Muestreo y Caracterización de Hidrocarburos ajenos a la Terminal 2 de RELAPASAA en la Costa de Ventanilla y Chancay

Memorando Técnico Complementario No. 13

PREPARADO PARA
RELAPASAA

FECHA
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CONTENIDO

1. INTRODUCCIÓN

Con fecha 02 de diciembre de 2022, Refinería La Pampilla SAA (RELAPASAA), remitió al Organismo de Evaluación y Fiscalización Ambiental (OEFA) con Cargo de recepción 2022-E01-123337, el informe *"Muestreo y Caracterización de Hidrocarburos ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay"* (en adelante, **Informe de Resultados de Fingerprint**), en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas entre el 20 de mayo y 26 de setiembre del 2022 en diferentes playas y en mar y, cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 19 de enero de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-040474, el informe titulado "*Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.1"*, (en adelante *Memorando Técnico Complementario No.1*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas entre el 3 de noviembre y 6 de diciembre del 2022, cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 9 de marzo de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-327609, el informe titulado "*Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.2"*, (en adelante *Memorando Técnico Complementario No.2*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días 01 y 22 de noviembre, y el 13, 15, 16, 19 y 27 de diciembre del 2022 y el 10, 13, 14, 15, 16, 23 y 24 de enero del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 15 de mayo de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-466870, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.3"*, (en adelante *Memorando Técnico Complementario No.3*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días 01, 02, 09 y 21 de febrero y 23 de marzo del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 2 de junio de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-473068, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.4"*, (en adelante *Memorando Técnico Complementario No.4*) en el que se reportaron los resultados de análisis Fingerprint de la muestra tomada el día 11 de abril del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 26 de julio de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-518019, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.5"*, (en adelante *Memorando Técnico Complementario No.5*) en el que se reportaron los resultados de análisis Fingerprint de la muestras tomadas los días 08, 09 y 10 de junio del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 16 de agosto de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-526330, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay- Memorando Técnico Complementario No.6"*, (en adelante *Memorando Técnico Complementario No. 6*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días 20 de junio y 08 de julio del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 23 de agosto de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-528477, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa*

de Ventanilla y Chancay - Memorando Técnico Complementario No.7", (en adelante *Memorando Técnico Complementario No. 7*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días 21, 23 y 28 de junio y 18 de julio del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 29 de agosto de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-530147, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.8"*, (en adelante *Memorando Técnico Complementario No. 8*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas el día 01 de agosto del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 29 de setiembre de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-540914, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.9"*, (en adelante *Memorando Técnico Complementario No. 9*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días del 04 al 08, 11, 21, 24, 25, 27, 29 y 31 de julio del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 19 de octubre de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-548962, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.10"*, (en adelante *Memorando Técnico Complementario No. 10*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días 02, 03, 06, 11 y 27 de agosto del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 8 de noviembre de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-558221, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.11"*, (en adelante *Memorando Técnico Complementario No. 11*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días 26, 28 y 29 de agosto del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

Con fecha del 14 de diciembre de 2023, RELAPASAA remitió a OEFA con cargo recepción 2023-E01-572291, el informe titulado *"Muestreo y Caracterización de Hidrocarburos Ajenos a la Terminal 2 de RELAPASAA en la costa de Ventanilla y Chancay - Memorando Técnico Complementario No.12"*, (en adelante *Memorando Técnico Complementario No. 12*) en el que se reportaron los resultados de análisis Fingerprint de las muestras tomadas los días 28 de setiembre y 16 de octubre del 2023 cuyo origen no se relaciona con la composición del crudo Buzios.

El presente documento tiene como objetivo presentar los resultados de los análisis Fingerprint de una muestra tomada el día 23 de enero del 2024, adicional a las reportadas en el Informe de Resultados de Fingerprint remitido al OEFA el 02 de diciembre de 2022, al Memorando Técnico Complementario No.1 remitido el 19 de enero del 2023, al Memorando Técnico Complementario No.2 remitido el 9 de marzo del 2023, al Memorando Técnico Complementario No.3 remitido el 15 de mayo del 2023, al Memorando Técnico Complementario No.4 remitido el 2 de junio del 2023, al Memorando Técnico Complementario No.5 remitido el 26 de julio del 2023, al Memorando Técnico Complementario No.6 remitido el 16 de agosto del 2023, al Memorando Técnico Complementario No.7 remitido el 23 de agosto del 2023, al Memorando Técnico Complementario No.8 remitido el 29 de agosto del 2023, al Memorando Técnico Complementario No.9 remitido el 29 de setiembre del 2023, al Memorando Técnico Complementario No.10 remitido el 19 de octubre del 2023, al Memorando Técnico Complementario No.11 remitido el 8 de noviembre del 2023 y al Memorando Técnico Complementario No.12 remitido el 14 de diciembre del 2023.

2. MUESTREO Y ANÁLISIS DE LABORATORIO

El día 23 de enero del 2024, se recolectó 01 muestra adicional, cuyo resultado de *Fingerprint* concluye que sus orígenes no corresponden al crudo Buzios derramado el 15 de enero en el T2 (i.e. químicamente no compatibles). La muestra fue tomada por personal del laboratorio independiente CERPER, colectada en frasco de vidrio, rotulada, precintado, siendo finalmente ITS quien la envió vía aérea al laboratorio New Fields con su respectiva cadena de custodia. Los análisis de *Fingerprint* de todas las muestras reportadas hasta el momento fueron realizados por New Fields. El laboratorio Alpha Laboratories (Alpha) a través de New Fields, está certificado por el Programa Nacional de Acreditación de Laboratorios Ambientales (NELAP) en 22 estados de Estados Unidos, y está certificado recíprocamente por NELAP para ejercer en 14 estados adicionales. Además de la certificación NELAP, los sistemas, procesos y procedimientos operativos de Alpha son consistentes con los protocolos ISO 17000 aplicables.

En la Figura 4-1, se presentan las ubicaciones de todas las muestras con resultados de Fingerprint tomadas al momento, y en el **Anexo B** se presentan los resultados analíticos de Fingerprint de la presente actualización.

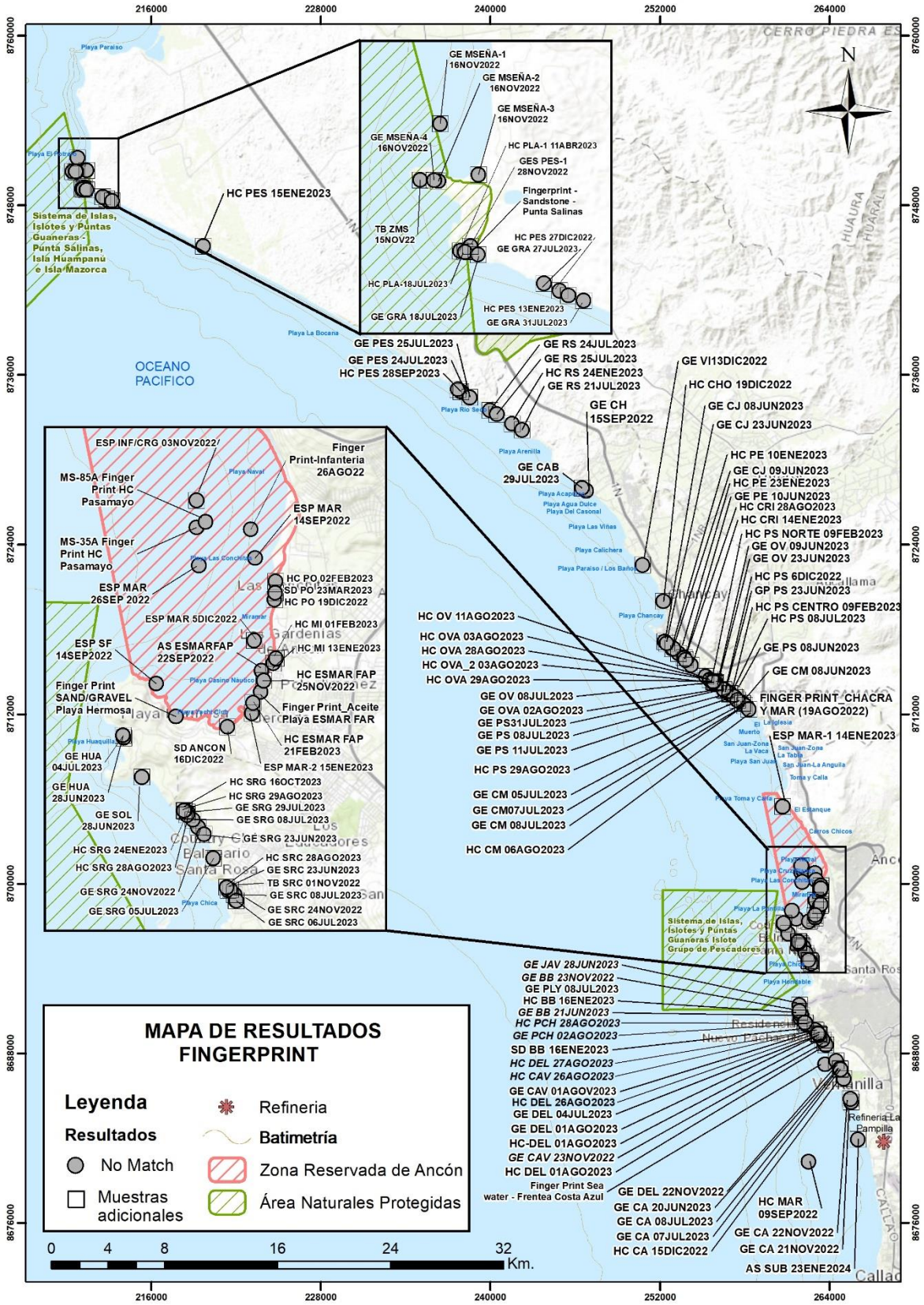


FIGURA 4-1. UBICACIÓN DE LAS MUESTRAS TOMADAS PARA ANÁLISIS DE FINGERPRINT.

Notas:
No Match = Químicamente no compatible con el crudo Buzios
Fuente: ERM – febrero, 2024

Los aportes de hidrocarburo de diferentes fuentes, con características químicas que permiten asegurar que son distintas al del crudo Buzios son recurrentes y se han identificado en diferentes periodos de tiempo y locaciones, como se detalla en la línea de tiempo de la Figura 4-2 donde se presentan a las muestras tomadas para determinación analítica de Fingerprint cuyo origen no corresponde al crudo Buzios.

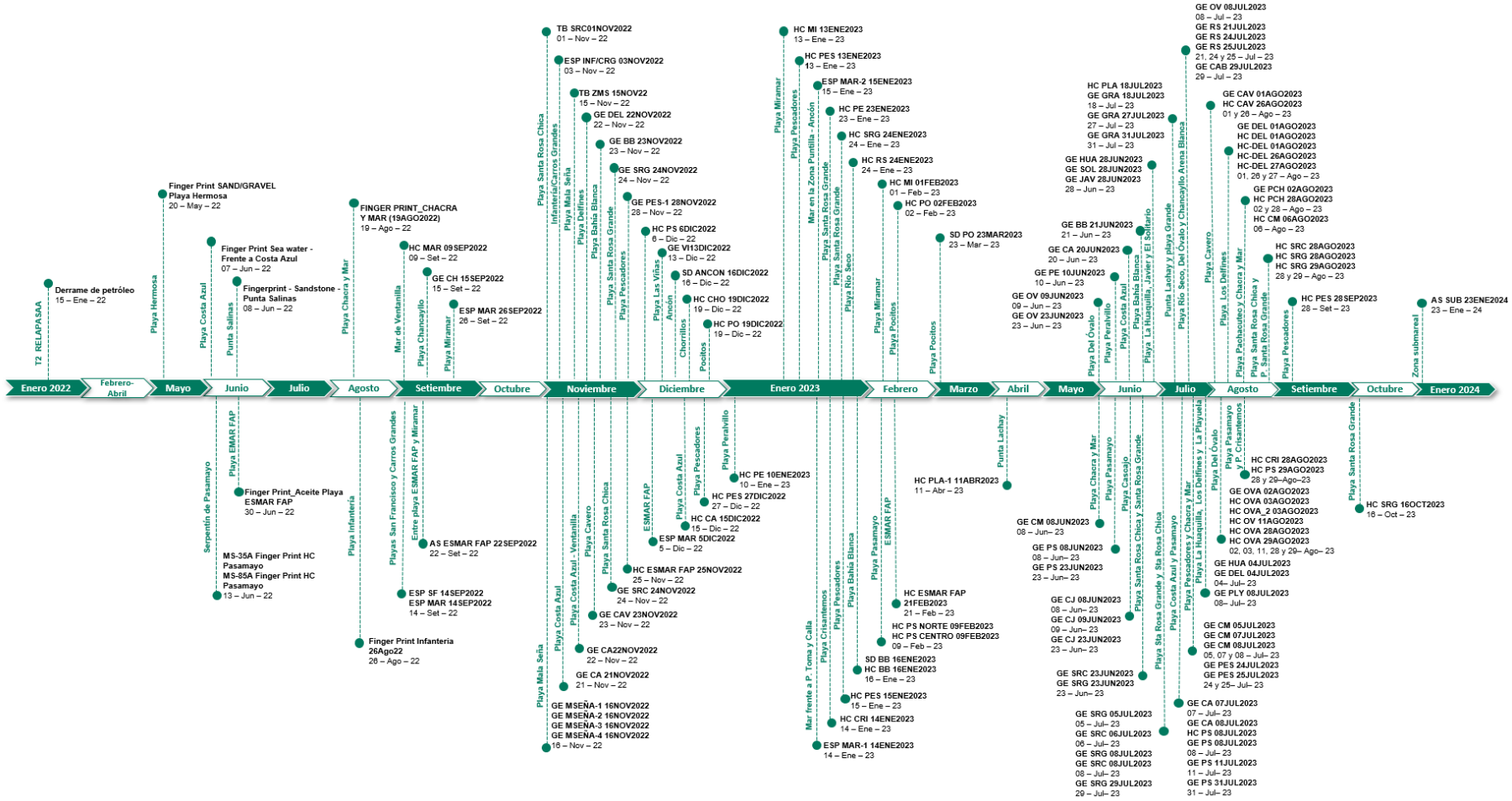


FIGURA 4-2. LÍNEA DE TIEMPO DE MUESTRAS DE FINGERPRINT CUYO ORIGEN ES DIFERENTE AL DEL CRUDO BUZIOS.

Fuente: Elaboración propia. ERM – febrero, 2024

3. RESULTADOS

3.1 RESULTADO DE LAS MUESTRAS AJENAS AL CRUDO BUZIOS

En la presente actualización, se detallan los resultados de 01 muestra adicional químicamente no compatible con el crudo Buzios y, por lo tanto, no relacionado al caso de T2 de enero 2022.

En la Tabla 5-1 y Tabla 5-2, se incluye el resumen de los resultados de los análisis de *Fingerprint*, en el Anexo A, el registro fotográfico de las actividades de muestreo para la muestra adicional reportada en este informe y en el Anexo B, el informe del laboratorio (*NewFields*).

TABLA 5-1. RESUMEN DE RESULTADOS DE ANÁLISIS DE FINGERPRINT AJENAS AL CRUDO BUZIOS.

Ubicación: Zona submareal	**Fecha de muestreo:** 23 de enero de 2024
	**Nombre de la muestra:** *AS SUB 23ENE2024* **Precintado por:** CERPER **Precinto N°:** 002504 **Enviado a NewFields por:** Intertek Testing Services Perú S.A Coordenadas UTM WGS84 18L 0266023 E, 8681921 N
	Descripción: Agua de mar con presencia de iridiscencia. **Resultado:** La muestra *AS SUB 23ENE2024* consiste en un crudo o petróleo pesado significativamente intemperizado. Los resultados de los análisis de FID, HAP y biomarcadores indican que **el petróleo detectado en la muestra *AS SUB 23ENE2024* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

TABLA 5-2. RESUMEN DE RESULTADOS DE FINGERPRINT QUÍMICAMENTE NO COMPATIBLES CON EL CRUDO BUZIOS (MUESTRAS ADICIONALES)

N°	Nombre de la muestra	Matriz	Fecha de muestreo	Ubicación	Resultado(*)
1	AS SUB 23ENE2024	Agua de mar	23-ene-24	Zona submareal	La muestra *AS SUB 23ENE2024* consiste en un crudo o petróleo pesado significativamente intemperizado. Los resultados de los análisis de FID, HAP y biomarcadores indican que **el petróleo detectado en la muestra *AS SUB 23ENE2024* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

(*) Traducido de las conclusiones de los informes de Fingerprint emitidos por NewFields

Fuente: Elaboración propia. ERM 2024

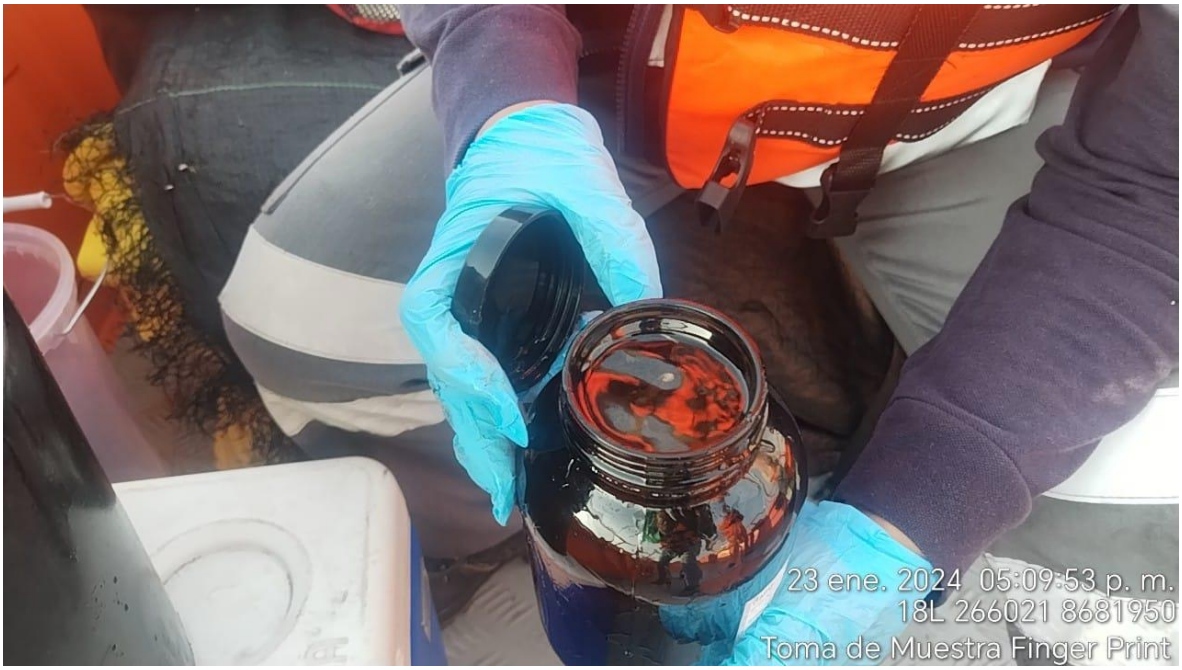
4. CONCLUSIONES

Los resultados de *Fingerprint*, permiten concluir lo siguiente:

- En el presente informe, mediante el análisis de *Fingerprint*, como técnica de análisis químico forense, se ha identificado una muestra adicional colectada de hidrocarburo que no es químicamente compatible con el crudo Buzios y que proviene de una distinta fuente de hidrocarburo. Esta muestra fue colectada en la zona submareal de Ventanilla.
- Hasta el momento, mediante el análisis de *Fingerprint*, como técnica de análisis químico forense, se han identificado un total de 125 muestras de diferentes matrices (arena, agua, espuma, bolas de alquitrán, y aceite) colectadas en playas y mar que no son químicamente compatibles con el crudo Buzios y que provienen de distintas fuentes de hidrocarburo.
- Hasta el momento, el análisis de *Fingerprint* ha permitido confirmar la existencia de hidrocarburos no asociados al crudo Buzios desde Ventanilla (Playa Delfines) hasta Huacho (Punta Salinas), siendo en la zona intermareal diferentes playas como Chacra y Mar, Hermosa, Del Óvalo, Punta Salinas, ESMAR FAP, Bahía Blanca, Mala Seña, Chancayllo, Los Delfines, Cavero, Costa Azul, Santa Rosa Grande, Santa Rosa Chica; Pescadores, Miramar, Ancón, Peralvillo, Pocitos, Pasamayo, Punta Lachay, Las Viñas, La Huaquilla, El Solitario, Javier, Grande, Río Seco, Pachacútec, Crisantemos y Cascajo así como en la zona submareal y en el mar frente a Playa Costa Azul, Pasamayo, playa Infantería, playa San Francisco, en el mar de Ventanilla, frente ESMARFAP/Miramar, frente a playa Miramar, frente a playa Infantería/Carros Grandes y en el mar frente a Playa Toma y Calla.
- Los resultados de análisis *Fingerprint* demuestran que existen una variedad de fuentes de petróleo en el medio marino a lo largo de la costa distintas al derrame del 15 de enero de 2022 en la Terminal T2 de RELAPASAA.

ANEXO A – REGISTRO FOTOGRÁFICO

Toma de muestra *AS SUB 23ENE2024* – 23 de enero 2024



Muestra *AS SUB 23ENE2024* – 23 de enero 2024

ANEXO B – RESULTADOS ANALÍTICOS DE FINGERPRINT

AS SUB 23ENE2024

To: Refinería La Pampilla S.A.A.

From: Gregory S. Douglas, Ph.D. (NewFields)

Date: February 5, 2024

Subject: Chemical Fingerprinting of samples collected in Ventanilla, Peru

This memorandum summarizes the results of forensic chemical analysis conducted on one (1) sample that was collected by Repsol contractors on January 23, 2024 (Table 1). The sample was shipped to NewFields alliance laboratory, Alpha Analytical Laboratory, Inc. (Mansfield MA) for forensic chemical analysis. The objective of the analysis was to the degree possible, identify the product type (s) present in the sample and determine if the chemical composition match that of the source oil (Table 1).

Sample and Analysis

A seawater sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of water and suspected petroleum residues. Sample "AS SUB 23ENE2024" was shipped to Alpha Analytical Labs in Mansfield, MA under chain of custody (COC) and arrived at 13.4°C on January 29, 2024 with a DHL Tracking # 5334390014 (Seal number 002504).

Samples were fortified with surrogate standards, extracted using methylene chloride and concentrated to volume, spiked with internal standards, and analyzed following laboratory methods that were specifically developed for forensic characterization of petroleum, as described by Douglas et.al. (2015).[1]

- The samples were analyzed using a modified EPA Method 8015 gas chromatography/flame ionization detection (GC/FID) technique to generate a high resolution chromatographic "fingerprint" of hydrocarbons present in the sample. The chromatographic "fingerprint" identifies the general nature of the hydrocarbons (e.g., petroleum product type) and relative weathering state of the sample. A suite of normal and branched-chain alkanes as well as total petroleum hydrocarbons (TPH) were also measured to aid in product identification (**Table 2**). Sample results were reported on a ng/L basis.

- The samples were also analyzed by a modified EPA Method 8270 gas chromatography/mass spectrometry (GC/MS) method operated in the selected ion monitoring (SIM) mode to quantify concentrations of 62 oil source diagnostic parent and C1-C4 alkylated PAHs (**Table 3**), and 55 sterane and triterpane petroleum biomarkers compounds (**Table 4**). These compounds provide highly specific information pertinent to the identification of petroleum or pyrogenic PAHs and their potential origin. Sample results were reported on a ug/L basis.

All chemical analyses were conducted following standard EPA methods for laboratory documentation, sample handling, instrument calibration, and method quality control. Quantified sample results are included in Attachment 2.

[1] Douglas, G.D., Emsbo-Mattingly, S.D., Stout, S.A., Uhler, A.D., and McCarthy, K.J. (2015). Hydrocarbon fingerprinting methods. In: Introduction to Environmental Forensics, 3rd Ed., B. Murphy and R. Morrison, Eds., Academic Press, New York, pp. 201-310.

Findings

The gas chromatographic "fingerprints" of the source oil, and AS SUB 23ENE2024 (AS SUB23) are shown in Figures 1A and1B respectively.

GC/FID Analysis

The GC/FID chromatogram for the AS SUB23 sample (Figure 1B) indicates this sample consists of a C_{16} – C_{44+} range material that has undergone significant weathering by evaporation and biodegradation as indicated by the lack of n-alkanes and relative increase in the UCM. In addition, there is a series of low level resolved peaks in the C_8-C_{10} range which likely represent the more water-soluble components. The petroleum signature is consistent with a significantly weathered crude or heavy oil.

GC/MS Alkylated PAH and Biomarker Analysis

The PAH and biomarker molecular chemistry was evaluated to determine if there was evidence for a chemical linkage between the source oil and the AS SUB23 sample. GC/MS analysis of PAH and biomarker compounds is approximately 10 times more sensitive than the GC/FID analysis and provides source diagnostic weathering resistant chromatographic "fingerprints" of the samples.

Qualitative comparison of the PAH histograms for the source oil, and the AS SUB23 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the AS SUB23 sample (Figure 2B) shows this sample is weathered by evaporation as indicated by the loss of decalins and lower proportion of naphthalenes compared to the source oil (Figure 2A). The abundance of naphthalene compared to its' alkylated homologues (C1-C4-naphthalenes) is likely a function of solubility. There are differences in the proportion of fluorenes and lack of naphthobenzothiophenes and chrysenes compared to the source oil.

Figure 3 is a double source ratio plot of sulfur containing alkyl-dibenzothiophenes to alkyl-phenanthrenes (C2-dibenzothiophenes/C2-phenanthrenes [D2/P2] versus C3-dibenzothiophenes/C3-phenanthrenes [D3/P3]). Differences in this ratio are a function of crude oil source and refinery processing.[2] The source oil, and the AS SUB23 sample show similarities however the AS SUB23 does contain a higher proportion of sulfur containing C2-dibenzothiophenes/C2-phenanthrenes compared to the source oil.

The biomarker triterpene m/z 191 ion traces for the source oil and the AS SUB23 sample are presented in Figures 4A and 4B respectively. The biomarker traces show many differences including tri and tetracyclic terpane triplet (T6a, T6a, and T6c),[3] the proportion of TS and TM (T11 and T12)[2], norhopane and hopane (T15 and T19)[2], and a decrease in gammacerane (T22A) and T7-T10 relative to the source oil. In addition, sample AS SUB23 contains trace levels of oleanane (T18) which is absent in the source oil. These differences indicate the AS SUB23 sample and source oil are derived from a different source of petroleum.

Figure 5 is a double source ratio plot for the biomarkers norhopane/hopane versus TS/TM. Differences in these ratio plots are a function of crude oil source and refinery processing.[2] The source oil and AS SUB23 sample plot away from each other indicating a different source of petroleum**.**

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[2] Douglas, G.S. et al. (1996) Environmental stability of selected petroleum hydrocarbon source and weathering ratios. Environ. Sci. Technol. 30: 2332-2339.

[3] Hostettler, F. D. and Kvenvolden, K. A. Kvenvolden. Geochemical changes in crude oil spilled from the Exxon Valdez supertanker into Prince William Sound, Alaska Org. Geochem. Vol. 21, No. 8/9, pp. 927-936, 1994.

Conclusion

The AS SUB 23ENE2024 sample consists of a significantly weathered crude or heavy oil. The FID, PAH and biomarker analysis indicate the petroleum detected in the source oil and the AS SUB 23ENE2024 sample are chemically different and were derived from a different source of petroleum.

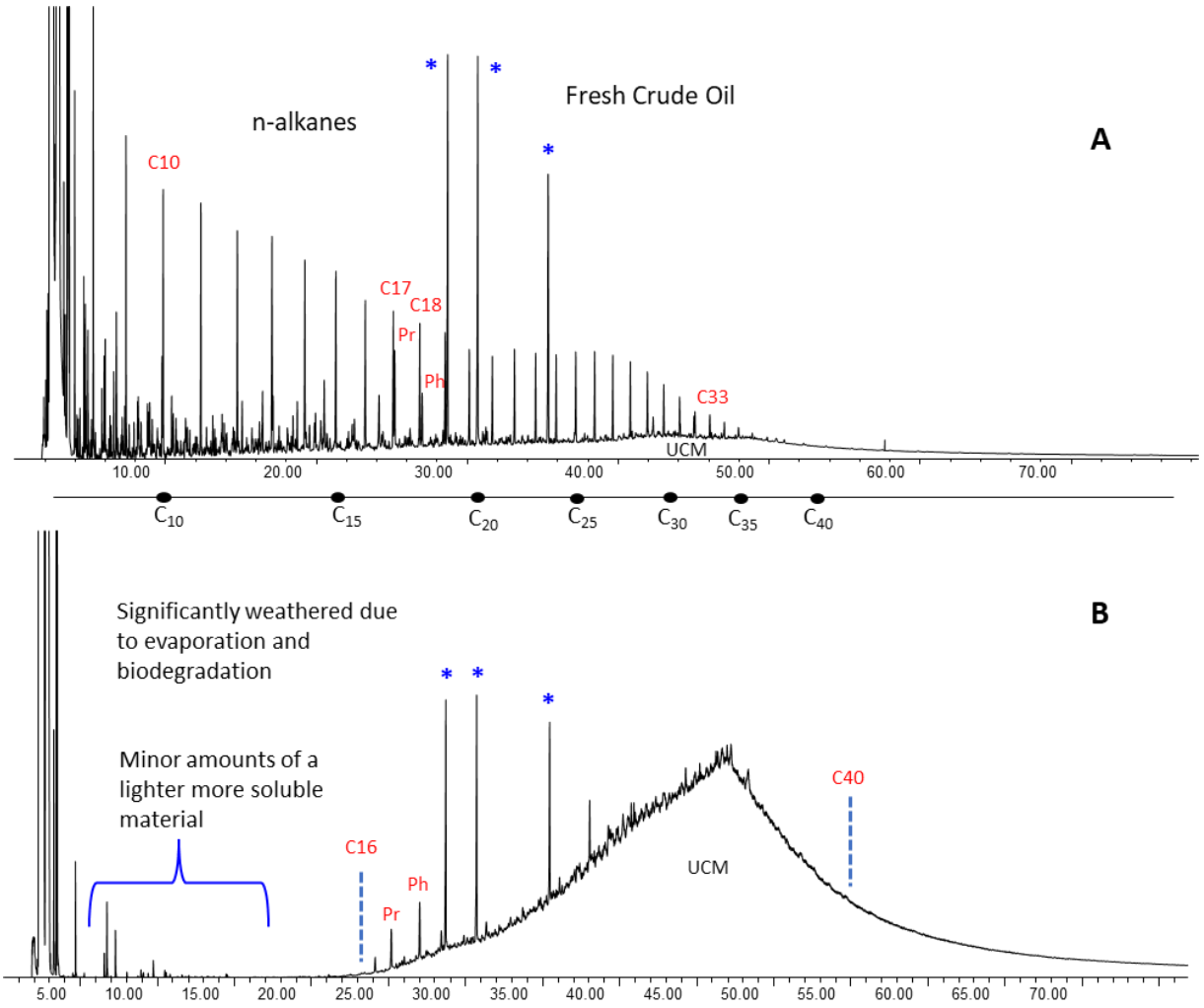

Figure 1. GC/FID "fingerprints" for the field samples.
Carbon ranges annotated below the x-axis analysis time scale.

A) Ship's Tanks Composite Sample
B) AS SUB 23ENE2024
'*': Laboratory-added Internal Standard

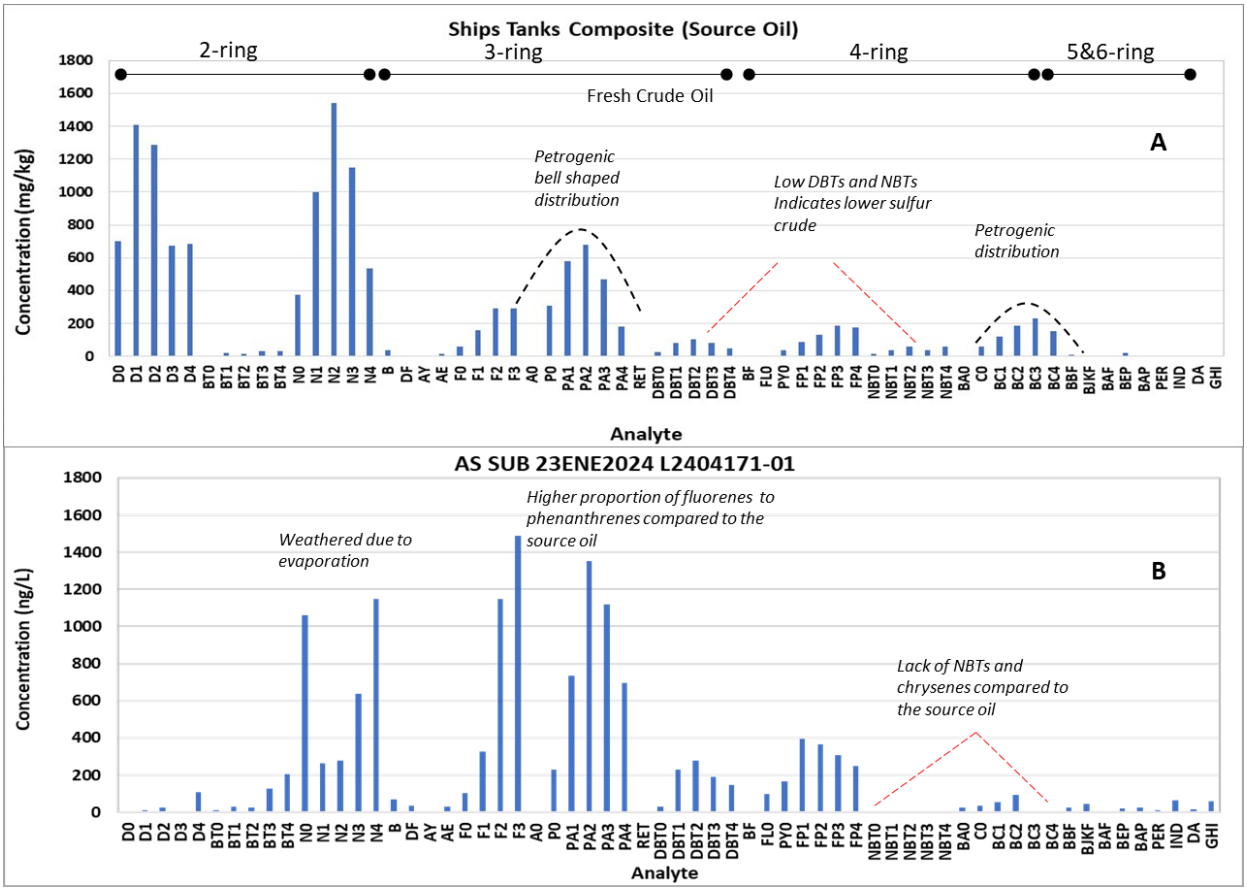

Figure 2. PAH Histograms

A) Ship's Tanks Composite Sample
B) AS SUB 23ENE2024

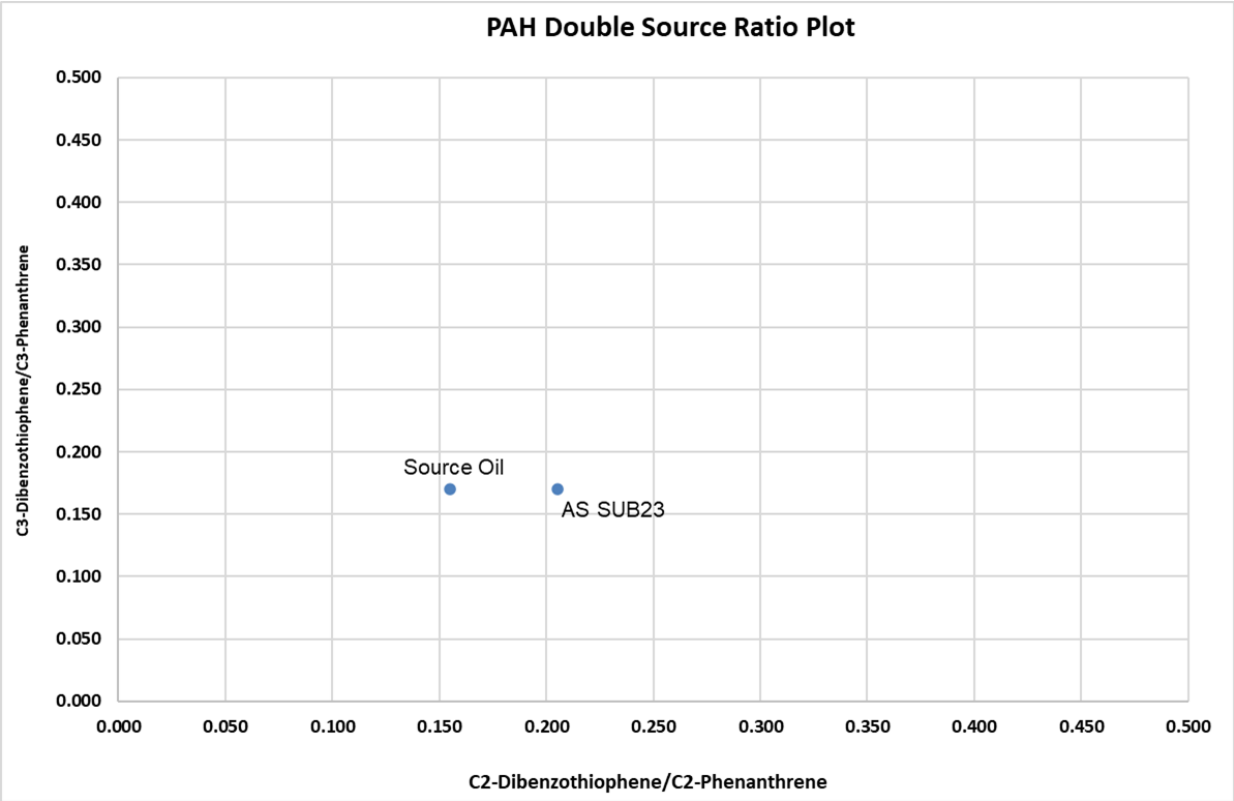

Figure 3. PAH Double Source Ratio Plots

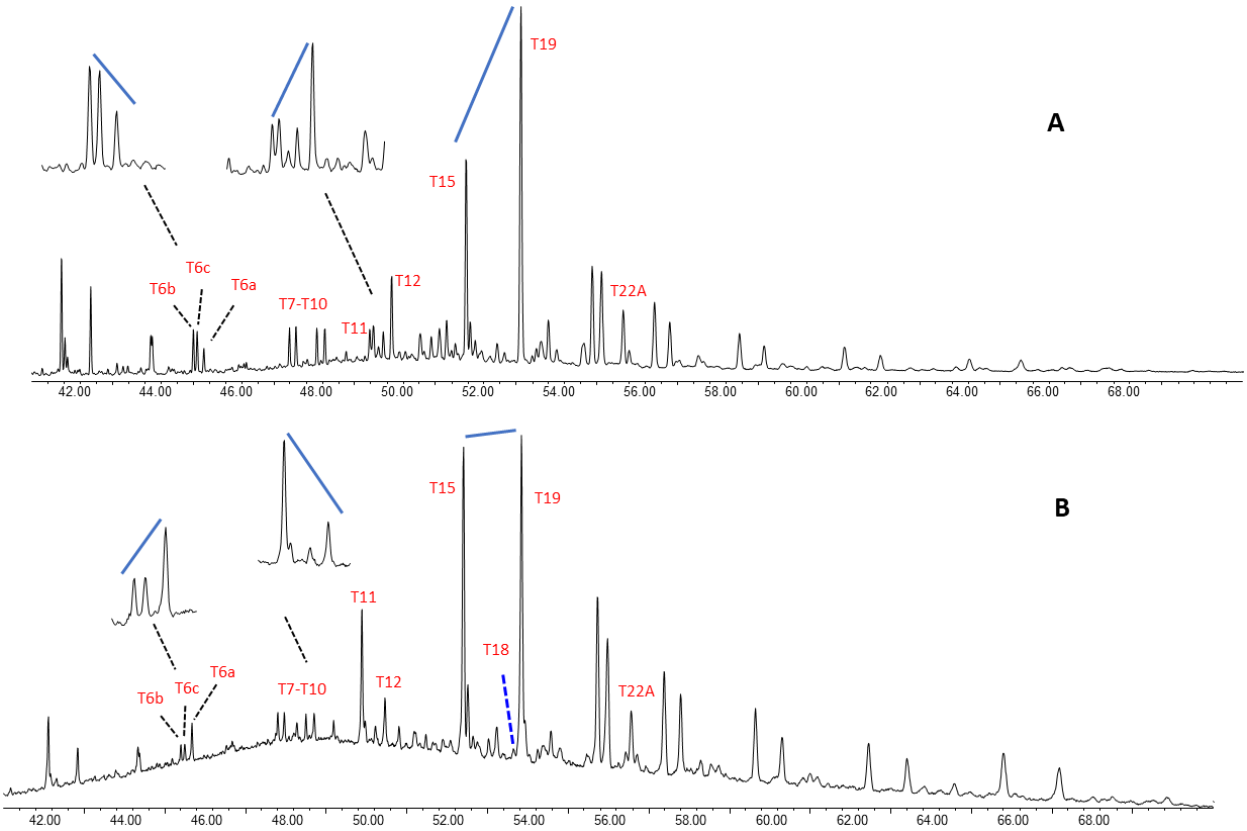

Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces

A) Ship's Tanks Composite Sample

B) AS SUB 23ENE2024

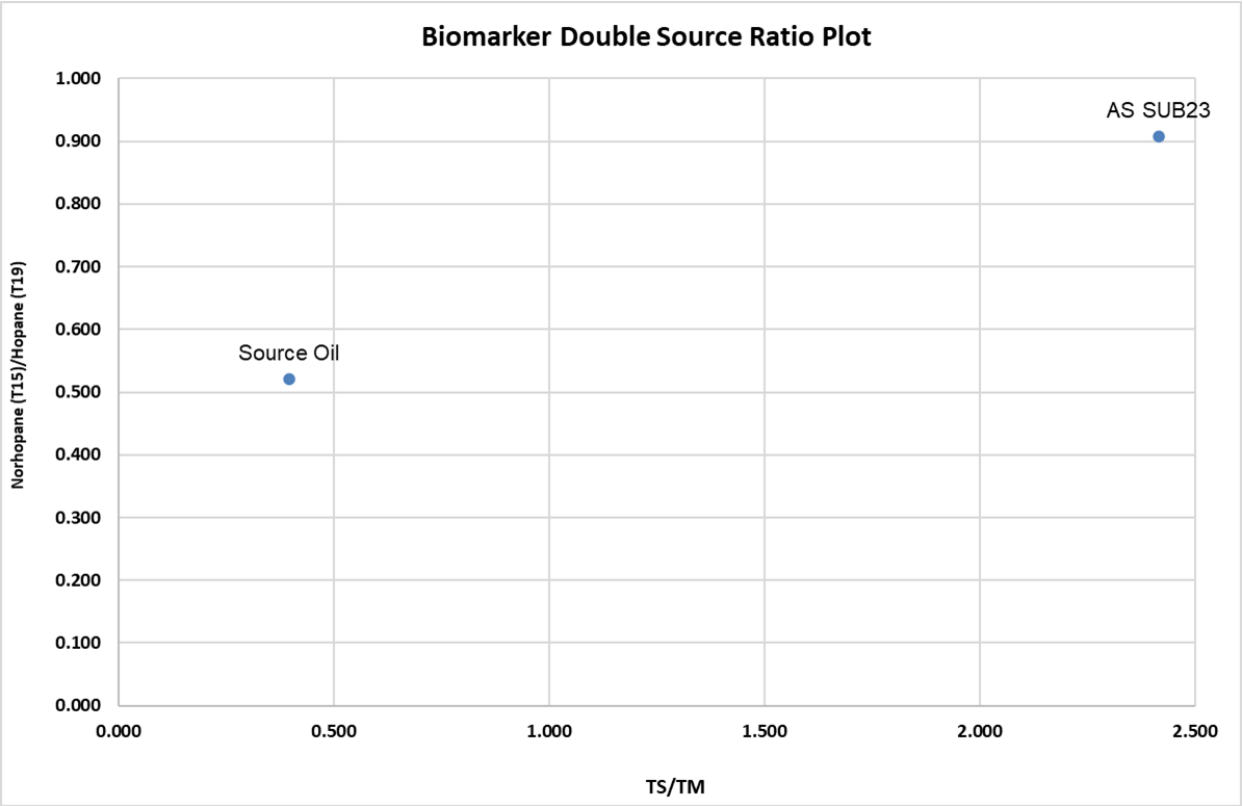

Figure 5. Biomarker Double Source Ratio Plots

Table 1. Sample List.

Field ID	Lab ID	Collection Date	Matrix	Collected by
Ship's Tanks Composite Sample	L2223310-01	01/14/2022	Source Oil	Repsol Contractor
AS SUB 23ENE2024	L2404171-01	01/23/2024	Seawater	Repsol Contractor

Table 2. n-Alkane and branched chain alkane target compounds.

Abbrev	Analytes
C9	n-Nonane (C_9)
C10	n-Decane (C_{10})
C11	n-Undecane (C_{11})
C12	n-Dodecane (C_{12})
C13	n-Tridecane (C_{13})
1380	2,6,10 Trimethyldodecane (1380)
C14	n-Tetradecane (C_{14})
1470	2,6,10 Trimethyltridecane (1470)
C15	n-Pentadecane (C_{15})
C16	n-Hexadecane (C_{16})
1650	Norpristane (1650)
C17	n-Heptadecane (C_{17})
Pr	Pristane
C18	n-Octadecane (C_{18})
Ph	Phytane
C19	n-Nonadecane (C_{19})
C20	n-Eicosane (C_{20})
C21	n-Heneicosane (C_{21})
C22	n-Docosane (C_{22})
C23	n-Tricosane (C_{23})
C24	n-Tetracosane (C_{24})
C25	n-Pentacosane (C_{25})
C26	n-Hexacosane (C_{26})
C27	n-Heptacosane (C_{27})
C28	n-Octacosane (C_{28})
C29	n-Nonacosane (C_29)
C30	n-Triacontane (C_{30})
C31	n-Hentriacontane (C_{31})
C32	n-Dotriacontane (C_{32})
C33	n-Tritriacontane (C_{33})
C34	n-Tetratriacontane (C_{34})
C35	n-Pentatriacontane (C_{35})
C36	n-Hexatriacontane (C_{36})
C37	n-Heptatriacontane (C_{37})
C38	n-Octatriacontane (C_{38})
C39	n-Nonatriacontane (C_{39})
C40	n-Tetracontane (C_{40})
TPH	Total Petroleum Hydrocarbons (C9-C44)
TSH	Total Saturated Hydrocarbons

Table 3. PAH and alkyl-PAH Target Compound List

Abbrev	Analytes
D0	cis/trans-Decalin
D0	cis/trans-Decalin
D1	C1-Decalins
D2	C2-Decalins
D3	C3-Decalins
D4	C4-Decalins
BT0	Benzothiophene
BT1	C1-Benzo(b)thiophenes
BT2	C2-Benzo(b)thiophenes
BT3	C3-Benzo(b)thiophenes
BT4	C4-Benzo(b)thiophenes
N0	Naphthalene
N1	C1-Naphthalenes
N2	C2-Naphthalenes
N3	C3-Naphthalenes
N4	C4-Naphthalenes
B	Biphenyl
DF	Dibenzofuran
AY	Acenaphthylene
AE	Acenaphthene
F0	Fluorene
F1	C1-Fluorenes
F2	C2-Fluorenes
F3	C3-Fluorenes
A0	Anthracene
P0	Phenanthrene
PA1	C1-Phenanthrenes/Anthracenes
PA2	C2-Phenanthrenes/Anthracenes
PA3	C3-Phenanthrenes/Anthracenes
PA4	C4-Phenanthrenes/Anthracenes
RET	Retene
DBT0	Dibenzothiophene
DBT1	C1-Dibenzothiophenes
DBT2	C2-Dibenzothiophenes
DBT3	C3-Dibenzothiophenes
DBT4	C4-Dibenzothiophenes
BF	Benzo(b)fluorene
FL0	Fluoranthene
PY0	Pyrene

Abbrev	Analytes
FP1	C1-Fluoranthenes/Pyrenes
FP2	C2-Fluoranthenes/Pyrenes
FP3	C3-Fluoranthenes/Pyrenes
FP4	C4-Fluoranthenes/Pyrenes
NBT0	Naphthobenzothiophenes
NBT1	C1-Naphthobenzothiophenes
NBT2	C2-Naphthobenzothiophenes
NBT3	C3-Naphthobenzothiophenes
NBT4	C4-Naphthobenzothiophenes
BA0	Benz[a]anthracene
C0	Chrysene/Triphenylene
BC1	C1-Chrysenes
BC2	C2-Chrysenes
BC3	C3-Chrysenes
BC4	C4-Chrysenes
BBF	Benzo[b]fluoranthene
BJKF	Benzo[k]fluoranthene
BAF	Benzo[a]fluoranthene
BEP	Benzo[e]pyrene
BAP	Benzo[a]pyrene
PER	Perylene
IND	Indeno[1,2,3-cd]pyrene
DA	Dibenz[a,h]anthracene
GHI	Benzo[g,h,i]perylene
CAR	Carbazole
4MDT	4-Methyldibenzthiophene
2DMT	2/3-Methyldibenzothiophene
1DMT	1-Methyldibenzothiophene
3MP	3-Methylphenanthrene
2MP	2-Methylphenanthrene
2MA	2-Methylanthracene
9MP	9/4-Methylphenanthrene
1MP	1-Methylphenanthrene
1MN	1-Methylnaphthalene
2MN	2-Methylnaphthalenene
26DMN	2,6-Dimethylnaphthalene
235TMN	2,3,5-Trimethylnaphthalene

Table 4. Triterpane and Sterane Biomarker Target Compound List.

Abbrev	Analytes
T4	C23 Tricyclic Terpane
T5	C24 Tricyclic Terpane
T6	C25 Tricyclic Terpane
T6a	C24 Tetracyclic Terpane
T6b	C26 Tricyclic Terpane-22S
T6c	C26 Tricyclic Terpane-22R
T7	C28 Tricyclic Terpane-22S
T8	C28 Tricyclic Terpane-22R
T9	C29 Tricyclic Terpane-22S
T10	C29 Tricyclic Terpane-22R
T11	18a-22,29,30-Trisnorneohopane-TS
T11a	C30 Tricyclic Terpane-22S
T11b	C30 Tricyclic Terpane-22R
T12	17a(H)-22,29,30-Trisnorhopane-TM
T14a	17a/b,21b/a 28,30-Bisnorhopane
T14b	17a(H),21b(H)-25-Norhopane
T15	30-Norhopane
T16	18a(H)-30-Norneohopane-C29Ts
X	17a(H)-Diahopane
T17	30-Normoretane
T18	18a(H)&18b(H)-Oleananes
T19	Hopane
T20	Moretane
T21	30-Homohopane-22S
T22	30-Homohopane-22S
T22A	Gammarcerane/C32-Diahopane
T26	30,31-Bishomohopane-22S
T27	30,31-Bishomohopane-22R
T30	30,31-Trishomohopane-22S
T31	30,31-Trishomohopane-22R
T32	Tetrakishomohopane-22S
T33	Tetrakishomohopane-22R
T34	Pentakishomohopane-22S
T35	Pentakishomohopane-22R

Abbrev	Analytes
S4	13b(H),17a(H)-20S-Diacholestane
S5	13b(H),17a(H)-20R-Diacholestane
S8	13b,17a-20S-Methyldiacholestane
S12	14a(H),17a(H)-20S-Cholestane
S17	14a(H),17a(H)-20R-Cholestane
S18	13b,17a-20R-Ethyldiacholestane
S19	13a,17b-20S-Ethyldiacholestane
S20	14a,17a-20S-Methylcholestane
S24	14a,17a-20R-Methylcholestane
S25	14a(H),17a(H)-20S-Ethylcholestane
S28	14a(H),17a(H)-20R-Ethylcholestane
S14	14b(H),17b(H)-20R-Cholestane
S15	14b(H),17b(H)-20S-Cholestane
S22	14b,17b-20R-Methylcholestane
S23	14b,17b-20S-Methylcholestane
S26	14b(H),17b(H)-20R-Ethylcholestane
S27	14b(H),17b(H)-20S-Ethylcholestane
RC26/SC27TA	C26,20R- +C27,20S- triaromatic steroid
SC28TA	C28,20S-triaromatic steroid
RC27TA	C27,20R-triaromatic steroid
RC28TA	C28,20R-triaromatic steroid

Attachment 1

Chain of Custody

1/29/24 L2404171

AGQ Labs

CADENA DE CUSTODIA / SOLICITUD DE ANÁLISIS

PARA SER LLENADO POR COMERCIAL AGQ

N° Presupuesto / Contrato	QSP-PE240100009	Cod. Cliente	PE01-00
N° Proyecto / Estudio		N° Dirc. Entrega	

CLIENTE y RUC	Refinería La Pampilla S. A. A.
CONTACTO	Giancarlo Enrico
TELÉFONO / e-mail	Giancarlosantiago.enrico@repsol.com / 999489711
DATOS DE CLIENTE TERCERO	
RAZON SOCIAL	
DATOS DEL PROYECTO	
NOMBRE DEL PROYECTO	*Monitoreo de Hallazgos en formaciones costeras – Finger Print*
LUGAR DE MUESTREO (Finca / Área)	*Zona Submareal Ventanilla*
CONTACTO AGQ	*José Maldonado* — N° OS / OC: 4500960706

ANÁLISIS REQUERIDOS — PARÁMETROS: Finger Print

Indicar con una (X) los recuadros inferiores según los análisis requeridos por cada muestra

Código del laboratorio	Punto de Muestreo / Descripción	Fecha (dd-mm-aa)	Hora (24:00)	Tipo de muestra* Sub tipo**	Coordenadas UTM N-HUSO	Número de envases por punto de muestreo	Análisis tipo aplicado (AT)	Finger Print
04171 -01	AS SUB 23ENE2024	23/01/2024	17:00	5A	N: 8681921 E: 0266023 18L		PE01-00025549-104	X

* Tipo de Muestra (Categoría)	** Sub Tipo (Sub categoría)	* Tipo de Muestra (Categoría)	** Sub Tipo (Sub Categoría)	* Tipo de Muestra	** Sub Tipo
1. Agua Residual	Doméstica = (A); Municipal = (B); Industrial = (C)	5. Agua salinas	Mar = (A); Salobre = (B); Salmuera (C)	7. Muestra Sólida	Suelo = (A); Lodo = (B); Sedimento = (C)
2. Agua Natural Subterránea	Manantial/ Pozo = (A); Termal = (B)	6. Agua de Proceso	Circulación/Enfriamiento = (A); Alimentación para Caldera = (B), Agua de Calderas (C); Lixiviación = (D); Purificada (E); Inyección-Reinyección (F)	8. Residuos	Sólido = (A); Líquido = (B)
3. Agua Natural Superficial	Río = (A); Lago/Laguna = (B); Deposición atmosférica - lluvia (C)			9. Ruido	
4. Agua de Consumo Humano	Bebida Potable = (A); Bebida Envasada = (B); Piscina = (C); Laguna Artificial = (D)			10. Otros (Indicar tipo)	

INFORMACIÓN DEL MUESTREO

Muestreo Realizado Por		Procedimiento de Muestreo	
Empresa	AGQ PERU S.A.C.	PNT / PPI	211
Responsable	Raquel Huaris	PNT / PPI	
Firma	[firma]	PNT / PPI	

Fitoplancton (Cualitativo) / Zooplancton (Cuantitativo / Cualitativo) / Perifiton — Volumen de filtrado / Volumen de filtrado / Área de raspado

Datos Equipos de Monitoreo (Solo AGQ): Equipo: MULTIPARÁMETRO — N° de serie: 2306185

Supervisor / Cliente	
Nombre	Giancarlo Enrico
Cargo	Supervisor de operaciones
Firma	[firma]

RUDY MEZA MEDINA DNI: 42121481

OBSERVACIONES PARA EL INFORME:
SE PROCEDIO A LLEGAR AL PUNTO INDICADO POR EL REPRESENTANTE DEL CLIENTE, SE REALIZO EL PROCEDIMIENTO DE CARACTERIZACION DE LA MUESTRA Y PRECINTADO EN CAMPO EN PRESENCIA DEL REPRESENTANTE DEL CLIENTE. SE USO EL PRECINTO N° 002504. SE TOMARON LAS COORDENADAS IN SITU

OBSERVACIONES DE LA MUESTRA (no se incluyen en el informe)

SOLO PARA SER LLENADO POR OPERACIONES - RECEPCIÓN DE MUESTRAS - AGQ

Recibido por	Cesar Vidal A.
Fecha (dd-mm-aa)	24-01-24 — Hora (24:00): 23:45h — T° 5,6°C
Mensajería Nacional	N° de Guía
Mensajería Local	N° de Guía
Condición físico (Muestras)	CONFORME / NO CONFORME
Cadena de frío	SI / NO
Entrega cliente en AGQ	

AGQ PERU SAC — 23 ENE 2024 — RECIBIDO

INTERTEK TESTING SERVICES PERU S.A. — 24 ENE. 2024 — LABORATORIO HIDROCARBUROS RECIBIDO

Rec: [firma] 1/29/24 11:24

Attachment 2

Analytical Data

Project Name: PAMPILLA 2
Project Number:

Client ID	AS SUB 23ENE2024
Lab ID	L2404171-01
Matrix	WATER
Matrix Description	
Reference Method	8015D(M)
Batch ID	WG1879745
Date Collected	1/23/2024
Date Received	1/29/2024
Date Prepped	1/30/2024
Date Analyzed	1/31/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F601312419
Units	ug/l
Final Volume	1
Dilution	1
Reporting Limit	1.85

Class	Abbrev	Analytes	Result		SSRL
SHC	C9	NONANE (C9)		U	1.85
SHC	C10	DECANE (C10)	0.272	JB	1.85
SHC	C11	UNDECANE	0.117	J	1.85
SHC	C12	DODECANE (C12)	0.104	J	1.85
SHC	C13	TRIDECANE		U	1.85
SHC	1380	2,6,10-TRIMETHYLDODECANE (1380)	0.215	J	1.85
SHC	C14	TETRADECANE (C14)	0.124	J	1.85
SHC	1470	2,6,10-TRIMETHYLTRIDECANE (1470)	0.950	J	1.85
SHC	C15	PENTADECANE (C15)	0.580	J	1.85
SHC	C16	HEXADECANE (C16)	1.06	J	1.85
SHC	1650	NORPRISTANE (1650)	8.43		1.85
SHC	C17	HEPTADECANE (C17)		U	1.85
SHC	Pr	PRISTANE	20.1		1.85
SHC	C18	OCTADECANE (C18)		U	1.85
SHC	Ph	PHYTANE	29.8		1.85
SHC	C19	NONADECANE (C19)	2.97		1.85
SHC	C20	EICOSANE (C20)		U	1.85
SHC	C21	HENEICOSANE (C21)	2.05		1.85
SHC	C22	DOCOSANE (C22)	1.65	J	1.85
SHC	C23	TRICOSANE (C23)		U	1.85
SHC	C24	TETRACOSANE (C24)	3.20		1.85
SHC	C25	PENTACOSANE (C25)		U	1.85
SHC	C26	HEXACOSANE (C26)		U	1.85
SHC	C27	HEPTACOSANE (C27)		U	1.85
SHC	C28	OCTACOSANE (C28)		U	1.85
SHC	C29	NONACOSANE (C29)		U	1.85
SHC	C30	TRIACONTANE (C30)		U	1.85
SHC	C31	HENTATRIACONTANE (C31)		U	1.85
SHC	C32	DOTRIACONTANE (C32)		U	1.85
SHC	C33	TRITRIACONTANE (C33)		U	1.85
SHC	C34	TETRATRIACONTANE (C34)		U	1.85
SHC	C35	PENTATRIACONTANE (C35)		U	1.85
SHC	C36	HEXATRIACONTANE (C36)		U	1.85
SHC	C37	HEPTATRIACONTANE (C37)		U	1.85
SHC	C38	OCTATRIACONTANE (C38)		U	1.85
SHC	C39	NONATRIACONTANE (C39)		U	1.85
SHC	C40	TETRACONTANE (C40)		U	1.85
SHC	TPH	TOTAL PETROLEUM HYDROCARBONS (C9-C44)	32700		61.1
SHC	TSH	TOTAL SATURATED HYDROCARBONS	71.6	J	1.85

Surrogates (% Recovery)	
O-TERPHENYL	88
D50-TETRACOSANE	92

Project Name: PAMPILLA 2
Project Number:

Client ID	Laboratory Method Bl
Lab ID	WG1879745-1
Matrix	WATER
Matrix Description	
Reference Method	8015D(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	1/31/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F601312411
Units	ug/l
Final Volume	1
Dilution	1
Reporting Limit	1.85

Class	Abbrev	Analytes	Result		SSRL
SHC	C9	NONANE (C9)	0.020	J	1.85
SHC	C10	DECANE (C10)	0.165	J	1.85
SHC	C11	UNDECANE		U	1.85
SHC	C12	DODECANE (C12)		U	1.85
SHC	C13	TRIDECANE		U	1.85
SHC	1380	2,6,10-TRIMETHYLDODECANE (1380)		U	1.85
SHC	C14	TETRADECANE (C14)		U	1.85
SHC	1470	2,6,10-TRIMETHYLTRIDECANE (1470)		U	1.85
SHC	C15	PENTADECANE (C15)		U	1.85
SHC	C16	HEXADECANE (C16)		U	1.85
SHC	1650	NORPRISTANE (1650)		U	1.85
SHC	C17	HEPTADECANE (C17)		U	1.85
SHC	Pr	PRISTANE		U	1.85
SHC	C18	OCTADECANE (C18)	1.51	J	1.85
SHC	Ph	PHYTANE		U	1.85
SHC	C19	NONADECANE (C19)	0.028	J	1.85
SHC	C20	EICOSANE (C20)	0.011	J	1.85
SHC	C21	HENEICOSANE (C21)	0.017	J	1.85
SHC	C22	DOCOSANE (C22)	0.056	J	1.85
SHC	C23	TRICOSANE (C23)	0.135	J	1.85
SHC	C24	TETRACOSANE (C24)	0.146	J	1.85
SHC	C25	PENTACOSANE (C25)	0.580	J	1.85
SHC	C26	HEXACOSANE (C26)	0.135	J	1.85
SHC	C27	HEPTACOSANE (C27)	0.141	J	1.85
SHC	C28	OCTACOSANE (C28)	0.254	J	1.85
SHC	C29	NONACOSANE (C29)	0.089	J	1.85
SHC	C30	TRIACONTANE (C30)	0.085	J	1.85
SHC	C31	HENTATRIACONTANE (C31)	0.111	J	1.85
SHC	C32	DOTRIACONTANE (C32)	0.037	J	1.85
SHC	C33	TRITRIACONTANE (C33)		U	1.85
SHC	C34	TETRATRIACONTANE (C34)		U	1.85
SHC	C35	PENTATRIACONTANE (C35)		U	1.85
SHC	C36	HEXATRIACONTANE (C36)		U	1.85
SHC	C37	HEPTATRIACONTANE (C37)		U	1.85
SHC	C38	OCTATRIACONTANE (C38)		U	1.85
SHC	C39	NONATRIACONTANE (C39)		U	1.85
SHC	C40	TETRACONTANE (C40)		U	1.85
SHC	TPH	TOTAL PETROLEUM HYDROCARBONS (C9-C44)		U	61.1
SHC	TSH	TOTAL SATURATED HYDROCARBONS	3.52	J	1.85

Surrogates (% Recovery)	
O-TERPHENYL	86
D50-TETRACOSANE	88

Project Name: PAMPILLA 2
Project Number:

Client ID	Laboratory Control S
Lab ID	WG1879745-2
Matrix	WATER
Matrix Description	
Reference Method	8015D(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	1/31/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F601312413
Units	%
Final Volume	1
Dilution	1
Reporting Limit	1.85

Class	Abbrev	Analytes	Result	SSRL	% REC	Spike Conc.	Lower Limit	Upper Limit
SHC	C9	NONANE (C9)	23.6	1.85	64	37	50	130
SHC	C10	DECANE (C10)	24.4	1.85	66	37	50	130
SHC	C12	DODECANE (C12)	26.6	1.85	72	37	50	130
SHC	C14	TETRADECANE (C14)	30.4	1.85	82	37	50	130
SHC	C16	HEXADECANE (C16)	34.2	1.85	92	37	50	130
SHC	C18	OCTADECANE (C18)	36.1	1.85	97	37	50	130
SHC	C19	NONADECANE (C19)	32.5	1.85	88	37	50	130
SHC	C20	EICOSANE (C20)	33.4	1.85	90	37	50	130
SHC	C22	DOCOSANE (C22)	32.9	1.85	89	37	50	130
SHC	C24	TETRACOSANE (C24)	35.6	1.85	96	37	50	130
SHC	C26	HEXACOSANE (C26)	33.6	1.85	91	37	50	130
SHC	C28	OCTACOSANE (C28)	33.6	1.85	91	37	50	130
SHC	C30	TRIACONTANE (C30)	34.1	1.85	92	37	50	130
SHC	C36	HEXATRIACONTANE (C36)	30.6	1.85	83	37	50	130

Surrogates (% Recovery)	
O-TERPHENYL	92
D50-TETRACOSANE	93

Project Name: PAMPILLA 2
Project Number:

Client ID	LCS Duplicate
Lab ID	WG1879745-3
Matrix	WATER
Matrix Description	
Reference Method	8015D(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	1/31/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F601312415
Units	%
Final Volume	1
Dilution	1
Reporting Limit	1.85

Class	Abbrev	Analytes	Result	SSRL	% REC	Spike Conc.	Lower Limit	Upper Limit	RPD	RPD Limit
SHC	C9	NONANE (C9)	23.7	1.85	64	37	50	130	0	30
SHC	C10	DECANE (C10)	24.9	1.85	67	37	50	130	2	30
SHC	C12	DODECANE (C12)	27.9	1.85	75	37	50	130	4	30
SHC	C14	TETRADECANE (C14)	32.3	1.85	87	37	50	130	6	30
SHC	C16	HEXADECANE (C16)	36.7	1.85	99	37	50	130	7	30
SHC	C18	OCTADECANE (C18)	38.7	1.85	104	37	50	130	7	30
SHC	C19	NONADECANE (C19)	35.0	1.85	94	37	50	130	7	30
SHC	C20	EICOSANE (C20)	35.9	1.85	97	37	50	130	7	30
SHC	C22	DOCOSANE (C22)	35.3	1.85	95	37	50	130	7	30
SHC	C24	TETRACOSANE (C24)	37.9	1.85	102	37	50	130	6	30
SHC	C26	HEXACOSANE (C26)	35.4	1.85	96	37	50	130	5	30
SHC	C28	OCTACOSANE (C28)	35.4	1.85	96	37	50	130	5	30
SHC	C30	TRIACONTANE (C30)	35.6	1.85	96	37	50	130	4	30
SHC	C36	HEXATRIACONTANE (C36)	32.0	1.85	86	37	50	130	4	30

Surrogates (% Recovery)	
O-TERPHENYL	95
D50-TETRACOSANE	96

Project Name: PAMPILLA 2
Project Number:

Client ID	Alaska North Slope Crude
Lab ID	WG1840757-1
Matrix	OIL
Matrix Description	Crude Oil
Reference Method	1,8015D(M)-A2-NFSHC
Batch ID	WG1840757-1
Date Collected	N/A
Date Received	N/A
Date Prepped	N/A
Date Analyzed	9/9/2023
Sample Size(wet)	0.1008 g
% Solid	100
File ID	F609082329
Units	mg/kg
Final Volume	10
Dilution	1
Reporting Limit	0.992

Class	Abbrev	Analytes	Result	SSRL	% REC	Spike Conc.	Lower Limit	Upper Limit
SHC	C9	NONANE (C9)	6600	0.992	105	6286	65	135
SHC	C10	DECANE (C10)	5340	0.992	106	5047	65	135
SHC	C11	UNDECANE	4970	0.992	106	4703	65	135
SHC	C12	DODECANE (C12)	4660	0.992	112	4155	65	135
SHC	C13	TRIDECANE	4240	0.992	104	4058	65	135
SHC	1380	2,6,10-TRIMETHYLDODECANE (1380)	948	0.992	112	845	65	135
SHC	C14	TETRADECANE (C14)	3850	0.992	105	3670	65	135
SHC	1470	2,6,10-TRIMETHYLTRIDECANE (1470)	1520	0.992	111	1367	65	135
SHC	C15	PENTADECANE (C15)	3910	0.992	107	3660	65	135
SHC	C16	HEXADECANE (C16)	3530	0.992	106	3330	65	135
SHC	1650	NORPRISTANE (1650)	1150	0.992	105	1093	65	135
SHC	C17	HEPTADECANE (C17)	2980	0.992	99	3012	65	135
SHC	Pr	PRISTANE	2360	0.992	110	2145	65	135
SHC	C18	OCTADECANE (C18)	2700	0.992	100	2700	65	135
SHC	Ph	PHYTANE	1360	0.992	112	1215	65	135
SHC	C19	NONADECANE (C19)	2650	0.992	115	2305	65	135
SHC	C20	EICOSANE (C20)	2710	0.992	116	2337	65	135
SHC	C21	HENEICOSANE (C21)	2270	0.992	111	2044	65	135
SHC	C22	DOCOSANE (C22)	2120	0.992	108	1972	65	135
SHC	C23	TRICOSANE (C23)	1900	0.992	109	1745	65	135
SHC	C24	TETRACOSANE (C24)	1870	0.992	114	1641	65	135
SHC	C25	PENTACOSANE (C25)	1990	0.992	127	1562	65	135
SHC	C26	HEXACOSANE (C26)	1490	0.992	108	1378	65	135
SHC	C27	HEPTACOSANE (C27)	1250	0.992	115	1083	65	135
SHC	C28	OCTACOSANE (C28)	852	0.992	110	776	65	135
SHC	C29	NONACOSANE (C29)	857	0.992	117	734	65	135
SHC	C30	TRIACONTANE (C30)	673	0.992	107	627	65	135
SHC	C31	HENTATRIACONTANE (C31)	555	0.992	108	514	65	135
SHC	C32	DOTRIACONTANE (C32)	579	0.992	126	458	65	135
SHC	C33	TRITRIACONTANE (C33)	510	0.992	131	388	65	135
SHC	C34	TETRATRIACONTANE (C34)	381	0.992	110	347	65	135
SHC	C35	PENTATRIACONTANE (C35)	360	0.992	129	278	65	135
SHC	C36	HEXATRIACONTANE (C36)	242	0.992	130	186	65	135
SHC	C37	HEPTATRIACONTANE (C37)	188	0.992	124	152	65	135
SHC	C38	OCTATRIACONTANE (C38)	146	0.992	111	131	65	135
SHC	C39	NONATRIACONTANE (C39)	110	0.992	124	89	65	135
SHC	C40	TETRACONTANE (C40)	105	0.992	114	92	65	135
SHC	TPH	TOTAL PETROLEUM HYDROCARBONS (C9-C44)	588000	0.992	106	554993	65	135
SHC	TSH	TOTAL SATURATED HYDROCARBONS	83196	0.992	122	68122	65	135

Project Name: PAMPILLA 2
Project Number:

Client ID	AS SUB 23ENE2024
Lab ID	L2404171-01
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	1/23/2024
Date Received	1/29/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012409
Units	ng/l
Final Volume	1
Dilution	1
Reporting Limit	9.26

Class	Abbrev	Analytes	Result		SSRL
2	D0	CIS/TRANS-DECALIN	2.72	J	9.26
2	D1	C1-DECALINS	12.7	J	18.5
2	D2	C2-DECALINS	27.4		18.5
2	D3	C3-DECALINS		U	18.5
2	D4	C4-DECALINS	106		18.5
S	BT0	BENZOTHIOPHENE	8.78	J	18.5
2	BT1	C1-BENZO(B)THIOPHENES	27.6		18.5
2	BT2	C2-BENZO(B)THIOPHENES	25.4		18.5
2	BT3	C3-BENZO(B)THIOPHENES	128		18.5
2	BT4	C4-BENZO(B)THIOPHENES	203		18.5
A	N0	NAPHTHALENE	1060		18.5
2	N1	C1-NAPHTHALENES	262		18.5
2	N2	C2-NAPHTHALENES	278		18.5
2	N3	C3-NAPHTHALENES	638		18.5
2	N4	C4-NAPHTHALENES	1150		18.5
2	B	BIPHENYL	68.8		18.5
3	DF	DIBENZOFURAN	33.5		18.5
3	AY	ACENAPHTHYLENE	4.52	JB	18.5
3	AE	ACENAPHTHENE	28.2		18.5
3	F0	FLUORENE	102		18.5
3	F1	C1-FLUORENES	325		18.5
3	F2	C2-FLUORENES	1150		18.5
3	F3	C3-FLUORENES	1490		18.5
3	A0	ANTHRACENE		U	18.5
3	P0	PHENANTHRENE	230		18.5
3	PA1	C1-PHENANTHRENES/ANTHRACENES	736		18.5
3	PA2	C2-PHENANTHRENES/ANTHRACENES	1350		18.5
3	PA3	C3-PHENANTHRENES/ANTHRACENES	1120		18.5
3	PA4	C4-PHENANTHRENES/ANTHRACENES	698		18.5
3	RET	RETENE		U	18.5
3	DBT0	DIBENZOTHIOPHENE	29.8		18.5
3	DBT1	C1-DIBENZOTHIOPHENES	230		18.5
3	DBT2	C2-DIBENZOTHIOPHENES	277		18.5
3	DBT3	C3-DIBENZOTHIOPHENES	191		18.5
3	DBT4	C4-DIBENZOTHIOPHENES	146		18.5
4	BF	BENZO(B)FLUORENE		U	18.5
4	FL0	FLUORANTHENE	98.6		18.5
4	PY0	PYRENE	165		18.5
4	FP1	C1-FLUORANTHENES/PYRENES	393		18.5
4	FP2	C2-FLUORANTHENES/PYRENES	365		18.5
4	FP3	C3-FLUORANTHENES/PYRENES	307		18.5
4	FP4	C4-FLUORANTHENES/PYRENES	250		18.5
4	NBT0	NAPHTHOBENZOTHIOPHENE		U	18.5
4	NBT1	C1-NAPHTHOBENZOTHIOPHENES		U	18.5
4	NBT2	C2-NAPHTHOBENZOTHIOPHENES		U	18.5
4	NBT3	C3-NAPHTHOBENZOTHIOPHENES		U	18.5
4	NBT4	C4-NAPHTHOBENZOTHIOPHENES		U	18.5
4	BA0	BENZ(A)ANTHRACENE	23.0		18.5
4	C0	CHRYSENE/TRIPHENYLENE	33.9		18.5
4	BC1	C1-CHRYSENES	56.0		18.5
4	BC2	C2-CHRYSENES	91.7		18.5
4	BC3	C3-CHRYSENES		U	18.5
4	BC4	C4-CHRYSENES		U	18.5
5	BBF	BENZO(B)FLUORANTHENE	24.4		18.5

Project Name: PAMPILLA 2
Project Number:

Client ID	AS SUB 23ENE2024
Lab ID	L2404171-01
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	1/23/2024
Date Received	1/29/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012409
Units	ng/l
Final Volume	1
Dilution	1
Reporting Limit	9.26

Class	Abbrev	Analytes	Result		SSRL
5	BJKF	BENZO(J)+(K)FLUORANTHENE	42.8		18.5
5	BAF	BENZO(A)FLUORANTHENE		U	18.5
5	BEP	BENZO(E)PYRENE	19.7	B	18.5
5	BAP	BENZO(A)PYRENE	26.9		18.5
5	PER	PERYLENE	9.14	JB	18.5
6	IND	INDENO(1,2,3-CD)PYRENE	65.4		18.5
6	DA	DIBENZ(A,H)+(A,C)ANTHRACENE	17.0	JB	18.5
6	GHI	BENZO(GHI)PERYLENE	57.6		18.5
O	CAR	CARBAZOLE	14.3	J	18.5
3	4MDT	4-METHYLDIBENZOTHIOPHENE(4MDT)	14.7	J	18.5
3	2DMT	2/3-METHYLDIBENZOTHIOPHENE(2MDT)		U	18.5
3	1DMT	1-METHYLDIBENZOTHIOPHENE(1MDT)	62.3		18.5
3	3MP	3-METHYLPHENANTHRENE (3MP)	191		18.5
3	2MP	2-METHYLPHENANTHRENE (2MP)	203		18.5
3	2MA	2-METHYLANTHRACENE (2MA)	8.65	J	18.5
3	9MP	9/4-METHYLPHENANTHRENE (9MP)	146		18.5
3	1MP	1-METHYLPHENANTHRENE (1MP)	118		18.5
A	1MN	1-METHYLNAPHTHALENE	162		18.5
A	2MN	2-METHYLNAPHTHALENE	240		18.5
2	26DMN	2,6-DIMETHYLNAPHTHALENE	118		18.5
2	235TMN	2,3,5-TRIMETHYLNAPHTHALENE	102		18.5
H30	T19	HOPANE (T19)	6030		18.5
t23	T4	C23 TRICYCLIC TERPANE (T4)	1080		18.5
t24	T5	C24 TRICYCLIC TERPANE (T5)	536		18.5
t25	T6	C25 TRICYCLIC TERPANE (T6)	559		18.5
te24	T6a	C24 TETRACYCLIC TERPANE (T6A)	483		18.5
t26S	T6b	C26 TRICYCLIC TERPANE-22S (T6B)	187		18.5
t26R	T6c	C26 TRICYCLIC TERPANE-22R (T6C)	224		18.5
t28S	T7	C28 TRICYCLIC TERPANE-22S (T7)	309		18.5
t28R	T8	C28 TRICYCLIC TERPANE-22R (T8)	446		18.5
t29S	T9	C29 TRICYCLIC TERPANE-22S (T9)	360		18.5
t29R	T10	C29 TRICYCLIC TERPANE-22R (T10)	400		18.5
Ts	T11	18A-22,29,30-TRISNORNEOHOPANE-TS (T11)	2120		18.5
t30S	T11a	C30 TRICYCLIC TERPANE-22S	285		18.5
t30R	T11b	C30 TRICYCLIC TERPANE-22R	349		18.5
Tm	T12	17A(H)-22,29,30-TRISNORHOPANE-TM (T12)	877		18.5
BNH	T14a	17A/B,21B/A 28,30-BISNORHOPANE (T14A)	116		18.5
25N	T14b	17A(H),21B(H)-25-NORHOPANE (T14B)	294		18.5
H29	T15	30-NORHOPANE (T15)	5470		18.5
C29Ts	T16	18A(H)-30-NORNEOHOPANE-C29TS (T16)	1110		18.5
X	X	17A(H)-DIAHOPANE (X)	331		18.5
M29	T17	30-NORMORETANE (T17)	718		18.5
OL	T18	18A(H)&18B(H)-OLEANANES (T18)	221		18.5
M30	T20	MORETANE (T20)	596		18.5
H31S	T21	30-HOMOHOPANE-22S (T21)	3560		18.5
H31R	T22	30-HOMOHOPANE-22R (T22)	3320		18.5
T22A	T22A	GAMMACERANE/C32-DIAHOPANE	1280		18.5
H32S	T26	30,31-BISHOMOHOPANE-22S (T26)	2700		18.5
H32R	T27	30,31-BISHOMOHOPANE-22R (T27)	1860		18.5
H33S	T30	30,31-TRISHOMOHOPANE-22S (T30)	1950		18.5
H33R	T31	30,31-TRISHOMOHOPANE-22R (T31)	1270		18.5
H34S	T32	TETRAKISHOMOHOPANE-22S (T32)	1490		18.5
H34R	T33	TETRAKISHOMOHOPANE-22R (T33)	1130		18.5
H35S	T34	PENTAKISHOMOHOPANE-22S (T34)	1620		18.5

Project Name: PAMPILLA 2
Project Number:

Client ID	AS SUB 23ENE2024
Lab ID	L2404171-01
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	1/23/2024
Date Received	1/29/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012409
Units	ng/l
Final Volume	1
Dilution	1
Reporting Limit	9.26

Class	Abbrev	Analytes	Result		SSRL
H35R	T35	PENTAKISHOMOHOPANE-22R (T35)	1380		18.5
d27S	S4	13B(H),17A(H)-20S-DIACHOLESTANE (S4)	883		18.5
d27R	S5	13B(H),17A(H)-20R-DIACHOLESTANE (S5)	494		18.5
d28S	S8	13B,17A-20S-METHYLDIACHOLESTANE (S8)	442		18.5
aa27S	S12	17A(H)20SC27/C29DIA	1400		18.5
aa27R	S17	17A(H)20RC27/C29DIA	1420		18.5
d29R	S18	UNKNOWN STERANE (S18)	380		18.5
d29S	S19	13A,17B-20S-ETHYLDIACHOLESTANE (S19)	84.2		18.5
aa28S	S20	14A,17A-20S-METHYLCHOLESTANE (S20)	840		18.5
aa28R	S24	14A,17A-20R-METHYLCHOLESTANE (S24)	580		18.5
aa29S	S25	14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25)	684		18.5
aa29R	S28	14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28)	806		18.5
bb27R	S14	14B(H),17B(H)-20R-CHOLESTANE (S14)	912		18.5
bb27S	S15	14B(H),17B(H)-20S-CHOLESTANE (S15)	833		18.5
bb28R	S22	14B,17B-20R-METHYLCHOLESTANE (S22)	788		18.5
bb28S	S23	14B,17B-20S-METHYLCHOLESTANE (S23)	991		18.5
bb29R	S26	14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26)	1610		18.5
bb29S	S27	14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27)	851		18.5
RC26/SC27TAS	TAS01	C26,20R+C27,20S TAS	193		18.5
SC28TAS	TAS02	C28,20S TAS	184		18.5
RC27TAS	TAS03	C27,20R TAS	197		18.5
RC28TAS	TAS04	C28,20R TAS		U	18.5

Surrogates (% Recovery)	
NAPHTHALENE-D8	81
PHENANTHRENE-D10	60
BENZO(A)PYRENE-D12	115
5B(H)CHOLANE	102

Project Name: PAMPILLA 2
Project Number:

Client ID	Laboratory Method Bl
Lab ID	WG1879745-1
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012406
Units	ng/l
Final Volume	1
Dilution	1
Reporting Limit	9.26

Class	Abbrev	Analytes	Result		SSRL
2	D0	CIS/TRANS-DECALIN	U		9.26
2	D1	C1-DECALINS	U		18.5
2	D2	C2-DECALINS	U		18.5
2	D3	C3-DECALINS	U		18.5
2	D4	C4-DECALINS	U		18.5
S	BT0	BENZOTHIOPHENE	U		18.5
2	BT1	C1-BENZO(B)THIOPHENES	U		18.5
2	BT2	C2-BENZO(B)THIOPHENES	U		18.5
2	BT3	C3-BENZO(B)THIOPHENES	U		18.5
2	BT4	C4-BENZO(B)THIOPHENES	U		18.5
A	N0	NAPHTHALENE	2.25	J	18.5
2	N1	C1-NAPHTHALENES	3.32	J	18.5
2	N2	C2-NAPHTHALENES	U		18.5
2	N3	C3-NAPHTHALENES	U		18.5
2	N4	C4-NAPHTHALENES	U		18.5
2	B	BIPHENYL	1.85	J	18.5
3	DF	DIBENZOFURAN	0.600	J	18.5
3	AY	ACENAPHTHYLENE	0.724	J	18.5
3	AE	ACENAPHTHENE	1.49	J	18.5
3	F0	FLUORENE	1.62	J	18.5
3	F1	C1-FLUORENES	U		18.5
3	F2	C2-FLUORENES	U		18.5
3	F3	C3-FLUORENES	U		18.5
3	A0	ANTHRACENE	0.992	J	18.5
3	P0	PHENANTHRENE	3.66	J	18.5
3	PA1	C1-PHENANTHRENES/ANTHRACENES	2.46	J	18.5
3	PA2	C2-PHENANTHRENES/ANTHRACENES	U		18.5
3	PA3	C3-PHENANTHRENES/ANTHRACENES	U		18.5
3	PA4	C4-PHENANTHRENES/ANTHRACENES	U		18.5
3	RET	RETENE	U		18.5
3	DBT0	DIBENZOTHIOPHENE	1.25	J	18.5
3	DBT1	C1-DIBENZOTHIOPHENES	1.70	J	18.5
3	DBT2	C2-DIBENZOTHIOPHENES	U		18.5
3	DBT3	C3-DIBENZOTHIOPHENES	U		18.5
3	DBT4	C4-DIBENZOTHIOPHENES	U		18.5
4	BF	BENZO(B)FLUORENE	U		18.5
4	FL0	FLUORANTHENE	1.02	J	18.5
4	PY0	PYRENE	1.24	J	18.5
4	FP1	C1-FLUORANTHENES/PYRENES	U		18.5
4	FP2	C2-FLUORANTHENES/PYRENES	U		18.5
4	FP3	C3-FLUORANTHENES/PYRENES	U		18.5
4	FP4	C4-FLUORANTHENES/PYRENES	U		18.5
4	NBT0	NAPHTHOBENZOTHIOPHENE	0.731	J	18.5
4	NBT1	C1-NAPHTHOBENZOTHIOPHENES	U		18.5
4	NBT2	C2-NAPHTHOBENZOTHIOPHENES	U		18.5
4	NBT3	C3-NAPHTHOBENZOTHIOPHENES	U		18.5
4	NBT4	C4-NAPHTHOBENZOTHIOPHENES	U		18.5
4	BA0	BENZ(A)ANTHRACENE	1.28	J	18.5
4	C0	CHRYSENE/TRIPHENYLENE	1.80	J	18.5
4	BC1	C1-CHRYSENES	U		18.5
4	BC2	C2-CHRYSENES	U		18.5
4	BC3	C3-CHRYSENES	U		18.5
4	BC4	C4-CHRYSENES	U		18.5
5	BBF	BENZO(B)FLUORANTHENE	2.21	J	18.5

Project Name: PAMPILLA 2
Project Number:

Client ID	Laboratory Method Bl
Lab ID	WG1879745-1
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012406
Units	ng/l
Final Volume	1
Dilution	1
Reporting Limit	9.26

Class	Abbrev	Analytes	Result		SSRL
5	BJKF	BENZO(J)+(K)FLUORANTHENE	2.04	J	18.5
5	BAF	BENZO(A)FLUORANTHENE		U	18.5
5	BEP	BENZO(E)PYRENE	2.67	J	18.5
5	BAP	BENZO(A)PYRENE	2.09	J	18.5
5	PER	PERYLENE	1.92	J	18.5
6	IND	INDENO(1,2,3-CD)PYRENE	4.17	J	18.5
6	DA	DIBENZ(A,H)+(A,C)ANTHRACENE	1.79	J	18.5
6	GHI	BENZO(GHI)PERYLENE	4.18	J	18.5
O	CAR	CARBAZOLE	0.409	J	18.5
3	4MDT	4-METHYLDIBENZOTHIOPHENE(4MDT)	0.535	J	18.5
3	2DMT	2/3-METHYLDIBENZOTHIOPHENE(2MDT)		U	18.5
3	1DMT	1-METHYLDIBENZOTHIOPHENE(1MDT)	0.604	J	18.5
3	3MP	3-METHYLPHENANTHRENE (3MP)	0.354	J	18.5
3	2MP	2-METHYLPHENANTHRENE (2MP)	0.359	J	18.5
3	2MA	2-METHYLANTHRACENE (2MA)	0.211	J	18.5
3	9MP	9/4-METHYLPHENANTHRENE (9MP)	0.628	J	18.5
3	1MP	1-METHYLPHENANTHRENE (1MP)	0.500	J	18.5
A	1MN	1-METHYLNAPHTHALENE	1.75	J	18.5
A	2MN	2-METHYLNAPHTHALENE	2.56	J	18.5
2	26DMN	2,6-DIMETHYLNAPHTHALENE		U	18.5
2	235TMN	2,3,5-TRIMETHYLNAPHTHALENE		U	18.5
H30	T19	HOPANE (T19)		U	18.5
t23	T4	C23 TRICYCLIC TERPANE (T4)		U	18.5
t24	T5	C24 TRICYCLIC TERPANE (T5)		U	18.5
t25	T6	C25 TRICYCLIC TERPANE (T6)		U	18.5
te24	T6a	C24 TETRACYCLIC TERPANE (T6A)		U	18.5
t26S	T6b	C26 TRICYCLIC TERPANE-22S (T6B)		U	18.5
t26R	T6c	C26 TRICYCLIC TERPANE-22R (T6C)		U	18.5
t28S	T7	C28 TRICYCLIC TERPANE-22S (T7)		U	18.5
t28R	T8	C28 TRICYCLIC TERPANE-22R (T8)		U	18.5
t29S	T9	C29 TRICYCLIC TERPANE-22S (T9)		U	18.5
t29R	T10	C29 TRICYCLIC TERPANE-22R (T10)		U	18.5
Ts	T11	18A-22,29,30-TRISNORNEOHOPANE-TS (T11)		U	18.5
t30S	T11a	C30 TRICYCLIC TERPANE-22S		U	18.5
t30R	T11b	C30 TRICYCLIC TERPANE-22R		U	18.5
Tm	T12	17A(H)-22,29,30-TRISNORHOPANE-TM (T12)		U	18.5
BNH	T14a	17A/B,21B/A 28,30-BISNORHOPANE (T14A)		U	18.5
25N	T14b	17A(H),21B(H)-25-NORHOPANE (T14B)		U	18.5
H29	T15	30-NORHOPANE (T15)		U	18.5
C29Ts	T16	18A(H)-30-NORNEOHOPANE-C29TS (T16)		U	18.5
X	X	17A(H)-DIAHOPANE (X)		U	18.5
M29	T17	30-NORMORETANE (T17)		U	18.5
OL	T18	18A(H)&18B(H)-OLEANANES (T18)		U	18.5
M30	T20	MORETANE (T20)		U	18.5
H31S	T21	30-HOMOHOPANE-22S (T21)		U	18.5
H31R	T22	30-HOMOHOPANE-22R (T22)		U	18.5
T22A	T22A	GAMMACERANE/C32-DIAHOPANE		U	18.5
H32S	T26	30,31-BISHOMOHOPANE-22S (T26)		U	18.5
H32R	T27	30,31-BISHOMOHOPANE-22R (T27)		U	18.5
H33S	T30	30,31-TRISHOMOHOPANE-22S (T30)		U	18.5
H33R	T31	30,31-TRISHOMOHOPANE-22R (T31)		U	18.5
H34S	T32	TETRAKISHOMOHOPANE-22S (T32)		U	18.5
H34R	T33	TETRAKISHOMOHOPANE-22R (T33)		U	18.5
H35S	T34	PENTAKISHOMOHOPANE-22S (T34)		U	18.5

Project Name: PAMPILLA 2
Project Number:

Client ID	Laboratory Method Bl
Lab ID	WG1879745-1
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012406
Units	ng/l
Final Volume	1
Dilution	1
Reporting Limit	9.26

Class	Abbrev	Analytes	Result	SSRL
H35R	T35	PENTAKISHOMOHOPANE-22R (T35)	U	18.5
d27S	S4	13B(H),17A(H)-20S-DIACHOLESTANE (S4)	U	18.5
d27R	S5	13B(H),17A(H)-20R-DIACHOLESTANE (S5)	U	18.5
d28S	S8	13B,17A-20S-METHYLDIACHOLESTANE (S8)	U	18.5
aa27S	S12	17A(H)20SC27/C29DIA	U	18.5
aa27R	S17	17A(H)20RC27/C29DIA	U	18.5
d29R	S18	UNKNOWN STERANE (S18)	U	18.5
d29S	S19	13A,17B-20S-ETHYLDIACHOLESTANE (S19)	U	18.5
aa28S	S20	14A,17A-20S-METHYLCHOLESTANE (S20)	U	18.5
aa28R	S24	14A,17A-20R-METHYLCHOLESTANE (S24)	U	18.5
aa29S	S25	14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25)	U	18.5
aa29R	S28	14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28)	U	18.5
bb27R	S14	14B(H),17B(H)-20R-CHOLESTANE (S14)	U	18.5
bb27S	S15	14B(H),17B(H)-20S-CHOLESTANE (S15)	U	18.5
bb28R	S22	14B,17B-20R-METHYLCHOLESTANE (S22)	U	18.5
bb28S	S23	14B,17B-20S-METHYLCHOLESTANE (S23)	U	18.5
bb29R	S26	14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26)	U	18.5
bb29S	S27	14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27)	U	18.5
RC26/SC27TAS	TAS01	C26,20R+C27,20S TAS	U	18.5
SC28TAS	TAS02	C28,20S TAS	U	18.5
RC27TAS	TAS03	C27,20R TAS	U	18.5
RC28TAS	TAS04	C28,20R TAS	U	18.5

Surrogates (% Recovery)	
NAPHTHALENE-D8	75
PHENANTHRENE-D10	90
BENZO(A)PYRENE-D12	107
5B(H)CHOLANE	86

Project Name: PAMPILLA 2
Project Number:

Client ID	Laboratory Control S
Lab ID	WG1879745-2
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012407
Units	%
Final Volume	1
Dilution	1
Reporting Limit	18.5

Class	Abbrev	Analytes	Result	SSRL	% REC	Spike Conc.	Lower Limit	Upper Limit
A	N0	NAPHTHALENE	1470	18.5	80	1850	50	130
3	AY	ACENAPHTHYLENE	1600	18.5	86	1850	50	130
3	AE	ACENAPHTHENE	1500	18.5	81	1850	50	130
3	F0	FLUORENE	1570	18.5	84	1850	50	130
3	A0	ANTHRACENE	1660	18.5	90	1850	50	130
3	P0	PHENANTHRENE	1480	18.5	80	1850	50	130
4	FL0	FLUORANTHENE	1010	18.5	55	1850	50	130
4	PY0	PYRENE	1150	18.5	62	1850	50	130
4	BA0	BENZ(A)ANTHRACENE	1850	18.5	100	1850	50	130
4	C0	CHRYSENE/TRIPHENYLENE	1720	18.5	93	1850	50	130
5	BBF	BENZO(B)FLUORANTHENE	1780	18.5	96	1850	50	130
5	BJKF	BENZO(J)+(K)FLUORANTHENE	1800	18.5	97	1850	50	130
5	BAP	BENZO(A)PYRENE	1970	18.5	106	1850	50	130
6	IND	INDENO(1,2,3-CD)PYRENE	2160	18.5	117	1850	50	130
6	DA	DIBENZ(A,H)+(A,C)ANTHRACENE	2070	18.5	112	1850	50	130
6	GHI	BENZO(GHI)PERYLENE	1900	18.5	102	1850	50	130
A	2MN	2-METHYLNAPHTHALENE	1430	18.5	77	1850	50	130

Surrogates (% Recovery)	
NAPHTHALENE-D8	86
PHENANTHRENE-D10	88
BENZO(A)PYRENE-D12	110
5B(H)CHOLANE	89

Project Name: PAMPILLA 2
Project Number:

Client ID	LCS Duplicate
Lab ID	WG1879745-3
Matrix	WATER
Matrix Description	
Reference Method	8270E-SIM(M)
Batch ID	WG1879745
Date Collected	NA
Date Received	1/30/2024
Date Prepped	1/30/2024
Date Analyzed	2/1/2024
Sample Size(wet)	540 ml
% Solid	100
File ID	F1402012408
Units	%
Final Volume	1
Dilution	1
Reporting Limit	18.5

Class	Abbrev	Analytes	Result	SSRL	% REC	Spike Conc.	Lower Limit	Upper Limit	RPD	RPD Limit
A	N0	NAPHTHALENE	1560	18.5	84	1850	50	130	5	30
3	AY	ACENAPHTHYLENE	1700	18.5	92	1850	50	130	7	30
3	AE	ACENAPHTHENE	1610	18.5	87	1850	50	130	7	30
3	F0	FLUORENE	1700	18.5	92	1850	50	130	9	30
3	A0	ANTHRACENE	1800	18.5	97	1850	50	130	7	30
3	P0	PHENANTHRENE	1620	18.5	87	1850	50	130	8	30
4	FL0	FLUORANTHENE	1130	18.5	61	1850	50	130	10	30
4	PY0	PYRENE	1280	18.5	69	1850	50	130	11	30
4	BA0	BENZ(A)ANTHRACENE	2040	18.5	110	1850	50	130	10	30
4	C0	CHRYSENE/TRIPHENYLENE	1910	18.5	103	1850	50	130	10	30
5	BBF	BENZO(B)FLUORANTHENE	2000	18.5	108	1850	50	130	12	30
5	BJKF	BENZO(J)+(K)FLUORANTHENE	2020	18.5	109	1850	50	130	12	30
5	BAP	BENZO(A)PYRENE	2210	18.5	119	1850	50	130	12	30
6	IND	INDENO(1,2,3-CD)PYRENE	2330	18.5	126	1850	50	130	7	30
6	DA	DIBENZ(A,H)+(A,C)ANTHRACENE	2350	18.5	127	1850	50	130	13	30
6	GHI	BENZO(GHI)PERYLENE	2150	18.5	116	1850	50	130	13	30
A	2MN	2-METHYLNAPHTHALENE	1510	18.5	82	1850	50	130	6	30

Surrogates (% Recovery)	
NAPHTHALENE-D8	89
PHENANTHRENE-D10	93
BENZO(A)PYRENE-D12	118
5B(H)CHOLANE	96

Project Name: PAMPILLA 2
Project Number:

Client ID	Alaska North Slope Crude
Lab ID	WG1873173-1
Matrix	OIL
Matrix Description	Crude Oil
Reference Method	1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER
Batch ID	WG1873173-1
Date Collected	N/A
Date Received	N/A
Date Prepped	N/A
Date Analyzed	1/6/2024
Sample Size(wet)	0.05184 g
% Solid	100
File ID	F1401052428
Units	mg/kg
Final Volume	10
Dilution	1
Reporting Limit	1.93

Class	Abbrev	Analytes	Result	SSRL	% REC	Spike Conc.	Lower Limit	Upper Limit
2	D0	CIS/TRANS-DECALIN	490	1.93	102	477.66	65	135
2	D1	C1-DECALINS	755	1.93	99	760.39	65	135
2	D2	C2-DECALINS	651	1.93	96	675.98	65	135
2	D3	C3-DECALINS	321	1.93	88	366.46	65	135
2	D4	C4-DECALINS	282	1.93	78	362.78	65	135
S	BT0	BENZOTHIOPHENE	5.39	1.93	94	5.75	65	135
2	BT1	C1-BENZO(B)THIOPHENES	27.4	1.93	91	29.96	65	135
2	BT2	C2-BENZO(B)THIOPHENES	49.1	1.93	96	50.93	65	135
2	BT3	C3-BENZO(B)THIOPHENES	92.1	1.93	89	103.18	65	135
2	BT4	C4-BENZO(B)THIOPHENES	84.3	1.93	93	90.8	65	135
A	N0	NAPHTHALENE	590	1.93	104	565.56	65	135
2	N1	C1-NAPHTHALENES	1160	1.93	96	1208.32	65	135
2	N2	C2-NAPHTHALENES	1320	1.93	91	1450.37	65	135
2	N3	C3-NAPHTHALENES	964	1.93	92	1052.74	65	135
2	N4	C4-NAPHTHALENES	513	1.93	88	583.65	65	135
2	B	BIPHENYL	144	1.93	99	145.7	65	135
3	DF	DIBENZOFURAN	53.9	1.93	109	49.63	65	135
3	AY	ACENAPHTHYLENE	6.32	1.93	92	6.91	65	135
3	AE	ACENAPHTHENE	16.5	1.93	90	18.35	65	135
3	F0	FLUORENE	71.8	1.93	102	70.69	65	135
3	F1	C1-FLUORENES	151	1.93	93	162.7	65	135
3	F2	C2-FLUORENES	224	1.93	89	251.87	65	135
3	F3	C3-FLUORENES	205	1.93	85	242.29	65	135
3	P0	PHENANTHRENE	177	1.93	94	188.41	65	135
3	PA1	C1-PHENANTHRENES/ANTHRACENES	360	1.93	93	388.12	65	135
3	PA2	C2-PHENANTHRENES/ANTHRACENES	387	1.93	89	434.38	65	135
3	PA3	C3-PHENANTHRENES/ANTHRACENES	254	1.93	82	308.67	65	135
3	PA4	C4-PHENANTHRENES/ANTHRACENES	103	1.93	79	129.94	65	135
3	DBT0	DIBENZOTHIOPHENE	116	1.93	89	130.56	65	135
3	DBT1	C1-DIBENZOTHIOPHENES	249	1.93	90	275.34	65	135
3	DBT2	C2-DIBENZOTHIOPHENES	307	1.93	83	369.42	65	135
3	DBT3	C3-DIBENZOTHIOPHENES	281	1.93	81	345.39	65	135
3	DBT4	C4-DIBENZOTHIOPHENES	155	1.93	80	193.51	65	135
4	FL0	FLUORANTHENE	2.95	1.93	78	3.77	65	135
4	PY0	PYRENE	9.05	1.93	78	11.65	65	135
4	FP1	C1-FLUORANTHENES/PYRENES	45.6	1.93	84	54.43	65	135
4	FP2	C2-FLUORANTHENES/PYRENES	75.2	1.93	84	89.07	65	135
4	FP3	C3-FLUORANTHENES/PYRENES	89.2	1.93	81	109.78	65	135
4	FP4	C4-FLUORANTHENES/PYRENES	75.8	1.93	78	97.22	65	135
4	NBT0	NAPHTHOBENZOTHIOPHENE	32.1	1.93	82	39.13	65	135
4	NBT1	C1-NAPHTHOBENZOTHIOPHENES	88.9	1.93	84	106.13	65	135
4	NBT2	C2-NAPHTHOBENZOTHIOPHENES	120	1.93	80	150.09	65	135
4	NBT3	C3-NAPHTHOBENZOTHIOPHENES	94.4	1.93	78	120.77	65	135
4	NBT4	C4-NAPHTHOBENZOTHIOPHENES	62.3	1.93	73	85.38	65	135
4	BA0	BENZ(A)ANTHRACENE	2.51	1.93	110	2.28	65	135
4	C0	CHRYSENE/TRIPHENYLENE	36.0	1.93	98	36.66	65	135
4	BC1	C1-CHRYSENES	64.6	1.93	100	64.59	65	135
4	BC2	C2-CHRYSENES	85.1	1.93	97	87.41	65	135
4	BC3	C3-CHRYSENES	97.1	1.93	96	101.29	65	135
4	BC4	C4-CHRYSENES	56.2	1.93	89	63.42	65	135
5	BBF	BENZO(B)FLUORANTHENE	5.36	1.93	99	5.4	65	135
5	BEP	BENZO(E)PYRENE	10.2	1.93	103	9.88	65	135
5	BAP	BENZO(A)PYRENE	2.02	1.93	100	2.03	65	135
5	PER	PERYLENE	3.25	1.93	97	3.34	65	135
6	GHI	BENZO(GHI)PERYLENE	4.18	1.93	116	3.59	65	135
O	CAR	CARBAZOLE	5.03	1.93	83	6.09	65	135
3	4MDT	4-METHYLDIBENZOTHIOPHENE(4MDT)	124	1.93	94	131.38	65	135
3	2DMT	2/3-METHYLDIBENZOTHIOPHENE(2MDT)	86.2	1.93	88	98.05	65	135
3	1DMT	1-METHYLDIBENZOTHIOPHENE(1MDT)	34.5	1.93	86	40.36	65	135

Project Name: PAMPILLA 2
Project Number:

Client ID	Alaska North Slope Crude	
Lab ID	WG1873173-1	
Matrix	OIL	
Matrix Description	Crude Oil	
Reference Method	1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER	
Batch ID	WG1873173-1	
Date Collected	N/A	
Date Received	N/A	
Date Prepped	N/A	
Date Analyzed	1/6/2024	
Sample Size(wet)	0.05184	g
% Solid	100	
File ID	F1401052428	
Units	mg/kg	
Final Volume	10	
Dilution	1	
Reporting Limit	1.93	

Class	Abbrev	Analytes	Result	SSRL	% REC	Spike Conc.	Lower Limit	Upper Limit
3	3MP	3-METHYLPHENANTHRENE (3MP)	71.4	1.93	90	79.32	65	135
3	2MA	2-METHYLANTHRACENE (2MA)	2.66	1.93	89	3	65	135
3	1MP	1-METHYLPHENANTHRENE (1MP)	80.2	1.93	91	87.93	65	135
A	1MN	1-METHYLNAPHTHALENE	789	1.93	99	793.54	65	135
A	2MN	2-METHYLNAPHTHALENE	1000	1.93	92	1087.89	65	135
2	26DMN	2,6-DIMETHYLNAPHTHALENE	623	1.93	98	635.33	65	135
2	235TMN	2,3,5-TRIMETHYLNAPHTHALENE	137	1.93	93	147.12	65	135
H30	T19	HOPANE (T19)	172	1.93	107	161.24	65	135
t23	T4	C23 TRICYCLIC TERPANE (T4)	89.0	1.93	128	69.8	65	135
t24	T5	C24 TRICYCLIC TERPANE (T5)	46.0	1.93	109	42.1	65	135
t25	T6	C25 TRICYCLIC TERPANE (T6)	45.0	1.93	111	40.4	65	135
te24	T6a	C24 TETRACYCLIC TERPANE (T6A)	17.0	1.93	120	14.2	65	135
t26S	T6b	C26 TRICYCLIC TERPANE-22S (T6B)	19.0	1.93	116	16.3	65	135
t26R	T6c	C26 TRICYCLIC TERPANE-22R (T6C)	17.0	1.93	116	14.6	65	135
t28S	T7	C28 TRICYCLIC TERPANE-22S (T7)	19.5	1.93	120	16.2	65	135
t28R	T8	C28 TRICYCLIC TERPANE-22R (T8)	19.4	1.93	110	17.6	65	135
t29S	T9	C29 TRICYCLIC TERPANE-22S (T9)	22.1	1.93	115	19.2	65	135
t29R	T10	C29 TRICYCLIC TERPANE-22R (T10)	26.6	1.93	127	21	65	135
Ts	T11	18A-22,29,30-TRISNORNEOHOPANE-TS (T11)	33.6	1.93	119	28.3	65	135
t30S	T11a	C30 TRICYCLIC TERPANE-22S	18.5	1.93	121	15.3	65	135
t30R	T11b	C30 TRICYCLIC TERPANE-22R	18.6	1.93	122	15.2	65	135
Tm	T12	17A(H)-22,29,30-TRISNORHOPANE-TM (T12)	39.0	1.93	113	34.4	65	135
BNH	T14a	17A/B,21B/A 28,30-BISNORHOPANE (T14A)	6.93	1.93	99	7	65	135
H29	T15	30-NORHOPANE (T15)	97.9	1.93	108	90.7	65	135
C29Ts	T16	18A(H)-30-NORNEOHOPANE-C29TS (T16)	24.2	1.93	104	23.3	65	135
X	X	17A(H)-DIAHOPANE (X)	13.7	1.93	105	13	65	135
M29	T17	30-NORMORETANE (T17)	12.7	1.93	113	11.2	65	135
M30	T20	MORETANE (T20)	16.2	1.93	99	16.3	65	135
H31S	T21	30-HOMOHOPANE-22S (T21)	71.9	1.93	106	67.6	65	135
H31R	T22	30-HOMOHOPANE-22R (T22)	62.6	1.93	107	58.3	65	135
H32S	T26	30,31-BISHOMOHOPANE-22S (T26)	51.1	1.93	104	48.9	65	135
H32R	T27	30,31-BISHOMOHOPANE-22R (T27)	35.6	1.93	100	35.6	65	135
H33S	T30	30,31-TRISHOMOHOPANE-22S (T30)	41.5	1.93	107	38.8	65	135
H33R	T31	30,31-TRISHOMOHOPANE-22R (T31)	25.8	1.93	101	25.6	65	135
H34S	T32	TETRAKISHOMOHOPANE-22S (T32)	29.6	1.93	106	27.9	65	135
H34R	T33	TETRAKISHOMOHOPANE-22R (T33)	19.3	1.93	98	19.8	65	135
H35S	T34	PENTAKISHOMOHOPANE-22S (T34)	28.0	1.93	97	28.8	65	135
H35R	T35	PENTAKISHOMOHOPANE-22R (T35)	24.0	1.93	108	22.3	65	135
d27S	S4	13B(H),17A(H)-20S-DIACHOLESTANE (S4)	57.5	1.93	120	48.1	65	135
d27R	S5	13B(H),17A(H)-20R-DIACHOLESTANE (S5)	29.0	1.93	116	25.1	65	135
d28S	S8	13B,17A-20S-METHYLDIACHOLESTANE (S8)	30.8	1.93	124	24.8	65	135
aa27S	S12	17A(H)20SC27/C29DIA	68.5	1.93	115	59.74	65	135
aa27R	S17	17A(H)20RC27/C29DIA	79.4	1.93	111	71.55	65	135
d29S	S19	13A,17B-20S-ETHYLDIACHOLESTANE (S19)	2.67	1.93	70	3.8	65	135
aa28S	S20	14A,17A-20S-METHYLCHOLESTANE (S20)	38.7	1.93	117	33	65	135
aa28R	S24	14A,17A-20R-METHYLCHOLESTANE (S24)	39.1	1.93	121	32.2	65	135
aa29S	S25	14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25)	63.3	1.93	122	51.7	65	135
aa29R	S28	14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28)	39.8	1.93	110	36.1	65	135
bb27R	S14	14B(H),17B(H)-20R-CHOLESTANE (S14)	40.2	1.93	105	38.4	65	135
bb27S	S15	14B(H),17B(H)-20S-CHOLESTANE (S15)	41.6	1.93	105	39.7	65	135
bb28R	S22	14B,17B-20R-METHYLCHOLESTANE (S22)	42.8	1.93	104	41	65	135
bb28S	S23	14B,17B-20S-METHYLCHOLESTANE (S23)	55.0	1.93	106	51.7	65	135
bb29R	S26	14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26)	57.1	1.93	104	54.6	65	135
bb29S	S27	14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27)	35.7	1.93	93	38.2	65	135
RC26/SC27TAS	TAS01	C26,20R+C27,20S TAS	359	1.93	124	289.3	65	135
SC28TAS	TAS02	C28,20S TAS	207	1.93	113	182.5	65	135
RC27TAS	TAS03	C27,20R TAS	207	1.93	117	177.1	65	135
RC28TAS	TAS04	C28,20R TAS	169	1.93	114	148.1	65	135

List of Potential Qualifiers
A: Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B: The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
C: Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
D: Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
E: Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
F: The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
G: The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
H: The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
I: The lower value for the two columns has been reported due to obvious interference.
J: Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs). For calculated parameters, this represents that one or more values used in the calculation were estimated.
J: Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
J: Estimated value. The Target analyte concentration is below the Limit of Quantitation (LOQ), but above the Detection Limit (DL). This represents an estimated concentration for Tentatively Identified Compounds (TICs). For calculated parameters, this represents that one or more values used in the calculation were estimated.
M: Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
ND: Not detected at the Limit of Quantitation (LOQ) for the sample.
ND: Not detected at the Limit of Detection (LOD) for the sample.
ND: Not detected at the reporting limit (RL) for the sample.
ND: Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.
NJ: Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
P: The RPD between the results for the two columns exceeds the method-specified criteria.
Q: The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
R: Analytical results are from sample re-analysis.
RE: Analytical results are from sample re-extraction.
S: Analytical results are from modified screening analysis.
U: Not detected at the reported detection limit for the sample.
V: The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)
Z: The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

ERM TIENE MÁS DE 160 OFICINAS EN LOS SIGUIENTES PAÍSES Y TERRITORIOS EN TODO EL MUNDO

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Colombia
Francia
Alemania
Ghana
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Italia
Japón
Kazajistán
Kenia
Malasia
México
Mozambique
Países Bajos
Nueva Zelanda
Perú
Polonia
Portugal
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