

A Rejoinder to Chevron's Rebuttal to the Opinion of Edwin Theriot, Ph.D. Addressing
Damages to the Flora and Fauna Caused by Texpet in the Concession Area
Oriente Region, Ecuador

In the Matter of An Arbitration Under the Rules of the United Nations Commission on International
Trade Law

Chevron Corporation and Texaco Petroleum Company vs. the Republic of Ecuador

PCA Case No. 2009-23

Prepared for:

Winston & Strawn, LLP
1700 K Street NW
Washington, DC 2006-3817

Prepared by:

Dr. Edwin Theriot
The Louis Berger Group, Inc.
412 Mount Kemble Avenue
Morristown, NJ 07962-1946



Edwin Theriot, PhD.

December 12, 2013-----
Date

New Orleans, LA -----
Location

Executive Summary

As outlined in the Lago Agrio Judgment (Judgment), Plaintiffs' claim the loss of fauna, flora, and biological diversity as a result of Claimants' exploration and production (E&P) activities from 1964 to 1990 that caused widespread direct and indirect harmful ecological impacts to the native flora and fauna within the Concession Area. Direct impacts included: (i) the removal of vegetation and loss of habitat resulting from the development of production sites and supporting infrastructure and (ii) the discharge of contaminants into the air, soil, sediment, surface water, and groundwater. Indirect or secondary effects include fragmentation of what was essentially pristine Ecuadorian rainforest and hydrologic alteration due to construction of road and pipeline infrastructure. These activities significantly reduced species diversity of the Concession Area.

The remediation prescribed in the Remedial Action Plan (RAP) did not address the entire damaged area and Claimants' minimal ecological restoration efforts were inadequate to restore the habitat in the treated areas even to the sub-standard conditions specified in the RAP, much less to its essentially pristine pre-Texpet conditions. As confirmed by Louis Berger's field investigation, contamination from Texpet's activities within the former Concession Area persists today, negatively impacts flora and fauna, and will continue to do so absent remedial action.

INTRODUCTION

Each opinion I provide in this document is given to a reasonable degree of scientific certainty. It is based on my education, training, experience, information and data available from the court records, scientific literature, discovery documents produced by Chevron's experts, my 2013 site visit, and sampling data. If additional information becomes available, I reserve the right to supplement my opinions to reflect such additional information.

SUMMARY OF JUDGMENT AND MY PRIOR OPINION

The Judgment awarded \$200M (\$10M a year for 20 years) to indemnify the indigenous peoples inhabiting the land in and around the Concession Area for the cost of restoration (where possible) and mitigation of damages to the flora, fauna and aquatic life caused by Texpet operations from 1964-1990. The Judgment (which I understand has been substantially upheld on appeal in a decision of the National Court, although I have not yet seen that decision in English translation) found "impacts on the indigenous communities" and, "given that these human groups depended on hunting and fishing," concluded that "the impacts suffered by the ecosystem affected them directly." The Judgment further stated that "we must occupy ourselves to repair the environmental harm caused to the flora and fauna in order to restore their source of subsistence and recover their traditional eating habits, looking to recover from this impact."¹

In February 2013 I produced an expert opinion on the evidence in the Lago Agrio first instance court (the Court) record pertaining to damage to flora and fauna.² My February 2013 opinion was prepared in response to the following assignment definition: do court records provide ample data to demonstrate significant ecological impact? I was not asked to quantify the impact, justify the damages awarded or apportion responsibility.

The key points made in my February 2013 opinion, which have not changed, include:

- Direct ecological impacts resulted from removal of habitat and release of contaminants (deforestation, spills, flaring, produced water, road oiling) to air, soil, sediment, surface water, and groundwater. Indirect ecological impacts resulted from fragmentation (edge effects) and hydrologic alteration.
- The RAP remediation did not address the total area affected, and failed to restore the environment to pre-Texpet operations conditions, nor mitigate for all damages.
- Residual contamination, through transport pathways, continues to negatively impact flora and fauna in the Concession Area.
- The Court record shows extensive residual loss of diversity due to Texpet's operations.

¹ The Judgment, p. 147

² *Expert Opinion of Edwin Theriot, Ph.D. Regarding Damages to Flora and Fauna Caused by Texpet in the Concession Area* (hereinafter referred to as "Theriot, 2013").

Claimants deposed me on my February 2013 opinion in April of 2013. They also filed a rebuttal in June of 2013.³ This Rejoinder is in response to Chevron's Rebuttal of my February 2013 opinion, and contains information and analyses resulting from a Louis Berger site visit and investigation of five selected sites operated by Texpet. A point-by-point response to Chevron's Annex A⁴ of the Rebuttal is presented in Appendix A of this Report.

HISTORICAL RECORD

Claimants' E&P activities from 1964 to 1990 caused widespread direct and indirect harmful ecological impacts within the Concession Area resulting in damage to the native flora and fauna. Direct impacts included (i) the removal of vegetation and loss of habitat resulting from the development of production sites and supporting infrastructure, and (ii) the discharge of contaminants into the air, soil, sediment, surface water and groundwater. Indirect or secondary effects include fragmentation of what was essentially pristine Ecuadorian rainforest and hydrologic alteration due to construction of road and pipeline infrastructure. These activities significantly reduced species diversity of the Concession Area.

Claimants argue that direct habitat loss due to construction of well sites, production sites, pits, roads, and camps in the Concession Area was minimal (<1 percent of the Concession Area footprint).⁵ But direct removal of habitat/deforestation is but a small fraction of the impact to the ecosystem by Texpet operations. As stated in my February 2013 opinion, the effect of such removal of habitat as well as other direct and indirect impacts greatly increased the geographical extent of the impacted area and the magnitude of effects on the flora and fauna in the Concession Area. In its rebuttal, Chevron fails to address most of the impacts identified in my opinion. The documented release of over 380 million barrels (or almost *16 billion gallons*) of production water and spills of 296 thousand barrels (or almost *12½ million gallons*) of oil into the rainforest and rivers of the Oriente region caused significant damage to the ecosystem.⁶

The RAP did not address the entire footprint of the damaged area, and Claimants' minimal ecological restoration efforts were inadequate to restore the habitat in the treated areas even to the sub-standard conditions specified in the RAP, much less to its essentially pristine pre-Texpet operations condition, as required by TULSMA.⁷ The RAP was limited to a small portion of the affected area and required restoration only to vegetation conditions surrounding the site at the time of remediation. Chevron's preliminary inspections (PIs) and judicial inspections

³ The Matter of An Arbitration Under the Rules of the United Nations on International Trade Law; *Chevron Corporation and Texaco Petroleum Company v. The Republic of Ecuador*, Claimants' Reply Memorial, Track 2 (hereinafter referred to as *Claimants' Reply Memorial*).

⁴ The Matter of An Arbitration Under the Rules of the United Nations on International Trade Law; *Chevron Corporation and Texaco Petroleum Company v. The Republic of Ecuador*, Claimants' Reply Memorial, Track 2, Annex A (hereinafter referred to as *Claimants' Reply Memorial, Annex A*).

⁵ *Claimants' Reply Memorial, Annex A*, p. 142-143

⁶ HBT Agra Ltd. 1993. Environmental Evaluation of Oilfields of the PetroEcuador-Texaco Consortium. Vol. 1. Calgary, Alberta; Henderson. Questions on Texaco's Environmental and Other Operations in Ecuador. Together with Appropriate Responses (Oct. 24, 1990).

⁷ TULSMA/TULAS Book VI, Appendix 2 (Section 4.1)

(JIs), as well as Louis Berger's own site investigations document the RAP's inadequacy to remediate Texpet's contamination.⁸

As cited in my previous opinion, by 2000 approximately 241,000 hectares (ha), or 54% of the former Concession Area, was deforested.⁹ This study, along with other evidence (mostly generated by Chevron) in the Court records (such as data from the various Audit reports and JI investigations), clearly documents environmental contamination as well as direct and indirect habitat losses that significantly reduced flora and fauna species diversity within the Concession Area. While Chevron's expert Bjorkman¹⁰ reported no significant loss of diversity, his non-representative selection of control sites in study areas—which were largely in populated agricultural land, thus avoiding large tracts of contiguous rainforest—render his findings biased and unreliable. Bjorkman also attempts to exonerate Texpet by blaming the ecological damage on acts of the Ecuadorian government, including nationalization of the oil industry, agrarian reform and colonization policies. I am advised that Ecuadorian law applies the doctrine of joint and several liability to environmental damages caused by either the intent or negligence of a joined defendant, rendering Chevron's attempts to cast blame on non-joined third parties legally irrelevant.

SITE INVESTIGATIONS

To assess Chevron's claim that contamination is minimal and localized within E&P facilities, Louis Berger recently undertook an independent field investigation of five sites operated exclusively by Texpet and closed by Texpet before withdrawing as Concession Operator. The testing conducted by my colleagues is summarized in the report of Kenneth Goldstein and its accompanying appendices. This section summarizes some of the data reported there that is most relevant to my opinion.

The general locations of these site investigations are shown on Figure B1 (see Appendix B). Sampling at these five sites confirmed the presence of surface and groundwater pathways as well as residual contamination from Texpet operations. Observations of contamination, including the visual presence of oil as sheens or free product, strong petroleum odors, and analytical results indicated high concentrations of petroleum hydrocarbon contamination in excess of applicable ecological risk screening criteria, sometimes by multiples, in stream bed sediments and soils adjacent to Texpet-remediated pits or pits closed prior to the RAP. We found that in some cases contamination extended many tens to hundreds of meters downstream of points of likely transport from Texpet pits and well site operations. Primary transport mechanisms likely include 1) overland releases from the pits to drainage pathways and downgradient areas (i.e., overtopping during periods of heavy rain, pit berm/wall and/or siphon failure, or an inadvertent overfilling during the addition of waste), 2) transport of contaminated soil surrounding the pits via erosion, and 3) migration transport of petroleum constituents into subsurface soils and groundwater underlying the pit and subsequent transport to downgradient areas.

⁸ See generally LBG February 2013 Expert Report; see generally Appendix B of the LBG Rejoinder Report; Chevron's 2006 and 2007 Clickable Database

⁹ CLIRSEN 2000 land cover maps cited in Chevron's Expert Report; Ellis, 2008, p. 13

¹⁰ Bjorn Bjorkman, and Claudia Sanchez de Lozada. 2008. Response to Mr. Cabrera's Affirmations Regarding Alleged Ecosystem Impacts Lawsuit 002-2003 Nueva Loja, Ecuador.

The results of Louis Berger's field investigation are detailed in Louis Berger's principal report submitted herewith. Detailed below is my expert opinion based on my investigation conducted in July 2013 and my evaluation of the data collected by Louis Berger.

Surface Water Contamination

Contamination from Texpet's operations has impacted surface water quality in the former Concession Area. Louis Berger collected seventeen surface water samples at four of the former well sites (see Table 1 and Appendix B for tabulated analytical data and Figures B2-B5). The data were compared to (1) Ecuador's TULSMA standards for the preservation of flora and fauna in warm freshwaters and (2) where available, USEPA criteria for protection of freshwater aquatic life. As I noted in my February 2013 opinion, an aquatic life criterion is the highest concentration of a pollutant in water that is not expected to pose a significant risk to the majority of species in a given environment. The corresponding USEPA aquatic life criteria (termed "criteria continuous concentrations") are estimates of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without an unacceptable effect. Samples collected at all four sites exceeded one or both ecological risk criteria for organics and inorganics. As shown in Table 1, Total Petroleum Hydrocarbon (TPH¹¹) concentrations exceed the TULSMA standard in 29 percent of the samples; concentrations of total phenols exceed the TULSMA standard in 88 percent of the samples; and concentrations of a variety of metals exceed the TULSMA standards or USEPA criteria in up to 24 percent (in the case of lead) of the samples. The range in surface water concentrations exceeding these standards are listed in Table 1. TPH and PAH attributable to Texpet were found in all analyzed samples from all four sites (Appendix B). The highest detected TPH concentration is 4.4 times higher than the TULSMA standard. In addition, major hydrocarbon components of crude oil were detected in most samples. Alkylated PAHs (which tend to be particularly persistent and toxic constituents of crude oil, even in comparison to their "parent" PAH compounds) were detected in all thirteen samples analyzed for this constitute (Appendix B). Naphthenic acids were detected in all seventeen samples analyzed for this constitute. As Dr. Jeffrey Short notes in his expert rejoinder report, Ecuador's Oriente crude oils typically contain about 1 percent PAHs, over 90 percent of which have alkylated substituents. The total alkylated PAH concentrations range from about equal to, to 50 times higher (SSF25-SW003, Table B1b, Appendix B) than the total parent PAH concentrations (i.e., the sum of the 16 priority pollutant parent PAHs). Naphthenic acids are water-soluble components of crude oil. While regulatory standards or criteria are not available to evaluate these components, they are known to be toxic to aquatic life. Neff et al. suggest that alkylated PAHs are considerably more toxic, both acutely and chronically, to benthic organisms than the parent PAHs.¹² Naphthenic acids have been shown to be acutely toxic to aquatic life, albeit at moderately high concentrations, with fish being the most sensitive aquatic organism.¹³

¹¹ TPH represents the sum of the detected concentrations of Gasoline Range Organics (GRO), Diesel Range Organics (DRO), Heavy DRO, and Extended Range DRO.

¹² Neff et. al., 2005, p. 27

¹³ API. 2012. Naphthenic Acids Category Analysis and Hazard Characterization. Submitted to the US EPA, The American Petroleum Institute, Petroleum HPV Testing Group. p. 3.

Sediment Contamination

Another line of evidence demonstrating release of crude oil contamination into surface water and areas outside the pits is sediment data. Louis Berger collected twenty-seven sediment samples at all five of the former well sites (see Figures B2-B6 for sample location maps and Table 2 and Appendix B for tabulated analytical data). The data were compared to RAOHE standards¹⁴ for sensitive ecosystems and, where available, to consensus-based sediment quality guidelines (SQGs) protective of freshwater sediment-dwelling organisms derived by MacDonald et al.¹⁵ Two SQGs, (1) the threshold effect concentration (TEC), below which adverse effects are not expected to occur, and (2) the probable effect concentration (PEC), above which adverse effects are expected to occur, were used in the comparison. The TECs and PECs are consensus-based ecological screening levels based on the results of a variety of approaches used to develop numerical sediment quality guidelines, including the Lowest Effects Levels (LELs) for heavy metals developed by Persaud et al. that I used to inform my February 2013 opinion.¹⁶ As shown in Table 2, TPH and total PAH¹⁷ concentrations are present at all five sites sampled and exceed the corresponding RAOHE standards in 55 percent and 33 percent of the samples, respectively. Chrysene concentrations exceed the TEC and PEC in 48 percent (from all the well sites) and 11 percent of the samples, respectively. Fluorene and phenanthrene concentrations exceed the TEC and PEC in 30 percent and 7 percent of the samples, respectively, and pyrene concentrations exceed the TEC in 26 percent of the samples. Of the six heavy metals included in Table 2, at least one sediment sample exceeded the RAOHE standards and/or TEC at each of the five sites. The sediment concentration ranges exceeding these standards or screening criteria are listed in Table 2. Cadmium, chromium, copper, lead, nickel, and zinc concentrations exceed the TEC in 7 to 48 percent of the sediment samples. In one sediment sample from Yuca 02 (SD001), a nickel concentration also exceeds the PEC (see Appendix B, Table B2c). TPH was detected in fifteen of the twenty-seven samples; the highest detected TPH concentration is over fifty times higher than the RAOHE standard. Total PAHs were detected in nine samples; the highest detected total PAH concentration is nearly 20 times higher than the RAOHE standard. In addition, major hydrocarbon components of crude oil, alkylated PAHs, were detected in all twenty-seven samples. While regulatory standards or criteria are not available to evaluate these components, they are known to be toxic to aquatic life.

Soil Contamination

Louis Berger collected fifty-three soil samples at all five of the former well sites (Table 3 and Appendix B for tabulated analytical data and Figures B2-B6). Again, TPH and PAH were present in soil samples at all five sites sampled. The data were compared to RAOHE standards for sensitive ecosystems, TULSMA standards for agricultural soil, and USEPA ecological soil screening levels (EcoSSLs). As I noted in my February 2013

¹⁴ RAOHE established permissible limits for soil for the planned use of the soil after contamination has been remediated. In addition to standards for soils for agricultural use, standards were established for soils of ecological value and subject to special protection, such as wetland in the Amazon (termed sensitive ecosystems). TULSMA established standards for soil to preserve or conserve the quality of soil resources to safeguard and preserve the integrity of people, ecosystems and their interrelationships, and the general environment. Developed for soil remediation or restoration, the TULSMA standards for agricultural use apply to soils that maintain a habitat for permanent and temporary species, as well as native flora.

¹⁵ See generally MacDonald et al., 2000.

¹⁶ See generally Persaud et al., 1993.

¹⁷ The sum of the 16 priority pollutant parent PAHs.

opinion, the EcoSSLs are the highest concentrations in soil that are still considered protective of ecological receptors that commonly come into contact with soil or ingest biota that live in or on soil. The lowest of the available EcoSSLs (for plant, soil invertebrate, bird, and mammalian receptors) were used. The EcoSSLs for birds and mammals include ingestion of food contaminated as result of the uptake of soil contaminants, as well as incidental ingestion of soil during feeding, grooming, and preening. As shown in Table 3, TPH concentrations exceed the corresponding RAOHE and TULSMA standards in 37 percent and 44 percent of the samples, respectively. Total PAH¹⁷ concentrations exceed the corresponding RAOHE and TULSMA standards in 36 percent and 30 percent of the samples, respectively. The USEPA derived EcoSSLs for two PAH groupings: low molecular weight (LMW) and high molecular weight (HMW) PAHs. HMW PAH concentrations exceed the corresponding EcoSSL in 25 percent of the samples while LMW PAH concentrations only exceed the corresponding EcoSSL in 2 percent of the samples. Concentrations of three individual parent PAHs (benzo[a]anthracene, naphthalene, and pyrene) exceed the corresponding TULSMA standards in 15 to 28 percent of the samples. Concentrations of two volatile BTEX constituents, ethylbenzene and xylenes, exceed the corresponding TULSMA standards in 8 percent and 4 percent of the samples, respectively.

Concentrations of barium (a drilling mud additive) exceed the corresponding TULSMA standard and EcoSSL in 11 percent and 40 percent of the samples, respectively (from four of the well sites). These barium concentrations are higher than the average detected concentration in the background soil samples collected by Chevron during the JIs.¹⁸ Chromium, copper, lead, nickel, and vanadium concentrations exceed the TULSMA standards in 2 to 32 percent of the soil samples. The concentrations of these metals exceed the EcoSSLs in 32 percent (lead) to 100 percent (vanadium) of the soil samples. The lead concentrations exceed the RAOHE standard in 4 percent of the soil samples. The nickel concentrations exceed the RAOHE standard in 26 percent of the soil samples.

TPH was detected in forty-nine of the fifty-four samples. The highest detected TPH concentration is over 30 times higher than the RAOHE standard. Total PAHs were detected in all fifty-three samples analyzed for this constituent; the highest detected total PAH concentration is approximately 50 times higher than the RAOHE standard. In addition, major hydrocarbon components of crude oil, alkylated PAHs, were detected in all fifty-three samples. The elevated barium concentrations are more than a factor of 10 higher than the average background soil concentrations in three samples and more than 3 times higher in an additional three samples which, according to the TULSMA regulations, is indicative of very severe or severe disturbances, respectively.¹⁹ Again the elevated metals concentrations could compromise the health of ecological receptors, perhaps rendering them more susceptible to crude oil contamination.

In summary, Louis Berger's observations and sampling at these five sites confirmed the presence of residual contamination at all five sites in surface water, sediment and soil exceeding relevant ecological standards and screening criteria. Since Texpet used the same techniques and technology at each of the well field sites it developed in the Concession Area, it is reasonable to assume that it caused widespread direct and indirect harmful ecological impacts of a similar nature throughout those portions of Concession Area where it was active. These findings confirm and support my February 2013 opinion that contamination directly resulting from Texpet's

¹⁸ TULSMA, Appendix 2, Section 4.1.3.3 indicates that in establishing soil background values, the average value must be selected as the background value.

¹⁹ TULSMA, Appendix 2, Section 4.1.3.3, Table 1 Indicative factors of contamination.

activities within the former Concession Area persists today and negatively impacts flora and fauna and, absent remedial action, will continue to do so in the future.

Table 1 Surface Water Concentrations Exceeding Applicable Standards or Screening Criteria

Well Site	# of Surface Water	TPH		Phenols		Metals			
		TULSMA ¹	TULSMA ¹	Barium		Cadmium		Copper	Lead
				> 0.5 # (Range)	> 0.001 # (Range)	TULSMA ¹ > 1 # (Range)	TULSMA ¹ > 0.001 # (Range)	USEPA NRWQC ² > 0.00025 # (Range)	TULSMA ¹ > 0.02 # (Range)
Lago Agrio 02	4	2 (0.692 - 1.09)	4 (0.0021 - 0.0027)	0 NA	0 NA	0 NA	0 NA	0 NA	0 NA
Shushufindi 25	5	1 (0.92)	5 (0.0019 - 1.6)	0 NA	0 NA	1 (0.0003)	0 NA	1 (0.01)	
Yuca 02	5	2 (1.03 - 2.2)	4 (0.0014 - 0.02)	2 (4.03 - 18)	1 (0.0063)	2 (0.001 - 0.0063)	2 (0.079-0.33)	2 (0.08 - 0.15)	
Guanta 06	3	0 NA	2 (0.0035 - 0.01)	0 NA	0 NA	0 NA	0 NA	1 (0.0028)	
Total Samples	17	5	15	2	1	3	2	4	
% Total		29	88	12	6	18	12	24	

Well Site	# of Surface Water	Metals (con'd)					
		Nickel		Thallium	Vanadium	Zinc	
		TULSMA ¹ > 0.025 # (Range)	USEPA NRWQC ² > 0.052 # (Range)	TULSMA ¹ > 0.0004 # (Range)	TULSMA ¹ > 0.1 # (Range)	TULSMA ¹ > 0.18 # (Range)	USEPA NRWQC ² > 0.12 # (Range)
Lago Agrio 02	4	0 NA	0 NA	0 NA	0 NA	0 NA	0 NA
Shushufindi 25	5	0 NA	0 NA	1 (0.0015)	0 NA	0 NA	0 NA
Yuca 02	5	1 (0.07)	1 (0.07)	1 (0.00075)	1 (0.57)	2 (0.19 - 1)	2 (0.19 - 1)
Guanta 06	3	0 NA	0 NA	0 NA	0 NA	0 NA	0 NA
Total Samples	17	1	1	2	1	2	2
% Total		6	6	12	6	12	12

Notes:

All units are mg/L

NA - Not Applicable

1: TULSMA Appendix 1 (Tables 3 & 4)

2: USEPA National Recommended Water Quality Criteria

Table 2 Sediment Concentrations Exceeding Applicable Standards or Screening Criteria

Well Site	# of Sediment Samples	TPH		PAHs							
		RAOHE ¹		Anthracene		Benz[a]anthracene		Benz[a]pyrene		Chrysene	
		Total PAHs ²		SQG ³		SQG ³		SQG ³		SQG ³	
		> 1000	> 1	TEC ⁴	> 0.06	TEC ⁴	> 0.11	TEC ⁴	> 0.15	TEC ⁴	> 0.17
Lago Agrio 02	5	4 (1,110 - 6775)	1 (1.45)	0 NA	0 NA	0 NA	0 NA	2 (0.18 - 0.6)	0 NA	0 NA	0 NA
Shushufindi 25	5	2 (3,140 - 11,900)	1 (2.97)	0 NA	1 (0.19)	0 NA	2 (0.27 - 1.19)	0 NA	1 (0.06)	0 NA	1 (0.06)
Yuca 02	6	3 (5,230 - 51,100)	3 (1.51 - 11)	0 NA	2 (0.59 - 1.01)	1 (0.3)	3 (0.61 - 6.9)	2 (4.16 - 6.9)	2 (0.16 - 0.36)	0 NA	2 (0.03-0.06)
Guanta 06	9 ⁶	5 (3,180 - 13,000)	3 (2.24 - 3.14)	0 NA	1 (0.15)	0 NA	5 (0.21 - 0.88)	0 NA	1 (4.07)	1 (4.07)	1 (0.15)
Aguarico 02	2	1 (31,310)	1 (19)	1 (0.01)	1 (0.56)	1 (0.39)	1 (0.39)	1 (4.07)	1 (4.07)	1 (4.07)	1 (0.15)
Total Samples	27	15	9	1	5	2	13	3	6	11	22
% Total		55	33	4	19	7	48				

Well Site	# of Sediment Samples	PAHs (con'd)						Metals*			
		Fluorene		Phenanthrene		Pyrene		Cadmium		Chromium	
		SQG ³		SQG ³		SQG ³		RAOHE ¹		SQG ³	
		TEC ⁴	> 0.08	PEC ⁵	> 0.54	TEC ⁴	> 0.2	PEC ⁵	> 1.17	TEC ⁴	> 0.2
Lago Agrio 02	5	0 NA	0 NA	1 (0.36)	0 NA	0 NA	0 NA	0 NA	0 NA	0 NA	0 NA
Shushufindi 25	5	2 (0.1 - 0.15)	0 NA	1 (0.35)	0 NA	1 (0.3)	0 NA	0 NA	0 NA	0 NA	5 (48 - 88)
Yuca 02	6	2 (0.11 - 0.7)	1 (0.7)	3 (0.27 - 1.83)	1 (1.83)	2 (0.34 - 0.6)	0 NA	0 NA	0 NA	0 NA	0 NA
Guanta 06	9 ⁶	3 (0.09 - 0.36)	0 NA	2 (0.94 - 1.06)	0 NA	3 (0.21 - 0.27)	3 (1.2 - 1.4)	3 (1.20 - 1.40)	3 (1.20 - 1.40)	0 NA	0 NA
Aguarico 02	2	1 (2.69)	1 (2.69)	1 (8.07)	1 (8.07)	1 (1.07)	1 (1.07)	1 (1.4)	1 (1.4)	1 (1.40)	0 NA
Total Samples	27	8	2	8	2	7	4	4	4	5	
% Total		30	7	30	7	26	15	15	15	19	

Well Site	# of Sediment Samples	Metals* (con'd)					
		Copper		Lead		Nickel	
		SQG ³		RAOHE ¹		RAOHE ¹	
		SQG ³	TEC ⁴	RAOHE ¹	TEC ⁴	RAOHE ¹	TEC ⁴
Lago Agrio 02	5	0 NA	0 NA	1 (41)	0 NA	0 NA	0 NA
Shushufindi 25	5	5 (41 - 53)	0 NA	0 NA	0 NA	5 (23 - 38)	1 (193)
Yuca 02	6	4 (33 - 50)	1 (89)	1 (89)	1 (60)	2 (35 - 60)	0 NA
Guanta 06	9 ⁶	3 (34 - 36)	0 NA	0 NA	0 NA	5 (25 - 31)	3 (121 - 134)
Aguarico 02	2	0 NA	0 NA	0 NA	1 (40)	1 (40)	1 (140)
Total Samples	27	12	1	2	2	13	5
% Total		19	4	7	7	48	19

Notes:

All units are mg/kg

NA - Not Applicable

* Listed concentrations are also greater than Chevron's average concentration in background soil: cadmium (0.16 mg/kg), chromium (22 mg/kg), copper (28 mg/kg), lead (7.05 mg/kg), nickel (14 mg/kg), and zinc (49 mg/kg)

1: RAOHE Sensitive Ecosystem

2: Sum of the detected concentrations of 16 PAHs listed and analyzed by HR GC/MS (Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene, Benzo[j,k]fluoranthenes, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Phenanthrene, Pyrene).

3: Soil Quality Guidelines

4: Threshold effect concentration; below which adverse effects are not expected to occur

5: Probable effect concentration; above which adverse effects are expected to occur more often than not

6: Only eight samples analyzed for metals.

Table 3 Soil Concentrations Exceeding Applicable Standards or Screening Criteria

Well Site	# of Soil Samples	TPH				PAHs									
		RAOHE ¹		TULSMA ²		Total PAHs		LMW PAHs		HMW PAHs		B[a]P		Naphthalene	Pyrene
		> 1000 # (Range)		>500 # (Range)		> 1 # (Range)		> 2 # (Range)		USEPA EcoSSL ⁴ > 29 # (Range)		USEPA EcoSSL ⁴ > 1.1 # (Range)		> 0.1 # (Range)	
Lago Agrio 02	17 ³	12 # (Range)	14 (758 - 31,960)	11 # (Range)	11 (2.06 - 46)	11 # (Range)	1 (36)	1 # (Range)	9 (1.21 - 7.48)	8 # (Range)	10 # (0.14 - 10)	8 # (0.17 - 0.91)			
Shushufindi 25	20	5 # (4,300 - 12,350)	6 # (650 - 12,350)	5 # (2.35 - 12)	5 # (2.35 - 12)	0 # (Range)	0 # (NA)	0 # (NA)	3 # (1.25 - 2)	3 # (0.13 - 0.17)	5 # (0.17 - 4.37)	0 # (NA)			
Yuca 02	5	2 # (3,172 - 7,540)	2 # (3,172 - 7,540)	2 # (1.27 - 1.62)	0 # (NA)	0 # (NA)	0 # (NA)	1 # (1.43)	1 # (0.18)	0 # (NA)	0 # (NA)	0 # (NA)			
Guanta 06	10	1 # (1,075)	2 # (787 - 1,075)	1 # (1.02)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)			
Aguarico 02	1	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)			
Total Samples	53	20 #	24 # (758 - 31,960)	19 # (Range)	16 # (Range)	1 # (Range)	13 # (Range)	12 # (Range)	15 # (Range)	8 # (Range)					
% Total		37 #	44 # (Range)	36 # (Range)	30 # (Range)	2 # (Range)	25 # (Range)	23 # (Range)	28 # (Range)	15 # (Range)					

Well Site	# of Soil Samples	VOCS				Metals								Copper		USEPA EcoSSL ⁴ > 28 # (Range)					
		Benzene TULSMA ²		Ethylbenzene TULSMA ²		Toluene TULSMA ²		Xylenes TULSMA ²		Barium TULSMA ²		USEPA EcoSSL ⁴ > 330 # (Range)		Chromium TULSMA ²		USEPA EcoSSL ⁴ > 26 # (Range)		Copper TULSMA ²		USEPA EcoSSL ⁴ > 28 # (Range)	
		> 0.05 # (Range)		> 0.1 # (Range)		> 0.1 # (Range)		> 0.1 # (Range)		> 750 # (Range)		> 330 # (Range)		> 65 # (Range)		> 26 # (Range)		> 63 # (Range)		> 28 # (Range)	
Lago Agrio 02	17 ³	0 # (NA)	2 # (0.17 - 2.8)	0 # (NA)	1 # (17)	0 # (NA)	3 # (401 - 608)	0 # (NA)	2 # (30-37)	2 # (66 - 81)	16 # (29 - 81)										
Shushufindi 25	20	0 # (NA)	2 # (0.18 - 0.44)	0 # (NA)	1 # (0.57)	3 # (764 - 786)	11 # (350 - 706)	3 # (70 - 73)	20 # (34-73)	10 # (64 - 83)	20 # (49 - 83)										
Yuca 02	5	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	1 # (2,800)	4 # (373 - 2,800)	0 # (NA)	1 # (29)	1 # (67)	5 # (30 - 67)										
Guanta 06	10	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	2 # (4,500 - 5,080)	3 # (476 - 5,080)	0 # (NA)	8 # (28-56)	1 # (128)	3 # (46 - 128)										
Aguarico 02	1	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)										
Total Samples	53	0 #	4 # (758 - 31,960)	0 # (Range)	2 # (Range)	6 # (Range)	21 # (Range)	3 # (Range)	31 # (Range)	14 # (Range)	44 # (Range)										
% Total		0 #	8 # (Range)	0 # (Range)	4 # (Range)	11 # (Range)	40 # (Range)	6 # (Range)	58 # (Range)	26 # (Range)	83 # (Range)										

Well Site	# of Soil Samples	Metals (con'd)				Metals								Metals				
		Lead RAOHE ¹		TULSMA ²		Nickel USEPA EcoSSL ⁴				Vanadium TULSMA ²				Metals				
		> 80 # (Range)		> 100 # (Range)		> 11 # (Range)		> 40 # (Range)		> 50 # (Range)		> 38 # (Range)		> 130 # (Range)		> 7.8 # (Range)		
Lago Agrio 02	17 ³	1 # (141)	1 # (141)	4 # (13-141)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	17 # (58 - 114)				
Shushufindi 25	20	1 # (98)	0 # (NA)	2 # (37 - 98)	12 # (41-59)	3 # (50 - 59)	15 # (39 - 59)	14 # (131 - 207)	20 # (107 - 207)									
Yuca 02	5	0 # (NA)	0 # (NA)	2 # (12 - 35)	1 # (42)	0 # (NA)	1 # (42)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	5 # (77 - 123)				
Guanta 06	10	0 # (NA)	0 # (NA)	8 # (11 - 29)	1 # (40)	0 # (NA)	0 # (NA)	2 # (40)	3 # (140 - 189)	10 # (62 - 189)								
Aguarico 02	1	0 # (NA)	0 # (NA)	1 # (9)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	0 # (NA)	1 # (57)					
Total Samples	53	2 #	1 # (758 - 31,960)	17 # (Range)	14 # (Range)	3 # (Range)	18 # (Range)	17 # (Range)	53 # (Range)									
% Total		4 #	2 # (Range)	32 # (Range)	26 # (Range)	6 # (Range)	34 # (Range)	32 # (Range)	100 # (Range)									

Notes:

All units are mg/kg

NA - Not Applicable

* Listed concentrations are also greater than Chevron's average concentration in background soil: barium (231 mg/kg), chromium (22 mg/kg), copper (28 mg/kg), lead (7.05 mg/kg), nickel (14 mg/kg). Listed concentrations for vanadium under the TULSMA standard exceed Chevron's average background concentration of 93 mg/kg.

1: RAOHE Sensitive Ecosystem

2: TULSMA Agricultural Soil

3: 18 samples analyzed for TPH

4: Exceeds lowest of the available EcoSSLs (for plant, soil invertebrate, bird, and mammalian receptors).

Summary of Rejoinder Arguments and Conclusions

Chevron's assertions stem primarily from facts irrelevant to the findings of the Court. In their Reply, Claimants argue that: (1) Texpet's ecological injury was overstated by the Court's failure to account for PetroEcuador's post-1990 contributions; (2) PetroEcuador was responsible even during the years that Texpet was Operator of the Consortium; (3) there were beneficial effects from the remediation conducted under the RAP; (4) Louis Berger used no environmental sampling data prior to 1990 to show Texpet contamination; (5) direct habitat losses are inconsequential; (6) the Ecuadorian government approved Texpet's ecological impacts; and (7) the Ecuadorian government encouraged rain forest colonization and changes in land use practices.²⁰

To start, there is simply no question that the Court record shows that Texpet's actions harmed the indigenous peoples of the Oriente region of Ecuador. The focus of the Court had been to determine whether this harm actually existed, and that was the focus of Louis Berger's February expert report as well. I am advised by counsel that remediation agreements and related releases exclusively between the Ecuadorian government and Texpet concerning Texpet's E&P operations and remediation in the region should have no bearing on my analysis. Thus, the RAP is scientifically irrelevant here.²¹ I am also advised by counsel that Claimants were jointly and severally liable for all damages, and thus, possible subsequent and/or additional harm caused by PetroEcuador (which inherited Texpet's sub-standard infrastructure) should be irrelevant to my opinion. Nonetheless, it should be noted that Louis Berger has found numerous instances of contamination from "Texpet only" sites and pits.

The minimal environmental data/sampling prior to 1990 is overcome by the documentation contained in Texpet's own Audit reports,²² which document: areas deforested, miles of infrastructure built, hundreds of spills accounting for more than billions of gallons of production water and millions of gallons of crude oil released into the rainforest, streams and tributaries in the Concession Area over a 23-year period. Texpet's own files confirm that its production practices and procedures used to extract oil from the Concession were extremely damaging to the environment and did not follow either existing Ecuadorian legal mandates, U.S. regulatory restrictions or the industry's own recommended oilfield E&P practices.

Claimants argue that direct habitat loss due to construction of well sites, production sites, pits, roads, and camps in the Concession Area was minimal (<1 percent of the Concession Area footprint).²³ However, they fail to address the other direct and indirect damages caused. These other effects include: the "edge effect" of deforestation disturbance; fragmentation of deep primary rainforest and its effect on vegetative propagation and movement/migration of fauna; other contamination caused by venting or flaring at well sites and production sites; the oiling of roads; the alteration of the hydrology of the region by building a road system across the length and breadth of the Concession Area; and the hundreds of miles of seismic surveys that crisscrossed the Concession Area throughout 1964-1990. The cumulative effects of these impacts have altered the ecosystem of the region to the extent that it no longer serves as a rainforest ecosystem. Other than intermittent fragments of vegetation, none of the Concession Area exploited by Texpet retains the abundant species of a typical rainforest, and most of the rainforest fauna endemic to the region have perished or migrated away from the impacted habitat. Claimants'

²⁰ *Claimants' Reply Memorial, Annex A*, p. 54-55.

²¹ I understand that there is disagreement as to the *res judicata* legal effect of the RAP remediation, which is outside my area of expertise and I am accordingly not addressing this.

²² See generally Fugro-McClelland, Inc., 1992 and HBT Agra, 1993.

²³ *Claimants' Reply Memorial, Annex A*, 2013, p. 54-55.

reply papers failed to address these other effects caused by Texpet's operatorship of the Concession from 1964-1990.

Applicable laws and regulations at the time: Claimants argue that Texpet followed the required practices and standards of Ecuador at that time. This is not true. By way of example, the Hydrocarbon Act of 1971 obligated Texpet "to adopt the necessary measures for the protection of the flora and fauna and other natural resources," and "avoid the contamination of the waters, the atmosphere and the land."²⁴ The Hydrocarbon Exploration and Production Regulations require the operator to "take all appropriate measures and precautions when performing its activities to prevent harm or danger to persons, property, natural resources."²⁵ Texpet did not follow this law or even utilize the standard industry E&P practices of the day that would have prevented the resulting widespread damage to the ecosystem.

In his Expert Report, Dr. Paul Templet opines that a significant source of present contamination in the Oriente was Texaco's oil and gas E&P operations and waste discharges in the Concession Area, especially surface discharges of produced water and oil, leaks, and vertical seepage from pits used for storage and disposal. Texpet had an obligation, which it failed to honor, to adopt practices that would minimize impacts to the environment – most of which it had long before adopted for its U.S. operations.²⁶

Based on data available from the Court records, scientific literature, discovery documents produced by Claimants' experts, my 2013 site visit, and Louis Berger's sampling data I conclude the following:

- 1) Ecuadorian laws were in place to protect the sensitive rainforest environment of the Oriente region before and during the time Texpet was operating E&P in the Concession Area (Petroleum Law August 9, 1937, Hydrocarbon Act of 1971, Hydrocarbon Exploration and Production Regulations, April 9, 1974).

Texpet chose to ignore the legal requirements to "take all measures to protect the flora and fauna, and other natural resources."

- 2) When Texpet acted as Operator of the Concession, it was aware of standard practices that it could have implemented to protect the sensitive environment/ecosystem of the region. It chose not to do so.
- 3) Claimants' reply arguments that Ecuadorian government policy is responsible for the damage caused by Texpet to the ecosystem are scientifically irrelevant and do not affect my analysis or opinions. I am also advised by counsel that they are legally irrelevant as well.
- 4) Damage caused by Texpet to the flora and fauna and other natural resources in the Concession Area goes well beyond the footprint needed to conduct E&P operations.

Claimants' expert, Southgate, ignores all the direct and indirect effects of Texpet's operations on the ecosystem of the Concession Area. Texet's required operational facilities constitute but a small fraction of the area of the impacted ecosystem. Other ecological impacts from Texpet's operations include fragmentation and the edge effect, modification of the hydrology of the concession due to development of

²⁴ The Hydrocarbon Act of 1971, p. 70

²⁵ Hydrocarbon Exploration and Production Regulations, April 9, 1974, p. 70

²⁶ See generally Templet, 2013

roads and facilities, widespread contamination from venting and flaring of formation gases.

- 5) Louis Berger's preliminary site investigation findings at representative "Texpet-only" facilities confirm the widespread residual contamination from Texpet operations throughout the region that persists even today.

Louis Berger's sampling at five drilling sites operated by Texpet confirms the presence of TPH, heavy metals, and brine in soils, sediment and surface water. Without remedial action Texpet's past and present contamination of the Concession Area will continue to cause additional future damage to the flora and fauna of the region for decades to come.

- 6) The key findings made in my February 2013 Expert Report remain valid despite Claimants' reply arguments, which are either scientifically unsound or legally irrelevant. These findings include:

- The presence of direct ecological impacts resulting from removal of habitat and release of contaminants (deforestation, spills, flaring, produced water, road oiling) to air, soil, sediment, surface water and groundwater and indirect ecological impacts resulting from fragmentation (edge effects) and hydrologic alteration.
- The RAP remediation did not address the total geographic area affected, and even where performed it failed to restore the environment to pre-Texpet conditions. Residual contamination, through transport pathways, continues to negatively impact flora and fauna in the Concession Area.
- The Court record shows extensive residual loss of diversity due to Texpet's operations.

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APPENDIX A: Direct Response to Reply Assertions

Key points from Southgate Expert Rebuttal²⁷ and Annex A²⁸

Please refer to following table for responses to reply assertions.

Contamination of Fish Tissue

My February 2013 opinion included an analysis of available fish tissue samples. Claimants assert that these conclusions are misleading by suggesting that exceedances of recommended screening values for subsistence fishers indicates environmental harm.²⁹ While the Court record does not contain a comprehensive study of contaminant concentrations in fish and wildlife, the limited data collected by Gallo³⁰ does provide strong evidence that:

- Contamination persists in the environment of the Concession Area;
- Fish are exposed to this residual contamination (either directly or through consumption of food that bioaccumulated contaminants); and
- This contamination has impacted fauna, as demonstrated by the elevated concentrations of contaminants within fish tissue in comparison to critical body residues (CBRs) derived from the Environmental Residue-Effects Database (ERED).

Gallo analyzed four fish tissue samples collected from the Parahuaco and Charapa River systems for heavy metals associated with crude oil. My February 2013 opinion compared Gallo's data to USEPA's recommended screening values for subsistence fishers, a valid comparison for some populations in the former Concession Area. USEPA analyses include arsenic, cadmium, and mercury, which were analyzed in fish tissue collected by Gallo. The fish tissue results exceeded the arsenic and mercury criteria, while none of the samples exceeded the cadmium criteria. Although fish tissue sampling was admittedly inadequate *per se* to determine ecological impact, the limited data does show that substantial levels of contamination are present, that fish are exposed to this contamination, and that the levels of residual contaminants in the environment are high enough to result in concentrations in the organisms' tissue that pose a risk to human health.

²⁷ Douglas Southgate. Expert Report: Ecuadorian government policies were the true drivers of deforestation in the Oriente region of Ecuador. In the Matter of An Arbitration Under the Rules of the United Nations Commission on International Trade Law: Chevron Corporation and Texaco Petroleum Company vs. the Republic of Ecuador, PCA Case No. 2009-23, Ohio, 2013.

²⁸ *Claimants' Reply Memorial, Annex A.*

²⁹ U.S. EPA, 2000. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 1 Fish Sampling and Analysis Third Edition. Office of Science and Technology - Office of Water. EPA 823-B-00-007.

³⁰ Gallo, 2007.

Table A1 Exceedances of USEPA fish tissue screening criteria by fish tissue from the concession.

Fish Tissue Contaminant	USEPA (2000) Subsistence Fisher Screening Value (mg/kg)	Sample 1 River: Parahuaco (mg/kg)	Sample 2 River: Parahuaco (mg/kg)	Sample 1 River: Charapa (mg/kg)	Sample 2 River: Charapa (mg/kg)
Arsenic	0.147*/0.00327**	0.85	0.82	7.17	4.44
Cadmium	0.491*	0.02	<0.003	0.09	0.13
Mercury (as methylmercury)	0.049*	0.16	<0.02	0.31	0.31

* Nonarcinogenic screening value

** Carcinogenic screening value

Values in bold font exceed USEPA screening value.

As further evidence that fish are likely exposed to harmful levels of contamination, I compared the measured concentrations in fish tissue to critical body residues (CBRs) derived from data retrieved from the U.S. Army Corps of Engineers.³¹ For each Chemical of Potential Ecological Concern (COPEC), CBR data were retrieved for mortality (survival), growth, and reproduction effects from whole body measures from studies on freshwater fish species.

From these data, CBRs were selected as the highest No Observed Adverse Effect Level (NOAEL), if available, and the Lowest Observed Adverse Effect Level (LOAEL), if available. If no NOAEL was available, the selected LOAEL value was divided by 10 and if no LOAEL was available, the selected NOAEL value was multiplied by 10. If the highest NOAEL was higher than the lowest LOAEL, then the selected LOAEL value divided by 10 was used as the NOAEL value. While the comparison of tissue data to CBRs is considered a conservative approach for evaluating ecological risks to fish, the limited available samples exceeded the LOAELs for five of the seven inorganic compounds with available CBR screening levels (Table A2). These include arsenic, cadmium, lead, mercury and zinc.

³¹ (USACE)/USEPA Environmental Residue-Effects Database (ERED) (<http://el.erdc.usace.army.mil/ered/>).

Table A2 Exceedances of critical body residues (CBRs) derived from data retrieved from the U.S. Army Corps of Engineers (USACE)/USEPA Environmental Residue-Effects Database (ERED) by fish tissue from the concession.

COPEC	Sample 1 River: Parahuaco (mg/kg)	Sample 2 River: Parahuaco (mg/kg)	Sample 1 River: Charapa (mg/kg)	Sample 2 River: Charapa (mg/kg)	NOAEL ¹ (mg/kg)	LOAEL ¹ (mg/kg)	Species	Effect Class	Toxicity Measure
Arsenic	0.85	0.82	7.17	4.44	0.04	0.4	Rainbow trout	Mortality	LD50
Cadmium	0.02	< 0.003	0.09	0.13	0.0032	0.032	Bull trout	Growth	LOED
Copper	0.23	0.16	0.81	0.82	0.196	1.96	Rainbow trout	Growth	LOED
Lead	< 0.04	< 0.04	1.14	1.36	0.0278	0.278	Rainbow trout	Growth	ED11, ED16, ED19, ED30
Mercury	0.16	< 0.02	0.31	0.31	0.006	0.06	Channel catfish	Mortality	LD50
Vanadium	< 0.03	< 0.03	0.59	0.6	0.68	2.7	American flagfish	Growth	NOED; LOED
Zinc	10.88	3.98	14.95	29.93	0.45	4.5	Brook trout	Mortality	LOED

Notes:

¹NOAEL and LOAEL critical body residues were derived from data retrieved from the U.S. Army Corps of Engineers (USACE)/USEPA Environmental Residue-Effects Database (ERED) <http://el.erdc.usace.army.mil/ered/>

Values in bold font exceed LOAEL

Page or Paragraph	Document	Assertion from Chevron June 2013 Reply Memorial Expert Report	Theriot Response	Assertion Confirmed or Refuted	Impact on Theriot's Opinions
p 2	Southgate	Deforestation in the Oriente region of Ecuador, including in the Concession Area developed during the 1960s by Texpet in partnership with Gulf, was the result of policies and actions of the government of Ecuador: policies and actions relating to agricultural colonization and the development of state-owned energy resources. Thus, any ecological impact or biodiversity loss in the Oriente region is the responsibility of the Ecuadorian government alone, not Texpet.	The Southgate reply regarding deforestation refers only to the direct effect of removal of vegetative habitat (footprint), but fails to address the indirect effects of deforestation and construction of production sites. Accordingly, it does not include damage due to fragmentation, edge effect or hydrologic alteration due to roads and bridges. These effects are likely to be magnitudes greater than just the deforestation footprint of the E&P actions themselves. The fact that Chevron fails to address other direct and indirect impacts caused by Texpet to the flora and fauna of the Concession Area in its reply is tantamount to admission of significant damage to the ecosystem. The government's alleged role in agrarian reform and the supposed "nationalization" of the oil industry does not change my opinions or conclusions.	Refuted	None
p 7	Southgate	Dr. Theriot devotes much of his report to supposed losses of biodiversity resulting from the "direct deforestation" that allegedly was caused by petroleum development. Direct deforestation in this context is defined as the clearing of tree-covered land to make way for oil wells and related installations. This clearing was minimal compared to the deforestation carried out by agricultural colonists.	Chevron's expert, Southgate, ignores all the direct and indirect effects of Texpet's operations on the ecosystem of the Concession Area. TexPet's required operational facilities constitute but a small fraction of the area of the impacted ecosystem. Other ecological impacts from Texpet's operations include fragmentation and the edge effect, modification of the hydrology of the concession due to development of roads and facilities, and widespread contamination from venting and flaring of formation gases.	Refuted	None
p 8	Southgate	Dr. Theriot also finds fault with Texpet for not restoring all oil wells to their natural condition after the company's operating responsibilities in the Concession Area came to an end in 1990. However, his assessment of restoration does not take into account the fact that operating responsibilities passed immediately to PetroEcuador, which extracts oil in the Concession Area to this day and which has expanded many of the facilities originally constructed by Texpet.	The remediation prescribed in the RAP did not address the entire damaged area and Claimants' minimal ecological restoration efforts were inadequate to restore the habitat in the treated areas even to the sub-standard conditions specified in the RAP, much less to its essentially pristine pre-Texpet conditions. Louis Berger's field investigation, which considered Texpet-only sites, confirmed that contamination from Texpet's activities within the former Concession Area persists today and negatively impacts flora and fauna, and it will continue to do so absent remedial action.	Refuted	None
para. 22	Annex A	Dr. Theriot likewise criticized Texpet's RAP compliance by saying that it was insufficient.... [E]ven Theriot had to admit that they 'show that ... Ecuador had approved of Texpet's remediation.	The RAP remediation is irrelevant here. My report did not offer any legal opinion on proportionate responsibility, nor did it opine on whether or not the cleanup standards agreed to by the Government of Ecuador and Texaco had been complied with. The RAP standards cannot be used to evaluate contamination at least insofar as they affect tort-based claims brought by third parties like the Lago Agrio Plaintiffs. Thus, it is proper to demonstrate without reference to the RAP standards that there is substantial evidence that contamination from the pits and outside the pits occurred, is present today and in the future will continue to cause significant further damage to the flora, fauna and fisheries of the Concession Area.	Refuted	None

Page or Paragraph	Document	Assertion from Chevron June 2013 Reply Memorial Expert Report	Theriot Response	Assertion Confirmed or Refuted	Impact on Theriot's Opinions
para. 53	Annex A	Likewise, Theriot admitted that he could not determine whether this data reflected contamination from Texpet or PetroEcuador.	In its February submission, LBG looked at data and information in the Court record on which the Judgment is based. These records show contamination. The fact that there was a successive operator that may have also added to the contamination is a legal determination potentially relevant to the ultimate apportionment of harm between or among liable parties in an appropriate legal proceeding. Our understanding is that PetroEcuador was not a party before the Lago Agrio Court, and thus that would not have been an appropriate legal proceeding for the apportionment of liability between Texpet and PetroEcuador. Since we only have the Judgment findings and the record before the Court to review, we understand our role as experts to be to determine whether contamination caused by Texpet exists. Further analysis in subsequent proceedings would be necessary in order to allocate liability for that contamination among other non-joined but potentially liable entities.	Refuted	None
para. 55	Annex A	For example, Theriot, Ecuador's expert on ecological impacts, admitted that of the 500,000 hectare Concession Area, Texpet confined its operations to roughly 1 percent of the land, most of which was used for government-mandated open roads and not oilfield operations.	The "footprint" of deforestation necessary for production operations was but a small fraction of the area that was damaged by Texpet's operations. In my February, 2013 Opinion, I repeatedly refer to <i>both</i> direct and indirect damages to the ecosystem by Texpet's operations.	Refuted	None
para. 127 cont.	Annex A	Dr. Theriot misleads by: (i) suggesting that exceedances of screening levels indicate environmental harm (a position he retracted under oath); (ii) failing to account for naturally-occurring concentrations of metals in the soil.	As noted above, LBG was not asked to apportion damages. I presented data on heavy metals in the Concession Area which exceeded accepted standards for ecological risk.	Refuted	None
para. 127	Annex A	Dr. Theriot misleads by: (iv) inappropriately citing human fish-consumption advisory values as suggesting evidence of potential harm to fish.	My February 2013 Opinion included an analysis of available fish tissue samples. Claimants assert that these conclusions are misleading by suggesting that exceedances of recommended screening values for subsistence fishers indicates environmental harm. While the Court record does not contain a comprehensive study of contaminant concentrations in fish and wildlife, the limited data collected by Gallo does provide strong evidence that: Contamination persists in the environment of the Concession Area; fish are exposed to this residual contamination (either directly or through consumption of food that bioaccumulated contaminants); and this contamination has impacted fauna, as demonstrated by the elevated concentrations of contaminants within fish tissue in comparison to critical body residues (CBRs) derived from the Environmental Residue-Effects Database (ERED).	Refuted	None

APPENDIX B: Louis Berger Site Investigation Maps and Data

Figure B1 Well Site Area Location

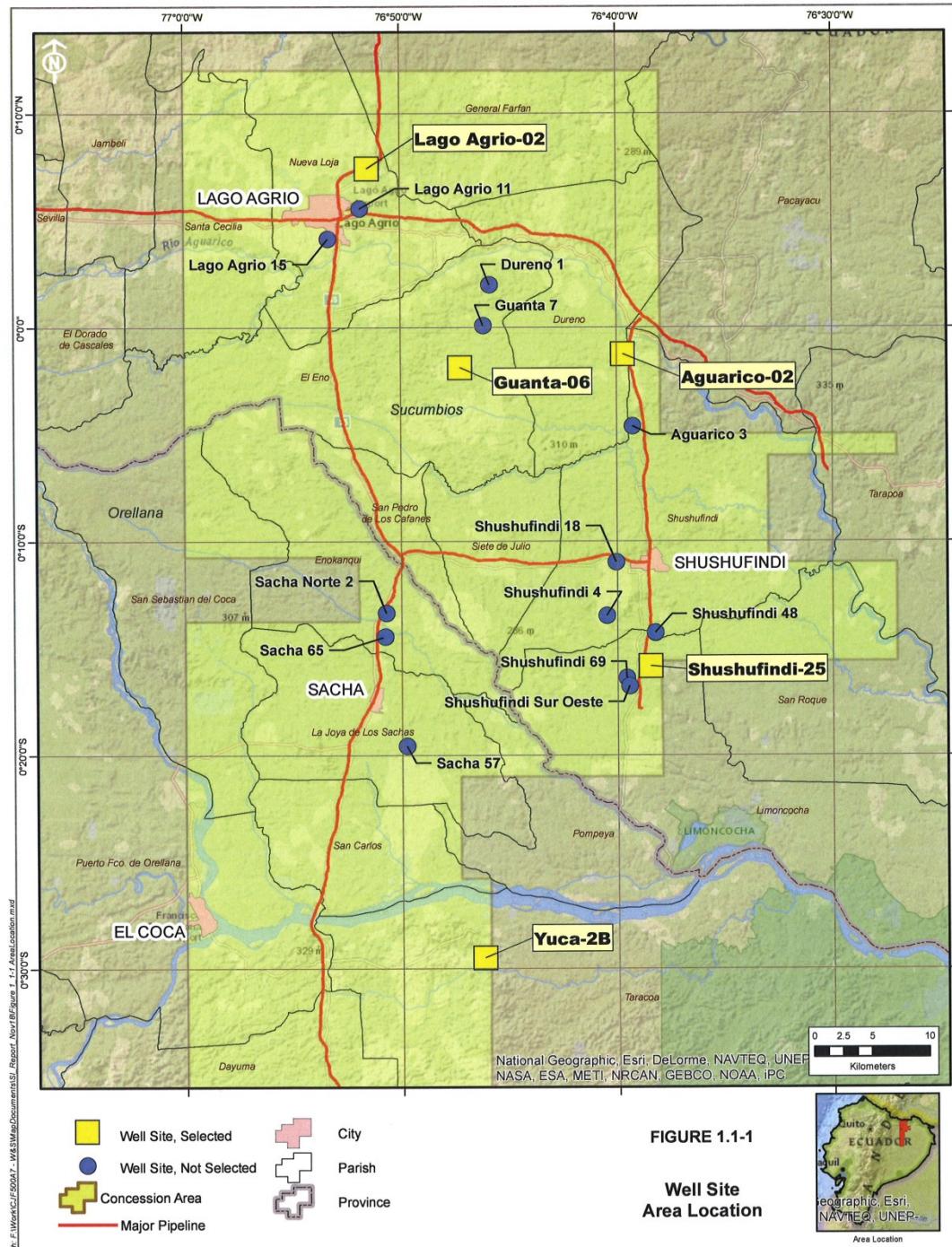


Figure B2 Sample Locations – Lago Agrio 02

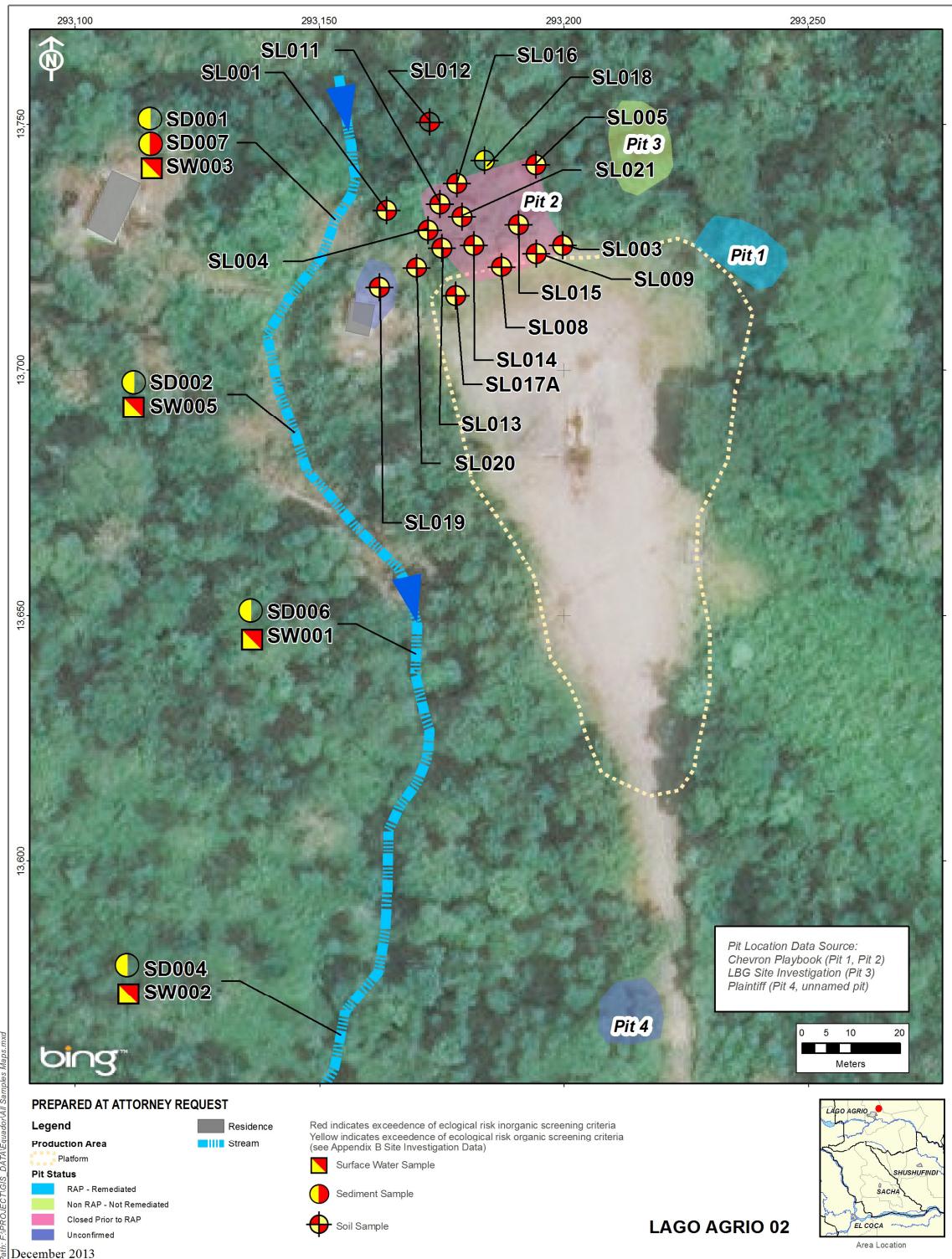


Figure B3 Sample Locations – Shushufindi 25

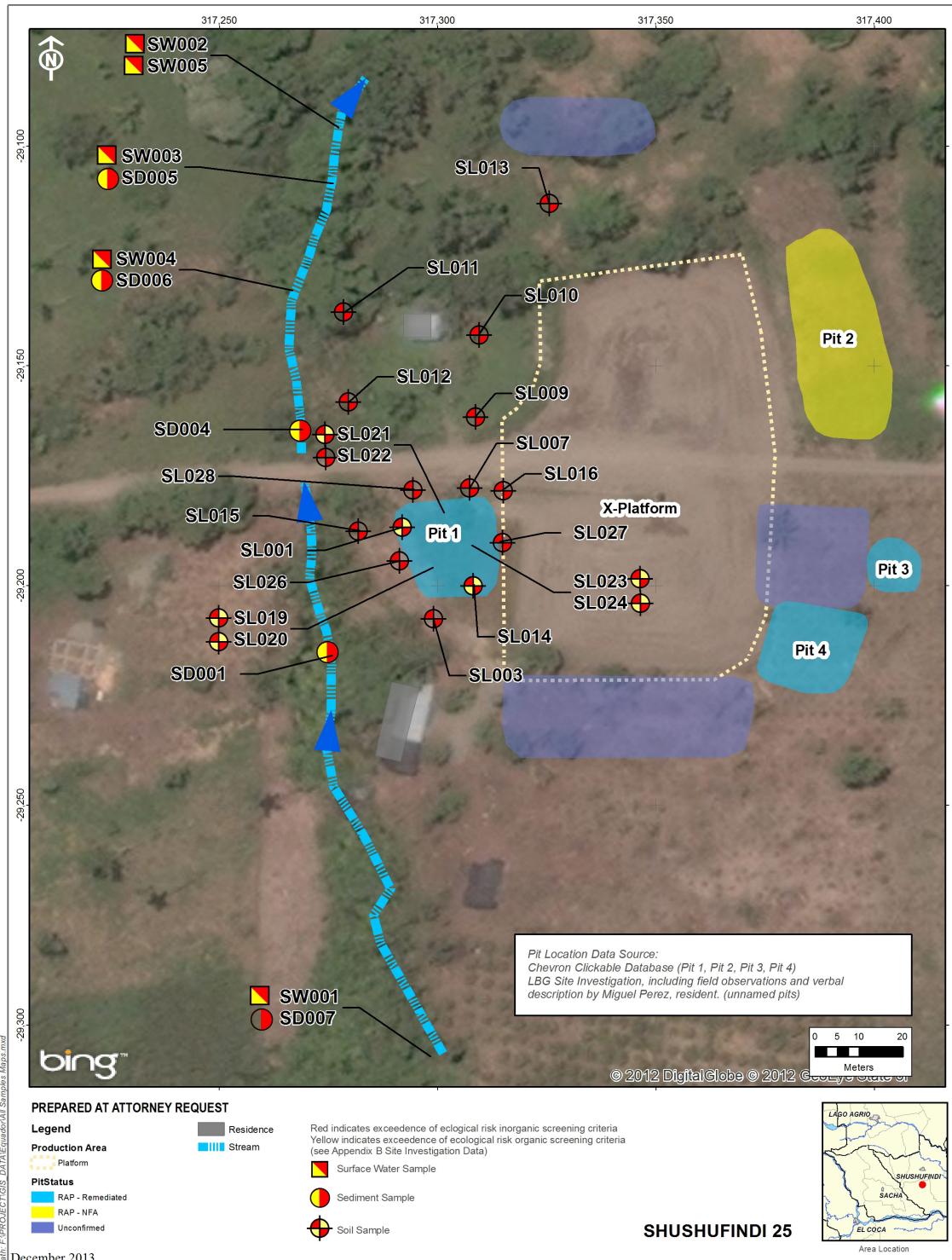


Figure B4 Sample Locations – Yuca 02

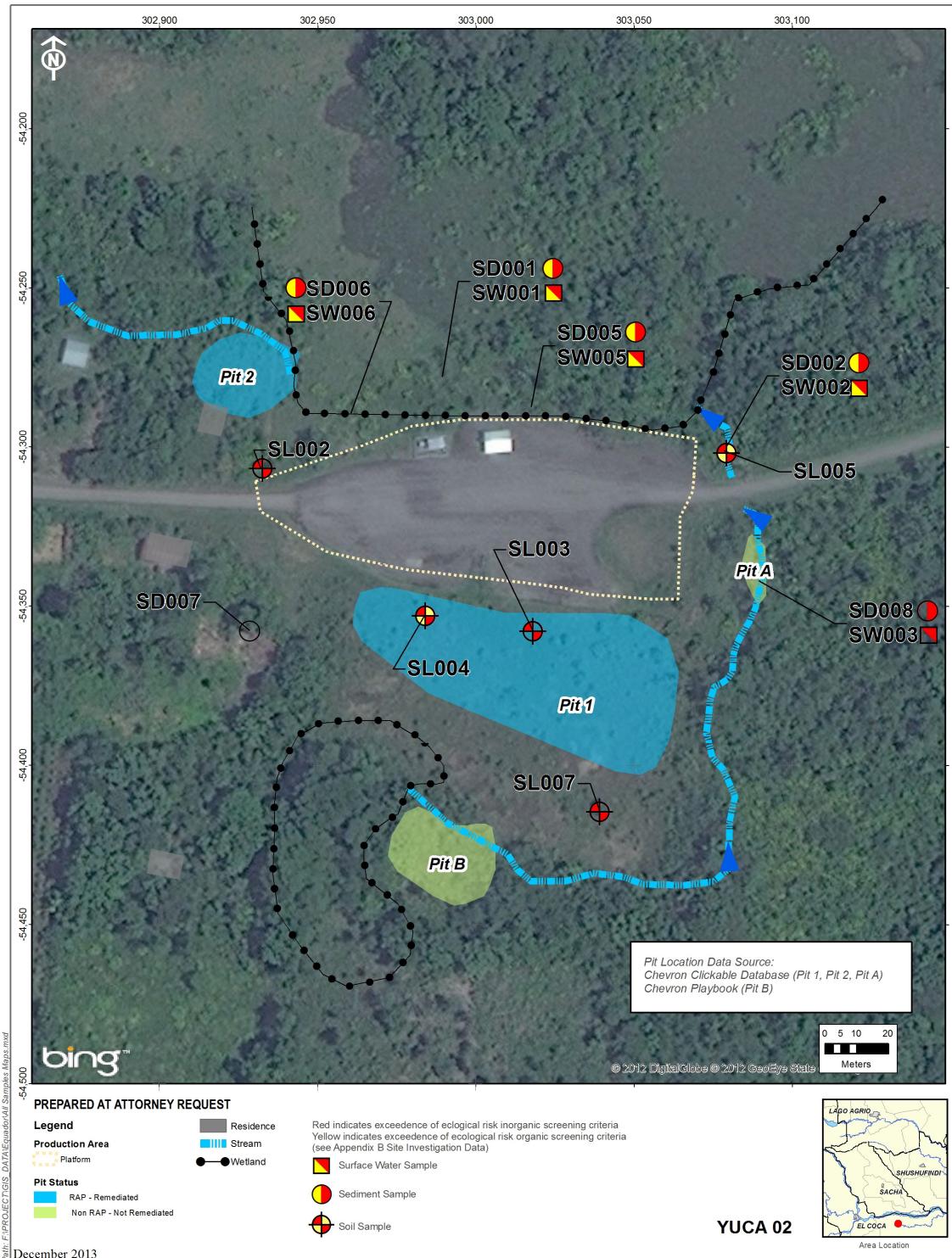


Figure B5 Sample Locations – Guanta 06

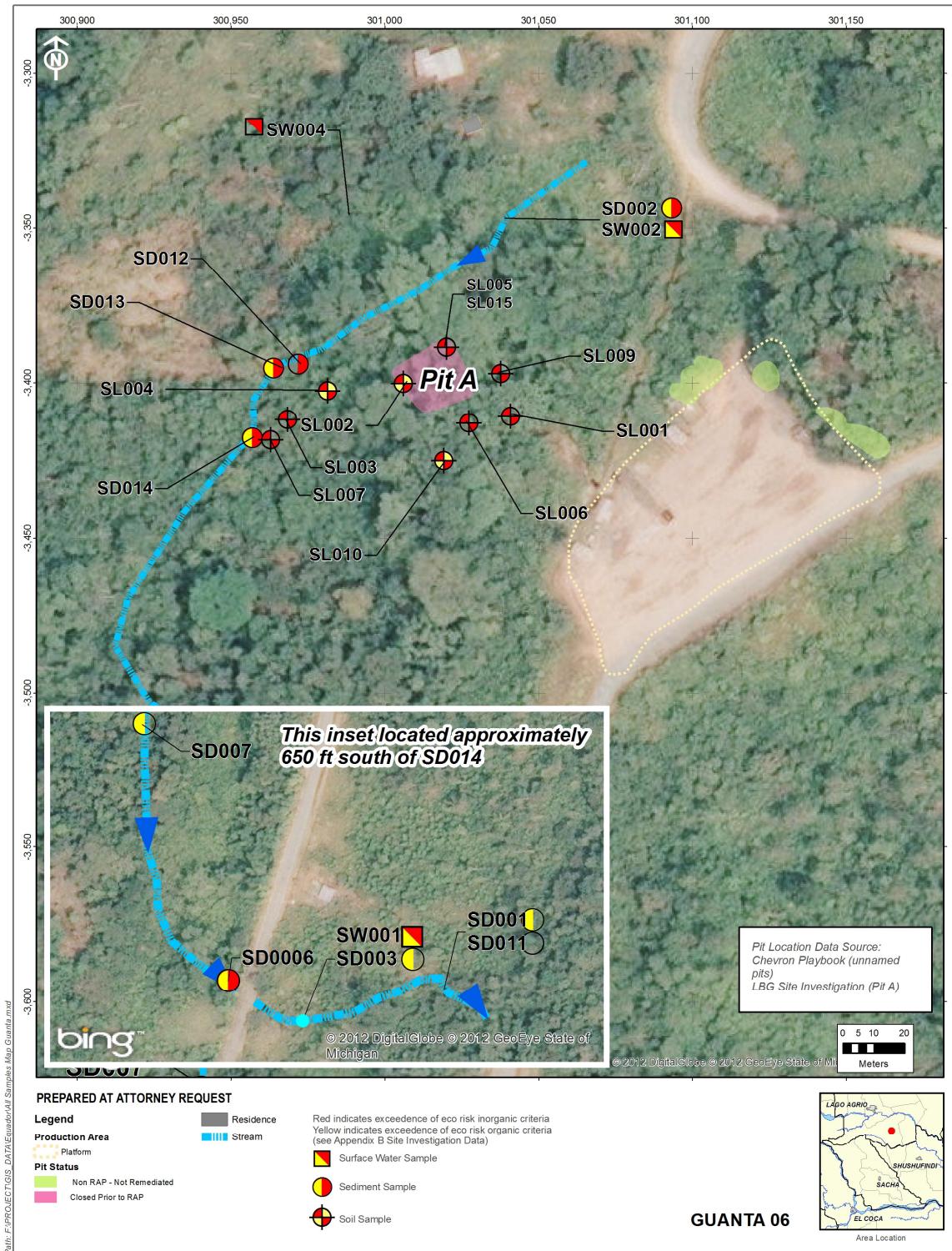


Figure B6 Sample Locations – Aguarico 02

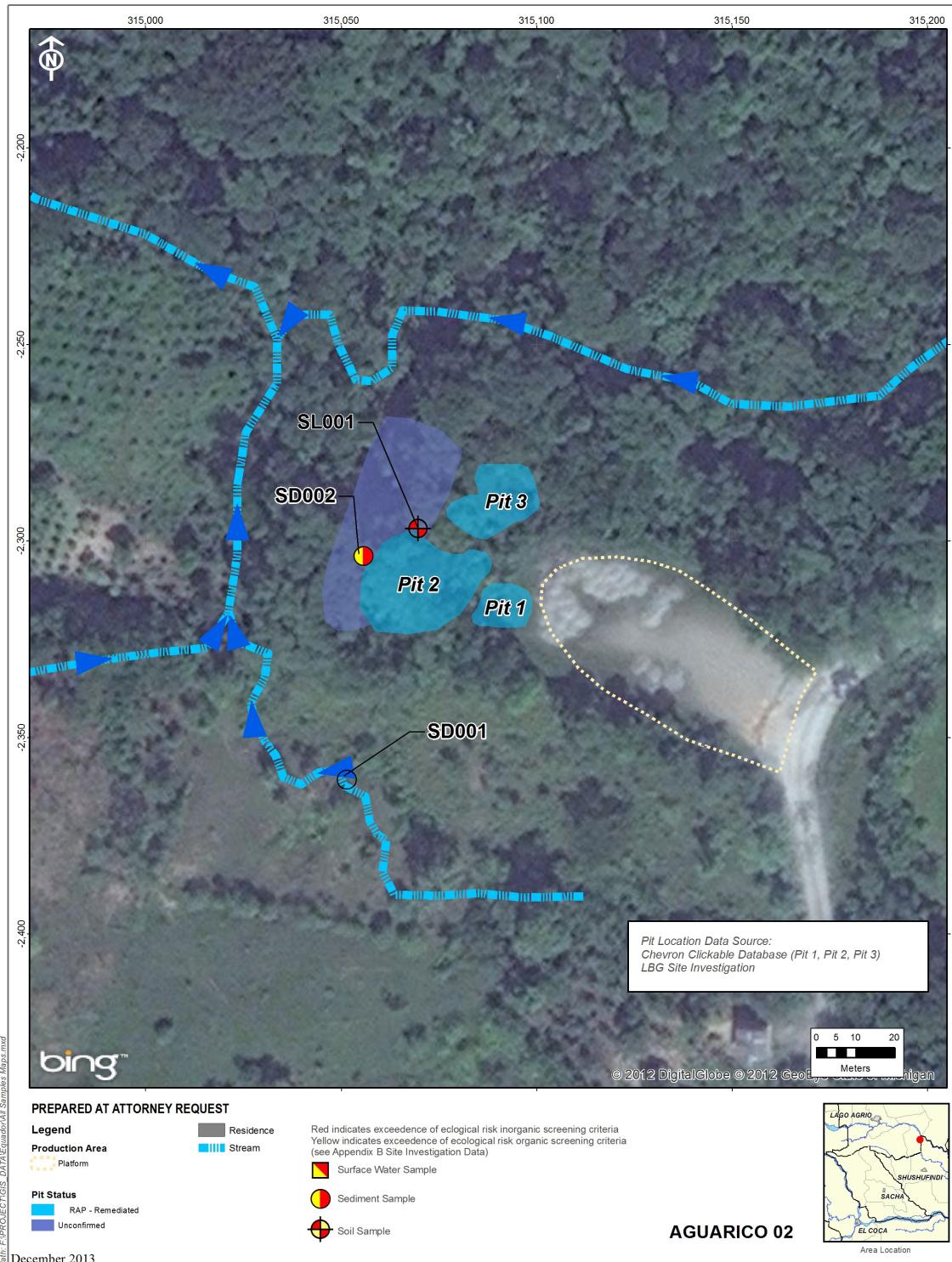


Table B1 Surface Water Results - Notes

Data available as of Nov. 12, 2013 were used in this table and they have not been validated. Field duplicate samples are not reported in this table.

Laboratory qualifiers (will be replaced by the validator qualifiers once the data are validated): U = The compound/analyte was analyzed for but the result was negated by validator since it was detected in a blank at a similar level J = Quantitation is approximate (estimated) due to limitations identified during the QA/QC review. B = Analyte found in sample and the associated blank. K = Peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration. D = Dilution data.

NA= Not available

RL = Reporting Limit

Highlighted cell indicates concentration exceeds the corresponding colored cell criteria as follows: purple - green exceeds RAOHE sensitive ecosystem criteria; blue - exceeds TULSMA criteria; and red - exceeds USEPA NRWQC criteria.

Analytical data for samples which required dilution/samples with higher RLs that the actual sample concentration is higher than reported and could not be quantified due to the level.

1. TPH represents the sum of the detected concentrations of Gasoline Range Organics (GRO), Diesel Range Organics (DRO), Heavy DRO, and Extended Range DRO.
2. Sum of 6 PAHs represents the sum of the detected concentrations of 6 PAHs compounds listed in Decreto 1215 Annex 5: Fluoranthene, Benzo[b]fluoranthene, Benzo[j,k]fluoranthenes, Benzo[a]pyrene, Benzo[ghi]perylene and Indeno[1,2,3-cd]pyrene.
3. Sum of 16 PAHs represents the sum of the detected concentrations of 16 PAHs listed and analyzed by HR GC/MS (Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene, Benzo[j,k]fluoranthenes, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Phenanthrene, Pyrene). PAHs were also analyzed via EPA Method 8270D;however, relatively high quantitation limits prevented the resolution and reporting of target compounds. High quantitation limits were associated with operation of the mass spectrometer in “open scan” (to detect TICs), percent moisture, and procedural dilutions.
4. Sum PAHs is the sum of detected concentrations of the following 23 compounds : it represents the sum of 16 PAHs in note 4, plus Benzo[e]pyrene, Perylene, Dibenzothiophene, 2-Methylnaphthalene, 2,6-Dimethylnaphthalene, 2,3,5-Trimethylnaphthalene and 1-Methylphenanthrene.
5. Sum of Alkylated PAH + Biphenyl is the sum of detected concentration of the following 9 compounds: C1-Naphthalenes, C1 Phenanthrenes/Anthracenes, C2-Naphthalenes, C2 Phenanthrenes/Anthracenes, C3-Naphthalenes, C3-Phenanthrenes/Anthracenes, C4-Naphthalenes, C4-Phenanthrenes/Anthracenes and Biphenyl.
6. Naphthenic acid represents the sum of 60 compounds as done by AXYS SOP MLA-077.

Table B1b Summary of Surface Water Results for LA-02

Sample Location	RAOHE	TULSMA Appendix 1 (Tables 3 and 4) for Surface Water Decreto 3516	USEPA NRWQC	LA02-T03A		LA02-T02		LA02-T05		LA02-T04		
				LA02-SW001		LA02-SW002		LA02-SW003		LA02-SW005		
Analyte		Values (mg/L)		Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL	
TPH ¹		0.5		0.049		0.015		1.09		0.692		
Acenaphthene		NA		0.00000146 BJ	0.000000141	0.00000155 BJ	0.000000343					
Acenaphthylene		0.002		0.000000561 J	0.000000164	0.000000641 J	0.000000219					
Anthracene		NA		U	0.000000138	U	0.000000124					
Benz[a]anthracene		NA		U	0.00000018	0.000000058 KBJ	3.97E-08					
Benzo[a]pyrene		NA		U	0.000000275	U	0.000000198					
Benzo[b]fluoranthene		NA		0.000000283 J	0.00000017	U	0.000000127					
Benzo[ghi]perylene		NA		0.00000039 KJ	0.000000169	U	0.000000203					
Benzo[j,k]fluoranthenes		NA		U	0.000000207	U	0.00000015					
Chrysene		NA		0.00000143 BJ	0.000000154	0.00000011 BJ	4.07E-08					
Dibenz[a,h]anthracene		NA		U	0.000000171	U	0.000000128					
Fluoranthene		NA		0.000000693 BJ	6.92E-08	0.000000348 BJ	0.000000054					
Fluorene		NA		0.00000143 BJ	8.22E-08	0.00000095 BJ	0.000000125					
Indeno[1,2,3-cd]pyrene		NA		0.000000409 KJ	0.000000161	0.000000258 J	0.000000189					
Naphthalene		0.006		0.0000307 B	0.000000236	0.0000286 B	0.000000327					
Phenanthrene		NA		0.00000191 KBJ	0.00000013	0.00000202 BJ	0.000000116					
Pyrene		NA		0.000000851 BJ	0.000000068	0.00000391 BJ	5.31E-08					
Sum of 6 PAHs ²		0.0003		0.000001775		0.000000606						
Sum of 16 PAHs ³ (EPA High Priority PAH Compounds)		0.0003		0.000040117		0.000034971						
Sum PAHs ⁴	0.0002	0.0003		0.000053659		0.000048967						
Sum Alkylated PAHs + Biphenyl ⁵		NA		0.000136094		0.000052098						
Total Phenols by Method E420.1		0.001		0.0021 J	0.005	0.0027 J	0.0051	0.0025 J	0.005	0.0025 J	0.005	
Total Phenols by Method SW8270		0.001		U	0.01	U	0.01					
BENZENE		0.3		U	0.0005	U	0.0005	U	0.0005	U	0.0005	
ETHYLBENZENE		0.7		U	0.0005	U	0.0005	U	0.0005	U	0.0005	
TOLUENE		0.3		U	0.0005	U	0.0005	0.0006	0.0005	0.0024	0.0005	
Xylenes Total		NA		U	0.0015	U	0.0015	U	0.0015	U	0.0015	
CYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001	U	0.001	
ISOPROPYLBENZENE		NA		U	0.001	U	0.001	U	0.001	U	0.001	
METHYLCYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001	U	0.001	
ALUMINUM		0.1	0.087	0.696	0.3	0.145 J	0.3	0.536	0.3	1.64	0.3	
ANTIMONY		0.016		0.00011 J	0.001	U	0.001	0.00014 J	0.001	0.00044 J	0.001	
ARSENIC		0.05	0.15	U	0.005	U	0.005	U	0.005	U	0.005	
BARIUM		1		0.0703	0.002	0.0174	0.002	0.0948	0.002	0.262	0.002	
BERYLLIUM		0.1		U	0.001	U	0.001	U	0.001	U	0.001	
CADMIUM	0.1	0.001	0.00025	0.00009 J	0.001	0.00008 J	0.001	0.00005 J	0.001	0.00006 J	0.001	
CHROMIUM		0.05	0.074	0.0018 J	0.005	0.0014 J	0.005	0.001 J	0.005	0.0014 J	0.005	
COBALT		0.2		0.0007 J	0.001	0.00038 J	0.001	0.0034	0.001	0.002	0.001	
COPPER		0.02	calculated	0.0024 J	0.003	0.0023 J	0.003	0.0017 J	0.003	0.0062	0.003	
IRON		0.3	1	2.12	0.1	1.3	0.1	10.2	0.1	7.25	0.1	
LEAD		NA	0.0025	0.00045 J	0.001	0.0001 J	0.001	0.0006 J	0.001	0.0023	0.001	
MANGANESE		0.1		0.0524	0.002	0.0284	0.002	0.433	0.002	0.308	0.002	
MERCURY		0.01	0.0002	0.00077	U	0.0002	U	0.0002	U	0.0002	U	
NICKEL		2	0.025	0.052	0.00031 J	0.002	U	0.002	0.00079 J	0.002	0.0011 J	0.002
SELENIUM		0.5	0.01	0.005	U	0.005	U	0.005	0.00036 J	0.005	U	0.005
SILVER		0.01		U	0.001	U	0.001	U	0.001	U	0.001	
THALLIUM		0.0004		U	0.001	U	0.001	U	0.001	U	0.001	
VANADIUM		0.1		0.0021 J	0.005	0.001 J	0.005	0.0022 J	0.005	0.0047 J	0.005	
ZINC		0.18	0.12	0.0052 J	0.01	U	0.01	0.0051 J	0.01	0.0112	0.01	
Naphthenic Acid ⁶				0.00856386		0.00174627		0.1995349		0.1		

See Notes on Page 1

Table B1b Summary of Surface Water Results for SSF-25

Sample Location	RAOHE	TULSMA Appendix 1 (Tables 3 and 4) for Surface Water Decreto 3516	USEPA NRWQC	SSF25-NAP (Perez Spring)		SSF25-N41		SSF25-N32		SSF25-N31A (SprSSF25-Ng Source)		SSF25-N41	
				SSF25-SW001		SSF25-SW002		SSF25-SW003		SSF25-SW004		SSF25-SW005	
Analyte		Values (mg/L)		Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL
TPH ¹		0.5		0.176		0.01		0.92		0.162		0.113	
Acenaphthene		NA		0.000000287 KBJ	0.000000258	0.000000816 BJ	0.000000234	0.00000546 B	0.000000498	0.00000185 KBJ	0.000000781		
Acenaphthylene		0.002		0.000000474 KBJ	0.000000115	0.000000413 BJ	0.000000242	0.000000773 KBJ	0.000000337	0.000000536 KBJ	0.00000041		
Anthracene		NA		0.000000163 BJ	6.94E-08	U	0.00000017	U	0.000000189	U	0.00000484		
Benz[a]anthracene		NA		0.000000139 BJ	3.57E-08	U	0.000000155	KBJ	0.00000363	0.00000596 KB	0.00000369		
Benzo[a]pyrene		NA		U	0.000000185	0.000000214 KJ	0.000000197	U	0.000000563	U	0.00000698		
Benzo[b]fluoranthene		NA		U	0.000000129	0.000000183 KJ	0.00000014	0.00000521 KJ	0.00000409	0.00000665 K	0.00000481		
Benzo[ghi]perylene		NA		0.000000215 KBJ	0.000000143	0.000000552 KBJ	0.000000137	0.0000151 B	0.00000263	0.0000166 B	0.0000025		
Benzo[j,k]fluoranthenes		NA		U	0.000000142	U	0.000000152	U	0.000000445	U	0.00000509		
Chrysene		NA		0.000000262 BJ	3.47E-08	0.00000256 KBJ	0.000000169	0.0000311 KB	0.00000411	0.0000343 B	0.00000404		
Dibenz[a,h]anthracene		NA		U	9.27E-08	U	0.000000177	U	0.00000266	U	0.00000262		
Fluoranthene		NA		0.000000771 BJ	7.82E-08	0.000000638 BJ	0.000000158	U	0.0000036	U	0.00000294		
Fluorene		NA		0.000000524 BJ	0.00000015	0.000000626 BJ	0.000000158	0.00000569 B	0.00000404	0.0000018 BJ	0.00000622		
Indeno[1,2,3-cd]pyrene		NA		0.000000177 KBJ	0.000000157	0.000000202 KBJ	0.000000141	U	0.00000289	U	0.0000025		
Naphthalene		0.006		0.00000349 BJ	0.000000317	0.00000029 BJ	0.000000292	0.00000451 BJ	0.00000518	0.00000497 BJ	0.00000318		
Phenanthrene		NA		0.00000261 BJ	6.38E-08	0.00000176 BJ	0.000000157	0.00000683 B	0.00000174	0.00000875 B	0.00000445		
Pyrene		NA		0.00000067 BJ	0.00000077	0.000000908 BJ	0.000000156	0.00000825 B	0.00000354	0.00000989 B	0.0000029		
Sum of 6 PAHs ²		0.0003		0.000001163		0.000001789		0.00002031		0.00002325			
Sum of 16 PAHs ³ (EPA High Priority PAH Compounds)		0.0003		0.000009782		0.000011772		0.000086923		0.000091306			
Sum PAHs ⁴	0.0002	0.0003		0.000039953		0.000033198		0.000510413		0.000371376			
Sum Alkylated PAHs + Biphenyl ⁵		NA		0.00003725		0.000192325		0.00448922		0.00549521			
Total Phenols by Method E420.1		0.001		U	0.005	U	0.005	0.0044 J	0.005	0.0019 J	0.005	0.0022 J	0.005
Total Phenols by Method E365.4		0.001		0.4	0.1	0.18	0.1	1.6	0.1	0.18	0.1		
Total Phenols by Method SW8270		0.001											
BENZENE		0.3		U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005
ETHYLBENZENE		0.7		U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005
TOLUENE		0.3		U	0.0005	U	0.0005	0.0012	0.0005	U	0.0005	U	0.0005
Xylenes Total		NA		U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015
CYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
ISOPROPYLBENZENE		NA		U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
METHYLCYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
ALUMINUM		0.1	0.087	0.767	0.3	0.513	0.3	7.07	0.3	0.57	0.3	0.82	0.3
ANTIMONY		0.016		0.00028 J	0.001	0.00024 J	0.001	0.00022 J	0.001	0.00026 J	0.001	0.00008 J	0.001
ARSENIC		0.05	0.15	U	0.005	U	0.005	U	0.005	U	0.005	U	0.005
BARIUM		1		0.0682	0.002	0.0338	0.002	0.352	0.002	0.0288	0.002	0.0391	0.002
BERYLLIUM		0.1		U	0.001	U	0.001	0.00032 J	0.001	U	0.001	U	0.001
CADMIUM	0.1	0.001	0.00025	0.00006 J	0.001	0.00006 J	0.001	0.0003 J	0.001	0.00007 J	0.001	0.00008 J	0.001
CHROMIUM		0.05	0.074	0.0017 J	0.005	0.0014 J	0.005	0.0097	0.005	0.0015 J	0.005	0.0037 J	0.005
COBALT		0.2		0.0028	0.001	0.00087 J	0.001	0.0091	0.001	0.00069 J	0.001	0.0013	0.001
COPPER		0.02	calculated	0.0023 J	0.003	0.0014 J	0.003	0.0179	0.003	0.0017 J	0.003	0.0026 J	0.003
IRON		0.3	1	9.06	0.1	2.5	0.1	39	0.1	2.08	0.1	3.83	0.1
LEAD		NA	0.0025	0.0023	0.001	0.00054 J	0.001	0.0107	0.001	0.0004 J	0.001	0.00051 J	0.001
MANGANESE		0.1		0.366	0.002	0.217	0.002	0.682	0.002	0.13	0.002	0.261	0.002
MERCURY	0.01	0.0002	0.00077	U	0.0002	U	0.0002	0.00003 J	0.0002	U	0.0002	U	0.0002
NICKEL	2	0.025	0.052	0.00066 J	0.002	0.00028 J	0.002	0.0031	0.002	0.00057 J	0.002	0.00086 J	0.002
SELENIUM	0.5	0.01	0.005	0.0004 J	0.005	0.00024 J	0.005	0.00046 J	0.005	U	0.005	0.00068 J	0.005
SILVER		0.01		U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
THALLIUM		0.0004		0.0015	0.001	U	0.001	0.00006 J	0.001	U	0.001	U	0.001
VANADIUM		0.1		0.0071	0.005	0.0036 J	0.005	0.0366	0.005	0.0054	0.005	0.0066	0.005
ZINC		0.18	0.12	0.0067 J	0.01	0.004 J	0.01	0.0776	0.01	0.0			

Table B1b Summary of Surface Water Results for YU-02

Sample Location	RAOHE	TULSMA Appendix 1 (Tables 3 and 4) for Surface Water Decreto 3516	USEPA NRWQC	YU02-T06A		YU02-T04		YU02-T03		YU02-N05		YU02-N06A	
				YU02-SW001		YU02-SW002		YU02-SW003		YU02-SW005		YU02-SW006	
Analyte		Values (mg/L)		Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL
TPH ¹		0.5		0.437		0.086		0.0487		1.028		2.2	
Acenaphthene		NA		0.00000254 J	0.000000112	0.00000146 J	0.000000225	0.00000119 J	0.000000455	U	0.00000201	U	0.00000213
Acenaphthylene		0.002		0.000000932 KBJ	0.000000174	0.000000546 BJ	0.000000135	0.000000787 BJ	0.000000138	0.00000125 BJ	0.000000775	U	0.00000147
Anthracene		NA		0.00000181 KJ	0.000000232	U	0.000000461	U	0.000000119	0.00000879 KBJ	0.00000143	0.00000205 BJ	0.00000154
Benz[a]anthracene		NA		0.0000029 KBJ	0.000000394	0.000000322 BJ	0.000000166	U	3.04E-08	U	0.00000043	0.0000053 KBJ	0.00000294
Benzo[a]pyrene		NA		U	0.000000729	U	0.000000654	U	0.000000217	U	0.00000129	U	0.00000921
Benzo[b]fluoranthene		NA		0.00000355 KJ	0.000000421	0.000000341 J	0.000000293	U	0.000000112	U	0.000000902	0.0000118 KJ	0.0000006
Benzo[ghi]perylene		NA		0.0000119 B	0.000000957	U	0.000000542	U	0.00000017	0.000112 B	0.00000755	0.0000991 B	0.00000678
Benzo[j,k]fluoranthenes		NA		U	0.000000505	U	0.000000357	U	0.000000135	U	0.00000102	U	0.00000735
Chrysene		NA		0.0000233 B	0.000000519	0.00000287 BJ	0.000000182	0.000000113 BJ	3.91E-08	0.000021 KBJ	0.00000489	0.0000368 KB	0.00000327
Dibenz[a,h]anthracene		NA		U	0.000000696	U	0.00000014	U	0.000000207	U	0.00000102	U	0.00000858
Fluoranthene		NA		0.00000139 BJ	0.000000158	0.000000299 BJ	0.00000027	0.000000326 BJ	6.06E-08	0.0000091 BJ	0.00000253	0.0000106 KBJ	0.00000275
Fluorene		NA		0.0000035 J	0.000000248	0.00000244 J	0.000000113	U	0.000000167	0.00000273 BJ	0.00000143	0.00000181 BJ	0.00000131
Indeno[1,2,3-cd]pyrene		NA		U	0.00000102	U	0.00000543	0.000000517 KBJ	0.000000166	U	0.00000782	U	0.00000718
Naphthalene		0.006		0.000036 B	0.000000339	0.0000258 B	0.000000393	0.0000362 B	0.000000353	0.00000756 BJ	0.00000246	0.000019 BJ	0.00000529
Phenanthrene		NA		0.0000111 B	0.000000217	0.00000774 B	0.000000432	0.00000149 BJ	0.000000112	0.0000143 BJ	0.00000131	0.0000138 BJ	0.00000142
Pyrene		NA		0.00000439 BJ	0.000000155	0.000000726 BJ	0.000000266	0.000000392 BJ	5.96E-08	0.0000114 KBJ	0.00000249	0.000012 BJ	0.00000271
Sum of 6 PAHs ²		0.0003		0.00001684		0.00000064		0.000000843		0.0001211		0.0001215	
Sum of 16 PAHs ³ (EPA High Priority PAH Compounds)		0.0003		0.000103312		0.000042544		0.000041015		0.00018813		0.00021226	
Sum PAHs ⁴	0.0002	0.0003		0.000247132		0.000106165		0.000055498		0.0003024		0.0003248	
Sum Alkylated PAHs + Biphenyl ⁵		NA		0.00215735		0.000818895		0.000051137		0.00144394		0.00080405	
Total Phenols by Method E420.1		0.001		0.0045 J	0.005	0.0014 J	0.005	U	0.0052	0.019	0.005	0.017	0.005
Total Phenols by Method E365.4		0.001											
Total Phenols by Method SW8270		0.001		U	0.0095	U	0.012	U	0.01				
BENZENE		0.3		U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005
ETHYLBENZENE		0.7		U	0.0005	U	0.0005	U	0.0005	U	0.0005	U	0.0005
TOLUENE		0.3		0.0004 J	0.0005	U	0.0005	U	0.0005	0.011	0.0005	0.0021	0.0005
Xylenes Total		NA		U	0.0015	U	0.0015	U	0.0015	U	0.0015	U	0.0015
CYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
ISOPROPYLBENZENE		NA		U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
METHYLCYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001	U	0.001	U	0.001
ALUMINUM		0.1	0.087	2.49	0.3	1.71	0.3	1.36	0.3	9.29	0.3	40.9	0.3
ANTIMONY		0.016		0.00005 J	0.001	U	0.001	U	0.001	0.00022 J	0.001	0.00023 J	0.001
ARSENIC		0.05	0.15	U	0.005	U	0.005	U	0.005	0.0041 J	0.005	0.0039 J	0.005
BARIUM		1		0.14	0.002	0.0635	0.002	0.0447	0.002	4.03	0.002	17.5	0.008
BERYLLIUM		0.1		0.00006 J	0.001	U	0.001	U	0.001	0.00072 J	0.001	0.0084	0.001
CADMIUM	0.1	0.001	0.00025	0.00009 J	0.001	U	0.001	0.00004 J	0.001	0.001	0.001	0.0063	0.001
CHROMIUM		0.05	0.074	0.00074 J	0.005	0.00031 J	0.005	0.00028 J	0.005	0.005	0.005	0.0088	0.005
COBALT		0.2		0.0011	0.001	0.00067 J	0.001	0.0022	0.001	0.025	0.001	0.132	0.001
COPPER		0.02	calculated	0.0038	0.003	0.0027 J	0.003	0.0031	0.003	0.0793	0.003	0.334	0.003
IRON		0.3	1	2.16	0.1	1.78	0.1	4	0.1	28.8	0.1	101	0.1
LEAD		NA	0.0025	0.0013	0.001	0.00044 J	0.001	0.00071 J	0.001	0.0844	0.001	0.145	0.001
MANGANESE		0.1		0.12	0.002	0.0632	0.002	0.326	0.002	2.52	0.002	11.2	0.008
MERCURY	0.01	0.0002	0.00077	U	0.0002	U	0.0002	U	0.0002	U	0.0002	U	0.0002
NICKEL	2	0.025	0.052	0.0015 J	0.002	0.00091 J	0.002	0.0012 J	0.002	0.0166	0.002	0.0671	0.002
SELENIUM	0.5	0.01	0.005	0.00077 J	0.005	0.00075 J	0.005	0.0009 J	0.005	0.00039 J	0.005	0.0022 J	0.005
SILVER		0.01		U	0.001	U	0.001	U	0.001	U	0		

Table B1b Summary of Surface Water Results for GU-06

Sample Location	RAOHE	TULSMA Appendix 1 (Tables 3 and 4) for Surface Water Decreto 3516	USEPA NRWQC	GU06-T02		GU06-T08			
				GU06-SW001		GU06-SW002		GU06-SW004	
Analyte		Values (mg/L)		Values (mg/L)	RL	Values (mg/L)	RL	Values (mg/L)	RL
TPH ¹		0.5		0.019		0.152		0.019	
Acenaphthene		NA		0.00000105 BJ	0.000000462	0.00000112 BJ	0.000000293		
Acenaphthylene		0.002		0.000000505 J	0.000000233	0.00000042 KJ	0.000000253		
Anthracene		NA		U	0.00000013	U	0.0000004		
Benz[a]anthracene		NA		U	0.0000002	0.000000598 KBJ	0.000000127		
Benzo[a]pyrene		NA		U	0.000000183	U	0.0000004		
Benzo[b]fluoranthene		NA		U	0.00000011	0.000000872 J	0.0000004		
Benzo[ghi]perylene		NA		0.000000185 KJ	9.02E-08	0.00000201 J	0.000000214		
Benzo[j,k]fluoranthenes		NA		U	0.000000131	U	0.0000004		
Chrysene		NA		0.000000415 BJ	0.0000001	0.00000271 BJ	0.000000136		
Dibenz[a,h]anthracene		NA		U	0.000000162	U	0.0000002		
Fluoranthene		NA		0.000000306 BJ	4.59E-08	0.00000109 BJ	0.000000162		
Fluorene		NA		0.000000656 BJ	9.44E-08	0.000000873 BJ	0.000000224		
Indeno[1,2,3-cd]pyrene		NA		0.000000345 KJ	8.44E-08	0.00000037 KJ	0.000000212		
Naphthalene		0.006		0.000023 B	0.000000214	0.0000302 B	0.000000385		
Phenanthrene		NA		0.000000213 KBJ	0.000000122	0.00000292 BJ	0.0000004		
Pyrene		NA		0.000000054 BJ	4.52E-08	0.00000165 BJ	0.00000016		
Sum of 6 PAHs ²		0.0003		0.000000836		0.000004342			
Sum of 16 PAHs ³ (EPA High Priority PAH Compounds)		0.0003		0.000029132		0.000044833			
Sum PAHs ⁴	0.0002	0.0003		0.000041091		0.000077033			
Sum Alkylated PAHs + Biphenyl ⁵		NA		0.000060576		0.000363643			
Total Phenols by Method E420.1		0.001		0.0035 J	0.0051	0.012		0.005	U 0.005
Total Phenols by Method E365.4		0.001							
Total Phenols by Method SW8270		0.001		U	0.01	U	0.01		
BENZENE		0.3		U	0.0005	U	0.0005	U	0.0005
ETHYLBENZENE		0.7		U	0.0005	U	0.0005	U	0.0005
TOLUENE		0.3		U	0.0005	0.00081		0.0005	U 0.0005
Xylenes Total		NA		U	0.0015	U	0.0015	U	0.0015
CYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001
ISOPROPYLBENZENE		NA		U	0.001	U	0.001	U	0.001
METHYLCYCLOHEXANE		NA		U	0.001	U	0.001	U	0.001
ALUMINUM		0.1	0.087	0.0899 J	0.3	4.33		0.3	0.836 0.3
ANTIMONY		0.016		U	0.001	0.00017 J	0.001	0.00019 J	0.001
ARSENIC		0.05	0.15	U	0.005	U	0.005	U	0.005
BARIUM		1		0.0433	0.002	0.312	0.002	0.0251	0.002
BERYLLIUM		0.1		U	0.001	0.00013 J	0.001	0.00009 J	0.001
CADMIUM	0.1	0.001	0.00025	0.00007 J	0.001	0.00022 J	0.001	0.00023 J	0.001
CHROMIUM		0.05	0.074	0.0012 J	0.005	0.0054	0.005	0.0018 J	0.005
COBALT		0.2		0.00046 J	0.001	0.0036	0.001	0.00082 J	0.001
COPPER		0.02	calculated	0.00087 J	0.003	0.0053	0.003	0.0019 J	0.003
IRON		0.3	1	1.55	0.1	9.87		0.1	0.46 0.1
LEAD		NA	0.0025	0.0002 J	0.001	0.0028	0.001	0.0004 J	0.001
MANGANESE		0.1		0.0836	0.002	0.805	0.002	0.0254	0.002
MERCURY	0.01	0.0002	0.00077	U	0.0002	U	0.0002	U	0.0002
NICKEL	2	0.025	0.052	U	0.002	0.0045	0.002	0.0012 J	0.002
SELENIUM	0.5	0.01	0.005	0.00031 J	0.005	0.0018 J	0.005	0.00046 J	0.005
SILVER		0.01		U	0.001	U	0.001	U	0.001
THALLIUM		0.0004		U	0.001	U	0.001	0.00006 J	0.001
VANADIUM		0.1		U	0.005	0.0091	0.005	0.0022 J	0.005
ZINC		0.18	0.12	U	0.01	0.03	0.01	0.0092 J	0.01
Naphthenic Acid ⁶				0.01437369		0.00559964		0.0010305	

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Table B2 Sediment Results - Notes

Data available as of Nov. 12, 2013 were used in this table and they have not been validated. Field duplicate samples

Laboratory qualifiers (will be replaced by the validator qualifiers once the data are validated): U = The compound/analyte was analyzed for but the result was negated by validator since it was detected in a blank at a similar level J = Quantitation is approximate (estimated) due to limitations identified during the QA/QC review. B = ANAlyte found in sample and the associated blank. K = Peak detected but did not meet quantification criteria, result

NA - Not available

RL = Reporting Limit

Highlighted cell indicates concentration exceeds the corresponding colored cell criteria as follows: green - exceeds RAOHE sensitive ecosystem criteria; tan - exceeds TEC Sediment Quality; orange - exceeds PEC Sediment Quality.

Analytical data for samples which required dilution/samples with higher RLs than the actual sample concentration is higher than reported and could not be quantified due to the level.

1. bgs = below ground surface
2. TPH represents the sum of the detected concentrations of Gasoline Range Organics (GRO), Diesel Range Organics (DRO), Heavy DRO, and Extended Range DRO.
3. Sum of 6 PAHs represents the sum of the detected concentrations of 6 PAHs compounds listed in Decreto 1215 Annex 5: Fluoranthene, Benzo[b]fluoranthene, Benzo[j,k]fluoranthenes, Benzo[a]pyrene, Benzo[ghi]perylene and
4. LMW PAHs represents the sum of the detected concentrations of Low Molecular Weight PAHs (Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene).
5. HMW PAHs represents the sum of the detected concentrations of High Molecular Weight PAHs (Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene, Benzo[j,k]fluoranthenes, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Indeno[1,2,3-cd]pyrene, and Pyrene).
6. Sum of 16 PAHs represents the sum of the detected concentrations of 16 PAHs listed and analyzed by HR GC/MS (Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene, Benzo[j,k]fluoranthenes, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-cd]pyrene, Naphthalene, Phenanthrene, Pyrene). PAHs were also analyzed via EPA Method 8270D; however, relatively high quantitation limits prevented the resolution and reporting of target compounds. High quantitation
7. Sum PAHs represents the sum of detected concentrations of 23 compounds which comprise of the 16 PAHs listed in note 4 plus Benzo[e]pyrene, Perylene, Dibenzothiophene, 2-MethylINApthalene, 2,6-DimethylINApthalene,
8. Sum of Alkylated PAH + Biphenyl is the sum of detected concentration of the following 9 compounds: C1-Naphthalenes, C1 Phenanthrenes/Anthracenes, C2-Naphthalenes, C2 Phenanthrenes/Anthracenes, C3-Naphthalenes, C3-Phenanthrenes/Anthracenes, C4-Naphthalenes, C4-Phenanthrenes/Anthracenes and Biphenyl.
9. Sample arrived at laboratory outside of holding temperature due to transit delays.
10. Sample was analyzed for TPH GRO only.

Table B2a Summary of Sediment Results for LA-02

Sample Location	RAOHE Sensitive Ecosystem Criteria Decreto 1215	Sediment Quality		LA02-T05A		LA02-T04A		LA02-T02A		LA02-T03A		LA02-T05	
Sample Name				LA02-SD001	LA02-SD002	LA02-SD004	LA02-SD006	LA02-SD007					
Depth (m bgs ⁻¹)		TEC	PEC	0.2 - 0.35	0.2 - 0.35	0.3 - 0.45	0.15 - 0.30	0.00 - 0.16	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)
Analyte		Values (mg/kg)		Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)
TPH ²		1,000		2,690		1,210		1,110		128		6,775	
AceNaphthalene	NA			0.02 J	8.58E-3	5.03E-3 J	4.41E-3	U	2.30E-3	U	6.15E-4	0.05 J	6.08E-3
AceNaphthylene	NA			5.32E-3 KJ	4.94E-3	U	2.41E-3	U	1.65E-3	U	2.34E-4	6.58E-3 KJ	3.31E-3
Anthracene	NA	0.06	0.85	U	0.08	U	0.02	U	9.84E-3	U	9.25E-4	U	0.09
Benz[a]anthracene	NA	0.11	1.05	0.03 KBJ	0.03	U	7.76E-3	U	0.01	U	1.63E-3	0.10 KB	0.03
Benz[a]pyrene	NA	0.15	1.45	U	0.02	U	4.23E-3	U	0.01	U	3.03E-3	U	0.04
Benz[b]fluoranthene	NA			0.02 BJ	0.01	3.30E-3 BJ	2.22E-3	U	7.01E-3	U	2.15E-3	0.06 K	0.03
Benz[ghi]perylene	NA			U	0.01	3.46E-3 KBJ	3.36E-3	8.82E-3 J	4.39E-3	3.64E-3 KJ	1.63E-3	0.03 J	9.42E-3
Benz[j,k]fluoranthenes	NA			U	0.02	U	2.66E-3	U	8.64E-3	U	2.28E-3	U	0.03
Chrysene	NA	0.17	1.29	0.18 KB	0.04	0.04 B	0.01	0.06	0.01	0.02 B	1.56E-3	0.60 B	0.03
Dibenz[a,h]anthracene	NA	0.03	NA	U	8.15E-3	U	3.22E-3	U	4.80E-3	U	1.84E-3	U	0.02
Fluoranthene	NA	0.42	2.23	U	0.06	9.56E-3 BJ	8.69E-3	U	6.33E-3	1.29E-3 BJ	7.55E-4	U	0.05
Fluorene	NA	0.08	0.54	0.01 J	8.92E-3	0.01 J	5.45E-3	3.42E-3 KJ	1.48E-3	1.38E-3 KJ	3.46E-4	0.07	0.02
Indeno[1,2,3-cd]pyrene	NA			U	0.01	U	3.47E-3	U	4.27E-3	U	1.71E-3	U	0.01
NAphthalene	NA	0.18	0.56	5.91E-3 KBJ	2.01E-3	6.71E-3 BJ	2.06E-3	8.65E-3 BJ	3.60E-3	3.22E-3 BJ	7.60E-4	6.39E-3 BJ	3.78E-3
PheNAanthrene	NA	0.20	1.17	0.08 KB	0.08	0.05 B	0.02	0.02 BJ	9.22E-3	8.21E-3 BJ	8.50E-4	0.36 B	0.08
Pyrene	NA	0.20	1.52	0.09 B	0.06	0.04 BJ	8.55E-3	0.01 BJ	6.23E-3	3.45E-3 BJ	7.43E-4	0.18 B	0.05
Sum of 6 PAHs ³	1.00			0.02		0.02		8.82E-3		4.93E-3		0.09	
LMW PAHs ⁴	1.00			0.13		0.08		0.03		0.01		0.48	
HMW PAHs ⁵	1.00			0.32		0.10		0.09		0.03		0.97	
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00			0.45		0.18		0.12		0.04		1.45	
Sum PAHs'	1.00	1.61	23	1.43		1.74		0.82		0.72		4.68	
Sum Alkylated PAHs + Biphenyl ⁸	NA			39		15		8.03		0.96		89	
Total Phenols by Method SW8270	NA			U	0.45	U	0.54	U	0.47				
BENZENE	NA			U	6.00E-3	U	7.00E-3	U	0.42	U	6.50E-3	U	7.50E-3
ETHYLBENZENE	NA			U	6.00E-3	U	7.00E-3	U	0.42	U	6.50E-3	U	7.50E-3
TOLUENE	NA			U	6.00E-3	U	7.00E-3	U	0.42	U	6.50E-3	U	7.50E-3
Total Xylenes	NA			U	0.02	U	0.02	U	1.26	U	0.02	U	0.02
CYCLOHEXANE	NA			U	6.00E-3	U	7.00E-3	U	0.42	U	6.50E-3	U	7.50E-3
ISOPROPYLBENZENE	NA			2.30E-3 J	6.00E-3	U	7.00E-3	U	0.42	U	6.50E-3	3.70E-3 J	7.50E-3
METHYLCYCLOHEXANE	NA			0.08	6.00E-3	U	7.00E-3	U	0.42	U	6.50E-3	0.11	7.50E-3
ALUMINUM	NA			14,300	38	17,500	34	16,800	28	17,800	35	13,300	42
ANTIMONY	NA			0.05 J	0.12	0.05 J	0.11	0.09 J	0.09	0.07 J	0.12	0.04 J	0.14
ARSENIC	NA	9.79	33	0.50 J	0.63	0.73	0.57	1.00	0.47	0.91	0.58	0.80	0.70
BARIUM	NA			418	0.25	5,460	4.60	5,120	3.70	2,200	1.20	972	0.56
BERYLLIUM	NA			0.18	0.12	0.27	0.11	0.32	0.09	0.33	0.12	0.21	0.14
CADMIUM	1.00	0.99	4.98	0.11 J	0.12	0.18	0.11	0.24	0.09	0.15	0.12	0.14	0.14
CHROMIUM	NA	43	111	17	0.63	23	0.57	18	0.47	13	0.58	19	0.70
COBALT	NA			10	0.12	8.60	0.11	9.90	0.09	9.80	0.12	9.40	0.14
COPPER	NA	32	149	28	0.38	28	0.34	24	0.28	31	0.35	27	
IRON	NA			21,600	12	19,300	11	21,600	9.30	17,700	12	19,100	14
LEAD	80	36	128	28	0.12	19	0.11	5.90	0.09	5.30	0.12	41	0.14
MANGANESE	NA			191	0.25	183	0.23	170	0.19	144	0.23	175	0.28
MERCURY	NA	0.18	1.06	7.00E-3 J	0.04	0.02 J	0.04	0.02 J	0.04	0.01 J	0.04	0.01 J	0.05
NICKEL	40	23	49	13	0.25	11	0.23	14	0.19	13	0.23	12	0.28
SELENIUM	NA			U	0.63	U	0.57	U	0.47	U	0.58	U	0.70
SILVER	NA			0.03 J	0.12	0.04 J	0.11	0.04 J	0.09	0.04 J	0.12	0.03 J	0.14
THALLIUM	NA			0.05 J	0.12	0.08 J	0.11	0.11	0.09	0.09 J	0.12	0.06 J	0.14
VANADIUM	NA			84	0.63	66	0.57	81	0.47	65	0.58	69	0.70
ZINC	NA	121	459	50	1.20	54	1.10	55	0.93	44	1.20	51	1.40
TOTAL ORGANIC CARBON	NA			41,000	580	6,500	660	30,000	570	22,000	580	49,000	770

See Notes on page 1

Table B2b Summary of Sediment Results for SSF-25

Sample Location	RAOHE Sensitive Ecosystem Criteria Decreto 1215	Sediment Quality		SSF25-T01		SSF25-T02		SSF25-T03R		SSF25-T02R		SSF25-NAP (Perez Spring)	
				SSF25-SD001		SSF25-SD004		SSF25-SD005		SSF25-SD0069		SSF25-SD007	
		Depth (m bgs ⁻¹)	TEC	PEC	0 - 0.15	0.1 - 0.25	0.30 - 0.45	0.00 - 0.12	0.02 - 0.17				
Analyte	Values (mg/kg)			Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)
TPH ²	1,000			604		11,900		91		3,140		48	
AceNaphthalene	NA			3.30E-3	KJ	1.03E-3	0.05 D	0.01	U	1.97E-3	0.05 KJ	4.86E-3	U
AceNaphthylene	NA				U	2.46E-3	UD	0.01	U	8.26E-4	U	3.64E-3	U
Anthracene	NA	0.06	0.85	U	7.18E-3	UD	0.06	U	1.07E-3	U	0.06	7.79E-4	KBJ
Benz[a]anthracene	NA	0.11	1.05	6.72E-3	KBJ	3.11E-3	0.19 BD	0.10	9.41E-4	KBJ	5.10E-4	0.05 KB	0.01
Benz[a]pyrene	NA	0.15	1.45	U	7.38E-3	UD	0.10	U	2.05E-3	U	0.04	U	1.40E-3
Benz[b]fluoranthene	NA			7.25E-3	J	4.78E-3	0.28 D	0.06	U	1.43E-3	0.04 J	0.03	U
Benz[ghi]perylene	NA			0.03	K	2.81E-3	0.39 D	0.06	3.10E-3	KJ	1.42E-3	0.09	0.01
Benz[j,k]fluoranthenes	NA			U	6.08E-3	UD	0.07	U	1.56E-3	U	0.03	U	1.08E-3
Chrysene	NA	0.17	1.29	0.08	4.26E-3	1.19 D	0.13	4.27E-3	BJ	4.93E-4	0.27 B	0.02	9.39E-4
Dibenz[a,h]anthracene	NA	0.03	NA	U	3.34E-3	0.06 D	0.05	U	1.23E-3	U	0.01	U	1.91E-3
Fluoranthene	NA	0.42	2.23	6.24E-3	BJ	3.70E-3	UD	0.07	2.27E-3	BJ	8.92E-4	U	0.03
Fluorene	NA	0.08	0.54	0.01 J	3.31E-3	0.15 D	0.06	U	7.52E-4	0.10	0.02	U	7.04E-4
Indeno[1,2,3-cd]pyrene	NA			U	3.00E-3	UD	0.06	U	1.56E-3	U	0.01	1.41E-3	KBJ
NAphthalene	NA	0.18	0.56	2.88E-3	BJ	7.06E-4	0.01 BDJ	7.26E-3	3.58E-3	KBJ	3.22E-3	0.01 BJ	3.17E-3
PheNAanthrene	NA	0.20	1.17	0.03 B	6.73E-3	0.35 BD	0.06	2.76E-3	BJ	9.85E-4	0.06 KB	0.05	2.59E-3
Pyrene	NA	0.20	1.52	0.02 B	3.64E-3	0.30 BD	0.06	4.13E-3	BJ	8.79E-4	0.10 B	0.02	9.35E-4
Sum of 6 PAHs ³	1			0.05		0.67		5.37E-3		0.13		3.91E-3	
LMW PAHs ⁴	1			0.05		0.56		6.34E-3		0.22		7.67E-3	
HMW PAHs ⁵	1			0.15		2.41		0.01		0.55		6.40E-3	
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1			0.21		2.97		0.02		0.76		0.01	
Sum PAHs'	1	1.61	23	5.22		15		1.37		6.96		0.52	
Sum Alkylated PAHs + Biphenyl ⁸	NA			26		199		1.05		67		0.10	
Total Phenols by Method SW8270	NA				U	1.40	U	1.70					
BENZENE	NA			U	0.03	U	0.03	U	0.01	U	0.03	U	0.01
ETHYLBENZENE	NA			U	0.03	U	0.03	U	0.01	U	0.03	U	0.01
TOLUENE	NA			U	0.03	U	0.03	U	0.01	U	0.03	5.20E-3	J
Total Xylenes	NA			U	0.09	U	0.08	U	0.04	U	0.09	U	0.03
CYCLOHEXANE	NA			U	0.03	U	0.03	U	0.01	U	0.03	U	0.01
ISOPROPYLBENZENE	NA			U	0.03	U	0.03	U	0.01	0.08	0.03	U	0.01
METHYLCYCLOHEXANE	NA			U	0.03	U	0.03	U	0.01	U	0.03	U	0.01
ALUMINUM	NA			43,200		110	47,800	110	49,400	47	69,600	120	84,200
ANTIMONY	NA			U	0.36	0.15 J	0.36	0.03 J	0.16	0.10 J	0.42	0.06 J	0.16
ARSENIC	NA	9.79	33	U	1.80	1.20 J	1.80	0.32 J	0.78	0.94 J	2.10	0.67 J	0.78
BARIUM	NA			332	0.71	333	0.72	345	0.31	579	0.84	460	0.31
BERYLLIUM	NA			0.69	0.36	0.78	0.36	0.82	0.16	1.10	0.42	1.10	0.16
CADMIUM	1	0.99	4.98	0.43	0.36	0.46	0.36	0.34	0.16	0.35 J	0.42	0.24	0.16
CHROMIUM	NA	43	111	77	1.80	53	1.80	88	0.78	48	2.10	77	0.78
COBALT	NA			11	0.36	19	0.36	15	0.16	17	0.42	20	0.16
COPPER	NA	32	149	46	1.10	50	1.10	41	0.47	53	1.20	52	0.47
IRON	NA			23,100	36	33,600	36	23,600	16	35,800	42	54,100	78
LEAD	80	36	128	15	0.36	29	0.36	5.70	0.16	17	0.42	7.50	0.16
MANGANESE	NA			156	0.71	794	0.72	123	0.31	299	0.84	248	0.31
MERCURY	NA	0.18	1.06	0.07 J	0.11	0.05 J	0.13	0.04 J	0.05	0.09 J	0.12	0.04 J	0.07
NICKEL	40	23	49	23	0.71	27	0.72	27	0.31	30	0.84	38	0.31
SELENIUM	NA			U	1.80	U	1.80	U	0.78	U	2.10	U	0.78
SILVER	NA			0.14 J	0.36	0.16 J	0.36	0.12 J	0.16	0.15 J	0.42	0.11 J	0.16
THALLIUM	NA			0.17 J	0.36	0.19 J	0.36	0.10 J	0.16	0.14 J	0.42	0.08 J	0.16
VANADIUM	NA			107	1.80	127	1.80	132	0.78	131	2.10	168	0.78
ZINC	NA	121	459	104	3.60	193	3.60	97	1.60	114	4.20	94	1.60
TOTAL ORGANIC CARBON	NA			140,000	1,800	200,000	2,000	48,000	760	220,000	1,800	48,000	810

See Notes on page 1

Table B2c Summary of Sediment Results for YU-02

Sample Location	RAOHE Sensitive Ecosystem	Sediment Quality		YU02-T06A		YU02-T04		YU02-T05		YU02-N15		YU02-T08		Irrigation Ditch	
Sample Name	Criteria	Decreto 1215		YU02-SD001		YU02-SD002		YU02-SD005		YU02-SD006		YU02-SD007		YU02-SD008	
Depth (m bgs ⁻¹)		TEC	PEC	0.07 - 0.15		0.01 - 0.16		0.3 - 0.45		0.05 - 0.2		0.05 - 0.15		Surface - 0.1 m	
Analyte	Values (mg/kg)			Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)								
TPH ²	1,000			49,300		5,230		51,100		470		15		147	
AceNaphthalene	NA			0.10	J	0.03	KJ	9.14E-3	0.28	D	0.01	U	9.87E-4	U	1.17E-3
AceNaphthylene	NA			U		4.65E-3	U	0.02	0.19	KBDJ	2.55E-3	U	7.82E-4	U	8.47E-4
Anthracene	NA	0.06	0.85	U		0.24	U	0.09	UD	0.36	1.24E-3	KBJ	5.96E-4	5.88E-4	6.05E-4
Benz[a]anthracene	NA	0.11	1.05	1.01	KB	0.62	U	0.16	0.59	KBD	0.15	4.14E-3	BJ	1.72E-3	4.20E-4
Benz[a]pyrene	NA	0.15	1.45	U		0.63	U	0.06	0.30	KD	0.21	U	8.71E-3	U	7.88E-4
Benz[b]fluoranthene	NA			0.79	K	0.44	0.08	KJ	0.04	0.48	D	0.15	5.54E-3	KJ	5.36E-3
Benz[ghi]perylene	NA			1.47		0.37	0.07	J	0.03	0.72	BD	0.07	0.03	KBJ	3.78E-3
Benz[j,k]fluoranthenes	NA			U		0.54	U	0.05	UD	0.17	U	6.14E-3	U	6.18E-4	U
Chrysene	NA	0.17	1.29	6.90	KB	0.83	0.61	B	0.20	4.16	BD	0.16	0.01	BJ	2.13E-3
Dibenz[a,h]anthracene	NA	0.03	NA	0.36	KJ	0.19	U	0.05	0.16	KDJ	0.11	7.69E-3	J	4.76E-3	U
Fluoranthene	NA	0.42	2.23	U		0.17	U	0.08	UD	0.26	4.57E-3	BJ	1.65E-3	1.13E-3	3.10E-4
Fluorene	NA	0.08	0.54	0.06	J	0.03	0.11	J	0.04	0.70	D	0.08	1.57E-3	J	8.24E-4
Indeno[1,2,3-cd]pyrene	NA			U		0.43	U	0.04	UD	0.08	8.13E-3	BJ	4.24E-3	1.35E-3	9.25E-4
NAphthalene	NA	0.18	0.56	0.06	BJ	9.83E-3	0.02	KBJ	0.01	0.89	BD	4.75E-3	3.70E-3	KBJ	1.92E-3
Phenanthrene	NA	0.20	1.17	0.27	KBJ	0.25	0.56	B	0.09	1.83	BD	0.33	6.05E-3	BJ	5.48E-4
Pyrene	NA	0.20	1.52	0.34	KBJ	0.17	U	0.08	0.60	BD	0.26	4.58E-3	BJ	1.63E-3	1.23E-3
Sum of 6 PAHs ³	1			2.26		0.15		1.50		0.05		2.48E-3			3.01E-3
LMW PAHs ⁴	1			0.49		0.75		3.89		0.01		2.30E-3			9.05E-3
HMW PAHs ⁵	1			11		0.76		7.01		0.08		4.81E-3			7.29E-3
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1			11		1.51		11		0.09		7.11E-3			0.02
Sum PAHs ⁷	1	1.61	23	17		6.95		45		1.10		0.06			0.23
Sum Alkylated PAHs + Biphenyl ⁸	NA			371		84		641		0.36		0.04			0.17
Total Phenols by Method SW8270	NA			U		1.50	U	0.64							
BENZENE	NA			U		0.22	U	0.01	U	0.02	U	0.02	U	9.00E-3	U
ETHYLBENZENE	NA			U		0.22	U	0.01	U	0.02	U	0.02	U	9.00E-3	U
TOLUENE	NA			U		0.22	0.07	U	0.01	U	0.02	U	9.00E-3	0.02	0.02
Total Xylenes	NA			U		0.66	U	0.03	U	0.07	U	0.06	U	0.03	U
CYCLOHEXANE	NA			U		0.22	U	0.01	0.02	J	0.02	U	0.02	U	9.00E-3
ISOPROPYLBENZENE	NA			U		0.22	2.80E-3	J	0.01	U	0.02	U	0.02	U	9.00E-3
METHYLCYCLOHEXANE	NA			U		0.22	0.02	U	0.01	U	0.02	U	0.02	U	9.00E-3
ALUMINUM	NA			15,300		93	43,300	38	25,900	70	32,000	81	47,000		38
ANTIMONY	NA			0.09	J	0.31	0.09	J	0.13	0.47	0.23	0.19	J	0.27	0.20
ARSENIC	NA	9.79	33	0.49	J	1.60	0.90	0.64	3.70	1.20	1.90	1.40	1.40	0.64	1.10
BARIUM	NA			214		0.62	388	0.26	694	0.46	556	0.54	162	0.26	241
BERYLLIUM	NA			0.24	J	0.31	0.63	0.13	0.53	0.23	0.63	0.27	0.40	0.13	0.54
CADMIUM	1	0.99	4.98	0.18	J	0.31	0.17	0.13	0.49	0.23	0.40	0.27	0.06	J	0.13
CHROMIUM	NA	43	111	7.00		1.60	18	0.64	12	1.20	16	1.40	20	0.64	13
COBALT	NA			3.30		0.31	9.50	0.13	11	0.23	10	0.27	7.50	0.13	8.80
COPPER	NA	32	149	22		0.93	42	0.38	50	0.70	49	0.81	29	0.38	33
IRON	NA			6,200		31	18,200	13	20,100	23	23,400	27	28,900		13
LEAD	80	36	128	15		0.31	16	0.13	89	0.23	27	0.27	13	0.13	12
MANGANESE	NA			107		0.62	183	0.26	206	0.46	224	0.54	77	0.26	208
MERCURY	NA	0.18	1.06	0.10	J	0.13	0.08	0.05	0.17	0.08	0.38	0.09	0.11	0.05	0.10
NICKEL	40	23	49	60		0.62	17	0.26	35	0.46	19	0.54	15	0.26	12
SELENIUM	NA			U		1.60	0.09	J	0.64	0.55	J	1.20	U	1.40	U
SILVER	NA			0.08	J	0.31	0.10	J	0.13	0.21	J	0.23	0.14	J	0.13
THALLIUM	NA			0.08	J	0.31	0.17	0.13	0.20	J	0.23	0.19	J	0.27	0.19
VANADIUM	NA			184		1.60	79	0.64	138	1.20	82	1.40	106	0.64	68
ZINC	NA	121	459	34											

Table B2d Summary of Sediment Results for GU-06

Sample Location	RAOHE Sensitive Ecosystem Criteria Decreto 1215	Sediment Quality		GU06-T01		GU06-T08		GU06-T02		GU06-T09		GU06-T04		GU06-T01		GU06-N20		GU06-T07		GU06-T06					
Sample Name				GU06-SD001		GU06-SD002		GU06-SD003 ⁹		GU06-SD006 ⁹		GU06-SD007 ⁹		GU06-SD011 ⁹		GU06-SD012 ⁹		GU06-SD013 ⁹		GU06-SD014 ⁹					
Depth (m bgs ¹)		Values (mg/kg)		Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)				
TPH ²	1,000			151		3,180		30		7,140		3,880		10 ¹⁰ U	8.80	680		11,707		13,000					
AceNaphthalene	NA			U	5.30E-4	4.80E-3	J	1.15E-3	U	7.41E-3	0.07	1.73E-3	0.04	D	2.75E-3	U	3.55E-4	U	1.34E-3	0.07	K	0.01			
AceNaphthalene	NA			U	3.66E-4		U	1.18E-3	U	4.94E-3		U	0.01	UD	4.27E-3	3.00E-3	BJ	3.34E-4	7.65E-3	BJ	1.24E-3	0.01	BJ	6.79E-3	
Anthracene	NA	0.06	0.85	U	5.84E-4	0.01	KJ	7.07E-3	U	4.20E-3		U	0.05	UD	0.03	U	7.80E-4	U	3.93E-3	U	0.07	U	0.08		
Benz[a]anthracene	NA	0.11	1.05	U	6.13E-4	0.04	B	0.02	U	3.80E-3	0.15	KB	0.11	0.04	KBD	0.02	2.20E-3	KBJ	9.33E-4	5.32E-3	KBJ	2.86E-3	0.10		
Benz[a]pyrene	NA	0.15	1.45	U	1.64E-3	0.02		8.56E-3	U	5.70E-3	0.08	KB	0.04	UD	0.02	3.74E-3	KJ	3.12E-3	0.01	J	8.23E-3	0.06	K	0.05	
Benz[b]fluoranthene	NA			2.28E-3	J	1.03E-3	0.04		U	5.76E-3		3.65E-3	0.14		0.03	0.06	D	9.13E-3	5.53E-3	KJ	2.11E-3	7.17E-3	KJ	5.57E-3	
Benz[ghi]perylene	NA			7.31E-3	J	7.58E-4	0.11		U	6.41E-3	0.31		0.02	0.18	KD	0.02	0.03	B	2.55E-3	0.09	B	7.28E-3	0.17	B	0.05
Benz[j,k]fluoranthenes	NA			U	1.21E-3	0.01	KJ	6.81E-3	U	4.37E-3		U	0.03	UD	0.01	3.09E-3	J	2.33E-3	U	6.12E-3	U	0.04	U	0.07	
Chrysene	NA	0.17	1.29	6.67E-3	J	8.06E-4	0.21		U	3.42E-3	0.88	KB	0.14	0.33	D	0.02	0.01	KBJ	1.20E-3	0.07	B	3.36E-3	0.51	B	0.02
Diben[a,h]anthracene	NA	0.03	NA	U	8.76E-4	9.01E-3	J	7.84E-3	U	0.01	0.03	J	0.03	9.85E-3	KDJ	7.85E-3	U	2.17E-3	7.77E-3	KJ	5.75E-3	0.02	KJ	0.02	
Fluoranthene	NA	0.42	2.23	7.32E-4	KBJ	5.06E-4		U	0.01	2.78E-3	BJ	2.53E-3	U	0.13	UD	0.02	3.65E-3	BJ	6.82E-4	7.19E-3	BJ	2.83E-3	U	0.05	U
Fluorene	NA	0.08	0.54	U	5.14E-4	9.96E-3	J	4.14E-3	U	4.00E-3	0.26		6.63E-3	0.09	D	2.71E-3	6.31E-4	J	1.90E-4	5.81E-3	J	1.33E-3	0.36	0.02	0.07
Indeno[1,2,3-cd]pyrene	NA			U	7.29E-4			U	8.10E-3	5.89E-3	KBJ	5.78E-3	U	0.03	UD	0.02	4.55E-3	BJ	2.72E-3	0.01	KBJ	8.18E-3	U	0.02	U
NAphthalene	NA	0.18	0.56	1.65E-3	BJ	9.26E-4	6.48E-3	BJ	1.10E-3	9.09E-3	KBJ	9.00E-3	9.00E-3	BJ	1.94E-3	7.14E-3	BDJ	4.15E-3	0.01	BJ	8.23E-4	0.03	BJ	1.05E-3	
Phenanthrene	NA	0.20	1.17	1.63E-3	BJ	5.48E-4	0.03	KB	6.63E-3	3.27E-3	BJ	3.00E-3	0.94	B	0.05	0.07	BD	0.02	4.32E-3	BJ	7.17E-4	0.03	BJ	3.62E-3	
Pyrene	NA	0.20	1.52	2.38E-3	BJ	4.98E-4	0.09	B	0.01	U	2.49E-3	0.27	B	0.13	0.09	BD	0.02	6.39E-3	BJ	6.71E-4	0.02	BJ	2.79E-3		
Sum of 6 PAHs ³	1.00			0.01		0.18			8.67E-3		0.54			0.24		0.05			0.13			0.31			
LMW PAHs ⁴	1.00			3.28E-3		0.06			0.01		1.27			0.20		0.02		0.08			1.57		0.32		
HMW PAHs ⁵	1.00			0.02		0.52			8.67E-3		1.87			0.71		0.08		0.23			1.14		1.92		
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00			0.02		0.58			0.02		3.14			0.91		0.09		0.30			2.71		2.24		
Sum PAHs ⁷	1.00	1.61	23	1.20		1.31			1.84		11			5.30		0.48		0.86			12		4.41		
Sum Alkylated PAHs + Biphenyl ⁸	NA			0.59		20			0.42		120			50		0.39		3.26			111		43		
Total Phenols by Method SW8270	NA			U	0.59	U	1.10	U	0.51	U	0.65	U	0.90												
BENZENE	NA			U	4.00E-3	5.50E-3	J	0.02	U	8.00E-3	U	0.01	U	0.02	U	7.50E-3	U	0.02	8.60E-3	U	7.50E-3	U	0.01		
ETHYLBENZENE	NA			U	4.00E-3	2.80E-3	J	0.02	U	8.00E-3	U	0.01	U	0.02	U	7.50E-3	U	0.02	6.00E-3	J	7.50E-3	U	0.01		
TOLUENE	NA			U	4.00E-3	7.40E-3	J	0.02	U	8.00E-3	U	0.01	U	0.02	U	7.50E-3	U	0.02	8.90E-3	U	7.50E-3	U	0.01		
Total Xylenes	NA			U	0.01	U	0.06	U	0.02	U	0.03	U	0.06	U	0.02	U	0.03	U	0.05	7.70E-3	U	0.04			
CYCLOHEXANE	NA			U	4.00E-3	U	0.02	U	8.00E-3	U	0.01	U	0.02	U	7.50E-3	U	0.02	U	7.50E-3	U	0.01				
ISOPROPYLBENZENE	NA			U	4.00E-3	U	0.02	U	8.00E-3	U	0.01	U	0.02	U	7.50E-3	U	0.02	0.02	7.50E-3	U	2.60E-3				
METHYLCYCLOHEXANE	NA			U</td																					

Table B2e Summary of Sediment Results for AG-02

Sample Location Sample Name Depth (m bgs ⁻¹)	RAOHE Sensitive Ecosystem Criteria Decreto 1215	Sediment Quality		AG02-T04		AG02-N09	
				AG02-SD001		AG02-SD002	
		TEC	PEC	0.05 - 0.20		0.02 - 0.17	
Analyte	Values (mg/kg)			Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)
TPH ²	1,000			51	31,310		
Aceanaphthene	NA			3.56E-3	J	8.38E-4	0.36 D
Aceanaphthylene	NA			8.50E-4	KJ	7.11E-4	UD 0.01
Anthracene	NA	0.06	0.85	4.36E-3	BJ	1.16E-3	0.09 KBD 0.03
Benz[a]anthracene	NA	0.11	1.05	4.21E-3	BJ	7.66E-4	0.56 KBD 0.04
Benz[a]pyrene	NA	0.15	1.45	4.62E-3	J	1.39E-3	0.39 D 0.05
Benz[b]fluoranthene	NA			1.38E-3	KJ	9.46E-4	0.50 D 0.03
Benz[ghi]perylene	NA			6.43E-3	BJ	3.90E-4	1.06 BD 0.04
Benz[j,k]fluoranthenes	NA			1.27E-3	BJ	1.05E-3	0.08 KBD 0.04
Chrysene	NA	0.17	1.29	8.15E-3	BJ	8.11E-4	4.07 BD 0.05
Dibenz[a,h]anthracene	NA	0.03	NA	U	1.81E-3	0.15 BD	0.04
Fluoranthene	NA	0.42	2.23	4.10E-3	BJ	1.06E-4	0.20 BD 9.85E-3
Fluorene	NA	0.08	0.54	0.01	J	7.40E-4	2.69 D 0.02
Indeno[1,2,3-cd]pyrene	NA			1.57E-3	KBJ	4.16E-4	0.08 BD 0.04
NAphthalene	NA	0.18	0.56	0.02	BJ	1.42E-3	0.12 BD 0.02
PheNAanthrene	NA	0.20	1.17	0.03	BJ	1.07E-3	8.07 BD 0.03
Pyrene	NA	0.20	1.52	9.21E-3	BJ	1.04E-4	1.07 BD 9.70E-3
Sum of 6 PAHs ³	1.00			0.02		2.31	
LMW PAHs ⁴	1.00			0.07		11	
HMW PAHs ⁵	1.00			0.04		8.15	
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00			0.11		19	
Sum PAHs ⁷	1.00	1.61	23	0.63		71	
Sum Alkylated PAHs + Biphenyl ⁸	NA			1.35		571	
Total Phenols by Method SW8270	NA			16,800		150	19,500 45
BENZENE	NA			U	7.00E-3	U	0.01
ETHYLBENZENE	NA			U	7.00E-3	4.00E-3 J	0.01
TOLUENE	NA			U	7.00E-3	0.05	0.01
Total Xylenes	NA			U	0.02	0.04	
CYCLOHEXANE	NA			U	7.00E-3	0.16	0.01
ISOPROPYLBENZENE	NA			U	7.00E-3	0.46	0.01
METHYLCYCLOHEXANE	NA			U	7.00E-3	0.69 E	0.01
ALUMINUM	NA			16,800		150	19,500 45
ANTIMONY	NA			0.75		0.10 0.74	0.15
ARSENIC	NA	9.79	33	5.20		0.51 3.70	0.76
BARIUM	NA			580		0.41 269	0.30
BERYLLIUM	NA			0.74		0.10 0.83	0.15
CADMIUM	1	0.99	4.98	0.56		0.10 1.40	0.15
CHROMIUM	NA	43	111	25		0.51 24	0.76
COBALT	NA			11		0.10 10	0.15
COPPER	NA	32	149	22		0.31 25	0.45
IRON	NA			32,800		51 23,200	15
LEAD	80	36	128	19		0.10 14	0.15
MANGANESE	NA			280		0.20 208	0.30
MERCURY	NA	0.18	1.06	0.03 J		0.04 0.03 J	0.07
NICKEL	40	23	49	23		0.20 40	0.30
SELENIUM	NA			0.38 J		0.51 0.62 J	0.76
SILVER	NA			0.05 J		0.10 0.03 J	0.15
THALLIUM	NA			0.16		0.10 0.21	0.15
VANADIUM	NA			67		0.51 72	0.76
ZINC	NA	121	459	103		1.00 140	1.50
TOTAL ORGANIC CARBON	NA			12,000		580 150,000	910

See Notes on page 1

Table B3 Soil Results - Notes

Data used on this table have not been validated. Field duplicate samples are not reported in this table.

Laboratory qualifiers (will be replaced by the validator qualifiers once the data are validated): U = The compound/analyte was analyzed for but the result was negated by validator since it was detected in a blank at a similar level J = Quantitation is approximate (estimated) due to limitations identified during the QA/QC review. B = Analyte found in sample and the associated blank. K = Peak detected but did not meet quantification criteria, result reported

Data available as of Nov. 12, 2013 were used in this table and they have not been validated. Field duplicate samples are

RL = Reporting Limit

Highlighted cell indicates concentration exceeds the corresponding colored cell criteria as follows: green - exceeds RAOHE sensitive ecosystem criteria; purple exceeds TULSMA agricultural criteria; orange exceeds lowest USEPA EcoSSL criteria.

Analytical data for samples which required dilution/samples with higher RLs than the actual sample concentration is higher than reported and could not be quantified due to the level.

1. bgs = Below Ground Surface
2. TPH represents the sum of the detected concentrations of Gasoline Range Organics (GRO), Diesel Range Organics
3. Sum of 6 PAHs represents the sum of the detected concentrations of 6 PAHs compounds listed in Decreto 1215 Annex 5: Fluoranthene, Benzo[b]fluoranthene, Benzo[j,k]fluoranthenes, Benzo[a]pyrene, Benzo[ghi]perylene and Indeno[1,2,3-*cd*]pyrene.
4. LMW PAHs represents the sum of the detected concentrations of Low Molecular Weight PAHs (Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene).
5. HMW PAHs represents the sum of the detected concentrations of High Molecular Weight PAHs (Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene, Benzo[j,k]fluoranthenes, Chrysene, Dibenz[a,h]anthracene,
6. Sum of 16 PAHs represents the sum of the detected concentrations of 16 PAHs listed and analyzed by HR GC/MS (Acenaphthene, Acenaphthylene, Anthracene, Benz[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene, Benzo[j,k]fluoranthenes, Chrysene, Dibenz[a,h]anthracene, Fluoranthene, Fluorene, Indeno[1,2,3-*cd*]pyrene, Naphthalene, Phenanthrene, Pyrene). PAHs were also analyzed via EPA Method 8270D; however, relatively high quantitation limits prevented the resolution and reporting of target compounds. High quantitation limits were
7. Sum PAHs represents the sum of detected concentrations of 23 compounds which comprise of the 16 PAHs listed in note 4 plus Benzo[e]pyrene, Perylene, Dibenzothiophene, 2-MethylINaphthalene, 2,6-DimethylINaphthalene,
8. Sum of Alkylated PAH + Biphenyl is the sum of detected concentration of the following 9 compounds: C1-Naphthalenes, C1 Phenanthrenes/Anthracenes, C2-Naphthalenes, C2 Phenanthrenes/Anthracenes, C3-Naphthalenes, C3-Phenanthrenes/Anthracenes, C4-Naphthalenes, C4-Phenanthrenes/Anthracenes and Biphenyl.
9. a: exceeds Plants criteria; b: exceeds Soil Invertebrates criteria; c: exceeds Avian Wildlife Criteria; d: exceeds
10. Sample arrived at laboratory outside of holding temperature due to transit delays.
11. Value represents TPH GRO only.
12. Value represents sum of the detected concentrations of DRO, Heavy DRO, and Extended Range DRO.

Sample Location	RAOHE Sensitive Ecosystem Criteria	TULSMA Agricultural Criteria	USEPA EcoSSLs	LA02-N17	LA02-N03	LA02-N08	LA02-N13	LA02-N05	LA02-N04	LA02-N16	LA02-N26	LA02-N09																
Sample Name	Decreto 1215	Decreto 3516		LA02-SL001	LA02-SL003	LA02-SL004	LA02-SL005	LA02-SL008 ¹⁰	LA02-SL009 ¹⁰	LA02-SL011	LA02-SL012	LA02-SL013																
Depth (m bgs ¹)	0.98 - 1.13			0.66 - 0.81			2.75 - 2.9			2.9 - 3.05			4.1 - 4.26			1.42 - 1.57			2.89 - 3.04			0.1 - 0.25			1.27 - 1.42			
	Values (mg/kg)	Values (mg/kg)	Values (mg/kg)	note ⁹	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)		
TPH ²	1,000	500			758		13,428		796		10,609		3,238		5,931		11,150		16		31,960							
Acenaphthene	NA	NA			U	0.02	UD	0.04	0.03 J	6.71E-3	0.23 KJ	0.01	0.09 KJ	9.58E-3	0.16	0.01	0.52	0.03	U	7.23E-3	1.12 D	0.08						
Acenaphthylene	NA	NA			U	3.41E-3	UD	0.02	U	6.27E-3	U	0.01	U	6.07E-3	U	3.33E-3	1.08 K	8.98E-3	U	4.73E-3	UD	0.09						
Anthracene	NA	NA			U	0.02	UD	0.36	U	0.02	U	0.11	U	0.04	U	0.06	0.13 KJ	0.07	U	3.02E-3	UD	0.57						
Benz[a]anthracene	NA	0.1			0.01 KBJ	5.30E-3	0.29 KBD	0.09	0.03 KBJ	4.15E-3	0.29 KBJ	0.07	0.05 BJ	0.01	0.14 KB	0.03	0.19 KBJ	0.08	U	3.18E-3	0.96 KBD	0.47						
Benz[a]pyrene	NA	0.1			U	0.02	UD	0.14	U	0.01	U	0.06	0.03 KJ	0.01	0.04 KJ	0.03	U	0.05	U	5.78E-3	UD	0.34						
Benz[b]fluoranthene	NA	NA			U	8.68E-3	0.17 BDJ	0.09	U	7.62E-3	0.13 J	0.03	0.03 J	7.04E-3	0.07 J	0.02	0.08 J	0.03	U	3.74E-3	0.49 KBD	0.21						
Benz[e]fluorophene	NA	NA			U	0.01	UD	0.10	U	8.46E-3	0.08 BJ	0.04	0.02 KBJ	0.01	0.05 KJ	0.04	U	8.90E-3	0.16 KBDJ	0.08								
Benz[j]fluoranthenes	NA	NA			U	0.01	UD	0.11	U	9.71E-3	U	0.03	U	8.95E-3	U	0.02	U	0.04	U	4.73E-3	UD	0.26						
Chrysene	NA	NA			0.09 BJ	5.37E-3	2.19 BD	0.11	0.21 BJ	5.40E-3	1.89 B	0.09	0.45 B	0.02	1.05 B	0.03	1.70	0.10	5.26E-3 BJ	3.46E-3	4.90 BD	0.49						
Diben[1,4]anthracene	NA	NA			U	0.01	UD	0.11	U	0.01	U	0.06	U	5.47E-3	0.01 BJ	0.01	U	0.04	U	6.63E-3	0.07 KDJ	0.06						
Fluoranthene	NA	NA			U	8.05E-3	UD	0.13	U	0.02	U	0.22	0.03 BJ	0.02	0.06 BJ	0.04	0.09 BJ	0.09	3.46E-3 BJ	2.42E-3	UD	0.29						
Fluorene	NA	NA			0.03 J	8.85E-3	1.13 KD	0.04	0.11 J	3.45E-3	1.01	0.03	0.40	0.02	0.70	2.47E-3	1.85	0.06	U	3.56E-3	5.05 D	0.20						
Indeno[1,2,3-cd]pyrene	NA	NA			U	0.01	UD	0.10	U	8.64E-3	U	0.04	U	0.01	U	0.01	U	0.04	9.47E-3 KBJ	8.35E-3	UD	0.08						
Naphthalene	NA	0.1			0.03 KBJ	0.02	1.09 BD	0.01	0.01 KBJ	6.31E-3	0.23 BJ	0.01	0.14 BJ	3.96E-3	1.91 B	2.08E-3	2.86 B	0.02	0.02 KBJ	9.39E-3	10 BD	0.03						
Phenanthrene	NA	NA			0.02 J	0.01	5.16 BD	0.34	0.08 J	0.02	5.39	0.10	2.11	0.04	3.45	0.06	8.70 B	0.07	9.78E-3 J	2.83E-3	22 BD	0.40						
Pyrene	NA	0.1			0.02 BJ	7.91E-3	0.38 BD	0.12	0.04 BJ	0.02	0.32 BJ	0.22	0.08 BJ	0.02	0.22 B	0.04	0.32 B	0.12	6.35E-3 BJ	2.38E-3	0.91 BD	0.28						
Sum of 6 PAHs ³	1.00	2			U	0.03	0.17		U	0.03	0.21		0.09	0.23		0.21		0.01	0.65									
LMW PAHs ⁴	1.00	2	29	b	0.08		7.38		0.22		6.86		2.74		6.21		15		0.03	38								
HMW PAHs ⁵	1.00	2	1.10	d	0.12		3.04		0.28		2.70		0.67		1.64		2.43		0.02	7.48								
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00	2			0.20		10		0.50		9.56		3.41		7.85		18		0.05	46								
Sum PAHs ⁷	1.00	2			2.11		62		4.98		58		23		45		117		0.07	247								
Sum Alkylated PAHs + Biphenyl ⁸	NA	NA			22		474		55		486		168		332		703		0.11	1,443								
Total Phenols by Method SW8270	NA	3.8			U	0.46	U	0.45	U	0.50	U	0.81	U	0.50	U	0.43	U	0.37	U	0.43	U	1.10						
BENZENE	NA	0.05			U	6.50E-3	U	7.50E-3	U	7.00E-3	U	6.00E-3	U	6.50E-3	U	6.50E-3	U	5.50E-3	U	9.50E-3	U	8.00E-3						
ETHYLBENZENE	NA	0.1			U	6.50E-3	U	7.50E-3	U	7.00E-3	U	6.00E-3	U	6.50E-3	U	6.50E-3	U	5.50E-3	U	9.50E-3	U	8.00E-3						
TOLUENE	NA	0.1			U	6.50E-3	U	7.50E-3	U	7.00E-3	U	6.00E-3	U	6.50E-3	U	6.50E-3	U	5.50E-3	U	9.50E-3	U	8.00E-3						
Total Xylenes	NA	0.1			U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U	0.03	U	8.90E-3						
CYCLOHEXANE	NA	NA			U	6.50E-3	5.40E-3 J	7.50E-3	U	7.00E-3	U	6.00E-3	U	6.50E-3	U	6.50E-3	U	5.50E										

Sample Location	RAOHE Sensitive Ecosystem Criteria	TULSMA Agricultural Criteria	USEPA EcoSSLs	LA02-N10	LA02-N11	LA02-N21	LA02-N01	LA02-N01	LA02-N22	LA02-N28	LA02-N06A	LA02-N15									
Sample Name	Decreto 1215	Decreto 3516		LA02-SL014	LA02-SL015	LA02-SL016	LA02-SL017A	LA02-SL017B	LA02-SL018	LA02-SL019	LA02-SL020	LA02-SL021									
Depth (m bgs ¹)				3.1 - 3.25	1.74 - 1.89	3.5 - 3.65	1.96 - 2.06	1.96 - 2.06	1.16 - 1.31	0.40 - 0.55	3.55 - 3.70	2.05 - 2.20									
	Values (mg/kg)	Values (mg/kg)	Values (mg/kg)	note ⁹	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)								
TPH ²	1,000	500			4,511	24,790	313	8,450	38	2,400	1,768	6,440									
Acenaphthene	NA	NA			0.10 KJ	5.56E-3	0.62	0.04	U	6.66E-4	0.03 J	9.03E-3	0.06 K	9.00E-4	0.17	4.71E-3					
Acenaphthylene	NA	NA			U	5.99E-3	U	0.04	U	2.68E-4 J	8.20E-3 KJ	2.63E-3	0.13 K	2.12E-3	U	2.92E-3					
Anthracene	NA	NA			U	0.06	U	0.49	U	4.61E-3	2.32E-4 KBJ	0.09E-4	0.03 KBJ	0.01	0.01 KBJ	2.30E-3	0.05 KB	0.01			
Benz[a]anthracene	NA	0.1			0.09 KBJ	0.02	0.51 KB	0.46	U	7.60E-3	0.14 KB	2.75E-3	U	1.98E-4	0.03 KBJ	0.02	0.04 KBJ	2.07E-3	0.21 B	3.51E-3	
Benzol[a]pyrene	NA	0.1			0.03 KJ	0.02	U	0.16	U	0.01	0.08 K	0.01	U	5.82E-4	U	0.04	0.02 KJ	4.34E-3	0.08 K	0.01	
Benzol[b]fluoranthene	NA	NA			0.05 J	0.02	0.27 KJ	0.10	0.01 KJ	6.75E-3	0.08 K	9.37E-3	U	3.87E-4	U	0.03	0.02 J	2.97E-3	0.07	8.50E-3	
Benzol[h]phenylene	NA	NA			0.02 KBJ	9.25E-3	0.13 KJ	0.03	U	0.02	0.05 KB	8.76E-3	1.32E-3 BJ	3.95E-4	0.03 BJ	0.03	9.43E-3 BJ	2.94E-3	0.04 BJ	8.59E-3	
Benzol[i,j]fluoranthenes	NA	NA			U	0.02	U	0.11	8.21E-3 KBJ	7.81E-3	0.02 KBJ	1.00E-2	U	4.12E-4	U	0.03	5.00E-3 KBJ	3.30E-3	0.01 BJ	9.09E-3	
Chrysene	NA	NA			0.80 B	0.02	3.98 B	0.54	0.05 KBJ	9.13E-3	1.08 B	3.02E-3	1.09E-3 BJ	1.91E-4	0.24 BJ	0.02	0.24 B	2.07E-3	0.97 B	3.63E-3	
Diben[2,h]anthracene	NA	NA			0.01 KBJ	9.28E-3	U	0.13	U	0.01	0.02 KBJ	7.85E-3	U	3.70E-4	U	0.04	4.71E-3 BJ	3.84E-3	0.02 KBJ	0.01	
Fluoranthene	NA	NA			0.04 KBJ	0.03	U	0.27	0.01 KBJ	4.36E-3	0.05 KBJ	7.35E-3	5.31E-4 BJ	2.12E-4	0.02 BJ	0.01	0.02 BJ	1.12E-3	0.05 KB	5.44E-3	
Fluorene	NA	NA			0.64	0.02	2.79	0.09	U	0.01	0.62	2.82E-3	U	3.17E-4	0.10 J	6.97E-3	0.25	2.56E-3	0.90	2.11E-3	
Indeno[1,2,3-cd]pyrene	NA	NA			U	9.15E-3	U	0.04	U	0.02	U	9.29E-3	U	4.25E-4	U	0.03	3.10E-3	U	9.28E-3		
Naphthalene	NA	0.1			1.23 B	8.10E-3	3.78 B	0.13	9.11E-3 KBJ	5.38E-3	0.76 B	1.70E-3	1.70E-3 BJ	3.99E-4	0.02 BJ	9.90E-3	6.97E-3 BJ	1.41E-3	2.98 B	1.53E-3	
Phenanthrene	NA	NA			3.25	0.06	13 B	0.51	0.01 KBJ	4.24E-3	2.50 B	4.24E-3	3.61E-3 BJ	1.92E-4	0.25 BJ	0.01	1.19 B	2.12E-3	3.90 B	0.01	
Pyrene	NA	0.1			0.17 BJ	0.03	0.64 B	0.27	0.02 BJ	4.28E-3	0.18 B	7.24E-3	5.51E-4 BJ	2.09E-4	0.04 BJ	0.01	0.05 B	1.11E-3	0.21 B	5.35E-3	
Sum of 6 PAHs ³	1.00	2			0.14		0.40		0.03		0.28		1.85E-3		0.05		0.07		0.25		
LMW PAHs ⁴	1.00	2	29	b	5.22		20		0.02		4.05		5.81E-3		0.44		1.65		8.00		
HMW PAHs ⁵	1.00	2	1.10	d	1.21		5.53		0.09		1.70		3.49E-3		0.36		0.40		1.65		
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00	2			6.43		26		0.12		5.75		9.30E-3		0.80		2.06		9.65		
Sum PAHs ⁷	1.00	2			35		153		0.44		29		0.02		3.76		11		52		
Sum Alkylated PAHs + Biphenyl ⁸	NA	NA			248		1,135		6.83		225		0.09		37		82		310		
Total Phenols by Method SW8270	NA	3.8			U	0.58	U	0.77	U	0.41	U	0.60	U	5.50E-3	U	7.00E-3	U	7.00E-3	U	0.50	
BENZENE	NA	0.05			2.10E-3 J	0.01	U	6.00E-3	U	5.50E-3	U	0.60	U	5.50E-3	U	7.00E-3	U	7.00E-3	U	0.50	
ETHYLBENZENE	NA	0.1			0.17	0.01	5.60E-3 J	6.00E-3	U	5.50E-3	U	0.60	U	5.50E-3	U	7.00E-3	U	7.00E-3	U	0.50	
TOLUENE	NA	0.1			U	0.01	U	6.00E-3	U	5.50E-3	U	0.60	U	5.50E-3	U	7.00E-3	U	7.00E-3	U	0.50	
Total Xylenes	NA	0.1			0.02		3.80E-3		U	0.02	U	1.80	U	0.02	U	0.02	U	0.02	U	0.17	
CYCLOHEXANE	NA	NA			0.25	0.01	0.06	6.00E-3	U	5.50E-3	U	0.60	U	5.50E-3	U	7.00E-3	U	7.00E-3	0.32 J	0.50	
ISOPROPYLBENZENE	NA	NA			1.90	0.85	1.80	0.38	U	5.50E-3	U	3.60	U	5.50E-3	U	7.00E-3	0.15	7.00E-3	0.20 J	0.50	
METHYLCYCLOHEXANE	NA	NA			1.70	0.85	0.81	0.38	U	5.50E-3	U	0.60	U	5.50E-3	U	7.00E-3	U	7.00E-3	0.15	0.50	
ALUMINUM	NA	NA			45,200	46	16,800	26	17,600	30	52,700	140	13,500	26	25,700	140	40,200	170	45,200	39	
ANTIMONY	NA	NA	0.27	d	0.14 J	0.15	0.04 J	0.09	0.04 J	0.10	0.09	0.07 J	0.09	0.07 J	0.09	0.08 J	0.11	0.18	0.13		
ARSENIC	NA	12	18	a	1.40	0.77	0.43 J	0.44	0.32 J	0.50	1.50	0.46	0.56	0.42	1.00	0.47	1.00	0.56	1.30	0.64	
BARIUM	NA	750	330	b	209	0.31	153	0.18	125	0.20	401	0.18	75	0.17	208	0.19	266	0.22	148	0.26	
BERYLLIUM	NA	NA	21	d	0.53	0.15	0.27	0.09	0.27	0.10	0.86	0.09	0.28	0.09	0.46	0.09	0.81				

Sample Location	RAOHE Sensitive Ecosystem Criteria Decreto 1215	TULSMA Agricultural Criteria Decreto 3516	USEPA EcoSSLs	SSF25-N10		SSF25-N02		SSF25-N15		SSF25-N19		SSF25-N25		SSF25-N24		SSF25-N18		SSF25-N34		SSF25-N05		SSF25-N09		SSF25-N14												
				SSF25-SL001		SSF25-SL003 ¹⁰		SSF25-SL007 ¹⁰		SSF25-SL009 ¹⁰		SSF25-SL010 ¹⁰		SSF25-SL011 ¹⁰		SSF25-SL012 ¹⁰		SSF25-SL013 ¹⁰		SSF25-SL014		SSF25-SL015		SSF25-SL016												
				Depth (m bgs ¹)	Values (mg/kg)	Values (mg/kg)	Values (mg/kg)	note ⁹	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)																		
TPH ²				1,000	500		509		7.60		U	18	3.80		U	18	3.50		U	19	U	20	12,350		4.10	6.00										
Acenaphthene	NA	NA			0.02	KJ	0.01		U	1.32E-3	U	3.42E-4	U	4.66E-4	U	5.69E-4	U	4.02E-4	U	5.35E-4	U	6.24E-4	0.72 D	0.01	U	1.12E-3	U	2.03E-3								
Acenaphthylene	NA	NA				U	3.94E-3		U	1.36E-3	U	5.77E-4	U	4.04E-4	U	3.65E-4	U	3.18E-4	U	4.06E-4	U	3.49E-4	0.01 KJ	6.70E-3	U	1.05E-3	U	9.96E-4								
Anthracene	NA	NA				U	0.02		U	5.12E-4	U	1.83E-4	U	1.84E-4	KJ	1.65E-4	U	2.33E-4	U	1.47E-4	U	1.83E-4	2.41E-4 J	2.09E-4	0.06	U	1.06E-3	U	4.20E-4							
Benz[a]anthracene	NA	0.1			8.32E-3	KBJ	8.06E-3		6.90E-4	KBJ	2.25E-4	2.15E-3	KBJ	1.22E-4	2.40E-3	KBJ	8.65E-5	U	7.14E-5	2.40E-3	KBJ	7.10E-5	2.57E-3	KBJ	6.94E-5	5.57E-4	KBD	4.57E-3	U	6.17E-4	3.77E-4	KBJ	3.51E-4			
Benz[a]pyrene	NA	0.1				U	8.95E-3		U	1.64E-3	U	4.04E-4	U	3.94E-4	U	2.49E-4	U	2.52E-4	U	2.79E-4	U	3.80E-4	J	2.36E-4	0.05 D	9.20E-3	U	1.29E-3	U	1.38E-3						
Benz[b]fluoranthene	NA	NA				U	5.87E-3		U	1.10E-3	U	2.54E-4	U	2.53E-4	U	1.59E-4	U	1.59E-4	U	1.78E-4	U	2.98E-4	BJ	1.42E-4	0.13 D	5.56E-3	U	8.28E-4	U	8.37E-4						
Benz[k]fluoranthene	NA	NA				0.03	KJ	6.88E-3		U	1.01E-3	U	4.23E-4	U	3.56E-4	KBJ	1.91E-4	U	1.98E-4	2.91E-4	KBJ	2.29E-4	2.14E-4	KBJ	6.13E-4	KBJ	2.43E-4	0.28 D	0.01	U	1.59E-3					
Benz[k]fluoranthenes	NA	NA				U	6.51E-3		U	1.21E-3	U	3.11E-4	U	3.01E-4	U	1.87E-4	U	1.94E-4	U	2.16E-4	U	6.41E-4	J	1.71E-4	0.05 KD	7.00E-3	U	1.02E-3	U	1.03E-3						
Chrysene	NA	NA				0.06	BJ	0.01	1.51E-3	BJ	2.58E-4	1.69E-4	KJ	1.44E-4	2.64E-4	BJ	1.05E-4	1.46E-4	KBJ	8.33E-5	1.18E-4	KBJ	8.17E-5	3.43E-4	KBJ	8.12E-5	6.83E-4	BJ	9.19E-5	1.04 D	6.47E-3	U	7.78E-4			
Diben[1,4]anthracene	NA	NA				U	7.77E-3		U	6.07E-4	U	2.21E-4	U	1.70E-4	KJ	1.50E-4	U	1.92E-4	U	2.19E-4	U	2.20E-4	U	5.92E-4	J	1.83E-4	0.03 KD	2.02E-3	U	9.77E-4						
Fluoranthene	NA	NA				U	0.02	1.71E-3	KBJ	2.29E-4	U	1.04E-4	3.03E-4	KBJ	1.53E-4	1.53E-4	BJ	1.08E-4	2.61E-4	BJ	8.92E-5	3.12E-4	BJ	1.14E-4	0.05 KBD	0.04	6.81E-4	BJ	5.41E-4	6.23E-4	BJ	2.59E-4				
Fluorene	NA	NA				0.03	J	7.50E-3		U	7.80E-4	U	2.91E-4	U	5.20E-4	U	3.03E-4	U	3.88E-4	U	2.24E-4	U	3.71E-4	U	2.25 D	0.06	U	1.47E-3	U	7.62E-4						
Indeno[1,2,3-cd]pyrene	NA	NA				0.01	KBJ	8.24E-3		1.33E-3	KBJ	4.06E-4	3.99E-4	KBJ	3.86E-4	5.33E-4	KBJ	1.73E-4	3.87E-4	KBJ	1.85E-4	4.24E-4	KBJ	2.12E-4	4.63E-4	KBJ	1.79E-4	1.16E-3	BJ	2.18E-4	UD	0.01	U	1.95E-3		
Naphthalene	NA	0.1			8.03E-3	KBJ	6.26E-3		2.18E-3	KBJ	9.55E-4	1.36E-3	BJ	4.88E-4	1.07E-3	BJ	5.88E-4	1.22E-3	BJ	4.53E-4	1.23E-3	BJ	7.35E-4	9.22E-4	KBJ	7.17E-4	6.76 D	0.06	1.22E-3	BJ	9.93E-4	1.46E-3	BJ	3.94E-4		
Phenanthrene	NA	NA				0.09	BJ	0.02	1.02E-3	BJ	5.34E-4	7.13E-4	BJ	1.72E-4	6.75E-4	BJ	1.55E-4	5.33E-4	BJ	2.18E-4	5.25E-4	KBJ	1.37E-4	7.35E-4	BJ	1.95E-4	8.20E-4	BJ	8.07E-4	9.31E-4	BJ	3.12E-4				
Pyrene	NA	0.1				0.03	BJ	9.88E-3		1.29E-3	KBJ	2.25E-4	4.27E-4	KBJ	1.02E-4	2.44E-4	BJ	1.50E-4	1.67E-4	KBJ	1.06E-4	1.31E-4	BJ	8.77E-5	3.19E-4	KBJ	1.12E-4	0.24 BD	0.04	2.15E-4	3.13E-4	BJ	5.32E-4			
Sum of 6 PAHs ³	1.00	2				0.04		3.04E-3		3.99E-4		1.19E-3		5.40E-4		9.76E-4		8.98E-4		3.86E-3		0.55		6.81E-4		6.23E-4										
LMW PAHs ⁴	1.00	2	29	b	0.15		3.20E-3		2.07E-3		1.94E-3		1.60E-3		1.75E-3		2.15E-3		2.05E-3		10		4.33E-3		7.13E-3											
HMW PAHs ⁵	1.00	2	1.10	d	0.13		6.53E-3		3.15E-3		4.27E-3		8.53E-4		3.63E-3		4.22E-3		6.50E-3		2.00		2.83E-3		1.31E-3											
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00	2			0.28		9.73E-3		5.22E-3		6.21E-3		2.46E-3		5.37E-3		6.37E-3		8.55E-3		1															

Sample Location	RAOHE Sensitive Ecosystem Criteria	TULSMA Agricultural Criteria	USEPA EcoSSLs	SSF25-N06A	SSF25-N06A	SSF25-N10R	SSF25-N10R	SSF25-N12	SSF25-N12	SSF25-N07	SSF25-N13	SSF25-N16A	
Sample Name	Decreto 1215	Decreto 3516		SSF25-SL019 ¹⁰	SSF25-SL020	SSF25-SL021	SSF25-SL022	SSF25-SL023	SSF25-SL024 ¹⁰	SSF25-SL026	SSF25-SL027	SSF25-SL028	
Depth (m bgs ¹)				1.65 - 1.80	2.65 - 2.80	1.40 - 1.55	2.95 - 3.10	1.85 - 2.00	2.65 - 2.80	3.02 - 3.17	3.17 - 3.32	2.04 - 2.19	
	Values (mg/kg)	Values (mg/kg)	Values (mg/kg)	note ⁹	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)
TPH ²	1,000	500			11,390		650		4,550		291		4,300
Acenaphthene	NA	NA			0.49	0.04	0.01 J	2.72E-3	0.09	8.51E-3	U	2.21E-3	0.10 J
Acenaphthylene	NA	NA			U	0.02	U	1.23E-3	U	8.78E-4	U	0.01	U
Anthracene	NA	NA			U	0.17	U	7.54E-3	U	0.02	U	2.96E-3	U
Benz[a]anthracene	NA	0.1			0.17 KB	0.05	9.74E-3 KB	3.88E-3	0.03 KB	1.98E-3 KB	1.58E-3	0.05 KB	0.02 0.13 KB
Benz[a]pyrene	NA	0.1			U	0.10	U	7.78E-3	U	0.02	U	2.34E-3	U
Benz[b]fluoranthene	NA	NA			0.11	0.07	6.31E-3 KJ	5.29E-3	0.03 KJ	0.01	U	1.72E-3	0.03 KJ
Benz[ghi]perylene	NA	NA			0.25	0.02	0.02 J	3.89E-3	0.06	0.01	3.77E-3 KJ	1.68E-3	0.07 KJ
Benz[j]fluoranthenes	NA	NA			U	0.07	U	5.75E-3	U	0.02	U	1.83E-3	U
Chrysene	NA	NA			0.85 B	0.06	0.04 BJ	4.48E-3	0.18 B	0.03	0.01 BJ	1.73E-3	0.23 BJ
Diben[1,4]anthracene	NA	NA			U	0.04	U	2.69E-3	U	9.38E-3	U	1.45E-3	U
Fluoranthene	NA	NA			U	0.08	6.20E-3 BJ	4.26E-3	U	0.02	2.31E-3 BJ	1.22E-3	0.03 BJ
Fluorene	NA	NA			1.38	0.06	0.04 J	1.75E-3	0.29	0.02	8.26E-3 J	1.09E-3	0.30 J
Indeno[1,2,3-cd]pyrene	NA	NA			U	0.02	U	4.21E-3	U	0.01	U	1.79E-3	U
Naphthalene	NA	0.1			4.37 B	0.03	9.75E-3 BJ	1.93E-3	0.89 B	5.74E-3	6.32E-3 BJ	2.46E-3	0.48 B
Phenanthrene	NA	NA			3.90 B	0.16	0.18 B	6.93E-3	0.98 B	0.02	0.05 B	2.72E-3	0.96 B
Pyrene	NA	0.1			0.27 B	0.08	0.02 BJ	4.19E-3	0.07 B	0.02	5.23E-3 BJ	1.20E-3	0.09 BJ
Sum of 6 PAHs ³	1.00	2			0.36	0.03	0.09	6.08E-3	0.14	0.29	5.82E-3	3.90E-3	4.94E-4
LMW PAHs ⁴	1.00	2	29	b	10	0.24		2.25	0.06	1.84	5.93	0.03	7.32E-3
HMW PAHs ⁵	1.00	2	1.10	d	1.64	0.10		0.37	0.02	0.51	1.25	0.02	8.36E-3
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00	2			12	0.34	2.63		0.09	2.35	7.18	0.06	0.02 4.57E-3
Sum PAHs ⁷	1.00	2			54	1.58		12	0.31	12	55	0.15	0.02 8.37E-3
Sum Alkylated PAHs + Biphenyl ⁸	NA	NA			272		12	67	2.41	72	293	1.52	0.07 0.03
Total Phenols by Method SW8270	NA	3.8											
BENZENE	NA	0.05			U	7.50E-3	U	6.50E-3	U	7.50E-3	U	7.00E-3	U
ETHYLBENZENE	NA	0.1			0.04	7.50E-3	U	6.50E-3	0.18	7.50E-3	0.03	7.00E-3	0.44 J
TOLUENE	NA	0.1			U	7.50E-3	U	6.50E-3	0.02	7.50E-3	2.90E-3 J	7.00E-3	U
Total Xylenes	NA	0.1			U	0.02	U	0.02	0.57	0.08	U	1.50	U
CYCLOHEXANE	NA	NA			0.29	7.50E-3	U	6.50E-3	0.38 J	0.49	7.00E-3	0.28 J	U
ISOPROPYLBENZENE	NA	NA			U	0.48	0.29 J	0.41	0.24	7.50E-3	0.04	7.00E-3	1.10
METHYLCYCLOHEXANE	NA	NA			U	0.48	0.25	6.50E-3	1.50	0.49	0.36 J	0.46	1.50
ALUMINUM	NA	NA			80,500	220	48,800	180	86,700	180	50,900	160	67,500
ANTIMONY	NA	NA	0.27	d	0.72	0.14	0.04 J	0.12	0.10 J	0.12	0.08 J	0.10	0.25
ARSENIC	NA	12	18	a	1.30	0.73	0.31 J	0.62	0.70	0.60	0.36 J	0.52	1.80
BARIUM	NA	750	330	b	544	0.29	328	0.25	330	0.24	403	0.42	522
BERYLLIUM	NA	NA	21	d	1.00	0.14	0.80	0.12	1.00	0.12	0.76	0.10	0.97
CADMIUM	1.00	2.00	0.36	d	0.18	0.14	0.10 J	0.12	0.10 J	0.12	0.05 J	0.10	0.17
CHROMIUM	NA	65	26	c	47	0.73	48	0.62	46	0.60	46	0.52	41
COBALT	NA	40	13	a	25	0.14	26	0.12	24	0.12	24	0.10	17
COPPER	NA	63	28	c	84	0.44	56	0.37	59	0.36	48	0.31	55
IRON	NA	NA	-	e	50,800	73	48,300	62	49,700	60	57,600	52	42,300
LEAD	80	100	11	d	98	0.14	7.70	0.12	37	0.12	9.70	0.10	60
MANGANESE	NA	NA			667	0.29	609	0.25	389	0.24	619	0.42	507
MERCURY	NA	0.8			0.03 J	0.05	U	0.04	0.01 J	0.05	U	0.03	0.07
NICKEL	40	50	38	a	42	0.29	39	0.25	40	0.24	41	0.21	30
SELENIUM	NA	2	0.52	a	U	0.73	U	0.62	U	1.20	U	1.00	U
SILVER	NA	20	4.20	c	0.12 J	0.14	0.08 J	0.12	0.09 J	0.12	0.07 J	0.14	0.09 J
THALLIUM	NA	1			0.15	0.14	0.09 J	0.12	0.08 J	0.10	0.14 J	0.14	0.11 J
VANADIUM	NA	130	7.80	c	150	0.73	129	0.62	145	0.60	123	0.52	123
ZINC	NA	200	46	c	139	1.40	97	1.20	86	1.20	113	1.00	83
TOTAL ORGANIC CARBON	NA	NA			47,000	620	4,800	560	24,000	620	1,200	610	16,000

Sample Location	RAOHE Sensitive Ecosystem Criteria Decreto 1215	TULSMA Agricultural Criteria Decreto 3516	USEPA EcoSSLs	YU02-N14B		YU02-N06A		YU02-N09A		YU02-N18A		YU02-N02A		
				YU02-SL002		YU02-SL003		YU02-SL004		YU02-SL005		YU02-SL007 ¹³		
				0.8 - 0.95		0.66 - 1.1		0.85 - 1.05		0.2 - 0.36		1.85 - 2.00		
Depth (m bgs ¹)	Values (mg/kg)	Values (mg/kg)	Values (mg/kg)	note ⁹	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)
TPH ²	1,000	500			4.20		183		3,172		7,540		7.10	
Acenaphthene	NA	NA			U	1.65E-3	U	4.84E-3	0.04 KJ	0.02	8.04E-3 KJ	3.08E-3	U	4.95E-4
Acenaphthylene	NA	NA			U	1.10E-3	U	1.65E-3	U	7.34E-3	U	2.48E-3	3.05E-3 BJ	2.48E-4
Anthracene	NA	NA			U	1.19E-3	U	3.97E-3	U	0.04	0.04 KJ	0.04	5.81E-4 BJ	1.65E-4
Benz[a]anthracene	NA	0.1			5.65E-4 KBJ	5.63E-4	U	2.45E-3	0.03 KBJ	0.01	0.18 KB	0.04	2.63E-4 BJ	1.34E-4
Benzol[a]pyrene	NA	0.1			U	1.71E-3	U	5.65E-3	U	0.03	U	0.02	4.39E-4 KJ	4.25E-4
Benzol[b]fluoranthene	NA	NA			U	1.06E-3	U	3.37E-3	U	0.01	0.08 K	0.02	U	3.10E-4
Benzol[g]perylene	NA	NA			U	2.63E-3	5.51E-3 KBJ	4.93E-3	0.02 KBJ	0.02	0.11 B	0.01	6.74E-4 BJ	2.51E-4
Benzol[k]fluoranthenes	NA	NA			U	1.38E-3	U	4.41E-3	U	0.02	U	0.02	U	3.35E-4
Chrysene	NA	NA			1.08E-3 BJ	6.03E-4	0.01 KBJ	2.79E-3	0.21 BJ	0.02	0.96 B	0.04	4.20E-4 BJ	1.63E-4
Diben[ab]anthracene	NA	NA			U	1.22E-3	U	5.38E-3	U	0.01	U	0.02	3.12E-4 KJ	2.75E-4
Fluoranthene	NA	NA			1.24E-3 BJ	4.57E-4	3.43E-3 KBJ	2.86E-3	U	0.02	U	0.02	1.60E-3 BJ	1.63E-4
Fluorene	NA	NA			U	1.81E-3	U	1.71E-3	0.17 J	0.01	0.01 J	3.01E-3	5.12E-4 J	2.23E-4
Indeno[1,2,3-cd]pyrene	NA	NA			2.51E-3 KBJ	2.36E-3	7.90E-3 KBJ	4.68E-3	U	0.02	U	0.02	5.06E-4 KBJ	2.69E-4
Naphthalene	NA	0.1			4.95E-3 KBJ	2.14E-3	0.01 KBJ	6.65E-3	0.09 BJ	0.01	4.71E-3 BJ	1.59E-3	0.01 BJ	4.63E-4
Phenanthrene	NA	NA			U	1.12E-3	8.03E-3 KJ	3.72E-3	0.65	0.03	0.13 K	0.03	2.42E-3 BJ	1.51E-4
Pyrene	NA	0.1			9.50E-4 BJ	4.50E-4	3.25E-3 BJ	2.81E-3	0.05 BJ	0.02	0.11 B	0.02	1.73E-3 BJ	1.61E-4
Sum of 6 PAHs ³	1.00	2			3.75E-3		0.02		0.02		0.19		3.22E-3	
Sum of 6 PAHs ⁴	1.00	2	29	b	4.95E-3		0.02		0.96		0.20		0.02	
HMW PAHs ⁵	1.00	2	1.10	d	6.35E-3		0.03		0.31		1.43		5.94E-3	
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00	2			0.01		0.05		1.27		1.62		0.02	
Sum PAHs ⁷	1.00	2			0.05		0.13		8.56		2.68		0.04	
Sum Alkylated PAHs + Biphenyl ⁸	NA	NA			0.01		0.94		81		76		0.02	
Total Phenols by Method SW8270	NA	3.8			U	0.47	U	0.49	U	0.44	U	0.57		
BENZENE	NA	0.05			U	0.44	U	0.01	U	7.00E-3	U	0.02	U	7.50E-3
ETHYLBENZENE	NA	0.1			U	0.44	U	0.01	U	7.00E-3	U	0.02	U	7.50E-3
TOLUENE	NA	0.1			U	0.44	U	0.01	U	7.00E-3	U	0.02	U	7.50E-3
Total Xylenes	NA	0.1			U	1.33	U	0.03	U	0.02	U	0.06	U	0.02
CYCLOHEXANE	NA	NA			U	0.44	U	0.01	9.10E-3	7.00E-3	U	0.02	U	7.50E-3
ISOPROPYLBENZENE	NA	NA			U	0.44	U	0.01	7.00E-3	U	0.02	U	7.50E-3	
METHYLCYCLOHEXANE	NA	NA			U	0.44	U	0.01	7.00E-3	U	0.02	U	7.50E-3	
ALUMINUM	NA	NA			33,500	27	28,700	28	43,800	32	41,600	40	39,500	37
ANTIMONY	NA	NA	0.27	d	0.13	0.09	0.08 J	0.09	0.10 J	0.11	0.16	0.13	0.10 J	0.12
ARSENIC	NA	12	18	a	1.60	0.45	2.50	0.47	1.20	0.54	2.00	0.66	1.00	0.62
BARIUM	NA	750	330	b	205	0.18	516	0.38	373	0.21	2,800	1.30	401	0.25
BERYLLIUM	NA	NA	21	d	0.84	0.09	0.91	0.09	0.61	0.11	0.67	0.13	1.50	0.12
CADMIUM	1.00	2.00	0.36	d	0.12	0.09	0.21	0.09	0.12	0.11	0.51	0.13	0.21	0.12
CHROMIUM	NA	65	26	c	21	0.45	17	0.47	17	0.54	29	0.66	20	0.62
COBALT	NA	40	13	a	16	0.09	13	0.09	9.20	0.11	11	0.13	15	0.12
COPPER	NA	63	28	c	50	0.27	30	0.28	37	0.32	48	0.40	67	0.37
IRON	NA	NA	-	e	28,000	18	23,000	9.40	22,500	11	24,500	13	24,300	12
LEAD	80	100	11	d	10	0.09	8.70	0.09	12	0.11	35	0.13	7.10	0.12
MANGANESE	NA	NA			336	0.18	273	0.19	277	0.21	274	0.26	147	0.25
MERCURY	NA	0.8			0.04 J	0.04	0.03 J	0.03	0.08	0.04	0.09	0.05	0.02 J	0.04
NICKEL	40	50	38	a	17	0.18	17	0.19	14	0.21	42	0.26	27	0.25
SELENIUM	NA	2	0.52	a	0.16 J	0.45	0.26 J	0.47	0.33 J	0.54	0.31 J	0.66	U	0.62
SILVER	NA	20	4.20	c	0.05 J	0.09	0.06 J	0.09	0.08 J	0.11	0.22	0.13	0.10 J	0.12
THALLIUM	NA	1			0.13	0.09	0.10	0.09	0.18	0.11	0.19	0.13	0.08 J	0.12
VANADIUM	NA	130	7.80	c	77	0.45	89	0.47	88	0.54	83	0.66	123	0.62
ZINC	NA	200	46	c	68	0.89	80	0.94	51	1.10	124	1.30	83	1.20
TOTAL ORGANIC CARBON	NA	NA</td												

Sample Location	RAOHE Sensitive Ecosystem Criteria Decreto 1215	TULSMA Agricultural Criteria Decreto 3516	USEPA EcoSSLs	GU06-N13		GU06-N17		GU06-N06		GU06-N18		GU06-N21		GU06-N04		GU06-N07		GU06-N15		GU06-N28		GU06-N29												
				GU06-SL001		GU06-SL002		GU06-SL003		GU06-SL004		GU06-SL005 ¹⁰		GU06-SL006 ¹⁰		GU06-SL007 ¹⁰		GU06-SL009 ¹⁰		GU06-SL010 ¹⁰		GU06-SL015												
				Depth (m bgs ¹)		1.3 - 1.45		2.11 - 2.26		0.04 - 0.19		1.21 - 1.36		1.8 - 1.95		3.1 - 3.25		1.65 - 1.8		1.55 - 1.7		0.28 - 0.43		0.85 - 1.00										
				Values (mg/kg)	Values (mg/kg)	Values (mg/kg)	note ⁹	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)	Values (mg/kg)	RL (mg/kg)											
TPH ²				1,000	500			71		787		17		1,075		U	28	79		15		17		466		7.40								
Acenaphthene	NA	NA				U		1.66E-3	0.02 K	1.53E-3	U	1.02E-3	J	0.02	6.41E-4	KJ	5.69E-4	6.51E-4	J	5.25E-4	U	8.66E-4	U	1.14E-3	0.01 KJ	1.10E-3	U	9.17E-4						
Acenaphthylene	NA	NA				U		1.25E-3		U	1.55E-3	U	1.00E-3		U	6.94E-4		4.43E-4	6.59E-4	KJ	1.62E-4	U	6.96E-4		5.32E-3	0.01 K	5.54E-4	8.62E-4	J	7.19E-4				
Anthracene	NA	NA				U		4.98E-3		U	0.01	U	2.40E-3		U	0.02	U	9.88E-4		U	9.08E-4	U	1.14E-3		7.76E-4	7.46E-3	KJ	6.74E-3	8.34E-4	KBJ	3.92E-4			
Benz[a]anthracene	NA	0.1				U		8.34E-3	5.35E-3	KBJ	3.55E-3	7.21E-3	KBJ	3.98E-4	U	0.02	2.66E-3	KBJ	1.30E-4	7.74E-4	KBJ	6.94E-4	1.96E-3	KBJ	5.58E-4	7.01E-4	KBJ	3.56E-4	4.35E-3	2.73E-3	4.11E-4	BI	2.33E-4	
Benz[a]pyrene	NA	0.1				U		1.11E-3		U	3.32E-3	U	1.37E-3		U	0.02	U	3.98E-4		U	8.28E-4	4.70E-3	BI	1.70E-3	U	7.87E-4		3.15E-3	U	1.09E-3		2.06E-3	U	7.94E-4
Benz[b]fluoranthene	NA	NA				U		9.83E-4	4.33E-3	KBJ	2.18E-3	U	6.98E-4		U	0.01	U	2.05E-4	7.92E-4	BJ	5.34E-4	2.15E-3	KJ	1.14E-3	U	5.19E-4		4.68E-3	8.35E-3	BI	1.28E-3	1.21E-3	KBJ	7.91E-4
Benz[k]fluoranthene	NA	NA				U		1.11E-3	9.30E-3	BJ	1.52E-3	1.36E-3	KBJ	7.78E-4	0.04 J	0.01	5.28E-4	KBJ	1.99E-4	1.95E-3	KBJ	7.11E-4	7.46E-3	KJ	1.56E-3	1.20E-3	KJ	9.73E-4	1.28E-3	1.21E-3	KBJ	7.91E-4		
Chrysene	NA	NA				U		8.38E-4		U	2.59E-3	U	9.09E-4		U	0.02	U	3.18E-4		U	6.34E-4	2.83E-3	KBJ	1.27E-3	U	5.68E-4		2.47E-3	U	8.46E-4				
Diben[1,4]anthracene	NA	NA				3.78E-3	BJ	7.30E-4	0.04 B	4.63E-3	1.18E-3	BJ	3.88E-4	0.12 J	0.02	5.75E-4	BJ	1.33E-3	3.14E-3	BJ	7.18E-4	4.03E-3	BJ	6.86E-4	1.79E-3	KBJ	4.25E-4	1.77E-3	1.52E-3	2.45E-4				
Fluoranthene	NA	NA				9.11E-4	KBJ	4.60E-4	6.91E-3	BJ	5.18E-3	1.05E-3	BJ	3.80E-4	0.02 BJ	0.01	3.50E-4	BJ	1.46E-4	U	7.00E-4	2.95E-3	KBJ	2.74E-4	1.79E-3	BJ	4.08E-4	3.76E-3	1.62E-3	7.85E-4	5.19E-4			
Fluorene	NA	NA				U		9.70E-4	0.08	2.57E-3	U	1.13E-3	0.15 J	0.01	U	3.35E-4	1.60E-3	J	4.16E-4	U	7.83E-4	U	1.15E-3	0.05	9.38E-4	U	7.10E-4							
Indeno[1,2,3-cd]pyrene	NA	NA				1.34E-3	KBJ	7.31E-4		U	1.56E-3	3.41E-3	KBJ	7.85E-4	0.01 KBJ	0.01	7.20E-4	KBJ	2.33E-4	U	6.77E-4	3.47E-3	KBJ	1.77E-3	1.78E-3	KJ	1.06E-3	U	1.33E-3	2.26E-3	KBJ	8.57E-4		
Naphthalene	NA	0.1				3.48E-3	BJ	1.86E-3	0.02 B	6.26E-4	5.18E-3	BJ	1.27E-3	0.03 KBJ	0.01	1.20E-3	BJ	4.75E-4	1.43E-3	BJ	4.23E-4	2.41E-3	BJ	1.12E-3	2.11E-3	BJ	9.64E-4	0.02 B	5.95E-4	3.10E-3	BJ	8.29E-4		
Phenanthrene	NA	NA				U		0.01 BJ	8.15E-4	0.06 B	0.01	2.44E-3	BJ	5.34E-4	0.55 B	0.02	9.80E-4	BJ	1.48E-4	0.01 B	8.51E-4	4.11E-3	BJ	1.19E-3	4.77E-3	BJ	8.09E-4	0.20 B	6.32E-3	2.62E-3	BJ	3.61E-4		
Pyrene	NA	0.1				U		2.04E-3	0.02 B	5.09E-3	1.35E-3	BJ	3.53E-4	0.04 BJ	0.01	5.02E-4	BJ	1.69E-4	1.02E-3	BJ	6.88E-4	3.84E-3	BJ	4.00E-4	1.25E-3	BJ	1.60E-3	5.82E-4	KBJ	5.11E-4				
Sum of 6 PAHs ³	1.00	2				2.25E-3		0.02	5.82E-3		0.07		1.60E-3		2.74E-3		0.02	4.77E-3		0.02		4.26E-3												
LMW PAHs ⁴	1.00	2	29	b		0.02		0.17		7.62E-3		0.79		2.82E-3		0.02	6.52E-3		6.88E-3		0.31		7.42E-3											
HMW PAHs ⁵	1.00	2	1.10	d		6.03E-3		0.09			0.02	0.23		5.34E-3		7.68E-3		0.03	8.51E-3		0.07		6.77E-3											
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00	2				0.02		0.26		0.02		1.02		8.16E-3		0.03	0.04		0.02		0.38		0.01											
Sum PAHs ⁷	1.00	2				0.08		1.72			0.03		3.67		0.02	0.11		0.39																

Sample Location	RAOHE Sensitive Ecosystem Criteria	TULAS Agricultural Criteria	Decreto 1215	AG02-N11		
				USEPA EcoSSLs		
				AG02-SL001		
Depth (m bgs ¹)	Values (mg/kg)	Values (mg/kg)	Values (mg/kg)	note ^a	Values (mg/kg)	RL (mg/kg)
TPH ²	1,000	500		33		
Acenaphthene	NA	NA		U	1.10E-3	
Acenaphthylene	NA	NA		9.44E-4 J	6.29E-4	
Anthracene	NA	NA		1.18E-3 KBJ	7.42E-4	
Benz[a]anthracene	NA	0.1		1.03E-3 BJ	4.34E-4	
Benz[a]pyrene	NA	0.1		U	1.57E-3	
Benz[b]fluoranthene	NA	NA		U	1.13E-3	
Benz[e]phenylenes	NA	NA		1.93E-3 KBJ	7.04E-4	
Benz[j]fluoranthenes	NA	NA		U	1.24E-3	
Chrysene	NA	NA		2.03E-3 BJ	4.30E-4	
Diben[<i>g,h</i>]anthracene	NA	NA		1.36E-3 KBJ	8.46E-4	
Fluoranthene	NA	NA		1.35E-3 BJ	2.91E-4	
Fluorene	NA	NA		7.39E-4 J	4.70E-4	
Indeno[1,2,3- <i>c,d</i>]pyrene	NA	NA		1.65E-3 KBJ	7.36E-4	
Naphthalene	NA	0.1		3.09E-3 BJ	8.10E-4	
Phenanthrene	NA	NA		2.61E-3 BJ	6.83E-4	
Pyrene	NA	0.1		1.65E-3 BJ	2.87E-4	
Sum of 6 PAHs ³	1.00	2		4.93E-3		
LMW PAHs ⁴	1.00	2	29	b	8.56E-3	
HMW PAHs ⁵	1.00	2	1.10	d	0.01	
Sum of 16 PAHs ⁶ (EPA High Priority PAH Compounds)	1.00	2			0.02	
Sum PAHs ⁷	1.00	2			0.03	
Sum Alkylated PAHs + Biphenyl ⁸	NA	NA			0.18	
Total Phenols by Method SW8270	NA	3.8				
BENZENE	NA	0.05		U	6.00E-3	
ETHYLBENZENE	NA	0.1		U	6.00E-3	
TOLUENE	NA	0.1		U	6.00E-3	
Total Xylenes	NA	0.1		U	0.02	
CYCLOHEXANE	NA	NA		U	6.00E-3	
ISOPROPYLBENZENE	NA	NA		U	6.00E-3	
METHYLCYCLOHEXANE	NA	NA		U	6.00E-3	
ALUMINUM	NA	NA		17,000	34	
ANTIMONY	NA	NA	0.27	d	0.91	0.11
ARSENIC	NA	12	18	a	4.70	0.57
BARIUM	NA	750	330	b	217	0.23
BERYLLIUM	NA	NA	21	d	0.90	0.11
CADMIUM	1.00	2.00	0.36	d	1.20	0.11
CHROMIUM	NA	65	26	c	24	0.57
COBALT	NA	40	13	a	10	0.11
COPPER	NA	63	28	c	22	0.34
IRON	NA	NA	-	e	24,200	11
LEAD	80	100	11	d	19	0.11
MANGANESE	NA	NA			393	0.23
MERCURY	NA	0.8			0.03 J	0.04
NICKEL	40	50	38	a	31	0.23
SELENIUM	NA	2	0.52	a	0.50 J	0.57
SILVER	NA	20	4.20	c	0.03 J	0.11
THALLIUM	NA	1			0.16	0.11
VANADIUM	NA	130	7.80	c	57	0.57
ZINC	NA	200	46	c	140	1.10
TOTAL ORGANIC CARBON	NA	NA			4,200	520

See Notes on Page 1