

Health Consultation

Stolthaven New Orleans, LLC

Review of 2012 Offsite Soil Data

Collected in Braithwaite, LA

Braithwaite

Plaquemines Parish, Louisiana

EPA Registry Identification Number: 110003368463

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Prepared by

Louisiana Department of Health and Hospitals
Office of Public Health
Section of Environmental Epidemiology and
Toxicology

Under a Cooperative Agreement With the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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List of Acronyms

AOC	Area of Concern
ATSDR	Agency for Toxic Substances and Disease Registry
COC	contaminant of concern
DEA	diethanolamine
ESL	Effects Screening Level
EPA	Environmental Protection Agency
bgs	below ground surface
LDEQ	Louisiana Department of Environmental Quality
LDHH	Louisiana Department of Health and Hospitals
LDNR	Louisiana Department of Natural Resources
mg/kg/day	milligrams per kilograms per day
OPH	Office of Public Health
ppm	parts per million
RECAP	Risk Evaluation/Corrective Action Program
RSL	Regional Screening Level
SEET	Section of Environmental Epidemiology and Toxicology
SVOC	semivolatile organic compound
VOC	volatile organic compound

Summary and Statement of Issues

INTRODUCTION

Stolthaven New Orleans operates as a certified bulk liquid storage terminal and an international distribution hub in Braithwaite, Louisiana. On August 29, 2012, Hurricane Isaac made landfall in southeastern Louisiana. Severe flooding related to the hurricane shifted some of the storage tanks at the Stolthaven facility on or from their foundations, and nine of them leaked stored liquids.

Through our cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) has evaluated soil data collected from the community of Braithwaite following the Stolthaven tank leaks to determine whether contaminants potentially carried by floodwater from the Stolthaven terminal to the surrounding community pose harm to public health.

Although this document is part of the cooperative agreement agreement, it has not been reviewed and authorized by ATSDR.

CONCLUSION

None of the chemicals that may have been carried by floodwater from the Stolthaven facility into soils in the offsite AOC were detected at levels that would pose harm to public health.

BASIS FOR DECISION

Except for 1-octene, for which no screening value for soil exposures has been established, none of the chemicals that leaked from damaged tanks at the Stolthaven New Orleans facility were present in offsite soils and sediments at levels that were above their screening values.

1-Octene, which is reported to have a low hazard potential for human health, was detected in very few samples at estimated levels much lower than those observed to cause inhalation health effects or health effects in laboratory studies.

NEXT STEPS

The information produced within this health consultation will be made available to the community members and stakeholders in Braithwaite, LA.

FOR MORE INFORMATION

If you have further concerns about the potential soil impacts of the Hurricane Isaac-related leaks at Stolthaven New Orleans, LLC on the community of Braithwaite, questions may be directed to DHH/OPH/SEET at 1-888-293-7020.

Background and Site History

The Stolthaven New Orleans, LLC facility is located on 590 acres of land at 2444 English Turn Road in the semi-rural community of Braithwaite, Plaquemines Parish, Louisiana, 70040. Approximately 120 acres on the northern side of the property are in use; the remainder of the property remains undeveloped and wooded. The Mississippi River serves as a border to the north of the property [1].

A subsidiary of Stolt-Nielsen Limited, Stolthaven New Orleans has provided transportation and storage solutions for a wide range of bulk liquid products since 2001. Stolthaven New Orleans operates as a certified bulk liquid storage terminal and an international distribution hub. Bulk liquids are transported to and from the terminal by train, truck, or ship and are maintained in aboveground storage tanks (ASTs) at the facility [2, 3]. The facility also operates as a centralized waste treatment facility, with a Louisiana Pollutant Discharge Elimination System permit to discharge treated wastewater to the Mississippi River and the Braithwaite Canal [4].

On August 29, 2012, Hurricane Isaac made landfall in southeastern Louisiana. Two days before landfall, the Plaquemines Parish Government issued an evacuation order (which remained in place until September 9, 2012) for the East Bank of Plaquemines Parish in preparation for the hurricane [1, 5]. A crew of personnel remained on duty at Stolthaven for the duration of the storm [1].

Severe flooding during Hurricane Isaac caused the storm surge to overtop the Plaquemines Parish levee system. Standing water became trapped between two levees. Parts of Plaquemines Parish were flooded with an estimated 10-17 feet of water, necessitating the rescue of many residents who had not evacuated. The Stolthaven terminal reportedly flooded to a level of 13 feet within 40 minutes. Although preparations had been made at the site in accordance with Stolthaven's Hurricane Readiness Plan, the surge of floodwater sheared through the bolts holding some of the aboveground storage tanks to their foundations. The damaged tanks shifted on or from their foundations, and nine of them leaked stored liquids. The materials and the final estimated quantities released were recorded as follows [1, 3]:

Product	Quantity Released
C12-C14 Fatty Alcohol (Lauryl Myristyl Alcohol)	283 gallons
1-Octene	80,467 gallons
Alcohols, C10-16 (Safol 23)	937 gallons
Soybean Soapstocks	2,051 gallons
Ultra S-4 (lube oil)	6,168 gallons
Diethanolamine (three tanks)	76,998 gallons
Vivatic (oil additive)	2,906 gallons

Once the leaks were identified, Stolthaven and its contractors took measures to minimize the offsite transport of these chemicals, including the placement of containment booms around the tank farms and the facility's perimeter to minimize potential offsite chemical releases. The

terminal and surrounding community remained flooded for several days until the parish levee east of the Stolthaven facility was breached to drain water from the area. The Stolthaven terminal resumed normal business activities on October 4, 2012 [1].

As part of Stolthaven's emergency response action, Stolthaven contractors conducted environmental sampling of floodwater, air, flood-related sediment, and soil on Stolthaven property and offsite in Braithwaite. The sampling was conducted in cooperation with and under the oversight of the Louisiana Department of Environmental Quality (LDEQ) to assess the potential environmental impacts of the leaks onsite and to the offsite community [1].

The Louisiana Department of Health and Hospitals/Office of Public Health/Section of Environmental Epidemiology and Toxicology (LDHH/OPH/SEET) conducted site visits at Stolthaven New Orleans on November 2, 2012 and November 7, 2012. The SEET site visit team observed Braithwaite residents in the process of repairing their properties; many residents had not yet returned home at that time. The nearest residences were approximately 0.25 miles away from the Stolthaven New Orleans facility.

In 2013, Stolthaven contractors performed Risk Evaluation/Corrective Action Program (RECAP) Investigations to evaluate the potential offsite impacts of the liquids that leaked from the terminal's tanks. The offsite Area of Concern (AOC) spanned from the concrete levee east of the Stolthaven terminal to the neighborhood immediately south of the Braithwaite ferry crossing (see Figure A-1) [1, 6]. The RECAP investigations included both residential properties and public rights of way and concluded that none of the chemicals potentially released from the Stolthaven New Orleans terminal as a consequence of Hurricane Isaac were present in offsite soils at levels that could pose a threat to human health or the environment [1, 6].

Demographics

The United States Census Bureau's American Community Survey 5-Year Estimates for 2011 recorded a population estimate of 1,995 people for the census tract within which Braithwaite is located (Census Tract 501, Plaquemines Parish, Louisiana). The largest ethnic group recorded for the city was African-American (50.8%), followed by White (49.2%). One point four percent (1.4%) of the population identified themselves as Hispanic or Latino. Thirty-eight percent (38%) of the population age 25 years or older had earned at least a high school diploma. The median household income was \$41,292. The largest employers were in the educational, health, and social services industry; public administration; and construction [7].

Following Hurricane Isaac in 2012, population numbers decreased in Braithwaite as families were forced to move away from homes damaged by floodwater. Three hundred and thirty-one residential properties are reported within the offsite AOC [1, 6]. A number of households have not been able to return. Current population numbers have not been reported for the community.

Discussion

Data Used

Through our cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), LDHH/OPH/SEET evaluated soil and sediment samples collected from both residential and non-residential properties within the Braithwaite AOC following Hurricane Isaac. Figure A-2 shows the locations from which these samples were collected.

General Soil and Sediment Samples

Initially, only aliphatics and aromatics were included in the laboratory analysis of the soil samples. The sampling plan was amended on September 15, 2012, after which soil samples were analyzed for a wider range of chemicals, including diethanolamine (DEA), volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). Areas that had been sampled prior to the change (prior to September 15, 2012) were subsequently resampled for the entire analyte list [1].

Residential Soils

A total of 91 residential properties were sampled within the AOC, at the request of and with the consent of the residents. Samples collected from these properties included five-point composite soil samples (created using soil collected from five randomly chosen locations around the property) and discrete (from one location) soil samples. The discrete residential soil samples were chosen from areas with deposits of flood-related sediments and/or staining or odor evidence of potential hydrocarbon impacts. The potential source of these hydrocarbons was not considered and may have included releases unrelated to Stolthaven, such as spilled motor oil [1].

Both discrete and composite samples were collected from a depth of 0 to 6 inches. When a discrete sample was selected from a location observed to include flood-related sediment, the location was only sampled to the full depth of the sediment, excluding the soil beneath [1].

Samples of flood-deposited sediments were collected inside several of the residences and from the bottom of a resident's pool [1]. However, since these sediments would have been removed from the residences as part of the cleanup process during the residents' return to their properties, SEET did not include flood-deposited sediments collected indoors or from the pool in this health consultation.

Non-Residential Soils

Non-residential soil sampling was performed at locations in undeveloped areas or public rights-of-way and from offsite locations in a ditch that drains stormwater from portions of the Stolthaven terminal. These areas were chosen by Stolthaven contractors and by LDEQ personnel to assess the potential extent of migration of the leaked liquids from the Stolthaven facility into the surrounding community. The non-residential samples also included both composite samples and discrete samples. Where possible, samples were collected from areas with staining or odor evidence of potential hydrocarbon impacts. The potential source of these hydrocarbons was not

considered and may have included releases unrelated to Stolthaven, such as spilled motor oil. Thirteen of the non-residential samples were initially collected as onsite samples but were reclassified when it was determined that they had been collected outside of the Stolthaven property boundary.

Exposure Pathways

An exposure pathway consists of five elements: a source of contamination, transport through an environmental medium (air, water, or soil), a point of exposure, a route of human exposure (ingestion, dermal exposure, or inhalation), and a population. Completed pathways require that all five necessary elements exist and that exposure to a contaminant has occurred in the past, is presently occurring, or will occur in the future. An exposure pathway can be eliminated if at least one of the five elements is missing and will never be present.

The substances that leaked from the Stolthaven tanks were transported from the Stolthaven facility into the surrounding AOC by floodwaters. Exposures to soils contaminated by these substances could occur through skin contact, inhalation of vapors migrating off of the soil, or through accidental ingestion of soil.

The soils at the Stolthaven site and surrounding areas consist of silts and clays with low permeability, limiting the movement of substances through the soil into shallow groundwater. The Mississippi River serves as the local drinking water source. A water well survey completed by the Louisiana Department of Natural Resources (LDNR) in March 2013 found no wells registered for industrial, irrigation, domestic, or public water supply use within a five-mile radius of the Stolthaven New Orleans property [1, 6]. Based on information from the Amax Metals Recovery Inc. facility, which is within the AOC, the groundwater classification for the offsite AOC is Groundwater-3 Drinking Water (not a source of drinking water) [6, 8]. Migration of contaminants from the soil into groundwater used for public consumption is therefore not considered to be a concern.

Evaluation Process

SEET screened a total of 304 offsite residential soil samples and 49 offsite non-residential soil samples. Duplicates of the samples collected from the AOC were not included in SEET's assessment. Although a larger range of analytes was included in the laboratory analysis of the soil samples collected from the Braithwaite AOI, SEET was only able to obtain detailed data sets for the constituents of concern that Stolthaven identified as potentially related to the product losses from the Stolthaven Terminal.

The evaluation process used to assess these constituents is described in Appendix B. Analyte concentrations were initially screened using comparison values (CVs) appropriate for their media. These conservative screening values are only used to determine which environmental contaminants need further evaluation. CVs are not used to predict adverse human health effects.

Health Effects Evaluation

Except for 1-octene, for which no comparison value for soil exposures has been established, none of the chemicals that leaked from damaged tanks at the Stolthaven New Orleans facility were present in offsite soils and sediments at levels that might pose potential health effects.

1-Octene belongs to a category of chemicals which show a low potential for human health hazards [9, 10]. 1-Octene was detected in very few samples (one residential sample and two non-residential samples) and was estimated to be present at very low levels. As a volatile liquid, the 1-octene released from Stolthaven would have begun to evaporate from the wet soils into the air in the period following the release [9]. Although standard comparison values specific to soil exposures are not available for this chemical, the levels estimated in all three samples were well below those that would require further screening for health effects based on inhalation (breathing) exposures (as shown by the comparison value for air, listed in Tables B-1 and B-2).

In laboratory studies, the lowest level of continuous exposure to 1-octene that caused no health hazards (the no-observed-adverse-effects level, or NOAEL) to female rats was 100 mg/kg/day (milligrams of 1-octene per kilogram of body weight per day) [10]. 1-Octene is also reportedly only mildly irritating to skin when tested on rabbits as a pure chemical [9]. Skin contact with or accidental swallowing of 1-octene in soils from the offsite AOC would be unlikely and, if these activities occurred, the exposures to 1-octene would be at levels far below those observed to cause health effects in laboratory studies. Inhaling 1-octene that evaporates from the soils sampled in the offsite AOC is not of concern because the levels of 1-octene estimated to be present in these areas are far below levels that could potentially cause health effects. Levels of 1-octene detected in the offsite AOC should therefore pose no harm to public health.

Child Health Considerations

The physical differences between children and adults demand special emphasis in assessing public health hazards. Children may be at greater risk than are adults from exposures to hazardous substances. Children play outdoors and engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than adults and breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate result in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage.

None of the chemicals that may have been carried by floodwater from the Stolthaven facility into soils in the offsite AOC were detected at levels that might pose harm to the health of children.

Conclusions

SEET and ATSDR are committed to addressing community concerns about the risks involved in exposure to environmental contaminants. Our agencies are committed to providing the residents

of Braithwaite, LA with the best science-based information available to keep the community safe.

None of the chemicals that may have been carried by floodwater from the Stolthaven facility into soils in the offsite AOC were detected at levels that might pose harm to public health. If you have further concerns about the potential soil impacts of the Hurricane Isaac-related leaks at Stolthaven New Orleans, LLC on the community of Braithwaite, questions may be directed to DHH/OPH/SEET at 1-888-293-7020.

Recommendations

SEET will be available to assess any additional samples collected from the Stolthaven New Orleans, LLC site or from the Braithwaite AOC as requested.

Public Health Action Plan

The information produced within this health consultation will be disseminated to the community members and stakeholders in Braithwaite, LA.

Report Preparation

This Stolthaven New Orleans, LLC: Review of 2012 Offsite Soil Data Collected in Braithwaite, LA Health Consultation was prepared by the Louisiana Department of Health and Hospitals under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). Although this document is part of the cooperative agreement, it has not been reviewed and authorized by ATSDR.

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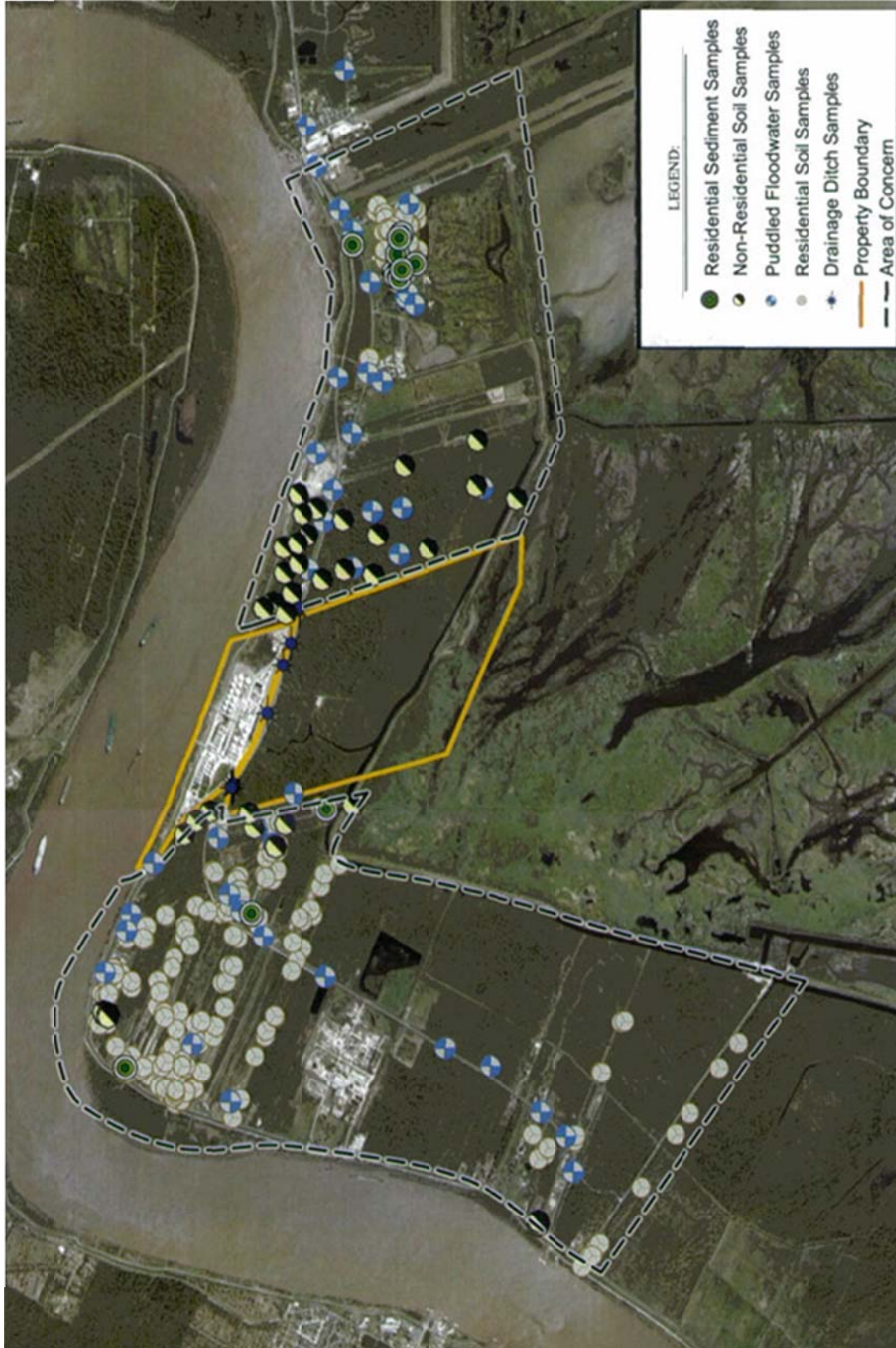
APPENDIX A: Maps

Figure A-1: Stolthaven New Orleans and the offsite Area of Concern



Adapted from: PPM Consultants. Risk Evaluation/Corrective Action Report: Stolthaven New Orleans LLC, Braithwaite Terminal. LDEQ Agency Interest No. 87738, PPM Project No. 528703. Sep 2013.

Figure A-2: Soil and sediment sampling locations in the Braithwaite AOC*



Adapted from: PPM Consultants. Risk Evaluation/Corrective Action Workplan: Stolthaven New Orleans LLC, Braithwaite Terminal. LDEQ Agency Interest No. 87738, PPM Project No. 528703. May 2013.

*Map also features floodwater sampling locations, though floodwater assessment was not included in this Health Consultation

APPENDIX B: Data Evaluation

Screening Process

Soil comparison values were used in the initial screening process to determine which soil or sediment samples, if any, needed to be more closely evaluated. Comparison values are media-specific concentrations of chemicals that are used by health assessors to screen environmental contaminants for further evaluation. These values are not used to predict adverse health effects.

Regional Screening Levels (RSLs) are estimated contaminant concentrations at which health effects are unlikely. RSLs are considered by the EPA to be protective for humans (including sensitive groups) over a lifetime.

Because no health-based comparison values were available for the aliphatic and aromatic constituents, screening for these chemicals was based on the Louisiana Department of Environmental Quality's Risk Evaluation/Corrective Action Program (RECAP) values. *RECAP values* are concentrations at or above which remediation of a medium (soil, sediment, or water) should occur.

No standard soil-specific comparison value was available for 1-octene, so an alternate source of toxicological information were used to discuss 1-octene concentrations:

Effects screening levels (ESLs), which are calculated by the Texas Commission on Environmental Quality, are air comparison values based on data concerning health effects, the potential for odors to be a nuisance, effects on vegetation, and corrosive effects. "Long-term" ESLs are used for an annual averaging period¹.

Chemicals that were not present at concentrations above their reporting limits (the minimum value below which a chemical amount would be reported as non-detect²) were identified as "non-detects" (ND). For non-detects, the chemicals' reporting limits were screened to assess whether a chemical not detected by the laboratory methods might still be present at levels that might pose health effects.

Tables B-1 and B-2 list the contaminants detected in soils and sediments sampled from the Stolthaven facility's offsite Area of Concern (AOC) in Braithwaite, LA.

¹ Texas Commission on Environmental Quality. Download Effects Screening Levels (ESLs). Accessed 16 Apr 2012 at: http://www.tceq.texas.gov/toxicology/esl/list_main.html#esl_1

² Reporting Limit definition retrieved from: http://www.epa.gov/fem/pdfs/Env_Measurement_Glossary_Final_Jan_2010.pdf

Table B-1: Contaminants detected in residential soil and sediment sampled from the Braithwaite AOC

Contaminant	Range of concentrations detected (ppm [*])		Sample Detects	Sample Non-Detects	Maximum Reporting Limit (ppm)	CV [†] (ppm)	CV reference
	Minimum	Maximum					
Diethanolamine	ND [‡]	ND	--	283	41	120	RSL [§]
1-Octene	ND	0.00108 ^{**}	1	282	0.0189	NA ^{††} 0.075	NA (soil) Long-term ESL ^{‡‡} (air)
Aliphatics C _{>12} - C ₁₆	ND	ND	--	304	49.3	370	RECAP SSni ^{§§}
Aliphatics C _{>16} - C ₃₅	ND	2310	2	302	100	7100	RECAP SSni
Aromatics C _{>12} - C ₁₆	ND	ND	--	304	49.3	180	RECAP SSni
Aromatics C _{>16} - C ₂₁	ND	57.9	1	303	25	150	RECAP SSni
Aromatics C _{>21} - C ₃₅	ND	152	3	301	25	180	RECAP SSni

^{*} ppm = parts per million

[†]CV = comparison value

[‡]ND = not detected

[§]RSL = Regional Screening Level

^{**} The analyte was positively identified at a level below the maximum reporting limit. The reported concentration is an estimate.

^{††} NA = not available

^{‡‡}ESL = Effects Screening Level

^{§§}RECAP SSni = Risk Evaluation/Corrective Action Program Soil Screening Level for Non-Industrial land use

Table B-2: Contaminants detected in non-residential soil and sediment sampled from the Braithwaite AOC

Contaminant	Range of concentrations detected (ppm [*])		Sample Detects	Sample Non-Detects	Maximum Reporting Limit (ppm)	CV [†] (ppm)	CV reference
	Minimum	Maximum					
Diethanolamine	ND [‡]	38	1	43	41	120	RSL [§]
1-Octene	ND	0.000926 ^{**}	2	26	0.025	NA ^{††} 0.075	NA (soil) Long-term ESL ^{‡‡} (air)
Aliphatics C _{>12} - C ₁₆	ND	ND	--	32	25	370	RECAP SSni ^{§§}
Aliphatics C _{>16} - C ₃₅	ND	ND	--	32	99.9	7100	RECAP SSni
Aromatics C _{>12} - C ₁₆	ND	ND	--	29	25	180	RECAP SSni
Aromatics C _{>16} - C ₂₁	ND	ND	--	32	25	150	RECAP SSni
Aromatics C _{>21} - C ₃₅	ND	ND	--	32	25	180	RECAP SSni

* ppm = parts per million

† CV = comparison value

‡ ND = not detected

§ RSL = Regional Screening Level

** The analyte was positively identified at a level below the maximum reporting limit. The reported concentration is an estimate.

†† NA = not available

‡‡ ESL = Effects Screening Level

§§ RECAP SSni = Risk Evaluation/Corrective Action Program Soil Screening Level for Non-Industrial land use