsible for working with hydrogologists and scientists to identify new spring sites for use as drinking water bottling facilities. Responsibilities included reviewing analytical data, developing project costs, evaluating hydrogeology and recharge areas, collecting samples for chemical analysis and age dating, determining yields and impacts from pumping.



Solid Waste Assessments, Numerous Landfills

Project Manager on numerous groundwater investigations associated with operation of solid waste landfills. Responsibilities included conducting site investigations, pump test analysis, leachate generation analysis and migration, ecological assessments and project permitting.

PRESENTATIONS



Set-up and Performance of Treatability Studies for VOC-Contaminated Ground Water, presented at NWWA Petroleum Hydrocarbons Conference, Houston, Texas, 1990.

Lecturer of hydrology and environmental investigation/remediation courses at University of California, Santa Cruz.

Lecturer on Investigating and Remediating Contaminated Site Using Historical Insurance Coverage at numerous conferences put on by state and national trade associations and EPA.

PUBLICATIONS



Henshaw, Stephen (2008, October 1). Conducting Site Characterizations Western Cleaner & Launderer

Henshaw, Stephen (2008, November 1). Vapor Intrusion. What Is It and How Can It Affect Me? Western Cleaner & Launderer

Henshaw, Stephen (2008, December 1). Phase I, Phase II, What Is It? Western Cleaner & Launderer

Henshaw, Stephen (2009, January 1). Selecting a Remedial Technology Western Cleaner & Launderer

Henshaw, Stephen (2009, March 1). Groundwater Flow Western Cleaner & Launderer

Henshaw, Stephen (2009, April 1). So What Triggers an Environmental Investigation? Western Cleaner & Launderer



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PUBLICATIONS



Henshaw, Stephen (2009, May 1). State of California Targets Dry Cleaners Western Cleaner & Launderer

Henshaw, Stephen (2009, June 1). Vapor Intrusion is on the Rise! Western Cleaner & Launderer

Henshaw, Stephen (2009, August 1). In Situ Bio-Remediation of Perc from Syrup to Cheese Whey Western Cleaner & Launderer

Henshaw, Stephen (2009, September 1). Using Old Insurance to Cover Investigation and Clean-Up Costs. Western Cleaner & Launderer

Henshaw, Stephen (2009, October 1). How Insurance Archeology Can Assist Dry Cleaners When Environmental Contamination Claims Threaten Their Business
Western Cleaner & Launderer

Henshaw, Stephen (2009, November 1). How to Select an Environmental Consultant Western Cleaner & Launderer

Henshaw, Stephen (2009, December 1). Good Housekeeping Includes Good Record Keeping Western Cleaner & Launderer

Henshaw, Stephen (2010, January 1). The Environmental Corner Western Cleaner & Launderer

Henshaw, Stephen (2010, March 1). Vapor Intrusion and Indoor Air Sampling Expensive Testing – Make Sure It's Done Correctly Western Cleaner & Launderer

Henshaw, Stephen (2010, April 1). Going, Going......Gone! Changing Laws and Economic Climate Affect Drycleaner Decisions to Deal with Contamination Issues

Western Cleaner & Launderer

Henshaw, Stephen (2010, May 1). Can PERC Releases Be Age Dated and Fingerprinted? Western Cleaner & Launderer

Henshaw, Stephen (2010, June 1). Planning for Remediation During Renovation Western Cleaner & Launderer

Henshaw, Stephen (2010, July 1). State Level Environmental Enforcement During Periods of Economic Downturn

Western Cleaner & Launderer

Henshaw, Stephen (2010, August 1). What Drives an Environmental Cleanup? Western Cleaner & Launderer

Henshaw, Stephen (2010, September 1). Environmental Cleanup can be Good Public Relations Western Cleaner & Launderer



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PUBLICATIONS



Henshaw, Stephen (2011, February 1). Advancements in Fingerprinting Contaminants; Compound Specific Isotope Analysis (CSIA)

Cleaner & Launderer

Henshaw, Stephen (2011, March 1). Vapor Intrusion; Who's DEFAULT is it? Cleaner & Launderer

Henshaw, Stephen (2011, June 1). Maximizing Your Business Asset Cleaner & Launderer

Henshaw, Stephen (2011, July 1). Fate of Spilled Perc in the Subsurface Cleaner & Launderer

Henshaw, Stephen (2011, September 1). You Sold Your Business and You're in the Clear.... Not So Fast Cleaner & Launderer

Henshaw, Stephen (2011, October 1). How the Cost of Cleanup Can Be Controlled by Things You Cannot Control
Cleaner & Launderer

Henshaw, Stephen (2011, December 1). Getting your Best Cleanup for your Money Cleaner & Launderer

Henshaw, Stephen (2012, January 1). Why You Don't Have to Worry About Your Site Being Re-Contaminated and You Can Clean-up Now Cleaner & Launderer

Henshaw, Stephen (2012, February 1). Vapor Intrusion Assessments: Can You Trust Your Indoor Air Data?

Cleaner & Launderer

Henshaw, Stephen (2012, March 1). Green Clean: How "Environmental" is Remediation? Cleaner & Launderer

Henshaw, Stephen (2012, April 1). What is a Hazardous Communication Plan and Why Do I Need One?

Cleaner & Launderer

Henshaw, Stephen (2012, May 1). Do you know your company's most valuable assets? Cleaner & Launderer

Henshaw, Stephen (2012, June 1). Risk Based Closure; What Is It and Is It Right for Your Situation? Cleaner & Launderer

Henshaw, Stephen (2012, July 1). Using Conceptual Site Models to Direct Investigations and Cleanups Cleaner & Launderer

Henshaw, Stephen (2012, August 1). Never is Too late! (insurance companies runoff leaves policyholders vulnerable) Cleaner & Launderer



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PUBLICATIONS



Henshaw, Stephen (2012, September 1). Green Mean\$ Green! Can You Afford to Not Go Green? Cleaner & Launderer

Henshaw, Stephen (2013, January 1). Source Removal: The Key to Effective Site Remediation Cleaner & Launderer

Henshaw, Stephen (2013, March 1). Preferential Pathways; Underground Pipes and Utility Lines Can Be Conduits for The Migration of Contaminants Cleaner & Launderer

Henshaw, Stephen (2013, February 1). Risk Based Closures Require Long Term Monitoring; What is the True Cost of Implementing Institutional Controls?

Cleaner & Launderer

Henshaw, Stephen (2013, August 1). Vapor Intrusion Can Pose Significant Liabilities; Take Steps to Understand the Issues Cleaner & Launderer

Henshaw, Stephen (2013, December 1). Increased Attention to Dry Cleaners Likely Under New Property Due Diligence Requirements
Cleaner & Launderer

Henshaw, Stephen (2014, February 1). Enhanced Reductive Dechlorination It's A Matter of Give and Take

Cleaner & Launderer

Henshaw, Stephen (2014, March 1). Risk Based Site Closures Should Include Remediating the Source Area

Cleaner & Launderer

Henshaw, Stephen (2014, May 1). Remediation of PCE and TCE in Impacted Soil and Groundwater Requires Teamwork and Coordination Cleaner & Launderer

Henshaw, Stephen (2014, July 1). Closure and Long-term Stewardship of Contaminated Sites Cleaner & Launderer

Henshaw, Stephen (2014, August 1). Vapor Intrusion or Process Emissions – Help Me, Help You Cleaner & Launderer

Henshaw, Stephen (2014, September 1). Choosing an Environmental Consultant for Your Unique Situation

Cleaner & Launderer

Henshaw, Stephen (2014, November 1). How Clean Is Clean May Depend on How Clean You Need It to Be

Cleaner & Launderer



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PUBLICATIONS



Henshaw, Stephen (2014, December 1). Long-term Stewardship of Contaminated Sites, Vapor Intrusion Mitigation and Monitoring Fit the Requirements Cleaner & Launderer

Henshaw, Stephen (2015, March 1). Still Fighting the Good Fight Using Old Insurance to Cover Investigation and Cleanup Costs Cleaner & Launderer

EXPERT TESTIMONY



Jensen Kelly Corporation v. Alianz, et al.

Testifying expert regarding the source, fate and transport of volatile organic compounds in soil and groundwater.

Serpa v. International Paper

Testifying expert regarding the historical operations of a former printing company and the associated release of chemicals and their fate and transport into soil and groundwater.

Williams, et. al. v. City of Jacksonville, et. al.

Testifying expert regarding the historical operations and disposal activities of former City of Jacksonville incinerators and the distribution of heavy metals and SVOCs in soil at parks and in residential neighborhoods.

Holy Cross Neighborhood Association, Louisiana Environmental Action Network, and Gulf Restoration Network v. U.S. Army Corps of Engineers

Testifying expert regarding whether the US Army Corp of Engineers followed appropriate regulations and the reasonableness of sediment characterization, dredging and sediment disposal by the Corp for their planned dredging of the Industrial Canal in New Orleans, Louisiana.

Brown v. NL Industries

Testifying expert regarding the distribution of lead from a former battery recycling facility located in a residential neighborhood.



EXHIBIT B

Soil Sample Result – May 3, 2019



ENVision Laboratories, Inc.

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Mr. Steve Henshaw Enviroforensics 825 N. Capitol Ave. Indianapolis, IN 46204

May 20, 2019

ENVision Project Number: 2019-1019 Client Project Name: Agriculture St. Landfill

Dear Mr. Henshaw,

Please find the attached analytical report for the samples received May 6, 2019. All test methods performed were fully compliant with local, state, and federal EPA methods unless otherwise noted. The project was analyzed as requested on the enclosed chain of custody record. Please review the comments section for additional information about your results or Quality Control data.

The reference for the preservation technique utilized by ENVision Laboratories for Volatile Organics in soil may be found on Table A.1 (p. 42) of Method 5035A: Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples, July 2002, Draft Revision 1. All soils collected via Method 5035A are frozen at the laboratory upon receipt.

Feel free to contact me if you have any questions or comments regarding your analytical report or service.

Thank you for your business. ENVision Laboratories looks forward to working with you on your next project.

Yours Sincerely,

David Norris

Client Services Manager ENVision Laboratories, Inc.

Analytical Report ENVISION

ENVision Laboratories, Inc.

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Client Name: ENVIROFORENSICS

Project ID: AGRICULTURE ST. LANDFILL

Client Project Manager: STEVE HENSHAW

ENVision Project Number: 2019-1019

Analytical Method:EPA 8260Prep Method:EPA 5035AAnalytical Batch:050719VS

Client Sample ID:ASL-A-2.3Sample Collection Date/Time:5/3/199:15Envision Sample Number:19-6832Sample Received Date/Time:5/6/1910:50

Sample Matrix: soil

Compounds	Sample Results (m	g/kg) Rep. Limit (mg/kg)	Flags
Acetone	< 0.122	0.122	
Acrolein	< 0.00021	0.001	1
Acrylonitrile	< 0.002	0.002	
Benzene	< 0.006	0.006	
Bromobenzene	< 0.006	0.006	
Bromochloromethane	< 0.006	0.006	
Bromodichloromethane	< 0.006	0.006	
Bromoform	< 0.006	0.006	
Bromomethane	< 0.006	0.006	
n-Butanol	< 0.061	0.061	
2-Butanone (MEK)	< 0.012	0.012	
n-Butylbenzene	< 0.006	0.006	
sec-Butylbenzene	< 0.006	0.006	
tert-Butylbenzene	< 0.006	0.006	
Carbon Disulfide	< 0.006	0.006	
Carbon Tetrachloride	< 0.006	0.006	
Chlorobenzene	< 0.006	0.006	
Chloroethane	< 0.006	0.006	
2-Chloroethylvinylether	< 0.061	0.061	
Chloroform	< 0.006	0.006	
Chloromethane	< 0.006	0.006	
2-Chlorotoluene	< 0.006	0.006	
4-Chlorotoluene	< 0.006	0.006	
1,2-Dibromo-3-chloropropane	< 0.0021	0.0021	
Dibromochloromethane	< 0.006	0.006	
1,2-Dibromoethane (EDB)	< 0.00034	0.001	1
Dibromomethane	< 0.006	0.006	
1,2-Dichlorobenzene	< 0.006	0.006	
1,3-Dichlorobenzene	< 0.006	0.006	
1,4-Dichlorobenzene	< 0.006	0.006	
trans-1,4-Dichloro-2-butene	< 0.006	0.006	
Dichlorodifluoromethane	< 0.006	0.006	
1,1-Dichloroethane	< 0.006	0.006	
1,2-Dichloroethane	< 0.006	0.006	
1,1-Dichloroethene	< 0.006	0.006	
	Yo	ur Projects. Our Passion.	

Your Projects. Our Passion. Page 2 of 37



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8260 continued...

8260 continued			
<u>Compounds</u>	Sample Results (mg/kg)	Rep. Limit (mg/kg)	Flags
cis-1,2-Dichloroethene	< 0.006	0.006	
trans-1,2-Dichloroethene	< 0.006	0.006	
1,2-Dichloropropane	< 0.006	0.006	
1,3-Dichloropropane	< 0.006	0.006	
2,2-Dichloropropane	< 0.006	0.006	
1,1-Dichloropropene	< 0.006	0.006	
1,3-Dichloropropene	< 0.006	0.006	
Ethylbenzene	< 0.006	0.006	
Ethyl methacrylate	< 0.122	0.122	
Hexachloro-1,3-butadiene	< 0.006	0.006	
n-Hexane	< 0.012	0.012	
2-Hexanone	< 0.012	0.012	
lodomethane	< 0.012	0.012	
Isopropylbenzene (Cumene)	< 0.006	0.006	
p-Isopropyltoluene	< 0.006	0.006	
Methylene chloride	< 0.024	0.024	
4-Methyl-2-pentanone (MIBK)	< 0.012	0.012	
Methyl-tert-butyl-ether	< 0.006	0.006	
n-Propylbenzene	< 0.006	0.006	
Styrene	< 0.006	0.006	
1,1,1,2-Tetrachloroethane	< 0.006	0.006	
1,1,2,2-Tetrachloroethane	< 0.006	0.006	
Tetrachloroethene	< 0.006	0.006	
Toluene	< 0.006	0.006	
1,2,3-Trichlorobenzene	< 0.006	0.006	
1,2,4-Trichlorobenzene	< 0.006	0.006	
1,1,1-Trichloroethane	< 0.006	0.006	
1,1,2-Trichloroethane	< 0.006	0.006	
Trichloroethene	< 0.006	0.006	
Trichlorofluoromethane	< 0.006	0.006	
	< 0.006	0.006	
1,2,3-Trichloropropane	< 0.006	0.006	
1,2,4-Trimethylbenzene	< 0.006		
1,3,5-Trimethylbenzene		0.006	
Vinyl acetate	< 0.012	0.012	
Vinyl chloride	< 0.002	0.002	
Xylene, M&P	< 0.006	0.006	
Xylene, 0rtho	< 0.006	0.006	
Xylene, Total	< 0.012	0.012	
Dibromofluoromethane (surroga	The state of the s		
1,2-Dichloroethane-d4 (surroga			
Toluene-d8 (surrogate)	96%		
4-bromofluorobenzene (surroga			
Analysis Date/Time:	5-7-19/18:54		
Analyst Initials	gjd		
Percent Solids:	82%		
All results reported on dry weight basis.			

Analytical Report ENVISION

ENVision Laboratories, Inc.

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Client Name: ENVIROFORENSICS

Project ID: AGRICULTURE ST. LANDFILL

Client Project Manager: STEVE HENSHAW

ENVision Project Number: 2019-1019

Analytical Method:EPA 8270 SVOCPrep Method:EPA 3550CAnalytical Batch:050919BS

Client Sample ID: ASL-A-2.3 Sample Collection Date/Time: 5/3/19 9:15 Envision Sample Number: 19-6832 Sample Received Date/Time: 5/6/19 10:50

Sample Matrix: soil

Compounds S	ample Results (mg/kg)	Rep. Limit (mg/kg)	Flags
Acenaphthene	< 0.40	0.40	
Acenaphthylene	< 0.40	0.40	
Aniline	< 0.40	0.40	
Anthracene	< 0.40	0.40	
Benzo(a)anthracene	< 0.40	0.40	
Benzo(a)pyrene	< 0.082	0.082	
Benzo(b)fluoranthene	< 0.40	0.40	
Benzo(g,h,i)perylene	< 0.40	0.40	
Benzo(k)fluoranthene	< 0.40	0.40	
Benzoic Acid	< 1.95	1.95	
Benzyl Alcohol	< 0.80	0.80	
4-Bromophenylphenyl et	her < 0.40	0.40	
Butylbenzylphthalate	< 0.40	0.40	
Carbazole	< 0.80	0.80	
4-Chloro-3-methylpheno	l < 0.80	0.80	
4-Chloroaniline	< 0.033	0.040	1
bis(2-Chloroethoxy)meth	nane < 0.082	0.082	
bis(2-Chloroethyl)ether	< 0.082	0.082	
bis(2-Chloroisopropyl)etl	ner < 0.40	0.40	
2-Chloronaphthalene	< 0.40	0.40	
2-Chlorophenol	< 0.40	0.40	
4-Chlorophenylphenyl et	her < 0.40	0.40	
Chrysene	< 0.40	0.40	
Dibenzo(a,h)anthracene	< 0.082	0.082	
Dibenzofuran	< 0.40	0.40	
1,2-Dichlorobenzene	< 0.40	0.40	
1,3-Dichlorobenzene	< 0.40	0.40	
1,4-Dichlorobenzene	< 0.40	0.40	
3,3-Dichlorobenzidine	< 0.17	0.80	
2,4-Dichlorophenol	< 0.40	0.40	
Diethylphthalate	< 0.40	0.40	
2,4-Dimethylphenol	< 0.40	0.40	
Dimethylphthalate	< 0.40	0.40	
Di-n-butylphthalate	< 0.40 y	our Profects. Our Pass	sion.



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8270 continued...

Compounds Sam	ple Results (mg/kg)	Rep. Limit (mg/kg)	Flags
4,6-Dinitro-2-methylphenol	< 0.050	0.050	
2,4-Dinitrophenol	< 0.082	0.082	
2,4-Dinitrotoluene	< 0.066	0.066	
2,6-Dinitrotoluene	< 0.40	0.40	
Di-n-octylphthalate	< 0.40	0.40	
bis(2-Ethylhexyl)phthalate	< 0.40	0.40	
Fluoranthene	< 0.40	0.40	
Fluorene	< 0.40	0.40	
Hexachloro-1,3-butadiene	< 0.082	0.082	
Hexachlorobenzene	< 0.082	0.082	
Hexachlorocyclopentadiene	< 0.40	0.40	
Hexachloroethane	< 0.082	0.082	
Indeno(1,2,3-cd)pyrene	< 0.40	0.40	
Isophorone	< 0.40	0.40	
2-Methylphenol (o-Cresol)	< 0.40	0.40	
3&4-Methylphenol	< 0.80	0.80	
1-Methylnaphthalene	< 0.40	0.40	
2-Methylnaphthalene	< 0.40	0.40	
Naphthalene	< 0.082	0.082	
2-Nitroaniline	< 1.59	1.59	
3-Nitroaniline	< 1.95	1.95	
4-Nitroaniline	< 0.082	0.082	
Nitrobenzene	< 0.04	0.04	
2-Nitrophenol	< 0.40	0.40	
4-Nitrophenol	< 1.95	1.95	
N-Nitroso-di-n-propylamine	< 0.082	0.082	
N-Nitrosodiphenylamine	< 0.40	0.40	
Pentachlorophenol	< 0.082	0.082	
Phenanthrene	< 0.37	0.37	
Phenol	< 0.40	0.40	
Pyrene	< 0.40	0.40	
1,2,4-Trichlorobenzene	< 0.40	0.40	
2,4,5-Trichlorophenol	< 0.40	0.40	
2,4,6-Trichlorophenol	< 0.40	0.40	
2-Fluorophenol (surrogate)	12%		
Phenol-d6 (surrogate)	18%		
Nitrobenzene-d5 (surrogate)	39%		
2-Fluorobiphenyl (surrogate)	42%		
2,4,6-Tribromophenol (surroga	te) 49%		
p-Terphenyl-d14 (surrogate)	49%		
Analysis Date/Time:	5-10-19/17:02		
Analyst Initials:	ajg		
Date Extracted:	5/9/2019		
Initial Sample Weight:	30 g		
Final Volume:	1.0 mL		
Percent Solids	82%		

Analytical Report ENVISION

ENVision Laboratories, Inc.

1439 Sadlier Circle West Drive Indianapolis, IN 46239

Tel: 317.351.8632 Fax: 317.351.8639 www.envisionlaboratories.com

Client Name: ENVIROFORENSICS

Project ID: AGRICULTURE ST. LANDFILL

Client Project Manager: STEVE HENSHAW

ENVision Project Number: 2019-1019

Analytical Method: EPA 6010B Prep Method: EPA 3050B

Client Sample ID: ASL-A-2.3 Sample Collection Date/Time: 5/3/19 9:15 Envision Sample Number: 19-6832 Sample Received Date/Time: 5/6/19 10:50

Sample Matrix: soil

<u>Compounds</u>	Sample Results (mg/kg)	Reporting Limit (mg/kg)	<u>Flags</u>
Arsenic	6.1	2	
Barium	400	2	
Cadmium	3.7	2	
Chromium	30	2	
Lead	1200	2	
Selenium	< 2	2	
Silver	< 2	2	

Analysis Date/Time: 5-7-19/14:16

Analyst Initials: gjd
Date Digested: 5/6/2019
Initial Sample Weight: 1.0 g
Final Volume: 50 mL
Analytical Batch: 050719icp

Analytical Method: EPA 7471A

CompoundsSample Results (mg/kg)Reporting Limit (mg/kg)FlagsMercury< 1</td>1

Hg Analysis Date/Time: 5-8-19/13:15

Hg Analyst Initials: ajg
Date Digested: 5/8/2019
Initial Sample Weight: 0.6 g
Final Volume: 50 mL
Analytical Batch: 050819hg

Percent Solids 82%

All results reported on dry weight basis.

Analytical Report $\overline{\mathbf{ENVISION}}$

ENVision Laboratories, Inc.

1439 Sadlier Circle West Drive Indianapolis, IN 46239

Tel: 317.351.8632 Fax: 317.351.8639 www.envisionlaboratories.com

Client Name: ENVIROFORENSICS

Project ID: AGRICULTURE ST. LANDFILL

Client Project Manager: STEVE HENSHAW

ENVision Project Number: 2019-1019

Client Sample ID: ASL-A-2.3 Sample Collection Date/Time: 5/3/19 9:15 Envision Sample Number: 19-6832 Sample Received Date/Time: 5/6/19 10:50

Sample Matrix: soil

Analyte Sample Results Flags Method

Percent Moisture 18.0% EPA 1684
Percent Solids 82.0% EPA 1684

Analysis Date: 5/9/19 Analyst Initials bg



May 17, 2019

Mr. David Norris **ENVISION LABORATORIES, INC.** 1439 Sadlier Circle West Drive Indianapolis, IN 46239

Project ID: 2019-1019

First Environmental File ID: 19-2690

Date Received: May 07, 2019

Dear Mr. David Norris:

The above referenced project was analyzed as directed on the enclosed chain of custody record.

All Quality Control criteria as outlined in the methods and current IL ELAP/NELAP have been met unless otherwise noted. OA/OC documentation and raw data will remain on file for future reference. Our accreditation number is 100292 and our current certificate is number 004598: effective 04/23/2019 through 02/28/2020.

I thank you for the opportunity to be of service to you and look forward to working with you again in the future. Should you have any questions regarding any of the enclosed analytical data or need additional information, please contact me at (630) 778-1200.

Sincerely,

Stan Zaworsk Project Manage

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Case Narrative

ENVISION LABORATORIES, INC.

Lab File ID: 19-2690

Project ID: 2019-1019

Date Received: May 07, 2019

All quality control criteria, as outlined in the methods, have been met except as noted below or on the following analytical report.

The results in this report apply to the samples in the following table:

Laboratory Sample ID	Client Sample Identifier	Date/Time Collected
19-2690-001	19-6832/ASL-A-2.3	05/03/19 9:15

Sample Batch Comments:

Sample acceptance criteria were met.

IL ELAP / NELAC Accreditation # 100292

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Case Narrative

ENVISION LABORATORIES, INC.

Lab File ID: 19-2690

Project ID: 2019-1019

Date Received: May 07, 2019

All quality control criteria, as outlined in the methods, have been met except as noted below or on the following analytical report.

The following is a definition of flags that may be used in this report:

Flag	Description	Flag	Description
Α	Method holding time is 15 minutes from collection. Lab an	alysis	was performed as soon as possible.
В	Analyte was found in the method blank.	L	LCS recovery outside control limits.
<	Analyte not detected at or above the reporting limit.	M	MS recovery outside control limits; LCS acceptable.
С	Sample received in an improper container for this test.	P	Chemical preservation pH adjusted in lab.
D	Surrogates diluted out; recovery not available.	Q	Result was determined by a GC/MS database search.
Е	Estimated result; concentration exceeds calibration range.	S	Analysis was subcontracted to another laboratory.
G	Surrogate recovery outside control limits.	T	Result is less than three times the MDL value.
Н	Analysis or extraction holding time exceeded.	W	Reporting limit elevated due to sample matrix.
J	Estimated result; concentration is less than routine RL but greater than MDL.	N	Analyte is not part of our NELAC accreditation or accreditation may not be available for this parameter.
RL	Routine Reporting Limit (Lowest amount that can be detected when routine weights/volumes are used without dilution.)	ND	Analyte was not detected using a library search routine. No calibration standard was analyzed.

IL ELAP / NELAC Accreditation # 100292

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Analytical Report

 Client:
 ENVISION LABORATORIES, INC.
 Date Collected:
 05/03/19

 Project ID:
 2019-1019
 Time Collected:
 9:15

 Sample ID:
 19-6832/ASL-A-2.3
 Date Received:
 05/07/19

 Sample No:
 19-2690-001
 Date Reported:
 05/17/19

Results are reported on a dry weight basis.

Analyte		Result	R.L.	Units	Flags
Solids, Total Analysis Date: 05/07/19	Method: 2540B				
Total Solids		82.13		%	

Analysis Date: 05/07/19		
Total Solids	82.13	%
Pesticides/PCBs Analysis Date: 05/15/19	Method: 8081A/8082	Preparation Method 3540C Preparation Date: 05/13/19
Aldrin	< 0.008	0.008 mg/kg
Aroclor 1016	< 0.016	0.016 mg/kg
Aroclor 1221	< 0.016	0.016 mg/kg
Aroclor 1232	< 0.016	0.016 mg/kg
Aroclor 1242	< 0.016	0.016 mg/kg
Aroclor 1248	< 0.016	0.016 mg/kg
Aroclor 1254	< 0.016	0.016 mg/kg
Aroclor 1260	< 0.016	0.016 mg/kg
alpha-BHC	< 0.002	0.002 mg/kg
beta-BHC	< 0.008	0.008 mg/kg
delta-BHC	< 0.008	0.008 mg/kg
gamma-BHC (Lindane)	< 0.008	0.008 mg/kg
alpha-Chlordane	< 0.080	0.080 mg/kg
gamma-Chlordane	< 0.080	0.080 mg/kg
Chlordane (Technical)	< 0.080	0.080 mg/kg
4,4'-DDD	< 0.016	0.016 mg/kg
4,4'-DDE	< 0.016	0.016 mg/kg
4,4'-DDT	< 0.016	0.016 mg/kg
Dieldrin	< 0.016	0.016 mg/kg
Endosulfan I	< 0.008	0.008 mg/kg
Endosulfan II	< 0.016	0.016 mg/kg
Endosulfan sulfate	< 0.016	0.016 mg/kg
Endrin	< 0.016	0.016 mg/kg
Endrin aldehyde	< 0.016	0.016 mg/kg
Endrin ketone	< 0.016	0.016 mg/kg
Heptachlor	< 0.008	0.008 mg/kg
Heptachlor epoxide	< 0.008	0.008 mg/kg
Methoxychlor	< 0.080	0.080 mg/kg
Toxaphene	< 0.160	0.160 mg/kg



IL ELAP / NELAC Accreditation # 100292

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Analytical Report

ENVISION LABORATORIES, INC. Client:

Date Collected: 05/03/19

Project ID: 2019-1019 Time Collected: 9:15

Sample ID: 19-6832/ASL-A-2.3 Date Received: 05/07/19

Sample No: 19-2690-001 **Date Reported:** 05/17/19

Results are reported on a dry weight basis.

Analyte		Resu	lt	R.L.	Units	Flags
Sample QC Summary:	Surrogate Recovery				%R Limits	
Method	Analyte	QC	C Result		Low High	h
8081A/8082	Decachlorobiphenyl (Surr)	%R:	201.2	*	28 - 136	
8081A/8082	Tetrachloro-m-xylene (Surr)	%R:	121.9		61 - 127	,



CHAIN OF CUSTODY RECORD

9 1100	1/4/5			Da C		1400	61-91-5			C740 113
Time	Date		nd hv:	Received hy:		Time	Date		Palinguished hv	Do
										Comments:
19-2690-00	j				7	7	C		L-A-265 1319	14-WX33/HSL
					_		0	つぶつ	7	
ENVISION Sample ID	Other None	H ₂ SO ₄	HCI HNO ₃				Matrix	Coll. Comp (C) Time	Coll. Date	Sample ID
e below	containers per preservative below	container		1	104	2	cle if applicable) Level IV	QA/QC Required: (circle if applicable) Level III Level IV	2	Desired TAT: (Please Circle One) 1-day 2-day 3-day Std (5-7 bus. days)
Les MO	Please indicate number of	Please inc	1	1	~			P.O. Number:	F	Fax:
Method 5035 collection-used? Yes No 5035 samples received within 48 hr of	Method 503 5035 sample	\	1	/	×, ×	>		Sampled by:	S STORY	Phone: So Q
2/0	VOC vials fro	\	1	1		_		Lab Contact:	Mobile!	Report To: OQUIC
Yes No Yes No Yes No	Samples on Ice? Samples Intact? Custody Seal: ENVision provide	1	1	E TON		4	610	Project Name:	Due 1	Report Address SUL
regrity:	Cooler Temp: 1.5		ETERS	REQUESTED PARAMETERS	REQUEST	200	J. (1) 0	Invoice Address	Noos I	Client: EMISLO
	Fax: (317)	1-8632	3: (317) 35	3239 Phone	apolis, IN 46	rive Indian	Circle West Dr	1439 Sadlier Circle West Drive Indianapolis, IN 46239 Phone: (317) 351-8632 Fax: (317) 351-8639	ENVision Laboratories, Inc.	ENVision



IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Quality Control Summary

Client:

ENVISION LABORATORIES, INC.

Lab File ID:

19-2690

Project ID:

2019-1019

QC Lab#	Time QC Code	Parameter	Reported Result	Units	QC Result	%R Limits Low High	RPD Limit
Parameter: F	Pesticides/PCBs	Analytical Method:	8081A/8082	Ana	alytical WS #: 1820	98 Analysis Date:	05/14/19
		Prep Method:	3540C		Prep WS#: 29909	9 Prep Date:	05/13/19
LCS55264	LCS	4,4'-DDT	19.6	ug/kg	%R: 97.9 *	35 - 87	
		LC	S recovery outs	side contro	ol limits; high bias.		
	LCS	Aldrin	6.8	ug/kg	%R: 84.4	61 - 109	
	LCS	Dieldrin	16.6	ug/kg	%R: 82.8	55 - 118	
	LCS	Endrin	18.9	ug/kg	%R: 94.5	63 - 139	
	LCS	gamma-BHC (Lindane)	6.3	ug/kg	%R: 78.3	53 - 104	
	LCS	Heptachlor	6.9	ug/kg	%R: 85.7	51 - 118	
LCS55269	LCS	Aroclor 1016	241	ug/kg	%R: 96.3	72 - 126	
	LCS	Aroclor 1260	225	ug/kg	%R: 90.2	56 - 121	
LCSD55268	LCSD	Aroclor 1016	255	ug/kg	%R: 102	72 - 126	
	LCSD	Aroclor 1260	235	ug/kg	%R: 93.8	56 - 121	
Method Blank55	26 BLK	4,4'-DDD	< 16.0	ug/kg	0		
	BLK	4,4'-DDE	< 16.0	ug/kg	0	•	
	BLK	4,4'-DDT	< 16.0	ug/kg	0	162	
	BLK	Aldrin	< 8.0	ug/kg	0	d e n	
	BLK	alpha-BHC	< 2.0	ug/kg	0	*	
	BLK	alpha-Chlordane	< 80.0	ug/kg	0	4	
	BLK	beta-BHC	< 8.0	ug/kg	0		

^{*} The QC indicator is outside control limits.
%R = percent recovery; RPD = Relative percent difference CB = Calibration Blank; CCVS = Continuing Calibration Verification Standard; MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Spike; SURR = Surrogate Spiking Compound; PB = Procedure Blank; BLK = Method Blank; D = QCI diluted out.





First Environmental Laboratories, Inc.

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Client:

ENVISION LABORATORIES, INC.

Lab File ID:

19-2690

Project ID:

2019-1019

QC Lab#	Time QC Code	Parameter	Reported Result	Units	QC Result	%R Limits Low High	RPD Limit
Method Blank5526	BLK	delta-BHC	< 8.0	ug/kg	0		
	BLK	Dieldrin	< 16.0	ug/kg	0	4	
	BLK	Endosulfan I	< 8.0	ug/kg	0	- 4	
	BLK	Endosulfan II	< 16.0	ug/kg	0		
	BLK	Endosulfan sulfate	< 16.0	ug/kg	0	14	
	BLK	Endrin	< 16.0	ug/kg	0		
	BLK	Endrin aldehyde	< 16.0	ug/kg	0		
	BLK	Endrin ketone	< 16.0	ug/kg	0		
	BLK	gamma-BHC (Lindane)	< 8.0	ug/kg	0	1.6	
	BLK	gamma-Chlordane	< 80.0	ug/kg	0		
	BLK	Heptachlor	< 8.0	ug/kg	0	÷	
	BLK	Heptachlor epoxide	< 8.0	ug/kg	0		
	BLK	Methoxychlor	< 80.0	ug/kg	0		
	BLK	Toxaphene	< 160	ug/kg	0	+	
Method Blank5527	BLK	Aroclor 1016	< 80.0	ug/kg	0	4	
	BLK	Aroclor 1221	< 80.0	ug/kg	0		
	BLK	Aroclor 1232	< 80.0	ug/kg	0	. . €	
	BLK	Aroclor 1242	< 80.0	ug/kg	0	7-41	
	BLK	Aroclor 1248	< 80.0	ug/kg	0	-	
	BLK	Aroclor 1254	< 160	ug/kg	0		

^{*} The QC indicator is outside control limits. %R = percent recovery; RPD = Relative percent difference CB = Calibration Blank; CCVS = Continuing Calibration Verification Standard; MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Spike; SURR = Surrogate Spiking Compound; PB = Procedure Blank; BLK = Method Blank; D = QCI diluted out.





First Environmental Laboratories, Inc.

IL ELAP / NELAC Accreditation # 100292

1600 Shore Road • Naperville, Illinois 60563 • Phone (630) 778-1200 • Fax (630) 778-1233

Client:

ENVISION LABORATORIES, INC.

Lab File ID:

19-2690

Project ID:

2019-1019

QC Lab#	Time QC Code	Parameter	Reported Result	Units	QC Result	%R Limits Low High	RPD Limit
Method Blank5527	BLK	Aroclor 1260	< 160	ug/kg	0		

^{*} The QC indicator is outside control limits. %R = percent recovery; RPD = Relative percent difference CB = Calibration Blank; CCVS = Continuing Calibration Verification Standard; MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Spike; SURR = Surrogate Spiking Compound; PB = Procedure Blank; BLK = Method Blank; D = QCI diluted out.





Summit Environmental Technologies, Inc. 3310 Win St. Cuyahoga Falls, Ohio 44223 TEL: (330) 253-8211 FAX: (330) 253-4489 Website: http://www.settek.com

May 22, 2019

David Norris Envision Laboratories 1439 Sadlier Circle West Drive Indianapolis, IN 46239

TEL: (317) 351-8632 FAX: (317) 351-8639

RE: 2019-1019

Dear David Norris: Order No.: 19050443

Summit Environmental Technologies, Inc. received 1 sample(s) on 5/7/2019 for the analyses presented in the following report.

There were no problems with the analytical events associated with this report unless noted in the Case Narrative.

Quality control data is within laboratory defined or method specified acceptance limits except where noted.

If you have any questions regarding these tests results, please feel free to call the laboratory.

Sincerely,

Holly Florea

Project Manager

3310 Win St.

Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 07256CA, Colorado, Connecticut PH-0108, Delaware, Florida NELAC E87688, Georgia E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Louisiana 04061, Maryland 339, Minnesota 409711, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Ohio DW, Ohio VAP CL0052, Oklahoma 9940, Oregon OH200001, Pennsylvania 010, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-11-5, Utah OH009232011-1, Virginia VELAP 9456, Washington C891



Summit Environmental Technologies, Inc. 3310 Win St. Cuyahoga Falls, Ohio 44223

TEL: (330) 253-8211 FAX: (330) 253-4489 Website: http://www.settek.com **Case Narrative**

WO#: 19050443 Date: 5/22/2019

CLIENT: Envision Laboratories

Project: 2019-1019

WorkOrder Narrative:

This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. Please refer to the "Accreditation Program Analytes Report" for accredited analytes list.

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Analytical Sequence Sample Notes:

19050443-001A DX-2C_S(1613): Low label/cleanup recoveries were observed and attributed to the sample matrix interference with the extraction process.

Analytical Sequence QC Notes:

LCS-37377 DX-2C S(1613): Low cleanup recovery was observed.

LCS-37377 DX-2C_S(1613): The LCS recovered above the acceptance criteria for 2,3,7,8-Tetrachlorodibenzo-p-dioxin. The sample concentration was below the RL. There is no negative impact on the data.



Summit Environmental Technologies, Inc. 3310 Win St.

Cuyahoga Falls, Ohio 44223 TEL: (330) 253-8211 FAX: (330) 253-4489

Website: http://www.settek.com

14223 WO#:

Date: 5/22/2019

19050443

Case Narrative

CLIENT: Envision Laboratories

Project: 2019-1019

MB-37377 DX-2C S(1613): Low cleanup recovery was observed.

19050443-001AMS DX-2C_S(1613): Low label/cleanup recoveries were observed and attributed to the sample matrix interference with the extraction process.

19050443-001AMSD DX-2C_S(1613): Low label/cleanup recoveries were observed and attributed to the sample matrix interference with the extraction process.



Summit Environmental Technologies, Inc. 3310 Win St. Cuyahoga Falls, Ohio 44223 TEL: (330) 253-8211 FAX: (330) 253-4489 Website: http://www.settek.com

Workorder **Sample Summary**

> WO#: 19050443

22-May-19

CLIENT: Envision Laboratories

Project: 2019-1019

Lab SampleID Client Sample ID Tag No **Date Collected Date Received** Matrix 19050443-001 19.6832/ASL-A-2-3

5/3/2019 9:15:00 AM 5/7/2019 10:15:00 AM Sludge



Summit Environmental Technologies, Inc. 3310 Win St.

Cuyahoga Falls, Ohio 44223 TEL: (330) 253-8211 FAX: (330) 253-4489

Website: http://www.settek.com

Analytical Report

(consolidated)

WO#: 19050443

Date Reported: 5/22/2019

Collection Date: 5/3/2019 9:15:00 AM

CLIENT: Envision Laboratories

Project: 2019-1019

Lab ID: 19050443-001 **Matrix:** SLUDGE

Client Sample ID 19.6832/ASL-A-2-3

Analyses	Result	PQL Qu	al	Units	DF	Date Analyzed
TCDD-SOLID-1613B HRMS DIOXIN ANALYSIS - FULL LI	IST (1613-B)			E1613	E1613	Analyst: TM
2378-TCDD	ND	1.22QL+	·QM	+ng/Kg-dry	1	5/15/2019 3:13:32 PM
Surr: 13C-2378-TCDF	35.0	29 - 140		%Rec	1	5/15/2019 3:13:32 PM
Surr: 13C-2378-TCDD	29.5	31 - 137	S	%Rec	1	5/15/2019 3:13:32 PM
Surr: 37Cl-2378-TCDD	35.4	42 - 164	S	%Rec	1	5/15/2019 3:13:32 PM
PERCENT MOISTURE (2540)				A2540B		Analyst: AJT
Percent Moisture	19.1			%	1	5/9/2019 11:27:00 AM

Qualifiers: H Holding times for preparation or analysis exceeded

ND Not Detected

RL Reporting Detection Limit

M Manual Integration used to determine area response

PL Permit Limit

W Sample container temperature is out of limit as specified at testcode



Summit Environmental Technologies, Inc. 3310 Win St. Cuyahoga Falls, Ohio 44223 TEL: (330) 253-8211 FAX: (330) 253-4489 Website: http://www.settek.com

QC SUMMARY REPORT

WO#:

19050443

22-May-19

Client: Envision Laboratories

Project: 2019-1019 **BatchID:** 37377

Project: 2019-1019						Batchid: 3	1311	
Sample ID LCS-37377	SampType: LCS	TestCode: DX-2C_S(161	Units: ng/Kg		Prep Date:	5/9/2019	RunNo: 98592	
Client ID: LCSS	Batch ID: 37377	TestNo: E1613	E1613		Analysis Date:	5/15/2019	SeqNo: 2120075	
Analyte	Result	PQL SPK value SF	PK Ref Val	%REC	LowLimit H	ighLimit RPD Ref Val	%RPD RPDLimit	Qua
2378-TCDF	115	0.400 80.00	0	144	80	147		
2378-TCDD	121	0.400 80.00	0	151	73	146		S
Surr: 13C-2378-TCDF	372	800.0		46.4	26	126		
Surr: 13C-2378-TCDD	319	800.0		39.8	25	141		
Surr: 37Cl-2378-TCDD	32.4	800.0		4.06	37	158		S
Sample ID MB-37377	SampType: MBLK	TestCode: DX-2C_S(161	Units: ng/Kg		Prep Date:	5/9/2019	RunNo: 98592	
Client ID: PBS	Batch ID: 37377	TestNo: E1613	E1613		Analysis Date:	5/15/2019	SeqNo: 2120076	
Analyte	Result	PQL SPK value SF	PK Ref Val	%REC	LowLimit H	ighLimit RPD Ref Val	%RPD RPDLimit	Qua
2378-TCDF	ND	0.400						
2378-TCDD	ND	0.400						
Surr: 13C-2378-TCDF	456	800.0		57.0	29	140		
Surr: 13C-2378-TCDD	390	800.0		48.7	31	137		
Surr: 37Cl-2378-TCDD	43.0	800.0		5.37	42	164		S
Sample ID 19050443-001AMS	SampType: MS	TestCode: DX-2C_S(161	Units: ng/Kg-dr	у	Prep Date:	5/9/2019	RunNo: 98592	
Client ID: 19.6832/ASL-A-2-3	Batch ID: 37377	TestNo: E1613	E1613		Analysis Date:	5/15/2019	SeqNo: 2120078	
					•		*	

Sample ID 19050443-001AMS	SampType: MS	TestCoo	le: DX-2C_S (161 Units: ng/Ko	g-dry	Prep Da	te: 5/9/201	9	RunNo: 988	592	
Client ID: 19.6832/ASL-A-2-3	Batch ID: 37377	TestN	lo: E1613	E1613		Analysis Da	te: 5/15/20	119	SeqNo: 212	20078	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2378-TCDF	141	0.475	95.01	4.866	143	80	147				
2378-TCDD	152	0.475	95.01	0	160	73	146				S
Surr: 13C-2378-TCDF	315		950.1		33.1	26	126				

Qualifiers:

H Holding times for preparation or analysis exceeded

PL Permit Limit

W Sample container temperature is out of limit as specified at testcode

Manual Integration used to determine area response

RL Reporting Detection Limit

ND Not Detected

S Spike Recovery outside accepted recovery limits



Summit Environmental Technologies, Inc. 3310 Win St. Cuyahoga Falls, Ohio 44223 TEL: (330) 253-8211 FAX: (330) 253-4489 **QC SUMMARY REPORT**

WO#: **19050443**

22-May-19

Client: Envision Laboratories

Project: 2019-1019 **BatchID:** 37377

Website: http://www.settek.com

Sample ID 19050443-001AMS	SampType: MS	TestCode: DX-2C_S(161 Units: ng/Kg-di	y Prep Date: 5/9/2019	RunNo: 98592
Client ID: 19.6832/ASL-A-2-3	Batch ID: 37377	TestNo: E1613 E1613	Analysis Date: 5/15/2019	SeqNo: 2120078
Analyte	Result	PQL SPK value SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val	%RPD RPDLimit Qual
Surr: 13C-2378-TCDD Surr: 37Cl-2378-TCDD	263 29.9	950.1 950.1	27.7 25 141 3.15 37 158	S

Sample ID 19050443-001AMSD	SampType: MSD	TestCod	de: DX-2C_S (161 Units: ng/Kg-d	ry	Prep Dat	te: 5/9/201	9	RunNo: 988	592	
Client ID: 19.6832/ASL-A-2-3	Batch ID: 37377	TestN	lo: E1613	E1613		Analysis Dat	te: 5/15/20	19	SeqNo: 212	20079	
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2378-TCDF	151	0.489	97.81	4.866	149	80	147	140.6	6.91	20	S
2378-TCDD	164	0.489	97.81	0	168	73	146	152.2	7.50	20	S
Surr: 13C-2378-TCDF	286		978.1		29.2	26	126		0	0	
Surr: 13C-2378-TCDD	245		978.1		25.0	25	141		0	0	
Surr: 37Cl-2378-TCDD	28.5		978.1		2.91	37	158		0	0	S

Qualifiers: H Holding times for preparation or analysis exceeded

PL Permit Limit

W Sample container temperature is out of limit as specified at testcode

Manual Integration used to determine area response

RL Reporting Detection Limit

ND Not Detected

S Spike Recovery outside accepted recovery limits



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QC SUMMARY REPORT

WO#: 19050443

RPDLimit

RPDLimit

%RPD

%RPD

Qual

Qual

22-May-19

Envision Laboratories Client:

Project: 2019-1019 **BatchID:** R98181

Website: http://www.settek.com

Sample ID MB-R98181 SampType: MBLK TestCode: PctMoist_S(2 Units: % Prep Date: RunNo: 98181

Analysis Date: 5/9/2019 Client ID: **PBS** Batch ID: R98181 TestNo: A2540B SeqNo: 2102610

Analyte SPK value SPK Ref Val %REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Result PQL Qual

Percent Moisture 0.0161

Analyte

Analyte

TestCode: PctMoist_S(2 Units: % Sample ID 19050454-002ADUP SampType: **DUP** Prep Date: RunNo: 98181 Client ID: **BatchQC** Batch ID: R98181 TestNo: A2540B Analysis Date: 5/9/2019 SeqNo: 2102614

SPK value SPK Ref Val

10 Percent Moisture 15.6 15.46 0.883

%REC

%REC

Sample ID 19050522-002ADUP SampType: **DUP** TestCode: PctMoist S(2 Units: % Prep Date: RunNo: 98181

Client ID: **BatchQC** Batch ID: R98181 TestNo: A2540B Analysis Date: 5/9/2019 SeqNo: 2102625 SPK value SPK Ref Val.

Percent Moisture 15.2 14.73 2.91 10

Holding times for preparation or analysis exceeded Qualifiers:

Sample container temperature is out of limit as specified at testcode

Result

Result

PQL

POI

Manual Integration used to determine area response

Reporting Detection Limit

Not Detected ND

LowLimit HighLimit RPD Ref Val

LowLimit HighLimit RPD Ref Val

Spike Recovery outside accepted recovery limits



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Cuyahoga Falls, Ohio 4422 TEL: (330) 253-8211 FAX: (330) 253-448

330) 253-8211 FAX: (330) 253-448 Website: <u>http://www.settek.co</u>. **Qualifiers and Acronyms**

WO#: 19050443 Date: 5/22/2019

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

I	The compour	l was analyzed for but	t was not detected above the MDL.

- J The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
- H The hold time for sample preparation and/or analysis was exceeded. Not Clean Water Act compliant.
- **D** The result is reported from a dilution.
- E The result exceeded the linear range of the calibration or is estimated due to interference.
- MC The result is below the Minimum Compound Limit.
- * The result exceeds the Regulatory Limit or Maximum Contamination Limit.
- m Manual integration was used to determine the area response.
- d Manual integration in which peak was deleted
- N The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
- P The second column confirmation exceeded 25% difference.
- C The result has been confirmed by GC/MS.
- X The result was not confirmed when GC/MS Analysis was performed.
- B The analyte was detected in the Method Blank at a concentration greater than the RL.

 MB+ The analyte was detected in the Method Blank at a concentration greater than the MDL.
- G The ICB or CCB contained reportable amounts of analyte.
- QC-/+ The CCV recovery failed low (-) or high (+).
- **R/QDR** The RPD was outside of accepted recovery limits.
- QL-/+ The LCS or LCSD recovery failed low (-) or high (+).
- QLR The LCS/LCSD RPD was outside of accepted recovery limits.
- **QM-/+** The MS or MSD recovery failed low (-) or high (+).
- QMR The MS/MSD RPD was outside of accepted recovery limits.
- **QV-/+** The ICV recovery failed low (-) or high (+).
- S The spike result was outside of accepted recovery limits.
- W Samples were received outside temperature limits ($0^{\circ} 6^{\circ}$ C). Not Clean Water Act compliant.
- Z Deviation; A deviation from the method was performed; Please refer to the Case Narrative for
 - additional information

Acronyms

ND	Not Detected	RL	Reporting Limit
QC	Quality Control	MDL	Method Detection Limit
MB	Method Blank	LOD	Level of Detection
LCS	Laboratory Control Sample	LOQ	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	PQL	Practical Quantitation Limit
QCS	Quality Control Sample	CRQL	Contract Required Quantitation Limit
DUP	Duplicate	PL	Permit Limit
MS	Matrix Spike	RegLvl	Regulatory Limit
MSD	Matrix Spike Duplicate	MCL	Maximum Contamination Limit
RPD	Relative Percent Different	MinCL	Minimum Compound Limit
ICV	Initial Calibration Verification	RA	Reanalysis
ICB	Initial Calibration Blank	RE	Reextraction
CCV	Continuing Calibration Verification	TIC	Tentatively Identified Compound
CCB	Continuing Calibration Blank	RT	Retention Time
RLC	Reporting Limit Check	CF	Calibration Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.



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DATES REPORT

WO#: 19050443

22-May-19

Client: Envision Laboratories

Project: 2019-1019

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
19050443-001A	19.6832/ASL-A-2-3	5/3/2019 9:15:00 AM	Sludge	HRMS Dioxin Analysis - Full List (16	5/9/2019 2:30:00 PM	5/15/2019 3:13:32 PM
				Percent Moisture (2540)			5/9/2019 11:27:00 AM



Summit Environmental Technologies, Inc. 3310 Win St. Cuyahoga Falls, Ohio 44223 TEL: (330) 253-8211 FAX: (330) 253-4489 Website: http://www.settek.com **Accreditation Program Analytes Report**

State: IN

WO#: **19050443**

22-May-19

Client: Envision Laboratories

Project: 2019-1019 Program Name: Indiana Dept. of E

Test Name	Matrix	Analyte	Status
HRMS Dioxin Analysis - Full List (1613-B)	Sludge	2,3,7,8-Tetrachlorodibenzofuran- C13	U
HRMS Dioxin Analysis - Full List (1613-B)	Sludge	2,3,7,8-Tetrachlorodibenzo-p- dioxin	U
HRMS Dioxin Analysis - Full List (1613-B)	Sludge	2,3,7,8-Tetrachlorodibenzo-p- dioxin-C13	U
HRMS Dioxin Analysis - Full List (1613-B)	Sludge	2,3,7,8-Tetrachlorodibenzo-p- dioxin-Cl37	U
Percent Moisture (2540)	Sludge	Percent Moisture	U

Fa	Custody Seal: Yes No ENVision provided bottles: Yes No VOC vials free of head-space: Yes No N/A pht checked? Yes No N/A Method 5035 collection used? Yes No 5035 samples received within 48 hr of	Collection? Yes No	containers per preservative below FNVicion Sample TD	None Other Haos HHOS HCI		
ENVision Laboratories, Inc. 1439 Sadlier Circle West Drive Indianapolis, IN 46239 Phone: (317) 351-8632 18 LON KODS Invoice Address: Sto Colon REQUESTED PARAMETERS Project Name:	TO THE TOTAL STATES	11/2000	11/1/66/0			
Invoice Address: Sp. O. O. O. Project Name:	20 9-1019 5 Contact: mpled by:	mber:	QA/QC Required: (circle if applicable)	Coll. Grab (G) Matrix	5	
ENVision Laboratories, Inc. 1439 Sa ENVISION KODS Invoice Address	Report To: On Wid NOW Lab Contact: Phone: So O O O O O O O O O O O O O O O O O O		Desired TAT: (Please Circle One) 1-day 2-day 3-day Std (\$-7 bus. days)		19.0832/118L-14-2-3 73/19 C	Comments:



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Sample Log-In Check List

Clie	nt Name:	ENV-IN-4623	9	Work Order I	Number:	19050443		RcptNo: 1	I
Log	ged by:	Jesseca E. W	/estfall	5/7/2019 10:1	5:00 AM		How	fei	
Com	npleted By:	Kayla L. Oult	on	5/7/2019 5:37:	40 PM		Kayla & ba	utton	
Revi	iewed By:	Holly Florea		5/8/2019 10:47	7:14 AM		Day Stres	_	
Cha	in of Cus	stody							
1.	Is Chain of	Custody comp	lete?			Yes 🗸	No 🗌	Not Present	
2.	How was th	e sample deliv	ered?			<u>UPS</u>			
Log	In								
	Coolers are	present?				Yes 🗸	No 🗌	NA \square	
4.	Shipping co	ontainer/cooler	in good condition	1?		Yes 🗸	No 🗌		
	Custody se	als intact on sh	nipping container/	cooler?		Yes	No 🗌	Not Present 🗹	
	No.		Seal Date:			Signed By:			
5.	Was an atte	empt made to	cool the samples	?		Yes 🗸	No L	NA 📙	
6.	Were all sa	mples received	d at a temperatur	e of >0° C to 6.	0°C	Yes 🗸	No 🗌	NA 🗆	
7.	Sample(s)	in proper conta	iner(s)?			Yes 🗸	No 🗌		
8.	Sufficient s	ample volume	for indicated test	(s)?		Yes 🗸	No 🗌		
9.	Are sample	es (except VOA	and ONG) prope	erly preserved?		Yes 🗸	No 🗌		
10.	Was prese	rvative added t	o bottles?			Yes	No 🗹	NA \square	
11.	Is the head	space in the V	OA vials less tha	n 1/4 inch or 6 m	nm?	Yes _	No 🗌	No VOA Vials	
12.	Were any s	ample contain	ers received brok	en?		Yes 🗌	No 🗹		
13.		rwork match bo epancies on ch	ottle labels? nain of custody)			Yes 🗸	No 📙		
14.	Are matrice	es correctly ide	ntified on Chain c	of Custody?		Yes 🗸	No 🗌		
_			ere requested?			Yes 🗹	No 🗌		
16.		olding times abl				Yes 🗸	No 🗌		
Spe	cial Hand	dling (if app	licable)						
			iscrepancies with	this order?		Yes	No 🗌	NA 🗹	i
	Perso	n Notified:			Date				
	By Wi	nom:			Via: [eMail	Phone Fax	☐ In Person	
	Regar	ding:							
	Client	Instructions:							
18.	Additional r	emarks:							

Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	4.2	Good	Not Present			



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EPA 8260 Quality Control Data

ENVision Batch Number: 050719VS

Method Blank (MB):	MB Results (ug/kg)	Rep Lim (ug/kg)	Flag
Acetone	< 100	100	
Acrolein	< 0.17	1	1
Acrylonitrile	< 2	2	
Benzene	< 5	5	
Bromobenzene	< 5	5	
Bromochloromethane	< 5	5	
Bromodichloromethane	< 5	5	
Bromoform	< 5	5	
Bromomethane	< 5	5	
n-Butanol	< 50	50	
2-Butanone (MEK)	< 10	10	
n-Butylbenzene	< 5	5	
sec-Butylbenzene	< 5	5	
tert-Butylbenzene	< 5	5	
Carbon Disulfide	< 5	5	
Carbon Tetrachloride	< 5	5	
Chlorobenzene	< 5	5	
Chloroethane	< 5	5	
2-Chloroethylvinylether	< 50	50	
Chloroform	< 5	5	
Chloromethane	< 5	5	
2-Chlorotoluene	< 5	5	
4-Chlorotoluene	< 5	5	
1,2-Dibromo-3-chloropropane	< 1.7	1.7	
Dibromochloromethane	< 5	5	
1,2-Dibromoethane (EDB)	< 0.28	1	1
Dibromomethane	< 5	5	
1,2-Dichlorobenzene	< 5	5	
1,3-Dichlorobenzene	< 5	5	
1,4-Dichlorobenzene	< 5	5	
trans-1,4-Dichloro-2-butene	< 5	5	
Dichlorodifluoromethane	< 5	5	
1,1-Dichloroethane	< 5	5	
1,2-Dichloroethane	< 5	5	
1,1-Dichloroethene	< 5	5	
cis-1,2-Dichloroethene	< 5	5	
trans-1,2-Dichloroethene	< 5	5	
1,2-Dichloropropane	< 5	5	
1,3-Dichloropropane	< 5	5	
2,2-Dichloropropane	< 5	5	
1,1-Dichloropropene	< 5	5	
1,3-Dichloropropene	< 5	5	
Ethylbenzene	< 5	5	
Ethyl methacrylate	< 100	100	



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8260 QC Continued...

8200 QC Continued			
Method Blank (MB)	MB Results (ug/kg)	Rep Lim (ug/kg)	<u>Flag</u>
Hexachloro-1,3-butadiene	< 5	5	
2-Hexanone	< 10	10	
n-Hexane	< 10	10	
Iodomethane	< 10	10	
Isopropylbenzene (Cumene)	< 5	5	
p-Isopropyltoluene	< 5	5	
Methylene chloride	< 20	20	
4-Methyl-2-pentanone (MIBK)	< 10	10	
Methyl-tert-butyl-ether	< 5	5	
1-Methylnaphthalene	< 5	5	
2-Methylnaphthalene	< 5	5	
Naphthalene	< 5	5	
n-Propylbenzene	< 5	5	
Styrene	< 5	5	
1,1,1,2-Tetrachloroethane	< 5	5	
1,1,2,2-Tetrachloroethane	< 5	5	
Tetrachloroethene	< 5	5	
Toluene	< 5	5	
1,2,3-Trichlorobenzene	< 5	5	
1,2,4-Trichlorobenzene	< 5	5	
1,1,1-Trichloroethane	< 5	5	
1,1,2-Trichloroethane	< 5	5	
Trichloroethene	< 5	5	
Trichlorofluoromethane	< 5	5	
1,2,3-Trichloropropane	< 5	5	
1,2,4-Trimethylbenzene	< 5	5	
1,3,5-Trimethylbenzene	< 5	5	
Vinyl acetate	< 10	10	
Vinyl chloride	< 2	2	
Xylene, M&P	< 5	5	
Xylene, 0rtho	< 5	5	
Xylenes, Total	< 10	10	
Dibromofluoromethane (surrogate)	106%		
1,2-Dichloroethane-d4 (surrogate)	110%		
Toluene-d8 (surrogate)	112%		
4-bromofluorobenzene (surrogate)	98%		
Analysis Date/Time:	5-7-19/16:56		
Analyst Initials	gjd		
•	5,		



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8260 QC Continued...

8280 QC Continuea							
		LCS/LCSD Conc.	LCSD Result		LCSD		
LCS/LCSD:	LCS Results (ug/kg)	<u>(ug/kg)</u>	<u>(ug/kg)</u>	LCS Rec.	Rec.	<u>% D</u>	<u>Flag</u>
Vinyl Chloride	57.3	50	57.0	115%	114%	0.5	
1,1-Dichloroethene	53.0	50	52.7	106%	105%	0.6	
trans-1,2-Dichloroethene	49.7	50	51.0	99%	102%	2.6	
Methyl-tert-butyl ether	47.1	50	46.1	94%	92%	2.1	
1,1-Dichloroethane	51.4	50	50.9	103%	102%	1.0	
cis-1,2-Dichloroethene	44.8	50	46.2	90%	92%	3.1	
Chloroform	46.1	50	47.0	92%	94%	1.9	
1,1,1-Trichloroethane	52.0	50	51.9	104%	104%	0.2	
Benzene	43.9	50	46.1	88%	92%	4.9	
Trichloroethene	48.4	50	48.4	97%	97%	0.0	
Toluene	48.7	50	51.3	97%	103%	5.2	
1,1,1,2-Tetrachloroethane	53.8	50	48.6	108%	97%	10.2	
Chlorobenzene	52.3	50	47.9	105%	96%	8.8	
Ethylbenzene	55.5	50	51.7	111%	103%	7.1	
o-Xylene	55.4	50	50.4	111%	101%	9.5	
n-Propylbenzene	50.7	50	54.1	101%	108%	6.5	
Dibromofluoromethane (surrogate)	108%		106%				
1,2-Dichloroethane-d4 (surrogate)	104%		95%				
Toluene-d8 (surrogate)	105%		106%				
4-bromofluorobenzene (surrogate)	107%		109%				
Analysis Date/Time:	5-7-19/16:22		5-7-19/16:39				
Analyst Initials	gjd		gjd				



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EPA 8270 Quality Control Data

ENVision Batch Number: 050919BS1

	Method Blank	Reporting Limit	
Method Blank (MB):	Results (mg/kg)	<u>(mg/kg)</u>	<u>Flag</u>
Acenaphthene	< 0.33	0.33	
Acenaphthylene	< 0.33	0.33	
Aniline	< 0.33	0.33	
Anthracene	< 0.33	0.33	
Benzo(a)anthracene	< 0.33	0.33	
Benzo(a)pyrene	< 0.33	0.33	
Benzo(b)fluoranthene	< 0.33	0.33	
Benzo(g,h,i)perylene	< 0.33	0.33	
Benzo(k)fluoranthene	< 0.33	0.33	
Benzoic Acid	< 1.6	1.6	
Benzyl Alcohol	< 0.66	0.66	
4-Bromophenylphenyl ether	< 0.33	0.33	
Butylbenzylphthalate	< 0.33	0.33	
Carbazole	< 0.66	0.66	
4-Chloro-3-methylphenol	< 0.66	0.66	
4-Chloroaniline	< 0.66	0.66	
bis(2-Chloroethoxy)methane	< 0.33	0.33	
bis(2-Chloroethyl)ether	< 0.33	0.33	
bis(2-Chloroisopropyl)ether	< 0.33	0.33	
2-Chloronaphthalene	< 0.33	0.33	
2-Chlorophenol	< 0.33	0.33	
4-Chlorophenylphenyl ether	< 0.33	0.33	
Chrysene	< 0.33	0.33	
Dibenzo(a,h)anthracene	< 0.33	0.33	
Dibenzofuran	< 0.33	0.33	
1,2-Dichlorobenzene	< 0.33	0.33	
1,3-Dichlorobenzene	< 0.33	0.33	
1,4-Dichlorobenzene	< 0.33	0.33	
3,3-Dichlorobenzidine	< 0.66	0.66	
2,4-Dichlorophenol	< 0.33	0.33	
Diethylphthalate	< 0.33	0.33	
2,4-Dimethylphenol	< 0.33	0.33	
Dimethylphthalate	< 0.33	0.33	
Di-n-butylphthalate	< 0.33	0.33	
4,6-Dinitro-2-methylphenol	< 1.6	1.6	
2,4-Dinitrophenol	< 1.6	1.6	
2,4-Dinitrotoluene	< 0.33	0.33	
2,6-Dinitrotoluene	< 0.33	0.33	
Di-n-octylphthalate	< 0.33	0.33	
bis(2-Ethylhexyl)phthalate	< 0.33	0.33	
Fluoranthene	< 0.33	0.33	
Fluorene	< 0.33	0.33	
Hexachloro-1,3-butadiene	< 0.33	0.33	
Hexachlorobenzene	< 0.33	0.33	



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8270 QC continued...

Method Blank (MB):	Method Blank Results (mg/kg)	Reporting Limit (mg/kg)	<u>Flag</u>
Hexachlorocyclopentadiene	< 0.33	0.33	
Hexachloroethane	< 0.33	0.33	
Indeno(1,2,3-cd)pyrene	< 0.33	0.33	
Isophorone	< 0.33	0.33	
2-Methylnaphthalene	< 0.33	0.33	
2-Methylphenol (o-Cresol)	< 0.33	0.33	
3&4-Methylphenol	< 0.66	0.66	
Naphthalene	< 0.33	0.33	
2-Nitroaniline	< 1.6	1.6	
3-Nitroaniline	< 1.6	1.6	
4-Nitroaniline	< 1.6	1.6	
Nitrobenzene	< 0.33	0.33	
2-Nitrophenol	< 0.33	0.33	
4-Nitrophenol	< 1.6	1.6	
N-Nitroso-di-n-propylamine	< 0.33	0.33	
N-Nitrosodiphenylamine	< 0.33	0.33	
Pentachlorophenol	< 1.6	1.6	
Phenanthrene	<0.3	0.3	
Phenol	< 0.33	0.33	
Pyrene	< 0.33	0.33	
1,2,4-Trichlorobenzene	< 0.33	0.33	
2,4,5-Trichlorophenol	< 0.33	0.33	
2,4,6-Trichlorophenol	< 0.33	0.33	
2-Fluorophenol (surrogate)	44%		
Phenol-d6 (surrogate)	45%		
Nitrobenzene-d5 (surrogate)	42%		
2-Fluorobiphenyl (surrogate)	46%		
2,4,6-Tribromophenol (surrogate)	46%		
p-Terphenyl-d14 (surrogate)	5%		
Analysis Date/Time:	5-10-19/15:43		
Analyst Initials:	ajg		
Date Extracted:	5/9/2019		
Initial Sample Weight:	30 g		
Final Volume:	1.0 mL		

		LCS		
LCS/LCSD:	LCS Results	Concentration	LCS Recovery	<u>Flag</u>
Acenaphthene	27.00	50.0	54%	
4-Chloro-3-methylphenol	28.19	50.0	56%	
2-Chlorophenol	26.84	50.0	54%	
1,4-Dichlorobenzene	25.74	50.0	51%	
4,6-Dinitro-2-methylphenol	18.75	50.0	38%	
2,4-Dinitrotoluene	26.65	50.0	53%	
2-Nitroaniline	28.54	50.0	57%	
3-Nitroaniline	21.72	50.0	43%	
4-Nitroaniline	23.25	50.0	47%	
4-Nitrophenol	69.73	100	70%	



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8270 QC continued...

N-Nitroso-di-n-propylamine	28.07	50.0	56%
Pentachlorophenol	25.48	50.0	51%
Phenol	32.28	50.0	65%
Pyrene	25.67	50.0	51%
1,2,4-Trichlorobenzene	26.03	50.0	52%
2,4,5-Tricholorphenol	25.16	50.0	50%
2-Fluorophenol (surrogate)	49%		
Phenol-d6 (surrogate)	46%		
Nitrobenzene-d5 (surrogate)	47%		
2-Fluorobiphenyl (surrogate)	53%		
2,4,6-Tribromophenol (surrogate)	57%		
p-Terphenyl-d14 (surrogate)	50%		
Analysis Date/Time:	5-10-19/16:36		
Analyst Initials:	ajg		
Date Extracted:			
Initial Sample Weight:	30 g		
Final Volume:	1.0 mL		



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EPA 6010B/7471A Metals Quality Control Data

ENVision Batch Number: 050819hg/050719icp

Method Blank (MB):	MB Results (mg/kg)	Rep Lim (mg/kg)	Flag
Arsenic	< 2	2	
Barium	< 2	2	
Cadmium	< 2	2	
Chromium	< 2	2	
Lead	< 2	2	
Mercury	< 1	1	
Selenium	< 2	2	
Silver	< 2	2	

Analysis Date/Time: 5-8-19/13:00/5-7-19/14:02icp

Analyst Initials: gjd

Analyst Initials:

Laboratory Control Standard:	LCS Results(ppm)	LCS Conc(ppm)	% Rec	<u>Flag</u>
Arsenic	0.48	0.50	96%	
Barium	0.55	0.50	110%	
Cadmium	0.46	0.50	92%	
Chromium	0.49	0.50	98%	
Lead	0.55	0.50	110%	
Mercury	0.00525	0.005	105%	
Selenium	0.46	0.50	92%	
Silver	0.55	0.50	110%	
Analysis Date/Time:	5-8-19/13:02/5-7-19/14:0)1icp		

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Flag Number

Comments

1

Reported value is below the reporting limit but above the MDL.



CHAIN OF CUSTODY RECORD

Envision Proj# $\frac{2019 \cdot 1019}{1019}$ Page / of /

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EXHIBIT C

Site Characterization Work Plan – EnviroForensics



SITE CHARACTERIZATION WORK PLAN

AGRICULTURE STREET LANDFILL SUPERFUND SITE NEW ORLEANS, ORLEANS PARISH, LOUISIANA

August 3, 2021

Prepared For:

Residents of Gordon Plaza, Inc. 2876 Abundance Street New Orleans, LA 70126

Prepared By:

EnviroForensics, LLC 825 N. Capitol Avenue Indianapolis, IN 46204 Phone: (317) 972-7870

www.enviroforensics.com

Document: 300002-0156



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LIST OF ACRONYMS

ASL Agriculture Street Landfill

ATSDR Agency for Toxic Substances and Disease Registry

BGS Below Ground Surface

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CLP Contract Laboratory Program

COC Contaminant of Concern

COPC Chemicals of Potential Concern
DDT Dichlorodiphenyltrichloroethane

DQO Data Quality Objective EDD Electronic Data Deliverable

EPA Environmental Protection Agency

GPS Global Positioning System

HANO Housing Authority of New Orleans

IDM Investigation-Derived Media

LDEQ Louisiana Department of Environmental Quality
LIMS Laboratory Information Management System

LTR Louisiana Tumor Registry
MCL Maximum Contaminant Level

MDL Method Detection Limit
 μg/L Microgram per Liter
 mg/kg Milligram per Kilogram
 mL/min Milliliters per Minute
 MRL Method Reporting Limit

MS Matrix Spike

MSD Matrix Spike Duplicate

MSL Mean Sea Level NA Not Applicable

NIST National Institute of Standards and Technology

NPL National Priorities List

PAH Polycyclic Aromatic Hydrocarbon

PCB Polychlorinated biphenyl
PDF Portable Document Format
PID Photoionization Detector
PQL Practical Quantitation Limit
PRP Potentially Responsible Party

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PVC Polyvinyl Chloride QA Quality Assurance

QAPP Quality Assurance Project Plan

QC Quality Control

RCRA Resource Conservation and Recovery Act RECAP Risk Evaluation/Corrective Action Program

ROD Record of Decision

RPD Relative Percent Difference

RRII Removal Integrated Investigation

RSD Relative Standard Deviation RSL Regional Screening Level

SI Site Investigation

SOP Standard Operating ProcedureSRM Standard Reference MaterialSVOC Semi-Volatile Organic Compound

TBC To Be Considered

TCLP Toxicity Characteristic Leaching Procedure

VI Vapor Intrusion

VISL Vapor Intrusion Screening Level VOC Volatile Organic Compound



1.0 SUMMARY

Steven Henshaw, supported by EnviroForensics, was asked to assess available environmental quality data about the Agriculture Landfill Site to determine whether those data are adequate to support an assessment of risks posed to public health by environmental contamination at that site and to assess whether risks have been adequately abated at the site. If the data were not adequate, Mr. Henshaw and EnviroForensics were tasked with developing a work plan for collecting sufficient data to support a risk assessment and, in conjunction with that risk assessment, to support a plan for risk abatement.

Mr. Henshaw and EnviroForensics have concluded that the available data are not sufficient to determine the nature and extent of contamination at the site and thus are not sufficient to assess risks to human health from contamination at the site. This is because:

- Soil sampling has been too limited to provide reasonable assurance that sampling would accurately characterize conditions at the site. Specifically, most soil sampling was performed on a 200-foot grid that was not sufficient to identify pockets of contaminated material given the heterogeneous nature of landfilled materials.
- Laboratory detection limits were not always sufficiently low to detect significant concentrations of contaminants.
- Exceedances of EPA screening levels have not been followed up on. Further, Louisiana RECAP levels (from the state's "Risk Evaluation / Corrective Action Program") have been adopted without examination as to their sufficiency, even when those levels exceed EPA screening levels.
- Exceedance of the EPA screening levels should have resulted in additional investigation and/or mitigation work.
- Elevated sample results were discounted for unreliable reasons. These elevated results should have resulted in follow-up sampling.
- Sufficient groundwater elevation and quality data were not collected to assess the risk that groundwater would rise to contaminate surface soil. Soil vapors have mostly been assessed with outdated methodology.
- Post-Katrina assessment of the remaining thickness of the topsoil cover was not sufficient to characterize the site, especially in light of results that show variable thickness and areas where the thickness is significantly reduced.

1

- The potential for contamination of residential areas from the undeveloped portion of the Site has not been assessed; nor has it been confirmed that portions of the undeveloped portion of the site do not drain to residential areas.
- No full risk assessment has been conducted since 1995, before EPA's "removal actions" and before Hurricane Katrina.



Steve Henshaw and EnviroForensics recommend additional data gathering through implementation of a proposed work plan. Key elements of that plan are:

- A soil investigation, including the advancement of two soil borings on each residential property on the Agriculture Street Landfill, ten soil borings on apartments and commercial buildings, and over a 100-foot grid over the remaining portion of OU-2, OU-3, and OU-4.
- A groundwater investigation, including the installation of nine (9) monitoring wells and the gauging and sampling of the monitoring wells during four (4) quarterly events.

Steve Henshaw and EnviroForensics estimate that the cost of implementing the recommended work plan will be \$2,183,492, plus or minus 15%.

Steve Henshaw and EnviroForensics recommend that implementation of the work plan should be followed up by a full-scale risk assessment. If risks are significant, the next steps should be development and implementation of a risk-abatement plan. Depending on sample results and the risk assessment, that plan may require the removal and ultimate replacement of structures and pavement at the site.

2



2.0 INTRODUCTION

This Site Characterization Work Plan (Work Plan) is provided per request of counsel for the Residents of Gordon Plaza, Inc. The Gordon Plaza subdivision sits atop the ASL. Residents are concerned about the incidence of cancer and other illnesses and have complained of foul odors in their homes and neighborhood since residential development. Residents reported breakage of utility lines and cracks in walls and foundations caused by the settlement of the underlying landfill waste material. In one reported incident, gaps had formed between the foundation slab and the underlying landfill waste (U.S. EPA, 2018).

In 1986, the EPA conducted a limited Site Investigation and identified several hazardous compounds within the fill material at concentrations that exceeded background or regulatory levels applicable at that time (U.S. EPA, 1986). The limited investigation did not provide sufficient data to receive a Hazard Ranking System score that would qualify the site for listing on the National Priorities List ("NPL"). An expanded site inspection was conducted by the EPA in 1993 to include sampling of soil in the 0-3 inch depth interval at 38 locations (Ecology & Environment, 1995). The results of this investigation revealed that the site posed an imminent and substantial threat to human health. EPA placed the site on the NPL in 1994. Upon placement of the site on the NPL, the Moton Elementary School (built in 1985-87) was abandoned due to health and safety concerns.

From 1994 through 1995, additional subsurface investigations were conducted [refer to Remedial Removal Integrated Investigation (RRII) Report (Ecology and Environment, 1995)]. Soil samples were reportedly collected using a 200-foot grid system across the footprint of the landfill, with additional sampling in developed portions. Landfill-related contaminants are not expected to be deposited homogeneously across the site, and sample points 200 feet apart are not adequate to identify pockets of contaminants that could exist across the landfill, especially across small residential parcels of land. To put that sampling density into context, approximately one (1) soil sample was collected per "football field" sized area across the Site. By comparison, a 100-foot grid spacing more closely resembles the size of common residential parcels and will provide a greater level of data density for evaluating sensitive receptors in residentially developed areas.

At the time EPA conducted its removal actions, there were no established soil cleanup levels. EPA therefore incorporated a list of values that EPA called "to be considered" (TBC) levels for the contaminants detected. EPA explained that it provided these TBC levels "only as a reference against which detected concentrations can be comparted and evaluated." For this informational tool, EPA did not consider the synergistic and additive effects of exposure to multiple hazardous



compounds in its assessment, which would require a more sophisticated analysis. Based on its spatially limited sampling and its "TBC" screening levels, EPA decided that the primary chemicals of potential concern (COPCs) were arsenic, lead, and polycyclic aromatic hydrocarbons (PAHs). Now, 25 years later, EPA has changed its practices to periodically revise risk levels for select contaminants based on evolving toxicological data, and the State of Louisiana has set soil cleanup standards for most of the compounds previously detected at the site (Louisiana Department of Environmental Quality, 2003).

During the period from 1994 through 2001, EPA initiated a few corrective action activities including: fencing off the undeveloped 48 acre portion of the landfill to discourage illegal dumping; grading and emplacing 12-inches of clean fill on the undeveloped portion of the landfill; and reportedly removing 24-inches of landfill material around existing structures within the developed areas laying down 24-inches of clean fill (Ecology & Environment, 2001).

In 2005, Hurricane Katrina flooded the area and left many residential dwellings uninhabitable. These buildings, with their contents of destroyed furniture, were left to decay for years. One hundred and fifty four multi-family residential structures owned by the Housing Authority of New Orleans (HANO) were demolished in 2014 (U.S EPA, 2018).

2.1 PURPOSE AND OBJECTIVES

The purpose of this site characterization is to thoroughly investigate the distribution of subsurface contaminants that exist in soil and groundwater across the entire landfill footprint and to also assess soil gas and vapor media beneath the developed portion of the landfill that could pose a risk to residents of the ASL site. Additionally, the thickness of soil cover will be determined across the undeveloped portion of the landfill.

The objective is to build upon past investigation data using current investigative methods and environmental standards. This Work Plan focuses on the 47 acres of developed land overlying the ASL, because the greatest risk of exposure is where people are actively living. However, because the undeveloped portion of the landfill is adjacent to the developed portion of the landfill, and because it is reasonable to expect that there will be some access onto the undeveloped portion of the landfill through broken areas of the fence, a separate section in this work plan describes proposed sampling on the 48 acres of the undeveloped portion of the landfill.

4



2.2 DESCRIPTION OF CURRENT CONDITIONS

Much of the information provided in this section has been summarized from information contained within past EPA documents, especially the 1995 RRII (Ecology and Environment, 1995). Figures depicting various geologic or hydrogeologic conditions were also obtained from these reports and represent the data collected at that time.

2.2.1 Site Description

The approximately 95-acre ASL site is located in the eastern section of the City of New Orleans, Louisiana, approximately three (3) miles south of Lake Pontchartrain and 2.5 to 3.0 miles northnortheast of the city's central business district (refer to topographic map, **Figure 1**). The site is bounded to the north by Higgins Boulevard and to the south and west by the Southern Railroad rights-of-way. The eastern boundary extends from a cul-de-sac at the southern end of Clouet Street near the railroad tracks to Higgins Boulevard between Press and Montegut Streets. Approximately 47 acres of the former landfill has been developed as commercial and residential properties. The outline of the former ASL and developed portion can be seen on the aerial photograph, **Figure 2**.

The residential and commercial properties were developed from the 1970s through the late 1980s. This included construction of single-family residences, multiple-family private and public housing units, a community center, a recreation center, Moton School, an electrical substation, and a few small businesses. Following Hurricane Katrina, several properties were damaged, abandoned, or demolished.

2.2.1.1 History of Site-specific Land Use

ASL was first authorized for use as a dump in 1909, when the City of New Orleans was engaged in an effort to phase out disposing of municipal trash into local canals and the Mississippi River. As of 1913 disinfectant was applied to the garbage at the dump and starting in 1914 oil was used to burn the garbage. The garbage was reportedly composed primarily of household waste collected through city collection systems and commercial waste brought to this dump by producers and private transporters.

In 1922, the 400 tons of garbage produced each day by the residents of New Orleans were disposed of in this dump. In the 1920s and into the 1940s, several incinerators were burning garbage in an effort to reduce the volume of waste being dumped at the site. In addition to the garbage and waste from local industries, ash from those incinerators was also disposed of in Agriculture Street dump.

5



It was reported that during the 1940s and 1950s, the dump site was routinely sprayed with the pesticide dichlorodiphenyltrichloroethane (DDT), which was presumably an effort to control insect infestation. As the population of New Orleans continued to grow and expand in size, the dump site was no longer located on the city's outskirts. By the late 1940s, continued complaints of odors and smog created from fires burning at this dump site resulted in its closure. It was also around this time that the site started to be referred to as the ASL, instead of the Agriculture Street Dump. The landfill continued to receive waste until it was officially closed in 1958.

In the mid-1960s the ASL was used to accept debris and spoiled foodstuffs resulting from Hurricane Betsy of September 1965. Reportedly, approximately 300 truckloads per day were disposed of in ASL for a six-month period. Open fires were set to burn much of the debris. While the ASL no longer received waste through the City, the site was accessible and illegal dumping reportedly continued through at least 1994.

In the early 1970s through the late 1980s city agencies initiated the development of 47 acres of the former landfill. Development consisted of 67 individually owned homes, 179 rent-to-own townhouses, 128 senior citizen apartments, the Moton Elementary School, the Shirley Jefferson Community Center, a recreation center, the Mugrauer Playground, and an electrical substation. Approximately 48 acres of the former landfill were left as an unsecured and undeveloped area.

The single-family homes located on the developed portion of the former landfill comprise the Gordon Plaza Subdivision. The individual properties typically contain small, open front yards with fenced backyards to separate the adjacent properties. The backyards typically contain recreational areas for families, and some have vegetable and flower gardens, as well as decorative and fruit bearing trees. Many of the single-family homes destroyed during Hurricane Katrina were demolished as recently as spring of 2018.

Multiple-family housing on the developed portion of the former landfill consisted of HANO rent-to-own townhouses and the Gordon Plaza Apartments. The HANO housing area is situated in the northeast and east-central portions of the site and the Gordon Plaza Apartments are located between Higgins Boulevard and Benefit Street. The Gordon Plaza Apartments were renovated following damage caused by Hurricane Katrina, and the HANO housing structures have been demolished.

The Moton Elementary School located on Abundance Street between Press and Feliciana streets in the eastern portion of the ASL site was closed in 1994. It is currently an abandoned and blighted structure.

6



The Shirley Jefferson Community Center was located on the southeast corner of the intersection of Benefit and Press streets. Playground equipment was located in the open area on the western portion of the property. The building was used by residents for community events, and the open areas were used by children as a playground. Elevated levels of lead were detected in soil at the playground and in 1995 the playground equipment was removed. The Shirley Jefferson Community Center has since been demolished.

A recreation center was located in the southeastern portion of the ASL site, northwest of the intersection of Feliciana and Industry streets. This recreation center was an indoor gymnasium used mainly for basketball. Mugrauer Playground was located in an open area north of the recreational center and south of the chain-link fence that forms the southern boundary of the Moton School property.

An electrical substation is located within the northwestern portion of the ASL site, on the southwest corner of the intersection of Almonaster Avenue and Higgins Boulevard. The residences, school, businesses, and public buildings in the developed portion of the site are served by underground public utilities including water, sewer, electricity, and natural gas.

The undeveloped area comprises the majority of the western portion and all of the southern portion of the ASL site and is now heavily vegetated with a variety of trees, shrubs, and grasses. In 1994, the EPA installed an 8-foot-high chain link fence around the undeveloped portion of the landfill to discourage access and the illegal dumping that was previously common to this area. It has been reported that the fence has been breached several times and illegal dumping has periodically occurred on the undeveloped portion of the ASL since 1994.

2.2.1.2 Surrounding Area Land Use

The City of New Orleans is a major seaport and trade center with established tourist, oil, and gas industries. The developed areas within the ASL site have been predominantly residential. The area surrounding the ASL contains some commercial, manufacturing, and retail/service businesses (see zoning map, **Figure 3**). A railroad network is located west and south of the site, and Interstate Highways 10 and 610 merge approximately 0.5 mile west of the site. Interstate 10 continues northeast and crosses the Inner Harbor Navigation Canal that is part of the Intracoastal Waterway system and is located approximately 1 mile east of the site. Additional drainage canals parallel Peoples Avenue to the west and Florida Avenue to the south of the ASL.

7



2.2.1.3 Demography

The ASL site is located in Orleans Parish, 2010 census tract 137. The total 2010 population of census tract 137 is 2,005 persons. The population is mostly persons of black ethnicity, with 1,915 individuals. The majority of the population is over the age of 18, with 1,348 individuals listed. There were 363 individuals in the 2010 census data listed as under the age of ten years. The median household income of Orleans Parish is listed at around \$37,000 and the poverty rate is 28%.

2.2.2 Site Specific Hydrogeology

2.2.2.1 Site Topography and Surface Water Drainage

Topography is relatively flat within the area of the site as is typical of a marsh and deltaic river deposits (see topographic map, **Figure 1**). Prior to EPA corrective actions in the early to mid-1990s, surface elevations across the former landfill ranged from approximately 10 feet above mean sea level (MSL) in the east-central part of the undeveloped area to between MSL and approximately 9 feet below MSL near the northwestern site boundary (see Landfill Topographic Survey Map, **Figure 4**). The contour intervals shown on **Figure 4** represent one (1) foot in elevation change.

As can be seen on **Figure 4**, surface elevations within the undeveloped portion of the landfill were 7-9 feet higher than in the Gordon Plaza neighborhood. Surface water flow would have been radially in all directions off the undeveloped portion of the landfill draining to adjacent areas. Since the undeveloped portion of the ASL is in an "L" shape, wrapping around the Gordon Plaza neighborhood, the surface water flow along the eastern edge of the west arm and northern edge of the south arm was directed towards the residential neighborhood. The surface water flow across the remaining areas of the undeveloped portion of the landfill would have flowed primarily to the west towards the railroad tracks and to the south toward the Florida Avenue Canal.

During EPA corrective actions, grading was performed on the undeveloped portion of the landfill to direct surface water drainage away from the Gordon Plaza neighborhood; however, it is uncertain whether this grading has resulted in complete re-direction of surface water flow away from the neighborhood, especially along the eastern edge of the west arm of the undeveloped portion of the ASL.

The developed portion of the ASL site is generally topographically higher in the area between Abundance and Industry streets than in the area north of Abundance Street. Elevations south of



Abundance Street reach approximately 2.4 feet above MSL, whereas the highest elevation north of Benefit Street is 1.4 feet below MSL. Elevations on the developed portion of the former landfill are largely a result of residential construction requirements, but there is a general downward slope across the developed area towards Higgins Boulevard to the north. Storm water in the developed area is channeled towards the streets and storm sewer catchments.

2.2.2.2 Subsurface Geology

The thickness of landfill material is shown on **Figure 5**, a geologic transect map is provided as **Figure 6**, and three (3) geologic cross-sections are provided as **Figures 7**, **8**, and **9**. As can be seen on **Figure 5**, the landfill material ranges from 10 to 17 feet thick along the eastern and southern portions of the undeveloped area and much of the developed area where the geologic cross sections were constructed. However, the thickness of fill varies considerably and has been measured at up to 33 feet in past geotechnical test borings.

As shown on the geologic cross-sections, the fill material is underlain by a layered series of organic and fine to medium grained deposits consisting of from top to bottom: 5-8 feet of peat mixed with organic clay; 10-20 feet of silty clay; 2-6 feet of clay; 1-4 feet of additional silty clay; 3-7 feet of silty, sandy, clay; 3-15 feet of interbedded silt, clay, and sand; and followed by a deeper sand unit.

2.2.2.3 Groundwater

Groundwater flow maps of the deeper sand unit and shallow zone water table are provided as **Figures 10** and **11**, respectively. As can be seen on these figures, monitoring wells that are completed in the deeper sand unit have higher water levels than the shallow wells completed within the landfill waste or the underlying clayey peat layer. This indicates that groundwater within the deeper sand layer is likely under confined and artesian conditions from overlying finegrained soils.

Figure 10 appears to suggest that groundwater flow within the deeper sand unit is controlled by the topography and is directed radially away from topographically higher areas. Groundwater levels suggest an upward gradient in the deeper sand unit and assuming that is accurate the groundwater flow may or may not be controlled by topography. It is unclear whether the well screens in these deeper units crossed stratigraphic lens of more permeable material or whether they were screened entirely in a confined water bearing unit. Because the wells have been removed, they cannot be used to confirm the EPA's interpretation of the site hydrogeology. Accordingly, the site hydrogeology is considered a significant data gap.

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The shallow water table resides within the landfill refuse material at between 5-12 feet across the ASL site and between 5-8 feet across the residential neighborhood of the ASL site. However, depths to the shallow water table have been reported as shallow as two (2) feet in the vicinity of Moton Elementary School, possibly from upward movement of groundwater along school foundation pilings that were set within the artesian sand layer. The flow direction in the shallow water table follows the same general radial flow pattern as the deeper sand unit (**Figure 11**). Higher water levels in the refuse generally coincide with the thickest sequences of fill material and the shallow water table appears to be mounded within the fill.

2.2.2.4 Potable Water Use

Municipal drinking for the greater New Orleans area is supplied by two (2) water purification plants that draw from the Mississippi River.

Water for commercial purposes is drawn from the Gonzales-New Orleans Aquifer. This aquifer lies at a depth of approximately 450-500 feet in the ASL area, is composed of sand, and has a thickness of approximately 700 feet. Although designated for commercial purposes, 28 of these supply wells are designated as emergency drinking water supply wells. No drinking water supplies come from shallow sand aquifers that lay above the Gonzales-New Orleans Aquifer.

2.2.3 Summary of Past Investigations

This Section describes the general nature of landfilled material and types of potentially hazardous elements and compounds detected in soil, groundwater, and air. This information has been summarized from past site investigations performed by EPA and others beginning in 1976 and continuing through 2018. Much of the information comes from the RRII performed on behalf of the EPA in 1994-1995.

2.2.3.1 Distribution and Nature of Landfill Waste

Test borings performed prior to construction of residential housing in the Gordon Plaza neighborhood portion of the landfill revealed the depth of landfill material to be up to 33 feet (Gillen, 1976). EPA documents describe five (5) test pits completed in the undeveloped portion of the ASL with visible refuse that included rocks, brick, ash, glass, bottles, cans, metal parts, crushed cars, plastics and other household waste, wood and roofing materials some of which could be seen on the surface. There are also materials described as "unnatural" deposits. One deposit was described as a reddish-brown granular semi-soft material, and another described as a black "greasy" material having a diesel fuel odor. At three (3) of the five (5) test pit locations



VOCs were detected at levels of up to 10 parts per million using a portable organic vapor monitor. The maximum depth of landfill materials on the undeveloped portion of the ASL during test pit investigations was identified as 17 feet.

2.2.3.2 General Contaminants in Soil

Numerous contaminants were detected on both the undeveloped and residential sections of the ASL during soil investigations performed by the EPA and others from 1984 through 1995. Soil samples were also collected from off-site locations to distinguish between the concentrations of compounds present within the City of New Orleans environment versus the general environment of the ASL site. Compounds detected on the ASL site in elevated concentrations in the upper 4-feet of landfill material (typically considered to be the zone of potential direct contact exposure) include:

- 23 target analyte list metals and cyanide
- VOCs 1,1-dichloroethene, 1,2-dichlorothene, and 1,1,1-trichloroethane
- 16 different polycyclic aromatic hydrocarbon (PAH) compounds
- 20 different pesticides
- PCBs including Aroclor 1254 and Aroclor 1260
- Dioxin

Many of these contaminants exceeded EPA's then-current screening or TBC levels

2.2.3.3 General Contaminants Detected in Groundwater

Groundwater was encountered in four (4) of five (5) test pits dug in the undeveloped portion of the landfill. The water in the test pits was described as having an oily sheen. In some of the pits a strong diesel fuel odor was noticed and in others a hydrocarbon-like odor was noticed.

Twenty-two (22) groundwater monitoring wells were installed at the ASL. The wells were reportedly constructed to intercept the shallow zone water table within the landfill material and also within a confined, artesian, deeper sand unit. The screening across the different hydrostratigraphic units could influence the groundwater flow in the shallow zone because of the artesian pressure reported in the deeper sand unit.

Note that the geotechnical pilings, installed for the Moton Elementary School, also penetrated the confining low-permeability units and extend into the deeper sand unit, which may contribute to mounding of shallow groundwater near the Moton school property because of the artesian



conditions within the deeper sand unit and associated natural upward hydraulic gradient (Ecology and Environment, 1995). High water table elevations can put contaminated groundwater in contact with building foundations and/or utility lines connected to residential dwellings.

Contaminants detected in the shallow groundwater above background concentrations included:

- Pesticides
- Semi-volatile PAH compounds
- Semi-volatile compounds (4-methylphenol, and N-nitrosodiphenylamine)
- Heavy metals (filtered samples)

The highest unfiltered lead and arsenic concentrations of 11,774 micrograms per liter (μ g/L) and 164 μ g/L, respectively were collected from a shallow groundwater well in the southwest corner of the Shirley Jefferson Community Center in the residential portion of the landfill.

2.2.3.4 Indoor Air Sampling

During the RRII, paired indoor/outdoor air was sampled for VOCs at half of the residential single family homes and the Moton Elementary School on the developed portion of the landfill and compared to indoor air sample results from five (5) off-site properties considered background samples. Several VOCs were detected within on-site residential structures that were not detected in outdoor air and/or were not detected in off-site background residences. However, the detected compounds were attributed, without further evaluation, to either household products or urban atmospheric contaminants.

In 2018, at one residence, CH2M HILL evaluated indoor air and air within a foundation gap (CH2MHILL, 2018). The company dismissed detections of volatile compounds and naphthalene detected within air samples collected based on an unconfirmed assumption of these compounds being constituents of household products, and that lower concentrations were detected in the foundation gap as compared to concentrations detected with the house living space. This conclusion is unfounded given the precautions taken to remove the household products prior to sampling, and that no evidence was provided that the contaminants detected were verified constituents in the household products.



2.2.4 Summary of EPA Removal Actions

The EPA originally organized the work for the ASL site into five (5) Operable Units (OUs). These Operable Units, except OU5 are shown on **Figure 2**. They were designated as follows:

- OU1 refers to the undeveloped portion of the landfill
- OU2 consists of all residential properties
- OU3 is the Shirley Jefferson Community Center
- OU4 is Moton Elementary School and includes Mugrauer Playground
- OU5 is groundwater

In chronological order, EPA performed the following actions for these Operable Units:

- 1994 EPA installed an 8-foot high chain-link fence around OU1 to discourage illegal dumping activities and to restrict access to limit exposure to contaminants.
- 1995 EPA removed playground equipment and installation of heavy grass sod at OU3.
- 1996 EPA repaired fencing around OU1 that had been damaged by trespassers.
- 1997 EPA placed of a geotextile marker and clean fill on OU1, OU2, and OU3.
- 2000 EPA removed OU4 and OU5 from the NPL indicating that OU4 was covered with 3-feet of clean soil, and OU5 was not used as a potable water supply. Both, according to the EPA required no further action.

For OU1, the 1997 Removal Action generally involved clearing the 48-acre area, grading it to direct storm water runoff away from the residential area, laying a permeable geotextile mat followed with orange fencing (to serve as a visible marker), covering the mat/marker with 12 inches of clean fill, and re-establishing a vegetative layer on the clean fill.

The Removal Action in 1997 for OU2 and OU3 consisted generally of property preparation, driveway and sidewalk removal (as needed), excavating 24 inches of soil, placing a permeable geotextile mat/marker on the subgrade, backfilling the excavated area with 24-inches of clean fill, covering the clean fill with grass, landscaping and yard restoration, driveway and sidewalk replacement, and final detailing. During this Removal Action, nine individual property owners elected not to participate; therefore, these homes and yards exist upon unprotected landfill material (Ecology & Environment, 2001).



2.2.5 Post Hurricane Katrina Evaluation

In August 2005, Hurricane Katrina made landfall along the coast of Louisiana near the City of New Orleans that resulted in severe wind and rain damage to property. Several levies failed which resulted in the flooding of much of the City of New Orleans, including the ASL site. One month later, Hurricane Rita made landfall west of New Orleans and parts of the city were flooded again.

In October of 2005, EPA contracted CH2M HILL, Inc. to perform some limited investigations to assess damage to the clean soil cover and collect soil samples to determine if the clean soil layer had become re-contaminated (CH2M HILL, 2006). The company collected soil samples of the soil cover from nine (9) locations on the undeveloped portion of the landfill (OU1) and from 14 locations within the residential portion of the landfill (OU2, OU3, and OU4). Also, at each location, it measured the thickness of the soil cover (refer to **Figure 12** for the reported thickness).

The soil samples were only analyzed for lead and arsenic. The levels of lead and arsenic detected were reported as less than RECAP levels of 400 milligrams per kilogram (mg/kg) and 12 mg/kg, respectively, except for one location in OU4 where arsenic was detected at 15 mg/kg.

Some erosion of the soil cover appears to have occurred based on the thickness measurements made. The cover thickness over the residential portion of the landfill was designed to be 24 inches. At two (2) locations measured, the thickness was recorded as 9 inches and 21 inches, respectively. The soil cover over the undeveloped portion of the landfill was designed to be 12 inches. At two (2) locations measured, it was recorded as 6 inches and 11 inches, respectively. This erosion was detected with a very limited number of sampling points over the entire 96 acre landfill, and this dearth of sampling points is inadequate to determine whether the soil cover is functioning as designed. Based on the sample density selected for the 2005 study, there are likely many other locations where the soil cover has been eroded.



3.0 DISCUSSION OF DATA GAPS/CONCERNS

3.1 Past Soil Sampling and Contaminant Identification

The EPA conducted a program of investigative soil sampling in the years between implementation of its Site Inspection (1986), Expanded Site Inspection (1993), and RRII (1994-1995). Much of the original soil sampling was performed on a 200 foot grid, with additional soil samples collected on approximately half of the residential properties. Due to the spatially heterogeneous nature of landfilled materials, this spatial distance allows for significant pockets of contaminated materials to remain unidentified across the landfill property.

Contaminants detected at that time included heavy metals, semi-volatile PAH compounds, pesticides, VOCs, PCBs, and dioxin. At the time of these investigations, there were no promulgated federal or State of Louisiana regulatory cleanup standards for soil; therefore, EPA prepared To Be Considered (TBC) criteria from draft EPA risk-based guidance and lead screening levels for residential land use available at the time. EPA used the TBC criteria to screen out some of the contaminants detected at the site. This process resulted in only lead, arsenic, and three (3) PAH compounds considered to be contaminants of concern (COCs).

During the Fourth 5-year EPA assessment conducted in 2017, 28 soil samples were collected from road rights-of-way, and four (4) samples were collected from residential properties. The samples were collected from surface soil at 0-3 inches in depth. The samples were analyzed for lead, arsenic, and PAH compounds. At two locations in the right-of-way, the Louisiana Department of Environmental Quality (LDEQ) RECAP levels were exceeded for lead and at one of those locations, the RECAP level for arsenic was exceeded. At another location in the right-of-way, the RECAP level for benzo(a)pyrene was exceeded. EPA explained—without confirming data—that the compounds exceeding the RECAP cleanup levels were of no consequence since they were not related to the original landfill contamination. This determination is not supported.

Flood waters and/or rising shallow zone water elevation could have transported and cross contaminated known groundwater contamination to surface soils. Heavy rainfall could easily have deposited this contamination as runoff from other areas of the landfill where the fill material used as cover may have been eroded. Another explanation could be that the previous limited sampling performed in the past missed the identified contamination. For example, after Hurricane Katrina in 2005, Subra Company collected only two (2) samples of surface soil in the developed portion of the ASL. One of the samples contained various PAH compounds in concentrations exceeding their respective RECAP levels (refer to Subra documentation in



Appendix B). In addition, water levels in shallow monitoring wells were not measured during flooding and the landfill material could have been fully saturated at the time. This could have resulted in transport of contaminants upward through the permeable geotextile membrane and into the overlying soil cover.

Since EPA covered the landfill material with clean fill between 1994 and 2001, there have been limited soil sampling events performed in the soil cover to assess whether the soil cover had been eroded or re-contaminated. Soil samples collected were analyzed for lead and arsenic, and in some cases PAH compounds. None of these sampling events were adequate to assess the condition of the soil cover due to the limited number of soil samples collected. More extensive soil sampling is needed to detect contaminants that may be in concentrations exceeding current risk criteria based on evolved toxicological studies.

3.2 Soil Cover Condition

During the EPA Removal Action in 1997, the undeveloped portion of the landfill was reportedly covered with 12 inches of fill material. The front and back yards of most residential housing in the developed portion of the landfill were reportedly covered with 24 inches of fill material. These thicknesses of fill material were considered by the EPA as adequate to protect human exposure from landfill contaminants. A survey of cover thickness was performed in 2005 following the significant flooding caused by Hurricane Katrina. Soil cover thicknesses were measured at nine (9) locations on the undeveloped portion of the landfill and at 14 locations on the developed portion of the landfill. At two (2) locations on each section of the landfill, the soil cover was not of the thickness as designed and specified by the EPA. This limited number of measurements is not adequate to evaluate the overall condition of the soil cover, especially because four (4) of the 23 locations (17%) reportedly were less thick than the remedial action measures designed by EPA.

The soil cover thickness over the entire landfill should be measured at each soil sample location proposed in this Work Plan to determine if the soil thickness across the developed portion of the landfill meet original design criteria.

3.3 Groundwater Impacts

It is not known if there are existing groundwater monitoring wells remaining on any portion of the ASL site. However, based on the 1997 EPA ROD that "no action" be taken for OU5, and EPA's removal of OU5 from the NPL in 2000, it is anticipated that all wells have been abandoned. Several metals including lead, cadmium, chromium, and cyanide were detected in



test pit groundwater at concentrations exceeding MCLs for groundwater. Lead in particular was detected in concentrations ranging from 1,848 micrograms per liter (μ g/L) to 63,766 μ g/L on the undeveloped portion of the landfill. The current LDEQ RECAP level for lead is 15 μ g/L.

It is not known if there are seasonal variations in the concentrations of groundwater contaminants or if groundwater levels can rise into the soil cover. It appears that groundwater monitoring wells were only sampled once, and groundwater elevations were only measured in April-May of 1994. High levels of lead and other landfill contaminants could be transported up into the fill material cover during high water levels within the landfill deposits that could result from sustained precipitation and associated flooding events. Migration of these contaminants along utility lines could occur during these conditions possibly resulting in re-deposition of landfill contaminants in contact with building foundations. Contaminated groundwater close to, or in contact with, building foundations can also be a source for vapor intrusion of volatile or semi-volatile compounds into building structures.

Shallow groundwater monitoring wells should be re-installed within the developed portion of ASL to assess whether high water table conditions within the landfill material occurs seasonally or after significant precipitation events and whether groundwater flows towards the residences from the undeveloped portion of the landfill during various seasonal fluctuations or storm events. The wells should be sampled on a quarter-year basis initially to determine if there are seasonal changes in the type and/or concentration of contaminants.

3.4 Soil Vapor Impacts

During past investigations managed by the EPA, only indoor and background air were sampled for contaminants. EPA eliminated vapor risk to occupied buildings as a consideration by calculating a risk potential from soil data. While this approach may have been acceptable at the time the initial investigation was being undertaken, it is not considered an acceptable technical approach by today's standards and with the knowledge garnered over the years associated with vapor intrusion. Current EPA risk evaluation criteria involve performing indoor/outdoor air sampling paired with sub-slab sampling to determine the potential risk of vapor intrusion.

Vapor from underlying contaminated soil and/or groundwater can build up beneath the confining area of the building foundation and floor slab. If there is sufficient build-up of volatile compounds below the foundation, vapors may enter the building space through cracks and other penetrations of the building foundation at various times under differing barometric and climatic conditions such as: winter versus summer; periods of high versus low barometric pressure; rising or falling groundwater levels, or under the varied operating conditions of heating and



cooling systems. Therefore, a single indoor air sample is only a snapshot of the volatile compounds that are present in indoor air under the particular environmental conditions occurring at that time and does not accurately represent the risk of intrusion of volatile compounds that may be accumulated beneath the building slab.

Paired sub-slab vapor/indoor air sampling should be performed at every occupied residence and any other dwelling proposed for occupation. Outdoor air samples should also be collected to compare background concentrations of with any detected indoor air contaminants. Two (2) sub-slab samples should be collected for every 2,000 square feet of foundation slab to determine variability. Sampling should be performed twice per year during periods of varying heating/cooling operations. Household products can contain chemicals that can bias indoor air results, so all suspect household products should be identified and removed from the residence at least 48-hours prior to sampling. Residents should also be notified to open windows to allow indoor air to equilibrate with outdoor air during the 24 hours following removal of the suspect household products.

3.5 Geotechnical Concerns

Geotechnical concerns were raised by contractors prior to constructing Moton Elementary School. Recommendations included excavating all of the landfill material in the footprint of the planned school due to concerns about structural loading and eventual settlement of the fill material. Rather than remove all of the landfill material, only three (3) feet of landfill material was removed and replaced with clean fill. Subsequent settlement of the structure resulted in cracking of a sanitary sewer lateral.

There are also reports that settlement has resulted in water conveyance lines rupturing. Water line rupturing will create a void in the adjacent material and open up pathways within the landfilled material that may act as conduits for transport of water or air borne contaminants from within the landfilled material.

All other residential homes and apartment buildings were constructed directly on top of the landfill materials. A complaint of odors in one residential home led inspectors in 2018 to observe a large gap between the floor slab of the building and the underlying landfilled material reportedly caused by a combination of settlement and some excavation to repair bathroom plumbing that had cracked. Air samples collected from within the gap detected naphthalene, 1,2-dichloroethene, 1,4-dichlorobenzene, chloroform, and acrolein in concentrations exceeding indoor air screening levels. Because these compounds were detected at somewhat lower concentrations in the gap than they were in the indoor air sample, there was speculation by the



inspectors that the source of these compounds were from household products. However, these products were removed from the residence prior to sampling.

One foundation crack and several smaller cracks in the ceiling were observed during this inspection. Further settlement of the landfill material will be location specific but is anticipated to cause continued issues such as voids below foundation slabs, failure of water supply and sewer systems, and compromises to building foundations.

At each sub-slab vapor sample location, the small borehole must be inspected visually to determine if air gaps exist beneath the foundation slab. This could be accomplished by using a small bore scope.



4.0 SITE CHARACTERIZATION PROCEDURES

As described in the previous section, there are numerous concerns regarding previous sampling methodologies and exposure assumptions. The sampling density was inadequate, the vapor intrusion (VI) assessment methodology is obsolete, soil could have become re-contaminated due to flooding, and most of the state and federal screening and clean up standards did not exist at the time of the RRII. Therefore, for purposes of the Site characterization all compounds that have been previously detected in samples collected from the ASL site are considered COCs. The COCs for soil, groundwater, and indoor air are listed in **Tables 1 through 3**, respectively. The COCs for sub-slab vapor are identical to those listed for indoor air. The COCs fall into the following groups of compounds: metals, VOCs, SVOCs, PCBs, pesticides, and dioxins.

4.1 Soil Sampling

Disposal of hazardous material in a landfill is a heterogeneous process. Previous soil sampling designs were based on a wide grid arrangement across all operable units. Some consideration was given to areas with the greatest residential density; however, not all properties were assessed. An even more sparse assessment was completed following the 2005 hurricanes. The most recent soil sampling, completed in 2017 as part of the fourth five-year review (U.S. EPA, 2018), indicated exceedances of standards in several soil samples. The additional characterization soil sampling will be performed to accomplish the following objectives:

- Determine concentrations of COCs in soil and landfill material at each single-family residential property to evaluate the current exposure risks.
- Advance soil borings with the currently vacant area on a more closely spaced grid than previous investigations to evaluate concentrations of COCs in soil and landfill material and to decrease uncertainty related to subsurface heterogeneity.

This section presents the methods and procedures that will be implemented to accomplish these objectives, including sub-surface utility surveys and soil sample collection across the developed portion of the landfill. Soil sampling and measurements of the thickness of the soil cover across the undeveloped portion of the landfill is addressed in Sections 3.1.3 and 3.4 below.

4.1.1 Sub-Surface Utility Survey

In accordance with safe work practices and as required by state law, the contractor will contact Louisiana One Call subsurface utility protection service at least 48 hours prior to the anticipated onset of subsurface work at the Site. As a result, subsurface utilities and structures owned or



managed by member companies and municipalities will be located by an independent contractor service. Due to the scale of the proposed work area and availability of One Call contractors, the public utility clearance process may be completed in phases as soil sampling work progresses.

The contractor will also contract with a private underground utility locating service to provide additional confidence regarding the position of potential underground hazards at the Site. The private locating service will use geophysical and electromagnetic equipment to locate underground utilities at every proposed soil boring and monitoring well location. Utility information will be evaluated to select final positions for soil borings and monitoring wells.

4.1.2 Sample Locations and Depths (developed land, OW-2 through OW-4)

The soil sampling approach has been developed based on a review of current land use and potential gaps in the sampling grid established for previous investigations. Soil borings will be advanced as follows:

- Two (2) soil borings on each individual property in the Gordon Plaza Subdivision at areas previously identified as containing COCs, in areas identified as having previously received fill material, or in areas selected based upon site-specific criteria;
- Ten (10) soil borings in accessible areas on the properties occupied by the recently renovated Gordon Plaza Apartments and commercial building on Higgins Blvd;
- On a 100-foot grid spacing over the remaining portion of OU-2, as well as OU-3, and OU-4;
- Soil boring locations will be aligned with high-risk areas, areas not previously abated, and with the locations of previously advanced borings that provided sampling results above the EPA screening levels.

The soil boring plan is illustrated and summarized on **Figure 13**. Within the randomly assigned grid area, borings will be advanced near every grid node or as described above. Minor adjustments to boring locations may be necessary in the field to avoid subsurface obstructions. Additionally, samples will not be collected within the footprint of the Moton Elementary School building. Soil boring locations will be recorded in the field with a Global Positioning System (GPS) unit with an accuracy of 10 feet. This will provide a field reference for later, more accurate surveying.

Two (2) samples for laboratory analysis will be collected from each soil boring. Sample collection depths will be from surface to the geotextile fabric and from the 12-inch interval immediately below the fabric, which is reportedly a maximum of 2 feet deep at all proposed



sampling locations. Therefore, anticipated sampling depths for the deeper sample interval range from 12 to 36 inches below ground surface. Exact sample depths will be field determined based upon visual inspection and mechanical field screening.

Following this sampling plan, it is anticipated that 237 soil borings will be advanced, with a total of 474 soil samples collected. Additional borings and associated soil samples will be collected as necessary to further delineation identified areas of elevated contaminant concentrations.

4.1.3 Sample Locations and Depths (undeveloped land, OW-1)

Soil samples will be collected from the undeveloped portion of the landfill on a randomly assigned 100-foot grid as shown on **Figure 13**.

Two (2) samples for laboratory analysis will be collected from each soil boring. Sample collection depths will be from surface to the geotextile fabric; and from the 12 inch interval immediately below the fabric, which is reportedly a maximum of 12 inches deep at all proposed sampling locations. Therefore, anticipated sampling depths for the deeper sample interval range from 12 to 24 inches below ground surface.

Following this sampling plan, it is anticipated that 172 soil borings will be advanced, with a total of 344 soil samples collected. Additional borings and associated soil samples may be necessary to further delineation identified areas of elevated contaminant concentrations.

4.1.4 Sample Collection Procedures

Soil samples should be collected using direct-push technology according to the SOP for drilling and soil sampling presented in **Appendix D**. All borings will be advanced as a single, continuous 4-foot core; however, multiple adjacent borings (i.e., within a 2-foot diameter area) may be required to obtain a sufficient volume of sample to perform all analyses. The samples will be collected in dedicated polyvinyl chloride sampling sleeves. The material collected from the pre-determined sampling intervals will be transferred to stainless-steel bowls, thoroughly homogenized and placed into pre-labeled sample containers. The VOC aliquots will be removed from the sampling sleeve using 5 or 10-gram Terra Core® samplers (or equivalent) prior to homogenization and placed directly into a cooler containing ice.

After sampling, boreholes will be sealed according to LDEQ requirements. All drilling and sampling equipment that contacts soil will be decontaminated using an Alconox wash and potable water rinse between each boring and sample location. Decontamination fluids will be containerized in 55-gallon drums and managed as described in Section 3.2.5.



4.1.5 Soil Sample Analysis

Sample coolers will be delivered to the laboratory by field personnel or shipped overnight to the laboratory under chain-of-custody. All soil samples will be analyzed for VOCs, SVOCs, RCRA 8 metals, PCBs, dioxins, and pesticides. Analytical method information is provided in Section 5.2.3.

4.1.6 Investigation-Derived Media Management

Investigation-derived media (IDM), including soil not selected for laboratory analysis, will be placed in 55-gallon steel drums for subsequent characterization and management. The drums will be labeled as "pending analysis" with the type of contents and generation date and staged at an acceptable location.

Each IDM drum will be characterized individually for profiling and disposal purposes by collecting composite soil samples using a sample probe that penetrates the entire thickness of the accumulated soil. Soil samples will be analyzed for VOCs, SVOCs, and PCBs according to the Test Methods in Section 5.2.3, along with metals according to EPA Test Method 1311 - TCLP. The IDM will be profiled with the landfill/treatment plant based on the analytical results, and a licensed contractor will be retained to remove the drums from the Site for proper disposal.

4.2 Groundwater Monitoring

Groundwater monitoring will be performed to accomplish the following objectives:

- Identify groundwater elevation and flow direction(s); and
- Evaluate the concentrations of COCs in groundwater near the occupied residences.

This section presents the methods and procedures that will be implemented to accomplish these objectives, including monitoring well installation, groundwater elevation measurements, and groundwater sample collection. Four (4) quarterly groundwater monitoring events are anticipated in order to evaluate hydrogeologic conditions and water quality impacts over the course of an annual cycle. An additional round of water level measurements is planned for a significant precipitation or flooding event, defined as a 5-year flood or rain event as defined by the United States Geological Survey. Ongoing groundwater monitoring may be necessary to evaluate seasonal data fluctuations.



4.2.1 Monitoring Well Installation

Nine (9) monitoring wells will be installed at the locations shown on **Figure 14**. The monitoring wells will be designated MW-101 through MW-109. The proposed wells are positioned:

- Along the eastern boundary of the undeveloped portion of the Site (OU-1) in areas identified as containing representative lithologic and hydrogeologic conditions based upon soil boring data. These monitoring wells will be used to evaluate potential groundwater impacts beneath the residences caused by illegal dumping and other activities that have reportedly occurred on OU-1.
- East of the remaining residences on currently vacant land to evaluate potential downgradient concentration trends. These wells will be located in the assumed downgradient direction from areas of identified contamination. Prior water table elevation contour maps indicated radial flow from the center of the Site.

Monitoring wells will be installed using 4.25-inch inner diameter hollow-stem auger tooling.

4.2.1.1 Well Construction and Development

Well construction will consist of 10 feet of 2-inch ID, 0.010-inch slotted polyvinyl chloride (PVC) well screen, with PVC riser extending approximately 3 feet above ground surface. The wells will be constructed such that the water table intersects the well screens. Sand pack materials will be placed from the bottom of the screen up to two feet above the well screen. A bentonite seal will extend from the top of the sand pack to approximately 1 foot below ground surface (BGS). Lockable hinged steel well protectors measuring 4 inches in diameter will be placed over the PVC casing above ground. The well protectors will be set in concrete to 1 foot BGS. Expandable locking caps and locks will be placed on each well. Well construction diagrams will be included in the Site Characterization Report.

The newly installed monitoring wells will be developed in accordance with the provided SOPs (**Appendix D**). Monitoring wells will be surged and pumped during the development process to remove fines from the sand pack until the water runs clear. If the monitoring well(s) can be purged dry, the well(s) will be slowly purged dry using a disposable bailer(s). The development equipment will be decontaminated between each monitoring well using a solution of AlconoxTM and water.



4.2.1.2 Survey Procedures

Upon completion of the installation of the new monitoring wells, a licensed surveyor will record the elevation and location of each monitoring well by standard surveying methods. A vertical elevation survey will be conducted to establish the elevation of each monitoring relative to MSL. The horizontal and vertical grid coordinates of each monitoring well will be recorded to within 0.5 foot and 0.01 foot, respectively. Horizontal coordinates will be referenced to the State Plane Coordinate System.

4.2.2 Water Level Measurements

Monitoring well caps will be removed at least 15 minutes prior to collecting water level measurements to allow groundwater in the monitoring wells to equilibrate with atmospheric pressure. The depth to water in each well will be measured from a reference point of known elevation, typically the top of the PVC well casing. Measurements will be collected using an electronic water level indicator to the nearest 0.01 foot and recorded in the field notebook and sampling form.

4.2.3 Groundwater Sampling Procedures

Groundwater purging and sample collection will be conducted using standard low-flow (minimal drawdown) methods. Field parameters including pH, specific conductivity, temperature, oxidation-reduction potential, turbidity, and dissolved oxygen will be measured during purging and recorded at set time intervals by the water quality instrument software. If low-flow sampling methods are not suitable due to limited recharge rates, the monitoring wells will be bailed dry and sampled as soon as a sufficient volume of water recharges the well. Purging may be performed using new, disposable bailers, or submersible pumps decontaminated between each well.

Groundwater samples will be collected directly from the sample apparatus into laboratory-supplied containers made of appropriate material and containing the appropriate preservative for the specified analyses. After filling, each sample container will be immediately labeled and placed in a cooler containing ice. Additional details regarding groundwater sampling procedures are presented the Low-Flow Groundwater Sampling SOP included in **Appendix D**.

4.2.4 Groundwater Sample Analysis

Sample coolers will be delivered to the laboratory by field personnel or shipped overnight to the laboratory under chain-of-custody. All monitoring well groundwater samples will be analyzed



for VOCs, SVOCs, RCRA 8 metals, PCBs, dioxin, and pesticides. Analytical method information is provided in Section 5.2.3.

4.2.5 Investigation-Derived Media Management

IDM, including soil cuttings generated during monitoring well installation and purge water generated by the well development process, will be placed in 55-gallon steel drums for subsequent characterization and management. The drums will be labeled as "pending analysis" with the type of contents and generation date and staged at an acceptable location.

Each IDM drum will be characterized individually for profiling and disposal purposes by collecting grab samples of groundwater using a drum thief. Water samples collected from drums will be analyzed for those compounds detected in the monitoring well samples. The IDM will be profiled with the landfill/treatment plant based on the analytical results, and a licensed contractor will be retained to remove the drums from the Site for proper disposal.

4.2.6 Well Abandonment Procedures

The monitoring wells will be abandoned when it is determined they are no longer needed. The well protectors, bollards, and PVC casing and screen will be completely removed from the ground. The hole will be backfilled with 3/8-inch bentonite chips to within six inches of the ground surface, followed by topsoil, asphalt, or concrete to match the surrounding material. Monitoring well abandonment forms will be prepared and submitted to LDEQ.

4.3 Vapor Intrusion Risk Evaluation

Vapor intrusion risk to occupied structures will be evaluated by conducting VI assessments. The assessments will consist of a building inspection, followed by the collection of paired indoor air and sub-slab vapor samples. It is understood that 54 of the single family homes remain occupied. A VI assessment will be conducted at each home, the recently renovated Gordon Plaza apartment buildings, and the commercial building at the intersection of St. Ferdinand Street and Higgins Boulevard.

All VI assessment activities will be conducted in accordance with EPA's guidance for assessing and mitigating the VI pathway (EPA, 2015). It is proposed that two (2) VI sampling events be completed; however, depending on the initial results additional sampling events may be needed to fully assess the VI pathway in each structure.



4.3.1 Initial Building Inspection

Prior to sampling, an inspection of the occupied spaces will be conducted to identify and inventory materials that could potentially contribute to indoor air conditions, unrelated to VI issues. Suspect items identified during the inspection will be listed on a pre-sampling inspection form for later reference or potential removal. The building layout will be examined, and a simple sketch will be prepared in the field to assist in the selection of indoor air sampling locations. The configuration of the structure's heating ventilation and air conditioning system will also be inspected to gather information pertaining to air circulation and exchange conditions in the occupied space. The results of all pre-sampling inspection activities will be recorded on an Indoor Air Building Survey Form.

4.3.2 Paired Sub-Slab and Indoor Air Sampling

The number of samples proposed for individual structures is listed in the table below.

Structure	Property Use	Indoor Air	Sub-Slab Vapor
Gordon Plaza Subdivision (54)	Residential	1	2
Gordon Plaza Apartment Buildings (7)	Residential	2	2
St. Ferdinand/ Higgins Blvd Building (1)	Commercial	3	3

In addition, outdoor air samples will be collected from an upwind location during the assessment of clusters buildings (to be determined in the field) to assess background conditions. The number of proposed samples are based upon the EPA guidance (OSWER Technical Guide for Assessing and Mitigating the VI Pathway from Subsurface Vapor Sources to Indoor Air, 2015) and estimated structure sizes.

4.3.2.1 Sample Locations

The structures proposed for assessment are identified on **Figure 15**. Specific locations of subslab vapor and indoor air samples within each structure will be coordinated with the occupants during the initial building inspection. In general, sub-slab vapor samples will be collected at least 5 feet away from any drains, cracks, or gaps in the floor slab. Indoor air sample canisters will be placed at least 10 feet away from windows.



4.3.2.2 Sub-Slab Vapor Sample Collection Procedures

Sub-slab vapor samples will be collected following the SOP presented in **Appendix D**. Permanent Vapor Pin® sub-slab vapor sampling ports will be installed in each structure to facilitate the collection of sub-slab vapor samples. The sub-slab vapor sampling ports will be installed by drilling a counter-sunk hole through the concrete slab using an electric hammer drill. The sampling ports, constructed with a silicon sleeve to provide a mechanical seal between the stainless steel Vapor Pin and the concrete, will then be implanted using a dead blow hammer. The sampling ports will be capped during installation until sampling is initiated. To ensure that the sub-slab vapor samples are representative of subsurface conditions, water dam leak testing will be performed at each sample port. The integrity of the sample tubing and fittings will be verified prior to sampling collection by conducting a negative pressure test.

All samples will be collected through dedicated polyethylene tubing connected to the sub-slab vapor sampling port. A graduated syringe will be utilized to purge ambient air from the tubing prior to initiating sample collection. Vapor beneath the concrete slab will then be drawn into a batch-certified 1-liter vacuum canister fitted with a laboratory supplied regulator that limits the flow rate to approximately 200 milliliters per minute (mL/min).

4.3.2.3 Indoor Air Sample Collection Procedures

Indoor air samples will be collected following the SOP presented in **Appendix D**. Indoor air samples will be collected in individually certified 6-liter vacuum canisters positioned within the breathing space approximately 3 to 5 feet above the floor surface. In the two-story apartment buildings, one (1) indoor air sample will be collected from each level. Sample collection will occur over a 24-hour period in the residential structures and over an 8-hour period in the commercial building. Calibrated regulators will be connected to the canisters to control the inflow of air over the prescribed sample duration.

4.3.2.4 Outdoor Air Sample Collection Procedures

Outdoor air samples will be collected in individually certified 6-liter vacuum canisters, positioned upwind of the structure under evaluation and approximately 3 to 5 feet above the ground surface. The inlet of the regulator will be pointed downward to prevent water accumulation. The timing and duration of outdoor air sample collection will be coincident with the corresponding indoor air samples collected from a given structure or small cluster of



structures. If indoor air samples are collected from structures located distant from one another, then additional outdoor air samples will be collected.

4.3.2.5 Sample Analysis

Sub-slab vapor and indoor air samples will be analyzed for PAHs according to EPA Test Method TO-13A, and VOCs according to EPA Test Method TO-15. Level IV quality control packages will be requested.

4.3.3 Evaluation of Potential Vapor Migration Conduits Due to Soil Subsidence

As part of the VI assessment process, the structural integrity of each building will be evaluated with respect to potential vapor migration conduits. Foundation settlement can result in cracks or gaps in the floor slab which allows vapor to directly affect indoor air quality. In this case, attenuation across the floor slab, which is assumed in EPA VISL calculations, is bypassed. The contractor's field staff will inspect floors and walls for indications of settlement and document identified issues.

In addition, subsidence of soil beneath the concrete slab of each structure will be evaluated by advancing a bore-scope through the holes drilled for purposes of collecting sub-slab vapor samples. The approximate depth of soil subsidence (i.e., the thickness of the void space beneath the slab) will be recorded at each location as an indication of future risk of the formation of vapor migration conduits.

4.4 Soil Cover Assessment

As part of the removal action, 18 to 20 inches of compacted sand and 4 to 6 inches of topsoil was placed over an orange mesh and geotextile fabric (Ecology & Environment, 2001) in the developed area of the landfill. In the undeveloped area of the landfill, only 12 inches of this soil was placed. The mesh/geotextile was not intended to act as a barrier to prevent contact with the landfill material. Rather, it was installed to indicate the boundary of the landfill material in the event of excavation.

The current condition of this fill material will be assessed during the site characterization. Soil thickness measurements and visual inspection for possible erosion will be conducted as described in the following sub-sections.



4.4.1 Thickness Measurements

The thickness of the soil cover will be documented during soil boring activities. Soil thickness from ground surface to the geotextile fabric will be measured in all soil borings using a tape measure and recorded to the nearest inch.

4.4.2 Visual Inspection

Field staff will visually inspect all areas in which soil was replaced as part of the removal action will be visually inspected by field staff. The inspection will focus on indications of soil erosion including:

- Visible orange mesh/ geotextile fabric;
- Obvious landfill debris at ground surface; and
- Holes or other abnormal appearing indentations in the soil cover.

Field staff will note any locations where soil has been eroded away, record coordinates using a GPS unit, and photograph the condition.

4.5 Health and Safety

A Site Health & Safety Plan (HASP) should be prepared to establish guidance for safe working practices, and to provide directions to project staff, subcontractors, and other allowed site inspectors regarding site health and safety issues. The information provided in the HASP includes access restrictions, procedures and contacts in case of emergency, directions to local medical facilities, personal protection requirements, and safety data sheets for any chemicals used during the remedial process. A HASP template has been provided in **Appendix E**.

4.6 Public Participation Plan

This public participation plan has been developed to serve as a framework for community relations efforts associated with disseminating information regarding the investigation of the former ASL, which incorporates the Gordon Plaza subdivision and other residential areas, in New Orleans, Louisiana. The focus of public information will be centered around the purpose of the investigation, timing, and nature of the work. While the scope of work is provided per request of the residents of the Gordon Plaza subdivision, it is still important to have a thorough plan for disseminating information and responding to questions.



The purpose of the investigation is to thoroughly understand the distribution of subsurface contaminants that exist within all media beneath the residential areas of the landfill. The objective is to build upon past investigations and provide a basis for a reliable assessment of health risks and plan to abate any such risks.

The investigation activities are planned for private properties and in the public right-of-way. The planned work includes soil and groundwater sampling from temporary bore holes, well installation and sampling, soil vapor sampling, vapor sampling from homes, and an inspection of the existing cap throughout the former landfill footprint.

The contractor will implement the recommendations in this public participation plan to communicate to residents and businesses located near the recommended site work what will be involved and the purpose of soil groundwater and vapor sampling.

4.6.1 Resident Notification and Informational Brochure

Objective:

To inform local residence of investigation activities so that they can better understand the nature of the project and to establish a communication protocol regarding questions they may have.

Method:

Current residents, businesses, and community institutions within the residential areas of the landfill, community centers public or private that serve the neighborhood, and nearby business centers will receive an informational brochure from the contractor (see the attached proposed flyer distribution area). The brochure will be in the form of a single, double-sided sheet. The brochures will be hand delivered and an attempt will be made to discuss the project with the residents or business at the time of delivery. Businesses and agencies will be approached during normal working hours, and residents after 4:30 p.m. If no one can be reached at that time, the brochure will be attached to entry doors or placed in the mailbox. The brochure provides information about the upcoming remedial activities and contact information for obtaining further information.

Timeline:

Informational Brochures will be distributed approximately one month prior to beginning the remedial work.



4.6.2 Local Government Notifications

Objective:

To inform local authorities of investigation activities so that they can better understand the nature of the project and their roles, and to establish a communication protocol regarding questions posed by the public.

Method:

The contractor will provide notification to the government units listed below in person and provide them with copies of the informational brochure:

City of New Orleans District D Council Member Jared C. Brossett City Hall, Room 2W20 1300 Perdido Street New Orleans, Louisiana 70112

City of New Orleans Health Department
City Hall Suite 8E18
1300 Perdido Street

New Orleans, Louisiana 70112

City of New Orleans Department of Public Works
City Hall Suite 6W03
1300 Perdido Street
New Orleans, Louisiana 70112

Timeline:

Notification will be provided approximately one month prior to beginning the investigation work.

4.6.3 Public Informational Meeting

Objective:

To receive and respond to inquiries from local residents, businesses, and news agencies.



Method:

The informational brochure will present the date, time, and location of the public meeting, as well as a call in telephone number to listen and a link to view the meeting remotely for interested parties unable to attend in person. The public meeting will be planned for approximately one month prior to the start of work activities but at least one week after distributing the informational brochure and public notices as indicate above.

Timeline:

The public meeting will be planned for approximately one month prior to the start of work activities but at least one week after distributing the informational brochure and public notices as indicated above.

4.6.4 Press Release

After the informational brochures are delivered, a press release will be issued containing the pertinent information for news outlets, newspapers, and social media to convey.

4.6.5 Response Protocol and Contact List

Local government units or media will be requested to direct any inquiries regarding project specifics to a specified project manager. The contractor's staff and subcontractors will respond to any questions during the work politely with "We are performing subsurface investigation work", hand them a brochure, and have them contact the project manager with additional questions. The contact information will have a toll free telephone number and email address to allow for contacting the project manager with questions.



5.0 QUALITY ASSURANCE AND QUALITY CONTROL

5.1 Data Management Plan

This section provides the data management plan for environmental data collection activities at the site. The contents of this section have been prepared in accordance with EPA guidance (EPA, 1994 and 2018a). The data management plan is a critical component of the overall quality assurance system for data collection and management activities for the project. The purpose of the data management plan is to ensure that all data collected during the site characterization are properly processed, analyzed, distributed, and preserved.

The procedures described in this section are intended to be used in conjunction with other sections of this Work Plan, particularly the quality control procedures described in Section 4.2. The procedures outlined in this section will apply to the data collected as part of this Work Plan, including laboratory results and field data.

5.1.1 Data Management Plan Scope and Objectives

The data management plan presents a description of how data collection, data management, and data reporting activities will be conducted. Specific objectives of the data management plan include:

- 1. Describe methods for documenting field data and sample collection activities;
- 2. Present procedures for management of sampling and analytical data, including establishment and maintenance of a project database; and
- 3. Describe reporting requirements and the general approach for presenting the results of the site characterization.

5.1.2 Data Management Organization and Responsibility

Environmental data will be collected and documented by field personnel, under the supervision of the Project Manager. The Quality Assurance (QA) manager will confirm that field and laboratory data are properly documented, reviewed, validated, and entered into the project database in a timely manner. Other authorized data users will have access to the project database for analysis and decision-making purposes.



5.1.3 Data Documentation Procedures

This section describes how data collected and analyzed as part of the site characterization will be recorded and documented. Complete and accurate documentation is essential for all aspects of the site characterization. Data documentation standards and procedures set forth in the data management plan are required to maintain overall project quality as well as compliance with quality assurance (QA) objectives.

The general steps in the generation and documentation of data will include:

- 1. Establishing sample locations, depth intervals, quality control (QC) sample frequency, analytical parameters and required detection limits, unique sample identification codes, and other pertinent information;
- 2. Collecting samples and recording of field parameter measurements and other sampling information;
- 3. Transmitting samples to the analytical laboratory under chain-of-custody;
- 4. Transmitting field documentation and analytical data to the Data Manager;
- 5. Review and validation of field and laboratory analytical data by the QA manager; and
- 6. Entering validated data into the project database.

5.1.3.1 Types of Data to be Collected

Field data and laboratory analytical data will be collected. Field data will include:

- Hydrogeological information such as lithology and depth to water;
- Volatile compounds in extracted soil using a PID;
- Analysis of water quality parameters using portable instruments;
- Depth to landfill geotextile fabric measurements;
- Survey coordinates and elevations;
- Building surveys prior to vapor intrusion assessments;
- Thickness of concrete slab and foundation settlement information; and
- General observations and photographs.

Laboratory analytical data will be associated with the collection and analysis of soil, groundwater, vapor and air samples.



5.1.3.2 Sample Naming Conventions

Soil samples (including QC samples) will be assigned unique sample IDs according to the following sample numbering scheme: 300002-MMYY-XXX where 300002 is the six-character code denoting the project, MMYY is a four-digit code denoting the month and year (e.g., 0320 for March 2020), and XXX is a three-digit code that is incremented sequentially for each successive sample.

Groundwater samples will be assigned sample IDs according to the unique monitoring well ID and sample date. Groundwater samples will be identified using the following format: 300002-MMYY-MWXXX where 300002 is the six-character code denoting the project, MMYY is a four-digit code denoting the month and year, and MWXXX denotes the monitoring well ID. Monitoring wells will be sequentially numbered MW101 through MW109. Groundwater QC samples, including trip blanks, equipment blanks, and duplicates will be assigned IDs as follows:

• Trip blanks: 300002-MMYY-TB-XXX

• Equipment blanks: 300002-MMYY-EB-XXX

• Duplicates: 300002-MMYY-DUP-XXX

where XXX is a three-digit code that is incremented sequentially for each successive sample in a given month.

Sub-slab vapor and air samples will be assigned sample IDs according to a unique code designated for each structure and sample date. Sample IDs will be in the following format:

• Sub-slab vapor: 300002-MMYY-AA-SSV-X

• Indoor air: 300002-MMYY-AA-IA-X

• Outdoor (ambient) air: 300002-MMYY-AA-OA-X

Where AA represents the unique structure code and X is a one-digit code that is incremented sequentially for each successive sample collected from the structure in a given month.

5.1.3.3 Field Data Documentation

Field data shall be recorded in field notebooks and media-specific field forms and will contain results of all measurements made in the field. Documentation includes:



- Chain of custody forms;
- Field notebooks and forms;
- Shipping records;
- Transmittal records; and
- Corrective action reports.

Instrument calibration and groundwater parameter stabilization data will be recorded in reports generated by the instrument software.

5.1.3.4 Laboratory Data Documentation

All samples collected and sent to the laboratory for analysis will follow standard documentation and chain of custody procedures. Each sample on the chain-of-custody will be assigned a unique laboratory sample number when received at the laboratory, which will then be used to cross-reference the unique field sample number and to track analytical results for the sample. All raw analytical data will be downloaded into the laboratory's information management system (LIMS). Analytical results recorded in the LIMS will be accompanied by other pertinent information, such as the field sample identification number and the laboratory sample number, the analytical method used, name of analyst, the date of analysis, matrix sampled, dilution concentrations, and instrument settings.

Quality control data (e.g., laboratory duplicates, matrix spikes, matrix spike duplicates, and laboratory control standards) will be compared to the method acceptance criteria by the analyst. Reanalysis will be performed if certain QC results exceed acceptance criteria. Data associated with QC criteria exceedances not requiring reanalysis will be qualified according to the laboratory's quality assurance plan. Acceptable data (with QC summaries) will be sent to the Laboratory QA Manager for review. Case narratives will be prepared by the QA manager which will include information concerning data exceeding QC limits, and any other anomalous conditions encountered during sample analysis. After the Laboratory QA Manager approves these data, a final laboratory report will be prepared.

All analytical data generated from the sampling activities will be provided by the laboratory as Electronic Data Deliverables (EDDs). The EDDs will include the results of the tests, the testing method employed, and method detection and reporting limits.



5.1.4 Data Management Procedures

This section discusses the data management scheme, data validation, and procedures for storage and protection of data collected during the site characterization.

5.1.4.1 Field Data Reduction

Upon receipt of field documentation, the Data Manager will:

- Make photocopies of field notebooks and field forms;
- Scan field notes and field forms into Adobe Portable Document Format (PDF) format and save scanned files to the project directory on the network server;
- Download calibration and groundwater parameter stabilization reports, and save those files to the project directory on the network server; and
- File originals documentation in a project-specific location at the contractor's office.

Field measurement data will be manually entered into electronic format and added to the project database along with the instrument reports. Saved files will be identified with a unique file description that references the collection date.

5.1.4.2 Laboratory Data Reduction

Laboratory data reduction procedures will follow protocol described in the laboratory's QA manual. Raw laboratory data will be reduced to EDDs suitable for input into the project database. The deliverables will consist of case narratives, chain-of-custody records, analytical dates, methods, results, detection limits, and specific QC sample results. EDDs will be delivered directly to the Data Manager. Raw laboratory data will not be delivered; however, the laboratory will archive raw data in accordance with laboratory QA procedures, and this data will be available and provided for review if necessary, during the data validation process.

5.1.4.3 Field Data Validation

To ensure the validity of data gathered in conjunction with the site characterization activities, all aspects of the project need to be monitored. Periodic audits will be conducted to monitor adherence to SOPs, QC protocols, and general fieldwork policies and protocols.

Factors affecting out-of-control conditions can usually be traced to sampling or laboratory activities. Examples of specific conditions that result in out-of-control situations and corrective action requirements include:



- Improper sampling techniques;
- Inappropriate sample identification;
- Improper sample storage and preservation; and/or
- Nonconformance to appropriate chain of custody protocols.

5.1.4.4 Laboratory Data Validation

The data validation process is used to screen data and accept, reject, or qualify data using sound criteria. Data will be validated, as appropriate, based on holding times, initial calibration, continuing calibration, blank results, and other laboratory QC sample results. The QA Manager will be responsible for ensuring data meet the QA/QC requirements.

The QC sample results (laboratory control standards, surrogates, initial calibration standards, and continuing calibration standards) will be compared against project-specific accuracy and precision criteria. The QC data must meet acceptance levels prior to processing the analytical data. If QC standards are not met, then the cause must be ascertained and appropriate corrective action must be taken, but if the noncompliant situation can be rectified without affecting the integrity of the data, then data processing will proceed. Furthermore, if resolution of the problem will jeopardize the integrity of the data, then the sample in question must be reanalyzed, and if reanalysis fails to correct the problem, then the data will be flagged to indicate that the data are out of control.

A minimum of 25 percent of the data generated during the site characterization will be validated. The data validation approach will consist of a systematic review of the analytical results, associated QC methods and results, and all of the supporting data. Best professional judgment in any area not specifically addressed by EPA guidelines will be used as necessary.

The following items shall be reviewed by the QA Manager to validate the data:

- Sample holding times;
- Documentation that the analytical results are in control and within the certified range;
- Documentation that data and calculations were checked by a reviewer who was not involved in the performance of sampling, analysis or data reduction;
- Calibration of methods and instruments;
- Routine instrument checks (calibration, control samples);
- Documentation on traceability of instrument standards, samples, and data;
- Documentation on analytical methodology and OC methodology;



- The potential presence of interferences in analytical methods (check of reference blanks and matrix spike recoveries);
- Documentation of routine maintenance activity to ensure analytical reliability; and
- Documentation of sample preservation and transport.

The tables in SW-846, ASTM International methods, and EPA methods will be used to validate the definitive data and professional judgment will be applied in accordance with these guidelines. Validation deliverables will include a QA memo discussing QA conformance and deviation issues that may have affected the quality of the data. Data usability, basis of application of qualifiers, and percentage of qualified data will also be discussed in the Site Characterization Report.

5.1.4.5 Data Storage and Access

The contractor will use EarthSoft's EQuIS Data Management System (EQuIS) and Microsoft's Excel spreadsheet software for managing all data collected during the sampling program. This software is a full-featured environmental data management system designed for both geological and analytical data management. EQuIS enables the user to organize, manage, import, export, analyze, and model:

- Sampling and analysis events;
- Sampling locations;
- Testing methods; and
- Analytical parameters and results.

EQuIS will provide data storage, retrieval and analysis capabilities, and is able to interface with a variety of spreadsheets, word processing, and statistical and graphics software packages.

The database will be maintained on a server with backups performed daily. Only authorized users will be provided access to the database (limited functionality) with password protection.

5.1.5 Reporting

The contractor will evaluate the data collected during the site characterization to identify any data gaps. If additional data collection or vapor mitigation activities are warranted, a contractor will be used to prepare and submit a supplemental work plan for approval. The methods and data will be documented in a Site Characterization Report along with data summary tables and figures to support data interpretation. Soil and groundwater data will be compared to RECAP



Management Option 1 (MO-1) non-industrial standards established by the LDEQ, and risk-based RSLs published by EPA, with a target cancer risk of 1E-06. Chemical concentrations in sub-slab vapor and indoor air samples will be compared to EPA's VISLs with default residential exposure assumptions to evaluate vapor intrusion risk. The report will include a risk assessment based on current data and screening levels.

5.2 Quality Control

The Quality Assurance Project Plan (QAPP) describes the policy, organization, and functional activities for QA and QC that are necessary to ensure that the data collected are reliable, to detect deficiencies that may affect data quality and usability, and to provide corrective actions when appropriate. QA refers to the system that provides assurance that reliable data will be generated during sampling and analysis. QC involves specific actions that are taken to ensure that system performance is consistent with established standards. QC activities ensure the precision, accuracy, and completeness of analytical data.

Field and laboratory QC data are necessary to determine precision and accuracy of the analyses. At least 5 percent of each data set generated will be composed of field and laboratory QC data. Field QC samples for this project will consist of trip blanks; equipment rinsate blanks; duplicate, split, or replicate samples; and laboratory QC samples. Laboratory QC samples will consist of method blanks, standards, laboratory control samples, MS, MSD, and/or surrogate spikes.

5.2.1 Field Quality Control

A discussion of field control samples including frequency of analysis is provided in the following sections. QC samples ensure that the sampling and analytical systems used in support of project activities are in control and verify the quality of the data generated from these activities. A summary of laboratory internal QC procedures including acceptance criteria and corrective action are attached.

5.2.1.1 Field Duplicates

Field QC samples for this project will consist of duplicate, split, or replicate samples.

One (1) field duplicate will be collected for every 20 groundwater, soil, and indoor air samples collected, or one (1) during each sampling event if fewer than 20 samples are obtained at a time.

For groundwater samples, field duplicates are two (2) samples collected independently from a single sampling location during a single act of sampling.



For soil samples, field duplicates are two (2) samples taken from the same-sited soil medium and interval. For indoor air samples, duplicates are collected by placing two (2) canisters side by side in the sampling space connected to a laboratory supplied sampling tee.

Field duplicate RPD will be calculated as detailed in Section 4.2.2.2 of this QAPP. Field duplicate RPD goals are defined as within 20 percent for water samples and 40 percent for all other media detections of chemicals in both samples at concentrations greater than the lowest standard used to define the laboratory calibration curve. The lowest standard on the laboratory calibration curve shall be run at the MDLs. The MDLs will be at or below the EPA screening, as defined by SW-846 guidance.

5.2.1.2 Blanks

Blanks are used to detect field-related contamination and are used to identify and minimize cross contamination interferences caused by solvents, reagents, glassware, or other equipment used in the field during sample collection and transportation.

A trip blank consists of a volume of deionized or distilled laboratory water for organic water samples and inorganic soil samples or a purified solid matrix for organic soil/sediment samples, which is carried through the entire field and laboratory analytical process.

A rinsate blank consists of deionized or distilled water used to rinse off equipment post equipment decontamination.

The blanks volume or weight must be approximately equal to that of the samples being processed. Blanks will be analyzed at a minimum frequency of one (1) per batch and the concentration of target compounds in the blank must be less than the PQL. If the blank exceeds the above criteria, then the source of the contamination must be identified and appropriate corrective action taken, including reanalysis of the sample group.

5.2.2 Data Quality Objectives

Data quality objectives (DQOs) are qualitative and quantitative statements developed by data users to specify the quality of data needed from a particular data collection activity to support specific decisions or regulatory actions. The process for developing DQOs is described in *Data Quality Objectives Process for Superfund* (U.S. EPA, 1993).



Data gathered during the site characterization or routine monitoring will be used to evaluate the nature and extent of contamination at the Site. Therefore, the data collected for this study must be scientifically sound, defensible, and of known, acceptable, and documented quality. To achieve this, the following procedures will be followed:

- Use standard operating procedures, chain-of-custody, calibration, preventative maintenance, laboratory analysis, reporting, validation, internal QC, audits, and corrective action;
- Set quantitative goals and units of measure for precision, accuracy, and completeness for each measurement parameter;
- Set quantitative goals for representativeness and comparability; and,
- Establish procedures for problem identification and correction.

Qualitative descriptions of precision, accuracy, representativeness, completeness, and comparability parameters are provided below. Quantitative descriptions are discussed in Section 5.2.3 of this QAPP.

5.2.2.1 Accuracy

Accuracy is a measurement of the bias in a system, and the accuracy of sampling data for this project will be determined through the use of laboratory control samples. Accuracy is generally expressed as percent recovery (%R), which is defined as:

$$%R = 100\% x U_{\underline{s} - \underline{U}}$$
 $CR_{sa}R$

where,

s = measured concentration of spiked aliquot

U = measured concentration of unspiked aliquot

 $CR_{sa}R$ = actual concentration of spike added.

If a standard reference material (SRM) is used instead of or in addition to laboratory control samples, accuracy is defined as:

$$%R = 100\% \times U_{\underline{C}UR_{\underline{m}}R}$$
 CR_{srm}

where, CR_mR = measured concentration of SRM in the spiked sample and $CR_{srm}R$ = actual concentration of SRM.



The degree of accuracy and the recovery of the analyte are dependent on the matrix, method of analysis, and compound being measured. The objective for accuracy is to equal or exceed the accuracy demonstrated for the analytical method for samples of similar matrix and contaminant concentration. Accuracy will be controlled by comparing percent recoveries to the acceptable tables in this QAPP to ensure it falls within the control limits. Control charts will be maintained for surrogates. Also, analytes of interest will be charted for each method for percent recovery and RSD and the charts shall be used to help show any adverse trends or drifts in the QC data, so that corrections can be made.

5.2.2.2 Precision

Precision is a measurement of the reproducibility of data under a specified set of conditions. For this project, precision will be evaluated in conjunction with accuracy for the laboratory control samples. Precision will be determined for matrix effects using the MS/MSD samples and will be expressed as RPD.

RPD is defined as:

$$RPD = U_{\underline{C}UR_{\underline{1}}RU_{\underline{-C}}UR_{\underline{2}}RU_{\underline{)} \times 100 \%}$$

$$(CR_{1}R + CR_{2}R)/2$$

where CR_1R and CR_2R are the larger and smaller of the two duplicate values, respectively.

Precision will be measured as the RSD for sample and MS/MSD values.

RSD is defined as:

$$RSD = U_{\underline{s}} U \times 100\%$$
$$yR_{mean}$$

where $s = standard deviation and yR_{mean}R = mean of replicate analyses.$

For field duplicates and replicates, both RPDs and RSDs will be used to evaluate precision. Acceptable levels of precision vary with the sample matrix, analytical method, and sample concentration. EPA precision data will be used as a basis for developing acceptance criteria for assessing precision; however, laboratory control charts must be developed and used to determine acceptance criteria for the laboratory control samples.



5.2.2.3 Completeness

Data completeness represents the percentage of measurements evaluated and judged to be valid measurements. In order to meet the completeness objective for this project, valid results will be defined as results not qualified with a flag. Data completeness is expressed as percent completeness (%C) and is defined as:

$$%C = 100\% \times U\underline{V}U$$

where, V = number of measurements judged valid n = total number of measurements

The QA objective for completeness is 95 percent for water and 90 percent for soil analyses.

5.2.2.4 Representativeness

Representativeness is a qualitative measure used to determine the degree to which obtained data correlate to the population sampled. This parameter will be measured through the precision of the analysis of field duplicate samples to their corresponding sample data. If the precision of the field duplicate data to their corresponding sample data is high, it will confirm that the sample collection and analysis methodology was appropriate. Certain circumstances, including very high degrees of heterogeneity within the sampling media, can produce poor precision in field duplicate data. Even under these circumstances, the data may still be representative of the Site conditions. When precision is poor, additional samples will need to be collected to account for this variance.

5.2.2.5 Comparability

Comparability is a qualitative measure assessing the confidence with which data sets obtained for similar samples and sample conditions can be correlated. Comparability is determined by the adherence of different laboratories and different sampling teams to standard sampling protocols and analytical methods as well as by the use of traceable calibration standards and the same reporting units. Comparability can be determined by having the various laboratories participate in a performance evaluation program or through collection of split samples for testing by independent laboratories.



5.2.2.6 Sensitivity

Sensitivity is the determination of the minimum concentration or attribute that can be measured by a method detection limit and method reporting or quantitation limit. Methods selected for this project are expected to provide sufficient sensitivity to yield reporting limits that are below the lowest reference value for this study.

5.2.3 Laboratory Analytical Procedures

Soil, sub-slab vapor, indoor air, and groundwater samples will be collected and analyzed for the contaminants of concern at the Site. Analytical test methods are set forth by the EPA in *Test Methods for Evaluating Solid and Hazardous Wastes, Physical and Chemical Methods (SW-846) (U.S. EPA, 1994a).* The laboratory analyses to be performed on samples from the Site are as follows:

Soil samples will be analyzed at a fixed laboratory for:

- VOCs via U.S. EPA Test Method 8260;
- SVOCs via U.S. EPA Test Method 8270;
- RCRA metals via U.S. EPA Test Method 6010;
- PCBs via U.S. EPA Test Method 8082;
- Pesticides via U.S. EPA Test Method 8081; and
- Dioxins via U.S. EPA Test Method 8280.

Groundwater samples will be analyzed at a fixed laboratory for:

- VOCs via U.S. EPA Test Method 8260;
- SVOCs via U.S. EPA Test Method 8270;
- RCRA metals via U.S. EPA Test Method 6010;
- PCBs via U.S. EPA Test Method 8082;
- Pesticides via U.S. EPA Test Method 8081; and
- Dioxins via U.S. EPA Test Method 8280.

Sub-slab vapor, and indoor air samples will be analyzed for:

- VOCs using the U.S. EPA Method TO-15; and
- PAHs via U.S. EPA Test Method TO-13A.



Collection of representative field samples requires adherence to established procedures. The following sections discuss the analytical and QC procedures that will be followed to ensure high quality data.

5.2.3.1 Analytical Methods

During site characterization activities, chemical analysis and physical characteristics will be measured by on-Site field personnel and an off-Site analytical chemistry laboratory.

Analytical procedures follow the methods set forth in SW-846, unless otherwise approved by the Project Manager. In some instances, the analytical methods contained in SW-846 may not meet the DQOs (e.g., detection limits may be greater than applicable or relevant and appropriate requirements). If the use of alternate analytical methods is deemed necessary, the modified method(s) will be described in an addendum to the QAPP.

Sample Container Requirements and Analysis Information

Media Analysis		U.S. EPA	Sample	Preservation	Holding
Type	Allalysis	Test Method	Container Type	Method	Time
	VOCs	8260	40mL VOA	10mL Methanol	21 days
	SVOCs	8270	2oz Glass	None	14 days
Soil	RCRA Metals	6010	4oz Plastic	None	6 months
	PCBs	8082	2oz Glass	None	14 days
	Pesticides	8081	2oz Glass	None	14 days
	Dioxins	8280	4oz Plastic	None	7 days
	VOCs	8260	3-40mL VOA	Hydrochloric Acid	14 days
	SVOCs	8270	0.25 Liter Amber	None	7 days
Water	RCRA Metals	6010	250mL Plastic	Nitic Acid	6 months
w ater	PCBs	8082	0.25 Liter Amber	None	7 days
	Pesticides	8081	0.25 Liter Amber	None	7 days
	Dioxins	8280	1 Liter Amber	Sodium Thiosulfate	7 days
Air and Vapor	VOCs	TO-15	1 liter (vapor) or 6 liter (air) canister	None	21 days
	PAHs	TO-13A	1 liter (vapor) or 6 liter (air) canister	None	21 days



5.2.3.2 Method Detection Limits

The method detection limit (MDL) is the lowest concentration at which a particular analyte can be measured and reported with a 99 percent confidence the analyte concentration is greater than zero. The MDL should be determined by multiplying the appropriate one-sided 99 percent T-statistic by the standard deviation obtained from at least seven analyses of a matrix spike containing the analyte of interest at a concentration of 3 to 5 times the estimated MDL. MDLs for each target analyte will be determined by the analytical laboratory using the applicable SW-846 protocol or the method specified in 40 Code of Federal Regulations (CFR) Part 136, Appendix B.

The laboratory will then develop individual method reporting limits (MRLs) that represent concentrations that can be consistently obtained by the method and are generally 2 to 5 times the respective MDL. Laboratory data quality objectives, including MRLs and MDLs for individual analytical tests are attached.

5.2.3.3 Practical Quantitation Limits

As specified in SW-846, practical quantitation limits (PQLs), also referred to as the estimated quantitation limits (EQLs), are defined as the lowest level of quantitation that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The PQL or EQL is generally 5 to 10 times the MDL but may be nominally selected within these guidelines to simplify data reporting. The laboratories must demonstrate that PQLs are routinely and reliably achieved by analyzing a calibration standard that is below the PQL for each analyte. Certified laboratories are expected to routinely achieve PQLs for SW-846 analytical methods. Laboratories may report results as MRLs, which are generally 2-5 times the MDL.

5.2.3.4 Method Calibration

At least once daily, or if the instrument exceeds calibration limits, calibration for each target analyte will be performed to ensure that the analytical instrumentation is functioning within the established sensitivity range. Analytes specified in Section 5.2.3 of this QAPP must be present in the initial and continuing calibrations, and these calibrations must meet the acceptance criteria specified by the respective method. The laboratories must demonstrate that PQLs are routinely and reliably achieved by analyzing a calibration standard that is below the PQL for each analyte. Calibration standards and solutions will be of known concentration and purity to achieve the criteria necessary for validation of the analytical results. Inorganic standards must conform to



the National Institute of Standards and Technology (NIST) Central QA Laboratory. Organic standards must conform to materials certified by the Cooperative Research and Development Agreement, NIST or Contract Laboratory Program (CLP) Standard Reference Material.

Standards used in this program will be prepared and maintained under the normal laboratory standards tracking system, which ensures preparation, checking, documentation, storage, and disposal of standards according to method specified procedures and schedules.

5.2.4 Instrument/Equipment Testing, Inspection, and Maintenance

A preventive maintenance plan allows for periodic instrument checks for problems that occur frequently. The objective of a preventive maintenance plan is to rectify equipment problems before they become serious. Preventive maintenance also brings attention to those areas of the instrument susceptible to degradation from aging, toxic/corrosive effects, and clogging due to environmental factors. Procedures for preventive maintenance are contained in each instrument's manual under the maintenance/troubleshooting sections. Only instruments that analyze soil, water, or vapor, or require calibration are mentioned in the following sections.

5.2.4.1 Field Instruments

Instruments to be used during field activities include In-Situ Inc.'s Aqua Troll 600 multiparameter sonde for groundwater quality monitoring. The contractor will maintain field equipment according to the manufacturer's maintenance schedule or, at a minimum verify the equipment is operation properly prior to use in the field. If a schedule is not provided by the manufacturer, then the maintenance group servicing the equipment will provide a written maintenance frequency. Each piece of equipment will have an associated SOP detailing the maintenance instructions and malfunctioning equipment failing maintenance checks will be identified with a red warning label and will not be used for sample analysis.



Calibration and Operational Check Requirements for Field Instruments

Parameter	Requirement	Frequency	Operation Check Criteria
рН	3-point calibration	Prior to start of sampling event	NAª
pm	1-point check with pH 4, 7, or 10 buffer	Daily and at end of sampling event	± 0.2 pH unit
Specific	1-point calibration	Prior to start of sampling event	NA
Conductance	1-point operational check	Daily and at end of sampling event	± 10 percent of standard
	1-point calibration	Prior to start of sampling event	NA
Oxidation-Reduction Potential	1-point operational check	Daily and at end of sampling event	\pm 10 percent of standard
	Calibration in water saturated air	Prior to start of sampling event	NA
Dissolved Oxygen	1-point operation check in water saturated air	Daily and at end of sampling event	\pm 0.3 mg/L of theoretical DO in water saturated air
	4-point calibration	Every 3 months	NA
Turbidity	3-point operational check	Daily and at end of sampling event	± 10 percent of standard
Temperature	Operational Check	Prior to start of sampling event	± 1.5 °C compared to NIST ^b -traceable thermometer

^aNA = Not Applicable

^bNIST = National Institute of Standards and Technology



5.2.4.2 Laboratory Instruments

A record of the instrument maintenance will be maintained by the Laboratory QC Manager or the contractor's field staff for field equipment.

5.2.5 Instrument/Equipment Calibration and Frequency

Calibration procedures establish the relationship between calibration standards and the measurement of each standard by an instrument or analytical procedure. The contractor will calibrate field equipment according to the manufacturer's schedule or, at a minimum, prior to use in the field on a daily basis. If a schedule is not provided by the manufacturer, then the calibration group servicing the equipment will provide a written calibration frequency. Calibrations will follow the manufacturer's instructions for equipment calibration. Each piece of equipment will have an associated user's manual provided by the manufacturer detailing the calibration instructions and calibrations will follow the manufacturer's instruction. Equipment failing calibration specifications will be identified with a red warning label and will not be used for sample analysis. A record of the instrument calibration will be maintained by the Laboratory QC Manager or the contractor's field staff (for field equipment).

Equipment requiring calibration will have an assigned record number that is permanently affixed to the instrument or to the dedicated carrying case of the instrument. A label will be affixed to each instrument or carrying case containing the following information:

- Description
- Manufacturer
- Model and Serial Number
- Date of last calibration or maintenance
- Name/Initials of person who performed last calibration/maintenance
- Date of next servicing

Should the selected contract laboratory have a more stringent preventive maintenance plan, then the laboratory QA manager or the project manager may approve the laboratory's plan.



6.0 PROJECT MANAGEMENT PLAN

This section describes the project organization and responsibilities, schedule, and deliverables.

6.1 Project Objectives

The objectives of this Site Characterization are to:

- Address data gaps in previous investigations;
- Evaluate current Site conditions with respect to potential exposure from all contaminated media (i.e., soil, groundwater, sub-slab vapor and air); and
- Generate defensible data sufficient for a comprehensive risk assessment.

6.2 Project Organization and Responsibilities

The primary project stakeholders are Residents of Gordon Plaza, Inc. and their legal team.

6.2.1 Key Project Personnel

Team Leader

The Team Leader provides for the overall coordination of all site characterization activities, ensuring that the project is technically consistent, accurate, and conforms to the overall goals. The Team Leader is the client's point of contact for all project questions.

Project Manager

The Project Manager (PM) provides overall coordination of the data collection tasks. This position provides oversight during implementation of fieldwork to ensure compliance with quality and data management objectives. The PM is the primary point of contact for technical problems and is responsible for the execution of decisions and courses of action deemed appropriate by the client. In the absence of the PM, the Team Leader will assume the PM's responsibilities.

Data Manager

The Data Manager is responsible for all data reduction tasks including scanning and filing field data, downloading electronic data from field instruments, receiving laboratory EDDs, and ensuring completeness of laboratory reports. The Data Manager is also responsible for uploading data to the EQuIS database and managing stakeholder access to data.



Quality Assurance Manager

The QA Manager reviews and approves the site-specific sampling and quality assurance plans and conducts in-house audits of field operations to ensure compliance with the HASP, SOPs, and project-specific protocols. The QA is responsible for validating all field and laboratory analytical data, proposing corrective action if necessary, and reviewing final deliverables.

6.2.2 Analytical Laboratory

All organic and inorganic samples collected by the contractor's field staff will be submitted to Pace Analytical laboratory (Pace) located in St. Rose, Louisiana. The Pace facility is equipped to perform all proposed analyses for all potentially affected media (i.e., soil, water, vapor, indoor air) in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program requirements, and provide EDDs and full Level 4 validation packages.

The analytical laboratory is responsible for analysis of all samples in accordance with the requirements of the requested tests (e.g., SW 846 Test Methods) and the laboratory's QA/QC manual. Additionally, the laboratory is expected to provide the analytical results within the requested turn-around-time. The Laboratory QA Manager shall report information concerning out of control data, and any anomalous conditions encountered during sample analysis.

6.2.3 Other Subcontractors

Other subcontractors will consist of drilling contractor(s), a surveyor, and structural engineer. Subcontractor responsibilities are as follows:

- Drilling contractor(s) will be retained to perform direct-push soil sampling and monitoring well installation activities. Drillers that install monitoring wells will be licensed by the State of Louisiana in accordance with state statutes Title 38, Section 3098.
- A licensed surveyor will be retained to survey the positions and elevations of soil sample locations and groundwater monitoring wells.
- A structural engineer licensed to work in Louisiana will be retained to assess foundation settlement at all occupied buildings and identify the resulting structural issues.



6.3 Schedule

The proposed sequence of events and schedule for implementation and completion of individual tasks is presented graphically in **Appendix F**. Lead time will be required for securing subcontracts, preparing access agreements, notifying the public, and preparing for data collection tasks.

It is anticipated that the project can be completed in 20 months, including several weeks for the Site Characterization Report review process.

6.3.1 Public Notifications and Participation

The Public Participation Plan presented in Section 3.6 will be implemented at least two (2) weeks prior to the start of field work.

6.3.2 Field Work Preparation

The following tasks will be completed in preparation for data collection activities:

- Retain and schedule subcontractors;
- Implement Public Participation Plan elements;
- Secure access agreements with each resident for vapor intrusion assessments;
- Establish laboratory communication protocol, routines, and expected detection, and reporting limits; and
- Obtain expendable supplies and equipment required for soil, groundwater, vapor, and air sampling.

It is anticipated that these tasks can be completed within three (3) months of authorization to proceed.

6.3.3 Field Work Implementation

Data collection tasks will be implemented in sequence, as appropriate, to provide the information or infrastructure required for subsequent tasks. As shown in **Appendix F**, some tasks will be performed concurrently. Field work comprises the following tasks, listed in order of implementation:

• Subsurface utility survey



- Soil sampling and soil cover assessment
- Vapor intrusion assessments
- Monitoring well installation and development
- Groundwater monitoring

Four (4) groundwater monitoring event are planned, to be conducted on a quarter year basis. One (1) additional water level measurement event will be conducted immediately following a significant precipitation event that causes localized flooding. Additional groundwater monitoring may be added or performed in a subsequent phase of work depending on the initial sample results.

6.3.4 Deliverables

A representative of the stakeholder group will be provided access to the project database for purposes of viewing data and making decisions about additional work. Progress reports in the form of emails to the stakeholder group will be delivered monthly to keep the group apprised of observations and findings, preliminary data evaluation, milestones reached, and overall project progress.

The Site Characterization Report will be prepared after all data proposed for collection in this Work Plan are validated and the stakeholder group determines that no further data collection beyond the scope of this Work Plan is needed.

Deliverable type, method, schedule, and responsibility for preparing and submitting data and documents is summarized in the table below.

Deliverable	Delivery Method	Schedule	Responsibility
Field and Analytical Data	Database Access	As needed	Data Manager
Progress Reports	Email	Monthly	Project Manager
Final Characterization Report	Electronic (PDF)	Completion	Team Leader and
		of project	Project Manager



7.0 REFERENCES

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Tables

Document: 300002-0156

DETECTED COMPOUNDS IN SOIL SAMPLES

WITH HISTORICAL SCREENING CRITERIA AND CURRENT REGULATORY STANDARDS

Agriculture Street Landfill New Orleans, Louisiana

Compound	Group	"Background" (RRII, 1995)	TBC (RRII, 1995)	EPA RSL* (TR=1E-06, THQ=0.1)	LDEQ RECAP MO-1 Standard (ni)	LDEQ Screening Standard (ni)
Arsenic	Metal	3.15	0.37	0.68	12	12
Chromium (III)	Metal	11.15	1400	12000	120000	12000
Chromium (VI)	Metal			0.3	230	23
Lead	Metal	36.95	400	400	400	400
Mercury	Metal VOC	0.06	82	11	23	2.3
Acetone Benzene	VOC	0.006	79000 22	6100 1.2	1700 1.5	170 1.5
Bromomethane	VOC	0.006	380	0.68	4.3	0.43
2-Butanone (MEK)	VOC	0.008	47000	2700	5900	590
Carbon Disulfide	VOC	0.007	27000	77	360	36
Carbon Tetrachloride	VOC	0.008	4.9	0.65	0.53	0.18
Chlorobenzene	VOC	0.0075	5500	28	170	17
Chloroform	VOC	0.006	110	0.32	0.44	0.044
1,1-Dichloroethane	VOC	0.008	27000	3.6	660	66
1,2-Dichloroethane	VOC	0.006	2700	0.46	0.82	0.82
1,1-Dichloroethene	VOC	0.006	1.1	23	130	13
Ethylbenzene	VOC	0.00575	27000	5.8	1600	160
Methylene Chloride	VOC	0.00925	13	57	19	19
Styrene	VOC	0.008	21	600	5000	500
Tetrachloroethene	VOC	0.006	13	24	8.3	8.3
Toluene	VOC	0.006	55000	490	680	68
1,1,1-Trichloroethane	VOC	0.006	25000	810	820	82
Trichloroethene	VOC	0.006	58	0.94	0.1	0.1
Xylenes	VOC	0.006	550000	58	180	18
Acenaphthene	SVOC	0.1925	16000	3600	3700	370
Acenaphthylene	SVOC	0.0185	27000	NA	3500	350
Anthracene	SVOC	0.1925	82000	1800	22000	2200
Benzo(a)anthracene	SVOC	0.245	0.9	1.1	0.62	0.62
Benzo(a)pyrene	SVOC	0.28	0.09	0.1	0.33	0.33
Benzo(b)fluoranthene	SVOC	0.36	0.9	1.1	0.62	0.62
Benzo(g,h,i)perylene	SVOC	0.21	1100			
Benzo(k)fluoranthene	SVOC	0.205	0.9	11	6.2	6.2
Bis(2-ethylhexyl)Phthalate	SVOC	0.2025	46	39	35	35
Butylbenzylphthalate	SVOC	0.1825	55000	290	12000	220
Carbazole	SVOC	0.195	32			
4-Chloro-3-Methylphenol	SVOC	0.195				
2-Chloronaphthalene	SVOC	0.255	6300	4800	5000	500
2-Chlorophenol	SVOC	0.195	1400	390	150	15
Chrysene	SVOC	0.3	9	110	62	62
Dibenz(a,h)anthracene	SVOC	0.195	0.09	0.11	0.33	0.33
Dibenzofuran	SVOC	0.1925		78	290	29
1,4-Dichlorobenzene	SVOC	0.195	27	2.6	6.7	6.7
Diethylphthalate	SVOC	0.195	220000	51000	36000	670
2,4-Dimethylphenol	SVOC	0.195	5500	1300	930	93
di-n-Butyl Phthalate	SVOC	0.1925	7800			
di-n-Octyl Phthalate	SVOC	0.195	16000	630	2400	240
Fluoranthene	SVOC	0.345	11000	240	2200	220
Fluorene	SVOC	0.1925	11000	240	2800	280
Indeno(1,2,3-cd)pyrene	SVOC	0.21	0.9	1.1	0.62	0.62
2-Methylnaphthalene	SVOC	0.195		24	220	22
2-Methylphenol	SVOC	0.195	14000			
4-Methylphenol	SVOC	0.195	14000			
Naphthalene	SVOC	0.195	1100	2	62	6.2
4-Nitroaniline	SVOC	0.65	820	27	100	10
N-Nitrosodiphenylamine	SVOC	0.1975	130	110	90	90
Phenanthrene	SVOC	0.21	7900		21000	2100
Phenol	SVOC	0.26	160000	1900	13000	1300
Pyrene	SVOC	0.355	8200	180	2300	230
Aldrin	Pesticide	0.001225	0.038	0.039	0.028	0.028
alpha-BHC	Pesticide	0.001175	0.1	0.086	0.082	0.082
beta-BHC	Pesticide	0.001225	0.35	0.3	0.29	0.29
delta-BHC	Pesticide	0.001225				
gamma-BHC	Pesticide	0.0011	0.49	0.57	0.39	0.39
alpha-Chlordane	Pesticide	0.0195	0.49	1.7	1.6	1.6
gamma-Chlordane	Pesticide	0.01058	0.49	1.7	1.6	1.6
4-4'-DDD	Pesticide	0.0064	2.7	2.3	2.4	2.4
4-4'-DDE	Pesticide	0.115	1.9	2	1.7	1.7
4-4'-DDT	Pesticide	0.119	1.9	1.9	1.7	1.7
Dieldrin	Pesticide	0.024	0.04	0.034	0.030	0.030
Endosulfan I	Pesticide	0.001225	470	47	340	34
Endosulfan II	Pesticide	0.002375	470	47	340	34
Endosulfan Sulfate	Pesticide	0.002275		38		-
Endrin	Pesticide	0.003975	23	1.9	18	1.8
Endrin Aldehyde	Pesticide	0.00621				
	Pesticide	0.002375				
Endrin Ketone	1 Collette					
Endrin Ketone Heptachlor	Pesticide	0.001225	0.14	0.13	0.016	0.016
			0.14 0.07	0.13 0.07	0.016 0.053	0.016 0.053

DETECTED COMPOUNDS IN SOIL SAMPLES

WITH HISTORICAL SCREENING CRITERIA AND CURRENT REGULATORY STANDARDS

Agriculture Street Landfill New Orleans, Louisiana

		"Background"	TBC	EPA RSL*	LDEQ RECAP MO-1	LDEQ Screening
Compound	Group	(RRII, 1995)	(RRII, 1995)	(TR=1E-06, THQ=0.1)	Standard (ni)	Standard (ni)
Toxaphene	Pesticide	0.145	0.58	0.49	0.44	0.44
Aroclor 1221	PCB	0.0575	0.083	0.20	0.21	0.11
Aroclor 1242	PCB	0.02325	0.083	0.23	0.21	0.11
Aroclor 1260	PCB	0.02375	0.083	0.24	0.21	0.11
Polychlorinated Dibenzo-p-Dioxins	Dioxin			0.0000048 **		

Notes:

All values in units of milligrams per kilogram (mg/kg)

LDEQ = Louisiana Department of Environmental Quality

MO-1 = Management Option 1

ni = non-industrial

PCB = Polychlorinated Biphenyl

RECAP = Risk Evaluation / Corrective Action Program

RSL = Regional Screening Level

SVOC = Semi-volatile organic compound

TBC = To be considered value listed in RRII

THQ = Target Hazard Quotient (for non-carcinogenic compounds)

TR = Target Cancer Risk (for carcinogenic compounds)

VOC = Volatile organic compound

* = For carcinogenic compounds, the carcinogenic screening levels are listed

** = The RSL for 2,3,7,8-TCDD is listed

Yellow highlight indicates the value is less than the TBC value referenced in the RRII

Blue highlight indicates the lower of the EPA RSL and RECAP Standard if both values are below the TBC value

Proposed revisions to RECAP: https://www.deq.louisiana.gov/page/recap-2019

DETECTED COMPOUNDS IN GROUNDWATER SAMPLES WITH HISTORICAL SCREENING CRITERIA AND CURRENT REGULATORY STANDARDS

Agriculture Street Landfill New Orleans, Louisiana

Compound	Group	"Background" (RRII, 1995)	ARAR (RRII, 1995)	TBC (1995)	EPA MCL	LDEQ RECAP Standard (GW1)	LDEQ Screening Standard
Antimony	Metal	26	6	15	6	6	6
Arsenic	Metal	1.35	50	0.05	10	10	10
Barium	Metal	738.84	2000	1800	2000	2000	2000
Beryllium	Metal	0.5	4	0.02	4	4	4
Cadmium	Metal	2	5	20		5	5
Chromium	Metal	46.74	100	200	100	100	100
Copper	Metal	12.67	1300	1000	1300	1300	1300
Lead	Metal	6.2	15		15	15	15
Mercury	Metal	0.1	2	11	2	2	2
Nickel	Metal	17.25	100	730		730	730
Selenium	Metal	10	50	110	50	50	50
Thallium	Metal	10	2	2.6	2	2	2
Acetone	VOC	7.5		3700		610	100
Benzene	VOC	5	5	0.62	5	5	5
Carbon Disulfide	VOC	5	<u></u>	3700	<u></u>	1000	100
Chloroform							
	VOC VOC	5	100	0.27	80 700	100	100 700
Ethylbenzene		5	700	3700	700	700	
Styrene	VOC	5	100	3	100	100	100
Toluene	VOC	5	1000	3200	1000	1000	1000
Xylene	VOC	5	10000	3700	10000	10000	10000
Acenaphthene	SVOC	5		2200		370	37
Benzo(a)anthracene	SVOC	5		0.11	0.2	7.8	7.8
Benzo(b)fluoranthene	SVOC	5		0.11		4.8	4.8
Bis(2-ethylhexyl)phthalate	SVOC	5		6.1	6	6	6
Butylbenzylphthalate	SVOC	5	100	7300		7300	730
Carbazole	SVOC	5		3.4			
Chrysene	SVOC	5	0	1.1		9.1	1.6
Dibenzofuran	SVOC	5				24	10
1,4-Dichlorobenzene	SVOC	5	75	3.5	75	75	75
di-n-Butyl Phthalate	SVOC	5		3700			
di-n-Octyl Phthalate	SVOC	5				1500	20
Dimethylphthalate	SVOC	5		370000		370000	37000
Fluoranthene	SVOC	5		1500		1500	150
Fluorene	SVOC	5		1500		240	24
2-Methylphenol	SVOC	5		1800			
4-Methylphenol	SVOC	5		1800			
2-Methylnaphthalene	SVOC	5				6.2	0.62
Naphthalene	SVOC	5		150		10	10
N-Nitrosodiphenylamine	SVOC	5		17		14	14
Phenanthrene	SVOC	5		1100		1800	180
Phenol	SVOC	5		22000		1800	180
Pyrene	SVOC	5		1100		180	18
Aroclor 1260	PCB	0.5	0.5	0.0087	0.5	0.5	0.5
beta-BHC	Pesticide	0.025		0.037		0.06	0.06
alpha-Chlordane	Pesticide	0.025	2	0.052	2	2	2
							2
gamma-Chlordane	Pesticide	0.025		0.2	2	2	
4-4' DDE	Pesticide	0.5				0.2	0.2
Dieldrin	Pesticide	0.05		0.0042		2.5	2.5
Endosulfan Sulfate	Pesticide	0.05					
Endrin Aldehyde	Pesticide	0.05					
Heptachlor	Pesticide	0.025	0.4	0.0023	0.4	0.4	0.4
Heptachlor Epoxide	Pesticide	0.025	0.2	0.0012	0.2	0.2	0.2
Methoxychlor	Pesticide	0.25	40	180	40	40	40
Polychlorinated Dibenzo-p-Dioxins	Dioxin				0.00003 *		

Notes:

All values in units of micrograms per liter (µg/L)

ARAR = Applicable or Relevant and Appropriate Requirements (EPA maximum contaminant levels in 1995)

GW1 = the RECAP Standard for the soil concentration protective of groundwater meeting the definition of Groundwater Classification 1

LDEQ = Louisiana Department of Environmental Quality

MCL = Maximum Contaminant Level

ni = non-industrial

PCB = Polychlorinated Biphenyl

 $RECAP = Risk\ Evaluation\ /\ Corrective\ Action\ Program$

SVOC = Semi-volatile organic compound

TBC = To be considered value listed in RRII

VOC = Volatile organic compound

* = The MCL for 2,3,7,8-TCDD is listed

Yellow highlight indicates the value is less than the TBC value referenced in the RRII

Proposed revisions to RECAP: https://www.deq.louisiana.gov/page/recap-2019

DETECTED COMPOUNDS IN INDOOR AIR SAMPLES WITH HISTORICAL SCREENING CRITERIA AND CURRENT REGULATORY STANDARDS

Agriculture Street Landfill New Orleans, Louisiana

		"Background" RRII	"Background" RRII	EPA RSL* (TR=1E-06, THQ=0.1)
Compound	Group	(ppbv)	$(\mu g/m^3)$	$(\mu g/m^3)$
Acrolein	VOC	(ррьт)	(μg/m)	0.0021
Benzene	VOC	3.5675	11.59	0.36
Bromodichloromethane	VOC	3.3073		0.076
Chlorobenzene	VOC	0.1	0.5	5.2
Chloroethane	VOC	0.1	0.3	1000
Chloroform	VOC	0.43	2.13	0.12
Chloromethane	VOC	0.355	0.745	9.4
1,2-Dichlorobenzene	VOC	0.1	0.6	21
1,3-Dichlorobenzene	VOC	0.1	0.6	
1,4-Dichlorobenzene	VOC	0.135	0.83	0.26
1,2-Dichloroethane	VOC			0.11
1,1-Dichloroethene	VOC	0.1	0.40	21
Ethylbenzene	VOC	0.7825	3.4543	1.1
Methylene Chloride	VOC	0.14	0.49	63
Naphthalene	VOC			0.083
Styrene	VOC	0.625	2.707	100
Tetrachloroethene	VOC	1.0625	7.3262	4.2
1,2,4-Trichlorobenzene	VOC	0.1275	0.9617	0.21
1,1,1-Trichloroethane	VOC	0.9925	5.5052	520
Trichloroethene	VOC	0.1	0.55	0.21
1,2,4-Trimethylbenzene	VOC	0.9925	4.9604	6.3
1,3,5-Trimethylbenzene	VOC	0.25	1.25	6.3
Toluene	VOC	8.45	32.37	520
m&p-Xylene	VOC	2.775	12.249	10
o-Xylene	VOC	0.9575	4.2265	10
Trichlorofluoromethane (Freon 11)		2.1	11.99	
1,1,2-Trichloro-1,2,2-trifluoroethane		0.1	0.78	
(Freon 113)	==.	0.1		
Dichlorodifluoromethane (Freon 12)		0.98	4.93	
Methane		12.625	8.420	

Notes:

ppbv = parts per billion by volume

 $\mu g/m^3 = micrograms per cubic meter$

RSL = Regional screening level

THQ = Target Hazard Quotient (for non-carcinogenic compounds)

TR = Target Cancer Risk (for carcinogenic compounds)

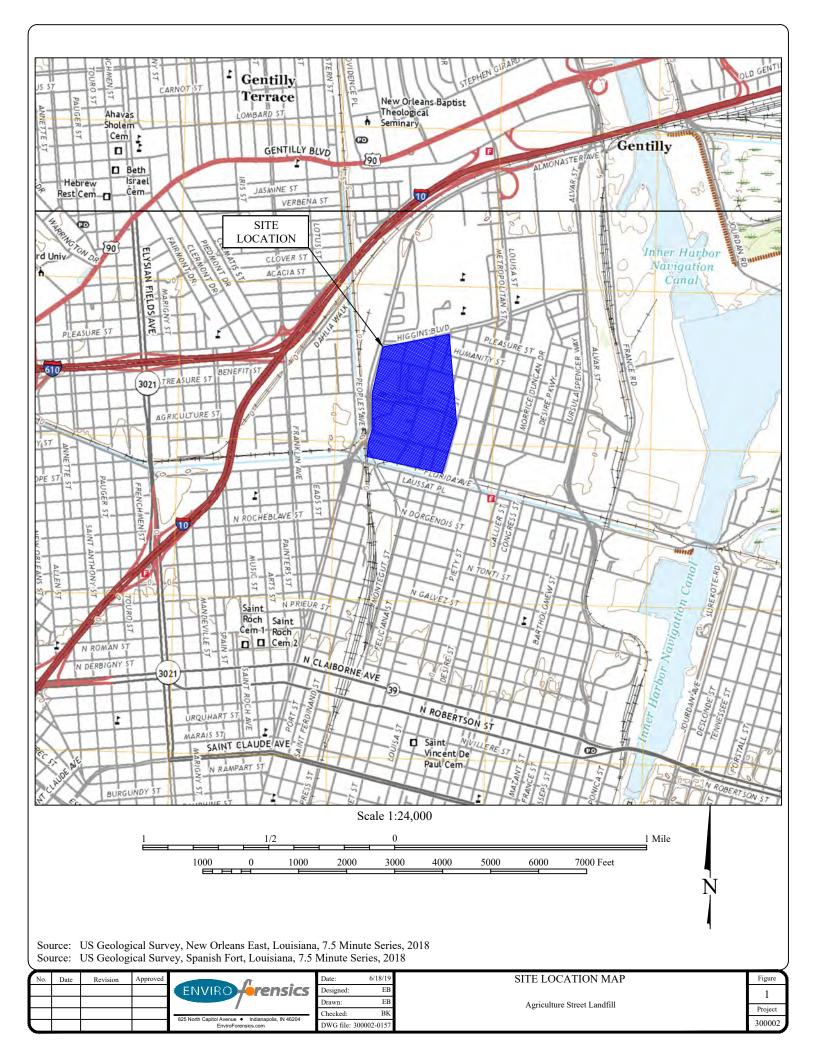
* = For carcinogenic compounds, the carcinogenic screening levels are listed

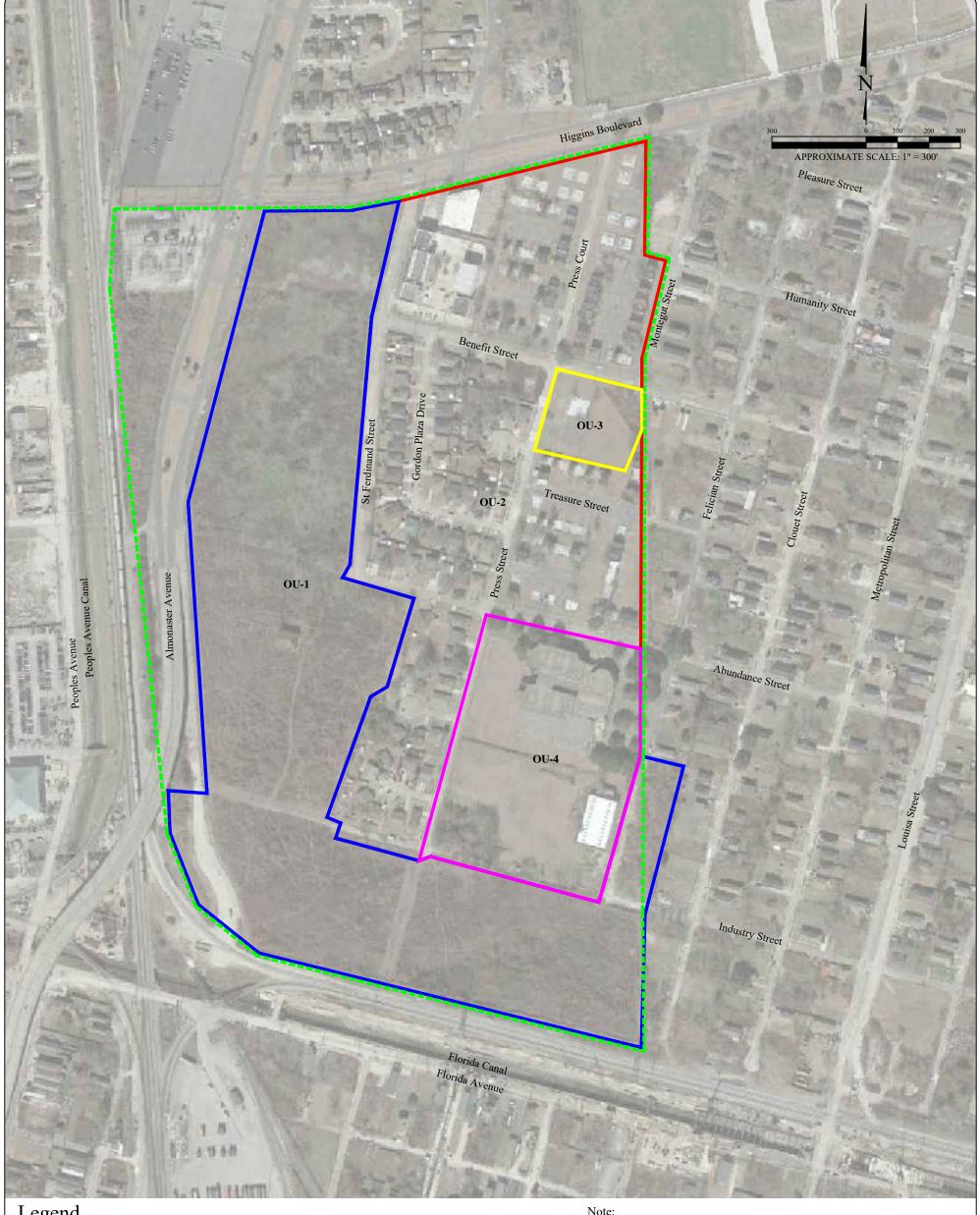
Yellow highlight indicates the value is less than the "Background" value referenced in the RRII



Figures

Document: 300002-0156





Legend

OA-1 = Undeveloped Land OA-2 = Residential Properties

OA-3 = Community Center

OA-4 = Former Moton Elementary School

Landfill boundary

Note:

1. Aerial photograph date January 24, 2018

No.	Date	Revision	Approved



Date:	6/10/19
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file: 30	0002-0107

OPERABLE UNITS SITE MAP

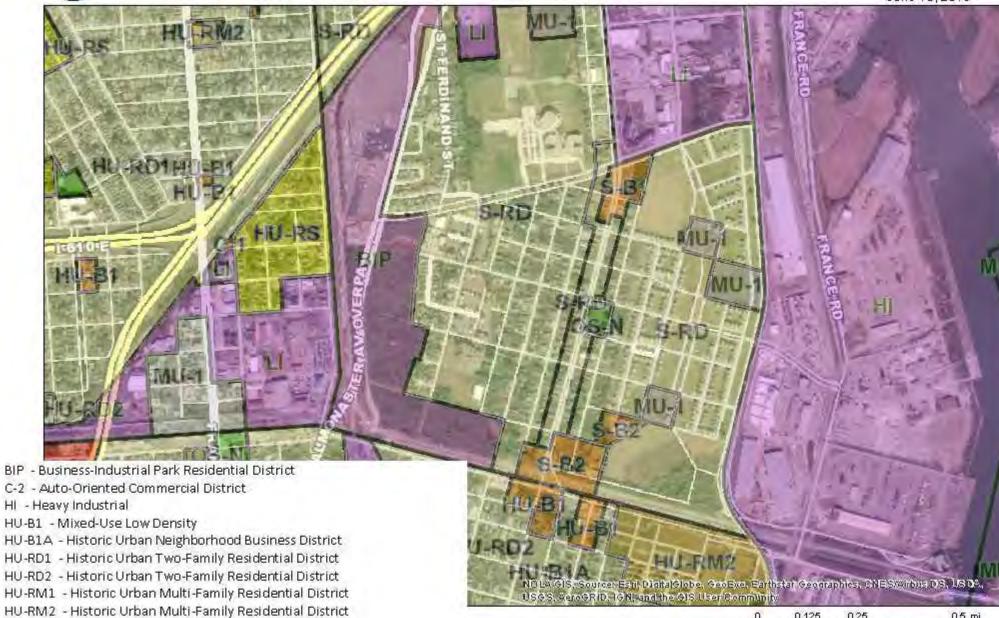
Agriculture Street Landfill

Figure	
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City of New Orleans Property Viewer

June 18, 2019



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Displayed information is a product of the City of New Orleans Enterprise GIS Database. The City of New Orleans does not assume any liability for damages and light from errors, one solors, or issentials in the match as it is intended for the display of relative positions and locations only. Legend contents are dependent on the type of information added to the web application and may not be fully spresented. This preliminary uses by map document is distributed so by for purposes of peer reulew.

LI - Light Industrial District

MI - Maritime Industrial District

MU-1 - Medium Intensity Mixed-Use District

HU-RS - Historic Single-Family Residential District

OS-N - Neighborhood Open Space District

S-B2 - Suburban Pedestrian-Oriented Corridor Business District

S-RD - Suburban Two-Family Residential District

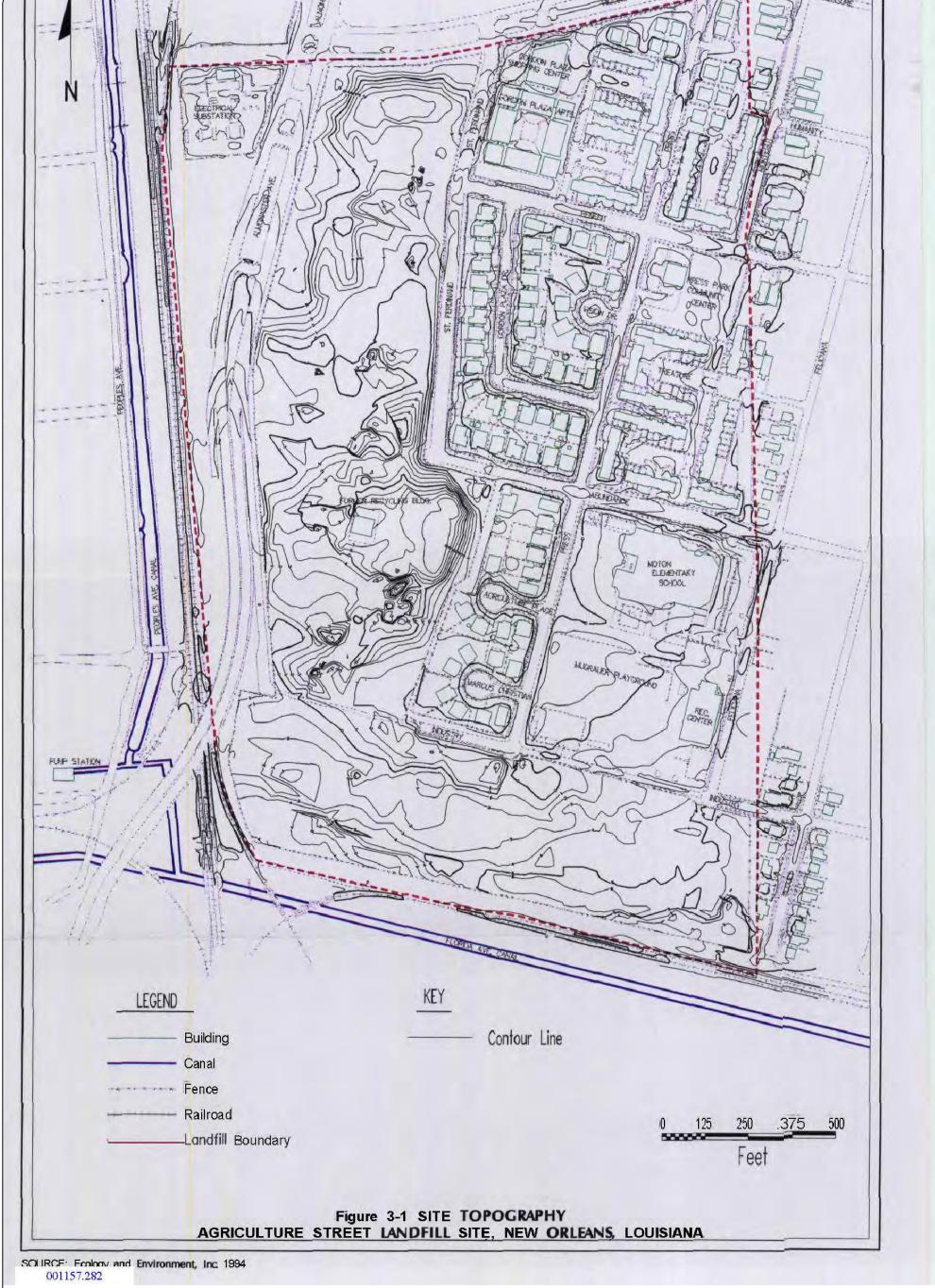
Agriculture Street Landfill

ZONING MAP

Date:	6/18/19
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file:	300002-0139

	Figure
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825 North Capitol Avenue ■ Indianapolis, IN 46204 EnviroForensics.com	300002

EnviroForensics.com

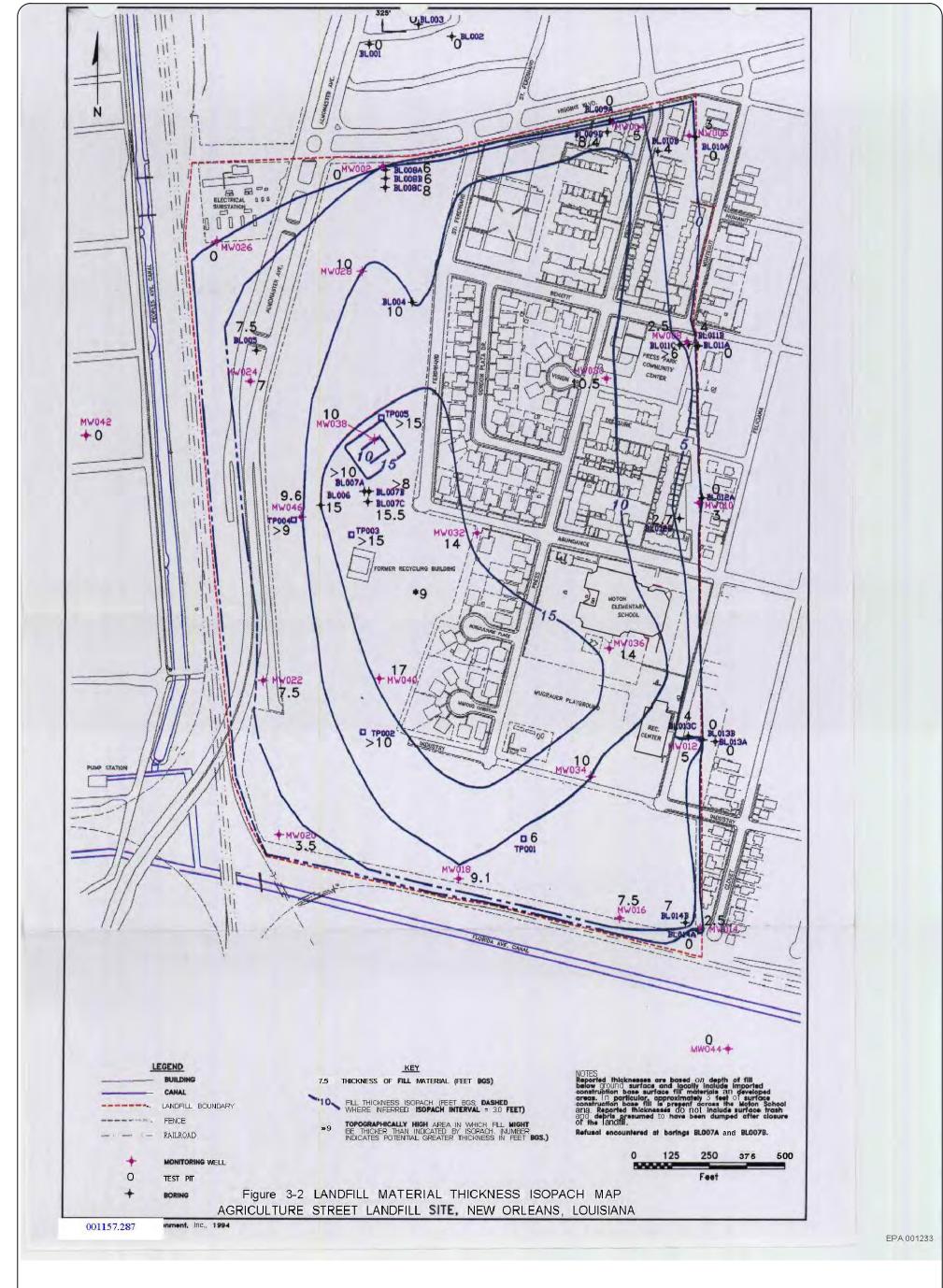


Legend

Note:

1. Figure originally presented in the Remedial Removal Integrated Investigation Report, Agriculture Street Landfill, March 1995

SITE TOPOGRAPHY 6/13/19 Date Revision Approved Date: Figure Designed: EB 4 Drawn: EB Agriculture Street Landfill Project BK Checked: 825 North Capitol Avenue • Indianapolis, IN 46204 300002 DWG file: 300002-0139 EnviroForensics.com

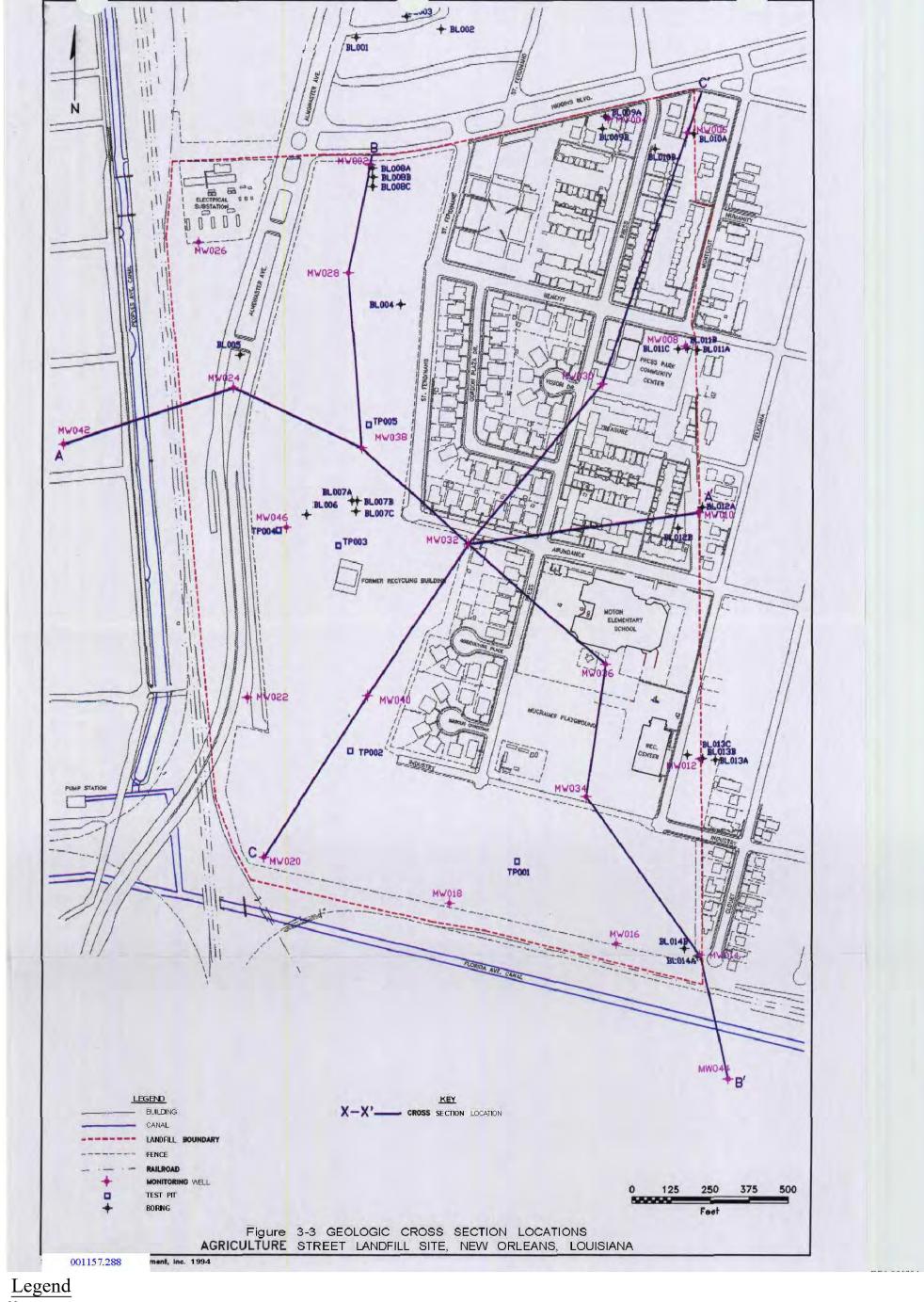


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Note

 Figure originally presented in the Remedial Removal Integrated Investigation Report, Agriculture Street Landfill, March 1995

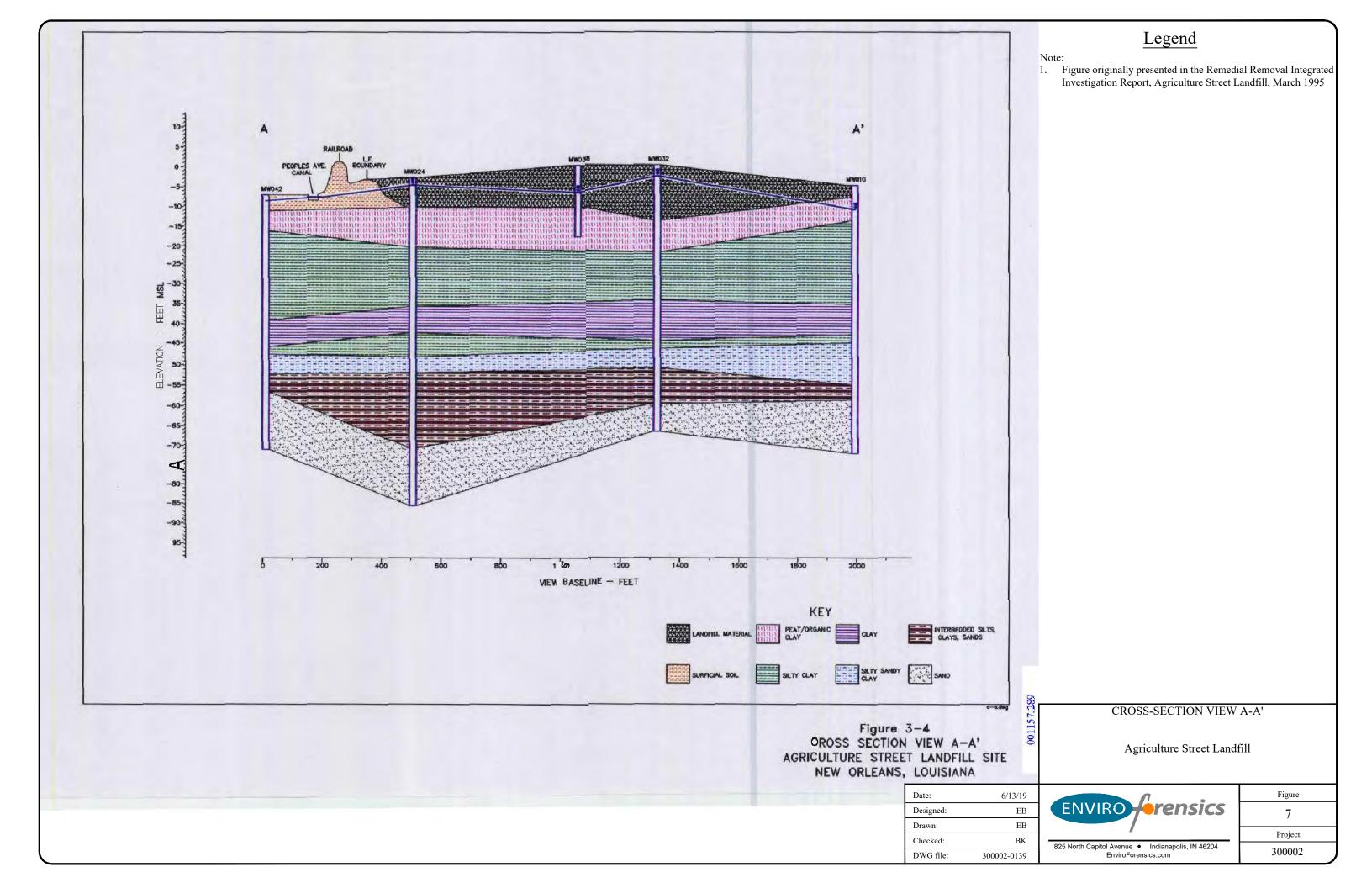
No.	Date	Revision	Approved		Date:	6/13/19	LANDFILL MATERIAL THICKNESS ISOPACH MAP	Figure
				ENVIRO Herensics	Designed:	EB	Agriculture Street Landfill	5
					Drawn:	EB		
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				825 North Capitol Avenue ● Indianapolis, IN 46204 EnviroForensics.com	DWG file: 300	002-0139		300002

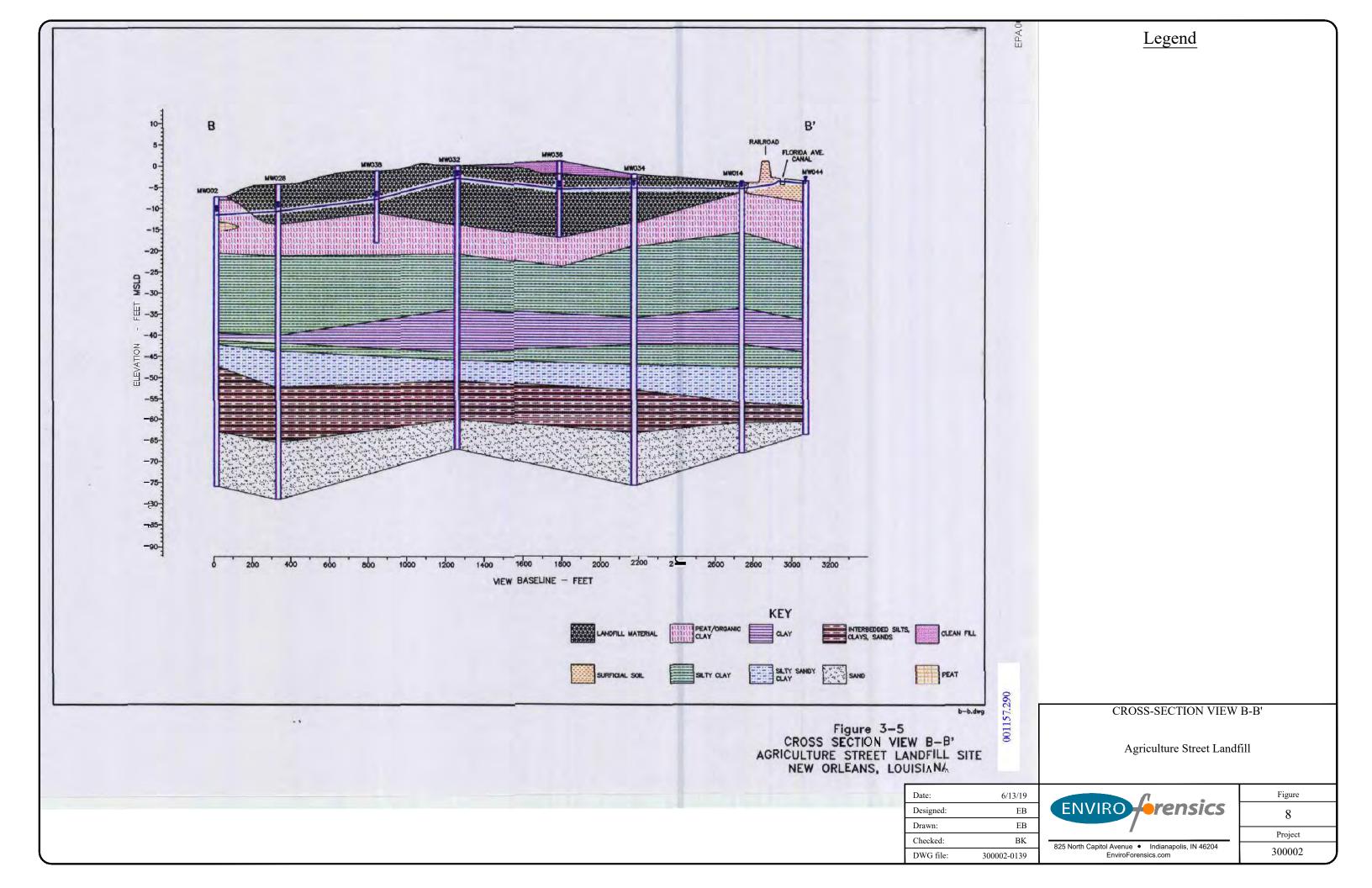


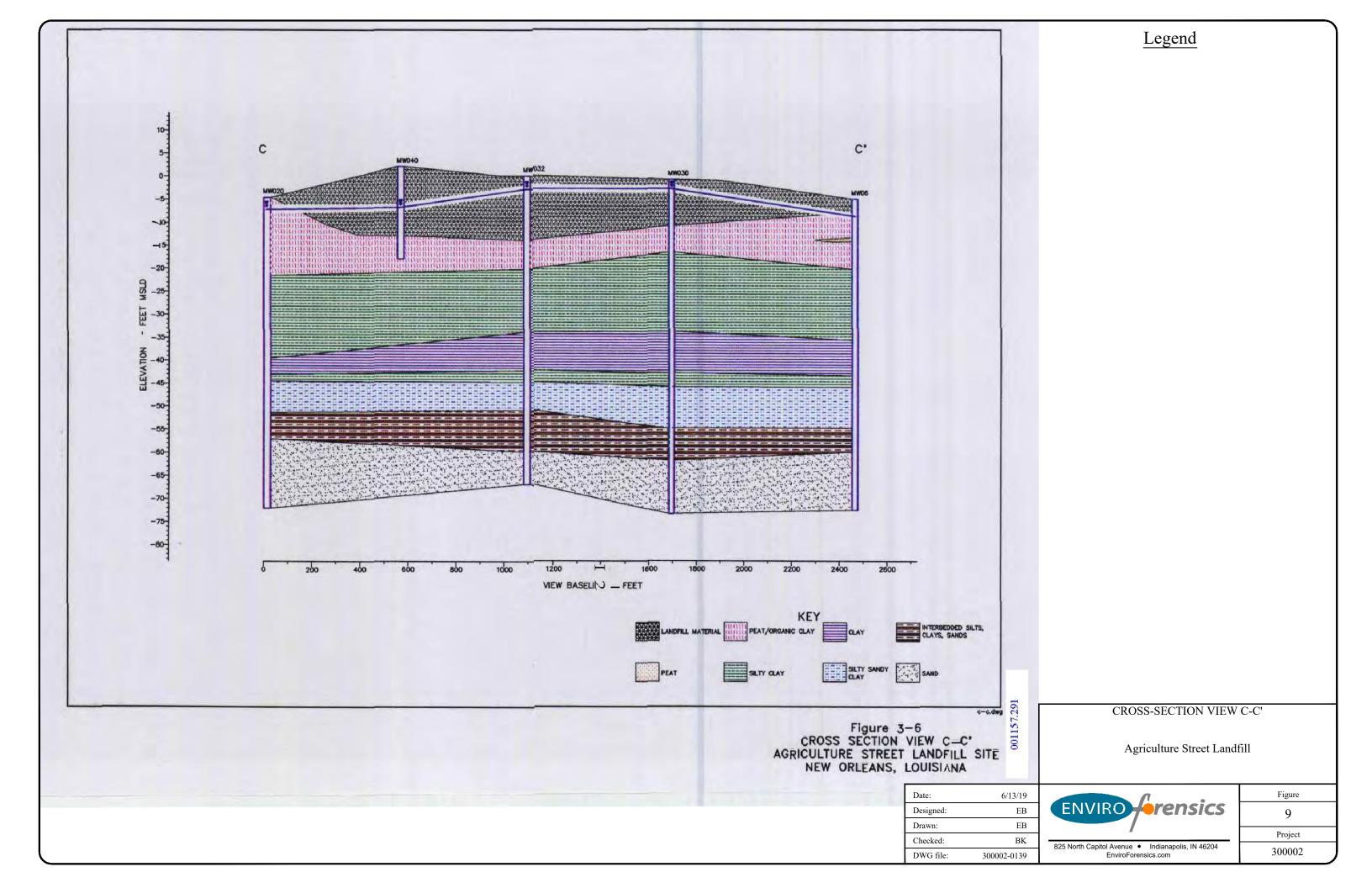
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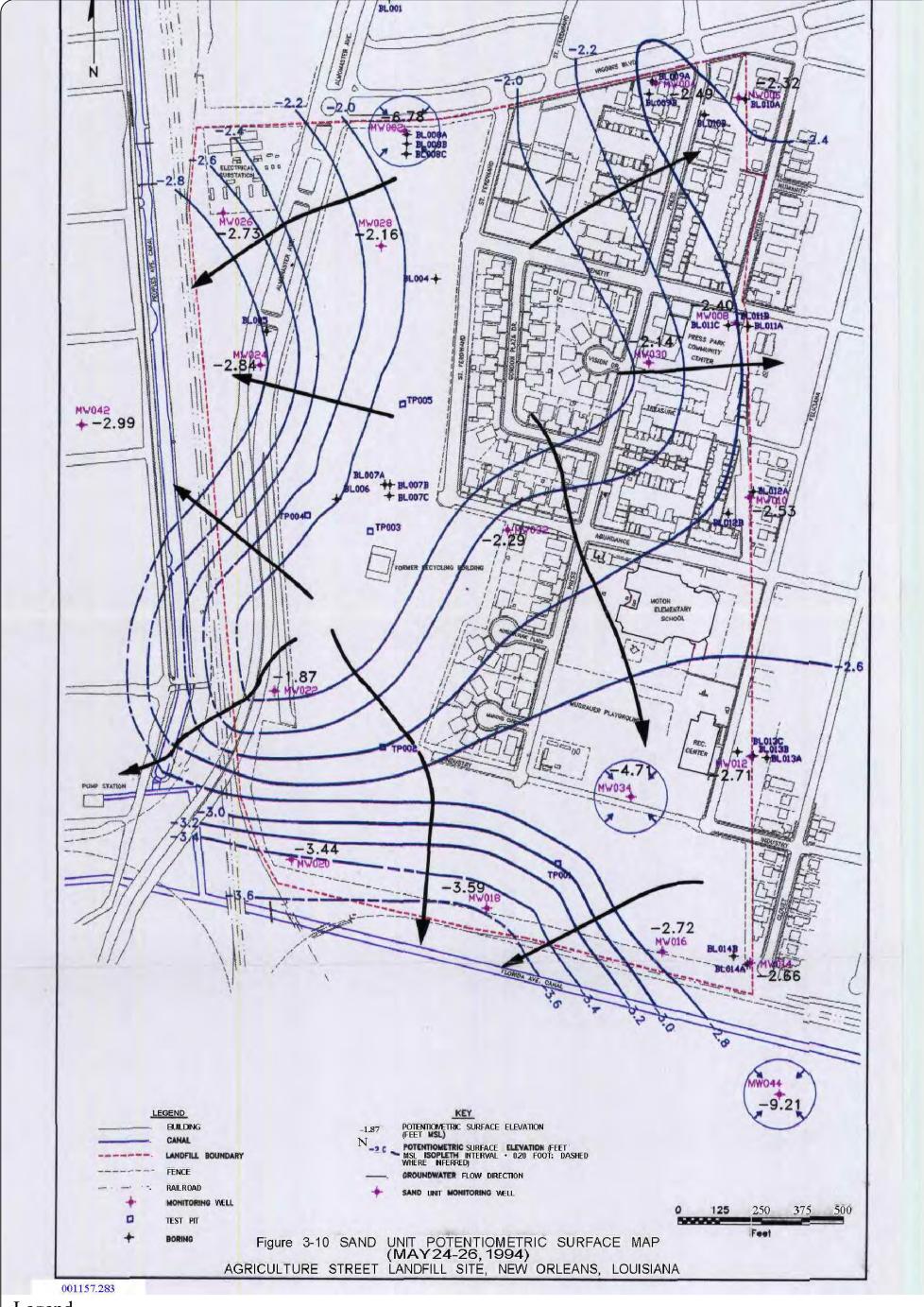
1. Figure originally presented in the Remedial Removal Integrated Investigation Report, Agriculture Street Landfill, March 1995

No.	Date	Revision	Approved		Date:	6/13/19	GEOLOGIC CROSS-SECTION LOCATIONS	Figure
				ENVIRO forensics	Designed:	EB	Agriculture Street Landfill	6
					Drawn:	EB		
				005 N # 0 * 1 A * 1 B * 1 B * 40004	Checked:	BK		Project
				825 North Capitol Avenue ● Indianapolis, IN 46204 EnviroForensics.com	DWG file: 30	00002-0139		300002









Note:

 Figure originally presented in the Remedial Removal Integrated Investigation Report, Agriculture Street Landfill, March 1995

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				825 North Capitol Avenue Indianapolis, IN 46204	D

Date:	6/13/19
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file: 30	0002-0139

SAND UNIT POTENTIOMETRIC SURFACE MAP (MAY 24-26, 1994)

Agriculture Street Landfill

Figure	
10	
Project	
300002	

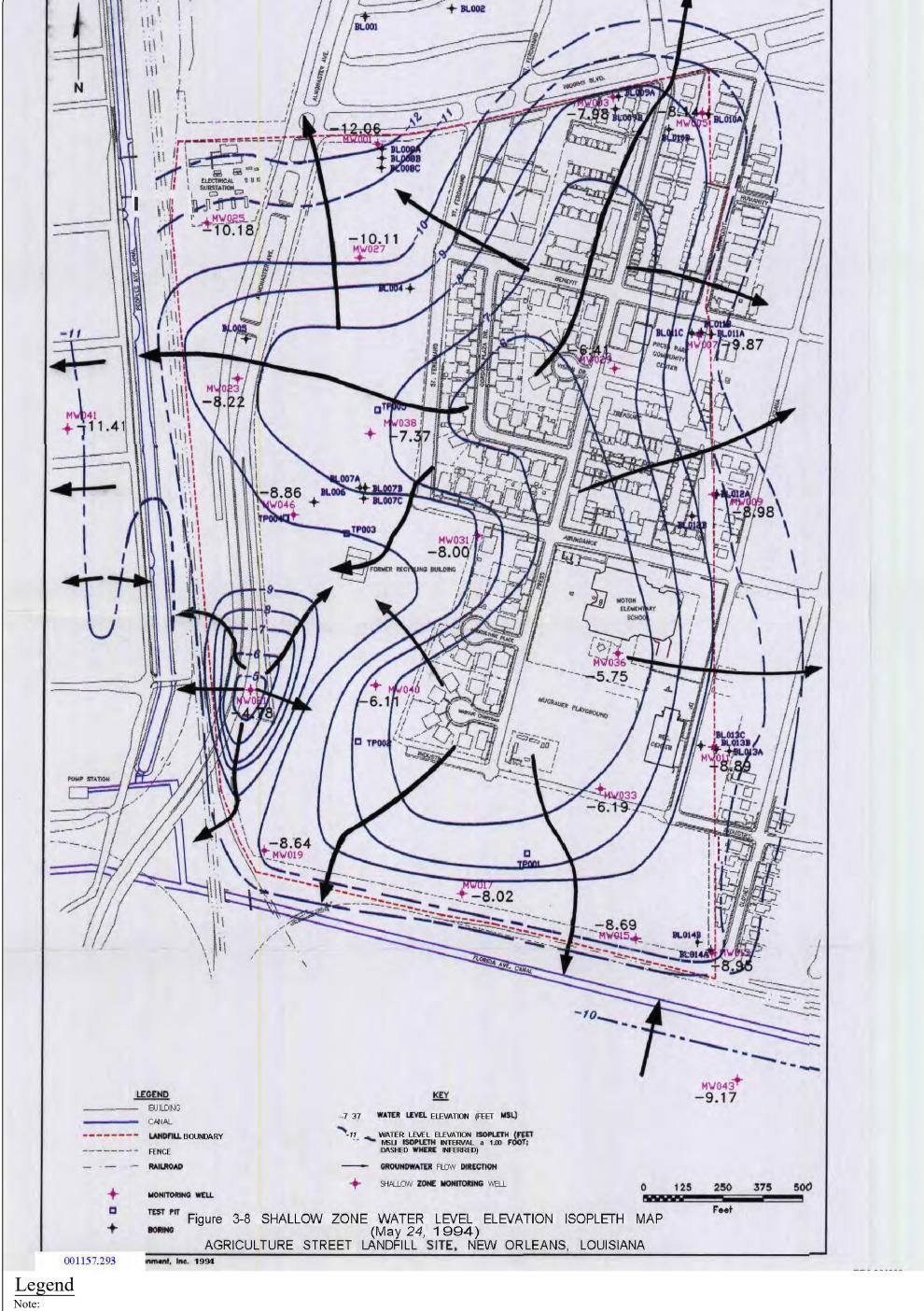


Figure originally presented in the Remedial Removal Integrated Investigation Report, Agriculture Street Landfill, March 1995

No.	Date	Revision	Approved		Date:	6/13/19	SHALLOW ZONE WATER LEVEL ELEVATION	Figure
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					Drawn:	EB	Agriculture Street Landfill	
				005 N # 0 * 1 A	Checked:	BK	8	Project
				825 North Capitol Avenue ● Indianapolis, IN 46204 EnviroForensics.com	DWG file: 30	0002-0139		300002



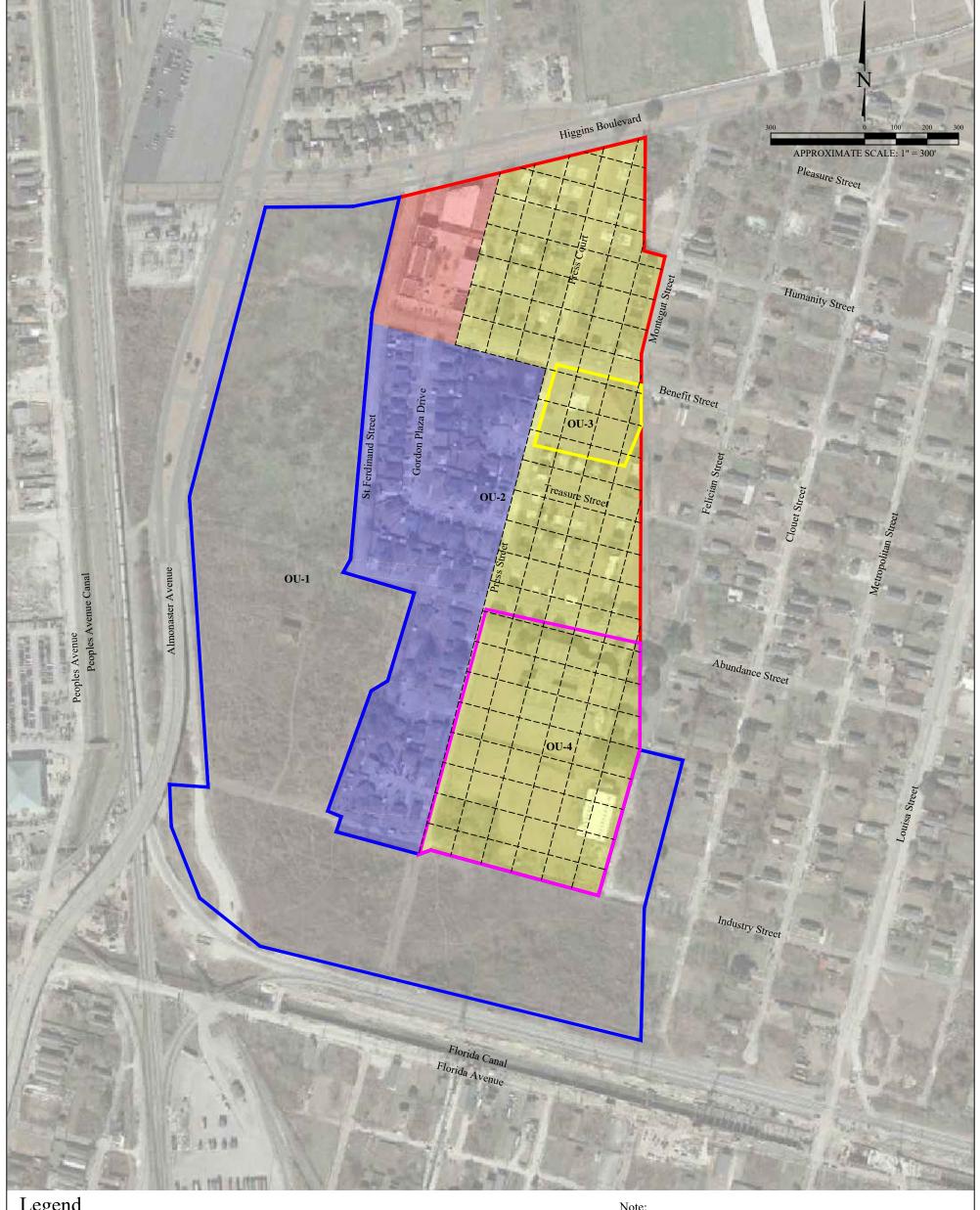
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Legend

Note:

Reference CH2M Hill, Inc. Report "Hurricane Katrina Response Agriculture Street Landfill, New Orleans Site Inspection and Sampling Results

N	. Dat	e Revision	Approved		Date:	6/13/19	DEPTH TO LINER IN INCHES (2006)	Figure
					Designed:	EB		12
					Drawn:	EB	Agriculture Street Landfill	
					Checked:	BK	8	Project
C				825 North Capitol Avenue ● Indianapolis, IN 46204 EnviroForensics.com	DWG file: 300	0002-0139		300002



OA-1 = Undeveloped Land OA-2 = Residential Properties

OA-3 = Community Center

OA-4 = Former Moton Elementary School Sample Grid 100' by 100'

Two soil borings advanced at each property

Soil borings advanced in accessible areas around the existing buildings

Soil boring advanced at each grid node

Note:

1. Aerial photograph date January 24, 2018

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No.	Date	Revision	Approved

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Date:	6/10/19
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file: 30	0002-0108

PROPOSED SOIL BORING PLAN

Figure 13 Project 300002

Agriculture Street Landfill



OA-1 = Undeveloped Land OA-2 = Residential Properties

OA-3 = Community Center

OA-4 = Former Moton Elementary School

Proposed monitoring well location

Note:

1. Aerial photograph date January 24, 2018

No.	Date	Revision	Approved

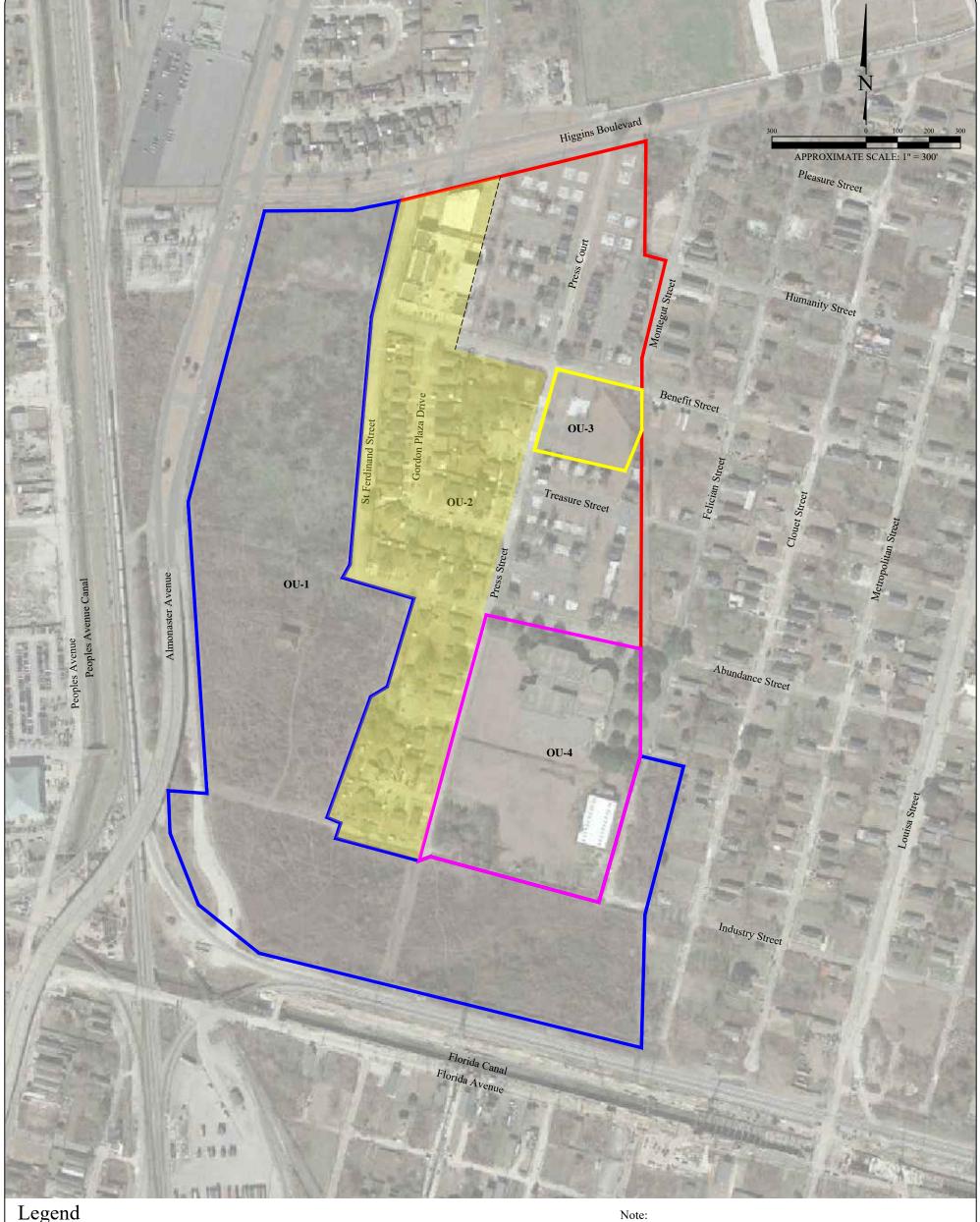


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DWG file: 30	0002-0132	l

PROPOSED MONITORING WELL LOCATIONS

Agriculture Street Landfill

Figure 14 Project 300002



OA-1 = Undeveloped Land OA-2 = Residential Properties

OA-3 = Community Center
OA-4 = Former Moton Elementary School
Sample Grid 100' by 100'

Vapor intrusion assessment will be conducted in all occupied structures in this part of OU-2

Date Revision Approved ENVIRO **Frensics** 825 North Capitol Avenue

Indianapolis, IN 46204 EnviroForensics.com

Date:	6/14/19
Designed:	EB
Drawn:	EB
Checked:	BK
DWG file: 30	0002-0152

PROPOSED VAPOR INTRUSION ASSESSMENT LOCATIONS

Agriculture Street Landfill

1. Aerial photograph date January 24, 2018

Figure	
15	
Project	
300002	



Appendix A

Agency for Toxic Substances & Disease Registry Health Consultation

Document: 300002-0156

HEALTH CONSULTATION

Review of Louisiana Tumor Registry Cancer Incidence Data

AGRICULTURE STREET LANDFILL NEW ORLEANS, ORLEANS PARISH, LOUISIANA

I. INTRODUCTION

As a follow-up activity to recommendations outlined in a prior health consultation regarding the Agriculture Street Landfill Superfund (ASL) site in New Orleans, the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) reviewed available health outcome data on additional years of cancer incidence data for the Agriculture Street Landfill community. These additional years include 1994-1997, and are the most current data available. Prior health consultations reviewedhealth outcome data from 1983-1993. The health outcome data examined in this healthconsultation include cancer incidence rates (from the Louisiana Tumor Registry (LTR)). This health consultation serves to provide the residents with a way to compare the health effects intheir area with a similar, but larger population. No cause-andeffect relationship with site related <u>contaminants</u> can be determined by this type of review.

II. BACKGROUND AND STATEMENT OF ISSUES

A. Site History

The ASL site is a 95-acre site located in New Orleans, Orleans Parish, Louisiana. The site wasused as a municipal landfill receiving municipal waste and construction debris for more than 50 years prior to being developed for housing and businesses. The landfill was closed in 1965. During the 1970s and 1980s, Gordon Plaza Subdivision, Housing Authority of New Orleans(HANO) residences, Gordon Plaza Apartments, the Moton School, the Press Park residential area and community center were constructed over part of the landfill. Forty-eight acres of the landfillremain undeveloped and fenced. Metals, pesticides, and polycyclic aromatic hydrocarbons(PAHs) have been found in surface and subsurface soils throughout the site during environmental studies.

In December of 1994, the <u>U.S. Environmental Protection Agency (EPA)</u> ✓ placed the ASL site on the National Priorities List (also called the Superfund list). EPA conducted a Remedial/RemovalIntegrated Investigation (RRII) of the entire site and released their results in 1995. During this investigation, surface soil, subsurface soil, groundwater, tap water, air, and indoor dust sampleswere analyzed for chemicals found at the site [1]. Based on those environmental results and health data, OPH/SEET in conjunction with the Agency for Toxic Substances and DiseaseRegistry (ATSDR), released a Public Health Assessment.

B. Findings of the Public Health Assessment [1]

The conclusions of the Public Health Assessment were:

- The **undeveloped area** of the site was classified as a **public health hazard**. The highestlevels of contaminants have been found in the undeveloped area. Although entry to this area has been limited by a fence, individuals continue to access this area and may come incontact with the elevated levels of lead and arsenic in the soil. If this area was developed for future residential use as is, exposure to lead, arsenic, and polycyclic aromatichydrocarbons (PAHs) in the soil could pose an unacceptable health risk to residents.
- The majority of the **residential area and the Press Park Community Center** has been classified as **no apparent public health hazard** since the levels of contaminants in the soil are generally below levels that may cause health problems. There are scatteredpockets of lead, arsenic, and PAHs in soil that need to be addressed to limit anypossibility of exposure to levels of health concern.
- The contamination presented at the Moton School poses no public health hazard since the levels of chemicals in the soil, air, and water were well below levels that may causehealth problems.

The remedy for the site is completed and no further action is planned. During the removalaction, two feet of soil was removed prior to grading and a semi-permeable geotextile liner was installed and clean soil was backfilled. The first five-year review is ongoing. The integrity of thecap was inspected by EPA and its contractor, and the Louisiana Department of Environmental Quality on October 17, 2002. Permanent relocation is an issue which continues to polarize the community since many prefer redevelopment. The Superfund law was examined by EPA who concluded that relocation is not possible because the redevelopment remedy is attainable and protective.

Previous health outcome investigations concerning the ASL site include a review of blood leadlevels and a health survey conducted by Xavier University. Both were addressed in the 1996Public Health Assessment [1]. The blood lead data were evaluated because lead is one of themost prevalent contaminants at the site and children are especially sensitive to the toxic effects of lead. The results of the 1993 and 1994 blood lead screens, conducted by the city of New Orleans, indicated that the children tested who live on the ASL site had a lower percentage of elevated blood leads levels as compared to other children in New Orleans (18%) and 44%, respectively).

The Deep South Center for Environmental Justice at Xavier University of Louisiana conducted ahealth survey of 328 adults and children (approximately one third of the residents of ASL) wholive in Gordon Plaza and Press Park [2]. The survey did not include a comparison group ofindividuals living outside the ASL area. Even though the findings indicated that there are reported illnesses in the community, the lack of a comparison group makes it impossible to determine if the illnesses at the ASL site are occurring more often than is expected for acommunity not living on a Superfund site.

C. Office of Public Health Activities Conducted

The Office of Public Health has taken a very active role in the activities occurring at the ASLsite. Initially, Louisiana Tumor Registry (LTR) data was examined in 1997. Also examined at his time, were birth weights of children born in the area. A follow-up examination of this information occurred in 2001. Results of both these examinations

showed similar elevations inbreast cancer incidence for the area that includes the ASL site. To follow-up to those results, we are once again examining cancer incidence for the most recent time period for which it exists.

III. DATA REVIEW

Health outcome data reviewed for a site are generally based upon (1) possible health effects that could be caused by exposure to site contaminants and (2) the availability of data. That is why inthe initial Public Health Assessment, information on blood lead levels of the ASL children wasreviewed. Lead has been a contaminant of concern at the ASL site and blood lead data wereavailable.

For this report, OPH reviewed additional years of cancer incidence not included in the priorreview. The period of time selected for this recent evaluation of the cancer incidence data was 1994-1997, which is the most recent health data available. The smallest geographic area for which we can calculate rates of disease is the census tract.

A. Census Data

In order to compare the ratios of cancer incidence around the ASL site with parish or regional rates, it is necessary to have specific population data. Population data, categorized by age, andhealth outcome data are both available at the census tract level. Census tracts are subdivisions of parishes. They usually have between 2,500 and 8,000 persons and are designed to be relativelyhomogeneous or similar with respect to population characteristics, economic status, and livingconditions [3].

The ASL site lies within Census Tract 1703 of Orleans Parish and covers about 1/5 of the censustract area. The total population for Census Tract 1703 is 4,506 persons, according to the 1990census data [4]. The population for the ASL site was estimated to be 1,137 persons, based on the number of housing units [5]. Thus, the population on the ASL site is estimated to be about 1/4 of the census tract population.

Table 1 summarizes the 1990 Census information for Louisiana, Orleans Parish, and Census Tract 1703, which contains the ASL site. Review of the census data suggests that Orleans Parishand Census Tract 1703 have a higher percentage of African Americans than the state as a whole. Results occurring in the white demographic strata would need to be examined closely as thenumbers comprising this strata are small, and small number sometimes yield unstable results. Orleans Parish and Census Tract 1703 also have a higher percentage of persons and families living below the poverty level. Census Tract 1703 has a lower per capita income than Louisianaand Orleans Parish. Median family and household incomes are also lower for the census tract than Orleans Parish and Louisiana.

Table 1. Summary of Demographic Information for Agriculture Street Landfill (Census Tract 1703)

1990 CENSUS DATA							
	LOUISIANA	ORLEANS PARISH	CENSUS TRACT 1703 ASL				
	Population(%)	Population(%)	Population(%)				
All Persons Black	4,219,973 1,299,281 (30.8)	496,938 307,728 (61.9)	4,506 4,163 (92.4)				

White Other	2,839,138 (67.3) 81,554 (1.9)	173,554 (34.9) 15,656 (3.2)	309 (6.9) 34 (0.7)	
Gender	Population	Population	Population	
Female Male	2,188,587 2,031,386	266,055 230,883	2,444 2,062	
Age Group	Population(%)	Population(%)	Population(%)	
<7 Years 7-14 Years 15-24 Years 25-44 Years 45-64 Years >64 Years	476,687 (11.3) 558,783 (13.2) 656,310 (15.6) 1,309,858 (31.0) 749,344 (17.8) 468,991 (11.1)	54,365 (10.9) 59,871 (12.1) 79,019 (15.9) 155,207 (31.2) 83,818 (16.9) 64,658 (13.0)	510 (11.3) 659 (14.6) 813 (18.0) 1,260 (28.0) 716 (15.9) 548 (12.2)	
Median Age	31.0	31.6	29.2	
Number of Families	1,098,374	119,516	1,062	
Number of Households	1,498,371	187,662	1,543	
Income	\$	\$	\$	
Median Family Median Household Per Capita	26,313 21,949 10,635	22,182 18,477 11,372	15,417 11,279 5,216	
Poverty	%	%	%	
Persons Below Families Below	23.6 19.4	31.6 27.3	41.0 38.3	
Median Year Housing Built	1969	1951	1963	

B. Cancer Incidence Rates

1. Method for analyzing cancer incidence data

Cancer incidence data were obtained for the 10-year period of 1988-1997 from the LouisianaTumor Registry. These are the most recent cancer data that are available by census tract levels. Because the community has expressed concern about cancer in general and because the currentlevel of contaminants would not be expected to cause an increase in any particular cancer, OPHreviewed all types of cancers that were diagnosed in the census tract. Cancer incidence(occurrence of cancer) was chosen for this review because cancer mortality (death) rates are affected by how advanced the cancer was at the time of diagnosis, access to health care, and other factors not related to exposure.

In order to evaluate whether the Census Tract 1703, which contains the ASL site, has an elevated evel of cancer incidence, the region was chosen as a comparison population. In general, the comparison population should be large enough so that its cancer rates are stable (that is, the rates do not fluctuate greatly). Furthermore, the comparison population should be similar to the population being studied in factors which could affect disease rates, such as socioeconomic factors and racial distribution, other than the study exposure factors of interest. Therefore, the Louisiana Tumor Registry's Region I, which includes Jefferson, Orleans, and St. BernardParishes, was chosen as the comparison population.

Because different groups of people have different rates of cancer, the cancer incidence data were calculated separately by age group, sex, and race. For example, as we get older, our chance ofgetting cancer increases. Therefore, an older population would be expected to have a higher rate of cancer than a younger one. In making our comparisons, the number of cancers for a certainage group is compared to the number of cancers expected for that same age group.

Once the rates are calculated for specific age groups, sexes, and races, the standardized incidenceratios (SIRs) are calculated. The SIR estimates the occurrence of cancer in the study population(in this case, Census Tract 1703) relative to what might be expected if the census tract had the ame cancer rate as the comparison population (Region I). An SIR is the ratio of the observed number of cases to the expected number of cases.

The SIR tells us how much higher or lower the census tract's cancer rate is compared to that in the other population. If the observed number of cases equals the expected number of cases, the SIR will equal 1. If there are more observed cases than one would expect, then the SIR will begreater than 1. If there are less observed cases than one would expect, then the SIR will be less than 1. For example, if 10 cases are observed in the study population, but five cases were expected, then the SIR = 10/5 = 2, and the area has two times the cancer rate than expected. But if 20 cases were expected, then the SIR = 10/20 = 0.5, and the area has half the rate than expected.

Caution should be exercised, however, when interpreting the SIR. The interpretation must takeinto account the actual number of cases observed and expected, not just the ratio. Two SIRs can have the same number, but represent very different scenarios. For example, a SIR of 1.5 could mean three cases were observed and two were expected (3/2 = 1.5). Or it could mean 300 caseswere observed and 200 were expected (300/200 = 1.5). In the first instance, only one excess cancer occurred, which could easily have been due to chance. But, in the second instance, 100excess cancers occurred and it would be less likely that this would occur by chance alone.

To help interpret the SIR, the statistical significance of the difference can be calculated. In other words, the number of observed cases can be determined to be significantly different from the expected number of cases or the difference can be due to chance alone. "Statistical significance" for this review means that there is less than five percent chance (p-value < 0.05) that the observed difference is merely the result of random fluctuation in the number of observed cancer cases. If the SIR is found to be statistically significant, then the difference between the expected and observed cases is probably due to some set of factors that influences the rate of that disease. Because cancer is, unfortunately, so common (more than one in three of us will develop cancer in our lifetime), every community will experience a certain number of cancers. Through the years, you would expect some fluctuation in the numbers. One year, there may be a few more cases of cancer A and the next year a few less. This occurs by chance. There is no specific cause. Just like flipping a coin, although you expect that you will get heads half the time and tails half the time, it doesn't always come up even. Out of 10 coin tosses, you may get seven heads and three tails or four heads and six tails. The more tosses you make, the closer you will probably come to getting a 50-50 mix. This is why, in order to determine if cancer rates are elevated, the statistical significance must be considered.

2. Standardized Incidence Ratios for Census Tract 1703 for the years, 1988-1997.

For Census Tract 1703, all major groupings of cancer were evaluated: esophageal, stomach, colon, rectal, liver, other biliary, pancreatic, lung, soft tissue, brain, breast, cervix uteri, corpusuteri, ovarian, prostate, bladder, kidney, thyroid, Hodgkin's lymphoma, Non-Hodgkin'slymphoma, multiple myeloma, leukemia, and all cancers combined. Table 2 shows the number of cancers that were observed in the census tract for the 10-year period of 1988-97. A prior healthconsultation reviewed cancer incidence from 1988-1993, however, this was combined with thenew data, to produce more stable results.

Standardized incidence ratios (SIRs) were calculated for each type of cancer when five cases ormore were observed in the census tract in the 10-year period. Calculating SIRs with fewer casesleads to statistical instability. The New Orleans Region (Jefferson, Orleans, & St. BernardParishes) was used as the comparison population. The census tract calculations were based onthe 1990 population data and the regional rates are also based on 1990 census data plus estimates from years between census surveys.

Table 2.

Summary of Standardized Incidence Ratios (SIR) for Agriculture Street Landfill Census Tract 1703, 1988-1997.

Only cancers that had five or more observed cases during the study period are listed.

Only cancers that had five or more observed	ved cases during the study period are listed.						
Site	Observed	Expected	SIR	Significant			
All	163	152.85	1.07	No			
All, whites	28	11.21	2.50	Yes			
All, blacks	135	130.33	1.04	No			
All, males	78	76.34	1.02	No			
All, females	85	76.47	1.11	No			
All, white males	18	7.09	2.54	Yes			
All, white females	10	4.20	2.38	Yes			
All, black males	60	67.60	0.89	No			
All, black females	75	62.73	1.20	No			
Colon	10	15.55	0.64	No			
Colon, males	5	6.83	0.73	No			
Colon, females	5	8.72	0.57	No			
Colon, blacks	7	11.88	0.59	No			
Colon, black females	5	6.54	0.76	No			
Rectum	6	4.90	1.22	No			
Rectum, blacks	6	3.27	1.84	No			
Lung & bronchus	28	30.37	0.92	No			
Lung & bronchus, whites	5	2.26	2.21	No			
Lung & bronchus, blacks	23	25.14	0.92	No			

Lung & bronchus, males	16	18.70	0.86	No
Lung & bronchus, females	12	11.62	1.03	No
Lung & bronchus, black males	13	16.77	0.77	No
Lung & bronchus, black females	10	8.36	1.20	No
Breast	36	24.04	1.50	Yes
Breast, whites	6	1.83	3.27	Yes
Breast, blacks	30	19.08	1.57	Yes
Breast, females	36	23.94	1.50	Yes
Breast, white females	6	1.34	4.47	Yes
Breast, black females	30	18.86	1.59	Yes
Prostate (males only)	24	16.47	1.46	No
Prostate (males only), black males	21	16.80	1.25	No
Urinary Bladder	6	4.51	1.33	No
Other, Ill-defined & Unknown	7	3.82	1.83	No
Other, Ill-defined & Unknown, blacks	6	4.21	1.42	No

From <u>Table 2</u>, one can see that the observed number of lung, colon, prostate, and total cancerssites combined are not statistically different than what was expected. However, there was a statistically significant excess of breast cancer in Census Tract 1703 from the years 1988-1997. This excess was seen in white males and white females.

3. Breast Cancers for Census Tract 1703 for 1983-87 and 1988-97

Adding the 1983-87 data with the 1988-97 data provides an 15-year span of breast cancerincidence in this census tract. The population used for the census tract calculations was based on the estimated 1985 and the 1990 census data. For this time period, 1983-97, no statistically significant excess was seen for all females combined or black females. However, a statistically significant excess of breast cancer did occur in white women (three cases expected and 10 cases observed) in Census Tract 1703. Table 3 is a summary of the observed breast cancer cases, the expected cases, and the SIRs for the three time periods.

Table 3. Standardized Incidence Ratios for Breast Cancers (Invasive) in Census Tract 1703 as Compared to New Orleans Region I.

	All Females			Black Females			White Females			
	Observed	Expected	SIR	Observed	Expected	SIR	Observed	Expected	SIR	
1983-87	10	10.92	0.92	6	7.93	0.76	4	1.61	2.49	
1988-97	36	24.04	1.50*	30	19.08	1.57*	6	1.34	4.47*	
1983-97	46	34.96	1.32	36	27.01	1.33	10	2.95	3.39*	

^{*} Statistically significant at p=0.05 level.

4. Discussion of Excess Cancers

Observations about the breast cancer rates for Census Tract 1703 are summarized as follows: Astatistically significant increase for all women is seen in the 1988-1997 period, but is notobserved for the entire 15-year period, 1983-97. White women in this census tract do not show a statistically significant elevation in breast cancer for either 1983-87, but show a statistically significant elevation in breast cancer for the 1988-97 period. The SIRs for all three periods were elevated. Small numbers makes it more difficult to achieve statistical significance. When the small numbers are combined, the 15 year rate is statistically significant.

The review of cancer incidence data in this document is only a screening mechanism to alert usto unusual rates. No cause or reason for the excess cancer in Census Tract 1703 can bedetermined at this point. A possible factor in the breast cancer elevation in white women is thelow percentage of whites in the area coupled with the small numbers of cancer.

A number of factors are known to be associated with a higher risk of developing breast cancer. These include: older age, family history of breast cancer, early menstruation, late menopause, recent use of oral birth control pills, never having children, or having your first child at a late age. Other non-reproductive factors include radiation exposure, consumption of dietary fat, and bodysize. In addition to these, physical activity, alcohol consumption, and pesticide and chemical exposure are suspected risk factors, and are currently being studied to determine their impact on breast cancer risk [1,2,3]. No survey has been conducted in this census tract of the above riskfactors. Therefore, we do not know if any of these have influenced the excess rate of breastcancers seen in Census Tract 1703 for some of the population groups.

Although some environmental contaminants have the potential to affect breast cancer risk, clearenvironmental links to breast cancer are limited, with the exception of radiation exposure and alcohol intake. Some studies have suggested links with certain pesticides, such as DDT. However, more research is needed to establish these chemicals as possible risk factors for breastcancer [9].

The current environmental data for the ASL site, that was collected by EPA, did not showpesticides in the soil at levels that are known to cause health effects. In fact, the EPA RRII reportstates that for surface soils, "pesticides found on site are not significantly different in type and concentration than those found in the background" [10]. Other chemicals found at the ASL site, such as metals and PAHs, have not been associated with breast cancer. In addition, removal andremedial activity at the site has further reduced the amount of site contaminants.

It is extremely difficult to identify the cause or causes of elevated rates of a chronic disease, such as breast cancer, especially in a small population. Since cancers may take many years to develop, various genetic, lifestyle, and environmental factors may interact before the disease becomes apparent. Also, it may be difficult to clearly identify those risk factors when they occurred yearsearlier. Another problem is that a factor may be related differently to the initial development of the disease than to its later course [11].

IV. CONCLUSIONS

LDHH/OPH/SEET reviewed cancer incidence data from 1983-1997. The following conclusions an be made based on the data reviewed:

- 1. The census data suggests that the Census Tract 1703 (which includes the ASL site) has a higher percentage of African Americans, a higher percentage of persons and familiesliving below the poverty level, and a lower income (per person) than Orleans Parish and Louisiana.
- 2. A review of the cancer incidence data for Census Tract 1703 from 1983-1997 showed the following:

From 1988-1997, the observed number of lung, colon, prostate, and total cancerssites combined for Census Tract 1703 are not statistically different from what is expected as compared with the regional rates.

3. A review of breast cancer data showed that:

For the 5-year period, 1983-87, in Census Tract 1703, no statistically significant differences between the breast cancers observed and the cancers expected werefound. For all females and black females, the SIRs were less than 1 and for whitefemales the SIR was approximately 2.5.

For the 10-year period, 1988-97, there was a statistically significant 50% excessof breast cancer for all females combined and black females. There was a statistically significant 400% excess of breast cancer observed in white femalesfor Census Tract 1703. The excess in this rate is contributed by the smallpercentage of white females in the census tract and the small numbers that were used to determine cancer incidence.

For the 15-year period, 1983-97, in Census Tract 1703, no statistically significant excess of breast cancer was found for all females combined or black females. However, a statistically significant 300% excess of breast cancer did occur inwhite women. Again, the excess in this rate is contributed by the small percentage of white females in the census tract and the small numbers that were used to determine cancer incidence.

4. No cause or reason for the excess breast cancers in Census Tract 1703 can be determined from this review. The extent of the influence of the established risk factors for breastcancer is not known at this time and no connection with environmental contamination has been made.

V. PUBLIC HEALTH ACTION PLAN

Actions Taken

- 1. OPH initially examined the Louisiana Tumor Registry (LTR) data in 1997. Also examined at this time, were birth weights of children born in the area. Follow-upexamination of this information occurred in 2001.
- 2. OPH attended all community meetings to assess community concerns, disseminaterequested information, and answer questions. Explanations of the increase

- breast cancerrates were explained to the public during these initial meetings. The importance of earlybreast cancer screening was also discussed.
- 3. OPH worked with ATSDR and the Association of Occupation and Environmental Clinicsto provide environmental medical monitoring to participating residents.

Action Planned

- 1. OPH/SEET will continue to monitor the rates of cancer every five years in Census Tract1703.
- 2. OPH/SEET will provide health education to the community on risk factors associated with breast cancer if requested. Health education will also be provided on the importance of early breast cancer screening.
- 3. This health consultation will be placed in the previously established ASL site repository so that residents and stakeholders will have access to the information contained in it.

VI. REFERENCES

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VII. PREPARERS OF REPORT

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CERTIFICATION

This Agriculture Street Landfill site, Review of Cancer Incidence Data, health consultation wasprepared by the Louisiana Department of Health and Hospitals under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

Tammie McRae, MS Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR has reviewed this public health consultation and concurs with the findings.

Roberta Erlwein Chief, State Program Section, DHAC, ATSDR

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Page last reviewed: December 18, 2009 Page last updated: December 18, 2009

Content source: Agency for Toxic Substances and Disease Registry

Agency for Toxic Substances and Disease Registry, 4770 Buford Hwy NE,

Atlanta, GA 30341

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Appendix B

Subra Company Report

Document: 300002-0156



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To: Aruro J. Blanco

Director 6 RA-DA

Office of Environmental Justice and Tribal Affairs

US EPA Region 6

1445 Ross Avenue

Dallas, Texas 75202-2733

From: Wilma Subra

Subject: Agriculture Street Landfill Super Fund Site

Date: October 12, 2015

In response to your dealings with Sharon Rainey Blanco concerning the Agriculture Street Landfill Superfund Site in New Orleans, I was requested to provide you with data I obtained after Hurricane Katrina from the Ag Street site.

Attached are copies of data resulting from:

- -Samples collected on September 16, 2005 near the corner of Almonaster Boulevard and Liberty Terrace Drive (samples SS-2 soil and SW-2 water).
- -Soil samples collected on October 1, 2005, on St. Ferdenand St. (SS-12) and Abundance St. (SS-11).
- -Soil and soil/sediment mixture collected on February 16, 2006 on the north end of Ag Street landfill off Higgins Blvd.., and along Benefit, Gordon Plaza and Press streets.

A write up of the Agriculture Street Landfill Contamination Areas is presented on the last 4 pages and contains information on a meeting with Sam Coleman on April 19, 2006.

If additional information is needed, please contact me.

ENGINEERING & HYDROGEOLOGY

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Transmitted by E-mail subracom@aol.com

October 6, 2005

Ms. Wilma Subra Subra Company P.O. Box 9813 New Iberia, LA 70562

Subject:

Sediment and Surface Water Sampling and Analyses

Five Louisiana Locations

Dear Ms. Subra:

On September 16, 2005, Altamont Environmental, Inc. (Altamont) assisted Subra Company with sediment and surface water sampling at five locations in south Louisiana. The sampling was conducted as part of an effort to assess potential contamination that may have resulted in residential areas due to the affects of Hurricane Katrina.

In summary: using a small population of samples, this study has shown that several contaminants exist in the residential areas that were sampled. However, two facts remain unknown: the physical extent of these contaminants, and the range of existing concentrations. These determinations can only be made on the basis of additional sampling and characterization of these areas.

This letter contains a description of the background, findings, and conclusions of the sampling and the associated sample analyses.

BACKGROUND

Following Hurricane Katrina, Subra Company requested assistance from Altamont with collection and analyses of sediment and surface water samples at the following general locations:

- Bywater neighborhood in New Orleans
- Near the Industrial Canal in New Orleans
- Chalmette and Meraux

Flooding associated with Hurricane Katrina deposited a layer of sediment in many areas of southeast Louisiana, including these three general areas. The purpose of this project was to screen sediments in residential areas for a wide range of organic and inorganic compounds. Samples were to be similarly collected and analyzed where standing surface water was observed. The samples were analyzed for compounds that might reasonably be expected to occur in these areas, given nearby land uses.

As shown in the following text and tables, the analytical results have been compared to Louisiana Department of Environmental Quality (LDEQ) and US Environmental Protection Agency (US EPA) criteria.

METHODS AND OBSERVATIONS

SAMPLE LOCATION SELECTION

A total of five sample locations were selected in the three previously described general areas. The locations of these samples with respect to the New Orleans area are shown in Figure 1. Each location was chosen on the following bases:

Bywater (SS-1)

The Bywater neighborhood was selected because of the extensive flooding that occurred in a densely populated residential area. During a drive through of the area, a thin layer of residual sediment was observed in most locations southeast of Interstate-10 along North Claiborne Avenue and North Robertson Streets, west of Franklin Avenue. The actual sampling location was in the median at the intersection of North Claiborne and St. Roch Avenues. Figure 2 shows the approximate location of SS-1.

East New Orleans (SS-2 and SW-2; SS-3)

The area in east New Orleans near the Industrial Canal was selected due to extensive flooding that occurred there and the proximity of an EPA Superfund site (Agriculture Street Landfill) to a residential neighborhood.

A sediment layer of variable thickness was also observed in most locations during a drive through of the area. Two sample locations were selected: one (SS-2 and SW-2) near the corner of Almonaster Boulevard and Liberty Terrace Drive, and one (SS-3) along Morrison Avenue near Foch Road. Respectively, these sites were south and north of Interstate 10.

Sample SS-2 was collected from a grassy median, and SW-2 was collected from standing water near the middle of the northbound portion of Almonaster. Both locations were approximately 60 feet south of the northern intersection of Liberty Terrace with Almonaster.

Sample SS-3 was collected from the intersection of Morrison Avenue and the entry drive to "Georgetown of New Orleans;" an apartment complex north of Morrison Avenue.

Samples SS-2 and SW-2 are shown in Figure 3. Sample SS-3 is shown in Figure 4.

Meraux (SS-4)

The Meraux area was selected for sampling due to extensive flooding and the proximity of the Murphy Oil Company refinery to residential areas. Altamont attempted to enter streets west and east of the refinery. Several streets on both of these sides of the refinery were blocked by police barricades. Judy Drive was the first open street east of the refinery. In an attempt to sample near the tank farm portion of the refinery, Altamont selected a location on the west side of Judy Drive, near its intersection with East

Ms. Wilma Subra October 6, 2005 Page 3 of 6

Judge Pérez Drive. The sample was collected from the west side of Judy Drive, approximately 100 feet south of East Judge Pérez Drive, in a location where sediment had been cleared from the street. Sediment thickness near SS-4 ranged from approximately one to four inches. Figure 5 shows the approximate location of SS-4.

Chalmette (SS-5)

The Chalmette area was selected for sampling due to extensive flooding and the proximity of the Exxon/Mobil Oil refinery to residential areas. Altamont collected the sample from the east side of Lloyds Avenue in an area where dried sediment had accumulated. This location was some 850 feet north of West St. Bernard Highway, which is adjacent to the northern boundary of the refinery. Figure 6 shows the approximate location of SS-5.

SAMPLE COLLECTION

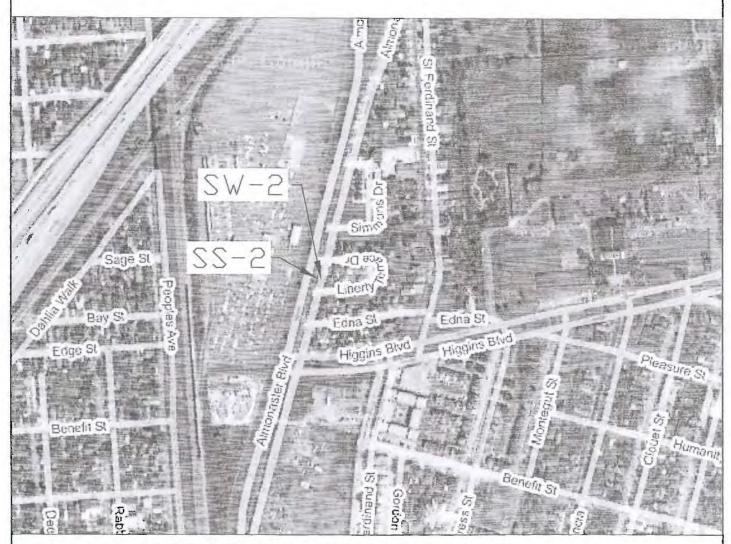
Altamont restricted sediment sampling to the apparent layer of recently deposited material. All sediment samples were collected from undisturbed areas in public rights-of-way. The sole surface water sample was collected from water standing in the street.

In each case, except that encountered at the Almonaster Avenue location, the sediment layer was visibly distinct from the native soil. Sediment observed at Almonaster was saturated and, based on the wet appearance of grass and portions of the adjacent street, flood waters appeared to have receded within hours of the time that the sample was collected. As a result, the relatively thin sediment layer, approximately 1/8-inch, was indistinct from the native soil.

Conditions at the five sample locations were noted with the following observations:

- SS-1: Light gray, fine grained, dry sediment; approximately 1/8-inch thick
- SS-2: Dark brown, fine grained, saturated sediment; approximately 1/8-inch thick
- SW-2: Standing water
- SS-3: Medium gray and grayish-tan (two distinct colors), fine grained, dry sediment; approximately 1/4-inch thick
- SS-4: Dark brown, fine grained, nearly saturated sediment; approximately 1 to 2 inches thick
- SS-5: Medium brown-brown, fine grained, dry sediment; approximately 1/2-inch thick

All samples were collected using stainless steel scoops and/or new vinyl gloves. The collected quantities of soil and water were placed in new sample containers provided by Pace Analytical Services (Pace). The sample containers were then placed in coolers and covered with ice. Altamont maintained control of the cooler throughout the sampling period until delivery of the cooler containing all five samples plus a trip blank, to the Pace laboratory in St. Rose, Louisiana at approximately 5:30 pm on the day of sampling.



@2005 GOOGLE - MAP DATA @2005 NAVTEQ™ -IMAGERY @2005 DIGITAL GLOBE

ALTAMONT ENVIRONMENTAL, INC.

ENGINEERING & HYDROGEOLOGY 50 COLLEGE STREET, ASHEVILLE, NC 28801 TEL 828.281.3350 FAC 828.281.3351 www.altamontenvironmental.com

DRAWN BY: PAUL DOW

PROJECT MANAGER: JIM MCELDUFF CLIENT: SUBRA COMPANY

10/06/05 DATE:

SCALE (FEET) 250 500

APPROXIMATE SAMPLE LOCATIONS SS-2 & SW-2

LOUISIANA SAMPLING NEAR ALMONASTER BLVD. & LIBERTY TERRACE DR.

NEW ORLEANS, LA 70126 FILE PATH: P:\Subra\Louisiana\Figures\ SS-2 SW-2.DWG

FIGURE

Table 1 Volatile Organic Compounds and Total Petroleum Hydrocarbons Analytical Results

Subra Company Louisiana Sampling

September 16, 2005

	Collection	•			V	olatile Organie Co	apounds (VOCs)				TPH - DRO	TPH - GRO
Sample	Date mm/dd/vy	Matrix	Acetone µg/kg	Benzene µg/kg	2-Butanone (MEK) µg/kg	Carbon Disulfide		1,2-Dichloroethane µg/kg	Methylene Chloride μg/kg	Toluene µg/kg	Xylenes (Total) µg/kg	μg/kg	µg/kg
SS-I	09/16/05	Soil	59.0 N A991	1.80 J	7.91 I A99	1.29 J A99	0.7641	0.706 J	64.8 N	2.72 J	0.235 J	NA	NA
SS-2	09/16/05	Soil	143 N A99	1.73 J	15.1 A99	2.43 J A99	0.618 J	<4.35	5.60 N	2.01 J	0.940 J	NA	NA
SS-3	09/16/05	Soil	NA	NA	NA	NA	NA	NA	NA	NA	NA	810,000	<2,500
SS-4	09/16/05	Soil	53.4 N A99	0.710 J	13.8 A99	14.9 A99	0.817 J	<6.70	10.4 N	2.51 J	<6.70	NA.	NA
SS-5	09/16/05	Soil	58.3 N A99	<6.50	9.37 J A99	6.93 A99	0.819 J	<6.50	9.93 N	1.30 J	<6.50	NA	NA
	DEO Soil Standar		160,000	820	580,000	37,000	17,000	800	18,000	69,000	150,000	61,000	61,000
The second second	tion VI Soil Screen	-	70,000,000	660	32,000,000	720,000	320,000	350	8,900	520,000	210,000	NE	NE

	Collection		Volatile Organic Compou uds (VOCs)									
Sample	Date mm/dd/vv	Matrix	Benzene µg/L	2-Butanone (MEK) µg/L	Carbon Disulfide µg/L	Ethylbenzene µg/L	2-Hexanone µg/L	Toluene µg/L	Xylenes (Total) μg/L			
SW-2	09/16/05	Surface Water	1.82	10.1	2.85	0.320 J	0.490 J	2.16	1.45 J			
77 77 77 77	ana Surface W	ater Criteria	12.5	NE	NE	8100	NE	46200	NE			

Notes:

- 1) This table represents detected compounds only.
- 2) For complete analyses and detection limits see the individual laboratory analytical reports,
- 3) Volatile Organic Compound analyses by USEPA Method 8260.
- 4) Bold numbers indicate concentrations above applicable Standards.
- 5) µg/L micrograms per liter.
- 6) ug/kg micrograms per kilogram.
- 7)TPH denotes Total Petroleum Hydrocarbons; DRO denotes Diesel Range Organics; CRO denotes Gasoline Range Organics.
- 3) NE Constituent Not Established in applicable standards.
- 9) A99 Analyte poor performer for this method. The QC recovery data may be poor or erratic.
- 10) J This estimated value for the analyte is below the adjusted reporting limit but above the instrument reporting limit.
- 11) LDEQ Soil Standards: LDEQ Recap Table 1 Screening Option Screening Standards for Soil and Groundwater, updated 9/19/2000.
- 12) EPA Region VI Soil Screening Levels: Region 6 Human Health Medium-Specific Screening Levels 2004-2005; updated 12/21/2004.
- 13) Louisiana Surface Water Criteria: Title 33, Environmental Quality, Part IX. Water Quality, Subpart 1, Water Pollution Control; Table 1 Numerical Criteria for Specific Toxic Substances; updated 7/05.
- 14) N Methylene chloride and acctone are common solvents used extensively in most laboratories. Due to facility damage caused by Hurricane Katrina, these compounds may be present at elevated concentrations in the air.
 - Results for these analytes may be affected by random spikes in the laboratory atmosphere during analysis of both samples and calibration standards, resulting in a greater margin of error.
 - The reporting limits for methylene chloride and acetone have been raised accordingly. The laboratory is scheduling all facility repairs as soon as possible
- 15) NA Constituent Not Analyzed for that sample.

Table 2 Semivolatile Organic Compounds Analytical Results

Subra Company Louisiana Sampling

September 16, 2005

			-	7			emiyolatil	e Organic	Compour	ds (SVO	Cs)			-	
Sample	Collection Date	Matrix	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(b) fluoranthene	Benzo(g,h,i)perylene	Венzо(я)ругене	Carbazole	Chrysene	bis(2-Ethylhexyl)phthalate	Fluoranthene	Indeno(1,2,3-cd)pyrene	Phenanthrene	Pyrene
	mm/dd/yy		µg/kg	µg/kg	µg/kg	μg/kg	ug/kg	µg/kg	µg/kg	µg/kg	ug/kg	µg/kg	μg/kg	µg/kg	µg/kg
SS-1	09/16/05	Soil	110 J	75.3 J	196 J	343	78.9 J	195 J	47.3 J	254 J	885	685	65.9 J	201 J	361
SS-2	09/16/05	Soil	<330	69.9 J	179 J	3201	<330	167 J	56.3 J	226 J	304 J	654	63.9 J	211 J	197 I
SS-4	09/16/05	Soil	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330
SS-5	09/16/05	Soil	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330	<330
	LDEQ Soil Standar	rds	NE	1,400,000	560	560	NE	330	NE	61,000	32,000	200,000	560	NE	150,000
EPA	Region VI Soil Screen	ing Levels	3,700,000	22,000,000	620	620	NE	62	24,000	62,000	35,000	2,300,000	620	NE	2,300,000

Sample	Collection Date	Matrix	bis (2- S Ethylbexyl) OA phthalate
SW-2	09/16/05	Surface Water	13.1
Lou	isiana Surface Wate	er Criteria	NE

Notes:

- 1) This table represents detected compounds only.
- 2) For complete analyses and detection limits see the individual laboratory analytical reports.
- 3) Semivolatile Organic Compound analyses by USEPA Method 8270.
- 4) Bold numbers indicate concentrations above applicable Standards.
- 5) µg/L micrograms per liter.
- 6) μg/kg micrograms per kilogram.
- 7) NE Constituent Not Established in applicable standards.
- 8) A99 Analyte poor performer for this method. The QC recovery data may be poor or erratic,
- 9) J This estimated value for the analyte is below the adjusted reporting limit but above the instrument reporting limit.
- 10) LDEQ Soil Standards : LDEQ Recap Table 1 Screening Option Screening Standards for Soil and Groundwater; updated 9/19/2000.
- 11) EPA Region VI Soil Screening Levels: Region 6 Human Health Medium-Specific Screening Levels 2004-2005; updated 12/21/2004.
- 12) Louisiana Surface Water Criteria: Title 33, Environmental Quality, Part IX, Water Quality, Subpart 1. Water Pollution Control: Table 1 Numerical Criteria for Specific Toxic Substances; updated 7/05.

Table 3 Metals Analytical Results

Subra Company Sampling New Orleans, Louisiana

September 16, 2005

		TI TI	Metals							
Sample	Collection Date mm/dd/yv	Matrix	mg/kg	Barium Barium	Cadmium Cadmium	da/sam	Fead way	Mercury Mercury		
SS-1	09/16/05	Soil	29.3	113	1.1	11.0	230	0.0799 J		
SS-2	09/16/05	Soil	5.2	137	0.8	7.5	60	0.0362 J		
SS-3	09/16/05	Soil	11.0	491	2.5	20.7	52	0.0815		
SS-4	09/16/05	Soil	<3.0	24.1	<0.5	4.4	6	< 0.0980		
SS-5	09/16/05	Soil	<3.0	31.5	0.5	5.6	12	< 0.0926		
I	DEQ Soil Stand	lards	0.38	520	3.7	22	400	2.2		
EPA Re	gion VI Soil Scre	0.39	5,500	39	210	400	NE			

			Metals
Sample	Collection Date mm/dd/yy	Matrix	T/8 Barium
SW-2	09/16/05	Surface Water	0.29
Louisia	na Surface W	ater Criteria	NE

Notes:

- 1) This table represents detected compounds only.
- 2) For complete analyses and detection limits see the individual laboratory analytical reports.
- 3) Metals analyses by various methods.
- 4) Bold numbers indicate concentrations above applicable Standards.
- μg/L micrograms per liter.
- μg/kg micrograms per kilogram.
- 7) NE Not Established in applicable standards.
- 8) A99 Analyte poor performer for this method. The QC recovery data may be poor or erratic.
- J This estimated value for the analyte is below the adjusted reporting limit but above the instrument reporting limit.
- 10) LDEQ Soil Standards: LDEQ Recap Table 1 Screening Option Screening Standards for Soil and Groundwater; updated 9/19/2000.
- 11) EPA Region VI Soil Screening Levels: Region 6 Human Health Medium-Specific Screening Levels 2004-2005; updated 12/21/2004.
- 12) Louisiana Surface Water Criteria: Title 33, Environmental Quality, Part IX. Water Quality, Subpart 1. Water Pollution Control; Table 1 Numerical Criteria for Specific Toxic Substances; updated 7/05.
- 13) The LDEQ Soil Standard used for Chromium is that established for Hexavalent Chromium; the more toxic of the two forms of Chromium.

10/6/2005

ALTAMONT ENVIRONMENTAL, INC.

ENGINEERING & HYDROGEOLOGY

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TRANSMITTAL LETTER

To: Wilma Subra	
From: Kyle Westmoreland	
Date: October 21, 2005	
cc:	
Subject: Draft Tables and Figures	

Enclosed are Draft Tables and Draft Figures from the Gulf Coast Sampling Event. Please call us if you have any questions.

Sincerely,

Kyle Westmoreland

Table 3-A Metals Analytical Results

Subra Company Louisiana Sampling October 1 and 2, 2005

Sample	Latitude	Longitude	Collection Date mm/dd/yy	Matrix	Metals						
					Arsenic mg/kg	Barium mg/kg	Cadmium mg/kg	Chromium mg/kg	Lead mg/kg	Selenium mg/kg	Mercury mg/kg
SS-11	290 59.316' North	90° 2.386' West	10/01/05	Soil	11	280	<0.10	16	41	<0.50	0.015
SS-12	29° 59.533' North	90° 2.481' West	10/01/05	Soil	13	220	1.6	11	53	<1.0	0.054
SS-13	29° 38.975' North	89° 57.699' West	10/01/05	Soil	6.6	200	< 0.097	9.4	17	<0.48	0.051
SS-14	29 ⁰ 43.623' North	90° 7.690' West	10/01/05	Soil	8.0	210	< 0.35	11	35	<1.7	0.025
SS-15	30° 52.175' North	89 ⁰ 68.826' West	10/02/05	Soil	1.2	70	0.51	2.9	30	1.0	0.088
LDEQ RECAP Standards for Soil				0.38	5,200	37	220	400	370	22	
EPA Region VI Human Health Medium-Specific Screening Levels				0.39	5,500	39	30	400	390	NE	

Notes:

- 1) This table represents detected compounds only
- 2) For complete analyses and detection limits see the individual laboratory analytical reports
- 3) Metals analyses by USEPA method 6010 with the exception of Mercury by USEPA method 7471
- 4) LDEQ RECAP Standards for Soil taken from "Table 2: Management Option 1, Standards for Soil, Non-Industrial Soil" Louisiana Department of Environmental Quality, Risk Evaluation / Corrective Action Program, September 2000
- 5) EPA Region VI Human Health Medium-Specific Screening Levels taken from "Region 6 Human Health Medium-Specific Screening Levels 2004-2005 Table, Residential Soil," 12/1/2004
- 6) Hexavalent Chromium used for Soil Standards and Screening Levels
- 7) mg/kg milligrams per kilogram
- 8) Bold numbers indicate concentrations above applicable standards and/or screening levels
- 9) NE indicates chemical Not Established in applicable screening levels

10/21/2005

DRAFT

Table 3-B Semivolatile Organic Compounds (SVOCs) Analytical Results

Subra Company Louisiana Sampling October 1 and 2, 2005

Sample	Latitude	Longitude	Collection Date	Matrix	SVOCs						
					Benzo (k) fluoranthene	Benzo (b) fluoranthene	Benzo (a) anthracene	Benzo (a) pyrene	Chrysene	Fluoranthene	Indeno (1,2,3-cd) pyrene
		0	mm/dd/yy	6.11	μg/kg	μg/kg	μg/kg	µg/kg	μg/kg	µg/kg	µg/kg
SS-11	29° 59.316' North	90° 2.386' West	10/01/05	Soil	<430	<430	<430	<430	<430	<430	<430
SS-12	29 ⁰ 59.533' North	90 ⁰ 2.481' West	10/01/05	Soil	1200	1200	900	1200	1500	2800	720
SS-13	29 ⁰ 38.975' North	89 ⁰ 57.699' West	10/01/05	Soil	<340	<340	<340	<340	<340	<340	<340
SS-14	29 ⁰ 43.623' North	90° 7.690' West	10/01/05	Soil	<1200	<1200	<1200	<1200	<1200	<1200	<1200
SS-15	30° 52.175' North	89 ⁰ 68.826' West	10/02/05	Soil	<3800	<3800	<3800	<3800	<3800	<3800	<3800
LDEQ RECAP Standards for Soil					5,500	560	560	330	61,000	2,000,000	560
EPA Region VI Human Health Medium-Specific Screening Levels					6,200	620	620	62	62,000	2,300,000	620

Notes:

- 1) This table represents detected compounds only
- 2) For complete analyses and detection limits see the individual laboratory analytical reports
- 3) SVOC analysis by USEPA 8270
- 4) LDEQ RECAP Standards for Soil taken from "Table 2: Management Option 1, Standards for Soil, Non-Industrial Soil," Louisiana Department of Environmental Quality, Risk Evaluation / Corrective Action Program, September 2000
- 5) EPA Region VI Human Health Medium-Specific Screening Levels taken from "Region 6 Human Health Medium-Specific Screening Levels 2004-2005 Table, Residential Soil," 12/1/2004
- 6) µg/kg micrograms per kilogram
- 7) Bold numbers indicate concentrations above applicable standards and/or screening levels

10/21/2005

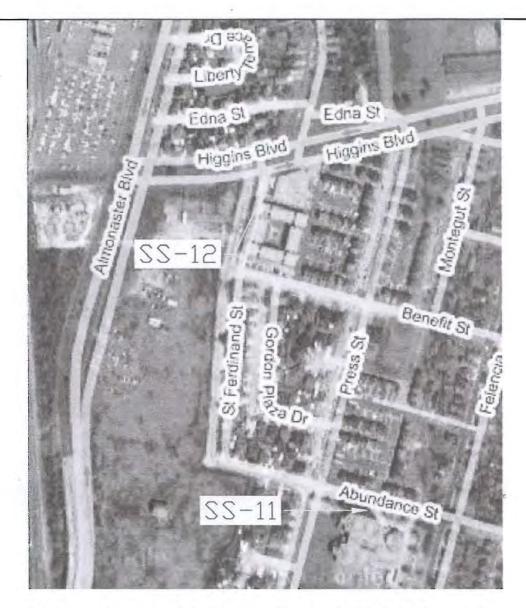
Table 3-C Volatile Organic Compounds (VOCs) Analytical Results

Subra Company Louisiana Sampling October 1 and 2, 2005

Sample	Latitude	atitude Longitude		Matrix	VOCs Naphthalene μg/kg	
SS-11	290 59.316' North	90° 2.386' West	10/01/05	Soil	NA	
SS-12	290 59.533' North	90° 2.481' West	10/01/05	Soil	12	
SS-13	290 38.975' North	890 57.699' West	10/01/05	Soil	NA	
SS-14	290 43.623' North	90 ⁰ 7.690' West	10/01/05	Soil	NA	
SS-15	30° 52.175' North	89° 68.826' West	10/02/05	Soil	NA	
	63,000					
EPA R	120					

Notes:

- 1) This table represents detected compounds only
- 2) For complete analyses and detection limits see the individual laboratory analytical reports
- 3) VOC analysis by USEPA 8260
- 4) LDEQ RECAP Standards for Soil taken from "Table 2: Management Option 1, Standards for Soil, Non-Industrial Soil," Louisiana Department of Environmental Quality, Risk Evaluation / Corrective Action Program, September 2000
- EPA Region VI Human Health Medium-Specific Screening Levels taken from "Region 6 Human Health Medium-Specific Screening Levels 2004-2005 Table, Residential Soil," 12/1/2004
- 6) μg/kg micrograms per kilogram



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DRAWN BY: PAUL DOW PROJECT MANAGER: JIM MCELDUFF

CLIENT: SUBRA COMPANY DATE: 10/19/05

SCALE (FEET) 200 400

APPROXIMATE SAMPLE LOCATIONS SS-II & SS-I2

NEW ORLEANS, LA

FILE PATH: P:\Subra\Gulf Coast\Figures\ Sampling Locations.dwg

FIGURE



3814 Old Jeanerette Road, New Iberia, LA 70563 ° P.O. Box 9813, New Iberia, LA 70562-9813 Phone 337.367.2216 ° Fax 337.367.2217 ° E-mail subracom@aol.com

Agriculture Street Landfill Superfund Site

By Wilma Subra September 25, 2014

On behalf of the Concerned Citizens of Agriculture Street Landfill, I served as the technical advisor to the community beginning in 1996. The Environmental Protection Agency funds the Superfund Technical Assistance program to assist community members at Superfund Sites to participate in the Superfund process. I have served as technical advisors at 6 Superfund sites in Louisiana, a number of Superfund sites in Texas and Florida, and pre-superfund sites across the United States.

I have continued to monitor the situation at the Agriculture Street Landfill site up to the present, including extensive sampling on the site and interaction with community member and state and federal regulatory agencies following Hurricane Katrina.

In the handout you have a history of the Agriculture Street Landfill and figures depicting the development on top of the waste in the Landfill.

Under the Superfund process EPA divided the Agriculture Street Landfill site into a number of operable unit.

- Operable Unit 1 is the undeveloped area and is depicted on page 2 of the handout as the tree area between Almonaster and St Ferdinand.
- -Operable Unit 2 is the residential properties on the site.
- Operable Unit 3 is the Shirley Jefferson Community Center at the corner of Benefit and Press.
- -Operable Unit 4 is Moton Elementary School at the corner of Press and Aundance
- -Operable Unit 5 Groundwater under and in the landfill debris at the site

The waste in the landfill and contaminating the soil in the yards of the residential area, community center and school contain the following chemicals in excess of acceptable standards.

Polynuclear Aromatic Hydocarbons

Benzo(a)anthracene

Benzo(a)prene

Benzo(b)fluoranthene

Benzo(k)fluoranthene

Dibenzo(a,h)anthracene

Indeno(1,2,3-cd)pyrene

PCBs

Arochlor 1248

Arochlor 1254

Arochlor 1260

Heavy Metals

Arsenic

Beryllium

Chromium

Cobalt

Copper

Lead

Thallium

Pesticides

4,4' DDD

Dioxins and Furans – these very toxic chemicals are in excess of the newly established EPA standards

The chemicals present at the Agriculture Street site consist of known and suspected cancer causing agents as well as teratogens and mutagens.

After Hurricane Katrina, toxic chemicals were deposited on the site as a result of contaminated sediment sludge carried by the storm surge, and chemicals in the landfill debris that was disrupted as a result of extensive flooding of the site and associated hurricane damage. The undeveloped area waste was flooded by the hurricane flood waters and the flood waters mixed with the waste generated large quantities of leachate that further contaminated the site.

Sampling I performed on the Agriculture Street Site after Hurricane Katrina identified contaminants in excess of acceptable standards

Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Indeno(,2,3-cd)pyrene
Arsenic
Dioxin and Furans

The location of the Benzo compounds are depicted in the map on page 8 of the handout.

The area of apartments along Higgins, on both sides of Press were required to be isolated from human contact with fencing following my sampling and additional sampling by EPA.

These chemicals are known and suspected cancer causing agents, mutagens and teratogens.

Additional information on the Agriculture Street Site is presented in the handout.

Contaminants originating from the landfill site as well as waste contaminants carried onto the site by Hurricane Katrina storm surge, continue to be present on and in the Agriculture Street site.

Agriculture Street Landfill Superfund Site

by Wilma Subra

The African American community of Agriculture Street lives on top of a municipal and industrial waste landfill in New Orleans East. The City of New Orleans operated the 95 acre landfill from 1909 to 1965. The waste was deposited 17 to 20 feet deep over 95 acres in a marsh area with ground water at or near the land surface. Beginning in the 1970s, the City of New Orleans with HUD financing constructed private and public housing, recreational facilities and an elementary school on 47 acres on top of the landfill. The remaining 48 acres remained undeveloped. The developed area on top of the landfill consists of 67 individually owned homes, 179 rent-to-own townhouses, 128 senior citizen apartments, Moton Elementary School, Press Park Community Center and McGruder Playground.

In December 1994, the Environmental Protection Agency placed the Agriculture Street Landfill on the National Priority List. The landfill and the community living on top of the landfill became a superfund site. The City of New Orleans was named the potentially responsible party by the Environmental Protection Agency. The City of New Orleans refused to participate in the Superfund Process. The State of Louisiana also refused to contribute their financial part of the site clean up. EPA had to use emergency cleanup funds to remediate the site.

The yards of homes on the Agriculture Street landfill were a combination of landfill waste, river sand and some soil. The yard material was contaminated from the surface down to 17 to 20 feet with carcinogenic poly nuclear hydrocarbon such as benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene and heavy metals arsenic and lead.

The remedy established by EPA only provided for the excavation and replacement of two feet of soil where the soil was exposed. No removal and replacement was planned for under homes, structures, streets and driveways. A calculation of area available for excavation was a mere 10% of the surface area of the developed portion of the landfill. Thus the other 90% will remain contaminated from the surface down to 17 to 20 feet. The contaminated soil and waste are in direct contact with the clean soil and contaminants will migrate and contaminate the clean soils.

Relocation of the entire community would have cost \$12 million. The EPA spent more than \$20 million to remove and replace 10% of the developed site and placed a foot of soil on the undeveloped portion. And still the community lives on top of a Superfund landfill.

Community Impacts due to Remedial Activities

- * Total neighborhood disruption
- * Quality of life degraded
- * Waterline breakage site flooding, street and property cave-ins
- * Backing up of sewage into homes
- * Gas lines broken and service disrupted
- * Cable TV lines cut on a frequent basis
- * Dust deposited inside homes
- * Excavated material stockpiled on site adjacent to residential homes
- * Children playing in contaminated excavated areas and on stockpiles
- * Noise and shaking of homes by excavation equipment

The health impacts experienced by the people living on top of the Agriculture Street Landfill are varied and severe.

In an October 1997 Agency for Toxics Study and Disease Registry health consultation, the rate of breast cancer in women from 1988-1993 was statistically significantly increased. There was a 60% excess of breast cancer in all females and in black females in the census tract that was made up of the Agriculture Street Landfill.

In 1999 a health survey was performed by the community. The most frequent condition was stress due to living on top of a toxic dump: 71% of the individuals in 86% of the households; 41% of the individuals in 49% of the households were on doctor prescribed medication for treatment of the landfill stress.

The second most frequently reported medical condition was breathing problems: 40% of the individuals in 67% of the households experienced asthma, bronchitis, sinus problems, emphysema, and upper respiratory problems.

The third most frequently reported health symptom was dizziness or faint feeling experienced by 29% of the individuals in 66% of the households.

two samples at 2910 ug/kg and 4060 ug/kg. DDE was detected above the LDEQ RECAP value of 1700 ug/kg in two samples at 2540 ug/kg and 6480 ug/kg. DDT was detected above the LDEQ RECAP value of 1700 ug/kg in one sample at 3320 ug/kg. Dieldrin was detected above the LDEQ RECAP value of 30 ug/kg in eight samples at levels ranging from 30.7 ug/kg to 1100 ug/kg. Heptachlor was detected above the LDEQ RECAP value of 16 ug/kg in two samples at 23.4 ug/kg and 34.7 ug/kg. Heptachlor epoxide was detected above the LDEQ RECAP value of 53 ug/kg in four samples at levels ranging from 79.8 ug/kg to 683 ug/kg. All of the exceedences for pesticides were from soil samples except two of the Dieldrin samples which were from samples consisting of soil mixed with sediment. Although the levels of these pesticides exceed their respective RECAP screening values, the levels fall within EPA's risk range of 1 in 1,000,000 to 1 in 10,000 risk of an individual developing cancer over a lifetime from exposure to those concentrations in residential soils.

February 16, 2006

Samples consisting of soil and soil mixed with sediment collected on February 16, 2006 were analyzed for arsenic, benzo(a)pyrene [B(a)P] and lead. Detected levels of arsenic were below the LDEQ RECAP value of 12 mg/kg. B(a)P was detected above the LDEQ RECAP value of 330 ug/kg in 4 of 15 samples at levels of 355 ug/kg, 1130 ug/kg, 1320 ug/kg and 15600 ug/kg. All of the exceedences for B(a)P were from samples consisting of soil mixed with sediment. Although the levels of B(a)P exceed the RECAP screening value, the levels of 355 ug/kg, 1130 ug/kg and 1320 ug/kg fall within EPA's risk range of 1 in 1,000,000 to 1 in 10,000 risk of an individual developing cancer over a lifetime from exposure to those concentrations in residential soils. The highest level detected (15600 ug/kg) was at the north end of the Agriculture Street Landfill, and it exceeds EPA's cancer risk range. Lead was detected above the LDEQ RECAP value of 400 mg/kg in 9 of 20 samples at levels ranging from 424 mg/kg to 3070 mg/kg. All of the exceedences for lead were from soil samples.

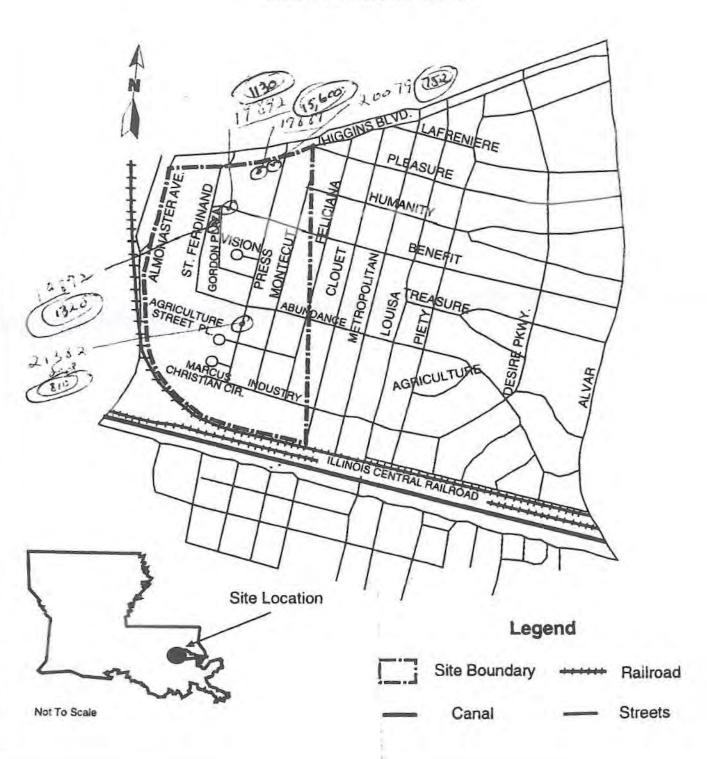
EPA is working with LDEQ and its other Federal partners to determine the appropriate course of action for the localized area of elevated B(a)P at the north end of the Agriculture Street Landfill. For lead, more focused analyses of samples are underway to try to determine the source of the elevated lead, EPA and LDEQ are also working closely together to determine next steps.

Top of page

EPA Home | Privacy and Security Notice | Contact Us <epadateLast updated on Tuesday, April 4th, 2006 URL: http://www.epa.gov/katrina/testresults/sediments/focused_daily.html Valuer ug/Rs PAHr

RECAP Standon 330 19/05

Figure 1
Agriculture Street Landfill
Superfund Site
New Orleans, Louisiana



Undeveloped Area of Agriculture Street Landfill

Ursula Lennox (214-665 6743), Remedial Project Manager for the Agriculture Street Landfill Superfund Site, November 29, 2006, Personal Communication

The EPA is negotiating a consent decree with the City of New Orleans concerning the types of institutional controls the EPA wants to have implemented as it relates to the site. The negotiations are all internal and not publicly available.

Sam Coleman (214-665-6701, cell 214-789-2016), Director of the Superfund Division of Region 6, EPA, April 19, 2006, meeting at the Hurricane Command Center in Metarie (New Orleans)

Prior to Hurricane Katrina, EPA was preparing to issue a letter to the city of New Orleans concerning the lack of maintenance of the cap on the Undeveloped Area. The Undeveloped Area is owned by a number of individuals and the city owns the areas designated as streets in the Undeveloped Area.

EPA Publication, November 7, 2006, Agriculture Street Landfill - Current Status

"The EPA is negotiating with the City of New Orleans to implement institutional controls. Once this is completed, the deletion process will continue."

Conveyance Notice Requirements

EPA Publication November 7, 2006 - Agriculture Street Landfill
Current Status

Nine single-family private homes in Gordon Plaza Subdivision were not remediated during the excavation of contaminated soils and replacement with clean soil. This was based on the homeowners electing to not participate in the remediating of their property. A list of properties not remediated are attached (EPA Sep. 30, 2004 letter). Fifty-eight of 67 homes had their yards remediated.

An undated letter from Greg Cooke, EPA Regional Administrator Region 6 provided information on certificate of completion.

On March 16, 2005 LA DEQ issues Conveyance Notice Requirements to landowners who did and did not have their property remediated. Copies are attached.

On June 28, 2005 LA DEQ issued a clarification letter concerning the New Orleans Clerk of Court and the filing process of the Conveyance Notice (copy attached).

Agriculture Street Landfill Contamination Areas

-US Environmental Protection Agency - Daily Reports for Focused Sampling of Flood Impacted Soil and Sediment, February 16, 2006

EPA is working with LA DEQ and its other Federal partners to determine the appropriate course of action for the localized area of B(a)P at the north end of the Agriculture Street Landfill.

-US Environmental Protection Agency - Release of Multi-Agency Report shows elevated lead levels in New Orleans soil, consistent with historic levels of urban lead, April 4, 2006

One location near the Agriculture Street Landfill showed levels of benzo(a)pyrene exceeding EPA's residential guidelines. Federal partners are working to determine the appropriate course of action for the localized area of elevated Benzo(a)pyrene.

-High Levels of Lead Fund in New Orleans Area, The Times Picayune, April 5, 2006 by Matthew Brown

At the Agriculture Street Landfill site, a residential area built on top of a closed landfill off of Almonaster Avenue, the EPA found the petroleum constituent benzo(a)pyrene at a concentration of 15.6 parts per million. That's almost 50 times the screening standard of 0.33 parts per million.

EPA Regional Hazardous Waste Director Sam Coleman said his agency would "discuss with property owners and the city what actions are appropriate for that location.

-Meeting with Sam Coleman

Sam Coleman (214-665-6701, cell 214-789-2016), Director of the Superfund Division of Region 6, EPA, April 19, 2006, meeting at the Hurricane Command Center in Metarie (New Orleans)

Concerning the Agriculture Street Landfill area where elevated levels of benzo(a)pyrene were identified - EPA will coordinate with the City of New Orleans, the Housing Authority of New Orleans and private landowners concerning additional work. One area of consideration has to do with whether the structures in the contaminated area will be repaired or demolished. EPA does not want to remediate the contaminated areas (remove and replace), if contractors will then disrupt the remediated areas. The phasing of the work is important. After the contractors are finished, then the EPA remediation contractor will conduct their remedial activities.

-Public Housing Authority Plans, FY 2006-2010, Annual Plan for Fiscal Year 2007

Demolition/Disposition Activity Document

Press Park Demolition and Disposition, 56 units are to be demolished and disposed of. The activity will begin in FY 2006 and be completed in FY 2007. These are the 14 Press Park buildings containing 56 housing units on the northern portion of the Agriculture Street site that are surrounded by the hurricane fence due to contamination of the surface soil with benzo(a)pyrene.

The Times-Picanume High levels of lead found in N.O. area

Carcinogen reported near former landfill Wednesday, April 05, 2006 By Matthew Brown West Bank bureau

Fourteen neighborhoods in the New Orleans area have dangerously high lead levels, and one residential neighborhood around the old Agriculture Street landfill has high levels of a cancer-causing petroleum constituent, federal and state environmental regulators said Tuesday, as they released the latest results from contamination tests following Hurricane Katrina.

The announcement marked the first time in the government's 7-month environmental investigation since the storm that officials have acknowledged contamination problems in neighborhoods beyond a million-gallon oil spill in St. Bernard Parish. While high levels of contaminants have been reported in at least 150 individual sites, officials previously cautioned against interpreting the results as neighborhood-wide problems that could cause long-term health issues.

In releasing the latest information, government officials blamed the lead contamination not on flooding caused by Katrina, but on a pre-existing condition attributed to New Orleans' long urban history.

Precise locations of contamination were not immediately available.

EPA and Louisiana Department of Environmental Quality officials said Tuesday that they have not decided how to address the contamination. In the interim, they offered recommendations to individual homeowners that include cleaning children's hands after they play outside, frequently wiping dusty surfaces and floors, and covering bare dirt in residential yards with grass, bushes or four to six inches of new topsoil, mulch or sand.

Howard Mielke, a Xavier University researcher considered one of the nation's foremost experts on lead contamination, said the new information put out by the Department of Environmental Quality and EPA obscures a much broader lead contamination issue affecting as much as 40 percent of the city.

"It's overlooking the severity of the problem that we have in New Orleans," Mielke said. "Twenty-five percent of children in the inner city were lead-poisoned before Katrina. I'm afraid that the city remains about as contaminated as it was before the storm."

Department of Environmental Quality toxicologist Tom Harris said the 15 areas identified as contamination hot spots were narrowed down from almost 800 sites initially tested.

"It was less than 2 percent of the data set we're looking at," Harris said. "It's not by a long shot a city-wide issue. It is fairly isolated if you look at the relatively small number that exceeded 400 parts per million."

The lead-contaminated areas had levels of the heavy metal greater than 400 parts per million -- the

amount considered a threat to human health. One location had lead as high as 3,900 parts per million, and "six or seven" locations had lead levels topping 1,000 parts per million, said Don Williams, an EPA risk assessment expert.

Lead can cause severe neurological problems, particularly among young children whose bodies are still developing. Used for decades in paint and gasoline, it breaks down into a fine powder that can be ingested or inhaled.

At the Agriculture Street landfill site, a residential area built on top of a closed landfill off of Almonaster Avenue, the EPA found the petroleum constituent benzo(a)pyrene at a concentration of 15.6 parts per million. That's almost 50 times the screening standard of 0.33 parts per million.

EPA Regional Hazardous Waste Director Sam Coleman said his agency would "discuss with property owners and the city what actions are appropriate for that location."

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Appendix C

Expert Declaration of Richard Thomas Di Giulio, Ph.D.

Document: 300002-0156

Expert Declaration of Richard Thomas Di Giulio, Ph.D.

EVALUATION OF EPA FOURTH FIVE-YEAR REVIEW REPORT FOR AGRICULTURE STREET LANDFILL SUPERFUND SITE NEW ORLEANS, ORLEANS PARISH, LOUISIANA

Prepared in connection with *Residents of Gordon Plaza, Inc. v. Cantrell, et al.*United States District Court for the Eastern District of Louisiana
Civil Action No. 18-cy-04226-ILRL-DMD

February 21, 2019

Testimony of Richard Thomas Di Giulio, Ph.D.
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I. My Qualifications

- 1. I am a toxicologist. Toxicology is the study of the biological effects of substances—including pollutants—on organisms. Toxicologists are interested in identification of hazards posed by pollutants as well as the dosages at which pollutants are, or may be, hazardous.
- 2. I have published more than 170 papers in the field of toxicology in peer-reviewed journals.
- 3. I direct the Duke University Superfund Research Center and Duke's graduate program in Environmental Health and Toxicology. I am a member of EPA's Board of Scientific Counselors, Chemical Safety for Sustainability Subcommittee and have served on the Risk and Technology Review (RTR) Methods Panel of EPA's Scientific Advisory Board.
- 4. As a toxicologist I maintain a familiarity with developments in the related fields of environmental risk assessment and epidemiology and, due to my research and experience, I have specialized knowledge in those fields that informs my professional opinions and endeavors.
- 5. An accurate copy of my Curriculum Vitae is attached as Exhibit A to this Declaration and is incorporated by reference. My biography on the Duke University web page is located at this link: https://nicholas.duke.edu/people/faculty/digiulio.

II. The Purpose of this Declaration and Opinion

- 6. I have been asked for an opinion about whether EPA's Fourth Five-Year Review Report for the Agriculture Street Landfill Superfund Site establishes the lack of a significant threat to the health of residents living in a neighborhood that is located on the Agriculture Street Landfill.
- 7. I have also been asked whether residents living on this municipal landfill may be exposed to an elevated risk of adverse health effects.
- 8. All opinions offered in this Declaration are grounded in the methods and procedures of science, including evaluation of the facts specific to the Agriculture Landfill Site and known characteristics of municipal landfills in light of current scientific knowledge and also in light of the limitations of current scientific knowledge and tools. In general, there are no certainties in science; my opinions are therefore based on current scientific knowledge in fields where research is ongoing.
- 9. I understand that this Declaration will be submitted to the U.S. District Court for the Eastern District of Louisiana in connection with a defense motion for summary judgment in *Residents of Gordon Plaza, Inc. v. Cantrell, et al.*, Civil Action No. 18-cv-04226-ILRL-DMD.

III. Opinions

- 10. The information presented in EPA's Fourth Five-Year Review is not sufficient to establish the lack of a significant threat to the health of Agriculture Street Landfill residents.
- 11. Agriculture Street Landfill residents are most likely subject to a significant elevated probability of developing adverse health effects due to contaminants in the landfill. "Significant" in the context of this Declaration means more than trivial or *de minimis*.

- 12. Location of a housing development on top of a municipal landfill is not prudent in terms of public health. This is because current risk assessment tools are inadequate to assess reliably the cumulative and potentially synergistic effects of potential residential exposures to the mixtures of chemicals typically present in a municipal landfill and because engineered barriers to public exposures are never completely reliable, especially when those barriers are not applied consistently.
- 13. Accordingly, contaminants at the Agriculture Street Landfill may pose a significant risk (*i.e.*, more than a trivial risk) of adverse health effects to Agriculture Street Landfill residents.

IV. Bases for My Opinions

Background Part A-Site Information

14. The Agriculture Street Landfill served as a City of New Orleans municipal landfill from approximately 1909 until the late 1950s. EPA *Record of Decision* at p.1 (April 2002). The landfill received municipal waste, ash from incineration of such waste, and ash and debris from open burning. *Id.* It reopened for approximately one year in 1965 for open burning and disposal of waste from Hurricane Betsy. *Id.* EPA summarized the landfill's operational history as follows:

A 1951 Refuse Disposal Study for New Orleans (Study) reported that the ASL site was used as a disposal facility for commercial refuse from 1909 through 1934. During this period, practically all household garbage generated within the municipality of New Orleans was disposed of by incineration and a portion of the resulting ash was land filled at the ASL. During the years from 1934 through 1939, a restrictive budget limited the incineration of household wastes causing the ASL to be opened to receive municipal and commercial waste. Between the years of 1939 and 1942, incineration again became the chief means for the reduction of household garbage. During World War II, a lack of labor again diverted household wastes to the ASL. Actual operation of the ASL as a permanent, sanitary, controlled landfill began in October 1948. A contract was awarded for salvage materials to be recovered and a 5-year lease was signed with the landowner. The Study states that poor operation and inadequate supervision during this period resulted in fires and other nuisances at the location.

In approximately 1958, operations at the landfill were terminated. The landfill was temporarily reopened in 1965 to receive debris resulting from the effects of hurricane Betsy. Debris was reported to have been deposited at a rate of up to 300 truckloads per day and open burning was used as a means of waste reduction. The landfill was officially closed in 1966, although determining the exact closure date is complicated by evidence of unofficial or illegal dumping.

EPA, *Phase II Close Out Report for the Agriculture Street Landfill Superfund Site*, New Orleans, Louisiana (CERCLIS No.: LAD981056997) at p. 2-2 (June 2001).

15. EPA engaged in several "removal actions" at the Agriculture Landfill Site during the mid-1990s until early 2000. EPA, *Fourth Five-Year Review Report* at p. 6.

- A. EPA erected a fence around the undeveloped portion of the landfill (approximately 48 acres). EPA *Record of Decision* at p. 3 (April 2002)
- B. EPA removed playground equipment at the Shirley Jefferson Community Center and backfilled and sodded that area. *Id.* at p. 4.
- C. EPA repaired the fence around the undeveloped area, which trespassers had damaged. *Id*.
- D. EPA cleared and graded the undeveloped area, placing a permeable geotextile mat and orange fencing on that area. EPA covered the mat with twelve inches of fill and re-established vegetation. *Id.* at p. 5.
- E. In residential areas (with exceptions), EPA excavated 24 inches of soil, putting down a permeable geotextile mat/marker, backfilling, and covering with sod. *Id.*
- F. EPA decided to take no action to clean up groundwater or at the Moton Elementary School. EPA, *Fourth Five-Year Review Report* at p. 7.
- 16. In 2002, EPA decided to take no further action. *Id*.
- 17. In 2006, the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) estimated, "Incidental ingestion of soil containing [a sampled] concentration [on the landfill] would yield a cancer risk of 2.70 x 10⁻⁴ or 27 excess cancers per 10,000 people exposed over a lifetime." This is outside of EPA's "acceptable risk" range. Because ATSDR considers such estimates to be "accurate within one order of magnitude," the risk calculation might actually represent 27 excess cancers per 1000 people—*i.e.*, a risk elevated by 2.7% from only one type of chemical present at the landfill. ATSDR, *Health Consultation (EPA Facility ID: LAD981056997)* (Aug. 29, 2006) at pp. 6, 7.
- 18. In 2006—long after EPA's removal actions were complete, the ATSDR concluded that "PAH concentrations pose an indeterminate public health hazard at the [Agriculture Street Landfill] site." ATSDR, *Health Consultation (EPA Facility ID: LAD981056997)* (Aug. 29, 2006) at p. 7 (also discussed at p. 6).
- 19. Recent EPA sampling found several dangerous contaminants at the Agriculture Landfill Site, including lead, arsenic, and polynuclear aromatic hydrocarbons (PAHs). EPA, *Fourth Five-Year Review Report* at p. 5 (July 2018).

Background Part B-Environmental Risks and Municipal Landfills in General

- 20. Risks from environmental contamination are often expressed in a mathematical formula that states a probability of a bad outcome over a 70-year lifespan. For example, a risk of 1×10^{-6} refers to a one-in-one-million risk of harm over such a lifespan. A risk of 1×10^{-4} refers to a one-in-ten-thousand risk of harm. A risk of 1×10^{-3} refers to a one-in-one-thousand risk of harm over such a lifespan.
- 21. In general, risks of 1×10^{-6} (one-in-one-million) or less are considered trivial or *de minimis*. For example, EPA has explained that "a de minimis risk is usually considered by

regulatory agencies to be a risk at or below 10⁻⁶ over a 70-year life time." EPA, *Hazardous Waste Management System; Identification and Listing of Hazardous Waste Final Exclusion*, 67 Fed. Reg. 1888, 1892 (Jan. 15, 2002).

- 22. In the Superfund program, EPA has adopted an "acceptable risk" range of 1 x 10⁻⁶ to 1 x 10⁻⁴, *i.e.*, one-in-one-million to one-in-ten-thousand. EPA discussed its selection of the 1 x 10⁻⁴ (one-in-ten-thousand) number as within an "acceptable" range in a Clean Air Act rulemaking. At that time, EPA acknowledged that a 1 x 10⁻⁴ does not represent a de minimis or trivial risk, explaining "EPA does not believe that the terms de minimis and 'acceptable risk' are synonymous." EPA, *National Emission Standards for Hazardous Air Pollutants*, 54 Fed. Reg. 38,044, 38,055 (Sept. 14, 1989). Based in part on an analysis that "driving a car or breathing city air are risk-laden activities that society does not consider 'unsafe,'" EPA explained that "the determination of what is an 'acceptable risk' is discretionary" with the agency. *Id.* In the Superfund program, EPA explained that it has a "preference [but not a presumption] for setting cleanup levels at the more protective end of the risk range" [*i.e.*, 1 x 10⁻⁶]. EPA, *National Oil and Hazardous Substance Pollution Contingency Plan*, 55 Fed. Reg. 8666, 8717(Mar. 8, 1990).
- 23. Under the Superfund Program, EPA has developed guidance for remedial action at municipal landfills. In that document, EPA noted that "future residential use of the landfill source area itself is not considered appropriate" EPA, *Presumptive Remedy for CERCLA Municipal Landfill Sites* at p. 5 (EPA 540-F-93-035, Sept. 1993).
- 24. EPA has explained that available data "do not provide strong support for distinguishing the health and environmental threats" posed by municipal landfills from risks posed by hazardous waste landfills. EPA, *Solid Waste Disposal Facility Criteria*, 56 Fed. Reg. 50,978, 50,982 (Oct. 9, 1991). The agency noted that data "do not reveal significant differences in the number of toxic constituents and their concentrations in the leachates of the two categories of facilities." *Id.* In other words, people living on a municipal landfill are not necessarily safer than those living on a hazardous waste landfill.

Agriculture Street Landfill Specific Information

- 25. For its Fourth Five-Year Report, EPA collected 36 soil samples from 33 locations (including three field duplicate samples). EPA, *Fourth Five-Year Review Report* at p. ES-1 and Appendix J Chain of Custody Record. Only four of these samples were collected from residential properties. *Id.* at p. 12.
- 26. In the introduction of the Fourth Five-Year Report, EPA claims that all samples were tested for PAHs, arsenic and lead (page ES-1); however, closer inspection of the report reveals that soil samples from only 8 of the 33 locations were tested for PAHs (see Appendix J, Chain of Custody Record and data tables). Benzo(a)pyrene exceeded the EPA screening level at 50% of the locations tested for PAHs (samples ASL-SS-01, ASL-SS-31, ASL-SS-32, and ASL-SS-33) and exceeded the RECAP screening level at 25% of the locations tested for PAHs (samples ASL-SS-01 and ASL-SS-33). *Id.* at Appendix K, Tables K-1 and K-2. In sample ASL-SS-33,

¹ The ECF Document page numbers are pp. 336-338 and 372 for the Chain of Custory Record, and pp. 239-297 and 344-350 for the data tables in ECF Document 36-4.

collected under the slab of a residence, the level of benzo(a)pyrene was more than 20 times the EPA screening level. *Id.* at Appendix K, Table K-2.

- 27. For its Fourth Five-Year Review soil sampling, EPA only took soil samples from the top "zero to three inches of soil." EPA, *Fourth Five-Year Review Report* at p. 12. Residents, including children, could easily dig or otherwise disturb soil below three inches. Indeed, the highest concentration of lead detected in EPA's 2005 sampling (conducted in response to Hurricane Katrina) was found in a sample from the 3 to 6-inch layer of soil. EPA, *Hurricane Katrina Response Agriculture Street Landfill, New Orleans Site Inspection and Sampling Results* p. 9-10 (Jan. 30, 2006). Thus, EPA's samples were not sufficient to characterize potential exposures.
- 28. EPA's Fourth Five-Year Review Report does not consider synergistic or additive effects from potential exposure to chemical mixtures. For example, substantial synergistic toxicity towards the developing cardiovascular system has been observed between PAHs with different molecular mechanisms of action (Billiard et al., 2008).
- 29. EPA's Fourth Five-Year Review Report does not consider the mental stress of living on a Superfund site. For example, the report notes the "low" odor threshold for some compounds detected in a soil sample, stating that odors "could be a nuisance" EPA, Fourth Five-Year Review Report at p. 12. According to EPA, "During the fourth FYR... the resident [of the Agriculture Street site] reported to EPA odor issues in the home...." EPA, Vapor Intrusion Investigation Property No. 01 Results Technical Memorandum Agriculture Street Landfill Superfund Site New Orleans, Louisiana (Nov. 12, 2018). Whether or not the exposures underlying the detection of odor were overtly toxic, it is likely that these odors would create anxiety given the potential for adverse health effects. More broadly, the health benefits of aesthetically pleasing environments versus the negative effects of degraded environments (such as demonstrated for the Agriculture Street Landfill in the photos provided in EPA, Fourth Five-Year Review Report at Appendix A) are being increasingly recognized (e.g., Coutts, 2015).
- 30. The screening levels and acceptable risk ranges that EPA employed for PAHs appear to be based on cancer risks. While cancer is certainly an important health impact of PAHs, there is growing evidence that for the developing fetal/embryonic organism other effects are very important, including effects on cardiovascular development (see para. 28, above) and neurological development (e.g., Perera et al., 2011; Peterson et al, 2015). Importantly, these effects appear to be based on mechanisms different from those underlying cancer (*i.e.*, direct damage to DNA). Also, the targets for PAH analysis appear to be the 16 PAHs EPA selected for priority in 1976, plus 1-methylnaphthalene and 2-methynaphthalene. This is not an adequate list because it does not include what are reported to be very toxic PAHs, including dibenzo[a,l]pyrene, dibenzo[a,i]pyrene, and benzo[c]flourene (Anderson and Achten, 2015).
- 31. The arsenic assay was not sensitive enough to ensure reliable results. Specifically, the lower threshold of detection for arsenic that EPA used for its Fourth Five-Year Review Report ranged from 10.3 ppm 13.8 ppm,² while EPA's Region 6 Residential Soil Screening Level is 0.68 ppm and the Louisiana RECAP screening level is 12 ppm. Thus, arsenic could be present at

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² EPA, Fourth Five-Year Review Report at Appendix J (ECF Doc. 36-4 at pp. 242-297, 347).

the ASL at concentrations above both the federal Screening Level and the state RECAP screening level but remain undetected. Thus, EPA's statement that it found arsenic above screening levels at only one location, *id.* at p. ES-1, fails to describe the extent of arsenic contamination at the site.

- 32. EPA placed unexplained reliance on the state RECAP screening levels which are generally significantly higher than EPA's own screening levels.³ For example, discussing samples that showed benzo(a)pyrene levels at more than twice the EPA screening level, the report states "because the RECAP screening level is not exceeded, no further action is recommended." EPA, Fourth Five-Year Review Report at p. E-2 and p. 14. EPA does not provide an explanation for failing to address federal screening levels in this evaluation. This approach is problematic given the large disparity between screening levels for EPA and RECAP with respect to multiple contaminants, (for example, 0.68 ppm versus 12 ppm for arsenic, respectively), EPA, Fourth Five-Year Review Report at p. 13.
- 33. The Fourth Five-Year Review Report lacks data for any element besides arsenic and lead (for example, chromium). The analysis used (inductively coupled plasma mass spectrometry) typically yields data on an entire suite of heavy metals. I would have expected these data to be included in the report.
- 34. PAHs are relatively insoluble, but they can still move with water. Given that this site is subject to severe flooding, EPA, *Fourth Five-Year Review Report* at p. 15 and EPA, *Hurricane Katrina Response Agriculture Street Landfill* at p. 3, the potential for PAH migration in the soil is a concern.

V. Documents reviewed

35. In preparation for this Declaration, I have reviewed the following documents:

EPA, Fourth Five-Year Review Report for the Agriculture Street Landfill Superfund Site, New Orleans, Orleans Parish, Louisiana (July 2018)

EPA, Hurricane Katrina Response Agriculture Street Landfill, New Orleans Site Inspection and Sampling Results p. 9-10 (Jan. 30, 2006)

EPA, Vapor Intrusion Investigation Property No. 01 Results Technical Memorandum Agriculture Street Landfill Superfund Site – New Orleans, Louisiana (Nov. 12, 2018)

EPA, Record of Decision (April 2002)

³ RECAP refers to Louisiana's Risk Evaluation/Corrective Action Program (RECAP), which comprise the state agency's "minimum remediation standards for present and past uncontrolled constituent releases."

https://deq.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=recap. EPA has explained, with regard to federal soil screening levels (SSLs), "Generally, where contaminant concentrations equal or exceed SSLs, further study or investigation, but not necessarily cleanup, is warranted." EPA, *Soil Screening Guidance: User's Guide* at p. 1 (July 1996).

- EPA, Human Health Risk Assessment (Appendix S to EPA, Remedial Removal Integrated Investigation Report, Agriculture Street Landfill New Orleans, Orleans Parish, Louisiana, v. 4 (Mar. 1995)
- EPA, *Phase II Close Out Report for the Agriculture Street Landfill Superfund Site*, New Orleans, Louisiana (CERCLIS No.: LAD981056997) (June 2001)
- EPA, Hazardous Waste Management System; Identification and Listing of Hazardous Waste Final Exclusion, 67 Fed. Reg. 1888, 1892 (Jan. 15, 2002)
- EPA, National Oil and Hazardous Substance Pollution Contingency Plan, 55 Fed. Reg. 8666, 8717 (Mar. 8, 1990)
- EPA, *Presumptive Remedy for CERCLA Municipal Landfill Sites* at p. 5 (EPA 540-F-93-035, Sept. 1993)
- EPA, *National Emission Standards for Hazardous Air Pollutants*, 54 Fed. Reg. 38,044, 38,055 (Sept. 14, 1989)
- EPA, Hazardous Waste Management System; Identification and Listing of Hazardous Waste Final Exclusion, 67 Fed. Reg. 1888, 1892 (Jan. 15, 2002)
- EPA, Solid Waste Disposal Facility Criteria, 56 Fed. Reg. 50,978, 50,982 (Oct. 9, 1991)
- U.S. Agency for Toxic Substances and Disease Registry, *Health Consultation (EPA Facility Id: LAD981056997)* (Aug. 29, 2006)
- EPA, Soil Screening Guidance: User's Guide (July 1996)
- Andersson, J.T., and C. Achten. 2015. Time to Say Goodbye to the 16 EPA PAHs? Toward an Up-to-Date Use of PACs for Environmental Purposes. Polycyclic Aromatic Hydrocarbons 35:330-354.
- Billiard, S.M., Meyer, J.N., Wassenberg, D.M., Hodson, P.V., and Di Giulio, R.T. 2008. Nonadditive effects of PAHs on early vertebrate development: mechanisms and implications for risk assessment. <u>Toxicological Sciences</u> 105:5-23.
- Coutts, C. 2015. Green Infrastructure and Public Health. Routledge, New York, NY, 312 pp.
- Perera, F.P., S. Wang, J. Vishnevetsky, B. Zhang, K.J. Cole, D. Tang, V. Rauh, and D.H. Phillips. 2011. Polycyclic Aromatic Hydrocarbons-Aromatic DNA Adducts in Cord Blood and Behavior Scores in New York City Children. Environmental Health Perspectives 119:1176-1181.
- Peterson, B.S., V.A. Rauh, R. Bansal, X. Hao, Z. Toth, G. Nati, K. Walsh, R. L. Miller, F. Arias, D. Semanek, and F. Perera. 2015. Effects of Prenatal

Expert Opinion of Richard Thomas Di Giulio, Ph.D. Evaluation of EPA Fourth Five-Year Review Report February 21, 2019

Exposure to Air Pollutants (Polycyclic Aromatic Hydrocarbons) on the Development of Brain White Matter, Cognition, and Behavior in Later Childhood. JAMA Psychiatry 72:531-540.

VI. Publications

36. To the best of my knowledge, all of my publications from the past 10 years are listed on my Curriculum Vitae, which is attached as Exhibit A to this Declaration and incorporated by reference.

VII. Past Testimony

37. I have not provided trial or deposition expert testimony in federal, state, or administrative cases in the past four years

VIII. Fees for Services

38. For reviewing appropriate information and preparing this testimony, I expect to receive a flat fee of \$5,000.00.

I declare under the penalty of perjury that the statements in this report are true and accurate to the best of my knowledge. Executed on February 21, 2019.

Richard Thomas Di Giulio, Ph.D.



Appendix D

Standard Operating Procedures

Document: 300002-0156



STANDARD OPERATING PROCEDURE

Drilling and soil sampling

Equipment/supplies:

- PID mini rae (w/ 100ppm isobutylene and regulator),
- plastic zip lock bags,
- plastic sheeting,
- cooler with ice,
- permanent marker,
- sample containers (check with PM and Envision for analysis needed),
- T- sample plugs,
- drum labels,
- spray paint (white or pink),
- 1" bailors and string,
- water level indicator,
- measuring wheel,
- camera (phone OK),
- buckets,
- decontamination supplies,
- site map(s),
- HASP,
- access agreements / right of way permits (if necessary),
- field book,
- work plan provided by project manager (PM).



PPE: As specified in the Site specific HASP; however, at a minimum to include:

- Hard hat,
- steel toe shoes/boots,
- ear protection,
- nitrile gloves (lots of them),
- traffic cones,
- caution tape,
- Z87 safety glasses.

When conducting soil borings, there are two (2) major objectives:

- 1. Accurately log the soil boring to depict the substrate of a site; and
- 2. Collect a sample(s) representative of the contamination (or lack thereof) within the substrate of a site.

Both criteria are imperative in site investigation field activities and project momentum. It is very important to do this accurately to ensure proper representation of the site and to meet regulatory requirements.

"We are not in the business of collecting pretty good samples".



- o Arrive on site, prior to drill crew.
 - Contact PM. Touch base with business management (if available): Describe work area and ask where to park driller's trailer and stage drums. Confirm utilities are clear in proposed drilling locations.
 - Conduct health and safety meeting and discuss work plan with drill crew upon their arrival.
- o Park the field truck so it is out of the way, but still convenient. Set a folding table adjacent to the tail gate. Cover the table with plastic sheeting. Be sure to keep PID out of the rain.
- Prepare exclusion zone at least $\sim 10^{\circ}$ from soil table and $\sim 25^{\circ}$ from drill rig using cones and caution tape. If space is limited, compromise accordingly to insure passers-by stay away from the drilling activates.
- o Drillers will bring soil cores to the table. Soil cores are typically 4 foot sections, but can vary.
 - Describe each core using USCS descriptions. Touch and feel the soil for accurate descriptions using a new pair of nitrile gloves for every 2' interval. Note that geology does not happen in 2 foot intervals. If you have a two foot interval with more than one formation (even thin sand seams) they must be described and screened separately.
 - Assuming 4 foot cores; collect ~2" of soil ~1' from both ends of the core for PID readings using zip lock bags. Set these aside in a warm area so they may volatilize. During the cold months, place them on the floor of the running truck with the floor heat on.
 - Collect ~1' of soil from both sides of the PID sections. Label these depth intervals and place the zip lock bag in the iced cooler so they DO NOT volatilize.
 - Leave ~1"-2" at both ends that have been exposed to atmosphere the longest and ~2"-3" in the middle of the core not to blend the 1' intervals. These also give you visual reference once much of the soil is gone.



- ***Make proportional adjustments based on core length and sample recovery. Sometimes not 4' cores***
- o If groundwater is encountered (saturated unit), discuss sampling technique and intervals with PM. If temporary well is installed, collect water level measurement before taking sample.
- o Have the drillers wait at depth. PM may request to go deeper. Text/email a picture of the completed field form (PID and soil descriptions) to the PM. Once the PM has confirmed sample intervals, log the sample interval in the sample column of the field form and collect samples accordingly using EPA Method 5035 kits for each sample



- Once the PM has confirmed it is ok to move on, discard remaining/un-sampled soil, plastic sheeting, and used gloves in a labeled 55 gallon US DOT 17hr -rated drum to be stored on site for classification and disposal.
- o Be sure to DECON all equipment and tools! (You may have to ask drillers specifically)
 - Direct push rods are cleaned with a 3 bucket wash/rinse system (Similar to low flow)
 - Hollow stem augers are cleaned with a pressure washer.
 - Observe drillers doing this, if not tell them to.
- o Move to the next boring location and repeat steps above.
- o After drilling activities are complete, make sure drillers are sufficiently patching the bore holes photograph all abandoned bore holes, and mark map with utilities.
- o Check out with the business management. Ask them if the bore holes have been patched to their satisfaction and the drums are in a preferred location. If they ask you questions regarding the site investigation, refer those questions to the PM.



STANDARD OPERATING PROCEDURE

Low-Flow Rate Purging and Sampling of Groundwater Monitoring Wells

Introduction:

Sampling of groundwater for contaminants is typically done to achieve one of the following goals, several of which are interrelated:

- To investigate the presence or absence of contaminants
- To delineate a plume
- To determine the concentrations of contaminants at specific points in a plume at a given time
- To understand the transport and fate of contaminants in the aquifer
- To carry out regulatory compliance monitoring
- To evaluate a treatment system through remediation performance monitoring

The common factor in achieving these objectives is that analytical data resulting from groundwater samples must accurately represent the contaminant concentrations and geochemistry of the subsurface at the points in space and time where the samples were acquired. Assuming the well screen is properly located and the well is appropriately constructed, the idea is to remove a portion of the water that represents the water in the aquifer at that precise screened location on that date. To accomplish this goal the water must be removed from the aquifer with as little disturbance as possible. This SOP assumes that sampling is being done from a properly constructed and adequately developed well. Groundwater samples can be compromised by aeration, mixing of the stagnant water in the well casing above the screened interval with the sample, the artificial entrainment of particulates pulled from the aquifer minerals or the sand pack (turbidity), and the loss of volatile dissolved compounds. All of these impacts can be caused by pumping water at a very high flow rate through the well screen and by using bailers, which induce surging in the well bore and require pouring or draining to collect the sample into containers for analysis. Low-flow purging and sampling technologies were developed to minimize these problematic issues and increase both accuracy and precision in sample collection.

Low-flow rate purging and sampling consists of a variety of concepts and processes designed to minimize disruption to the well, sand pack, outlying aquifer, and the collected samples. These techniques are also generally designed to provide confirmation that the water being collected is representative of the formation water through the observation of sensitive indicator parameters. Low-flow rate sampling concepts and techniques include:

- Low pump rates, usually 0.1-0.5 L/min
- Purging and sampling is always performed from within the screened interval when standard monitoring wells are used
- Collect samples in the formation immediately adjacent to the well and pump (or tubing)



• Sampling follows stabilization of the most sensitive purging indicator parameters

The low pumping rates and the elimination of the use of bailers minimize artificial turbidity, aeration, mixing of different waters, VOC loss and outgassing, while maintaining any naturally mobile colloidal particulates that might contribute to the total contaminant loading. Since waters are collected from the aquifer in the immediate vicinity of the well, better concentration data at that point are obtained. The development of low-flow purging and sampling techniques increased the list of parameters that had been routinely monitored during high-speed purging, i.e., temperature, pH, and conductivity, to include dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity. Flow-through cells are required during the purging because certain values immediately change upon exposure to the atmosphere, such as would occur in an open container.

It is also important that all of these parameters be measured accurately when their readings become stabilized. This is due to their importance for understanding contaminant transport and fate, speciation, monitored natural attenuation, performance monitoring and geochemical modeling when used in conjunction with the laboratory analytical data. To accurately measure these parameters requires that all the electrodes within the flow-through cell be properly calibrated using manufacturer's guidelines. This requires little time, is very important, and provides both the person assessing the data and the client for whom data-based decisions will be made with a much better cost to benefit ratio. For reference, typical ranges for various water quality parameters are as follows:

Parameter	Expected Range	Notes
рН	6 - 8	
DO	0 - 8 mg/L	Never negative. Should be in line with ORP (e.g., if ORP low or negative, DO should be low)
		Should be in line with DO (e.g., if DO low, ORP should
ORP	varies	be low or negative)
		Never negative. If low turbidity, water should be clear,
Turbidity	varies	if high turbidity, water should be cloudy
Specific	450 - 1050	
Conductivity	μS/cm	
		Groundwater temperature is around 13°C, however your
Temperature	13°C +/- 10°	reading may be affected by the ambient air temperature.

Note that sites that have undergone or are undergoing remediation activities may exhibit values that are outside the expected range. This condition should be discussed in pre sampling meetings.

Equipment:



This equipment list may not include all items needed, which would depend upon a variety of factors including weather, availability of power, analyses to be done in the field, etc., but lists the basic needs and provides a starting point for consideration of items that will be required when in the field.

- Detailed well location map
- Groundwater Sampling Forms
- Total well depth and screened interval data and previous water level data
- Order of the well sampling (lowest to highest contaminant concentrations)
- Electronic water level tape
- Peristaltic sampling pump (if allowed by regulators) or bladder pump and controllers
- Tubing
- Sample bottles, cooler, ice, chain of custody forms
- Drums for purge water (if required)
- Water quality meter (e.g., Horiba or YSI) including the flow-through cell
- Bound record book for recording meter calibrations and any issues
- Calibration solutions and instructions, spare DO membranes, etc.
- Alconox and distilled water
- Graduated cylinder for measuring flow rate
- Markers and pens, calculator
- PPE

Procedure:

- 1. Following manufacturer's instructions, calibrate the meter that will be used to collect the low-flow stabilization data. This should be done at least once per day prior to collecting samples and repeated if conditions warrant or should data appear to be overly noisy or otherwise suspect (e.g., DO values above 10 mg/L). Calibration should be done for pH, conductivity, DO, and turbidity. The DO membrane should be replaced occasionally based upon the manufacturer's guidelines or should calibration prove impossible. Bubbles must not be trapped under the membrane.
- 2. Decontaminate the pump, water level meter, and any other non-dedicated equipment according to the decontamination SOP.
- 3. Sample the wells beginning with those having the lowest concentrations of the contaminants of concern and work up to those with the highest concentrations (if this information is known).
- 4. Observe the condition of the wellhead; the cover, the lock, the standpipe, any standing water, etc., and note observations of anything unusual on the data sheet for that well. Notes should be made in the field notebook regarding anything out of the ordinary throughout the entire sampling procedure.



- 5. Open the well carefully and be cautious to avoid any dirt, water, or other materials entering the casing. If anything does enter the casing, note this in the field notebook.
- 6. The depth to water for each well should be approximately known from well logs or previous sampling data. Carefully lower a clean electronic water level measuring tape into the casing until it signals that water has been reached. Raise and lower the tape slowly and carefully to ascertain that you have reached the water table; try to avoid disturbing the water below the surface. Note the depth to 0.01 foot of resolution on the Sampling Form and remove the tape.
- 7. If the well contains either a dedicated length of tubing or a dedicated pump, confirm that the tubing/pump remains properly set at the correct depth for sampling (by whatever means this has been established at the site). Note any changes that are necessary.
- 8. If the well does not contain a dedicated pump or tubing, measure the length of new tubing needed to reach from the midpoint of the screened interval (or saturated interval if the water table is within the screen portion of the well) to the pump controller at the surface. If using a bladder pump, use a new disposable bladder for each sample.
- 9. Slowly lower the pump/ tubing until the pump intake reaches that depth, taking care not to disturb any sediment at the bottom of the well.
- 10. Attach the tubing from the well to the peristaltic pump or pump controller. The tubing that extends from the well to the peristaltic pump, pump controller, etc., must be replaced between wells. Attach tubing from the pump controller to the flow-through cell and from the outlet of the flow-through cell to a bucket.
- 11. Begin pumping the well at a very low flow-rate and calculate the volume pumped per unit time (using a graduated cylinder and stopwatch. Typically, 150 ml/minute is a reasonable initial pumping rate for wells that produce sufficient water having a five-foot or longer well screen. If production is unknown for the well, it can be useful to carefully measure the water level with the tape, while pumping, and track whether or not the cone of depression (drawdown) stabilizes with time. For piezometers, drawdown should be minimized to the extent possible to prevent stagnant casing water above the screened interval from being pulled into the screened interval. If drawdown doesn't occur to any appreciable extent, the pumping rate can be carefully increased. The pumping rate cannot exceed 500 ml/ min.
- 12. Begin collecting data from the sensors in the flow-through cell using either an automated data logger or by manually transcribing the readings displayed on the meter on the Groundwater Sampling Form. Water quality meter readings, pumping rate, and drawdown should be recorded approximately every five minutes. Readings can be recorded on shorter timeframe (e.g., every three minutes) if the well can maintain higher pumping rates with drawdown less than 0.33 feet.



- 13. If drawdown exceeds 0.33 feet at the lowest achievable pumping rate, low-flow sampling techniques are not appropriate for the monitoring well. Consult the project manager to select an alternative sampling method. Typically, the well should be purged to dryness and samples collected as soon as the well has recovered to provide sufficient sample volume.
- 14. Stabilization is achieved after certain parameters have stabilized for three successive readings. As listed on the Groundwater Sampling Form, three successive readings must be within ± 3% for temperature, ± 0.1 for pH, and ± 3% for conductivity, ± 10 mv for oxidation-reduction potential (ORP), and ± 10% for turbidity and DO. However, for ORP, DO, and turbidity, only one of these three parameters needs to reach stability prior to sampling.
- 15. Upon stabilization, record all the final data for the flow-through cell parameters (temperature, pH, conductivity, ORP, DO, turbidity) and the flow rate at which they were collected.
- 16. Disconnect the tubing from the flow-through cell and drain into the bucket.
- 17. Collect samples from the tubing extending from the pump directly into laboratory-supplied containers. Collect in this order: VOCs, SVOCs, all other parameters. When collecting these samples, minimize agitation of the well by maintaining the pump elevation and a constant flow rate. If a duplicate VOC sample is being collected, alternate filling vials between the primary and duplicate sample.
- 18. Measure the total depth of the well and record on the Groundwater Sampling Form.
- 19. Clean the electrodes and flow-through cell, and other non-dedicated equipment such as the pump and water level indicator, with an Alconox solution followed by multiple rinses with distilled water, or by following manufacturer's guidelines, prior to use at the next well.



STANDARD OPERATING PROCEDURE

Indoor Air Sampling Procedures

Scope:

This standard operating procedure (SOP) describes the procedures for indoor air sampling at commercial and residential properties.

Purpose:

The purpose of this SOP is to ensure good quality control in field operations and uniformity between field personnel.

Equipment/Materials Needed:

- 6-L Stainless Steel Canisters
- Appropriate flow controllers (8-hour for commercial and 24-hour for residential);
- Duplicate T with appropriate flow controllers (4-hour for commercial and 12-hour for residential)
- Outdoor Air Tags
- Zip ties
- Trash bags
- Bike locks
- #14 spanner wrench;
- Personal Protective Equipment (PPE)
- Masterflex tubing and Teflon-lined tubing
- Bailer
- PVC tubing



Meeting the owner/tenant:

- 1. Ensure all your canisters are assembled and paperwork is in order prior to the scheduled meeting time;
- 2. Where possible, avoid walking into residential structures with steel toes during indoor air sampling activities. Ensure your shoes are clean when walking into residential or commercial structures. TyvekTM or paper booties are to be worn if shoes are not clean and/or covered in snow; and
- 3. Discuss all sampling activities, including the indoor air building survey and sampling schedule with owner/tenant prior to beginning sampling. Confirm air canister pickup time.

Indoor Air Building Survey:

- 1. Complete the IDEM-required indoor air building survey form in its entirety. Do not leave spaces blank. If a particular question/item does not apply, indicate this by noting "NA" on the form.
- 2. Document the type of structure, foundation, floor layout, physical conditions, and airflow within the building/tenant spaces. If the tenant space is part of a strip mall, make note of potential indoor air exchanges through the HVAC, ceilings, open spaces, or cracks;
- 3. Perform a thorough product inventory to identify chemicals or products that may bias indoor air sampling. Make a note of all product names and active ingredients. If not listed, record the product name and manufacturer so this information can be researched at a later date. Take pictures of all products;
- 4. Eliminate potential interference from products or activities which could bias the sample:
 - a. Ensure all windows and doors remain closed to the extent practical during the sampling period;
 - b. If a source containing a chemical of concern (COC), such as tetrachoroethene (PCE) or trichloroethene (TCE) is identified, the VI and/or project management team must be contacted for further instructions. In most instances, the sampling event will need to be rescheduled. To avoid sample bias, any source materials should be removed (with property owner permission) from the structure a minimum of 72 hours prior to initiating and during indoor air sampling;
 - c. During the rescheduled event, confirm with the owner/tenant that the source was removed for a minimum of 72 hours prior to initiating indoor sampling activities.

Indoor Air Sampling:

Air samples should be collected from an adequate number of locations to assess potential exposure to occupants. The number and location of the samples will be determined by the VI and project management team. Any questions or changes regarding sample placement

^{*}Please see **Attachment A** for a list of products containing PCE and TCE that are commonly found within residential and/or commercial structures.



should be cleared by the VI and project management team prior to sampling. An IDEM-required pre-sampling inspection/indoor air building survey should be completed prior to sampling in order to identify, inventory and where appropriate remove materials that are already present in the structure, but could bias the sampling results. Outdoor/ambient and duplicate samples should be collected for quality assurance purposes during each event.

- 1. Indoor air samples should be collected from, at a minimum, the lowest occupied floor of a structure during initial investigation, including basements and crawl spaces. Subsequent investigations may require additional samples (check with VI team);
- 2. At commercial structures, samples should be collected during normal business operation hours to be representative of potential exposure, unless business operations may interfere with sample results or access is not granted by the property owner during business hours;
- 3. Indoor air samples should be collected from the most occupied spaces within each floor and as close to the center of the room as possible. Ensure that the selected sampling location causes minimal inconvenience to occupants, and allows for the installation of a paired sub-slab port nearby.
- 4. The sample collection intake on the controller should be situated within the breathing zone (3 to 5 feet above the floor level). Use the canister box to situate the canister at the desired height, if necessary.
- 5. If crawl space sampling is necessary and the space is inaccessible, tubing can be advanced in to the middle of the crawl space to get a representative sample. Use approximately 1" of Masterflex over the controller intake threads, and use the desired amount of Teflon-lined tubing to stretch the intake to the middle of the crawlspace. Ensure the end of the advanced tubing is situated in an area where it can pull a quality air sample. Place the canister as close to the crawl space and at a location where the intake tubing is in the desired location. The tubing can also be taped to a bailer or clean PVC pipe to assist with getting the tubing to the desired location;
- 6. While assembling the canisters, ensure the controllers are properly threaded on to the canisters and tightened (but not over tightened) to avoid potential leaks (no cross threading);
- 7. When ready to initiate indoor air sampling, unscrew the cap on the intake, and open the canister valve one-half turn;
- 8. Record the canister number, flow controller number, start time, and initial pressure on field forms. You may need to gently tap the pressure gauge to ensure the needle is not stuck:
- 9. Check the pressure for at least 2 to 5 minutes and prior to leaving the structure and listen for any hissing sounds (this means you have a leak). If you notice a hissing sound or an immediate decrease in pressure, close the valve immediately and contact the project manager;
- 10. At the end of the sampling period, note the end time and final pressure on field forms;
- 11. The canister pressure should be approximately between -2 and -5 at the end of the sampling period. Ensure the canister pressure does not reach zero. Arrive a minimum of 30 minutes prior to the end of the sample collection to check on the pressure; and
- 12. Close the valve on the canister.



Quality Assurance and Quality Control:

- 1. The canisters should be pre-cleaned by an accredited laboratory and individually certified;
- 2. If tubing is used, it should be Teflon-lined tubing;
- 3. All fittings should be stainless steel;
- 4. Ambient/outdoor air sample(s) should be collected each day of the event to evaluate background VOC concentrations.
 - a. Outdoor air canisters should be initiated at least 30 minutes prior to initiating the first indoor air sample, and should be placed upwind of the structure(s) being sampled. If the Site building is an active dry cleaner, an additional outdoor air canister will be placed downwind of the structure being sampled. Check with the PM regarding outdoor air sample placement prior to the sampling event.
 - b. An 8-hour outdoor air sample will be collected if all structures to be sampled are commercial and a 24-hour outdoor air sample will be collected if at least one (1) structure is residential.
 - c. Attach an outdoor air tag to each outdoor air canister using a zip tie. The outdoor air tag should include the words "environmental testing do not disturb" and the sample ID (Example: 6304-OA-1). If possible, place the outdoor air canister(s) in areas with less foot traffic;
- 5. One (1) duplicate sample should be collected per 20 indoor/outdoor air samples. Attach the first end of the stainless-steel duplicate T to the 6-liter air canister and the second end of the duplicate T to the corresponding 6-liter duplicate air canister. Connect the appropriate controller (4-hour for commercial and 12-hour for residential) to the third end of the duplicate T. Unscrew the cap on the intake and open the canister valve to begin sampling. Since there are additional connections while collecting duplicate samples, there is more potential for leaks. Listen to make sure there is no hissing sound and watch the controller for at least 5 minutes to ensure no drops in pressure. If you notice a hissing sound or a drop-in pressure, close the valve immediately and contact the project manager.



STANDARD OPERATING PROCEDURE

Sub-Slab (SS) Point Installation, QA/QC & Sampling Procedures

Scope:

This standard operating procedure (SOP) describes the installation of a sub-slab vapor sampling port, quality assurance and quality control (QA/QC) leak detection testing and documentation, and the sub-slab vapor sampling procedures. This SOP describes the installation of both temporary and permanent Vapor Pin^{TM} sub-slab ports, as well as procedures for its extraction and abandonment.

Purpose:

The purpose of this SOP is to ensure good quality control in field operations and uniformity between field personnel.

Equipment Needed:

- Vapor PinTM;
- Silicone sleeve;
- Hammer drill;
- ⁵/₈ inch diameter drill bit;
- 1½-inch diameter drill bit for flush mount permanent ports;
- Vapor PinTM Drilling Guide;
- ¾-inch diameter bottle brush;
- Wet/dry vacuum and/or broom and dust pan;
- T-Handle installation/extraction tool;
- Dead blow hammer:
- Vapor PinTM secure flush mount cover for permanent ports;
- Vapor PinTM protective cap;
- #14 spanner wrench;
- VOC-free modeling clay and 2-in pipe couple for temporary ports;
- Distilled water;
- Stainless steel sampling "T";
- Hand Pump;
- Graduated Plastic Syringe;
- Tedlar Bag;
- Teflon-lined tubing;
- Masterflex tubing;
- VOC-free hole patching material (hydraulic cement) and putty knife or trowel;
- 1-L Stainless Steel Cansiters with appropriate flow controllers; and
- Personal Protective Equipment (PPE)



Note: Bolded items supplied by Cox and Colvin

Vapor PinTM Sub-Slab Port Installation:

Sub-Slab port installation should not be done during indoor air sampling events; installation should be done after indoor air sampling, if possible (consult with your PM if this is an issue).

Prior to advancing a drill through a slab, it is imperative to check for all utilities within the structure being investigated. Generally, utilities which may be beneath the slab include drain and sanitary lines; however, some facilities (mostly commercial) may have electrical conduits within the slab as well (water lines may also be beneath a slab). Despite the aforementioned, every building is different and all utilities must be assessed prior to advancing a drill; if you are unsure, call your PM or experienced staff. Also, avoid advancing holes directly next to exterior or load bearing walls as building footer construction may obstruct advancement of borehole. Aside from avoiding utilities, remember that we are guests; attempt to install points in areas that are less traveled (if possible, don't place the port in a location that will be an eyesore), such as a closet or behind a door, while still targeting the center of the slab where possible. TyvekTM or paper booties are to be worn in finished areas within residential structures.

Flush Mount Permanent Port Installation Procedures:

- 1. Set up wet/dry vacuum (and/or broom and dust pan) to collect drill cuttings by placing the nozzle inlet right next to the drill point.
- 2. Slide the silicon sleeve over the Vapor PinTM. Be careful as the thread of the pin is sharp and can cause injury to hand TIP: Use the T-Handle install/abandonment tool to secure pin and slide sleeve over.
- 3. While wearing PPE, drill a 1 ½-inch diameter hole into the concrete slab to a depth of approximately 1 ¾-inches.
- 4. Remove cuttings from the hole using the vacuum (we do not want dust in the sample train and canister; dust could also affect the seal) and place the Drilling Guide in the hole with the conical end down. The hole is sufficiently deep if the flange of the Drilling Guide lies flush with the surface of the slab. Deepen the hole as necessary, but avoid drilling more than 2 inches into the slab, as the threads on the Secure Cover may not engage properly with the threads on the Vapor PinTM.
- 5. When the 1½-inch diameter hole is drilled to the proper depth, replace the drill bit with a 5%-inch diameter bit, insert the bit through the Drilling Guide, and drill through the slab. The Drilling Guide will help to center the hole for the Vapor PinTM, and keep the hole perpendicular to the slab.



- 6. Remove the bit and drilling guide and clean the hole with the bottle brush (do not use the vacuum once the slab has been drilled completely through).
- 7. Place the pin in the hole. Using the T-handle tool and dead-blow hammer, hammer in the vapor pin. The silicon sleeve will compress to create the seal; don't hammer it in too far as you could end up tearing the sleeve.
- 8. Place the rubber cap over the pin after installation.
- 9. Screw the Secure Cover onto the Vapor PinTM and tighten using a #14 spanner wrench by rotating it clockwise. Rotate the cover counter clockwise to remove it for subsequent access.

Limitations:

On slabs less than 3 inches thick, it may be difficult to obtain a good seal in a flush mount configuration with the Vapor PinTM. In this situation, a temporary port will need to be installed per the procedures below.

Temporary Port Installation Procedures:

- 1. While wearing PPE, drill a 5/8-inch diameter hole through the slab and approximately 1-inch into the underlying soil to form a void. Avoid reaming out the hole as the integrity of the silicon sleeve mechanical seal is dependent on the drill hole diameter of 5/8-inch.
- 2. Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings. (We don't want dust in the sample train and canister, dust could also affect the seal). Use a dust pan and broom to clean up debris.
- 3. Slide the silicon sleeve over the Vapor Pin. Be careful as the thread of the pin is sharp and can cause injury to hand TIP: Use the T-Handle install/abandonment tool to secure pin and slide sleeve over.
- 4. Place the pin in the hole. Using the T-handle tool and dead-blow hammer, hammer in the vapor pin. The silicon sleeve will 'doughnut up' to create the seal; don't hammer it in too far as you could end up tearing the sleeve.
- 5. Place the rubber cap over the pin after installation.

Leak Detection Testing Procedures:

Leak detection testing of the sampling train and sub-slab port should be performed prior to collecting a sub-slab sample. The purpose of these tests is to ensure that indoor air does not leak past the sub-slab port or associated tubing and hardware and dilute the sub-slab soil gas sample.



- 1. For a permanent flush-mount installation, proceed to the next step. For a temporary installation, roll a 1-inch diameter ball of VOC-free clay between your palms to form a "snake" approximately 7 inches long and press it against the end of the water dam (2" pipe couple). Push the couple against the slab to form a seal between the pipe and the concrete.
- 2. Prior to sampling, assemble the sampling train. Install stainless steel sampling T with valves to the sampling port (Teflon-lined tubing should be used for sampling procedures). Valve end should be installed to the port. Install non-valve end of sampling T to the sample canister as sample canister is equipped with a valve. The third connection, valve-end, of the sampling T will be available for the negative pressure hand pump.
- 3. With the valve to the sample port closed, <u>and</u> the valve to the can closed, attach the hand pump to the remaining valve end of the sampling T. Apply negative pressure to sample train assembly to a pressure greater than 15 in Hg. Observe for 60 seconds to ensure pressure within sample assembly remains constant.
- 4. If pressure is not constant, sample train assembly needs to be reassessed. If pressure is constant, remove the hand pump and proceed to the water dam test.
- 5. Pour enough distilled water into the pipe couple or flush-mount depression to immerse the tubing connection to the Vapor PinTM. After the water has been poured into the dam, place a ruler or tape measure into the dam, at the base of the flush-mount depression or slab to observe any water loss which may indicate a leaky seal. Observe the water level for at least two (2) minutes to determine if a leak exists (You can begin purging the sampling train and sub-slab port during observation).
- 6. Attach a graduated syringe with a two-way valve to the remaining valve end of the sampling T (attach the syringe to the valve end of the sampling T where the hand pump was previously). With the valve to the sample port open, and the valve to the can closed, use the graduated syringe to purge three volumes of air from the sampling train and port into a Tedlar bag. The water level might drop slightly due to absorption into the concrete, but if there is a sudden drop in water level, the appearance of water in sample tubing, or other indication of water entering the sub-slab, remove the distilled water from the couple or depression, and reposition the Vapor PinTM to stop the leakage before resuming the leak test and sampling. Replacing the silicon sleeve and re-installing the Vapor PinTM is an option to trouble-shoot a leaky seal.
- 7. The volume of purged air should be measured using the graduated syringe and recorded on the field sheet. Once purging is complete, close the valve to the syringe and remove the syringe.

Sampling Procedures:



The 1L stainless steel canister will be equipped with a flow controller set to withdraw a sample at 200 ml/min. At this flow rate, it should take approximately 4-6 minutes for the canister to fill. Open the valve to the sample canister and record the start time and start pressure. Continue to sample while monitoring the pressure of the canister. Close the valve to the sample canister when the pressure reaches between -2 and -5.

Abandonment:

Permanent sub-slab vapor ports will generally be left in place until vapor intrusion is no longer needed. Once the determination is made by the project management team that the sub-slab port can be abandoned, the following procedures should be used:

- 1. Using the Vapor Pin T-Handle Install tool, thread tool over sample pin and retract pin.
- 2. Discard the silicon sleeve and clean pin of dust. Make sure to decontaminate the vapor pin before re-use.
- 3. Using quick setting concrete, patch surface and smooth with a putty knife or trowel.



Appendix E

Health and Safety Plan

Document: 300002-0156



SITE HEALTH AND SAFETY PLAN

Agriculture Street Landfill, Superfund Site Orleans Parish, New Orleans, Louisiana

Project # 300002

June 14, 2021

Prepared For:

Residents of Gordon Plaza, Inc. 2876 Abundance Street New Orleans, LA 70126

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Document: 300002-0093



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ACRONYMS AND TERMS LIST

ANSI American National Standards Institute

ASL Agriculture Street Landfill
AST Aboveground Storage Tank

bgs below ground surface

CFR Code of Federal Regulations
COC Contaminants of Concern
EnviroForensics EnviroForensics, LLC

GFCI Ground Fault Circuit Interrupters

HASP Health and Safety Plan

IDLH Immediately Dangerous to Life and Health

IDM Investigation-Derived Media

LDEQ Louisiana Department of Environmental Quality

MSDS Material Safety Data Sheets

NIOSH National Institute for Occupational Safety and Health

OSHA Occupational Safety and Health Administration

PAH Polynuclear Aromatic Hydrocarbons

PCB Polychlorinated biphenyl
PEL Permissible Exposure Limit
PID Photoionization Detector

PPE Personal Protective Equipment

ppm parts per million

RCRA Resource Recovery and Conservation Act

SAP Sampling and Analysis Plan

SI Site investigation

Site Agriculture Street Landfill

SVOC Semi-Volatile Organic Compound

TWA Time-Weighted Average

U.S. EPA United States Environmental Protection Agency

U.S. CG United States Coast Guard
VOC Volatile Organic Compound
WP Site Investigation Work Plan



1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed for subsurface investigation and remediation activities on and off-site to be performed by EnviroForensics, LLC (EnviroForensics) at the Agriculture Street Landfill (ASL), located in New Orleans Parish, New Orleans, Louisiana (Site). The HASP provides information on the potential hazards and general health and safety guidance for personnel conducting field activities at the Site and vicinity. Available Site characterization data obtained during previous investigations were used as a basis for developing this HASP. The following background, guidance, and regulatory documents were also used.

- Standard Operating Safety Guides (U.S. Environmental Protection Agency, 1988)
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (National Institute for Occupational Safety and Health [NIOSH], Occupational Safety and Health Administration [OSHA], U. S. Coast Guard [CG], U. S. EPA, 1985)
- Title 29, Code of Federal Regulations (29 CFR)

1.1 **Site Description**

The approximately 95-acre ASL site is located in the eastern section of the City of New Orleans, Louisiana, approximately three miles south of Lake Pontchartrain and 2.5 to 3.0 miles northnortheast of the city's central business district The site is bounded to the north by Higgins Boulevard and to the south and west by Southern Railroad right-of-ways. The eastern boundary extends from a cul-de-sac at the southern end of Clouet Street near the railroad tracks to Higgins Boulevard between Press and Montegut Streets. Approximately 47 acres of the former landfill had been developed as commercial and residential properties. ASL started as far back as 1909 when the City of New Orleans filled in a swampy area, currently considered part of the Ninth Ward of New Orleans. Over the years, the dump site became a main city municipal landfill where domestic trash and industrial waste were disposed.

The ASL was first closed in 1952, although domestic refuse was reportedly landfilled at the Site until the end of the 1950's. The dump was reopened in the aftermath of Hurricane Betsy in 1965 and received storm debris for burning and disposal. The ASL officially reclosed in approximately 1967. The ASL was reportedly covered with incinerator ash which was compacted by bulldozers.

Health and Safety Plan Agriculture Street Landfill Superfund Site

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Starting in 1978, the Site was reportedly covered with sand and soil then approximately 47 acres were redeveloped into a residential neighborhood, with 67 single-family homes, 225 townhouses (majority public housing), a 128-unit apartment complex, Moton Elementary School, and a small shopping plaza. Three (3) residential developments - Press Park (the townhouses), Gordon Plaza (the single-family homes), and Liberty Terrace (the apartment building) - were built over the old landfill area. The remaining portion of the Site remains undeveloped and heavily vegetated.

1.2 Scope

The HASP provides standard safety procedures for EnviroForensics personnel conducting investigation and remediation tasks as outlined in the work plan. The scope of work would encompass Site investigation activities such as advancement of direct push soil borings, monitoring well installation, soil and groundwater sampling, and indoor and vapor sampling that have the potential to be impacted with lead, arsenic, and polynuclear aromatic hydrocarbons (PAHs). The details of the field activities are provided in the work plan.

All field activities will be performed by EnviroForensics and its subcontractors. Subcontractors are expected to have their own HASPs in accordance with federal and state laws. Subcontractors' HASPs should be available for inspection upon request. Additionally, upon request prior to initiating field activities, the subcontractors will be required to provide EnviroForensics with documentation of training, medical surveillance monitoring, respirator fittest records, and workers compensation insurance for all Site personnel.

1.3 Human Exposure Pathways

Impacted soil, groundwater, and sub-slab vapor are the primary potential exposure media for personnel implementing field activities. The potential exposure pathways for the Hazardous Materials that have been detected at the Site include dermal contact, incidental ingestion and inhalation of windblown dust or vapors during field activities. Dermal contact, inhalation, and incidental ingestion pathways will be minimized through a personal hygiene program and the use of respiratory equipment (if necessary) and personal protective equipment (PPE).

Air monitoring in the breathing zone may be performed to confirm that ambient hazardous gases and particulates are below prescribed action levels (see Section 5) if deemed necessary based on field conditions.

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2.0 PROJECT SAFETY AUTHORITY

The following rolls will be assigned to EnviroForensics personnel and are responsible for project health and safety under the HASP:

- Corporate Health and Safety
- Senior Project Manager
- Project Manager
- Site Investigation Team Leader (SITL)
- Site Health and Safety Manager

Each individual working at the Site will be required to comply with the health and safety procedures established herein, procedures and practices required by applicable law, and general work practices.

2.1 Manager, Corporate Health and Safety

The corporate health and safety manager is responsible for establishing health and safety standards and monitoring the implementation of those standards. The corporate health and safety manager oversees accident/injury investigations and approves modifications to site-specific health and safety practices.

2.2 Senior Project Manager

The Senior Project Manager is responsible for the overall technical and administrative functions of the project. The Senior Project Manager directs and oversees the project team, implementation of the Work Plan (WP) for any given phase, and is ultimately responsible for the compliance with the HASP.

2.3 Project Manager

The project manager has the authority to direct activities at the Site and is responsible for ensuring that EnviroForensics personnel conducting investigation activities at the Site have received the appropriate training and certification, consistent with this HASP.

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2.4 Site Investigation Team Leader (SITL)

The Site Investigation Team Leader (SITL) will be responsible for field implementation of the pertinent Work Plan at any phase in the project. The SITL may act as the health and safety manager. This position will communicate regularly with the Project Manager during field activities to report on status and request assistance and guidance in making field decisions or Work Plan modifications.

2.5 Site Health and Safety Manager

The Site health and safety manager is also responsible for disseminating the information contained in this HASP to all personnel working on the Site. The Site health and safety manager has the authority to suspend work any time that he/she determines that this HASP is not being followed. Overall, this individual is responsible for:

- Overall Site safety during field activities;
- Enforcing safe work practices;
- Conducting Site safety meetings;
- Inventorying equipment and supplies;
- Accident investigation and reporting;
- Workers compensation reporting; and
- Regularly reviewing the HASP for accuracy and modifying it, if needed, in consultation with the Corporate Health and Safety Officer.

The Site health and safety manager will review the requirements of the HASP during a mandatory health and safety meeting with project personnel before each phase of field activities. The Field Health and Safety Plan Sign-in Form (**Appendix B**) will be completed during each meeting. Safe work practices, control of potentially hazardous substances, and protection of personnel and property as described in this HASP will be reiterated during the safety meeting.

All staff working on the Site is required to read this HASP and acknowledge that they have read and understand the requirements set forth herein by signing the agreement at the front of this document.



Subcontractors will be required to identify their responsible representatives for project safety by name before the field activities begin; telephone numbers of these individuals for emergency contact will also be provided.

2.6 Project Personnel

All project personnel are responsible for ensuring that they understand how to safely perform their work at the Site. The project personnel will not compromise safe operating procedures at any time. If they are unclear about any aspect of their job, they should immediately ask the SITL or project manager for clarification. Site personnel are responsible for reporting any unsafe condition, accident or near miss to the SITL or project manager.



3.0 HAZARD ASSESSMENT AND CONTROL MEASURES

Field personnel are required to control exposure primarily through the use of safe work practices and PPE. Working conditions will be assessed using air monitoring instruments and visual observations. Air monitoring will be conducted during field activities to assess airborne levels of potential contaminants. If performed, the action levels specified in Section 3.1 will be used to control activities in areas where hazardous vapor concentrations may be present.

3.1 Chemical Hazards

The contaminants of concern (COCs) for this Site are: Resource Recovery and Conservation Act (RCRA) metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), Polychlorinated biphenyls (PCBs), pesticides, and dioxins.

The permissible exposure limits (PELs) are defined as the time-weighted average (TWA) concentrations for a normal eight-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed without adverse effect (29 CFR 1910.1000). OSHA PELs can be found on OSHA's website (https://www.osha.gov/dsg/annotated-pels/)

The immediately dangerous to life and health (IDLH) criteria are defined as the maximum level from which a person could escape within 30 minutes without loss of life or irreversible health effects (*NIOSH Pocket Guide to Chemical Hazards*, U.S. Department of Health and Human Services).

It should be noted that the concentrations of COCs in groundwater have been reported in a weight-to-volume ratio (e.g., $\mu g/l$). Consequently, they are not directly comparable to the inhalation exposure route criteria for PEL and IDLH, which are reported on a weight-to-volume ratio in air or volume-to-volume ratio in air.

3.2 Physical Hazards

On the basis of available information, physical hazards associated with the SI field activities may present a greater risk of injury than the chemical constituents in soil and groundwater at the Site. Activities within the scope of this project shall comply with Wisconsin and federal OSHA construction safety standards, and other applicable laws and regulations.

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Specific potential physical hazards of concern include:

- Slip, Trip and Fall
- Pinch hazards associated with Direct Push sampling
- Field work in close proximity to moving augers
- Traffic hazards associated with work in proximity to vehicular traffic
- Underground Utilities
- Inclement weather (i.e. winter conditions)

3.2.1 Head Trauma

To minimize the potential for head injuries, field personnel will be required to wear NIOSH-approved hard hats during all field activities. Such equipment will be required to be worn properly and not altered in any way that would decrease the degree of protection provided.

3.2.2 Foot Trauma

To avoid foot injuries, field personnel will be required to wear steel-toed safety shoes while field activities are being performed and to afford maximum protection, all safety shoes must meet American National Standards Institute (ANSI) standards.

3.2.3 Eye Trauma

Field personnel will be required to wear eye protection (safety glasses with side shields) while field activities are being performed, to prevent eye injuries, which might otherwise be caused by contact with chemical or physical agents.

3.2.4 Noise Exposure

Field personnel will be required to wear hearing protection (ear plugs or muffs) in high noise areas (noise from heavy equipment) while field activities are being performed. Local noise ordinances will be observed during execution of the field activities. Any elevated noise levels from field activities will be minimized, and limited to normal working hours.

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3.2.5 Heavy Equipment Limitations

Vehicles and heavy equipment will not exceed a speed limit of 10 miles per hour in the project area and drivers and equipment operators will wear seat belts at all times. Also, no riders will be allowed on heavy equipment or in vehicles unless seats and seat belts are available for their use.

3.2.6 Buried Utilities and Overhead Power Lines

Drilling locations will be examined by project personnel and an underground utility locator service, so that utilities and on-site personnel will be protected during drilling activities. Wisconsin Diggers Hotline will be provided notice at least two days before beginning drilling activities. Protection from overhead power lines will be accomplished by maintaining safe distances, of at least 10 feet, at all times.

3.2.7 Thermal Stress

Heat / Cold Stress Procedures

Heat stress is a significant potential hazard associated with work task performed and the degree of protective equipment used in hot weather environments. Local weather conditions may produce situations that will require restricted work schedules in order to protect employees. Monitoring for heat stress will follow one or two protocols depending on whether impermeable clothing (Tyvek®, Saranex®) or permeable clothing (cotton) is worn. Impermeable clothing impedes cooling by sweat evaporation and puts workers at higher risk. The following table was generated by the American Conference of Governmental Industrial Hygienists (ACGIH) for worker exposure to heat stress that it is believed nearly all workers may be repeatedly exposed without adverse health effects. This table only serves as guideline that should not be exceeded.

Permissible Heat Exposure Applicable to Workers Wearing Permeable Clothing

() Parentheses indicate working in impermeable clothing

	Workload		
Work / Rest Regimen	Light	Moderate	Heavy
Continuous work	86 F(76 F)	80 F(70 F)	77 F (67 F)
75% work – 25% rest, each hour	87 F(77 F)	82 F(72 F)	78 F(68 F)
50% work – 50% rest, each hour	89 F(79 F)	85 F(75 F)	82 F(72 F)
25% work – 75% rest, each hour	90 F(80 F)	88 F(78 F)	86 F(76 F)

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Rest periods should be in shade and be sufficient enough to allow workers to recover from the effects of heat stress.

Prevention of Heat Stress

- Provide plenty of fluids to drink. Water is best. Avoid soda or caffeine.
- Work in pairs (Use the buddy system).
- Provide cooling devices such as ice vests, showers, fans, or air conditioning.
- Adjust work schedule to carry out intensive tasks during the coolest part of the day.
- Utilize shaded areas whenever possible.

Recognition and Treatment of Heat Stress

Any personnel who observe any form of heat stress either in themselves or in another worker must report the information to his supervisor or safety officer immediately. An excessive heat stress condition may exist when sustained (more than 5 minutes) oral or ear temperature is greater than 99.5 °F and/ or sustained pulse rate (more than 5 minutes) is above 90 beats per minute.

Conditions of heat stress are as follows from least to greatest:

Heat Rash or Prickly Heat

Cause: Continuous exposure to hot, humid air, aggravated by chafing clothing.

Symptoms: Formation of red pimples around sweat ducts accompanied by intense itching.

Treatment: Remove source of irritation and cool skin with water.

Heat Cramps or Heat Prostration

Cause: Profuse perspiration and inadequate replenishment of water and electrolytes.

Symptoms: Development of pain, cramps, muscle spasms in abdomen.

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Treatment: Remove worker from heat exposure, remove restrictive clothing, decrease body temperature, replenish fluids, and rest in cool location.

Heat Exhaustion - SERIOUS

Cause: Overexertion in hot environment and profuse perspiration accompanied by inadequate replenishment of water and electrolytes.

Symptoms: Muscular weakness, staggering gait, nausea, dizziness, shallow breathing.

Treatment: Perform the following while simultaneously making arrangements for transport to medical facility: Remove worker from heat exposure; remove restrictive clothing; Lie worker down in cool place with the feet in an elevated position; Administer fluids; Keep victim conscious and alert; and Transport to hospital.

Heat Stroke – EXTREMELY SERIOUS

Cause: Same as heat exhaustion.

Symptoms: No perspiration, skin is hot and dry, dry mouth, dizziness, nausea.

Treatment: Perform the following while simultaneously making arrangements for transport to medical facility: Remove worker from heat exposure; remove restrictive clothing; Lie worker down in cool place and raise the head and shoulder slightly; Cool the body without chilling; Apply wet cloth to head; Sponge bare skin with cool water; and Transport to hospital.

Cold Stress

Thermal injury due to cold exposure can become a problem for field personnel during the winter months. Systemic cold exposure is referred to as hypothermia. Localized cold exposure is generally labeled as frostbite.

Hypothermia is defined as a decrease in the core body temperature below 96°F. Normal body temperature is maintained by a combination of central (brain) and peripheral (skin and muscle) activity. Interferences with either of these mechanisms can result in hypothermia, even in the absence of what is normally considered "cold" ambient temperature. Hypothermia can be can be

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produced at temperature as moderate as 50 °F. Symptoms include: uncontrollable shivering, apathy, listlessness, sleepiness, and unconsciousness.

Frostbite is both a general and medical term given to areas of localized cold injury. Unlike hypothermia, frostbite rarely occurs unless the ambient temperature is less than freezing and usually less than 2 °F. Symptoms of frostbite include: sudden blanching or whitening of the skin; waxy or white appearance of the skin; skin is firm to touch; skin is cold, pale, and solid.

Prevention of Cold Stress

Prevention of cold stress can be made by recognizing the symptoms of hypothermia and frostbite. Employees should be provided with enclosed, heated environments at the work site. Dry changes of clothing and warm drinks should also be provided.

Clinical Symptoms of Hypothermia

Body Core	
Temperature °F	Symptoms
98.6	Normal core body temperature
96.8	Metabolic rate increases, shivering starts
95.0	Maximum shivering
93.2	Victim conscious and responsive
91.4	Severe hypothermia
89.6 – 87.8	Semi-conscious, low blood pressure, dilated pupils, shivering ceases
86.0 – 84.2	Loss of consciousness, muscular rigidity, respiration slows
78.8	Victim unresponsive
64.4	Lowest temperature hypothermia victim can recover from

Workers developing moderate hypothermia (92 °F) should not return to work for at least 48 hours.

3.2.8 Electric Shock

All electrical equipment to be used during field activities will be suitably grounded and insulated, and ground fault circuit interrupters (GFCI) will be utilized with all heavy electrical equipment to reduce the potential for electrical shock.



3.2.9 Hazardous Weather Conditions

Project personnel will be made aware of hazardous weather conditions, including extreme heat or cold, and take the precautions described herein to avoid adverse health risks. Project personnel are encouraged to take reasonable, common sense precautions to avoid potential injury associated with possible rain, sleet, snow, ice, lightning, or high wind.

3.2.10 Slip, Trip, and Fall Hazards

Areas at the Site may be slippery from mud, water or ice and care should be taken by project personnel to avoid slip, trip and fall hazards. Project personnel will not enter areas that are not adequately lit and additional portable lighting will be provided at the discretion of the SITL or the Corporate Health and Safety Manager, if necessary. Workers will not pass through or work in areas of inadequate lighting, in order to prevent physical injury.

3.2.11 Biological Hazards

Drugs and alcohol are prohibited from the Site and any worker or oversight personnel suspected of being in an impaired condition, due to drugs or alcohol will be immediately expelled from the Site. Any worker or oversight personnel with a relevant medical condition that requires attention should inform the SITL of such condition and describe appropriate measures to be taken if the individual should become symptomatic.

All personnel working on-Site should be cognizant of poisonous snakes, spiders, plants, and insects that could potentially be encountered; these hazards should be avoided. Care should be taken in lifting objects under which a poisonous insect or reptile may be residing.

3.2.12 Drilling and Groundwater Monitoring Hazards

Severe accidents, if any, will probably be related to the operation of heavy equipment at the Site, particularly during drilling and/or trenching activities during remediation system installation. Physical harm can be caused by improper or unsafe use of the drill rig and associated equipment, or faulty or poorly maintained drilling machinery. Examples of unsafe use include not properly stabilizing and leveling the rig, failure to wear a hardhat or failure to don hearing protection. Electrical hazards include shock from lightning, drilling into live utility lines or using improperly grounded electrical hand tools. Physical harm can also be caused by improper or unsafe use of

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trenching excavation equipment, or faulty or poorly maintained excavation machinery. All OSHA regulations will be followed in addition to standard construction safety practices.

3.2.13 Hazard Identification and Control

Precautions must be taken to prevent injuries and exposures to the following hazards.

Potential Hazards and Controls

Potential Hazard	Control		
Chemical exposure	1. Stay upwind whenever possible.		
	2. Minimize contact and contact time with chemical.		
(See an MSDS for	3. Avoid walking through suspected areas or anything likely to be		
`	contaminated.		
more specific	. Do not eat, drink, smoke, or apply cosmetics in exclusion zone.		
information on	5. Wear gloves when in contact with contamination.		
chemical exposure)	6. Wear safety glasses at all times.		
, ,	7. Splash goggles must be worn when working with liquids.		
	8. Exposure to 50% PEL vapors in breathing zone, sustained for 5 minutes requires upgrade to Level C.		
	9. Exposure to 100% PEL vapors in breathing zone, sustained for 5 minutes		
	requires upgrade to Level B.		
	10. Unknown materials, call the Health and Safety Representative.		
	11. All hazardous materials must be adequately labeled and have MSDS		
	available.		
	12. Use Daily Safety Meeting to record training attendance.		
Container management	1. All containers must be clearly labeled for contents.		
(drums & cylinders)	2. Incompatible materials must be separated by 20 ft or physical barrier.		
	3. Avoid storage in high traffic areas.		
	4. Containers must not be damaged, dented, or leaking.		
	5. Containers must be kept securely closed when not in use.		
	6. All cylinders must be securely anchored upright.		
Vehicular Traffic	1. Wear traffic safety vest.		
	2. Use cones, flags, barricades, and caution tape to define work area.		
	3. Use vehicle to block work area.		
	4. Engage police detail for high traffic situations.		
Fall Protection	Access the work area to determine potential for falling.		
	2. Access the distance of the potential fall.		
	3. Fall protection must be used for falls greater than 6 feet.		
	4. Consult safety personnel regarding fall protection and what system to use.		
	5. Inspect fall protection equipment and anchoring points prior to use.		
Confine Space Entry	1. Ensure personnel assigned have met confined space training requirements.		
	2. Complete confined space entry permit.		
	3. Conduct pre-entry safety meeting.		

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Potential Hazard	Control
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	5. Conduct remote air monitoring prior to entry.
	6. Attendant must be present at entry point at all times when entrant is in
	confined space.
	7. Access for fall hazards and ensure provisions for non-entry rescue have been
	met.
Utility Lines	8. Enter only when safe; conduct continuous air monitoring.
Offinity Lines	1. Contact Diggers Hotline to have utility lines marked prior to excavation, trenching, drilling, or boring.
	2. Refer to site drawings or client if on private property for utility locations.
	3. Hand dig when within 5 feet of a utility marker.
Inclement weather	1. Cease all outdoor work during electrical storms, hail, and other extreme
	weather conditions.
	2. Take cover indoors.
	3. Listen to local forecasts for weather watches and warnings.
	4. Obey the "30/30" rule.
Noise	1. Wear hearing protection when working near drill rig, jackhammer, cutting
	saw, compressor, blower, or other heavy equipment.
	2. Wear hearing protection when it is necessary to raise your voice above
	normal speech due to a loud noise.
	3. Conduct noise monitoring to verify hearing protection requirements.
Electric Shock	1. Maintain appropriate distance from overhead utilities:
	10 Feet minimum clearance from power lines 50 kV or less
	10 Feet minimum plus 4 inches for every 10 kV over 50 kV
	2. Use ground fault interrupters.
	3. Use adequate grounding of electrical systems.
	4. Check equipment for frayed wiring or exposed circuits.
	5. Perform lockout / tag out procedures.
	6. Use three pronged plugs and extension cords.
	7. Contact your local utility locating service.
	8. Follow code requirements for electrical installations in hazardous locations.
Physical Injury	1. Wear hard hats and safety glasses when on site.
	2. Maintain visual contact with equipment operator and wear safety colored
	vest when heavy equipment is used on site.
	3. Avoid loose fitting clothing.
	4. Prevent slips, trips, and falls by keeping work area uncluttered.
	5. Keep hands away from moving parts.
	6. Test emergency cut off switch on equipment every day.
Back injury	1. Use a mechanical lifting device.
	2. Plan the lift.
	3. Check your route.
	4. Bend at the knees.
	5. Use the buddy system.
	6. Do not twist your body.
Heat Stress	1. Increase water intake.



Potential Hazard	Control
	2. Take frequent breaks, or rotate workers, take shorter work shifts.
	3. Watch for signs and symptoms of heat exhaustion and fatigue.
	4. Avoid the hottest part of the day. Plan work for early morning or
	evening.
	5. Use ice vests when necessary.
	6. Rest in cool areas.
	7. In the event of heat stroke, cool the victim and initiate first aid. Seek
	immediate medical attention.
Cold stress	1. Take breaks in heated shelters.
	2. Wear warm insulating clothing.
	3. Drink warm liquids.
	4. Be aware of cold stress symptoms such as shivering, numbness,
	sluggishness, frost bite.
Bites, stings from	1. Avoid suspected areas such as tall grass, brush, or undergrowth.
spiders, insects,	2. Use caution moving or lifting objects which could be used as cover.
snakes	3. Never reach under or behind objects which could be used as cover.
SHakes	4. Wear long pants and sleeves.
	5. Wear heavy gloves and sturdy leather boots.
	6. Use repellant.
	7. Check for signs of bites such as redness, swelling, and flu-like
	symptoms.
	8. Snake and spider bites can be medical emergencies – seek treatment
	immediately.
Poisonous plants	1. Avoid suspected areas such as tall grass, brush, or undergrowth.
	2. Wash exposed skin that may come into contact with poison plants.
	3. Utilize protective clothing.
Ladders	1. Assess work areas for fall hazards.
	2. Only one person at a time on a ladder.
	3. Inspect ladders for damage.
	4. Secure feet of ladders.
	5. Pitch ladders at a 4:1 ratio.
	6. Secure ladders at the top when possible.
	7. Do not use ladders as scaffolding.
	8. Both rails of a ladder must be supported.
	9. Extension ladders must extend 3 feet beyond landing platform.
	10. Use non-conductive ladders.
Fire Control	1. Smoke only in designated areas.
	2. Keep flammable liquids in approved containers.
	3. Keep approved containers closed.
	4. Keep work areas free from combustible debris.
	5. Isolate ignition sources.



Potential Hazard	Control		
Static Electricity	Do not create static discharge around flammable materials. 1. Electrically bond and ground pumps, vessels, tanks, drums, and probes when moving flammable liquids. 2. Do not splash fill containers filled with flammable liquids.		
Drilling / Boring Operations	 All active operations must be actively manned. Personnel must know the location of emergency shut off switch and test it daily for function. Unauthorized personnel must be kept clear of drilling rig. Area of drilling rig must be cordoned off or barricaded. 		
Well development, Well gauging, Well bailing Water sampling Rapid response	 Wear appropriate PPE to avoid skin, eye, and inhalation contact with contaminated water and soil. Stand upwind and minimize inhalation exposure. Conduct air monitoring. Utilize engineering controls to control chemical vapors. Ensure emergency response activities have been completed prior to beginning rapid response activities. Conduct hazard assessment of project site and communicate findings through a daily safety meeting (tailgate meeting) to all EnviroForensics employees and subcontractors prior to beginning rapid response activities. Communicate EnviroForensics health and safety programs to other contractors on site that may be impacted and coordinate field activities with them. 		
Welding, cutting, brazing	 Conduct fire safety evaluation (hot work permit). Ensure flammable materials are protected from hot work and sources of ignition. Ensure fire watch / fire extinguisher is on standby. 		
Cleaning equipment	 Wear appropriate PPE to avoid skin and eye contact with cleaning materials. Stand upwind to minimize any potential inhalation exposure. Dispose of spent cleaning solutions and rinses accordingly. 		



4.0 PERSONAL PROTECTIVE EQUIPMENT

Potential hazards from exposure to COCs will be minimized by using the appropriate PPE during field operations. The minimum level of protection selected for the project is Level D, as defined by the U.S. EPA (July 1988). Level D protective equipment is used on Sites that have been investigated and characterized as posing occupationally insignificant skin or respiratory hazards, and for which all criteria for the use of air-purifying respirators have been met. Dermal protection will be required when direct contact with potentially impacted materials is possible to prevent unnecessary exposure. The protection level at the project area may be upgraded to Level C, if deemed necessary on the basis of air monitoring results.

The following PPE must be worn during all field activities associated with this project:

Level D

- Safety glasses or goggles;
- Hard hat;
- Steel-toed boots; and
- Gloves.

In addition, chemical resistant (Nitrile) gloves are required when handling soil or groundwater samples. The following PPE will be readily available for use as necessary based on air monitoring results, as outlined in Section 5.

Level C

- Half- or full-face respirators with organic vapor cartridges and high efficiency particulate filters (see Section 4.0 for use requirements);
- Chemical-resistant (Nitrile) gloves;
- Chemical-resistant boots;
- Tyvek® or Saranex® outer garment, and
- Level D equipment.

All field personnel assigned to work in a project area where respiratory protection may be necessary will be required to provide evidence of fit-testing for an appropriately-sized respirator, and trained in the use, limitations, care, and maintenance of air-purifying respirators.



5.0 EXPOSURE MONITORING

Select monitoring of high-risk workers (those who are closest to the source of COCs) may be conducted. This approach is based on the argument that the probability of exposure varies directly with the distance from the source. If workers closest to the source are not significantly exposed, then other workers are presumably also not significantly exposed and probably do not need to be monitored. Personal monitoring samples may be collected at the discretion of the health and safety manager in the breathing zone and, if workers are wearing respiratory protective equipment, outside the face-piece. These OK samples would represent the actual inhalation exposure of workers who are not wearing respiratory protection and the potential exposure of workers who are wearing respirators.



6.0 SITE ACCESS

Access to the Site during field activities will be controlled and unauthorized personnel and visitors shall not be allowed access to the project Exclusion Area (Section 7.0). Only personnel with specific operational duties should be present in the Exclusion Area, when field operations are being conducted. Site control at work locations will be established using barricades, cones, and flagging tape, as needed to prevent unauthorized access to the Exclusion Area during work.



7.0 WORK AREAS

This section provides a brief description of the work areas that will be established for the activities described in this HASP. In addition to the areas described below, an evacuation meeting place will be designated before each operation begins, based on the field activity planned. Work-zone boundaries will be delineated in the field using safety cones, barricades, and flagging tape, as necessary.

7.2 Exclusion Area

An Exclusion Area will be established to control access to the work areas and will extend from a distance of at least 10 feet from the area where potentially-impacted media is being sampled or tested, and at least 25 feet in areas where drill rigs or heavy equipment is in use. The size and shape of the Exclusion Area will be determined based on wind direction, effective Site security, surrounding operations, and surrounding public areas. Level D protection and appropriate training will be required at a minimum for personnel working in the Exclusion Area.

7.3 Contamination Reduction Area

A Contamination Reduction Area will be placed in an area adjacent to and upwind from the Exclusion Area. In this area, personnel and equipment will be decontaminated, as appropriate, after work has been completed.

7.4 Support Area

The Support Area covers all areas outside the Exclusion and Contamination Reduction Areas and provides for all administrative and support functions (command post, first-aid station, rest area) needed to keep the field activities running smoothly. Potable water, portable hand washing area, and restroom facilities for field personnel shall be provided at this location. The entire project area will be considered the Support Area, when field activities are not being conducted.

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8.0 DECONTAMINATION PROCEDURES

Decontamination procedures will be performed before leaving the work areas, as part of the system for preventing or reducing the physical transfer of impacted materials from the project area. Physical (removal of contamination by removing PPE, gloves, boots, brushing, vacuuming) and chemical (washing with detergent and/or neutralizing agents) decontamination procedures will be used. Primary decontamination will take place in the Contamination Reduction Area where washtubs filled with soap and water and rinse tubs will be provided to clean reusable equipment and drums will be provided to contain used, disposable PPE. Secondary decontamination will take place at portable hand washing facilities in the Support Area. All Site personnel will be required to wash their hands before eating and after work.

Disposable sampling equipment, used PPE, liquid waste (e.g., decontamination wastewater and purged groundwater), and other investigation-derived media (IDM) will be placed in properly labeled containers as these wastes are generated. These materials will be managed as IDM, as discussed in the Work Plan.

Personnel decontamination procedures will be performed in the following sequence:

- If gross contamination is obvious, physically remove contamination by brushing, scraping or other method prior to leaving the Exclusion Area.
- Transfer the equipment to the Contamination Reduction Area for subsequent chemical decontamination or disposal.
- In the Contamination Reduction Area, remove any outer disposable PPE and discard into the appropriate disposal drum.
- In the Contamination Reduction Area, scrub chemical-resistant boots and gloves with detergent and water followed by water rinse.
- In the Contamination Reduction Area, remove respirator and avoid touching face.
- In the Support Area thoroughly wash hands and face.



9.0 SAFE WORK PRACTICES

The field activities will be conducted with the minimum safety practices as noted below:

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in any area where the potential for contamination exists.
- Hands must be thoroughly washed when leaving a contaminated or suspected contaminated area before eating, drinking or any other activities.
- Potentially contaminated PPE and equipment will not be removed from the Contaminant Reduction Area until it has been properly decontaminated or containerized.
- Removal of potential contamination from PPE and equipment by blowing, shaking, or any means that may disperse materials into the air is prohibited.
- Personnel working on Site must use the "buddy" system when wearing respiratory protective devices or working in an Exclusion Area. Visual contact must be maintained between "pairs" on-Site and each individual should remain close enough to assist the other in an emergency.
- Personnel will be cautioned to inform each other of subjective symptoms of chemical exposure, such as headache, dizziness, nausea, and irritation of the respiratory tract and heat stress.
- <u>No excessive facial hair</u> that interferes with a satisfactory fit of the face-piece of the respirator to the face will be allowed on personnel required to wear respiratory protective equipment.
- On-Site personnel will be thoroughly briefed about the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communications methods.

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- All field personnel will, whenever possible, situate themselves so that they work upwind from any area with exposed soil or groundwater.
- Field personnel are prohibited from entering confined spaces, trenches, or excavations deeper than four feet unless the entry provisions of 29 CFR 1910.146 are addressed. Open trenches or excavations that are unattended will be guarded, covered, or marked as described in Section 6.0 to restrict entry.

The following care should be taken within the workplace to provide continuing safe workplace conditions.

- A multipurpose (A, B, C) portable fire extinguisher and other emergency response equipment shall be located in the immediate vicinity of the work area;
- Field equipment shall be kept in good condition;
- First-aid supplies shall be available in the Support Area; and
- Appropriate work areas designated for support, contamination reduction, and exclusion will be maintained.



10.0 EMERGENCY PROCEDURES

All illnesses, injuries, or accidents occurring during the field activities will be reported to the SITL or Corporate Health and Safety Manager. Injured personnel must be attended to immediately and medical attention must be obtained for serious injuries, a route to the nearest hospital is included as **Figure 1**. If necessary, the injured will be transported to a hospital. A preliminary incident report (**Appendix C**) must be completed to document any illness, injury or accident that occurs during field activities. The SITL shall consult with the Corporate Health and Safety Manager or Project Manager for instructions on completing this report. Field activities will be suspended until the cause of the injury has been investigated and the work procedures have been modified, if necessary.

A first-aid kit will be available in the Support Area for treatment of minor injuries, such as cuts or abrasions. In an emergency or a hazardous situation involving explosions, fires or major physical injuries, the individual who observes this condition will immediately give a verbal alarm. Upon hearing the alarm, field personnel will safely de-energize nonessential equipment and evacuate to a suitable upwind location and away from the danger. Emergency contact telephone numbers are shown in **Table 1**. If there is a chemical release to the environment in excess of the reportable quantities, it will be reported to the National Response Center, within 24 hours, in accordance with the applicable law.



11.0 TRAINING

All personnel performing the field activities described in this HASP will have received the initial safety training required by 29 CFR, Part 1910.120. Current refresher training status also will be required for all personnel engaged in field activities. Documentation that this training has been completed will be provided to the Site Monitor upon request.

During field activities, daily safety meetings will be held by the Site Health and Safety Manager to review specific health and safety aspects of the scheduled work.

Field personnel responsible for air monitoring will be adequately trained in the use, calibration, and limitations of the field monitoring equipment.



12.0 MEDICAL MONITORING

All personnel scheduled for field activities will have completed medical examinations, meeting the minimum medical surveillance requirements described in 29 CFR, Part 1910.120 and 1910.1000.



TABLE 1

EMERGENCY PHONE NUMBERS

EMERGENCY NAME	TELEPHONE NUMBER
Ambulance	911
Fire	911
Hospital: Tulane Medical Center 1415 Tulane Ave. New Orleans, LA 70112	911 or (504) 988-5263
Police	911
Wisconsin Diggers Hotline	811 or 1-800-272-3020
WDNR Emergency Response	1-866-288-2484
EnviroForensics Office (Waukesha, WI)	1-262-290-4001



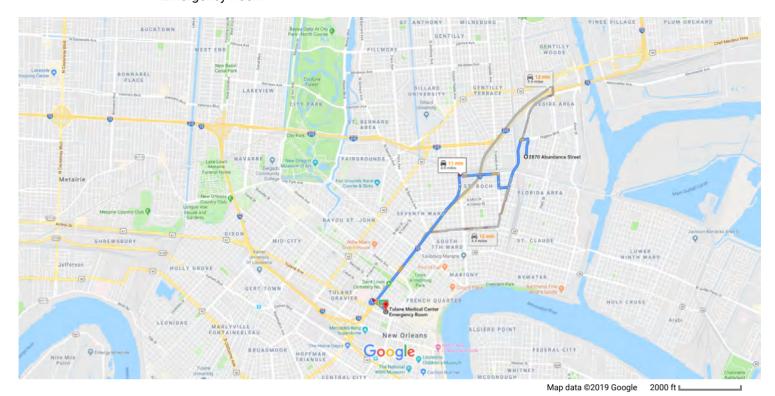
FIGURE 1

MAP TO HOSPITAL



2870 Abundance St, New Orleans, LA 70126 to Tulane Medical Center Emergency Room

Drive 4.8 miles, 11 min



2870 Abundance St

New Orleans, LA 70126

Follow St Ferdinand St to Higgins Blvd

1	1.	Head northwest on Abundance St toward St Ferdinand St	
Ļ	2.	Abundance St turns right and becomes St Ferdinand St	— 33 ft
			- U.Z MI

Take Almonaster Ave, Florida Ave and I-10 W to Cleveland Ave. Take exit 235B from I-10 W

			8 min (4.2 mi)
٦	3.	Turn left onto Higgins Blvd	,
4	4.	Turn left onto Almonaster Ave	——— 440 ft
Ļ	5.	Turn right onto N Rocheblave St	0.8 mi
r	6.	Turn right at the 3rd cross street onto Fr	
Ļ	7.	Keep right	459 ft
4	8.	Turn left onto Florida Ave	0.1 mi
r	9.	Turn right to stay on Florida Ave	——— 0.5 mi
			289 ft

4	10.	Turn left	0.2 mi
Γ*	11.	Turn right onto Elysian Fields Ave	0.2 mi
*	12.	Use the right 2 lanes to turn slightly right on Interstate 10 W ramp to Baton Rouge	to the
*	13.	Merge onto I-10 W	0.4 mi
۳	14.	Take exit 235B toward Canal St/Superdome	1.7 mi 0.1 mi
Follo	w Cle	eveland Ave to Lasalle St	(0.3 mi)
Ļ	15.		,
Ļ	16.	Turn right onto Lasalle St Destination will be on the left	0.3 mi
			- 118 ft

Tulane Medical Center Emergency Room

1415 Tulane Ave, New Orleans, LA 70112

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.



APPENDIX A

AGREEMENT AND ACKNOWLEDGEMENT SHEET VISITOR GUIDELINES VISITOR AGREEMENT FORM



AGREEMENT AND ACKNOWLEDGEMENT SHEET

EnviroForensics personnel have the authority to stop field activities at this site if any activity is not performed in accordance with the requirements of this plan. All EnviroForensics project personnel, subcontractor personnel, and visitors are required to sign the Agreement and Acknowledgement Sheet prior to conducting field activities at this site.

ENVIROFORENSICS AGREEMENT AND ACKNOWLEDGEMENT STATEMENT

- 1. I have reviewed and fully understand of this plan and my responsibilities.
- 2. I am aware that additional, standardized health and safety information is available for me.
- 3. I agree to abide by the provisions of this health and safety plan.

Signature
Date
Signature
Date



Visitor Guidelines

EnviroForensics is committed to providing a safe environment on all work sites for employees and visitors. In order to accomplish this, the following guidelines must be followed.

Any person not actively participating in the work at the site is regarded as a "visitor" and must follow EnviroForensics visitor guidelines.

- Visitors must be accompanied by an EnviroForensics representative while on-site.
- The site must be marked with signs, placards, and/ or barricades to designate hazardous boundaries. Visitors will not be allowed on any site that is not adequately marked.
- Visitors are not to perform work functions of any type while on site.
- Visitors are not to handle any equipment, tools, and hazardous materials and/ or supplies while on site.
- Visitors are not to enter any hazardous or hot zones or confined space areas while on site.

SITL will be responsible for informing visitors of the above conditions and ensuring that conditions are met. SITL will also ensure that visitors will not be asked to violate the conditions listed above.

A visitor form must be signed by both the visitor and the SITL, and placed on file with the project records.



VISITOR AGREEMENT FORM

EnviroForensics is committed to providing a safe working environment for all employees. In addition, EnviroForensics will comply with OSHA requirements for employee safety training prior to working on any hazardous site.

The following section is to be filled out by visite	or.
Agreement between:	and EnviroForensics
NAME (print):	
As a visitor to an EnviroForensics work site, y these restrictions.	your signature below indicates your agreement to
 You will be supervised at all times during You may not perform any work function You may not handle any equipment, too You may not enter any hazardous areas, 	ns of any type. Ils, hazardous materials, or supplies of any type.
I agree to adhere to the above conditions in all i	nstances while on-site as a visitor.
Visitor Signature	Date
As SITL to the above visitor, I agree to above perform activities contrary to those restrictions.	restrictions and agree not to request the visitor to
Signature	Date



APPENDIX B

FIELD HEALTH AND SAFETY PLAN SIGN-IN FORM



Field Health and Safety Plan Sign-in Form

Project Name:	Agriculture Street Landfill	Date:	
Project Number:	300002	Completed By:	

Check the Topics/Information Reviewed:

1
SAFETY GLASSES, HARD HAT, SAFETY BOOTS
SITE SAFETY PLAN REVIEW AND LOCATION
EQUIPMENT AND MACHINERY FAMILIARIZATION
EMPLOYEE RIGHT-TO-KNOW/MSDS LOCATIONS
OPEN PITS, EXCAVATIONS, AND SITE HAZARDS
VEHICLE SAFETY AND DRIVING/ROAD CONDITIONS
PORTABLE TOOL SAFETY AND AWARENESS
OVERHEAD UTILITY LOCATIONS AND CLEARANCE
FIRST AID, SAFETY AND PPE LOCATION
SHARP OBJECT, REBAR AND SCRAP METAL HAZARDS
SAFETY IS EVERYONE'S RESPONSIBILITY
LATEX GLOVES INNER/NITRILE GLOVES OUTER
EXCAVATION/TRENCHING INSPECTIONS/DOCUMENTATION
FULL FACE RESPIRATORS WITH PROPER CARTRIDGES
REVIEW ACTION LEVELS WITH ALL PERSONNEL ON-SITE

SLIPS, TRIPS AND FALLS
DIRECTIONS TO HOSPITAL
ANTICIPATED VISITORS
ELECTRICAL GROUND FAULT
PUBLIC SAFETY AND FENCES
EXCAVATOR SWING AND LOADING
ORDERLY SITE AND HOUSEKEEPING
SMOKING IN DESIGNATED AREAS
LEATHER GLOVES FOR PROTECTION
EFFECTS OF THE NIGHT BEFORE
VIBRATION RELATED INJURIES
FIRE EXTINGUISHER LOCATIONS
EYE WASH STATION LOCATIONS
DECONTAMINATION PROCEDURES

DAILY WORK SCOPE
EMERGENCY PROTOCOL
PARKING AND LAYDOWN
HOT WORKS PERMITS
STRAINS AND SPRAINS
Noise hazards
NO HORSEPLAY
HEAT AND COLD STRESS
BACKING UP HAZARDS
ACCIDENTS ARE COSTLY
DUST AND VAPOR CONTROL
REFUELING PROCEDURES
CONFINED SPACE ENTRY
FLYING DEBRIS HAZARDS

Attendee Comments/Follow-up Actions:		
Brief Description of Daily Tasks:		
Associated Hazards and Required PPE:		

NAME	<u>COMPANY</u>	<u>SIGNATURE</u>



APPENDIX C

PRELIMINARY INCIDENT REPORT (PIR)



PRELIMINARY INCIDENT REPORT

Type of Incident:	
Project	
Name/Number:	
Location of Incident (name of Site and specific area where incident occurred):	
Date of Incident:	
Time Incident Occurred:	
Witnesses to Incident (full names and employers):	
Description of Incident (exactly what happened and how it happened):	

(Continue on separate sheet if necessary)



Description of Illnesses or Injuries, if any:

Name(s) and Employer of Ill/Injured	Symptoms Experienced/Type of Injury
Did any of the above require medical care by	a doctor or other health professional?
No Yes (give number next to nat	me)
Actions taken to mitigate incident:	
Actions needed to prevent recurrence of simil	ar incidents:
Attach:Police ReportPhotos	
Signature of Site Health and Safety Manager:	:
Date:	
This form will be distributed to the Corner	rote Health and Cafety Manager and D

This form will be distributed to the Corporate Health and Safety Manager and Project Manager.



APPENDIX D

AIR MONITORING FORM DAILY CALIBRATION FORM



				Air	Moni	toring Fo	rm		
Projec	et Name:								
Projec	t Numb	er:	30002)					
Conta	minants	<u>.</u>							
		PID .	/ FID	LEL /	/ O2				
		Readings		Read		Detector			
D.	m·	FID PID		%LE	%	Tube	·		
Date	1 ime	FID	PID	L	O2	Reading	Location	Purpose	Initials
	1		1		1			ı	ı



Daily Instrument Calibration Form												
Project Na	ame:						_					
Project Nu	ımber:	30002										
Instrumen	t Number:_											
Date	Instrument	Battery?	Zeroed?	Calibration Gas (PPM)	Reading (PPM)	By:	Comments					



Appendix F

Preliminary Project Schedule

Document: 300002-0156

Site Characterization Project Schedule Agriculture Street Landfill Site

		Week																																								
Task	1 2 3	4 5 (6 7	8 9	10	1 12 1	13 14	15 16	17 18	19 20	21	22 23	24 2	25 26	27 28	3 29 3	30 31	32 33	3 34 35	36 3		41 42	43 4	4 45 4	46 47	48 49	50 51	52 5	3 54 3	55 56	57 58	59 60	61 62	2 63 6	64 65	66 67	7 68 69	70 7	1 72 7	73 74	75 76 7	7 78
Contracting																																										
Access Agreements																																										
Public Notifications																																										
Fieldwork Preparation																																										
Subsurface Utility Surveys																																										
Soil Sampling																																										
Soil Cover Assessment																																										
Vapor Intrusion Assessments																																										
Monitoring Well Installation																																										
Groundwater Monitoring																																										
Data Evaluation																																										
Reporting																																										

