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

Memorando Técnico Complementario No. 11

PREPARADO PARA
RELAPASAA

FECHA
06 de noviembre 2023

REFERENCIA
0633786

## DETALLES DEL DOCUMENTO

| The details entered below are automatically shown on the cover and the main page footer. PLEASE NOTE: This table must NOT be removed from this document. | |
|---|---|
| DOCUMENT TITLE | Muestreo y Caracterización de Hidrocarburos ajenos a la Terminal 2 de RELAPASAA en la Costa de Ventanilla y Chancay |
| DOCUMENT SUBTITLE | Memorando Técnico Complementario No. 11 |
| PROJECT NUMBER | 0633786 |
| Date | 06 de noviembre 2023 |
| Version | 01 |
| Author | Alejandro Guido Zárate, Diana Ortega Mayorga |
| Client name | RELAPASAA |

## DOCUMENTO HISTORIA

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ANEXO A – REGISTRO FOTOGRÁFICO

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# 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 septiembre 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 septiembre 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.

El presente documento tiene como objetivo presentar los resultados de los análisis Fingerprint de diez muestras tomadas los días 26, 28 y 29 de agosto del 2023, 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 septiembre del 2023 y al Memorando Técnico Complementario No.10 remitido el 19 de octubre del 2023.

# 2. MUESTREO Y ANÁLISIS DE LABORATORIO

Los días 26, 28 y 29 de agosto del 2023, se recolectó un total de 10 muestras adicionales, 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). Las muestras fueron tomadas por personal del laboratorio independiente CERPER, colectadas en frascos de vidrio, rotuladas, precintados, siendo finalmente ITS quien las 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.

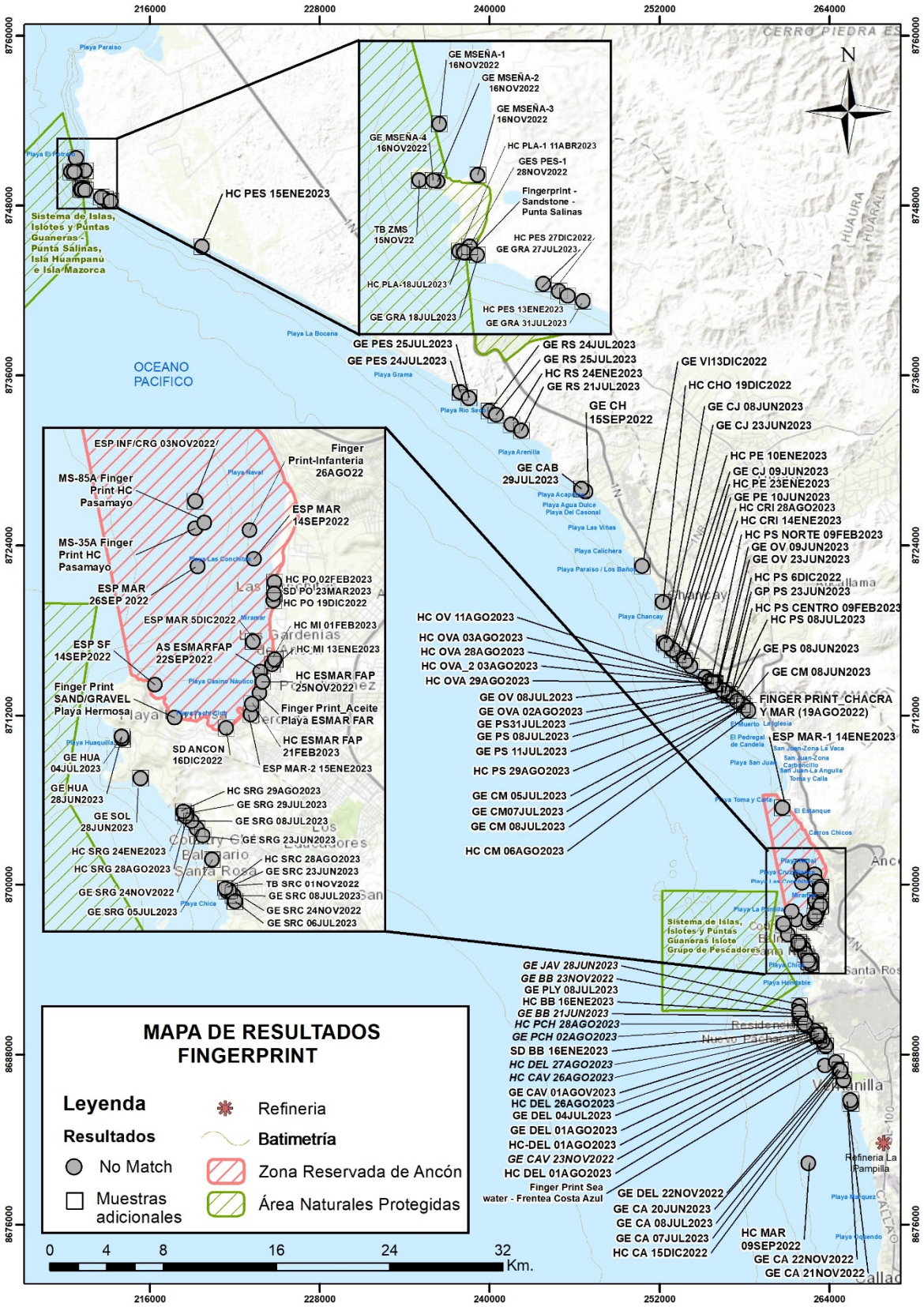



FIGURA 4-1. UBICACIÓN DE LAS MUESTRAS TOMADAS PARA ANÁLISIS DE FINGERPRINT.

**Notas:**
No Match = Químicamente no compatible con el crudo Buzios
Fuente: ERM - noviembre, 2023

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.

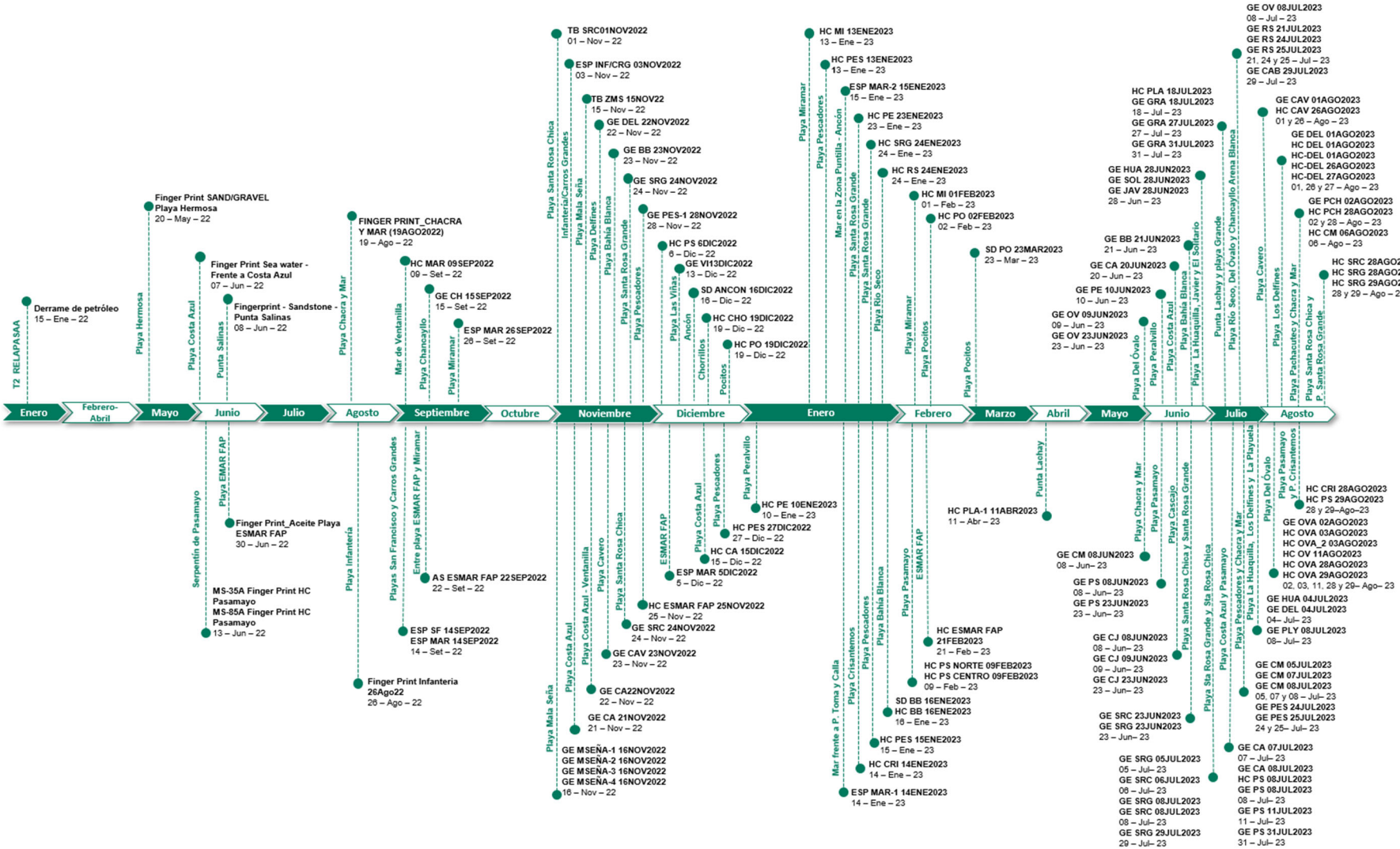



FIGURA 4-2. LÍNEA DE TIEMPO DE MUESTRAS DE FINGERPRINT CUYO ORIGEN ES DIFERENTE AL DEL CRUDO BUZIOS.

**Fuente:** Elaboración propia. ERM – noviembre, 2023

# 3. RESULTADOS

## 3.1 RESULTADO DE LAS MUESTRAS AJENAS AL CRUDO BUZIOS

En la presente actualización, se detallan los resultados de 10 muestras adicionales químicamente no compatibles 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 las muestras adicionales reportadas 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:** Playa Cavero | **Fecha de muestreo:** 26 de agosto de 2023 |
|---|---|
| | **Nombre de la muestra:** *HC CAV 26AGO2023*<br>**Precintado por:** CERPER<br>**Precinto N°:** 200939<br>**Enviado a NewFields por:** Intertek Testing Services Perú S.A<br>Coordenadas UTM WGS84 18L<br>0262988 E, 8689647N<br>**Descripción:**<br>Restos sólidos de hidrocarburo encontrados en playa Cavero.<br>**Resultado:**<br>La muestra *HC CAV 26AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC CAV 26AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |

**Ubicación:** Playa Los Delfines

**Fecha de muestreo:** 26 de agosto de 2023

**Nombre de la muestra:** *HC DEL 26AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 201696

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0263199 E, 8689386 N

**Descripción:**

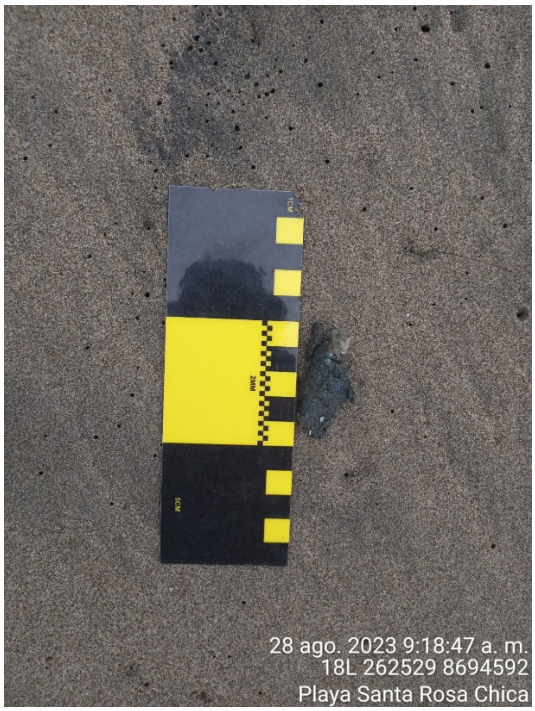
Restos sólidos de hidrocarburo encontrados en playa Los Delfines.

**Resultado:**

La muestra *HC DEL 26AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC DEL 26AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Santa Rosa Chica

**Fecha de muestreo:** 28 de agosto de 2023




**Nombre de la muestra:** *HC SRC 28AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 203904

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0262532 E, 8694586 N

**Descripción:**

Restos sólidos de hidrocarburo, con olor a hidrocarburo, encontrados en playa Santa Rosa Chica.

**Resultado:**

La muestra *HC SRC 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC SRC 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Santa Rosa Grande

**Fecha de muestreo:** 28 de agosto de 2023

**Nombre de la muestra:** *HC SRG 28AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 203903

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0261849 E, 8695834 N

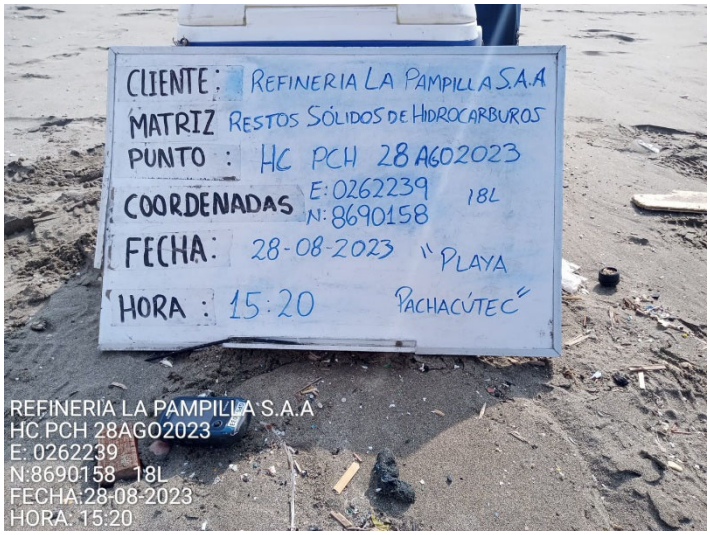
**Descripción:**

Restos sólidos de hidrocarburo, de coloración azul verdosa y con olor a hidrocarburo, encontrados en playa Santa Rosa Grande.

**Resultado:**

La muestra *HC SRG 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC SRG 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Pachacútec




**Fecha de muestreo:** 28 de agosto de 2023

**Nombre de la muestra:** *HC PCH 28AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 203910

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0262239 E, 8690158 N

**Descripción:**

Restos sólidos de hidrocarburo, de coloración azul verdosa y con olor a hidrocarburo, encontrados en playa Pachacútec.

**Resultado:**

La muestra *HC PCH 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC PCH 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Del Óvalo

**Fecha de muestreo:** 28 de agosto de 2023

**Nombre de la muestra:** *HC OVA 28AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 203905

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0255538 E, 8714465 N

**Descripción:**

Restos sólidos de hidrocarburo, de coloración azul verdosa y con olor a hidrocarburo, encontrados en playa Del Óvalo.

**Resultado:**

La muestra *HC OVA 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC OVA 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Crisantemos

**Fecha de muestreo:** 28 de agosto de 2023

**Nombre de la muestra:** *HC CRI 28AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 203906

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0253797 E, 8715835 N

**Descripción:**

Restos sólidos de hidrocarburo, de coloración azul verdosa y con olor a hidrocarburo, encontrados en playa Crisantemos.

**Resultado:**

La muestra *HC CRI 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC CRI 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Santa Rosa Grande

**Fecha de muestreo:** 29 de agosto de 2023

**Nombre de la muestra:** *HC SRG 29AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 203907

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0261810 E, 8695911 N

**Descripción:**

Restos sólidos de hidrocarburo, de coloración azul verdosa y con olor a hidrocarburo, encontrados en playa Santa Rosa Grande.

**Resultado:**

La muestra *HC SRG 29AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC SRG 29AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Del Óvalo

**Fecha de muestreo:** 29 de agosto de 2023

**Nombre de la muestra:** *HC OVA 29AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 200980

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0255781 E, 8714320 N

**Descripción:**

Restos sólidos de hidrocarburo, con coloración obscura y olor a hidrocarburo, encontrados en playa Del Óvalo.

**Resultado:**

La muestra *HC OVA 29AGO2023* consiste en un crudo o petróleo pesado moderadamente intemperizado. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC OVA 29AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.**

**Ubicación:** Playa Pasamayo

**Fecha de muestreo:** 29 de agosto de 2023

**Nombre de la muestra:** *HC PS 29AGO2023*

**Precintado por:** CERPER

**Precinto N°:** 202370

**Enviado a NewFields por:** Intertek Testing Services Perú S.A

Coordenadas UTM WGS84 18L

0257474 E, 8712997 N

**Descripción:**

Restos sólidos de hidrocarburo, de coloración azul verdosa y con olor a hidrocarburo, encontrados en playa Pasamayo.

**Resultado:**

La muestra *HC PS 29AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC PS 29AGO2023* 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 | HC CAV 26AGO2023 | Restos sólidos de hidrocarburo | 26-ago-23 | Cavero | La muestra *HC CAV 26AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC CAV 26AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |
| 2 | HC DEL 26AGO2023 | Restos sólidos de hidrocarburo | 26-ago-23 | Los Delfines | La muestra *HC DEL 26AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC DEL 26AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta**. |
| 3 | HC SRC 28AGO2023 | Restos sólidos de hidrocarburo | 28-ago-23 | Santa Rosa Chica | La muestra *HC SRC 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC SRC 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |
| 4 | HC SRG 28AGO2023 | Restos sólidos de hidrocarburo | 28-ago-23 | Santa Rosa Grande | La muestra *HC SRG 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC SRG 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |
| 5 | HC PCH 28AGO2023 | Restos sólidos de hidrocarburo | 28-ago-23 | Pachacútec | La muestra *HC PCH 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC PCH 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |
| 6 | HC OVA 28AGO2023 | Restos sólidos de hidrocarburo | 28-ago-23 | Del Óvalo | La muestra *HC OVA 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC OVA 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |
| 7 | HC CRI 28AGO2023 | Restos sólidos de hidrocarburo | 28-ago-23 | Crisantemos | La muestra *HC CRI 28AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC CRI 28AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |

| N° | Nombre de la muestra | Matriz | Fecha de muestreo | Ubicación | Resultado(*) |
|---|---|---|---|---|---|
| 8 | HC SRG 29AGO2023 | Restos sólidos de hidrocarburo | 29-ago-23 | Santa Rosa Grande | La muestra *HC SRG 29AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC SRG 29AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |
| 9 | HC OVA 29AGO2023 | Restos sólidos de hidrocarburo | 29-ago-23 | Del Óvalo | La muestra *HC OVA 29AGO2023* consiste en un crudo o petróleo pesado moderadamente intemperizado. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC OVA 29AGO2023* y el petróleo del crudo de origen (Buzios) son químicamente diferentes, y se derivan de una fuente de petróleo distinta.** |
| 10 | HC PS 29AGO2023 | Restos sólidos de hidrocarburo | 29-ago-23 | Pasamayo | La muestra *HC PS 29AGO2023* consiste en un crudo o petróleo pesado intemperizado que contiene bajas cantidades de un producto más ligero. Los resultados de los análisis de HAP y biomarcadores indican que **el petróleo detectado en la muestra *HC PS 29AGO2023* 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 2023

# 4. CONCLUSIONES

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

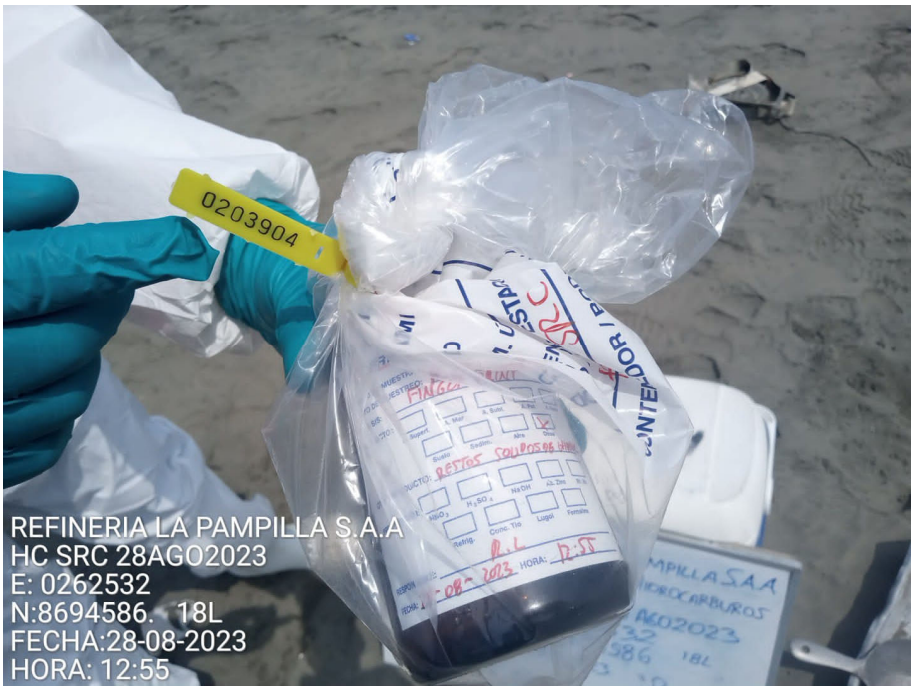
- En el presente informe, mediante el análisis de *Fingerprint*, como técnica de análisis químico forense, se han identificado diez muestras adicionales colectadas de hidrocarburo que no son químicamente compatibles con el crudo Buzios y que provienen de distintas fuentes de hidrocarburo. Estas muestras fueron colectadas en la zona intermareal de las playas Cavero, Santa Rosa Chica, Santa Rosa Grande, Crisantemos, Pasamayo, Del Óvalo, Los Delfines y Pachacútec.
- Hasta el momento, mediante el análisis de *Fingerprint*, como técnica de análisis químico forense, se han identificado un total de 122 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

Material muestra *HC CAV 26AGO2023* – 26 de agosto 2023

Material de muestra *HC DEL 26AGO2023* – 26 de agosto 2023

Toma de muestra *HC SRC 28AGO2023* – 28 de agosto 2023




Muestra *HC SRC 28AGO2023* precintada – 28 de agosto 2023

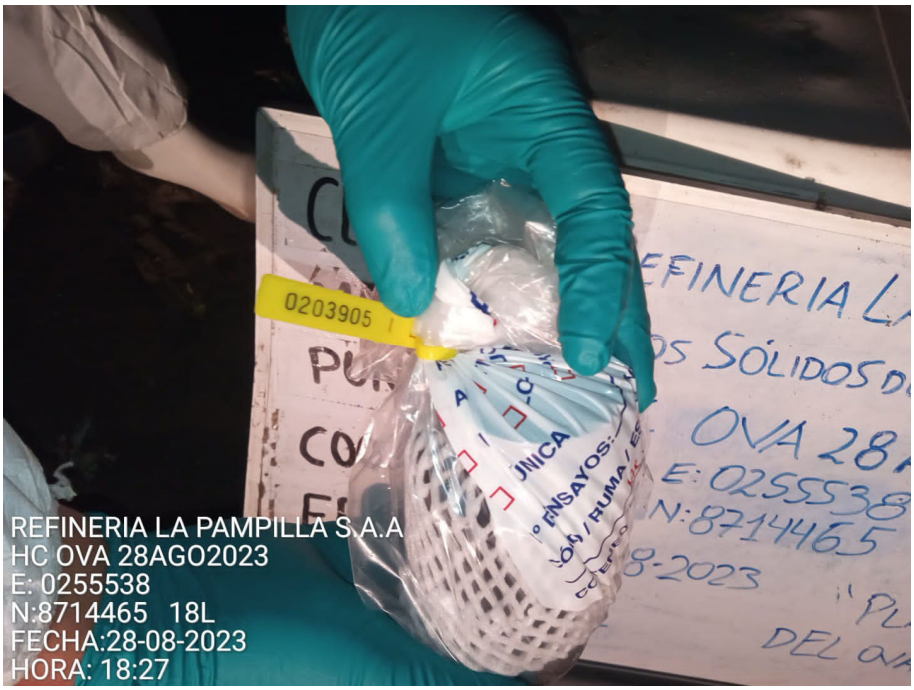
Toma de muestra *HC SRG 28AGO2023* – 28 de agosto 2023

Precinto muestra *HC SRG 28AGO2023* – 28 de agosto 2023

Toma de muestra *HC PCH 28AGO2023* – 28 de agosto 2023

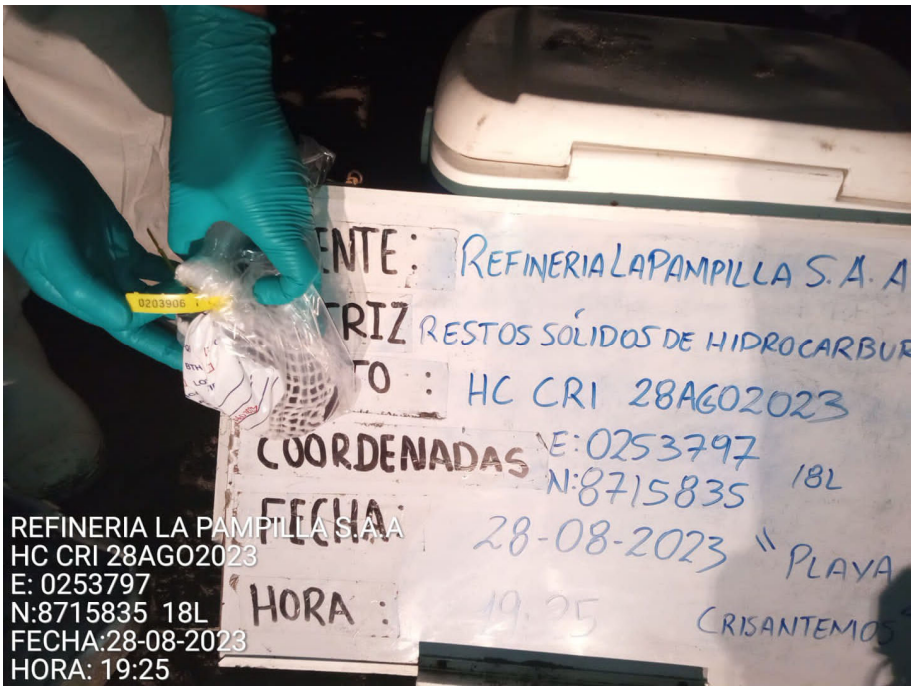
Muestra *HC PCH 28AGO2023* precintada – 28 de agosto 2023

Toma de muestra *HC OVA 28AGO2023* – 28 de agosto 2023



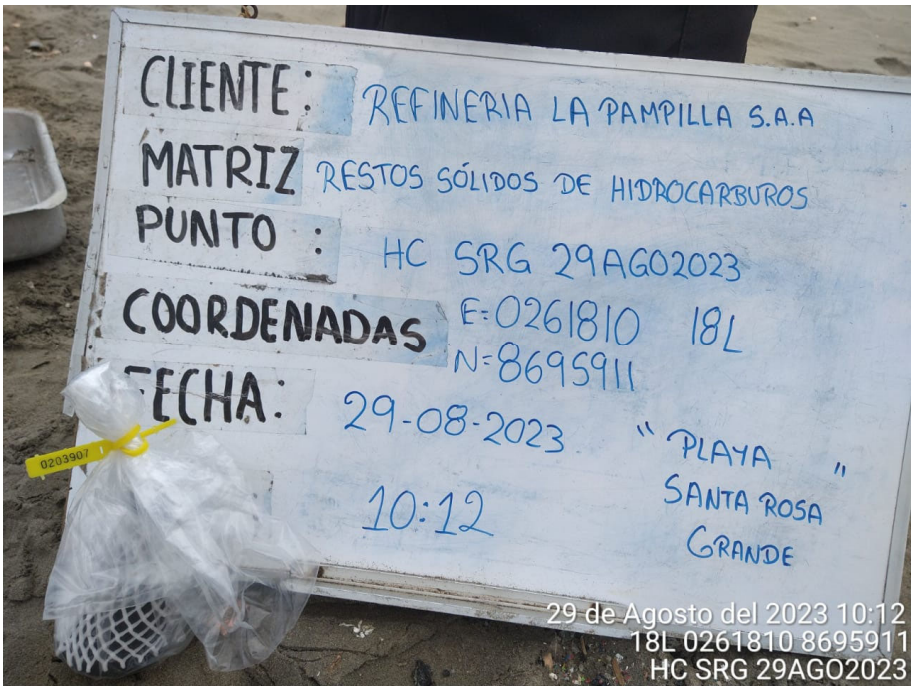

Muestra *HC OVA 28AGO2023* precintada – 28 de agosto 2023

Toma de muestra *HC CRI 28AGO2023* – 28 de agosto 2023



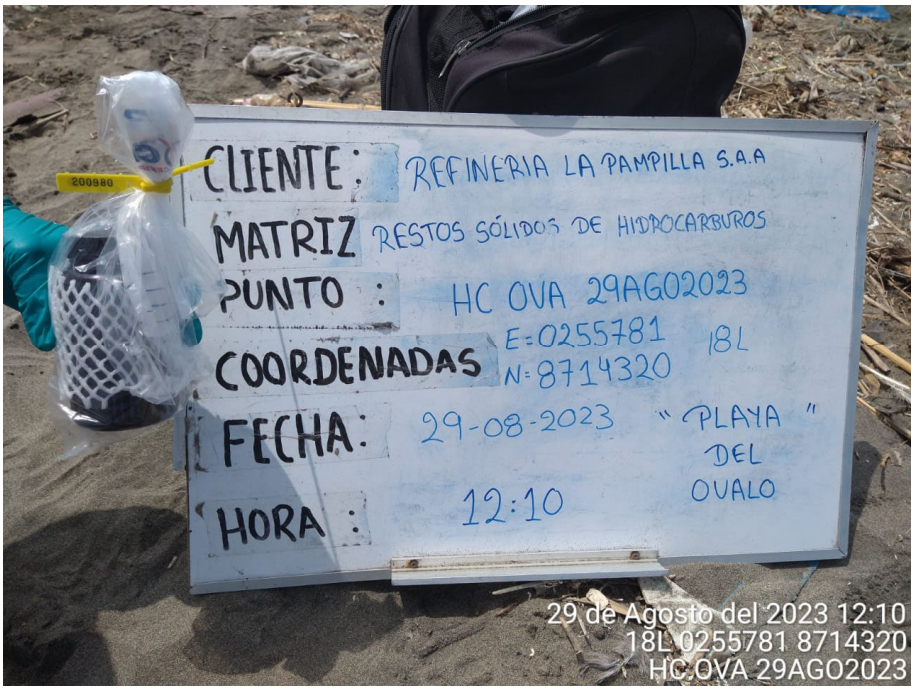

Muestra *HC CRI 28AGO2023* precintada – 28 de agosto 2023

Toma de muestra *HC SRG 29AGO2023* – 29 de agosto 2023




Muestra *HC SRG 29AGO2023* precintada – 29 de agosto 2023

Toma de muestra *HC OVA 29AGO2023* – 29 de agosto 2023




Muestra *HC OVA 29AGO2023* precintada – 29 de agosto 2023

Toma de muestra *HC PS 29AGO2023* – 29 de agosto 2023

Muestra *HC PS 29AGO2023* precintada – 29 de agosto 2023

# ANEXO B – RESULTADOS ANALÍTICOS DE FINGERPRINT

# HC CAV 26AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 27, 2023

**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 August 26, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC CAV 26AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA and arrived at a temperature of 26.5°C on September 8, 2023 with a DHL Tracking # 7103324546 (Seal number 200939). The sample arrived without a chain of custody however a chain of custody (Attachment 1) was supplied via email prior to sample arrival and was consistent with the sample received.

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC CAV 26AGO2023 (HC CAV26) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC CAV26 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are four (4) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC CAV26 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 HC CAV26 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC CAV26 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC CAV26 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC CAV26 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC CAV26 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC CAV26 sample and source oil are derived from 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.

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 HC CAV26 plot away from each other indicating a different source of petroleum.

**Conclusion**

The HC CAV 26AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC CAV 26AGO2023 sample are chemically different and were derived from a different source of petroleum.

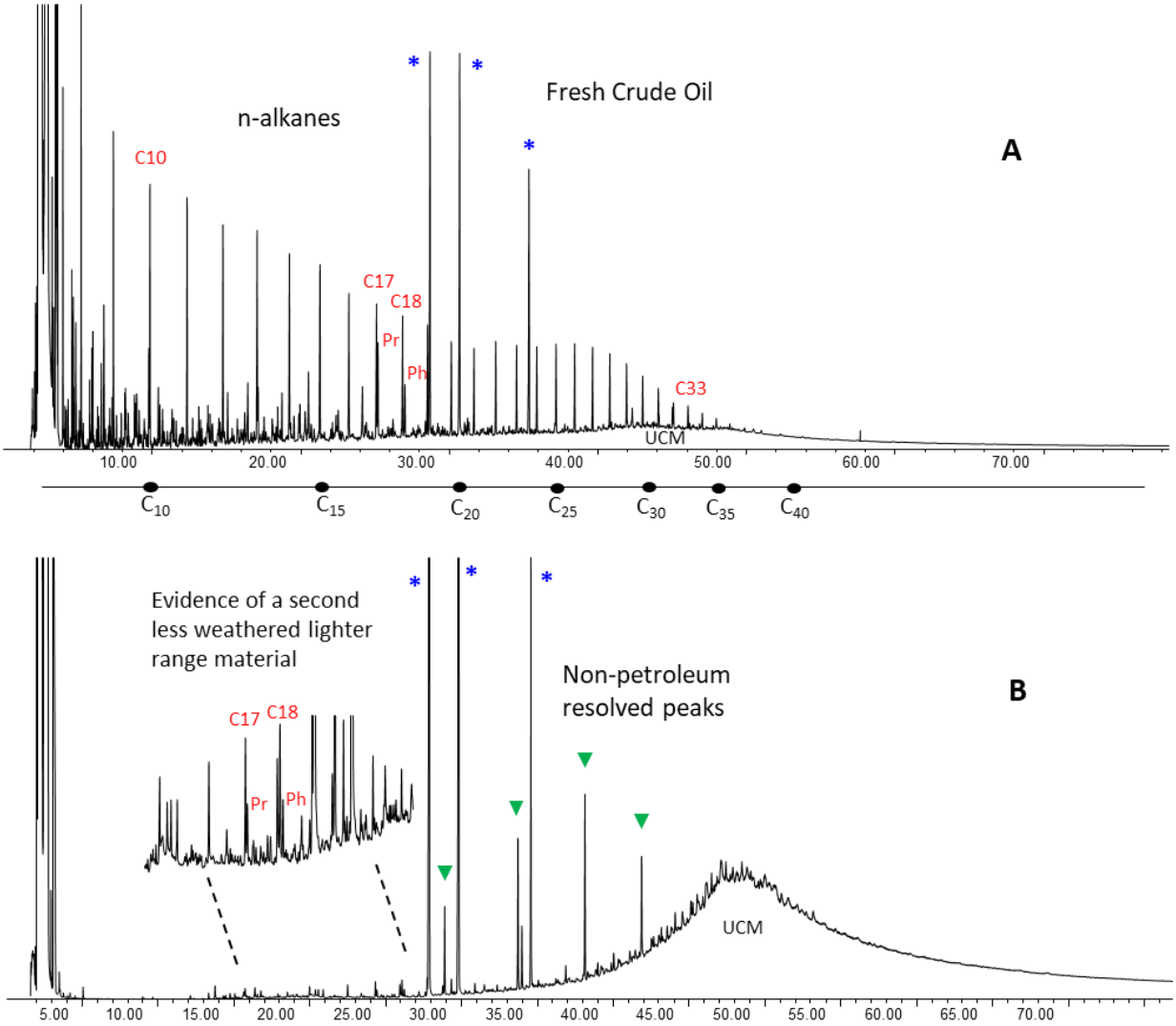


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC CAV 26AGO2023**
'*': Laboratory-added Internal Standard

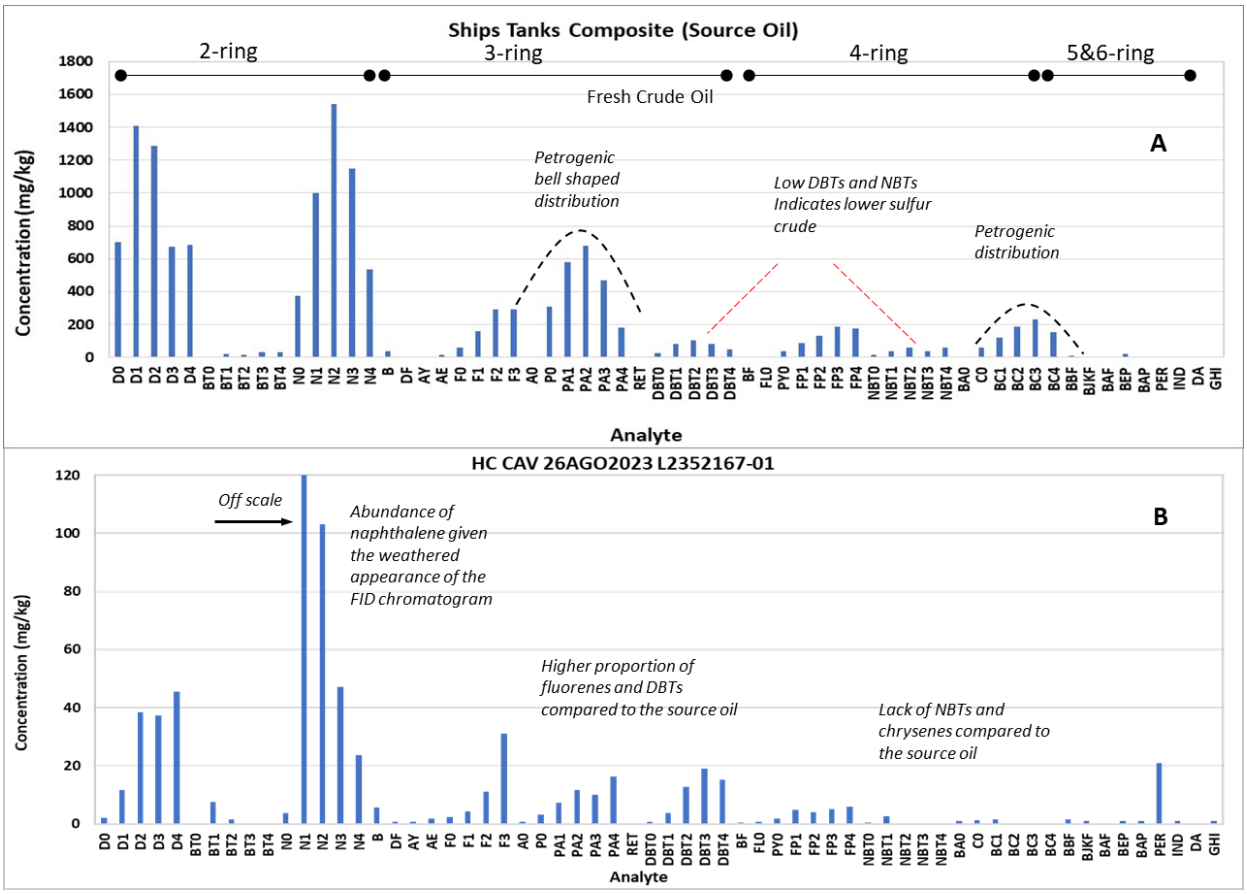


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC CAV 26AGO2023**

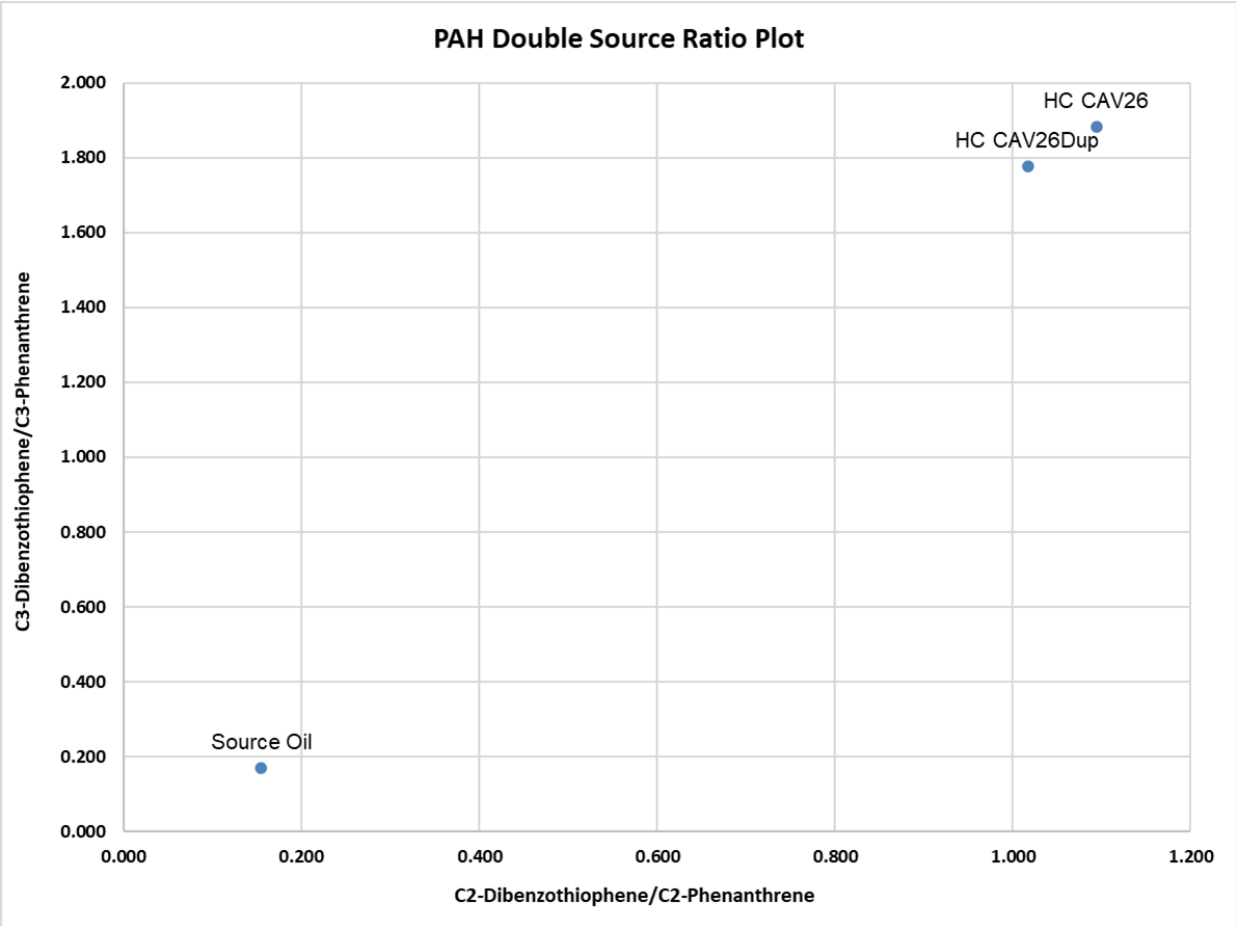


**Figure 3. PAH Double Source Ratio Plot**

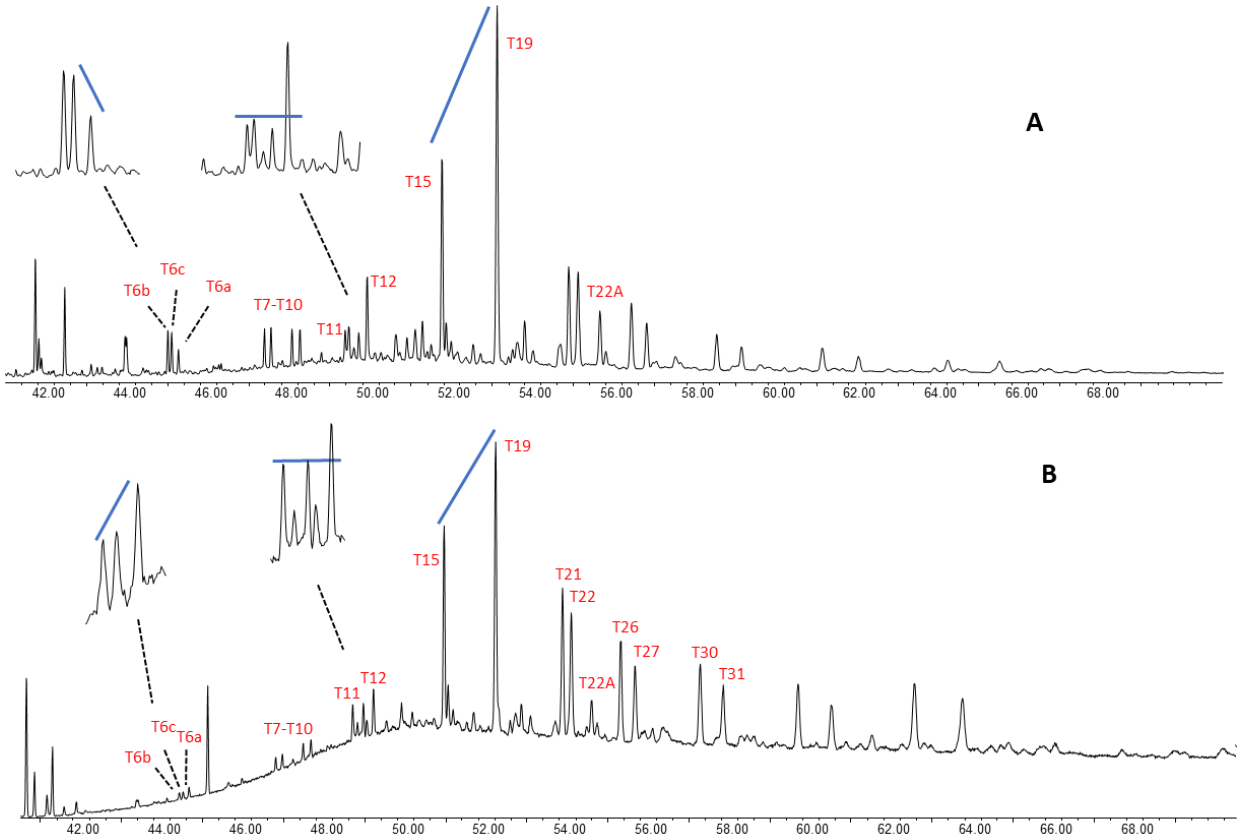


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC CAV 26AGO2023**

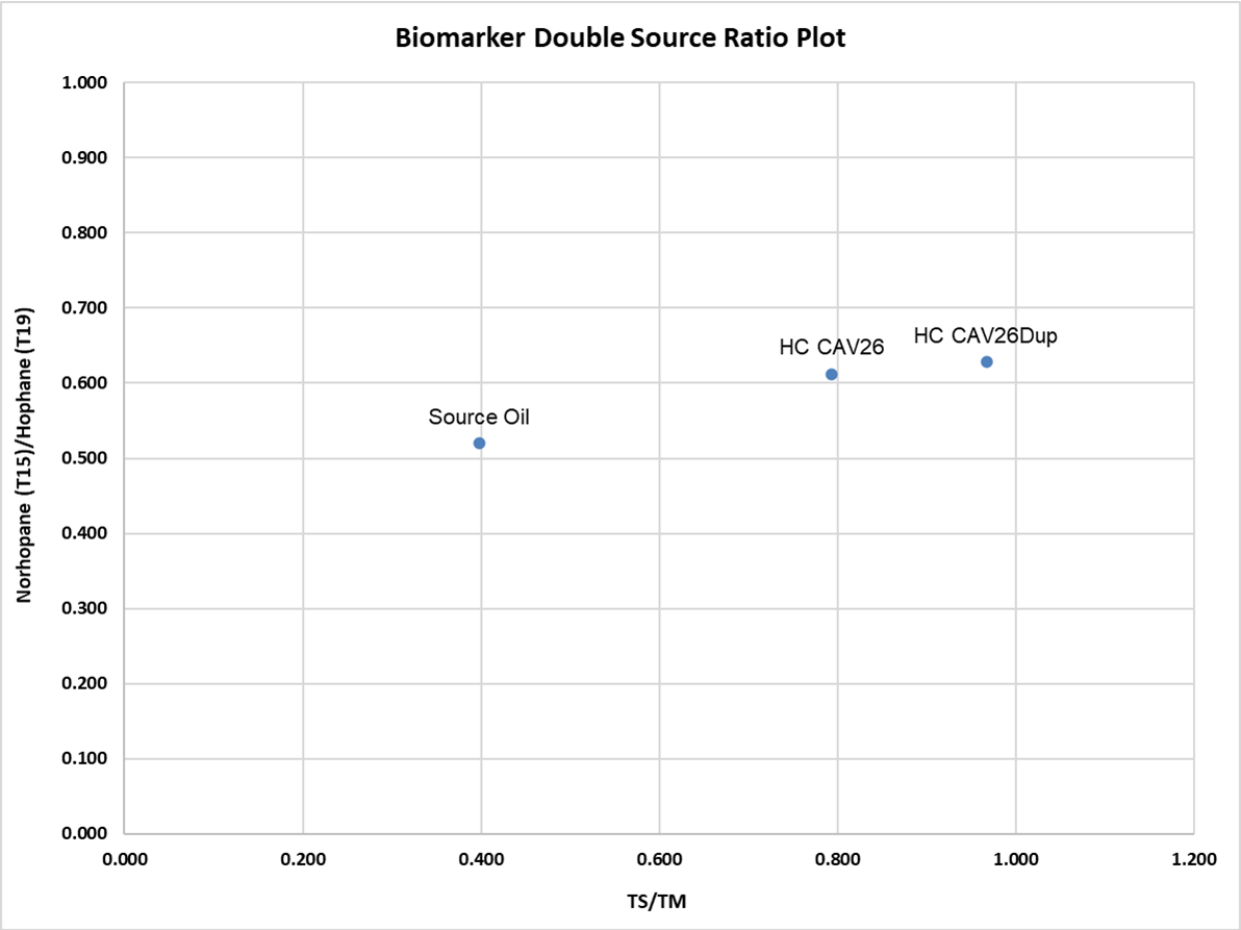


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC CAV 26AGO2023 | L2352167-01 | 08/26/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/8/23 L2352167

№ 007925

CERPER CERTIFICACIONES DEL PERÚ S.A.

# CADENA DE CUSTODIA
(Registro de Campo -Toma de muestra de aguas, suelos, lodos y sedimentos)

Página 01 de 01

EXPEDIENTE: 11700 - 2023

HS: 23006017

JOB NUMBER: 23LM 00262546748

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A.

LUGAR: PLAYA CAVERO | Distrito: VENTANILLA | Provincia: CALLAO | Departamento: | PERSONA DE CONTACTO: Milagros Rodriguez

NORMA:

1 SMEWW – APHA – AWWA – WEF. 23rd Ed. 2017. Collection and preservation of samples. Part 9060 A-B ( ) 1060 B-C ( ) 10200 B ( ) 10300 B ( ) 10500 B ( ) 10750 B ( )
2 Instrucción 8030-I Toma de muestras de sedimentos ( )
3 NTP 214.005 – 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.3 ( )
4 RM N° 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto ( )
5 RJN° 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO-5667-10:2012 (Revisada el 2016) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060:2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM N° 273-2013-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales PTAR ( )
9 RM N° 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-EM ( )
11 Otros: ( )

## DESCRIPCIÓN DE LA MUESTRA

| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17, 18, 19) (K, L, M) | CANTIDAD DE ENVASES | FINGER PRINT | pH (Unidades de pH) | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg $Cl_2$/L Libre ( ) Total ( ) | Turbiedad (UNT) | Caudal ($m^3/s$) | Transparencia cm ( ) m ( ) | Nivel freático cm ( ) m ( ) | ORP (mV) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HC CAV 26AGO2023 | 26/08/23 | 16:43 | * | 0262958 | 8689647 | 22 18L | 01 | ✓ | | | | | | | | | | | | |
| | | | | | | Total de Envases | 01 | | | | | | | | | | | | | |

(1) Matriz (s)

AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo:
Otro: *Residos Solidos de Hidrocarburos

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (X) Congelada ( ) Caja conservadora (X)
Herméticamente cerrada (X) Ice pack (X) Hielo de calidad potable ( )

Equipos: Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 003 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: Se procedio a llegar al punto de muestreo indicado y acompañado por el representante del CLIENTE quien estuvo presente desde inicio a fin. Se procedio con el procedimiento de caracterización de la muestra lo cual presenta ~~como~~ coloración azul verdoso con apariencia oleosa a hidrocarburo. La muestra fue presentada con N°. de precinto 2009391. La muestra se ubica en la parte norte de la playa CAVERO, se tomaron las coordenadas insitu.

Responsable de la toma de muestra:
Firma:
Inspector Cerper: Leonardo Chavez / M Rodriguez
Inspectores de apoyo:
Hora de inicio: 16:00 Hora de término: 18:25

Representante del cliente
Firma:
Nombre: Rodriguez Ramirez M.
DNI: 47219303
Cargo: supervisor

Recepción de muestras
Nombre: Noelia Machuca
Fecha: 02-09-23
Hora: 08:00 am

LAB. CALEB BRETT
RECEIVED
02 SEP 2023

OI-R-CMAS
Versión 06
2023-06-20

9/8/23 14:44

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC CAV 26AGO2023 |
| Lab ID | L2352167-01 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1835448 |
| Date Collected | 8/26/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00397 g |
| % Solid | 100 |
| File ID | F18100523029 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 252 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 252 |
| SHC | C10 | DECANE (C10) | | U | 252 |
| SHC | C11 | UNDECANE | 7.56 | J | 252 |
| SHC | C12 | DODECANE (C12) | 33.2 | J | 252 |
| SHC | C13 | TRIDECANE | 49.1 | J | 252 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 30.2 | J | 252 |
| SHC | C14 | TETRADECANE (C14) | 92.9 | J | 252 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 58.4 | J | 252 |
| SHC | C15 | PENTADECANE (C15) | 153 | J | 252 |
| SHC | C16 | HEXADECANE (C16) | 216 | J | 252 |
| SHC | 1650 | NORPRISTANE (1650) | 117 | J | 252 |
| SHC | C17 | HEPTADECANE (C17) | 245 | J | 252 |
| SHC | Pr | PRISTANE | 152 | J | 252 |
| SHC | C18 | OCTADECANE (C18) | 313 | | 252 |
| SHC | Ph | PHYTANE | 178 | J | 252 |
| SHC | C19 | NONADECANE (C19) | 259 | | 252 |
| SHC | C20 | EICOSANE (C20) | 250 | J | 252 |
| SHC | C21 | HENEICOSANE (C21) | 147 | J | 252 |
| SHC | C22 | DOCOSANE (C22) | 120 | J | 252 |
| SHC | C23 | TRICOSANE (C23) | | U | 252 |
| SHC | C24 | TETRACOSANE (C24) | 130 | J | 252 |
| SHC | C25 | PENTACOSANE (C25) | 144 | J | 252 |
| SHC | C26 | HEXACOSANE (C26) | | U | 252 |
| SHC | C27 | HEPTACOSANE (C27) | 192 | J | 252 |
| SHC | C28 | OCTACOSANE (C28) | | U | 252 |
| SHC | C29 | NONACOSANE (C29) | 263 | CB | 252 |
| SHC | C30 | TRIACONTANE (C30) | | U | 252 |
| SHC | C31 | HENTATRIACONTANE (C31) | 128 | J | 252 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 252 |
| SHC | C33 | TRITRIACONTANE (C33) | 350 | | 252 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 252 |
| SHC | C35 | PENTATRIACONTANE (C35) | 1270 | | 252 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 252 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 252 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 252 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 252 |
| SHC | C40 | TETRACONTANE (C40) | | U | 252 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 622000 | | 8310 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 4900 | J | 252 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 100 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F18100523013 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 254 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 254 |
| SHC | C10 | DECANE (C10) | | U | 254 |
| SHC | C11 | UNDECANE | | U | 254 |
| SHC | C12 | DODECANE (C12) | | U | 254 |
| SHC | C13 | TRIDECANE | | U | 254 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | | U | 254 |
| SHC | C14 | TETRADECANE (C14) | | U | 254 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | | U | 254 |
| SHC | C15 | PENTADECANE (C15) | | U | 254 |
| SHC | C16 | HEXADECANE (C16) | | U | 254 |
| SHC | 1650 | NORPRISTANE (1650) | | U | 254 |
| SHC | C17 | HEPTADECANE (C17) | | U | 254 |
| SHC | Pr | PRISTANE | | U | 254 |
| SHC | C18 | OCTADECANE (C18) | | U | 254 |
| SHC | Ph | PHYTANE | | U | 254 |
| SHC | C19 | NONADECANE (C19) | | U | 254 |
| SHC | C20 | EICOSANE (C20) | | U | 254 |
| SHC | C21 | HENEICOSANE (C21) | | U | 254 |
| SHC | C22 | DOCOSANE (C22) | | U | 254 |
| SHC | C23 | TRICOSANE (C23) | | U | 254 |
| SHC | C24 | TETRACOSANE (C24) | 6.09 | J | 254 |
| SHC | C25 | PENTACOSANE (C25) | 10.2 | J | 254 |
| SHC | C26 | HEXACOSANE (C26) | | U | 254 |
| SHC | C27 | HEPTACOSANE (C27) | | U | 254 |
| SHC | C28 | OCTACOSANE (C28) | | U | 254 |
| SHC | C29 | NONACOSANE (C29) | 228 | JC | 254 |
| SHC | C30 | TRIACONTANE (C30) | | U | 254 |
| SHC | C31 | HENTATRIACONTANE (C31) | | U | 254 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 254 |
| SHC | C33 | TRITRIACONTANE (C33) | | U | 254 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 254 |
| SHC | C35 | PENTATRIACONTANE (C35) | | U | 254 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 254 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 254 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 254 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 254 |
| SHC | C40 | TETRACONTANE (C40) | | U | 254 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | | U | 8380 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 244 | J | 254 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1835448-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1835448 | |
| Date Collected | NA | |
| Date Received | 10/4/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00394 | g |
| % Solid | 100 | |
| File ID | f18100523019 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 254 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5090 | 254 | 100 | 5080 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 5050 | 254 | 99 | 5080 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 5300 | 254 | 104 | 5080 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 5200 | 254 | 102 | 5080 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5390 | 254 | 106 | 5080 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5570 | 254 | 110 | 5080 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 5210 | 254 | 103 | 5080 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 5330 | 254 | 105 | 5080 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 5020 | 254 | 99 | 5080 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 5190 | 254 | 102 | 5080 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 5030 | 254 | 99 | 5080 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 5150 | 254 | 102 | 5080 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 4960 | 254 | 98 | 5080 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4340 | 254 | 85 | 5080 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1835448-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1835448 | |
| Date Collected | NA | |
| Date Received | 10/4/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00394 | g |
| % Solid | 100 | |
| File ID | f18100523021 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 254 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5140 | 254 | 101 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C10 | DECANE (C10) | 5090 | 254 | 100 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5240 | 254 | 103 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C14 | TETRADECANE (C14) | 5240 | 254 | 103 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5350 | 254 | 105 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5590 | 254 | 110 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C19 | NONADECANE (C19) | 5230 | 254 | 103 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C20 | EICOSANE (C20) | 5340 | 254 | 105 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C22 | DOCOSANE (C22) | 5030 | 254 | 99 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 5200 | 254 | 102 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 5050 | 254 | 100 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 5170 | 254 | 102 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 4990 | 254 | 98 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4360 | 254 | 86 | 5080 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Client ID | HC CAV 26AGO2023 | | | Duplicate Sample | | | |
| | | Lab ID | L2352167-01 | | | WG1835448-4 | | | |
| | | Matrix | SOLID | | | SOLID | | | |
| | | Matrix Description | | | | | | | |
| | | Reference Method | 8015D(M) | | | 8015D(M) | | | |
| | | Batch ID | WG1835448 | | | WG1835448 | | | |
| | | Date Collected | 8/26/2023 | | | NA | | | |
| | | Date Received | 9/8/2023 | | | 10/4/2023 | | | |
| | | Date Prepped | 10/4/2023 | | | 10/4/2023 | | | |
| | | Date Analyzed | 10/6/2023 | | | 10/6/2023 | | | |
| | | Sample Size(wet) | 0.00397 | g | | 0.00343 | g | | |
| | | % Solid | 100 | | | 100 | | | |
| | | File ID | F18100523029 | | | F18100523031 | | | |
| | | Units | mg/kg | | | mg/kg | | | |
| | | Final Volume | 1 | | | 1 | | | |
| | | Dilution | 1 | | | 1 | | | |
| | | Reporting Limit | 252 | | | 292 | | | |
| Class | Abbrev | Analytes | Result | | SSRL | Result | | SSRL | RPD | RPD Limit | |
| SHC | C9 | NONANE (C9) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C10 | DECANE (C10) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C11 | UNDECANE | 7.56 | J | 252 | 8.16 | J | 292 | | 30 | NC |
| SHC | C12 | DODECANE (C12) | 33.2 | J | 252 | 33.2 | J | 292 | | 30 | NC |
| SHC | C13 | TRIDECANE | 49.1 | J | 252 | 39.1 | J | 292 | | 30 | NC |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 30.2 | J | 252 | 32.9 | J | 292 | | 30 | NC |
| SHC | C14 | TETRADECANE (C14) | 92.9 | J | 252 | 89.5 | J | 292 | | 30 | NC |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 58.4 | J | 252 | 60.3 | J | 292 | | 30 | NC |
| SHC | C15 | PENTADECANE (C15) | 153 | J | 252 | 153 | J | 292 | | 30 | NC |
| SHC | C16 | HEXADECANE (C16) | 216 | J | 252 | 231 | J | 292 | | 30 | NC |
| SHC | 1650 | NORPRISTANE (1650) | 117 | J | 252 | 88.6 | J | 292 | | 30 | NC |
| SHC | C17 | HEPTADECANE (C17) | 245 | J | 252 | 236 | J | 292 | | 30 | NC |
| SHC | Pr | PRISTANE | 152 | J | 252 | 156 | J | 292 | | 30 | NC |
| SHC | C18 | OCTADECANE (C18) | 313 | | 252 | 291 | J | 292 | | 30 | NC |
| SHC | Ph | PHYTANE | 178 | J | 252 | 173 | J | 292 | | 30 | NC |
| SHC | C19 | NONADECANE (C19) | 259 | | 252 | 246 | J | 292 | | 30 | NC |
| SHC | C20 | EICOSANE (C20) | 250 | J | 252 | 242 | J | 292 | | 30 | NC |
| SHC | C21 | HENEICOSANE (C21) | 147 | J | 252 | 143 | J | 292 | | 30 | NC |
| SHC | C22 | DOCOSANE (C22) | 120 | J | 252 | 119 | J | 292 | | 30 | NC |
| SHC | C23 | TRICOSANE (C23) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C24 | TETRACOSANE (C24) | 130 | J | 252 | 146 | J | 292 | | 30 | NC |
| SHC | C25 | PENTACOSANE (C25) | 144 | J | 252 | 156 | J | 292 | | 30 | NC |
| SHC | C26 | HEXACOSANE (C26) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C27 | HEPTACOSANE (C27) | 192 | J | 252 | U | | 292 | | 30 | X |
| SHC | C28 | OCTACOSANE (C28) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C29 | NONACOSANE (C29) | 263 | CB | 252 | 321 | CB | 292 | 20 | 30 | |
| SHC | C30 | TRIACONTANE (C30) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C31 | HENTATRIACONTANE (C31) | 128 | J | 252 | 164 | J | 292 | | 30 | NC |
| SHC | C32 | DOTRIACONTANE (C32) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C33 | TRITRIACONTANE (C33) | 350 | | 252 | 392 | | 292 | 11 | 30 | |
| SHC | C34 | TETRATRIACONTANE (C34) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C35 | PENTATRIACONTANE (C35) | 1270 | | 252 | 1370 | | 292 | 8 | 30 | |
| SHC | C36 | HEXATRIACONTANE (C36) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C38 | OCTATRIACONTANE (C38) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C39 | NONATRIACONTANE (C39) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | C40 | TETRACONTANE (C40) | U | | 252 | U | | 292 | | 30 | NC |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 622000 | | 8310 | 666000 | | 9620 | 7 | 30 | |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 4900 | J | 252 | 4890 | J | 292 | | 30 | NC |

| Surrogates (% Recovery) | | |
|---|---|---|
| O-TERPHENYL | 101 | 101 |
| D50-TETRACOSANE | 100 | 101 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1762020-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1762020-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 3/29/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F18032823029 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6880 | 0.983 | 109 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5560 | 0.983 | 110 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 5120 | 0.983 | 109 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4740 | 0.983 | 114 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4380 | 0.983 | 108 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 1000 | 0.983 | 118 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3960 | 0.983 | 108 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1480 | 0.983 | 108 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 3910 | 0.983 | 107 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3500 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1190 | 0.983 | 109 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 3040 | 0.983 | 101 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2400 | 0.983 | 112 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2700 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1450 | 0.983 | 119 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2540 | 0.983 | 109 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2240 | 0.983 | 110 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2120 | 0.983 | 108 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1920 | 0.983 | 110 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1820 | 0.983 | 111 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1750 | 0.983 | 112 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1520 | 0.983 | 110 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1180 | 0.983 | 109 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 840 | 0.983 | 108 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 817 | 0.983 | 111 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 652 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 549 | 0.983 | 107 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 565 | 0.983 | 123 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 330 | 0.983 | 85 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 313 | 0.983 | 90 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 282 | 0.983 | 101 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 157 | 0.983 | 84 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 150 | 0.983 | 99 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 130 | 0.983 | 99 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 85.2 | 0.983 | 96 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 81.4 | 0.983 | 88 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 586000 | 0.983 | 106 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 83312 | 0.983 | 122 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC CAV 26AGO2023 | |
| Lab ID | L2352167-01 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1835448 | |
| Date Collected | 8/26/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/25/2023 | |
| Sample Size(wet) | 0.00397 | g |
| % Solid | 100 | |
| File ID | F1210232332 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.26 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 2.18 | | 1.26 |
| 2 | D1 | C1-DECALINS | 11.6 | | 2.52 |
| 2 | D2 | C2-DECALINS | 38.5 | | 2.52 |
| 2 | D3 | C3-DECALINS | 37.4 | | 2.52 |
| 2 | D4 | C4-DECALINS | 45.4 | | 2.52 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.52 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 7.43 | | 2.52 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 1.39 | J | 2.52 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.52 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.52 |
| A | N0 | NAPHTHALENE | 3.58 | | 2.52 |
| 2 | N1 | C1-NAPHTHALENES | 183 | | 2.52 |
| 2 | N2 | C2-NAPHTHALENES | 103 | | 2.52 |
| 2 | N3 | C3-NAPHTHALENES | 47.1 | | 2.52 |
| 2 | N4 | C4-NAPHTHALENES | 23.7 | | 2.52 |
| 2 | B | BIPHENYL | 5.70 | | 2.52 |
| 3 | DF | DIBENZOFURAN | 0.822 | J | 2.52 |
| 3 | AY | ACENAPHTHYLENE | 0.610 | JB | 2.52 |
| 3 | AE | ACENAPHTHENE | 1.93 | J | 2.52 |
| 3 | F0 | FLUORENE | 2.29 | J | 2.52 |
| 3 | F1 | C1-FLUORENES | 4.34 | | 2.52 |
| 3 | F2 | C2-FLUORENES | 11.2 | | 2.52 |
| 3 | F3 | C3-FLUORENES | 31.0 | G | 2.52 |
| 3 | A0 | ANTHRACENE | 0.691 | JB | 2.52 |
| 3 | P0 | PHENANTHRENE | 3.24 | B | 2.52 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 7.17 | | 2.52 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 11.7 | | 2.52 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 10.1 | | 2.52 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 16.2 | | 2.52 |
| 3 | RET | RETENE | | U | 2.52 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.767 | JB | 2.52 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 3.74 | | 2.52 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 12.8 | | 2.52 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 19.0 | | 2.52 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 15.3 | | 2.52 |
| 4 | BF | BENZO(B)FLUORENE | 0.393 | JB | 2.52 |
| 4 | FL0 | FLUORANTHENE | 0.815 | JB | 2.52 |
| 4 | PY0 | PYRENE | 1.83 | JB | 2.52 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 4.70 | B | 2.52 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 3.96 | | 2.52 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 5.02 | | 2.52 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 5.98 | | 2.52 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.357 | JB | 2.52 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 2.62 | | 2.52 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.52 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.52 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.52 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.896 | JB | 2.52 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 1.35 | JB | 2.52 |
| 4 | BC1 | C1-CHRYSENES | 1.63 | J | 2.52 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.52 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.52 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.52 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 1.50 | JB | 2.52 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC CAV 26AGO2023 |
| Lab ID | L2352167-01 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | 8/26/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/25/2023 |
| Sample Size(wet) | 0.00397 g |
| % Solid | 100 |
| File ID | F1210232332 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.26 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.934 | JB | 2.52 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.52 |
| 5 | BEP | BENZO(E)PYRENE | 1.10 | JB | 2.52 |
| 5 | BAP | BENZO(A)PYRENE | 1.09 | JB | 2.52 |
| 5 | PER | PERYLENE | 21.0 | | 2.52 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 0.904 | JB | 2.52 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.52 |
| 6 | GHI | BENZO(GHI)PERYLENE | 0.968 | JB | 2.52 |
| O | CAR | CARBAZOLE | | U | 2.52 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 2.16 | J | 2.52 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.52 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.817 | J | 2.52 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.57 | J | 2.52 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.72 | J | 2.52 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 0.137 | J | 2.52 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.80 | J | 2.52 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.10 | JB | 2.52 |
| A | 1MN | 1-METHYLNAPHTHALENE | 109 | | 2.52 |
| A | 2MN | 2-METHYLNAPHTHALENE | 167 | | 2.52 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 45.7 | | 2.52 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 4.27 | | 2.52 |
| H30 | T19 | HOPANE (T19) | 183 | | 2.52 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 10.1 | | 2.52 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 5.39 | | 2.52 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 6.58 | | 2.52 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 5.16 | | 2.52 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.88 | | 2.52 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 4.38 | | 2.52 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 6.93 | | 2.52 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 7.49 | | 2.52 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 9.14 | | 2.52 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 8.76 | | 2.52 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 20.0 | | 2.52 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 9.93 | | 2.52 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 9.18 | | 2.52 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 25.2 | | 2.52 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.45 | | 2.52 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 5.52 | | 2.52 |
| H29 | T15 | 30-NORHOPANE (T15) | 112 | | 2.52 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 24.0 | | 2.52 |
| X | X | 17A(H)-DIAHOPANE (X) | 11.7 | | 2.52 |
| M29 | T17 | 30-NORMORETANE (T17) | 13.3 | | 2.52 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.52 |
| M30 | T20 | MORETANE (T20) | 18.6 | | 2.52 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 100 | | 2.52 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 96.2 | | 2.52 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 27.3 | | 2.52 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 80.7 | | 2.52 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 63.6 | | 2.52 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 78.8 | | 2.52 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 52.8 | | 2.52 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 67.5 | | 2.52 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 51.1 | | 2.52 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 81.8 | | 2.52 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC CAV 26AGO2023 | |
| Lab ID | L2352167-01 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1835448 | |
| Date Collected | 8/26/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/25/2023 | |
| Sample Size(wet) | 0.00397 | g |
| % Solid | 100 | |
| File ID | F1210232332 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.26 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 77.5 | | 2.52 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 21.9 | | 2.52 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 14.4 | | 2.52 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 13.2 | | 2.52 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 44.5 | | 2.52 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 54.9 | | 2.52 |
| d29R | S18 | UNKNOWN STERANE (S18) | 11.2 | | 2.52 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 2.33 | J | 2.52 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 21.0 | | 2.52 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 25.8 | | 2.52 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 28.9 | | 2.52 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 45.8 | | 2.52 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 37.3 | | 2.52 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.2 | | 2.52 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 36.4 | | 2.52 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 64.5 | | 2.52 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 60.0 | | 2.52 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 46.8 | | 2.52 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 6.62 | | 2.52 |
| SC28TAS | TAS02 | C28,20S TAS | 8.86 | | 2.52 |
| RC27TAS | TAS03 | C27,20R TAS | 10.8 | | 2.52 |
| RC28TAS | TAS04 | C28,20R TAS | 3.44 | | 2.52 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 95 |
| BENZO(A)PYRENE-D12 | 97 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052324 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.27 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.27 |
| 2 | D1 | C1-DECALINS | | U | 2.54 |
| 2 | D2 | C2-DECALINS | | U | 2.54 |
| 2 | D3 | C3-DECALINS | | U | 2.54 |
| 2 | D4 | C4-DECALINS | | U | 2.54 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.54 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.54 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.54 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.54 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.54 |
| A | N0 | NAPHTHALENE | 0.166 | J | 2.54 |
| 2 | N1 | C1-NAPHTHALENES | 0.297 | J | 2.54 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.54 |
| 2 | N3 | C3-NAPHTHALENES | 0.695 | J | 2.54 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.54 |
| 2 | B | BIPHENYL | | U | 2.54 |
| 3 | DF | DIBENZOFURAN | | U | 2.54 |
| 3 | AY | ACENAPHTHYLENE | 0.149 | J | 2.54 |
| 3 | AE | ACENAPHTHENE | 0.142 | J | 2.54 |
| 3 | F0 | FLUORENE | 0.0952 | J | 2.54 |
| 3 | F1 | C1-FLUORENES | | U | 2.54 |
| 3 | F2 | C2-FLUORENES | | U | 2.54 |
| 3 | F3 | C3-FLUORENES | | U | 2.54 |
| 3 | A0 | ANTHRACENE | 0.179 | J | 2.54 |
| 3 | P0 | PHENANTHRENE | 0.777 | J | 2.54 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 0.631 | J | 2.54 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.54 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.54 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 0.909 | J | 2.54 |
| 3 | RET | RETENE | 0.767 | J | 2.54 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.143 | J | 2.54 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.54 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.54 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.54 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.54 |
| 4 | BF | BENZO(B)FLUORENE | 0.197 | J | 2.54 |
| 4 | FL0 | FLUORANTHENE | 0.543 | J | 2.54 |
| 4 | PY0 | PYRENE | 0.647 | J | 2.54 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 0.695 | J | 2.54 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.54 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.54 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.54 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.226 | J | 2.54 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.365 | J | 2.54 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.537 | J | 2.54 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.54 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.54 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.54 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.54 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.465 | J | 2.54 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052324 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.27 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.466 | J | 2.54 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.54 |
| 5 | BEP | BENZO(E)PYRENE | 0.406 | J | 2.54 |
| 5 | BAP | BENZO(A)PYRENE | 0.455 | J | 2.54 |
| 5 | PER | PERYLENE | 0.250 | J | 2.54 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 0.246 | J | 2.54 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 0.165 | J | 2.54 |
| 6 | GHI | BENZO(GHI)PERYLENE | 0.312 | J | 2.54 |
| O | CAR | CARBAZOLE | | U | 2.54 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.54 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.54 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.54 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 0.121 | J | 2.54 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 0.108 | J | 2.54 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.54 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 0.0921 | J | 2.54 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 0.166 | J | 2.54 |
| A | 1MN | 1-METHYLNAPHTHALENE | 0.186 | J | 2.54 |
| A | 2MN | 2-METHYLNAPHTHALENE | 0.129 | J | 2.54 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.54 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 0.0962 | J | 2.54 |
| H30 | T19 | HOPANE (T19) | | U | 2.54 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.54 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.54 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.54 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.54 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.54 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.54 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.54 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.54 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.54 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.54 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.54 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.54 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.54 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.54 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.54 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.54 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.54 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.54 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.54 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.54 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.54 |
| M30 | T20 | MORETANE (T20) | | U | 2.54 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.54 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.54 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.54 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.54 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.54 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.54 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.54 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.54 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.54 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.54 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | | U | 2.54 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052324 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.27 |

| | | | | |
|---|---|---|---|---|
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.54 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.54 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.54 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.54 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.54 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.54 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.54 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.54 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.54 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.54 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.54 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.54 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.54 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.54 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.54 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.54 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.54 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.54 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.54 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.54 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.54 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 101 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 100 |
| 5B(H)CHOLANE | 89 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1835448-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052325 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.54 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 277 | 2.54 | 109 | 254 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 250 | 2.54 | 98 | 254 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 239 | 2.54 | 94 | 254 | 50 | 130 |
| 3 | F0 | FLUORENE | 255 | 2.54 | 100 | 254 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 259 | 2.54 | 102 | 254 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 253 | 2.54 | 100 | 254 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 227 | 2.54 | 90 | 254 | 50 | 130 |
| 4 | PY0 | PYRENE | 242 | 2.54 | 95 | 254 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 236 | 2.54 | 93 | 254 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 245 | 2.54 | 97 | 254 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 239 | 2.54 | 94 | 254 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 260 | 2.54 | 102 | 254 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 257 | 2.54 | 101 | 254 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 232 | 2.54 | 91 | 254 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 245 | 2.54 | 97 | 254 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 243 | 2.54 | 96 | 254 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 233 | 2.54 | 92 | 254 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 101 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 101 |
| 5B(H)CHOLANE | 85 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1835448-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052326 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.54 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 282 | 2.54 | 111 | 254 | 50 | 130 | 2 | 30 |
| 3 | AY | ACENAPHTHYLENE | 255 | 2.54 | 100 | 254 | 50 | 130 | 2 | 30 |
| 3 | AE | ACENAPHTHENE | 245 | 2.54 | 96 | 254 | 50 | 130 | 2 | 30 |
| 3 | F0 | FLUORENE | 260 | 2.54 | 102 | 254 | 50 | 130 | 2 | 30 |
| 3 | A0 | ANTHRACENE | 268 | 2.54 | 105 | 254 | 50 | 130 | 3 | 30 |
| 3 | P0 | PHENANTHRENE | 260 | 2.54 | 102 | 254 | 50 | 130 | 2 | 30 |
| 4 | FL0 | FLUORANTHENE | 233 | 2.54 | 92 | 254 | 50 | 130 | 2 | 30 |
| 4 | PY0 | PYRENE | 249 | 2.54 | 98 | 254 | 50 | 130 | 3 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 242 | 2.54 | 95 | 254 | 50 | 130 | 2 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 252 | 2.54 | 99 | 254 | 50 | 130 | 2 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 242 | 2.54 | 95 | 254 | 50 | 130 | 1 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 268 | 2.54 | 105 | 254 | 50 | 130 | 3 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 265 | 2.54 | 104 | 254 | 50 | 130 | 3 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 234 | 2.54 | 92 | 254 | 50 | 130 | 1 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 250 | 2.54 | 98 | 254 | 50 | 130 | 1 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 247 | 2.54 | 97 | 254 | 50 | 130 | 1 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 237 | 2.54 | 93 | 254 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 101 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 101 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Client ID | | | HC CAV 26AGO2023 | | | Duplicate Sample | | | |
| Lab ID | | | L2352167-01 | | | WG1835448-4 | | | |
| Matrix | | | SOLID | | | SOLID | | | |
| Matrix Description | | | | | | | | | |
| Reference Method | | | 8270E-SIM(M) | | | 8270E-SIM(M) | | | |
| Batch ID | | | WG1835448 | | | WG1835448 | | | |
| Date Collected | | | 8/26/2023 | | | NA | | | |
| Date Received | | | 9/8/2023 | | | 10/4/2023 | | | |
| Date Prepped | | | 10/4/2023 | | | 10/4/2023 | | | |
| Date Analyzed | | | 10/25/2023 | | | 10/25/2023 | | | |
| Sample Size(wet) | | | 0.00397 | g | | 0.00343 | g | | |
| % Solid | | | 100 | | | 100 | | | |
| File ID | | | F1210232332 | | | F1210232333 | | | |
| Units | | | mg/kg | | | mg/kg | | | |
| Final Volume | | | 1 | | | 1 | | | |
| Dilution | | | 1 | | | 1 | | | |
| Reporting Limit | | | 1.26 | | | 1.46 | | | |
| Class | Abbrev | Analytes | Result | | SSRL | Result | | SSRL | RPD | RPD Limit | |
| 2 | D0 | CIS/TRANS-DECALIN | 2.18 | | 1.26 | 2.19 | | 1.46 | 0 | 30 | |
| 2 | D1 | C1-DECALINS | 11.6 | | 2.52 | 11.0 | | 2.92 | 5 | 30 | |
| 2 | D2 | C2-DECALINS | 38.5 | | 2.52 | 36.1 | | 2.92 | 6 | 30 | |
| 2 | D3 | C3-DECALINS | 37.4 | | 2.52 | 32.3 | | 2.92 | 15 | 30 | |
| 2 | D4 | C4-DECALINS | 45.4 | | 2.52 | 38.3 | | 2.92 | 17 | 30 | |
| S | BT0 | BENZOTHIOPHENE | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 7.43 | | 2.52 | 6.62 | | 2.92 | 12 | 30 | |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 1.39 | J | 2.52 | 1.33 | J | 2.92 | | 30 | NC |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| A | N0 | NAPHTHALENE | 3.58 | | 2.52 | 2.39 | J | 2.92 | | 30 | NC |
| 2 | N1 | C1-NAPHTHALENES | 183 | | 2.52 | 164 | | 2.92 | 11 | 30 | |
| 2 | N2 | C2-NAPHTHALENES | 103 | | 2.52 | 91.8 | | 2.92 | 11 | 30 | |
| 2 | N3 | C3-NAPHTHALENES | 47.1 | | 2.52 | 43.4 | | 2.92 | 8 | 30 | |
| 2 | N4 | C4-NAPHTHALENES | 23.7 | | 2.52 | 21.7 | | 2.92 | 9 | 30 | |
| 2 | B | BIPHENYL | 5.70 | | 2.52 | 5.21 | | 2.92 | 9 | 30 | |
| 3 | DF | DIBENZOFURAN | 0.822 | J | 2.52 | 0.725 | J | 2.92 | | 30 | NC |
| 3 | AY | ACENAPHTHYLENE | 0.610 | JB | 2.52 | 0.336 | JB | 2.92 | | 30 | NC |
| 3 | AE | ACENAPHTHENE | 1.93 | J | 2.52 | 1.38 | JB | 2.92 | | 30 | NC |
| 3 | F0 | FLUORENE | 2.29 | J | 2.52 | 1.77 | J | 2.92 | | 30 | NC |
| 3 | F1 | C1-FLUORENES | 4.34 | | 2.52 | 3.84 | | 2.92 | 12 | 30 | |
| 3 | F2 | C2-FLUORENES | 11.2 | | 2.52 | 11.4 | | 2.92 | 2 | 30 | |
| 3 | F3 | C3-FLUORENES | 31.0 | G | 2.52 | 28.8 | G | 2.92 | 7 | 30 | |
| 3 | A0 | ANTHRACENE | 0.691 | JB | 2.52 | 0.274 | JB | 2.92 | | 30 | NC |
| 3 | P0 | PHENANTHRENE | 3.24 | B | 2.52 | 1.96 | JB | 2.92 | | 30 | NC |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 7.17 | | 2.52 | 6.40 | | 2.92 | 11 | 30 | |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 11.7 | | 2.52 | 11.5 | | 2.92 | 2 | 30 | |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 10.1 | | 2.52 | 9.85 | | 2.92 | 3 | 30 | |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 16.2 | | 2.52 | 15.4 | | 2.92 | 5 | 30 | |
| 3 | RET | RETENE | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.767 | JB | 2.52 | 0.611 | JB | 2.92 | | 30 | NC |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 3.74 | | 2.52 | 3.15 | | 2.92 | 17 | 30 | |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 12.8 | | 2.52 | 11.7 | | 2.92 | 9 | 30 | |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 19.0 | | 2.52 | 17.5 | | 2.92 | 8 | 30 | |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 15.3 | | 2.52 | 14.3 | | 2.92 | 7 | 30 | |
| 4 | BF | BENZO(B)FLUORENE | 0.393 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 4 | FL0 | FLUORANTHENE | 0.815 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 4 | PY0 | PYRENE | 1.83 | JB | 2.52 | 0.902 | JB | 2.92 | | 30 | NC |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 4.70 | B | 2.52 | 3.88 | B | 2.92 | 19 | 30 | |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 3.96 | | 2.52 | 4.19 | | 2.92 | 6 | 30 | |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 5.02 | | 2.52 | 5.88 | | 2.92 | 16 | 30 | |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 5.98 | | 2.52 | 6.48 | | 2.92 | 8 | 30 | |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.357 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 2.62 | | 2.52 | | U | 2.92 | | 30 | X |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.896 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 1.35 | JB | 2.52 | 0.395 | JB | 2.92 | | 30 | NC |
| 4 | BC1 | C1-CHRYSENES | 1.63 | J | 2.52 | | U | 2.92 | | 30 | X |
| 4 | BC2 | C2-CHRYSENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 4 | BC3 | C3-CHRYSENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 4 | BC4 | C4-CHRYSENES | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 5 | BBF | BENZO(B)FLUORANTHENE | 1.50 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.934 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 5 | BEP | BENZO(E)PYRENE | 1.10 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 5 | BAP | BENZO(A)PYRENE | 1.09 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 5 | PER | PERYLENE | 21.0 | | 2.52 | 19.2 | | 2.92 | 9 | 30 | |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 0.904 | JB | 2.52 | | U | 2.92 | | 30 | X |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.52 | | U | 2.92 | | 30 | NC |

Project Name: PAMPILLA 2
Project Number:

| | | | | | | |
|---|---|---|---|---|---|---|
| Client ID | HC CAV 26AGO2023 | | | Duplicate Sample | | |
| Lab ID | L2352167-01 | | | WG1835448-4 | | |
| Matrix | SOLID | | | SOLID | | |
| Matrix Description | | | | | | |
| Reference Method | 8270E-SIM(M) | | | 8270E-SIM(M) | | |
| Batch ID | WG1835448 | | | WG1835448 | | |
| Date Collected | 8/26/2023 | | | NA | | |
| Date Received | 9/8/2023 | | | 10/4/2023 | | |
| Date Prepped | 10/4/2023 | | | 10/4/2023 | | |
| Date Analyzed | 10/25/2023 | | | 10/25/2023 | | |
| Sample Size(wet) | 0.00397 | g | | 0.00343 | g | |
| % Solid | 100 | | | 100 | | |
| File ID | F1210232332 | | | F1210232333 | | |
| Units | mg/kg | | | mg/kg | | |
| Final Volume | 1 | | | 1 | | |
| Dilution | 1 | | | 1 | | |
| Reporting Limit | 1.26 | | | 1.46 | | |

| Class | Abbrev | Analytes | Result | | SSRL | Result | | SSRL | RPD | RPD Limit | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | GHI | BENZO(GHI)PERYLENE | 0.968 | JB | 2.52 | | U | 2.92 | | 30 | X |
| O | CAR | CARBAZOLE | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 2.16 | J | 2.52 | 1.87 | J | 2.92 | | 30 | NC |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.52 | | U | 2.92 | | 30 | NC |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.817 | J | 2.52 | 0.803 | J | 2.92 | | 30 | NC |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.57 | J | 2.52 | 1.28 | J | 2.92 | | 30 | NC |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.72 | J | 2.52 | 1.54 | J | 2.92 | | 30 | NC |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 0.137 | J | 2.52 | 0.0945 | J | 2.92 | | 30 | NC |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.80 | J | 2.52 | 1.56 | J | 2.92 | | 30 | NC |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.10 | JB | 2.52 | 1.16 | JB | 2.92 | | 30 | NC |
| A | 1MN | 1-METHYLNAPHTHALENE | 109 | | 2.52 | 94.5 | | 2.92 | 14 | 30 | |
| A | 2MN | 2-METHYLNAPHTHALENE | 167 | | 2.52 | 150 | | 2.92 | 11 | 30 | |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 45.7 | | 2.52 | 40.6 | | 2.92 | 12 | 30 | |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 4.27 | | 2.52 | 4.85 | | 2.92 | 13 | 30 | |
| H30 | T19 | HOPANE (T19) | 183 | | 2.52 | 172 | | 2.92 | 6 | 30 | |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 10.1 | | 2.52 | 10.9 | | 2.92 | 8 | 30 | |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 5.39 | | 2.52 | 5.14 | | 2.92 | 5 | 30 | |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 6.58 | | 2.52 | 7.88 | | 2.92 | 18 | 30 | |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 5.16 | | 2.52 | 5.61 | | 2.92 | 8 | 30 | |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.88 | | 2.52 | 4.24 | | 2.92 | 9 | 30 | |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 4.38 | | 2.52 | 3.74 | | 2.92 | 16 | 30 | |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 6.93 | | 2.52 | 6.37 | | 2.92 | 8 | 30 | |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 7.49 | | 2.52 | 6.26 | | 2.92 | 18 | 30 | |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 9.14 | | 2.52 | 10.2 | | 2.92 | 11 | 30 | |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 8.76 | | 2.52 | 8.76 | | 2.92 | 0 | 30 | |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 20.0 | | 2.52 | 20.6 | | 2.92 | 3 | 30 | |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 9.93 | | 2.52 | 11.4 | | 2.92 | 14 | 30 | |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 9.18 | | 2.52 | 7.13 | | 2.92 | 25 | 30 | |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 25.2 | | 2.52 | 21.3 | | 2.92 | 17 | 30 | |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.45 | | 2.52 | 6.86 | | 2.92 | 6 | 30 | |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 5.52 | | 2.52 | 5.70 | | 2.92 | 3 | 30 | |
| H29 | T15 | 30-NORHOPANE (T15) | 112 | | 2.52 | 108 | | 2.92 | 4 | 30 | |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 24.0 | | 2.52 | 23.5 | | 2.92 | 2 | 30 | |
| X | X | 17A(H)-DIAHOPANE (X) | 11.7 | | 2.52 | 12.2 | | 2.92 | 4 | 30 | |
| M29 | T17 | 30-NORMORETANE (T17) | 13.3 | | 2.52 | 14.1 | | 2.92 | 6 | 30 | |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.52 | | U | 2.92 | | 30 | NC |
| M30 | T20 | MORETANE (T20) | 18.6 | | 2.52 | 21.0 | | 2.92 | 12 | 30 | |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 100 | | 2.52 | 96.8 | | 2.92 | 3 | 30 | |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 96.2 | | 2.52 | 96.0 | | 2.92 | 0 | 30 | |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 27.3 | | 2.52 | 28.7 | | 2.92 | 5 | 30 | |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 80.7 | | 2.52 | 78.7 | | 2.92 | 3 | 30 | |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 63.6 | | 2.52 | 59.2 | | 2.92 | 7 | 30 | |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 78.8 | | 2.52 | 77.8 | | 2.92 | 1 | 30 | |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 52.8 | | 2.52 | 54.3 | | 2.92 | 3 | 30 | |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 67.5 | | 2.52 | 69.3 | | 2.92 | 3 | 30 | |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 51.1 | | 2.52 | 49.8 | | 2.92 | 3 | 30 | |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 81.8 | | 2.52 | 80.2 | | 2.92 | 2 | 30 | |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 77.5 | | 2.52 | 79.8 | | 2.92 | 3 | 30 | |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 21.9 | | 2.52 | 21.7 | | 2.92 | 1 | 30 | |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 14.4 | | 2.52 | 14.9 | | 2.92 | 3 | 30 | |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 13.2 | | 2.52 | 13.6 | | 2.92 | 3 | 30 | |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 44.5 | | 2.52 | 43.7 | | 2.92 | 2 | 30 | |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 54.9 | | 2.52 | 51.0 | | 2.92 | 7 | 30 | |
| d29R | S18 | UNKNOWN STERANE (S18) | 11.2 | | 2.52 | 9.72 | | 2.92 | 14 | 30 | |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 2.33 | J | 2.52 | 2.21 | J | 2.92 | | 30 | NC |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 21.0 | | 2.52 | 20.2 | | 2.92 | 4 | 30 | |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 25.8 | | 2.52 | 24.5 | | 2.92 | 5 | 30 | |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 28.9 | | 2.52 | 28.2 | | 2.92 | 2 | 30 | |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 45.8 | | 2.52 | 43.7 | | 2.92 | 5 | 30 | |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 37.3 | | 2.52 | 34.1 | | 2.92 | 9 | 30 | |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.2 | | 2.52 | 37.0 | | 2.92 | 6 | 30 | |

Project Name: PAMPILLA 2
Project Number:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Client ID | | | HC CAV 26AGO2023 | | Duplicate Sample | | |
| Lab ID | | | L2352167-01 | | WG1835448-4 | | |
| Matrix | | | SOLID | | SOLID | | |
| Matrix Description | | | | | | | |
| Reference Method | | | 8270E-SIM(M) | | 8270E-SIM(M) | | |
| Batch ID | | | WG1835448 | | WG1835448 | | |
| Date Collected | | | 8/26/2023 | | NA | | |
| Date Received | | | 9/8/2023 | | 10/4/2023 | | |
| Date Prepped | | | 10/4/2023 | | 10/4/2023 | | |
| Date Analyzed | | | 10/25/2023 | | 10/25/2023 | | |
| Sample Size(wet) | | | 0.00397 | g | 0.00343 | g | |
| % Solid | | | 100 | | 100 | | |
| File ID | | | F1210232332 | | F1210232333 | | |
| Units | | | mg/kg | | mg/kg | | |
| Final Volume | | | 1 | | 1 | | |
| Dilution | | | 1 | | 1 | | |
| Reporting Limit | | | 1.26 | | 1.46 | | |
| Class | Abbrev | Analytes | Result | SSRL | Result | SSRL | RPD | RPD Limit |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 36.4 | 2.52 | 34.9 | 2.92 | 4 | 30 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 64.5 | 2.52 | 61.7 | 2.92 | 4 | 30 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 60.0 | 2.52 | 66.6 | 2.92 | 10 | 30 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 46.8 | 2.52 | 38.4 | 2.92 | 20 | 30 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 6.62 | 2.52 | 8.59 | 2.92 | 26 | 30 |
| SC28TAS | TAS02 | C28,20S TAS | 8.86 | 2.52 | 8.55 | 2.92 | 4 | 30 |
| RC27TAS | TAS03 | C27,20R TAS | 10.8 | 2.52 | 9.75 | 2.92 | 10 | 30 |
| RC28TAS | TAS04 | C28,20R TAS | 3.44 | 2.52 | 3.10 | 2.92 | 10 | 30 |

| Surrogates (% Recovery) | | |
|---|---|---|
| NAPHTHALENE-D8 | 96 | 95 |
| PHENANTHRENE-D10 | 95 | 94 |
| BENZO(A)PYRENE-D12 | 97 | 95 |
| 5B(H)CHOLANE | 87 | 85 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

# HC DEL26AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 27, 2023

**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 August 26, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC DEL 26AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA and arrived at a temperature of 26.5°C on September 8, 2023 with a DHL Tracking # 7103324546 (Seal number 201696). The sample arrived without a chain of custody however a chain of custody (Attachment 1) was supplied via email prior to sample arrival and was consistent with the sample received.

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC DEL 26AGO2023 (HC DEL26) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC DEL26 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are four (4) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. The petroleum signature is consistent with a severely 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 HC DEL26 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 HC DEL26 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC DEL26 sample (Figure 2B) shows an abundance of naphthalenes which is unusual given the weathered appearance of the FID chromatogram. This could indicate the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC DEL26 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC DEL26 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC DEL26 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) and the presence of oleanane (T18) which is absent in the source oil. These differences indicate the HC DEL26 sample and source oil are derived from 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.

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 HC DEL26 plot away from each other indicating a different source of petroleum.

**Conclusion**

The HC DEL 26AGO2023 sample consists of a weathered crude or heavy oil that may also contain low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC DEL 26AGO2023 sample are chemically different and were derived from a different source of petroleum.

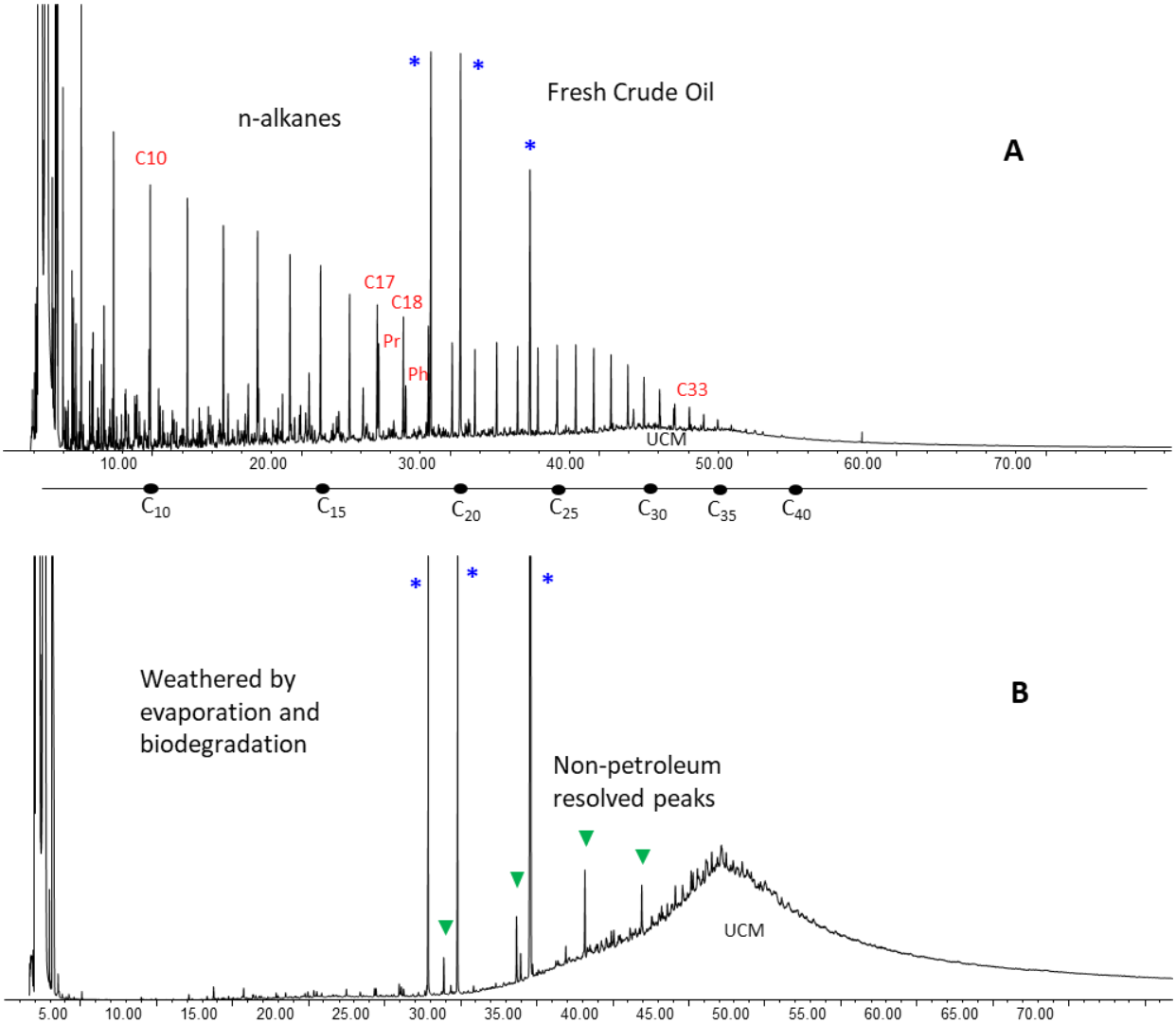


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC DEL 26AGO2023**
'*': Laboratory-added Internal Standard

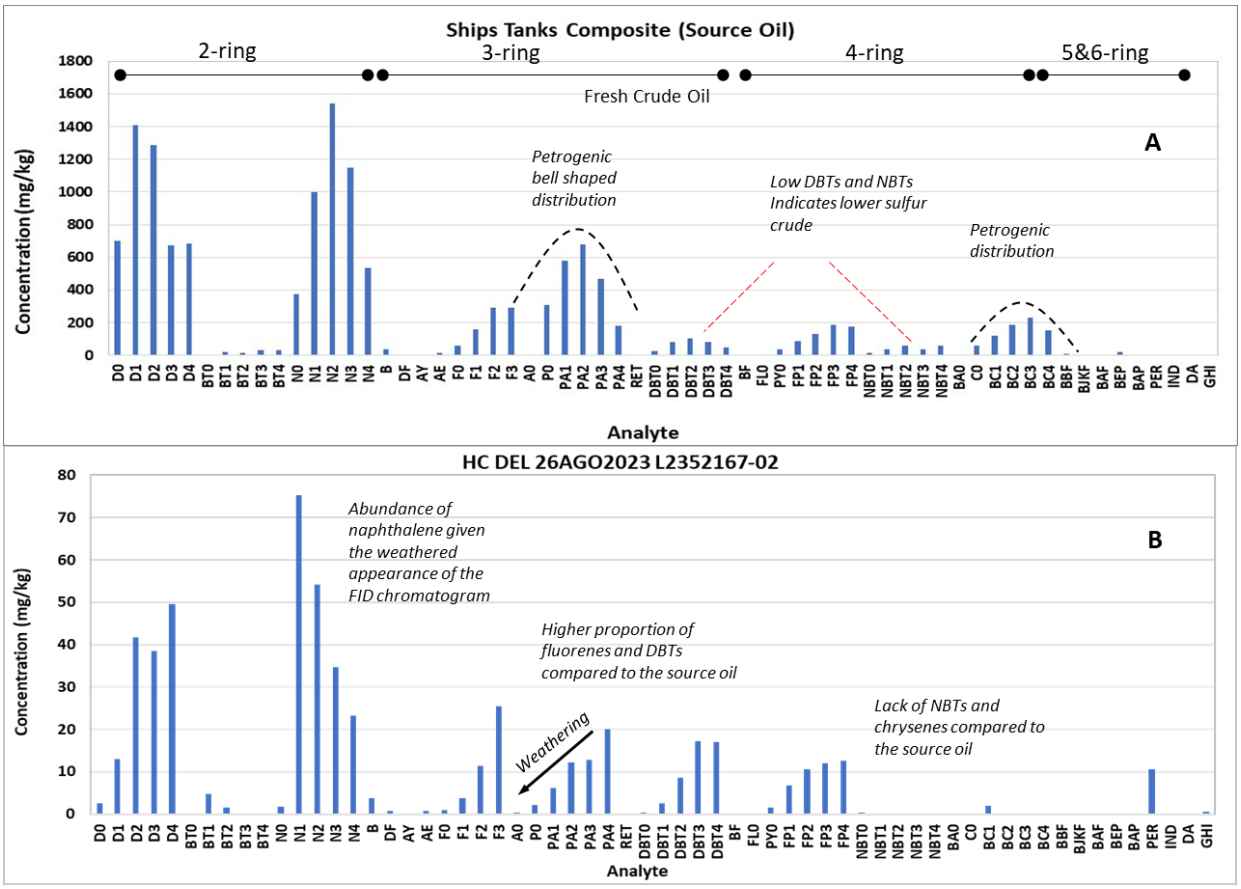


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC DEL 26AGO2023**

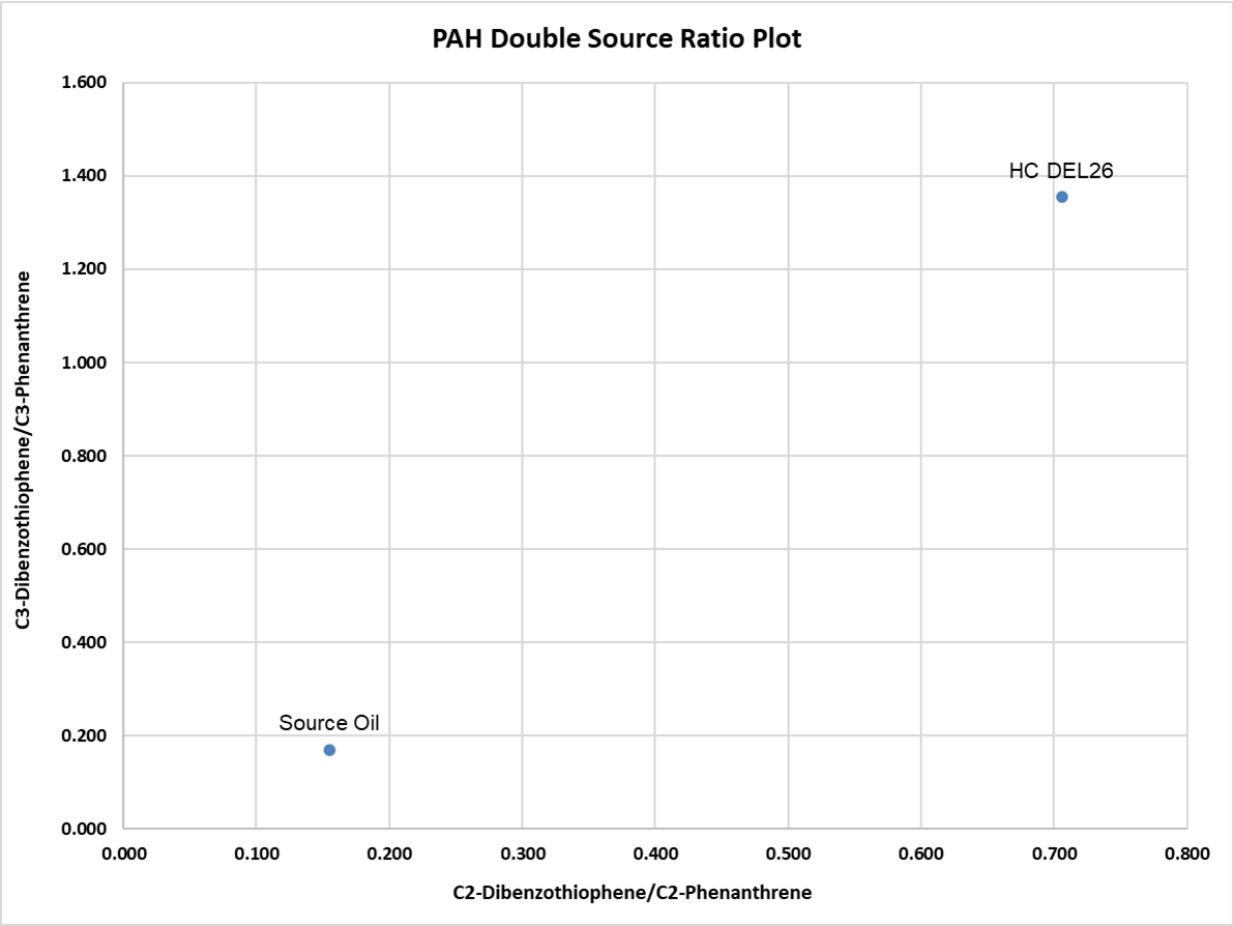


**Figure 3. PAH Double Source Ratio Plot**

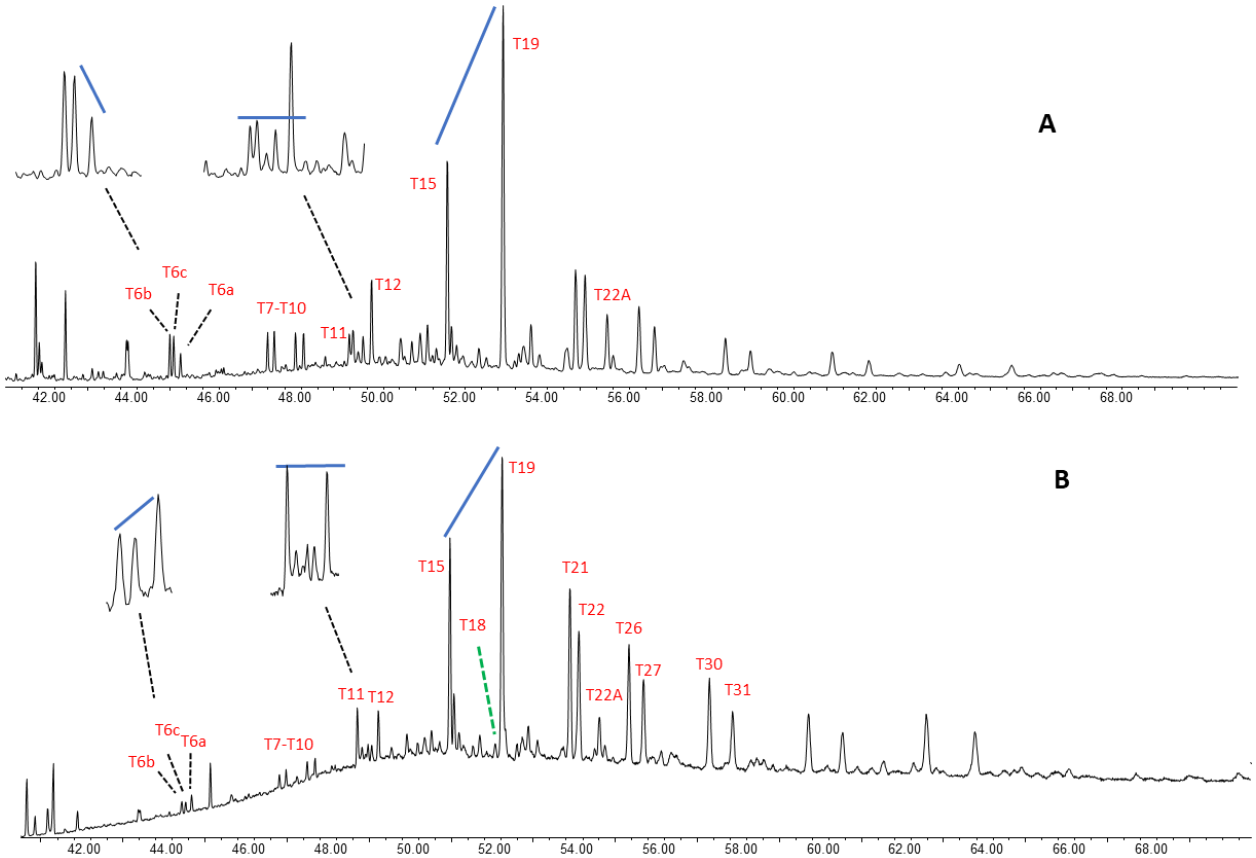


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC DEL 26AGO2023**

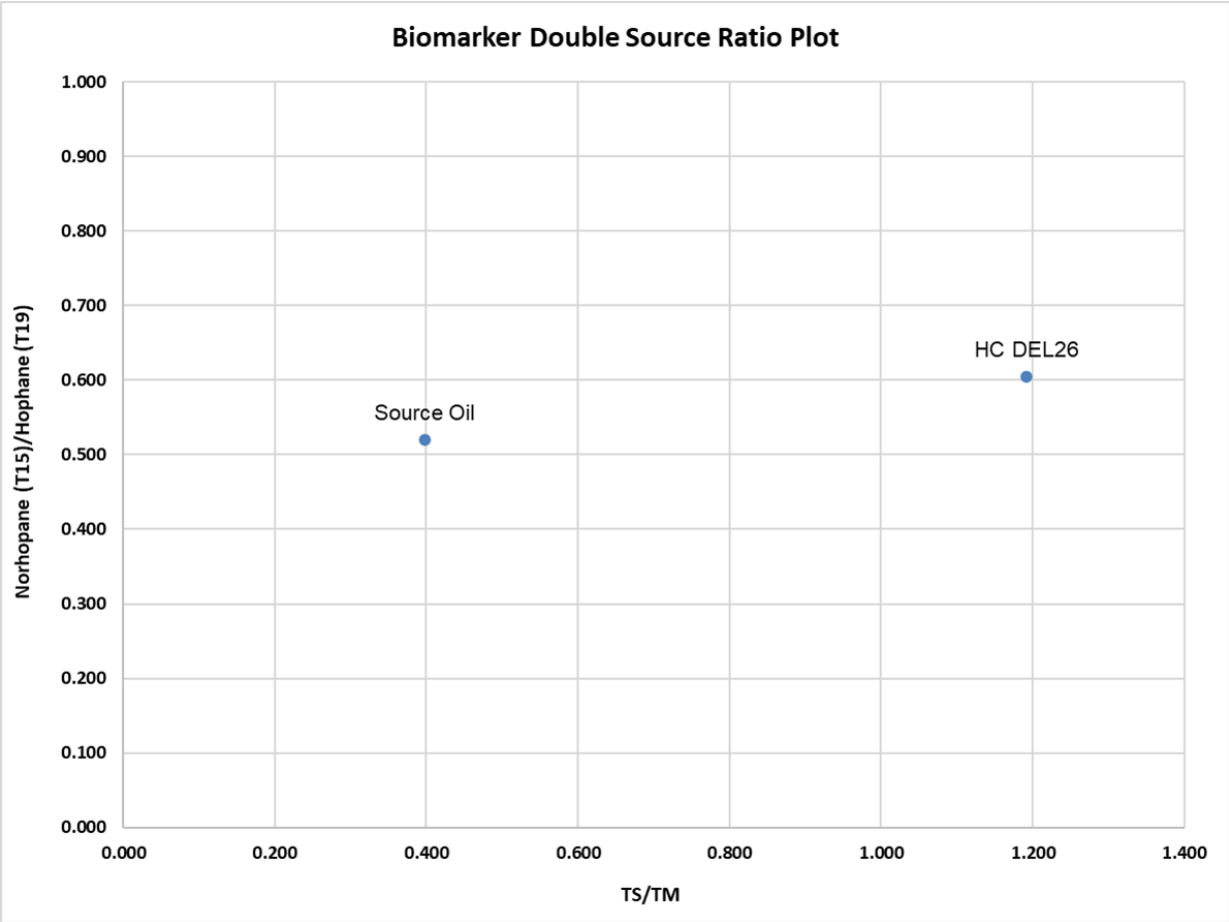


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC DEL 26AGO2023 | L2352167-02 | 08/26/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/8/23

L23 52167

CERPER
CERTIFICACIONES DEL PERÚ S.A.

Nº 007926

# CADENA DE CUSTODIA
(Registro de Campo -Toma de muestra de aguas, suelos, lodos y sedimentos)

Página 01 de 07

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A
EXPEDIENTE: 11700 - 2023
LUGAR: PLAYA DELFINES
Distrito: VENTANILLA
Provincia: CALLAO
Departamento:
PERSONA DE CONTACTO: Miguel Rodriguez
HS: 23006017
JOB NUMBER: 23LM0026254 0748

NORMA:
1 SMEWW - APHA - AWWA - WEF 23ed Ed. 2017. Collection and preservation of samples. Part 9060 A-B ( ) 1060 B-C ( ) 9200 B ( ) 10300 B ( ) 10500 B ( ) 10700 B ( )
2 Instrucción 8084-Toma de muestras de sedimentos ( )
3 NTP 214.055 - 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RM N° 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto
5 RJ N° 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO 5667-10:2012 (Revisada el 2017) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060:2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM N° 273-2013-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales PTAR ( )
9 RM N° 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-EN ( )
11 Otros: ( )

## DESCRIPCIÓN DE LA MUESTRA

| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17, 18, 19) (K, L, M) | CANTIDAD DE ENVASES |
|---|---|---|---|---|---|---|---|
| HC DEL 26AGO2023 | 26/08/23 | 17:40 | * | 0263199 | 8689386 | 18 L | 01 |
| | | | | | | Total de Envases | 01 |

## PARÁMETROS DE ANÁLISIS EN EL LABORATORIO

FINGER PRINT

## PARÁMETROS DE CAMPO

| pH (Unidades de pH) | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg $Cl_2/L$ Libre ( ) Total ( ) | Turbiedad (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( ) | Nivel freático cm ( ) m ( ) | ORP (mV) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

(1) Matriz (s)
AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo:
Otro: * Restos Solidos de Hidrocarburos.

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (X) Congelada ( ) Caja conservadora (X)
Herméticamente cerrada (X) Ice pack (X) Hielo de calidad potable ( )

Equipos: Utilizados

| | Equipo | Código | | Equipo | Código |
|---|---|---|---|---|---|
| 1 | GPS | 003 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Observaciones: Se procedio a llegar al punto de muestreo establecido y determinado por el representante del CLIENTE quien estuvo presente dicha muestra, a fin. Se procedio con el procedimiento de conservacion de la muestra la cual presento una coloracion azul verdoso con apariencia olor a hidrocarburo, la muestra fue presentada con N°. de precinto 201696, la muestra se hizo en la cale norte de la playa DELFINES; se tomaron las coordenadas in situ.

Responsable de la toma de muestra:
Firma:
Inspector Cerper: Jampier Chávez / H. Rodríguez
Inspectores de apoyo:
Hora de inicio: 16:00 Hora de término: 18:25

Representante del cliente
Firma:
Nombre: Rodriguez Ramirez M.
DNI: 47219303
Cargo: Supervisión

Recepción de muestras
Nombre: Maelin Huchuca A.
Fecha: 02.09.23 Hora:

Intertek
07 SEP. 2023
08° LAB. CALEB BRETT
RECEIVED
OI-R-C-005 Versión 06 2023-06-20

9/8/23 14:44

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC DEL 26AGO2023 | |
| Lab ID | L2352167-02 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1835448 | |
| Date Collected | 8/26/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/6/2023 | |
| Sample Size(wet) | 0.00379 | g |
| % Solid | 100 | |
| File ID | F18100523033 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 264 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 264 |
| SHC | C10 | DECANE (C10) | | U | 264 |
| SHC | C11 | UNDECANE | | U | 264 |
| SHC | C12 | DODECANE (C12) | 43.3 | J | 264 |
| SHC | C13 | TRIDECANE | 66.8 | J | 264 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 46.7 | J | 264 |
| SHC | C14 | TETRADECANE (C14) | 99.7 | J | 264 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 79.2 | J | 264 |
| SHC | C15 | PENTADECANE (C15) | 121 | J | 264 |
| SHC | C16 | HEXADECANE (C16) | 140 | J | 264 |
| SHC | 1650 | NORPRISTANE (1650) | 124 | J | 264 |
| SHC | C17 | HEPTADECANE (C17) | 150 | J | 264 |
| SHC | Pr | PRISTANE | 173 | J | 264 |
| SHC | C18 | OCTADECANE (C18) | 186 | J | 264 |
| SHC | Ph | PHYTANE | 165 | J | 264 |
| SHC | C19 | NONADECANE (C19) | 155 | J | 264 |
| SHC | C20 | EICOSANE (C20) | 137 | J | 264 |
| SHC | C21 | HENEICOSANE (C21) | 98.9 | J | 264 |
| SHC | C22 | DOCOSANE (C22) | 93.7 | J | 264 |
| SHC | C23 | TRICOSANE (C23) | | U | 264 |
| SHC | C24 | TETRACOSANE (C24) | 118 | J | 264 |
| SHC | C25 | PENTACOSANE (C25) | 146 | J | 264 |
| SHC | C26 | HEXACOSANE (C26) | | U | 264 |
| SHC | C27 | HEPTACOSANE (C27) | 142 | J | 264 |
| SHC | C28 | OCTACOSANE (C28) | | U | 264 |
| SHC | C29 | NONACOSANE (C29) | 304 | CB | 264 |
| SHC | C30 | TRIACONTANE (C30) | | U | 264 |
| SHC | C31 | HENTATRIACONTANE (C31) | 199 | J | 264 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 264 |
| SHC | C33 | TRITRIACONTANE (C33) | 436 | | 264 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 264 |
| SHC | C35 | PENTATRIACONTANE (C35) | 1510 | | 264 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 264 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 264 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 264 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 264 |
| SHC | C40 | TETRACONTANE (C40) | | U | 264 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 746000 | | 8710 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 4730 | J | 264 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 100 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F18100523013 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 254 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 254 |
| SHC | C10 | DECANE (C10) | | U | 254 |
| SHC | C11 | UNDECANE | | U | 254 |
| SHC | C12 | DODECANE (C12) | | U | 254 |
| SHC | C13 | TRIDECANE | | U | 254 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | | U | 254 |
| SHC | C14 | TETRADECANE (C14) | | U | 254 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | | U | 254 |
| SHC | C15 | PENTADECANE (C15) | | U | 254 |
| SHC | C16 | HEXADECANE (C16) | | U | 254 |
| SHC | 1650 | NORPRISTANE (1650) | | U | 254 |
| SHC | C17 | HEPTADECANE (C17) | | U | 254 |
| SHC | Pr | PRISTANE | | U | 254 |
| SHC | C18 | OCTADECANE (C18) | | U | 254 |
| SHC | Ph | PHYTANE | | U | 254 |
| SHC | C19 | NONADECANE (C19) | | U | 254 |
| SHC | C20 | EICOSANE (C20) | | U | 254 |
| SHC | C21 | HENEICOSANE (C21) | | U | 254 |
| SHC | C22 | DOCOSANE (C22) | | U | 254 |
| SHC | C23 | TRICOSANE (C23) | | U | 254 |
| SHC | C24 | TETRACOSANE (C24) | 6.09 | J | 254 |
| SHC | C25 | PENTACOSANE (C25) | 10.2 | J | 254 |
| SHC | C26 | HEXACOSANE (C26) | | U | 254 |
| SHC | C27 | HEPTACOSANE (C27) | | U | 254 |
| SHC | C28 | OCTACOSANE (C28) | | U | 254 |
| SHC | C29 | NONACOSANE (C29) | 228 | JC | 254 |
| SHC | C30 | TRIACONTANE (C30) | | U | 254 |
| SHC | C31 | HENTATRIACONTANE (C31) | | U | 254 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 254 |
| SHC | C33 | TRITRIACONTANE (C33) | | U | 254 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 254 |
| SHC | C35 | PENTATRIACONTANE (C35) | | U | 254 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 254 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 254 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 254 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 254 |
| SHC | C40 | TETRACONTANE (C40) | | U | 254 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | | U | 8380 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 244 | J | 254 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1835448-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1835448 | |
| Date Collected | NA | |
| Date Received | 10/4/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00394 | g |
| % Solid | 100 | |
| File ID | f18100523019 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 254 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5090 | 254 | 100 | 5080 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 5050 | 254 | 99 | 5080 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 5300 | 254 | 104 | 5080 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 5200 | 254 | 102 | 5080 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5390 | 254 | 106 | 5080 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5570 | 254 | 110 | 5080 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 5210 | 254 | 103 | 5080 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 5330 | 254 | 105 | 5080 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 5020 | 254 | 99 | 5080 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 5190 | 254 | 102 | 5080 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 5030 | 254 | 99 | 5080 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 5150 | 254 | 102 | 5080 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 4960 | 254 | 98 | 5080 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4340 | 254 | 85 | 5080 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1835448-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1835448 | |
| Date Collected | NA | |
| Date Received | 10/4/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00394 | g |
| % Solid | 100 | |
| File ID | f18100523021 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 254 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5140 | 254 | 101 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C10 | DECANE (C10) | 5090 | 254 | 100 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5240 | 254 | 103 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C14 | TETRADECANE (C14) | 5240 | 254 | 103 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5350 | 254 | 105 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5590 | 254 | 110 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C19 | NONADECANE (C19) | 5230 | 254 | 103 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C20 | EICOSANE (C20) | 5340 | 254 | 105 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C22 | DOCOSANE (C22) | 5030 | 254 | 99 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 5200 | 254 | 102 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 5050 | 254 | 100 | 5080 | 50 | 130 | 1 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 5170 | 254 | 102 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 4990 | 254 | 98 | 5080 | 50 | 130 | 0 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4360 | 254 | 86 | 5080 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1762020-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1762020-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 3/29/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F18032823029 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6880 | 0.983 | 109 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5560 | 0.983 | 110 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 5120 | 0.983 | 109 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4740 | 0.983 | 114 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4380 | 0.983 | 108 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 1000 | 0.983 | 118 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3960 | 0.983 | 108 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1480 | 0.983 | 108 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 3910 | 0.983 | 107 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3500 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1190 | 0.983 | 109 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 3040 | 0.983 | 101 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2400 | 0.983 | 112 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2700 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1450 | 0.983 | 119 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2540 | 0.983 | 109 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2240 | 0.983 | 110 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2120 | 0.983 | 108 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1920 | 0.983 | 110 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1820 | 0.983 | 111 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1750 | 0.983 | 112 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1520 | 0.983 | 110 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1180 | 0.983 | 109 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 840 | 0.983 | 108 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 817 | 0.983 | 111 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 652 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 549 | 0.983 | 107 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 565 | 0.983 | 123 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 330 | 0.983 | 85 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 313 | 0.983 | 90 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 282 | 0.983 | 101 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 157 | 0.983 | 84 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 150 | 0.983 | 99 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 130 | 0.983 | 99 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 85.2 | 0.983 | 96 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 81.4 | 0.983 | 88 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 586000 | 0.983 | 106 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 83312 | 0.983 | 122 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC DEL 26AGO2023 |
| Lab ID | L2352167-02 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | 8/26/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/25/2023 |
| Sample Size(wet) | 0.00379 g |
| % Solid | 100 |
| File ID | F1210232334 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.32 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 2.50 | | 1.32 |
| 2 | D1 | C1-DECALINS | 12.9 | | 2.64 |
| 2 | D2 | C2-DECALINS | 41.8 | | 2.64 |
| 2 | D3 | C3-DECALINS | 38.6 | | 2.64 |
| 2 | D4 | C4-DECALINS | 49.5 | | 2.64 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.64 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 4.69 | | 2.64 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 1.50 | J | 2.64 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.64 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.64 |
| A | N0 | NAPHTHALENE | 1.67 | J | 2.64 |
| 2 | N1 | C1-NAPHTHALENES | 75.2 | | 2.64 |
| 2 | N2 | C2-NAPHTHALENES | 54.1 | | 2.64 |
| 2 | N3 | C3-NAPHTHALENES | 34.7 | | 2.64 |
| 2 | N4 | C4-NAPHTHALENES | 23.3 | | 2.64 |
| 2 | B | BIPHENYL | 3.67 | | 2.64 |
| 3 | DF | DIBENZOFURAN | 0.735 | J | 2.64 |
| 3 | AY | ACENAPHTHYLENE | 0.144 | JB | 2.64 |
| 3 | AE | ACENAPHTHENE | 0.826 | JB | 2.64 |
| 3 | F0 | FLUORENE | 0.937 | JB | 2.64 |
| 3 | F1 | C1-FLUORENES | 3.82 | | 2.64 |
| 3 | F2 | C2-FLUORENES | 11.4 | | 2.64 |
| 3 | F3 | C3-FLUORENES | 25.5 | G | 2.64 |
| 3 | A0 | ANTHRACENE | 0.400 | JB | 2.64 |
| 3 | P0 | PHENANTHRENE | 2.06 | JB | 2.64 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 6.23 | B | 2.64 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 12.1 | | 2.64 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 12.7 | | 2.64 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 20.0 | | 2.64 |
| 3 | RET | RETENE | | U | 2.64 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.378 | JB | 2.64 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 2.53 | J | 2.64 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 8.54 | | 2.64 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 17.2 | | 2.64 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 17.1 | | 2.64 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.64 |
| 4 | FL0 | FLUORANTHENE | | U | 2.64 |
| 4 | PY0 | PYRENE | 1.54 | JB | 2.64 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 6.76 | B | 2.64 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 10.5 | | 2.64 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 12.0 | | 2.64 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 12.6 | | 2.64 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.279 | JB | 2.64 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.64 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.64 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.64 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.64 |
| 4 | BA0 | BENZ(A)ANTHRACENE | | U | 2.64 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | | U | 2.64 |
| 4 | BC1 | C1-CHRYSENES | 1.94 | J | 2.64 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.64 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.64 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.64 |
| 5 | BBF | BENZO(B)FLUORANTHENE | | U | 2.64 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC DEL 26AGO2023 |
| Lab ID | L2352167-02 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | 8/26/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/25/2023 |
| Sample Size(wet) | 0.00379 g |
| % Solid | 100 |
| File ID | F1210232334 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.32 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.64 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.64 |
| 5 | BEP | BENZO(E)PYRENE | | U | 2.64 |
| 5 | BAP | BENZO(A)PYRENE | | U | 2.64 |
| 5 | PER | PERYLENE | 10.5 | | 2.64 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.64 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.64 |
| 6 | GHI | BENZO(GHI)PERYLENE | 0.598 | JB | 2.64 |
| O | CAR | CARBAZOLE | | U | 2.64 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 1.16 | J | 2.64 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.64 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.458 | J | 2.64 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.45 | J | 2.64 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.64 | J | 2.64 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.64 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.55 | J | 2.64 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.05 | JB | 2.64 |
| A | 1MN | 1-METHYLNAPHTHALENE | 44.0 | | 2.64 |
| A | 2MN | 2-METHYLNAPHTHALENE | 67.5 | | 2.64 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 23.3 | | 2.64 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 3.68 | | 2.64 |
| H30 | T19 | HOPANE (T19) | 228 | | 2.64 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 16.1 | | 2.64 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 10.3 | | 2.64 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 11.4 | | 2.64 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 9.17 | | 2.64 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 7.09 | | 2.64 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 7.10 | | 2.64 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 7.56 | | 2.64 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 8.83 | | 2.64 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 12.2 | | 2.64 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 9.57 | | 2.64 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 36.0 | | 2.64 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 14.6 | | 2.64 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 10.6 | | 2.64 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 30.2 | | 2.64 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 17.5 | | 2.64 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 16.8 | | 2.64 |
| H29 | T15 | 30-NORHOPANE (T15) | 138 | | 2.64 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 40.0 | | 2.64 |
| X | X | 17A(H)-DIAHOPANE (X) | 15.7 | | 2.64 |
| M29 | T17 | 30-NORMORETANE (T17) | 17.8 | | 2.64 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | 12.0 | | 2.64 |
| M30 | T20 | MORETANE (T20) | 27.4 | | 2.64 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 136 | | 2.64 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 120 | | 2.64 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 41.0 | | 2.64 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 110 | | 2.64 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 79.1 | | 2.64 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 95.5 | | 2.64 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 62.8 | | 2.64 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 71.1 | | 2.64 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 51.9 | | 2.64 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 82.2 | | 2.64 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC DEL 26AGO2023 | |
| Lab ID | L2352167-02 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1835448 | |
| Date Collected | 8/26/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/25/2023 | |
| Sample Size(wet) | 0.00379 | g |
| % Solid | 100 | |
| File ID | F1210232334 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.32 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 72.3 | 2.64 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 56.0 | 2.64 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 35.2 | 2.64 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 27.3 | 2.64 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 74.3 | 2.64 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 89.7 | 2.64 |
| d29R | S18 | UNKNOWN STERANE (S18) | 21.7 | 2.64 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 5.06 | 2.64 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.2 | 2.64 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 35.2 | 2.64 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 36.0 | 2.64 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 45.8 | 2.64 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 50.4 | 2.64 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 50.9 | 2.64 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 48.2 | 2.64 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 69.9 | 2.64 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 72.3 | 2.64 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 58.0 | 2.64 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 10.6 | 2.64 |
| SC28TAS | TAS02 | C28,20S TAS | 10.8 | 2.64 |
| RC27TAS | TAS03 | C27,20R TAS | 15.0 | 2.64 |
| RC28TAS | TAS04 | C28,20R TAS | 4.94 | 2.64 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 95 |
| PHENANTHRENE-D10 | 92 |
| BENZO(A)PYRENE-D12 | 97 |
| 5B(H)CHOLANE | 85 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052324 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.27 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.27 |
| 2 | D1 | C1-DECALINS | | U | 2.54 |
| 2 | D2 | C2-DECALINS | | U | 2.54 |
| 2 | D3 | C3-DECALINS | | U | 2.54 |
| 2 | D4 | C4-DECALINS | | U | 2.54 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.54 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.54 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.54 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.54 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.54 |
| A | N0 | NAPHTHALENE | 0.166 | J | 2.54 |
| 2 | N1 | C1-NAPHTHALENES | 0.297 | J | 2.54 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.54 |
| 2 | N3 | C3-NAPHTHALENES | 0.695 | J | 2.54 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.54 |
| 2 | B | BIPHENYL | | U | 2.54 |
| 3 | DF | DIBENZOFURAN | | U | 2.54 |
| 3 | AY | ACENAPHTHYLENE | 0.149 | J | 2.54 |
| 3 | AE | ACENAPHTHENE | 0.142 | J | 2.54 |
| 3 | F0 | FLUORENE | 0.0952 | J | 2.54 |
| 3 | F1 | C1-FLUORENES | | U | 2.54 |
| 3 | F2 | C2-FLUORENES | | U | 2.54 |
| 3 | F3 | C3-FLUORENES | | U | 2.54 |
| 3 | A0 | ANTHRACENE | 0.179 | J | 2.54 |
| 3 | P0 | PHENANTHRENE | 0.777 | J | 2.54 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 0.631 | J | 2.54 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.54 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.54 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 0.909 | J | 2.54 |
| 3 | RET | RETENE | 0.767 | J | 2.54 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.143 | J | 2.54 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.54 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.54 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.54 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.54 |
| 4 | BF | BENZO(B)FLUORENE | 0.197 | J | 2.54 |
| 4 | FL0 | FLUORANTHENE | 0.543 | J | 2.54 |
| 4 | PY0 | PYRENE | 0.647 | J | 2.54 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 0.695 | J | 2.54 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.54 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.54 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.54 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.226 | J | 2.54 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.54 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.365 | J | 2.54 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.537 | J | 2.54 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.54 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.54 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.54 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.54 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.465 | J | 2.54 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052324 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.27 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.466 | J | 2.54 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.54 |
| 5 | BEP | BENZO(E)PYRENE | 0.406 | J | 2.54 |
| 5 | BAP | BENZO(A)PYRENE | 0.455 | J | 2.54 |
| 5 | PER | PERYLENE | 0.250 | J | 2.54 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 0.246 | J | 2.54 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 0.165 | J | 2.54 |
| 6 | GHI | BENZO(GHI)PERYLENE | 0.312 | J | 2.54 |
| O | CAR | CARBAZOLE | | U | 2.54 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.54 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.54 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.54 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 0.121 | J | 2.54 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 0.108 | J | 2.54 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.54 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 0.0921 | J | 2.54 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 0.166 | J | 2.54 |
| A | 1MN | 1-METHYLNAPHTHALENE | 0.186 | J | 2.54 |
| A | 2MN | 2-METHYLNAPHTHALENE | 0.129 | J | 2.54 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.54 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 0.0962 | J | 2.54 |
| H30 | T19 | HOPANE (T19) | | U | 2.54 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.54 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.54 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.54 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.54 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.54 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.54 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.54 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.54 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.54 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.54 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.54 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.54 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.54 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.54 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.54 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.54 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.54 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.54 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.54 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.54 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.54 |
| M30 | T20 | MORETANE (T20) | | U | 2.54 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.54 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.54 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.54 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.54 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.54 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.54 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.54 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.54 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.54 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.54 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | | U | 2.54 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1835448-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052324 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.27 |

| | | | | |
|---|---|---|---|---|
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.54 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.54 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.54 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.54 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.54 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.54 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.54 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.54 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.54 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.54 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.54 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.54 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.54 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.54 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.54 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.54 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.54 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.54 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.54 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.54 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.54 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 101 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 100 |
| 5B(H)CHOLANE | 89 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1835448-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052325 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.54 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 277 | 2.54 | 109 | 254 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 250 | 2.54 | 98 | 254 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 239 | 2.54 | 94 | 254 | 50 | 130 |
| 3 | F0 | FLUORENE | 255 | 2.54 | 100 | 254 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 259 | 2.54 | 102 | 254 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 253 | 2.54 | 100 | 254 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 227 | 2.54 | 90 | 254 | 50 | 130 |
| 4 | PY0 | PYRENE | 242 | 2.54 | 95 | 254 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 236 | 2.54 | 93 | 254 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 245 | 2.54 | 97 | 254 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 239 | 2.54 | 94 | 254 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 260 | 2.54 | 102 | 254 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 257 | 2.54 | 101 | 254 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 232 | 2.54 | 91 | 254 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 245 | 2.54 | 97 | 254 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 243 | 2.54 | 96 | 254 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 233 | 2.54 | 92 | 254 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 101 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 101 |
| 5B(H)CHOLANE | 85 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1835448-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1835448 |
| Date Collected | NA |
| Date Received | 10/4/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/6/2023 |
| Sample Size(wet) | 0.00394 g |
| % Solid | 100 |
| File ID | F1210052326 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.54 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 282 | 2.54 | 111 | 254 | 50 | 130 | 2 | 30 |
| 3 | AY | ACENAPHTHYLENE | 255 | 2.54 | 100 | 254 | 50 | 130 | 2 | 30 |
| 3 | AE | ACENAPHTHENE | 245 | 2.54 | 96 | 254 | 50 | 130 | 2 | 30 |
| 3 | F0 | FLUORENE | 260 | 2.54 | 102 | 254 | 50 | 130 | 2 | 30 |
| 3 | A0 | ANTHRACENE | 268 | 2.54 | 105 | 254 | 50 | 130 | 3 | 30 |
| 3 | P0 | PHENANTHRENE | 260 | 2.54 | 102 | 254 | 50 | 130 | 2 | 30 |
| 4 | FL0 | FLUORANTHENE | 233 | 2.54 | 92 | 254 | 50 | 130 | 2 | 30 |
| 4 | PY0 | PYRENE | 249 | 2.54 | 98 | 254 | 50 | 130 | 3 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 242 | 2.54 | 95 | 254 | 50 | 130 | 2 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 252 | 2.54 | 99 | 254 | 50 | 130 | 2 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 242 | 2.54 | 95 | 254 | 50 | 130 | 1 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 268 | 2.54 | 105 | 254 | 50 | 130 | 3 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 265 | 2.54 | 104 | 254 | 50 | 130 | 3 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 234 | 2.54 | 92 | 254 | 50 | 130 | 1 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 250 | 2.54 | 98 | 254 | 50 | 130 | 1 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 247 | 2.54 | 97 | 254 | 50 | 130 | 1 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 237 | 2.54 | 93 | 254 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 101 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 101 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

HC SRC 28AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 11, 2023

**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 August 28, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC SRC 28AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA and arrived at a temperature of 26.5°C on September 8, 2023 with a DHL Tracking # 7103324546 (Seal number 0203904). The sample arrived without a chain of custody however a chain of custody (Attachment 1) was supplied via email prior to sample arrival and was consistent with the sample received.

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC SRC 28AGO2023 (HC SRC28) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC SRC28 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are four (4) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC SRC28 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 HC SRC28 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC SRC28 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC SRC28 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC SRC28 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC SRC28 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC SRC28 sample and source oil are derived from 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.

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 HC SRC28 sample plot away from each other indicating a different source of petroleum**.**

**Conclusion**

The HC SRC 28AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC SRC 28AGO2023 sample are chemically different and were derived from a different source of petroleum.

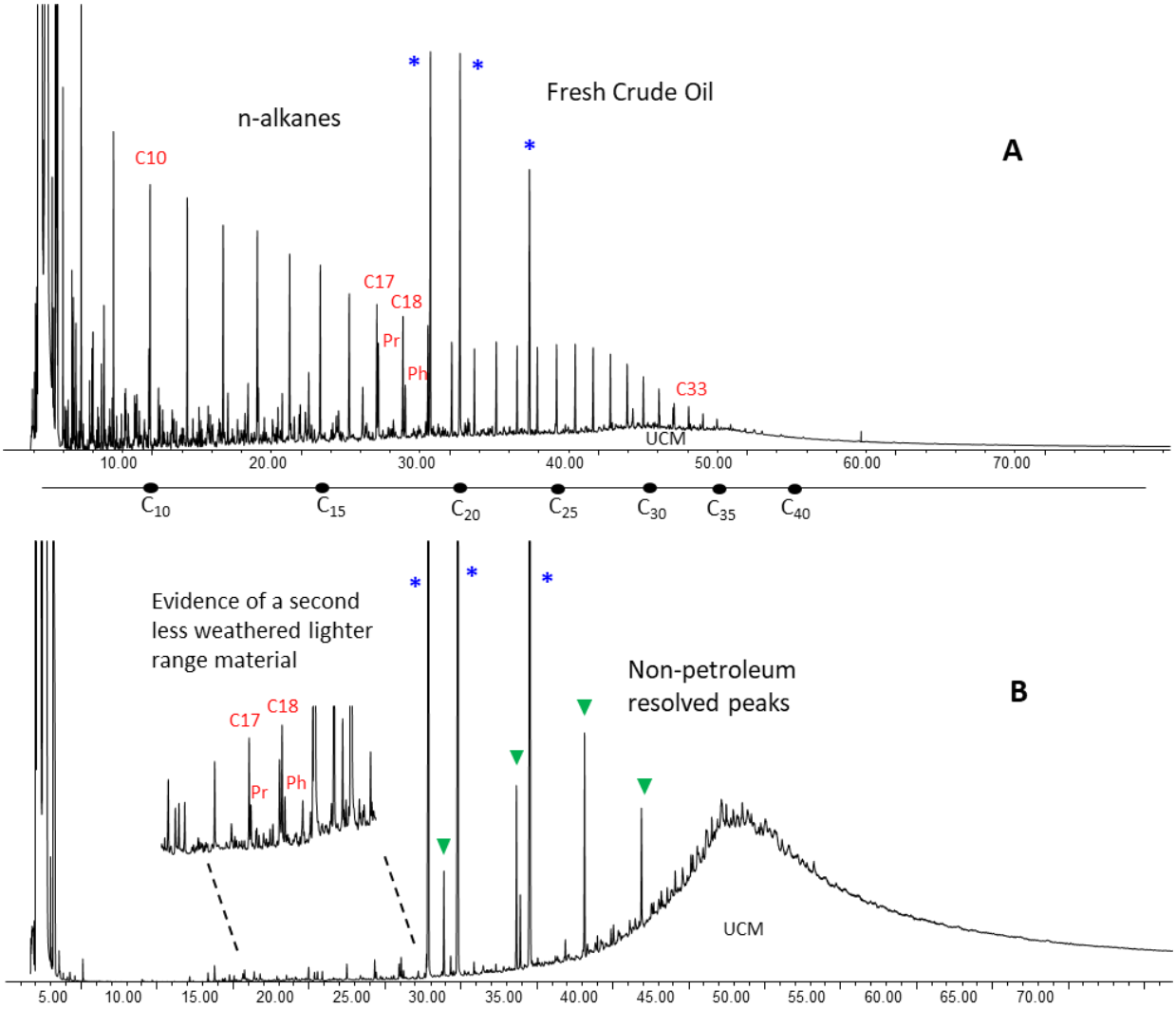


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC SRC 28AGO2023**
'*': Laboratory-added Internal Standard

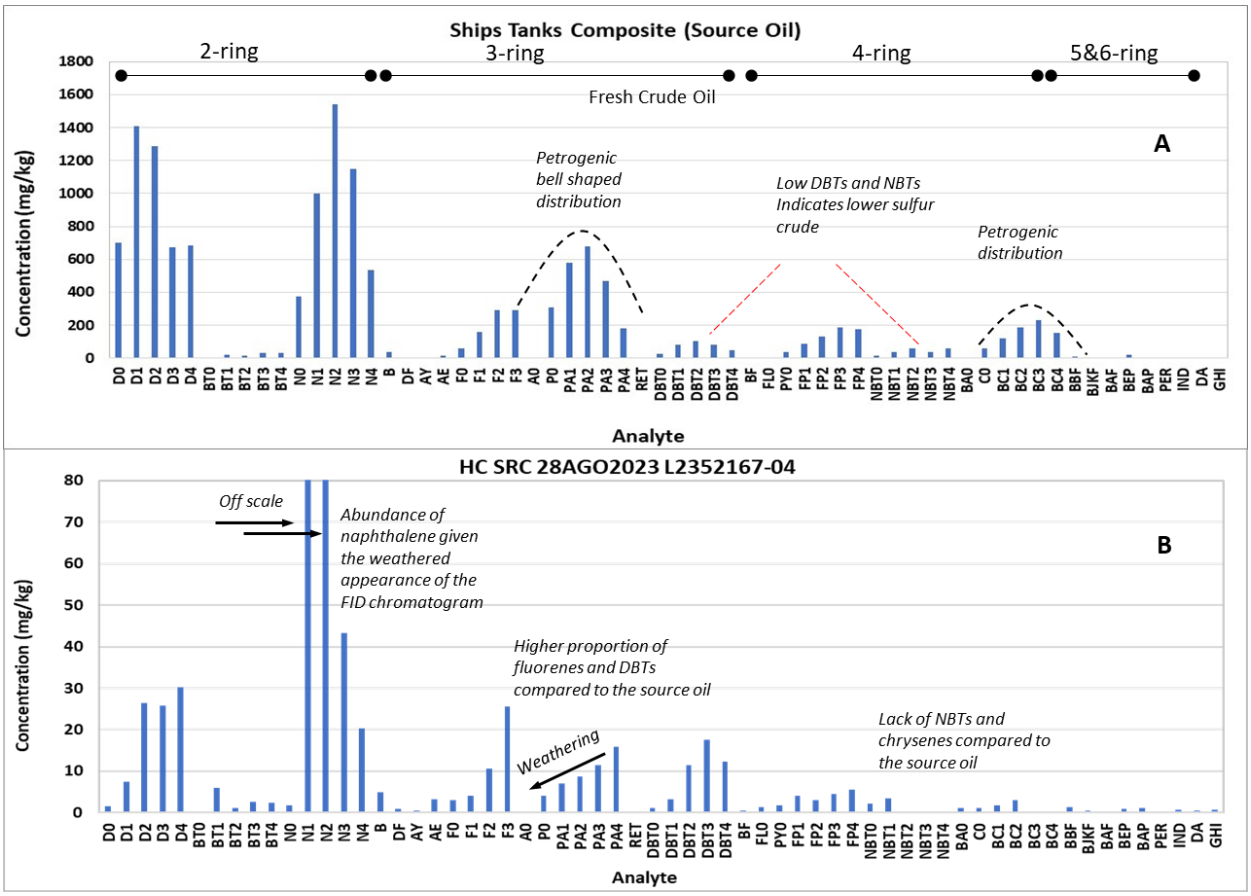


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC SRC 28AGO2023**

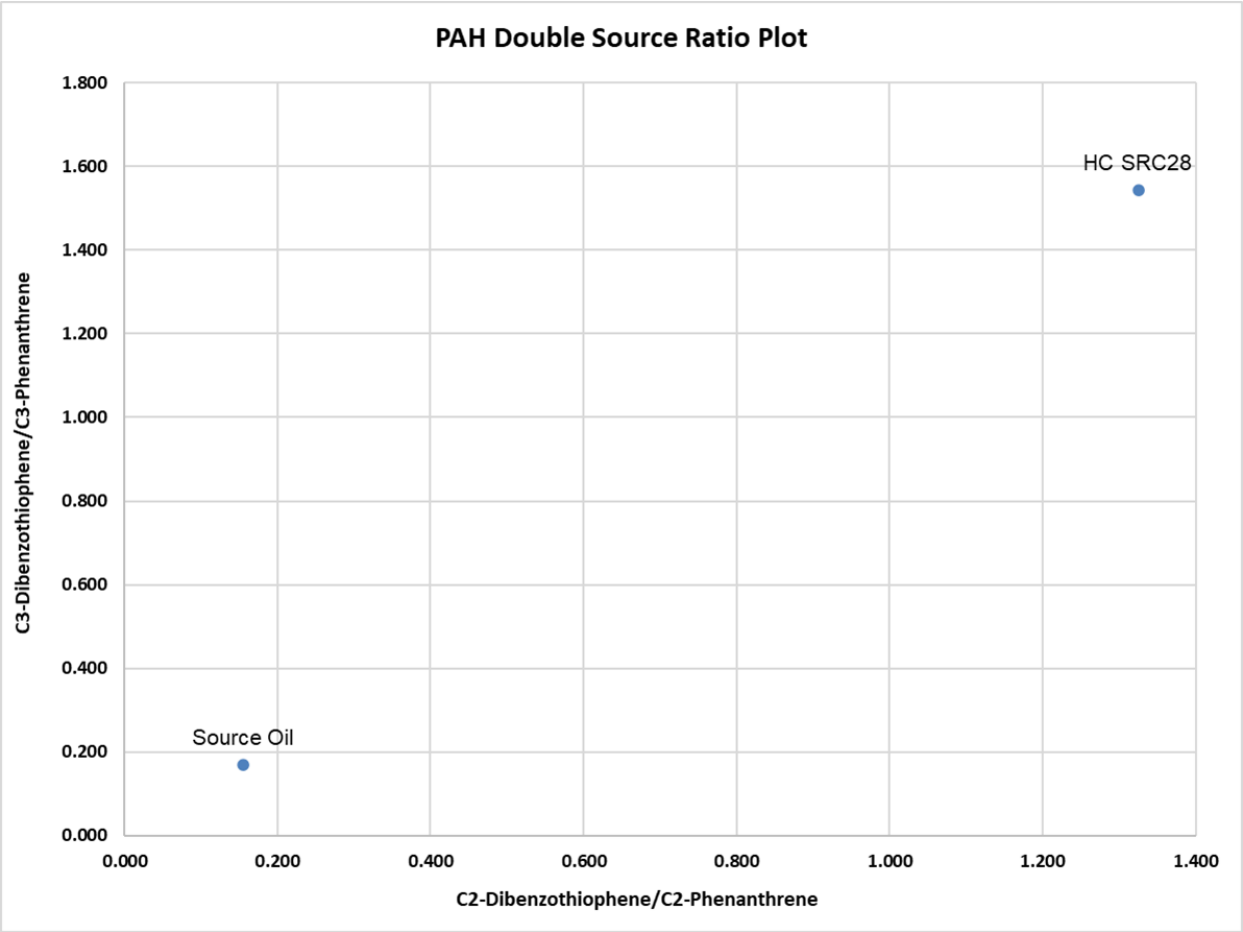


**Figure 3. PAH Double Source Ratio Plot**

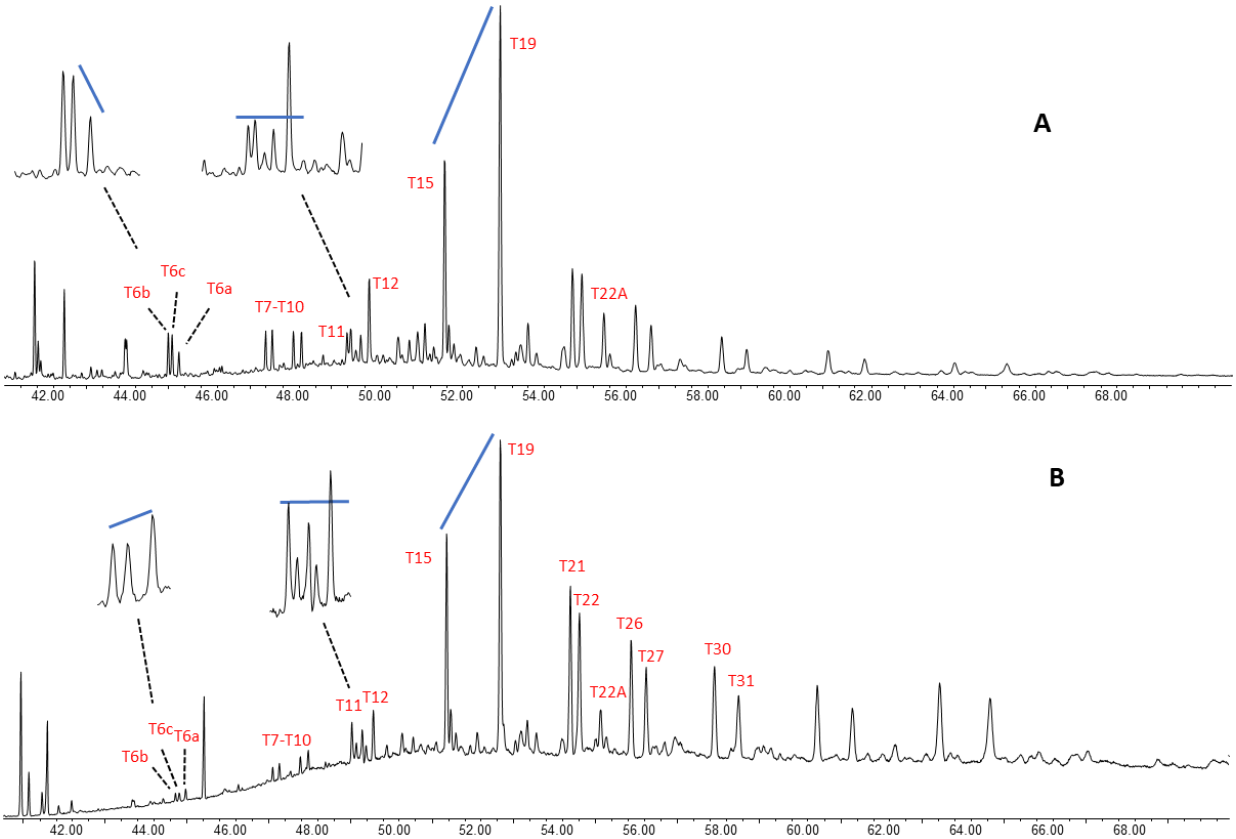


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC SRC 28AGO2023**

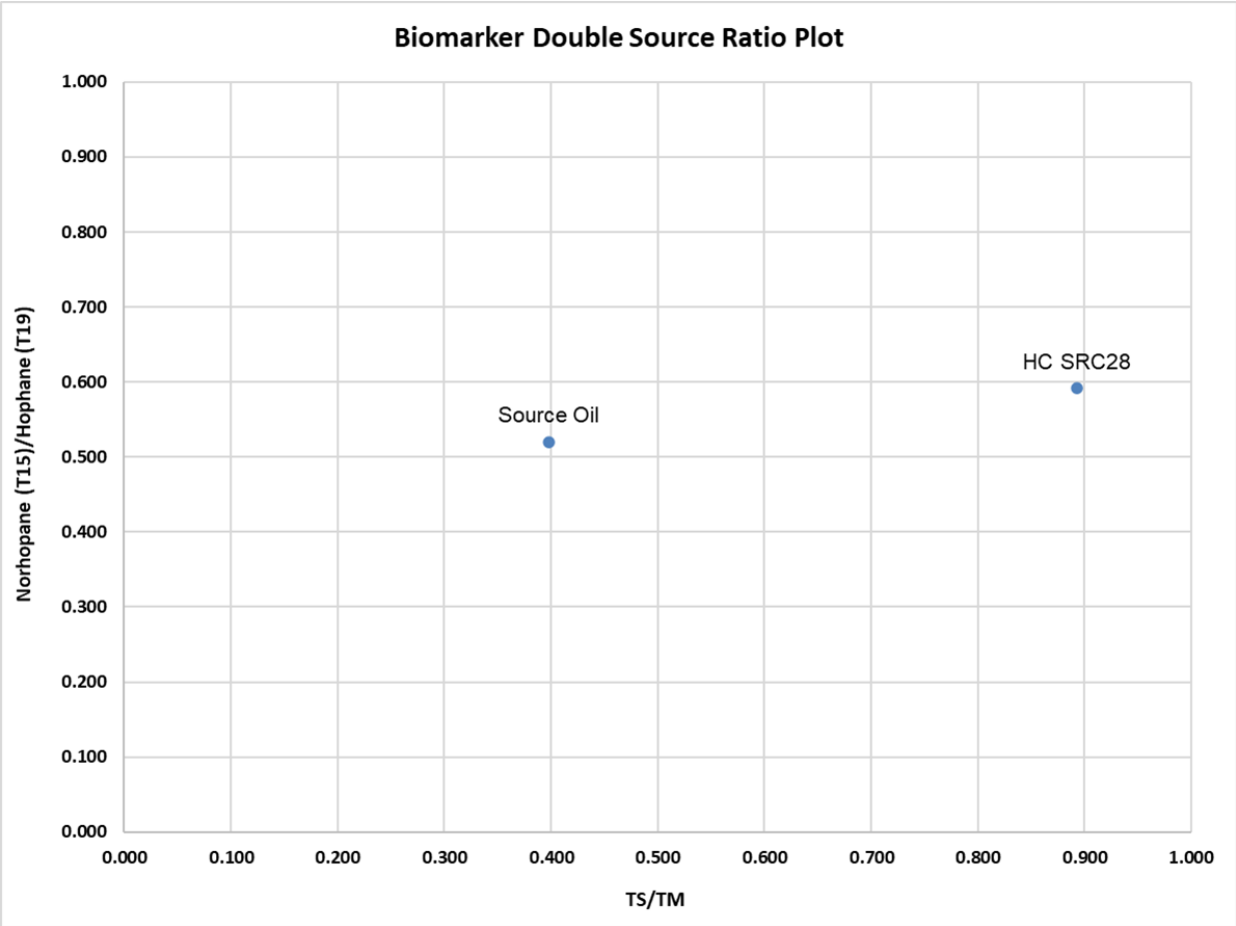


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC SRC 28AGO2023 | L2352167-04 | 08/28/2023 | Oil | 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_2$9) |
| C30 | n-Triacontane ($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**

9/8/23 L2352167

CERPER CERTIFICACIONES DEL PERU S.A.

# CADENA DE CUSTODIA
## (Registro de Campo - Toma de muestra de aguas, suelos, lodos y sedimentos)

Nº 005334

Página 01 de 01

EXPEDIENTE: EXMA- 11689-2023

HS: 2300 6017

JOB NUMBER: 23LM0026234 6741

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A.

PERSONA DE CONTACTO: Carlos Torres

LUGAR: PLAYA SANTA ROSA CHICA | Distrito: SANTA ROSA | Provincia: LIMA | Departamento: LIMA

NORMA:

1 SMEWW – APHA – AWWA – WEF, 23rd Ed. 2017, Collection and preservation of samples. Part. 9060 A-B ( ) 1060 B-C ( ) 1300 B ( ) 1030 B ( ) 1050 B ( ) 1070 B ( )
2 Instrucción 8356 Toma de muestras de sedimentos ( )
3 NTP 214.003 – 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RM N° 271-2005-PRODUCE, Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesquero de consumo humano directo e indirecto ( )
5 RJ N°010-2016-ANA, Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO 5667-10:2012 (Revisada el 2018) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060:2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM N°273-2013-VIVIENDA, Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales - PTAR ( )
9 RM N° 085-2014-MINAM, Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-EM ( )
11 Otros: ( )

PARÁMETROS DE ANÁLISIS EN EL LABORATORIO: FINGER PRINT

PARÁMETROS DE CAMPO: pH | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg/L Libre ( ) Total ( ) | Turbidez (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( ) | Nivel freático cm ( ) m ( ) | ORP (mV)

DESCRIPCIÓN DE LA MUESTRA

| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEORREFERENCIA (UTM WGS84) ESTE (m) | GEORREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (msnm) ZONA (12L/18L/19L) | CANTIDAD DE ENVASES |
|---|---|---|---|---|---|---|---|
| 01 HC SRC 28A602023 | 29.08.23 | 12:55 | * | 0262537 | 8694586 | 18L | 01 |
| Total de Envases | | | | | | | 01 |

(1) Matriz (s)
AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro: RESTOS SOLIDOS DE HIDROCARBURO

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (✓) Congelada ( ) Caja conservadora (✓)
Hermeticamente cerrada (✓) Ice pack (✓) Hielo de calidad potable ( )

Equipos: Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 033 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: SE PROCEDIO A LLEGAR AL PUNTO DE MUESTREO INDICADO Y DENOMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZO EL PROCEDIMIENTO DE CARACTERIZACION DE LA MUESTRA LA CUAL PRESENTO UNA COLORACIÓN AZUL VERDOSA CON OLOR A HIDROCARBURO. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRECINTO N°0203904. SE TOMARON COORDENADAS IN SITU.

Responsable de la toma de muestra:
Firma:
Inspector Cerper: ROBERTO LEYVA
Inspectores de apoyo: JUNIOR CHUNGA
Hora de inicio: 08:00 Hora de término: 10:00

Representante del cliente
Firma:
Nombre: CARLOS TORRES YACHACHIN
DNI: 40001656
Cargo: SUPERVISOR PLAYA

Recepción de muestras
Nombre: Noelia Mochuca. a.
Fecha: 02.09.23 Hora: 08:00am.

intertek
LAB. CALEB BRETT
RECEIVED

OI-R-CMAS Versión 05 2023-04-19

9/8/23 14:44

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC SRC 28AGO2023 | |
| Lab ID | L2352167-04 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/6/2023 | |
| Sample Size(wet) | 0.00401 | g |
| % Solid | 100 | |
| File ID | F18100523045 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 249 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 249 |
| SHC | C10 | DECANE (C10) | | U | 249 |
| SHC | C11 | UNDECANE | | U | 249 |
| SHC | C12 | DODECANE (C12) | 26.2 | J | 249 |
| SHC | C13 | TRIDECANE | 27.4 | J | 249 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 23.9 | J | 249 |
| SHC | C14 | TETRADECANE (C14) | 74.1 | J | 249 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 45.1 | J | 249 |
| SHC | C15 | PENTADECANE (C15) | 120 | J | 249 |
| SHC | C16 | HEXADECANE (C16) | 206 | J | 249 |
| SHC | 1650 | NORPRISTANE (1650) | 72.8 | J | 249 |
| SHC | C17 | HEPTADECANE (C17) | 246 | J | 249 |
| SHC | Pr | PRISTANE | 130 | J | 249 |
| SHC | C18 | OCTADECANE (C18) | 311 | | 249 |
| SHC | Ph | PHYTANE | 150 | J | 249 |
| SHC | C19 | NONADECANE (C19) | 269 | | 249 |
| SHC | C20 | EICOSANE (C20) | 255 | | 249 |
| SHC | C21 | HENEICOSANE (C21) | 153 | J | 249 |
| SHC | C22 | DOCOSANE (C22) | 118 | J | 249 |
| SHC | C23 | TRICOSANE (C23) | | U | 249 |
| SHC | C24 | TETRACOSANE (C24) | 141 | J | 249 |
| SHC | C25 | PENTACOSANE (C25) | 159 | J | 249 |
| SHC | C26 | HEXACOSANE (C26) | | U | 249 |
| SHC | C27 | HEPTACOSANE (C27) | 215 | J | 249 |
| SHC | C28 | OCTACOSANE (C28) | | U | 249 |
| SHC | C29 | NONACOSANE (C29) | 315 | CB | 249 |
| SHC | C30 | TRIACONTANE (C30) | | U | 249 |
| SHC | C31 | HENTATRIACONTANE (C31) | 130 | J | 249 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 249 |
| SHC | C33 | TRITRIACONTANE (C33) | 430 | | 249 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 249 |
| SHC | C35 | PENTATRIACONTANE (C35) | 1350 | | 249 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 249 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 249 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 249 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 249 |
| SHC | C40 | TETRACONTANE (C40) | | U | 249 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 673000 | | 8230 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 4970 | J | 249 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 101 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F18100523011 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 241 |
| SHC | C10 | DECANE (C10) | U | 241 |
| SHC | C11 | UNDECANE | U | 241 |
| SHC | C12 | DODECANE (C12) | U | 241 |
| SHC | C13 | TRIDECANE | U | 241 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 241 |
| SHC | C14 | TETRADECANE (C14) | U | 241 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 241 |
| SHC | C15 | PENTADECANE (C15) | U | 241 |
| SHC | C16 | HEXADECANE (C16) | U | 241 |
| SHC | 1650 | NORPRISTANE (1650) | U | 241 |
| SHC | C17 | HEPTADECANE (C17) | U | 241 |
| SHC | Pr | PRISTANE | U | 241 |
| SHC | C18 | OCTADECANE (C18) | U | 241 |
| SHC | Ph | PHYTANE | U | 241 |
| SHC | C19 | NONADECANE (C19) | U | 241 |
| SHC | C20 | EICOSANE (C20) | U | 241 |
| SHC | C21 | HENEICOSANE (C21) | U | 241 |
| SHC | C22 | DOCOSANE (C22) | U | 241 |
| SHC | C23 | TRICOSANE (C23) | U | 241 |
| SHC | C24 | TETRACOSANE (C24) | 10.1 J | 241 |
| SHC | C25 | PENTACOSANE (C25) | U | 241 |
| SHC | C26 | HEXACOSANE (C26) | U | 241 |
| SHC | C27 | HEPTACOSANE (C27) | U | 241 |
| SHC | C28 | OCTACOSANE (C28) | U | 241 |
| SHC | C29 | NONACOSANE (C29) | 216 JC | 241 |
| SHC | C30 | TRIACONTANE (C30) | U | 241 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 241 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 241 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 241 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 241 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 241 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 241 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 241 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 241 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 241 |
| SHC | C40 | TETRACONTANE (C40) | U | 241 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 7950 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 226 J | 241 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1829653-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | NA | |
| Date Received | 9/20/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00415 | g |
| % Solid | 100 | |
| File ID | f18100523015 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 241 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4880 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 4820 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 4970 | 241 | 103 | 4820 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 4930 | 241 | 102 | 4820 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5060 | 241 | 105 | 4820 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5240 | 241 | 109 | 4820 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 4870 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 4990 | 241 | 104 | 4820 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 4830 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 4790 | 241 | 99 | 4820 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 4610 | 241 | 96 | 4820 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4050 | 241 | 84 | 4820 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | f18100523017 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4920 | 241 | 102 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C10 | DECANE (C10) | 4880 | 241 | 101 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5030 | 241 | 104 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C14 | TETRADECANE (C14) | 4990 | 241 | 104 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5090 | 241 | 106 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5300 | 241 | 110 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C19 | NONADECANE (C19) | 4960 | 241 | 103 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C20 | EICOSANE (C20) | 5050 | 241 | 105 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 4750 | 241 | 98 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 4900 | 241 | 102 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 4760 | 241 | 99 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 4880 | 241 | 101 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 4700 | 241 | 98 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4120 | 241 | 85 | 4820 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1762020-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1762020-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 3/29/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F18032823029 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6880 | 0.983 | 109 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5560 | 0.983 | 110 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 5120 | 0.983 | 109 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4740 | 0.983 | 114 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4380 | 0.983 | 108 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 1000 | 0.983 | 118 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3960 | 0.983 | 108 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1480 | 0.983 | 108 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 3910 | 0.983 | 107 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3500 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1190 | 0.983 | 109 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 3040 | 0.983 | 101 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2400 | 0.983 | 112 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2700 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1450 | 0.983 | 119 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2540 | 0.983 | 109 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2240 | 0.983 | 110 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2120 | 0.983 | 108 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1920 | 0.983 | 110 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1820 | 0.983 | 111 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1750 | 0.983 | 112 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1520 | 0.983 | 110 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1180 | 0.983 | 109 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 840 | 0.983 | 108 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 817 | 0.983 | 111 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 652 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 549 | 0.983 | 107 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 565 | 0.983 | 123 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 330 | 0.983 | 85 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 313 | 0.983 | 90 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 282 | 0.983 | 101 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 157 | 0.983 | 84 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 150 | 0.983 | 99 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 130 | 0.983 | 99 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 85.2 | 0.983 | 96 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 81.4 | 0.983 | 88 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 586000 | 0.983 | 106 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 83312 | 0.983 | 122 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC SRC 28AGO2023 |
| Lab ID | L2352167-04 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | 8/28/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00401 g |
| % Solid | 100 |
| File ID | F1210052337 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.25 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 1.60 | | 1.25 |
| 2 | D1 | C1-DECALINS | 7.54 | | 2.49 |
| 2 | D2 | C2-DECALINS | 26.4 | | 2.49 |
| 2 | D3 | C3-DECALINS | 25.8 | | 2.49 |
| 2 | D4 | C4-DECALINS | 30.2 | | 2.49 |
| S | BT0 | BENZOTHIOPHENE | 0.167 | J | 2.49 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 6.00 | | 2.49 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 1.08 | J | 2.49 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 2.66 | | 2.49 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 2.38 | J | 2.49 |
| A | N0 | NAPHTHALENE | 1.82 | JB | 2.49 |
| 2 | N1 | C1-NAPHTHALENES | 145 | | 2.49 |
| 2 | N2 | C2-NAPHTHALENES | 90.1 | | 2.49 |
| 2 | N3 | C3-NAPHTHALENES | 43.3 | | 2.49 |
| 2 | N4 | C4-NAPHTHALENES | 20.4 | | 2.49 |
| 2 | B | BIPHENYL | 4.88 | | 2.49 |
| 3 | DF | DIBENZOFURAN | 0.878 | J | 2.49 |
| 3 | AY | ACENAPHTHYLENE | 0.576 | J | 2.49 |
| 3 | AE | ACENAPHTHENE | 3.18 | | 2.49 |
| 3 | F0 | FLUORENE | 3.01 | | 2.49 |
| 3 | F1 | C1-FLUORENES | 4.10 | | 2.49 |
| 3 | F2 | C2-FLUORENES | 10.6 | | 2.49 |
| 3 | F3 | C3-FLUORENES | 25.5 | G | 2.49 |
| 3 | A0 | ANTHRACENE | | U | 2.49 |
| 3 | P0 | PHENANTHRENE | 4.08 | | 2.49 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 6.94 | | 2.49 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 8.68 | | 2.49 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 11.4 | | 2.49 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 15.9 | B | 2.49 |
| 3 | RET | RETENE | | U | 2.49 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 1.03 | J | 2.49 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 3.27 | | 2.49 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 11.5 | | 2.49 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 17.6 | | 2.49 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 12.2 | | 2.49 |
| 4 | BF | BENZO(B)FLUORENE | 0.423 | J | 2.49 |
| 4 | FL0 | FLUORANTHENE | 1.31 | J | 2.49 |
| 4 | PY0 | PYRENE | 1.83 | J | 2.49 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 4.01 | | 2.49 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 2.94 | | 2.49 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 4.58 | | 2.49 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 5.48 | | 2.49 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 2.23 | J | 2.49 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 3.35 | | 2.49 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.49 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.49 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.49 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 1.03 | J | 2.49 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 1.21 | JB | 2.49 |
| 4 | BC1 | C1-CHRYSENES | 1.70 | J | 2.49 |
| 4 | BC2 | C2-CHRYSENES | 3.12 | | 2.49 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.49 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.49 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 1.34 | JB | 2.49 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC SRC 28AGO2023 |
| Lab ID | L2352167-04 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | 8/28/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00401 g |
| % Solid | 100 |
| File ID | F1210052337 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.25 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.530 | J | 2.49 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.49 |
| 5 | BEP | BENZO(E)PYRENE | 0.988 | J | 2.49 |
| 5 | BAP | BENZO(A)PYRENE | 1.10 | JB | 2.49 |
| 5 | PER | PERYLENE | | U | 2.49 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 0.645 | J | 2.49 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 0.576 | J | 2.49 |
| 6 | GHI | BENZO(GHI)PERYLENE | 0.706 | J | 2.49 |
| O | CAR | CARBAZOLE | 0.492 | J | 2.49 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 2.04 | J | 2.49 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.49 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.710 | J | 2.49 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.31 | J | 2.49 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.38 | J | 2.49 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 0.229 | J | 2.49 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.74 | J | 2.49 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.29 | J | 2.49 |
| A | 1MN | 1-METHYLNAPHTHALENE | 85.6 | | 2.49 |
| A | 2MN | 2-METHYLNAPHTHALENE | 132 | | 2.49 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 40.5 | | 2.49 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 4.91 | | 2.49 |
| H30 | T19 | HOPANE (T19) | 186 | | 2.49 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 9.69 | | 2.49 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 4.62 | | 2.49 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 5.63 | | 2.49 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 5.47 | | 2.49 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.48 | | 2.49 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 3.78 | | 2.49 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 5.61 | | 2.49 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 5.79 | | 2.49 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 6.67 | | 2.49 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 6.96 | | 2.49 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 20.9 | | 2.49 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 10.9 | | 2.49 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 9.35 | | 2.49 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 23.4 | | 2.49 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 7.90 | | 2.49 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 6.07 | | 2.49 |
| H29 | T15 | 30-NORHOPANE (T15) | 110 | | 2.49 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 21.9 | | 2.49 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.4 | | 2.49 |
| M29 | T17 | 30-NORMORETANE (T17) | 14.2 | | 2.49 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.49 |
| M30 | T20 | MORETANE (T20) | 20.9 | | 2.49 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 104 | | 2.49 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 102 | | 2.49 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 30.8 | | 2.49 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 85.0 | | 2.49 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 65.4 | | 2.49 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 75.4 | | 2.49 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 58.4 | | 2.49 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 73.5 | | 2.49 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 54.4 | | 2.49 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 88.8 | | 2.49 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC SRC 28AGO2023 | |
| Lab ID | L2352167-04 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/7/2023 | |
| Sample Size(wet) | 0.00401 | g |
| % Solid | 100 | |
| File ID | F1210052337 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.25 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 93.0 | 2.49 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 21.0 | 2.49 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 13.4 | 2.49 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 11.4 | 2.49 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 43.3 | 2.49 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 52.5 | 2.49 |
| d29R | S18 | UNKNOWN STERANE (S18) | 10.2 | 2.49 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 2.66 | 2.49 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 20.7 | 2.49 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 26.7 | 2.49 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 28.5 | 2.49 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 46.9 | 2.49 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.1 | 2.49 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 36.7 | 2.49 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 39.3 | 2.49 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 58.8 | 2.49 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 66.8 | 2.49 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 44.3 | 2.49 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 7.82 | 2.49 |
| SC28TAS | TAS02 | C28,20S TAS | 9.44 | 2.49 |
| RC27TAS | TAS03 | C27,20R TAS | 10.2 | 2.49 |
| RC28TAS | TAS04 | C28,20R TAS | 2.91 | 2.49 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 95 |
| PHENANTHRENE-D10 | 95 |
| BENZO(A)PYRENE-D12 | 95 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.20 |
| 2 | D1 | C1-DECALINS | | U | 2.41 |
| 2 | D2 | C2-DECALINS | | U | 2.41 |
| 2 | D3 | C3-DECALINS | | U | 2.41 |
| 2 | D4 | C4-DECALINS | | U | 2.41 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.41 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.41 |
| A | N0 | NAPHTHALENE | 0.196 | J | 2.41 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.41 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.41 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.41 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.41 |
| 2 | B | BIPHENYL | | U | 2.41 |
| 3 | DF | DIBENZOFURAN | | U | 2.41 |
| 3 | AY | ACENAPHTHYLENE | 0.0576 | J | 2.41 |
| 3 | AE | ACENAPHTHENE | | U | 2.41 |
| 3 | F0 | FLUORENE | | U | 2.41 |
| 3 | F1 | C1-FLUORENES | | U | 2.41 |
| 3 | F2 | C2-FLUORENES | | U | 2.41 |
| 3 | F3 | C3-FLUORENES | | U | 2.41 |
| 3 | A0 | ANTHRACENE | | U | 2.41 |
| 3 | P0 | PHENANTHRENE | 0.143 | J | 2.41 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 1.81 | J | 2.41 |
| 3 | RET | RETENE | 0.562 | J | 2.41 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.0422 | J | 2.41 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.41 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.41 |
| 4 | FL0 | FLUORANTHENE | 0.129 | J | 2.41 |
| 4 | PY0 | PYRENE | 0.163 | J | 2.41 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | | U | 2.41 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.0940 | J | 2.41 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.141 | J | 2.41 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.41 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.41 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.41 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.41 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.163 | J | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.41 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.41 |
| 5 | BEP | BENZO(E)PYRENE | 0.0901 | J | 2.41 |
| 5 | BAP | BENZO(A)PYRENE | 0.121 | J | 2.41 |
| 5 | PER | PERYLENE | | U | 2.41 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.41 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.41 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.41 |
| O | CAR | CARBAZOLE | | U | 2.41 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.41 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.41 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.41 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.41 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.41 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.41 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.41 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.41 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.41 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.41 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.41 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.41 |
| H30 | T19 | HOPANE (T19) | | U | 2.41 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.41 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.41 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.41 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.41 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.41 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.41 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.41 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.41 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.41 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.41 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.41 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.41 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.41 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.41 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.41 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.41 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.41 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.41 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.41 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.41 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.41 |
| M30 | T20 | MORETANE (T20) | | U | 2.41 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.41 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.41 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.41 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.41 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.41 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.41 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.41 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.41 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.41 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.41 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.41 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.41 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.41 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.41 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.41 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.41 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.41 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.41 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.41 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.41 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.41 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.41 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.41 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.41 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.41 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.41 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.41 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.41 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.41 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.41 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.41 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 100 |
| 5B(H)CHOLANE | 88 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1829653-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052342 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 238 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 220 | 2.41 | 91 | 241 | 50 | 130 |
| 3 | F0 | FLUORENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 241 | 2.41 | 100 | 241 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 231 | 2.41 | 96 | 241 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 179 | 2.41 | 74 | 241 | 50 | 130 |
| 4 | PY0 | PYRENE | 184 | 2.41 | 76 | 241 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 219 | 2.41 | 91 | 241 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 214 | 2.41 | 89 | 241 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 204 | 2.41 | 84 | 241 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 210 | 2.41 | 87 | 241 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 205 | 2.41 | 85 | 241 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 213 | 2.41 | 88 | 241 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 213 | 2.41 | 88 | 241 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 97 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052334 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 252 | 2.41 | 104 | 241 | 50 | 130 | 6 | 30 |
| 3 | AY | ACENAPHTHYLENE | 240 | 2.41 | 99 | 241 | 50 | 130 | 1 | 30 |
| 3 | AE | ACENAPHTHENE | 225 | 2.41 | 94 | 241 | 50 | 130 | 3 | 30 |
| 3 | F0 | FLUORENE | 242 | 2.41 | 100 | 241 | 50 | 130 | 2 | 30 |
| 3 | A0 | ANTHRACENE | 250 | 2.41 | 104 | 241 | 50 | 130 | 4 | 30 |
| 3 | P0 | PHENANTHRENE | 240 | 2.41 | 100 | 241 | 50 | 130 | 4 | 30 |
| 4 | FL0 | FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 18 | 30 |
| 4 | PY0 | PYRENE | 231 | 2.41 | 96 | 241 | 50 | 130 | 23 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 229 | 2.41 | 95 | 241 | 50 | 130 | 4 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 5 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 221 | 2.41 | 92 | 241 | 50 | 130 | 9 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 8 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 215 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 220 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 213 | 2.41 | 88 | 241 | 50 | 130 | 3 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 219 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 98 |
| PHENANTHRENE-D10 | 99 |
| BENZO(A)PYRENE-D12 | 98 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

HC SRG 28AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 12, 2023

**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 August 28, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC SRG 28AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA and arrived at a temperature of 26.5°C on September 8, 2023 with a DHL Tracking # 7103324546 (Seal number 0203903). The sample arrived without a chain of custody however a chain of custody (Attachment 1) was supplied via email prior to sample arrival and was consistent with the sample received.

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC SRG 28AGO2023 (HC SRG28) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC SRG28 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are four (4) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC SRG28 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 HC SRG28 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC SRG28 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC SRG28 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC SRG28 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC SRG28 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC SRG28 sample and source oil are derived from a different source of petroleum.

---

[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.

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 HC SRG28 sample plot away from each other indicating a different source of petroleum**.**

**Conclusion**

The HC SRG 28AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC SRG 28AGO2023 sample are chemically different and were derived from a different source of petroleum.

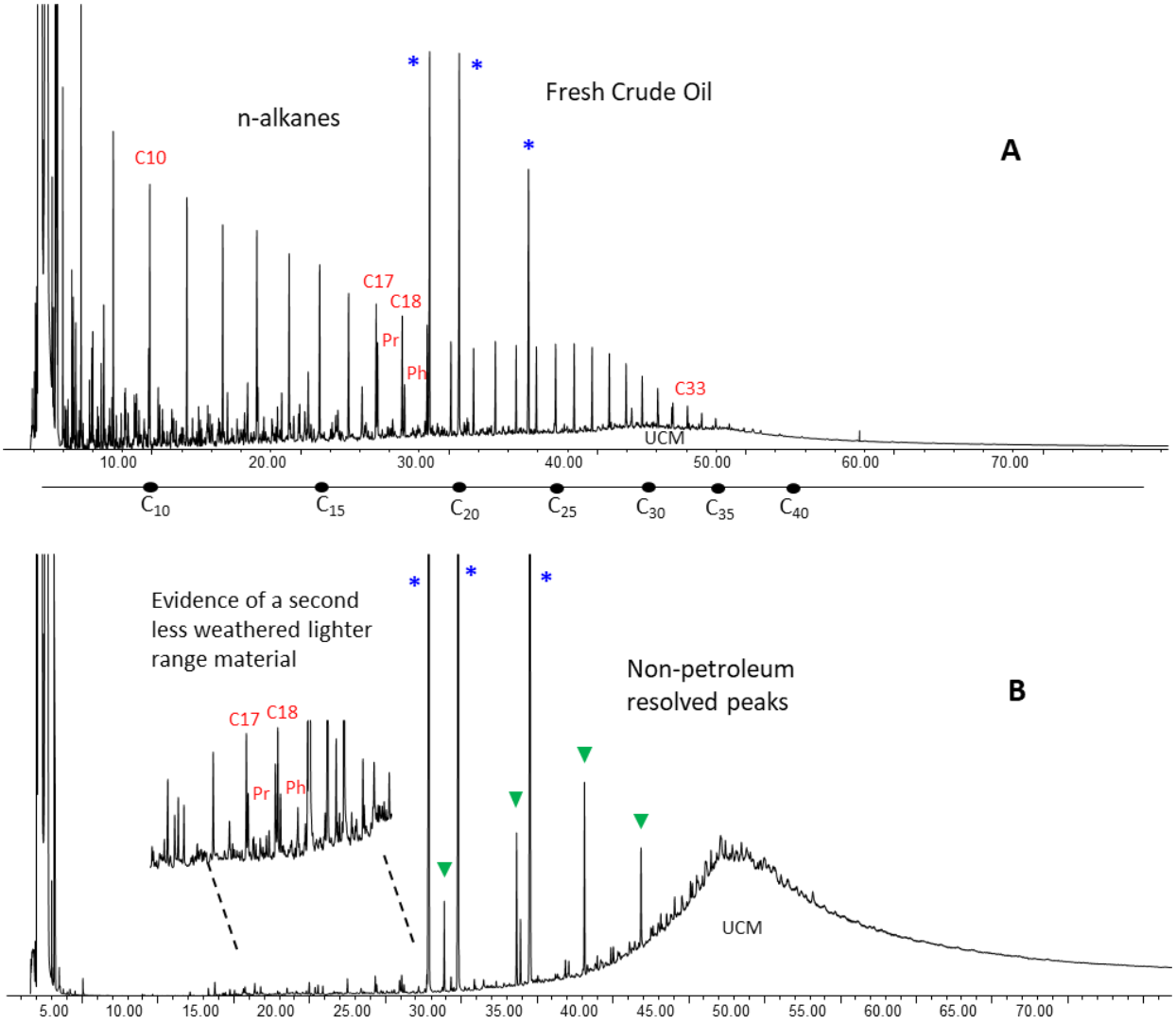


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC SRG 28AGO2023**
'*': Laboratory-added Internal Standard

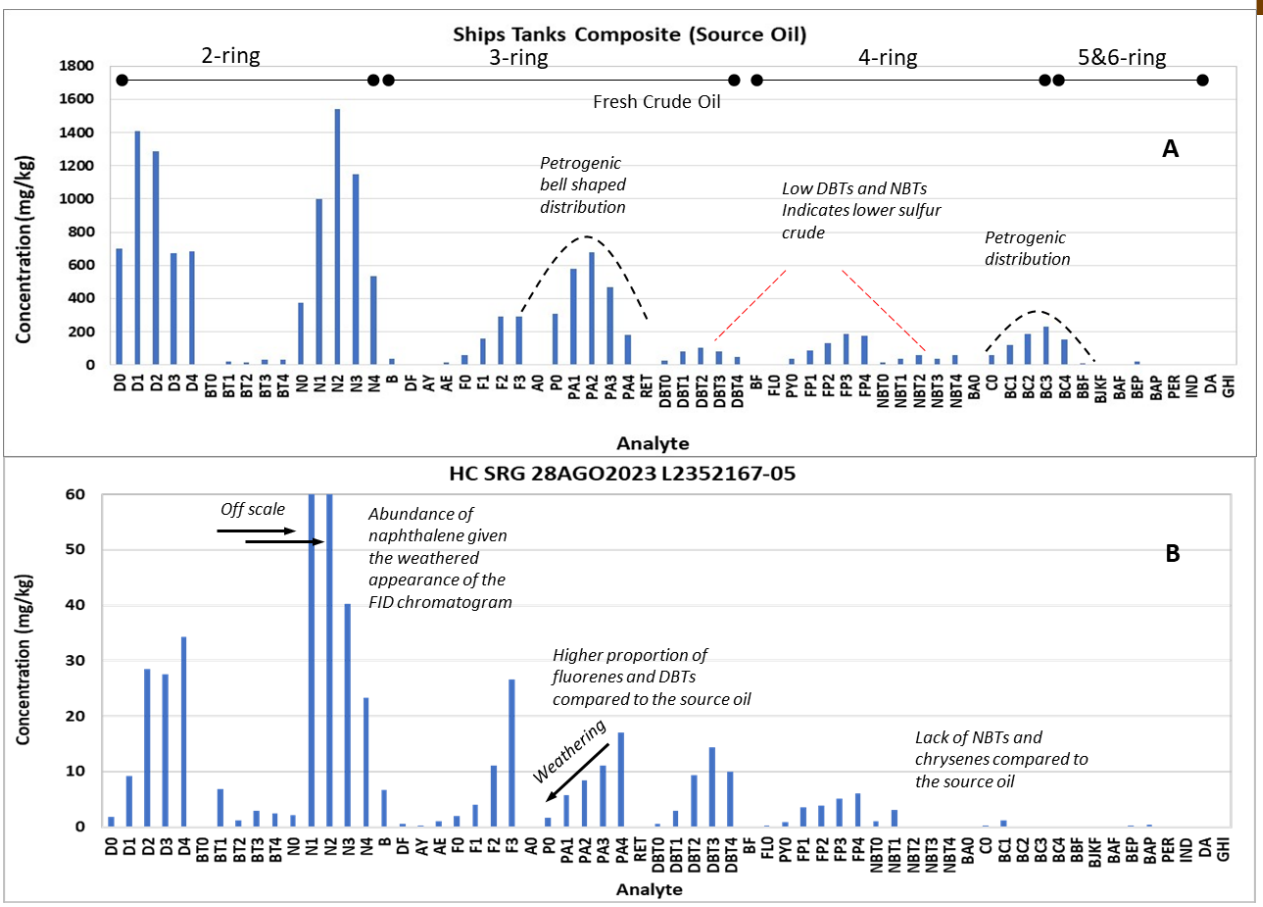


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC SRG 28AGO2023**

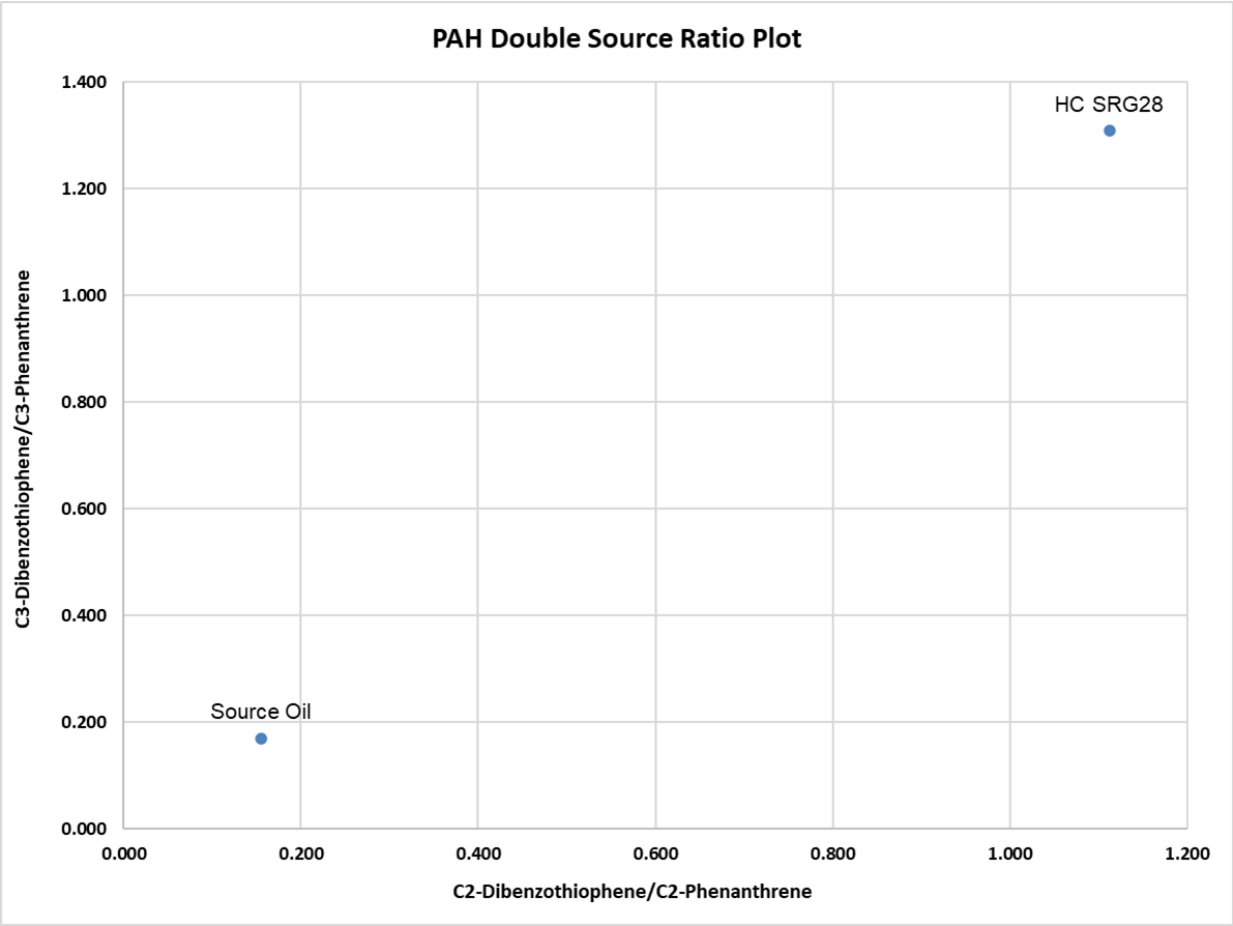


**Figure 3. PAH Double Source Ratio Plot**

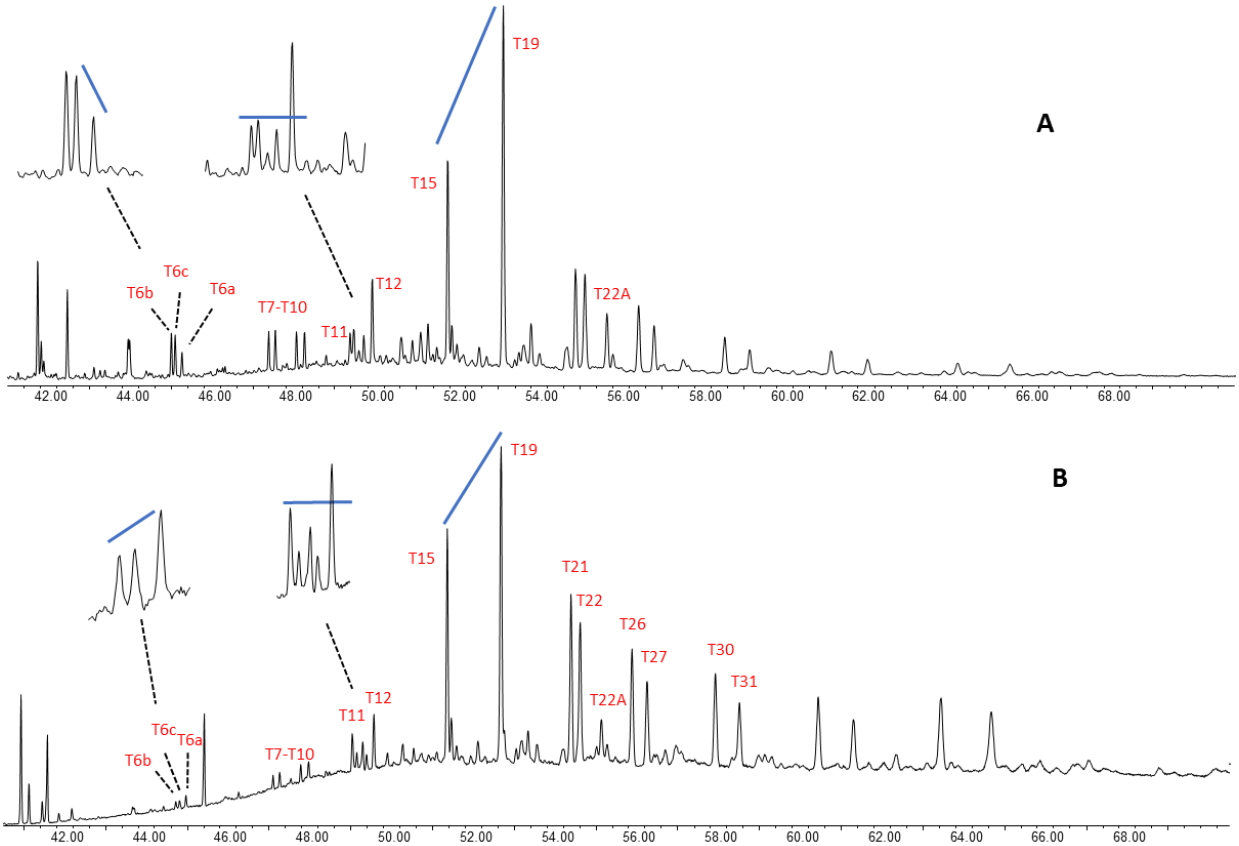


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC SRG 28AGO2023**

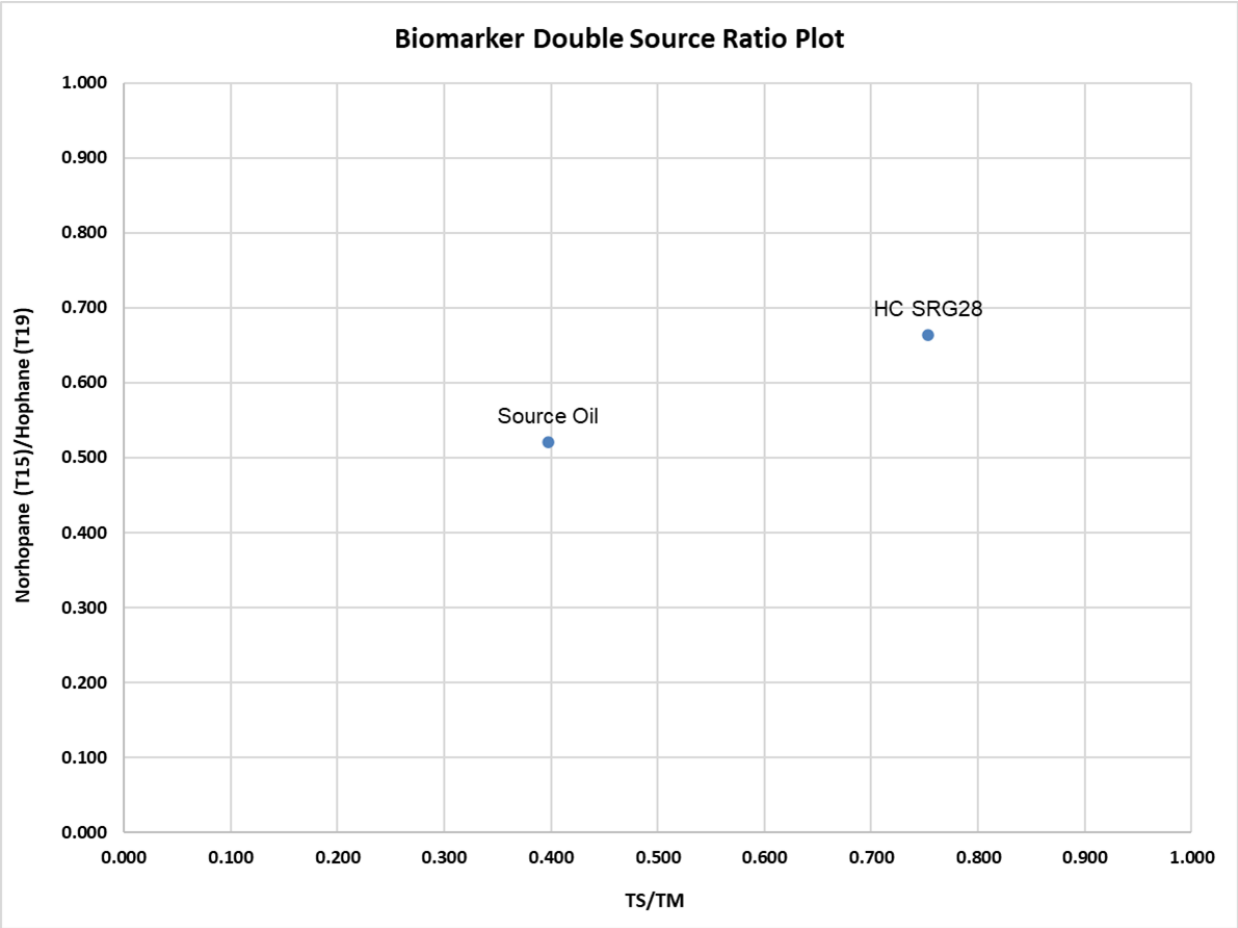


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC SRG 28AGO2023 | L2352167-05 | 08/28/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/8/23 L2352167

CERPER CERTIFICACIONES DEL PERÚ S.A.

# CADENA DE CUSTODIA
## (Registro de Campo - Toma de muestra de aguas, suelos, lodos y sedimentos)

Nº 005335

Página 01 de 01

EXPEDIENTE: EXMA-11689-2023
HS: 23006017
JOB NUMBER: 232M002613 46741

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A.
PERSONA DE CONTACTO: Carlos Torres
LUGAR: PLAYA SANTA ROSA GRANDE
Distrito: SANTA ROSA
Provincia: LIMA
Departamento: LIMA

NORMA:
1 SMEWW – APHA – AWWA – WEF. 23rd Ed. 2017. Collection and preservation of samples. Part. 8060 A-E ( ) 1060 B-C ( ) 10200 B ( ) 10300 B ( ) 10500 B ( ) 10750 B ( )
2 Instrucción 8056-I Toma de muestras de sedimentos ( )
3 NTP 214.003 – 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RM Nº 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto ( )
5 RJ Nº 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO 5667-10:2012 (Revisada el 2018) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060:2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM Nº 273-2013-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales - PTAR ( )
9 RM Nº 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-EM ( )
11 Otros: ( )

| DESCRIPCIÓN DE LA MUESTRA | | | | | | | | | PARÁMETROS DE ANÁLISIS EN EL LABORATORIO | PARÁMETROS DE CAMPO | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17,18,19) (G,J,H) | CANTIDAD DE ENVASES | FINGER PRINT | | pH | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg/L Libre ( ) Total ( ) | Turbidez (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( ) | Nivel freático cm ( ) m ( ) | ORP (mV) |
| -05 HC SRG 28 AGO2023 | 28/08/23 | 13:30 | * | 0262844 | 8605834 | 182 | 01 | ✓ | | | | | | | | | | | | | |
| | | | | | | Total de Envases | 01 | | | | | | | | | | | | | |

(1) Matriz (s)
AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro RESTOS SOLIDOS DE HIDROCARBUROS

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (✓) Congelada ( ) Caja conservadora (✓)
Hermeticamente cerrada (✓) Ice pack (✓) Hielo de calidad potable ( )

Equipos: Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 033 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: SE PROCEDIO A LLEGAR AL PUNTO DE MUESTREO INDICADO Y DENOMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZO EL PROCEDIMIENTO DE CARACTERIZACION DE LA MUESTRA LA CUAL PRESENTO UNA COLORACIÓN AZUL VERDOSA CON OLOR A HIDROCARBURO. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRECINTO Nº 0203903. SE TOMARON COORDENADAS IN SITU.

Responsable de la toma de muestra:
Firma:
Inspector Cerper: ROBERTO LEYVA
Inspectores de apoyo: JUNIOR CHUNGA.
Hora de inicio: 08:00 Hora de término: 20:00

Representante del cliente
Firma:
Nombre: CARLOS TORRES YACHACHIN
DNI: 48006156
Cargo: SUPERVISOR PLAYA

Recepción de muestras
Nombre: Noelia Morchuca C.
Fecha: 02.09.23 Hora: 8:00am

intertek
LAB. CALEB BRETT
RECEIVED
01-R-CMAS Versión 05 2023-04-19

9/8/23 14:44

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC SRG 28AGO2023 | |
| Lab ID | L2352167-05 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/6/2023 | |
| Sample Size(wet) | 0.00392 | g |
| % Solid | 100 | |
| File ID | F18100523047 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 255 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 255 |
| SHC | C10 | DECANE (C10) | 9.44 | J | 255 |
| SHC | C11 | UNDECANE | 12.5 | J | 255 |
| SHC | C12 | DODECANE (C12) | 31.6 | J | 255 |
| SHC | C13 | TRIDECANE | 46.9 | J | 255 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 33.2 | J | 255 |
| SHC | C14 | TETRADECANE (C14) | 105 | J | 255 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 75.0 | J | 255 |
| SHC | C15 | PENTADECANE (C15) | 160 | J | 255 |
| SHC | C16 | HEXADECANE (C16) | 278 | | 255 |
| SHC | 1650 | NORPRISTANE (1650) | 104 | J | 255 |
| SHC | C17 | HEPTADECANE (C17) | 264 | | 255 |
| SHC | Pr | PRISTANE | 177 | J | 255 |
| SHC | C18 | OCTADECANE (C18) | 300 | | 255 |
| SHC | Ph | PHYTANE | 187 | J | 255 |
| SHC | C19 | NONADECANE (C19) | 240 | J | 255 |
| SHC | C20 | EICOSANE (C20) | 230 | J | 255 |
| SHC | C21 | HENEICOSANE (C21) | 160 | J | 255 |
| SHC | C22 | DOCOSANE (C22) | 121 | J | 255 |
| SHC | C23 | TRICOSANE (C23) | | U | 255 |
| SHC | C24 | TETRACOSANE (C24) | 146 | J | 255 |
| SHC | C25 | PENTACOSANE (C25) | 156 | J | 255 |
| SHC | C26 | HEXACOSANE (C26) | 53.6 | J | 255 |
| SHC | C27 | HEPTACOSANE (C27) | | U | 255 |
| SHC | C28 | OCTACOSANE (C28) | | U | 255 |
| SHC | C29 | NONACOSANE (C29) | 303 | CB | 255 |
| SHC | C30 | TRIACONTANE (C30) | | U | 255 |
| SHC | C31 | HENTATRIACONTANE (C31) | 148 | J | 255 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 255 |
| SHC | C33 | TRITRIACONTANE (C33) | 388 | | 255 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 255 |
| SHC | C35 | PENTATRIACONTANE (C35) | 1490 | | 255 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 255 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 255 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 255 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 255 |
| SHC | C40 | TETRACONTANE (C40) | | U | 255 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 696000 | | 8420 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 5220 | J | 255 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 101 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F18100523011 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 241 |
| SHC | C10 | DECANE (C10) | U | 241 |
| SHC | C11 | UNDECANE | U | 241 |
| SHC | C12 | DODECANE (C12) | U | 241 |
| SHC | C13 | TRIDECANE | U | 241 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 241 |
| SHC | C14 | TETRADECANE (C14) | U | 241 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 241 |
| SHC | C15 | PENTADECANE (C15) | U | 241 |
| SHC | C16 | HEXADECANE (C16) | U | 241 |
| SHC | 1650 | NORPRISTANE (1650) | U | 241 |
| SHC | C17 | HEPTADECANE (C17) | U | 241 |
| SHC | Pr | PRISTANE | U | 241 |
| SHC | C18 | OCTADECANE (C18) | U | 241 |
| SHC | Ph | PHYTANE | U | 241 |
| SHC | C19 | NONADECANE (C19) | U | 241 |
| SHC | C20 | EICOSANE (C20) | U | 241 |
| SHC | C21 | HENEICOSANE (C21) | U | 241 |
| SHC | C22 | DOCOSANE (C22) | U | 241 |
| SHC | C23 | TRICOSANE (C23) | U | 241 |
| SHC | C24 | TETRACOSANE (C24) | 10.1 J | 241 |
| SHC | C25 | PENTACOSANE (C25) | U | 241 |
| SHC | C26 | HEXACOSANE (C26) | U | 241 |
| SHC | C27 | HEPTACOSANE (C27) | U | 241 |
| SHC | C28 | OCTACOSANE (C28) | U | 241 |
| SHC | C29 | NONACOSANE (C29) | 216 JC | 241 |
| SHC | C30 | TRIACONTANE (C30) | U | 241 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 241 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 241 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 241 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 241 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 241 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 241 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 241 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 241 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 241 |
| SHC | C40 | TETRACONTANE (C40) | U | 241 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 7950 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 226 J | 241 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1829653-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | NA | |
| Date Received | 9/20/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00415 | g |
| % Solid | 100 | |
| File ID | f18100523015 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 241 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4880 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 4820 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 4970 | 241 | 103 | 4820 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 4930 | 241 | 102 | 4820 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5060 | 241 | 105 | 4820 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5240 | 241 | 109 | 4820 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 4870 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 4990 | 241 | 104 | 4820 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 4830 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 4790 | 241 | 99 | 4820 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 4610 | 241 | 96 | 4820 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4050 | 241 | 84 | 4820 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | f18100523017 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4920 | 241 | 102 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C10 | DECANE (C10) | 4880 | 241 | 101 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5030 | 241 | 104 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C14 | TETRADECANE (C14) | 4990 | 241 | 104 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5090 | 241 | 106 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5300 | 241 | 110 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C19 | NONADECANE (C19) | 4960 | 241 | 103 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C20 | EICOSANE (C20) | 5050 | 241 | 105 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 4750 | 241 | 98 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 4900 | 241 | 102 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 4760 | 241 | 99 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 4880 | 241 | 101 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 4700 | 241 | 98 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4120 | 241 | 85 | 4820 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1762020-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1762020-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 3/29/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F18032823029 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6880 | 0.983 | 109 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5560 | 0.983 | 110 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 5120 | 0.983 | 109 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4740 | 0.983 | 114 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4380 | 0.983 | 108 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 1000 | 0.983 | 118 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3960 | 0.983 | 108 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1480 | 0.983 | 108 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 3910 | 0.983 | 107 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3500 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1190 | 0.983 | 109 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 3040 | 0.983 | 101 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2400 | 0.983 | 112 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2700 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1450 | 0.983 | 119 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2540 | 0.983 | 109 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2240 | 0.983 | 110 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2120 | 0.983 | 108 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1920 | 0.983 | 110 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1820 | 0.983 | 111 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1750 | 0.983 | 112 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1520 | 0.983 | 110 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1180 | 0.983 | 109 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 840 | 0.983 | 108 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 817 | 0.983 | 111 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 652 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 549 | 0.983 | 107 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 565 | 0.983 | 123 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 330 | 0.983 | 85 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 313 | 0.983 | 90 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 282 | 0.983 | 101 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 157 | 0.983 | 84 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 150 | 0.983 | 99 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 130 | 0.983 | 99 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 85.2 | 0.983 | 96 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 81.4 | 0.983 | 88 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 586000 | 0.983 | 106 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 83312 | 0.983 | 122 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC SRG 28AGO2023 | |
| Lab ID | L2352167-05 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/7/2023 | |
| Sample Size(wet) | 0.00392 | g |
| % Solid | 100 | |
| File ID | F1210052338 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.28 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 1.80 | | 1.28 |
| 2 | D1 | C1-DECALINS | 9.24 | | 2.55 |
| 2 | D2 | C2-DECALINS | 28.5 | | 2.55 |
| 2 | D3 | C3-DECALINS | 27.5 | | 2.55 |
| 2 | D4 | C4-DECALINS | 34.3 | | 2.55 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.55 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 6.81 | | 2.55 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 1.21 | J | 2.55 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 2.85 | | 2.55 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 2.50 | J | 2.55 |
| A | N0 | NAPHTHALENE | 2.11 | J | 2.55 |
| 2 | N1 | C1-NAPHTHALENES | 208 | | 2.55 |
| 2 | N2 | C2-NAPHTHALENES | 88.2 | | 2.55 |
| 2 | N3 | C3-NAPHTHALENES | 40.2 | | 2.55 |
| 2 | N4 | C4-NAPHTHALENES | 23.3 | | 2.55 |
| 2 | B | BIPHENYL | 6.70 | | 2.55 |
| 3 | DF | DIBENZOFURAN | 0.627 | J | 2.55 |
| 3 | AY | ACENAPHTHYLENE | 0.174 | JB | 2.55 |
| 3 | AE | ACENAPHTHENE | 1.08 | J | 2.55 |
| 3 | F0 | FLUORENE | 1.98 | J | 2.55 |
| 3 | F1 | C1-FLUORENES | 4.05 | | 2.55 |
| 3 | F2 | C2-FLUORENES | 11.0 | | 2.55 |
| 3 | F3 | C3-FLUORENES | 26.6 | G | 2.55 |
| 3 | A0 | ANTHRACENE | | U | 2.55 |
| 3 | P0 | PHENANTHRENE | 1.69 | J | 2.55 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 5.68 | | 2.55 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 8.35 | | 2.55 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 11.0 | | 2.55 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 17.1 | B | 2.55 |
| 3 | RET | RETENE | | U | 2.55 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.540 | J | 2.55 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 2.90 | | 2.55 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 9.29 | | 2.55 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 14.4 | | 2.55 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 10.0 | | 2.55 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.55 |
| 4 | FL0 | FLUORANTHENE | 0.310 | JB | 2.55 |
| 4 | PY0 | PYRENE | 0.846 | JB | 2.55 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 3.58 | | 2.55 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 3.83 | | 2.55 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 5.15 | | 2.55 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 6.00 | | 2.55 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 1.10 | J | 2.55 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 3.10 | | 2.55 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.55 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.55 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.55 |
| 4 | BA0 | BENZ(A)ANTHRACENE | | U | 2.55 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.229 | JB | 2.55 |
| 4 | BC1 | C1-CHRYSENES | 1.20 | J | 2.55 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.55 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.55 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.55 |
| 5 | BBF | BENZO(B)FLUORANTHENE | | U | 2.55 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC SRG 28AGO2023 |
| Lab ID | L2352167-05 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | 8/28/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00392 g |
| % Solid | 100 |
| File ID | F1210052338 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.28 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.55 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.55 |
| 5 | BEP | BENZO(E)PYRENE | 0.294 | JB | 2.55 |
| 5 | BAP | BENZO(A)PYRENE | 0.341 | JB | 2.55 |
| 5 | PER | PERYLENE | | U | 2.55 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.55 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.55 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.55 |
| O | CAR | CARBAZOLE | 0.571 | J | 2.55 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 1.88 | J | 2.55 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.55 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.596 | J | 2.55 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.10 | J | 2.55 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.13 | J | 2.55 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.55 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.41 | J | 2.55 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 0.954 | J | 2.55 |
| A | 1MN | 1-METHYLNAPHTHALENE | 122 | | 2.55 |
| A | 2MN | 2-METHYLNAPHTHALENE | 196 | | 2.55 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 40.5 | | 2.55 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 4.66 | | 2.55 |
| H30 | T19 | HOPANE (T19) | 202 | | 2.55 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 9.66 | | 2.55 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 6.08 | | 2.55 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 5.81 | | 2.55 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 6.12 | | 2.55 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.85 | | 2.55 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 4.04 | | 2.55 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 5.97 | | 2.55 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 6.14 | | 2.55 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 8.87 | | 2.55 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 7.95 | | 2.55 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 21.4 | | 2.55 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 8.25 | | 2.55 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 8.00 | | 2.55 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 28.4 | | 2.55 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 9.34 | | 2.55 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 5.84 | | 2.55 |
| H29 | T15 | 30-NORHOPANE (T15) | 134 | | 2.55 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 24.7 | | 2.55 |
| X | X | 17A(H)-DIAHOPANE (X) | 12.0 | | 2.55 |
| M29 | T17 | 30-NORMORETANE (T17) | 17.5 | | 2.55 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.55 |
| M30 | T20 | MORETANE (T20) | 22.7 | | 2.55 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 116 | | 2.55 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 110 | | 2.55 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 32.2 | | 2.55 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 93.8 | | 2.55 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 72.3 | | 2.55 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 81.1 | | 2.55 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 65.2 | | 2.55 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 77.1 | | 2.55 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 56.4 | | 2.55 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 92.3 | | 2.55 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC SRG 28AGO2023 | |
| Lab ID | L2352167-05 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/7/2023 | |
| Sample Size(wet) | 0.00392 | g |
| % Solid | 100 | |
| File ID | F1210052338 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.28 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 87.9 | | 2.55 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 20.0 | | 2.55 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 12.7 | | 2.55 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 13.4 | | 2.55 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 43.9 | | 2.55 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 53.0 | | 2.55 |
| d29R | S18 | UNKNOWN STERANE (S18) | 11.6 | | 2.55 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 3.18 | | 2.55 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 23.0 | | 2.55 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 28.7 | | 2.55 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 28.9 | | 2.55 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 47.4 | | 2.55 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.3 | | 2.55 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 38.3 | | 2.55 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 41.4 | | 2.55 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 57.5 | | 2.55 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 66.4 | | 2.55 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 56.1 | | 2.55 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 7.03 | | 2.55 |
| SC28TAS | TAS02 | C28,20S TAS | 9.03 | | 2.55 |
| RC27TAS | TAS03 | C27,20R TAS | 11.2 | | 2.55 |
| RC28TAS | TAS04 | C28,20R TAS | 1.70 | J | 2.55 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 95 |
| PHENANTHRENE-D10 | 93 |
| BENZO(A)PYRENE-D12 | 95 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.20 |
| 2 | D1 | C1-DECALINS | | U | 2.41 |
| 2 | D2 | C2-DECALINS | | U | 2.41 |
| 2 | D3 | C3-DECALINS | | U | 2.41 |
| 2 | D4 | C4-DECALINS | | U | 2.41 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.41 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.41 |
| A | N0 | NAPHTHALENE | 0.196 | J | 2.41 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.41 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.41 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.41 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.41 |
| 2 | B | BIPHENYL | | U | 2.41 |
| 3 | DF | DIBENZOFURAN | | U | 2.41 |
| 3 | AY | ACENAPHTHYLENE | 0.0576 | J | 2.41 |
| 3 | AE | ACENAPHTHENE | | U | 2.41 |
| 3 | F0 | FLUORENE | | U | 2.41 |
| 3 | F1 | C1-FLUORENES | | U | 2.41 |
| 3 | F2 | C2-FLUORENES | | U | 2.41 |
| 3 | F3 | C3-FLUORENES | | U | 2.41 |
| 3 | A0 | ANTHRACENE | | U | 2.41 |
| 3 | P0 | PHENANTHRENE | 0.143 | J | 2.41 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 1.81 | J | 2.41 |
| 3 | RET | RETENE | 0.562 | J | 2.41 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.0422 | J | 2.41 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.41 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.41 |
| 4 | FL0 | FLUORANTHENE | 0.129 | J | 2.41 |
| 4 | PY0 | PYRENE | 0.163 | J | 2.41 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | | U | 2.41 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.0940 | J | 2.41 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.141 | J | 2.41 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.41 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.41 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.41 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.41 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.163 | J | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.41 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.41 |
| 5 | BEP | BENZO(E)PYRENE | 0.0901 | J | 2.41 |
| 5 | BAP | BENZO(A)PYRENE | 0.121 | J | 2.41 |
| 5 | PER | PERYLENE | | U | 2.41 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.41 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.41 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.41 |
| O | CAR | CARBAZOLE | | U | 2.41 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.41 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.41 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.41 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.41 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.41 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.41 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.41 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.41 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.41 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.41 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.41 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.41 |
| H30 | T19 | HOPANE (T19) | | U | 2.41 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.41 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.41 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.41 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.41 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.41 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.41 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.41 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.41 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.41 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.41 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.41 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.41 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.41 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.41 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.41 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.41 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.41 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.41 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.41 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.41 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.41 |
| M30 | T20 | MORETANE (T20) | | U | 2.41 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.41 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.41 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.41 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.41 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.41 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.41 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.41 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.41 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.41 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.41 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.41 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.41 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.41 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.41 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.41 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.41 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.41 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.41 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.41 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.41 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.41 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.41 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.41 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.41 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.41 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.41 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.41 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.41 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.41 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.41 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.41 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 100 |
| 5B(H)CHOLANE | 88 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1829653-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052342 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 238 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 220 | 2.41 | 91 | 241 | 50 | 130 |
| 3 | F0 | FLUORENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 241 | 2.41 | 100 | 241 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 231 | 2.41 | 96 | 241 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 179 | 2.41 | 74 | 241 | 50 | 130 |
| 4 | PY0 | PYRENE | 184 | 2.41 | 76 | 241 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 219 | 2.41 | 91 | 241 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 214 | 2.41 | 89 | 241 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 204 | 2.41 | 84 | 241 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 210 | 2.41 | 87 | 241 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 205 | 2.41 | 85 | 241 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 213 | 2.41 | 88 | 241 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 213 | 2.41 | 88 | 241 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 97 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052334 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 252 | 2.41 | 104 | 241 | 50 | 130 | 6 | 30 |
| 3 | AY | ACENAPHTHYLENE | 240 | 2.41 | 99 | 241 | 50 | 130 | 1 | 30 |
| 3 | AE | ACENAPHTHENE | 225 | 2.41 | 94 | 241 | 50 | 130 | 3 | 30 |
| 3 | F0 | FLUORENE | 242 | 2.41 | 100 | 241 | 50 | 130 | 2 | 30 |
| 3 | A0 | ANTHRACENE | 250 | 2.41 | 104 | 241 | 50 | 130 | 4 | 30 |
| 3 | P0 | PHENANTHRENE | 240 | 2.41 | 100 | 241 | 50 | 130 | 4 | 30 |
| 4 | FL0 | FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 18 | 30 |
| 4 | PY0 | PYRENE | 231 | 2.41 | 96 | 241 | 50 | 130 | 23 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 229 | 2.41 | 95 | 241 | 50 | 130 | 4 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 5 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 221 | 2.41 | 92 | 241 | 50 | 130 | 9 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 8 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 215 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 220 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 213 | 2.41 | 88 | 241 | 50 | 130 | 3 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 219 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 98 |
| PHENANTHRENE-D10 | 99 |
| BENZO(A)PYRENE-D12 | 98 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

HC PCH 28AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 12, 2023

**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 August 28, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC PCH 28AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA and arrived at a temperature of 26.5°C on September 8, 2023 with a DHL Tracking # 7103324546 (Seal number 0203910). The sample arrived without a chain of custody however a chain of custody (Attachment 1) was supplied via email prior to sample arrival and was consistent with the sample received.

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC PCH 28AGO2023 (HC PCH28) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC PCH28 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are four (4) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC PCH28 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 HC PCH28 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC PCH28 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC PCH28 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC PCH28 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC PCH28 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC PCH28 sample and source oil are derived from 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.

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 HC PCH28 sample plot away from each other indicating a different source of petroleum**.**

**Conclusion**

The HC PCH 28AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC PCH 28AGO2023 sample are chemically different and were derived from a different source of petroleum.

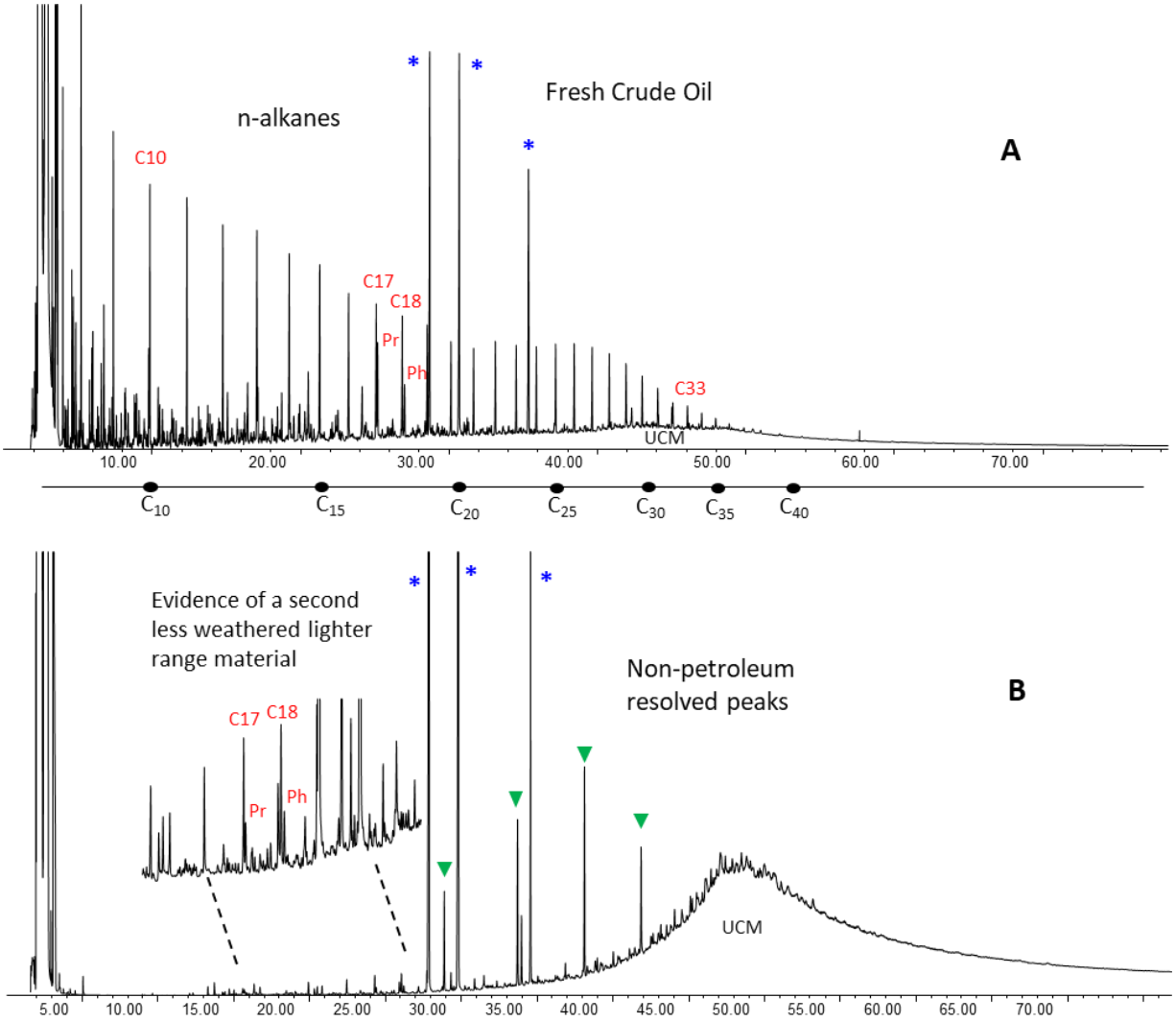


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC PCH 28AGO2023**
'*': Laboratory-added Internal Standard

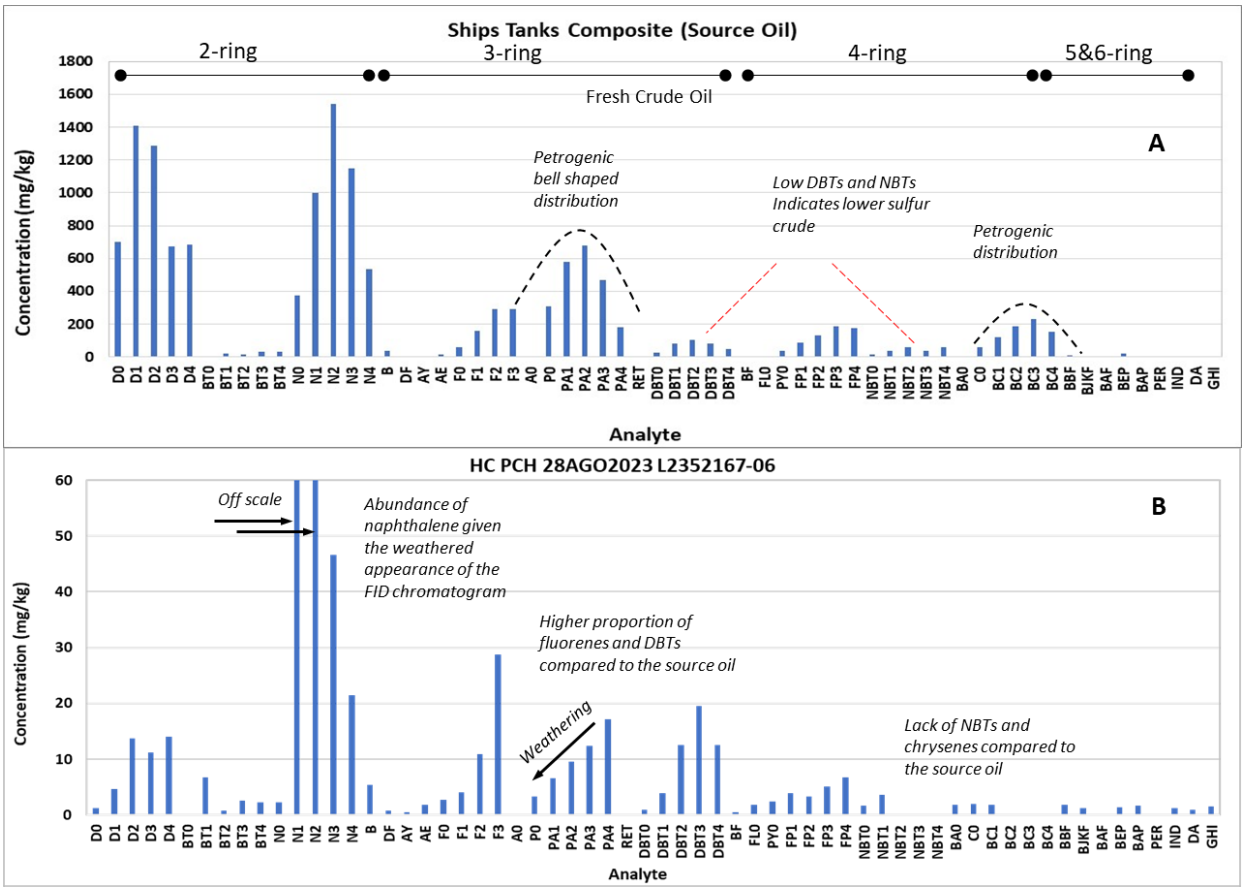


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC PCH 28AGO2023**

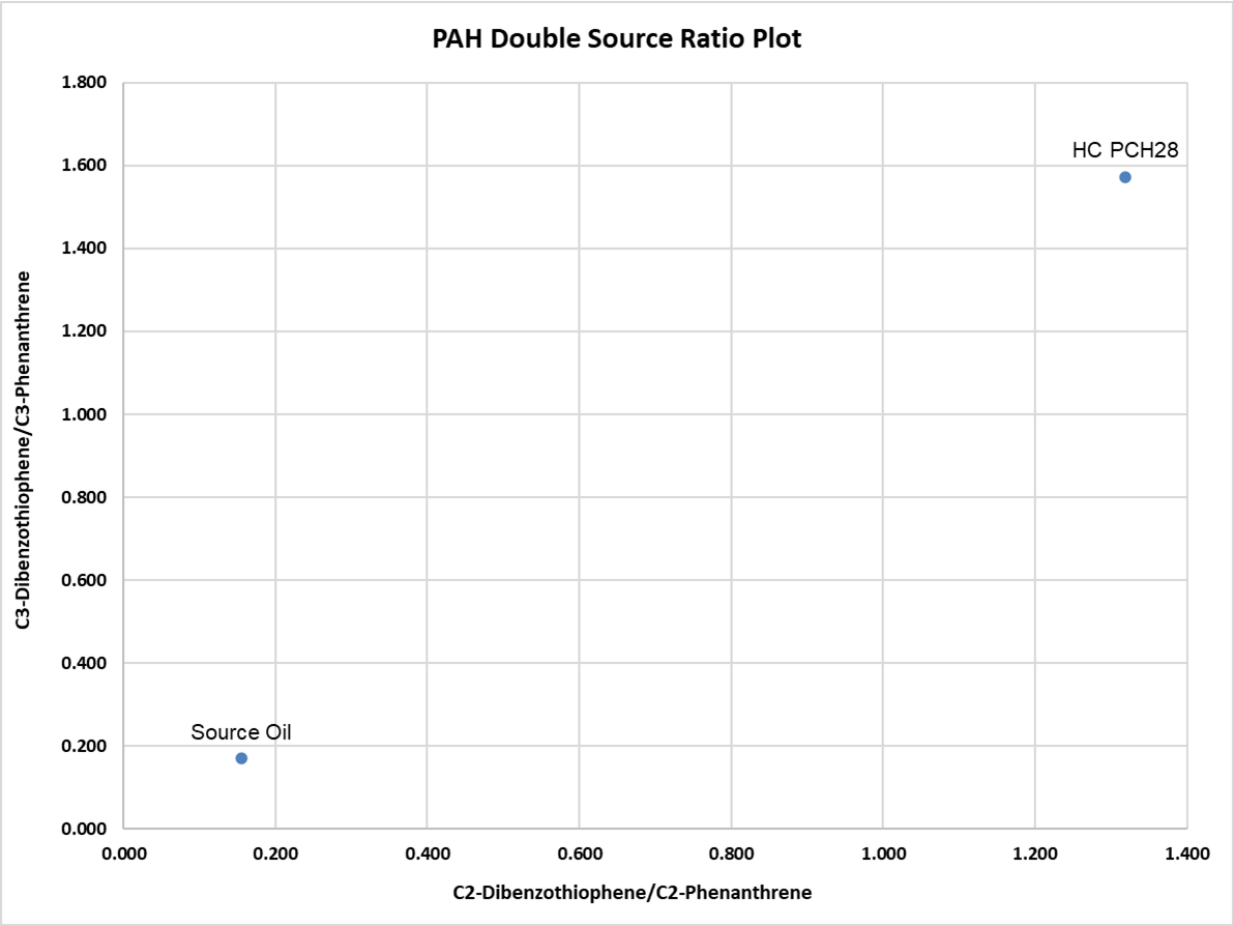


**Figure 3. PAH Double Source Ratio Plot**

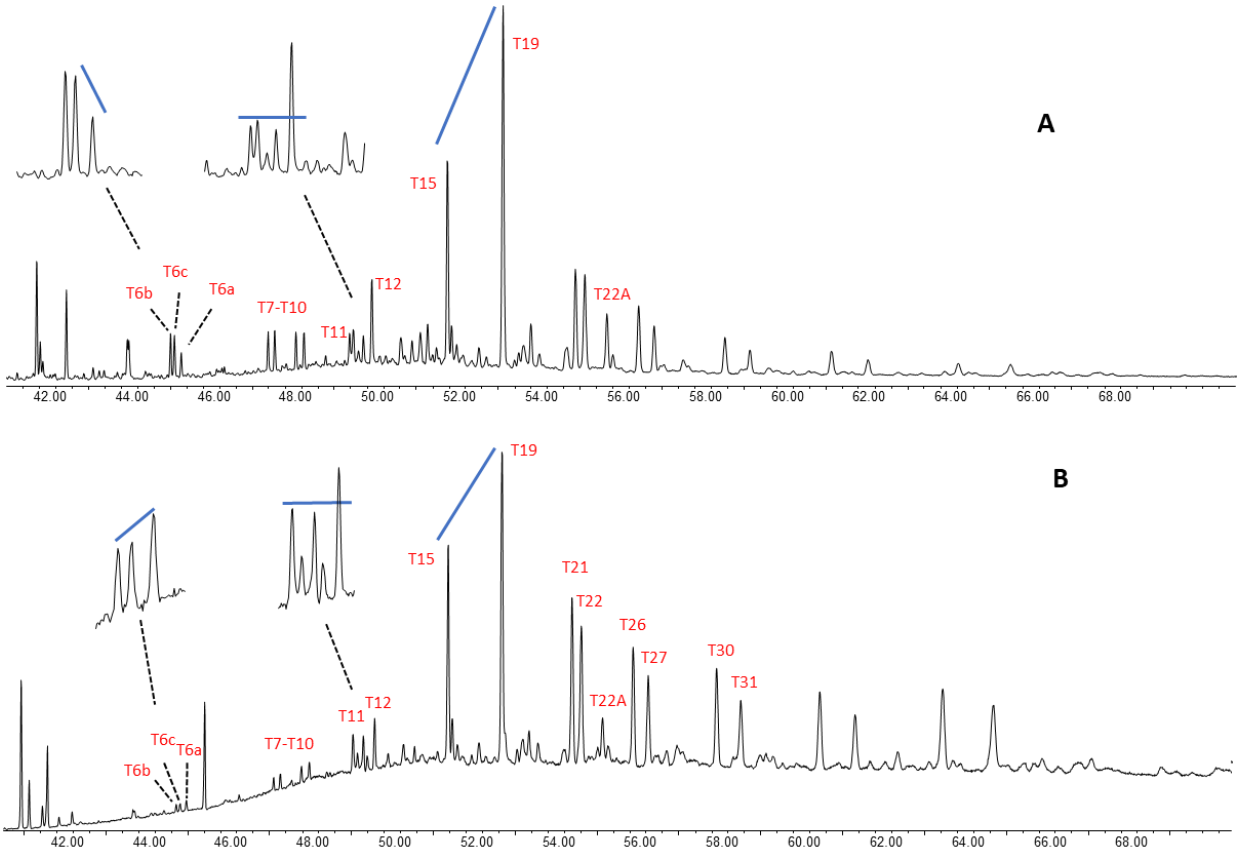


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC PCH 28AGO2023**

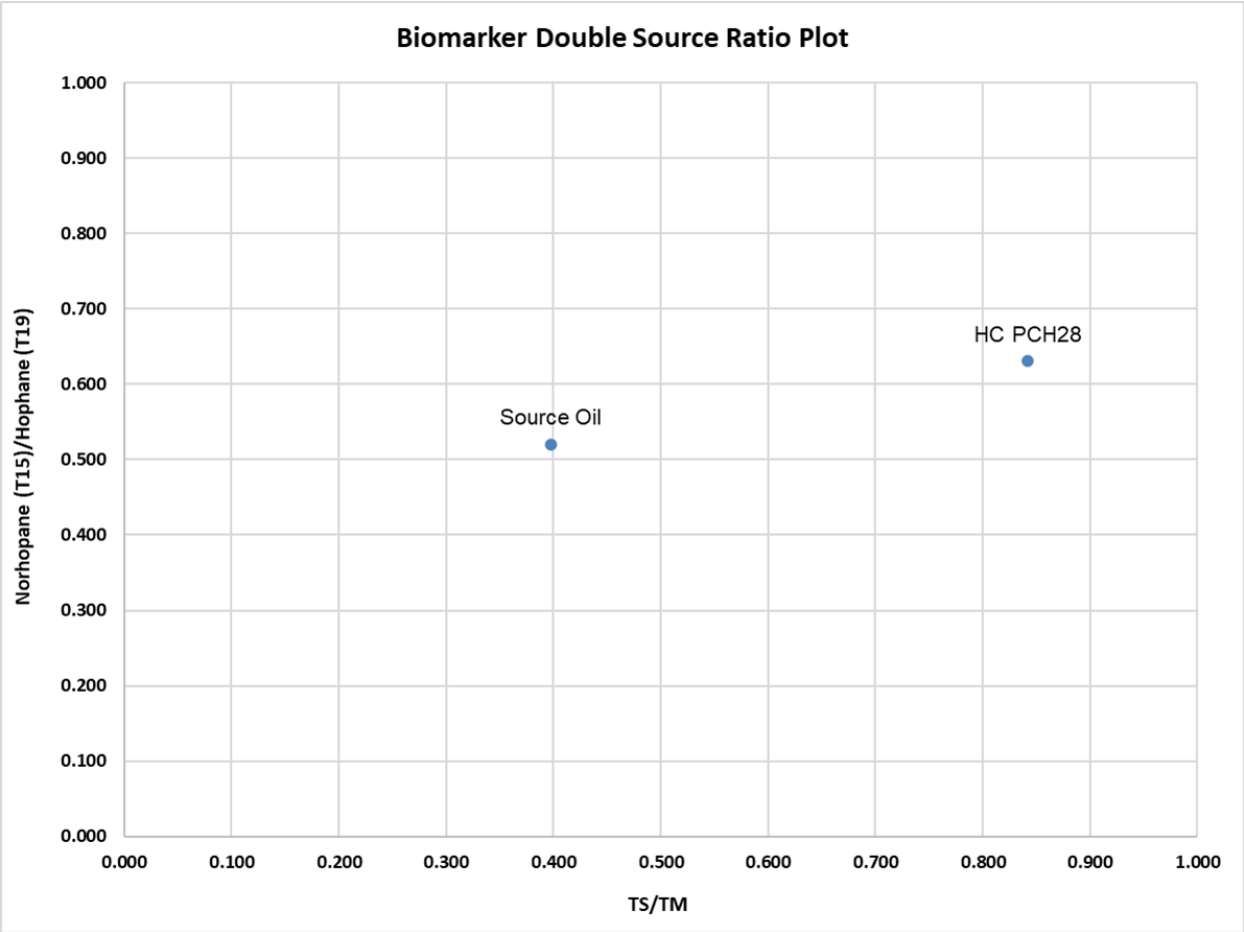


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC PCH 28AGO2023 | L2352167-06 | 08/28/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/8/23 L2352167

CERPER CERTIFICACIONES DEL PERU S.A.

# CADENA DE CUSTODIA
## (Registro de Campo - Toma de muestra de aguas, suelos, lodos y sedimentos)

Nº 005337

Página 01 de 01

EXPEDIENTE: EXMA- 11684 2023

HS: 23006017

JOB NUMBER: 231M0026234 6741

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A.

PERSONA DE CONTACTO: Carlos Torres

LUGAR: PLAYA PACHACÚTEL | Distrito: UCÉNTANILLA | Provincia: LIMA | Departamento: LIMA

NORMA:

1 SMEWW – APHA – AWWA - WEF. 23rd Ed. 2017. Collection and preservation of samples. Part. 9060 A-B ( ) 1060 B-C ( ) 10300 B ( ) 10300 B ( ) 10500 B ( ) 10730 B ( )
2 Instrucción 0056-r Toma de muestras de sedimentos ( )
3 NTP 214.006- 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RM Nº 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto ( )
5 RJ Nº 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO-5667-13:2012 (Revisada el 2018) Calidad de agua. Muestreo. Parte 13 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060.2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM Nº 273-2013-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales - PTAR ( )
9 RM Nº 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-GH ( )
11 Otros: ( )

| DESCRIPCIÓN DE LA MUESTRA | | | | | | | | | PARÁMETROS DE ANÁLISIS EN EL LABORATORIO | PARÁMETROS DE CAMPO | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17,18,19) (L,U) | CANTIDAD DE ENVASES | FINGER PRINT | | pH | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg/L Libre ( ) Total ( ) | Turbidez (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( ) | Nivel freático cm ( ) m ( ) | ORP (mV) |
| HC PCH 28 AGO 2023 | 28/08/23 | 15:20 | * | 0262234 | 8690150 | 18L | 01 | ✓ | | | | | | | | | | | | | |
| Total de Envases | | | | | | | 01 | | | | | | | | | | | | | | |

(1) Matriz (s)
AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro RESTOS SOLIDOS DE HIDROCARBUROS.

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (✓) Congelada ( ) Caja conservadora (✓)
Hermeticamente cerrada (✓) Ice pack (✓) Hielo de calidad potable ( )

Equipos: Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 033 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: SE PROCEDIO A LLEGAR AL PUNTO DE MUESTREO INDICADO Y DENOMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZO EL PROCEDIMIENTO DE CARACTERIZACION DE LA MUESTRA LA CUAL PRESENTO UNA COLORACION AZUL VERDOSA CON OLOR A HIDROCARBURO. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRECINTO Nº 0203910. SE TOMARON COORDENADAS IN SITU.

Responsable de la toma de muestra:
Firma:
Inspector Cerper: ROBERTO LEYVA.
Inspectores de apoyo: JUNIOR CHUNGA.
Hora de inicio: 08:00 Hora de término: 20:00

Representante del cliente
Firma:
Nombre: CARLOS TORRES YACHACHIN
DNI: 48061156
Cargo: SUPERVISOR PLAYA

Recepción de muestras
Nombre: Noelia Machuca
Fecha: 02.09.23 Hora: 8:00am

intertek
LAB. CALEB BRETT
RECEIVED

OH-R-CMAS Versión 05 2023-04-19

9/8/23 14:44

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC PCH 28AGO2023 | |
| Lab ID | L2352167-06 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/6/2023 | |
| Sample Size(wet) | 0.00434 | g |
| % Solid | 100 | |
| File ID | F18100523049 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 230 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 230 |
| SHC | C10 | DECANE (C10) | 6.68 | J | 230 |
| SHC | C11 | UNDECANE | 4.61 | J | 230 |
| SHC | C12 | DODECANE (C12) | 21.2 | J | 230 |
| SHC | C13 | TRIDECANE | 30.0 | J | 230 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 15.7 | J | 230 |
| SHC | C14 | TETRADECANE (C14) | 73.0 | J | 230 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 39.2 | J | 230 |
| SHC | C15 | PENTADECANE (C15) | 149 | J | 230 |
| SHC | C16 | HEXADECANE (C16) | 259 | | 230 |
| SHC | 1650 | NORPRISTANE (1650) | 81.6 | J | 230 |
| SHC | C17 | HEPTADECANE (C17) | 278 | | 230 |
| SHC | Pr | PRISTANE | 139 | J | 230 |
| SHC | C18 | OCTADECANE (C18) | 323 | | 230 |
| SHC | Ph | PHYTANE | 165 | J | 230 |
| SHC | C19 | NONADECANE (C19) | 304 | | 230 |
| SHC | C20 | EICOSANE (C20) | 280 | | 230 |
| SHC | C21 | HENEICOSANE (C21) | 162 | J | 230 |
| SHC | C22 | DOCOSANE (C22) | 123 | J | 230 |
| SHC | C23 | TRICOSANE (C23) | | U | 230 |
| SHC | C24 | TETRACOSANE (C24) | 156 | J | 230 |
| SHC | C25 | PENTACOSANE (C25) | 144 | J | 230 |
| SHC | C26 | HEXACOSANE (C26) | 67.7 | J | 230 |
| SHC | C27 | HEPTACOSANE (C27) | 394 | | 230 |
| SHC | C28 | OCTACOSANE (C28) | | U | 230 |
| SHC | C29 | NONACOSANE (C29) | 284 | CB | 230 |
| SHC | C30 | TRIACONTANE (C30) | | U | 230 |
| SHC | C31 | HENTATRIACONTANE (C31) | 150 | J | 230 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 230 |
| SHC | C33 | TRITRIACONTANE (C33) | 385 | | 230 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 230 |
| SHC | C35 | PENTATRIACONTANE (C35) | 1360 | | 230 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 230 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 230 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 230 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 230 |
| SHC | C40 | TETRACONTANE (C40) | | U | 230 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 659000 | | 7600 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 5390 | J | 230 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 101 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F18100523011 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 241 |
| SHC | C10 | DECANE (C10) | U | 241 |
| SHC | C11 | UNDECANE | U | 241 |
| SHC | C12 | DODECANE (C12) | U | 241 |
| SHC | C13 | TRIDECANE | U | 241 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 241 |
| SHC | C14 | TETRADECANE (C14) | U | 241 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 241 |
| SHC | C15 | PENTADECANE (C15) | U | 241 |
| SHC | C16 | HEXADECANE (C16) | U | 241 |
| SHC | 1650 | NORPRISTANE (1650) | U | 241 |
| SHC | C17 | HEPTADECANE (C17) | U | 241 |
| SHC | Pr | PRISTANE | U | 241 |
| SHC | C18 | OCTADECANE (C18) | U | 241 |
| SHC | Ph | PHYTANE | U | 241 |
| SHC | C19 | NONADECANE (C19) | U | 241 |
| SHC | C20 | EICOSANE (C20) | U | 241 |
| SHC | C21 | HENEICOSANE (C21) | U | 241 |
| SHC | C22 | DOCOSANE (C22) | U | 241 |
| SHC | C23 | TRICOSANE (C23) | U | 241 |
| SHC | C24 | TETRACOSANE (C24) | 10.1 J | 241 |
| SHC | C25 | PENTACOSANE (C25) | U | 241 |
| SHC | C26 | HEXACOSANE (C26) | U | 241 |
| SHC | C27 | HEPTACOSANE (C27) | U | 241 |
| SHC | C28 | OCTACOSANE (C28) | U | 241 |
| SHC | C29 | NONACOSANE (C29) | 216 JC | 241 |
| SHC | C30 | TRIACONTANE (C30) | U | 241 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 241 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 241 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 241 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 241 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 241 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 241 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 241 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 241 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 241 |
| SHC | C40 | TETRACONTANE (C40) | U | 241 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 7950 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 226 J | 241 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1829653-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | NA | |
| Date Received | 9/20/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00415 | g |
| % Solid | 100 | |
| File ID | f18100523015 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 241 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4880 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 4820 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 4970 | 241 | 103 | 4820 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 4930 | 241 | 102 | 4820 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5060 | 241 | 105 | 4820 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5240 | 241 | 109 | 4820 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 4870 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 4990 | 241 | 104 | 4820 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 4830 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 4790 | 241 | 99 | 4820 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 4610 | 241 | 96 | 4820 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4050 | 241 | 84 | 4820 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | f18100523017 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4920 | 241 | 102 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C10 | DECANE (C10) | 4880 | 241 | 101 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5030 | 241 | 104 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C14 | TETRADECANE (C14) | 4990 | 241 | 104 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5090 | 241 | 106 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5300 | 241 | 110 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C19 | NONADECANE (C19) | 4960 | 241 | 103 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C20 | EICOSANE (C20) | 5050 | 241 | 105 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 4750 | 241 | 98 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 4900 | 241 | 102 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 4760 | 241 | 99 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 4880 | 241 | 101 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 4700 | 241 | 98 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4120 | 241 | 85 | 4820 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1762020-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1762020-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 3/29/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F18032823029 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6880 | 0.983 | 109 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5560 | 0.983 | 110 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 5120 | 0.983 | 109 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4740 | 0.983 | 114 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4380 | 0.983 | 108 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 1000 | 0.983 | 118 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3960 | 0.983 | 108 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1480 | 0.983 | 108 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 3910 | 0.983 | 107 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3500 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1190 | 0.983 | 109 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 3040 | 0.983 | 101 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2400 | 0.983 | 112 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2700 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1450 | 0.983 | 119 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2540 | 0.983 | 109 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2240 | 0.983 | 110 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2120 | 0.983 | 108 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1920 | 0.983 | 110 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1820 | 0.983 | 111 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1750 | 0.983 | 112 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1520 | 0.983 | 110 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1180 | 0.983 | 109 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 840 | 0.983 | 108 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 817 | 0.983 | 111 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 652 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 549 | 0.983 | 107 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 565 | 0.983 | 123 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 330 | 0.983 | 85 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 313 | 0.983 | 90 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 282 | 0.983 | 101 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 157 | 0.983 | 84 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 150 | 0.983 | 99 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 130 | 0.983 | 99 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 85.2 | 0.983 | 96 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 81.4 | 0.983 | 88 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 586000 | 0.983 | 106 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 83312 | 0.983 | 122 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC PCH 28AGO2023 |
| Lab ID | L2352167-06 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | 8/28/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00434 g |
| % Solid | 100 |
| File ID | F1210052339 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.15 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 1.20 | | 1.15 |
| 2 | D1 | C1-DECALINS | 4.64 | | 2.30 |
| 2 | D2 | C2-DECALINS | 13.7 | | 2.30 |
| 2 | D3 | C3-DECALINS | 11.2 | | 2.30 |
| 2 | D4 | C4-DECALINS | 14.0 | | 2.30 |
| S | BT0 | BENZOTHIOPHENE | 0.155 | J | 2.30 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 6.72 | | 2.30 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 0.824 | J | 2.30 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 2.52 | | 2.30 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 2.21 | J | 2.30 |
| A | N0 | NAPHTHALENE | 2.27 | J | 2.30 |
| 2 | N1 | C1-NAPHTHALENES | 190 | | 2.30 |
| 2 | N2 | C2-NAPHTHALENES | 106 | | 2.30 |
| 2 | N3 | C3-NAPHTHALENES | 46.6 | | 2.30 |
| 2 | N4 | C4-NAPHTHALENES | 21.4 | | 2.30 |
| 2 | B | BIPHENYL | 5.44 | | 2.30 |
| 3 | DF | DIBENZOFURAN | 0.745 | J | 2.30 |
| 3 | AY | ACENAPHTHYLENE | 0.527 | JB | 2.30 |
| 3 | AE | ACENAPHTHENE | 1.75 | J | 2.30 |
| 3 | F0 | FLUORENE | 2.69 | | 2.30 |
| 3 | F1 | C1-FLUORENES | 4.03 | | 2.30 |
| 3 | F2 | C2-FLUORENES | 10.9 | | 2.30 |
| 3 | F3 | C3-FLUORENES | 28.7 | G | 2.30 |
| 3 | A0 | ANTHRACENE | | U | 2.30 |
| 3 | P0 | PHENANTHRENE | 3.31 | | 2.30 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 6.64 | | 2.30 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 9.55 | | 2.30 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 12.4 | | 2.30 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 17.2 | B | 2.30 |
| 3 | RET | RETENE | | U | 2.30 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.905 | J | 2.30 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 3.89 | | 2.30 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 12.6 | | 2.30 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 19.5 | | 2.30 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 12.6 | | 2.30 |
| 4 | BF | BENZO(B)FLUORENE | 0.453 | J | 2.30 |
| 4 | FL0 | FLUORANTHENE | 1.76 | J | 2.30 |
| 4 | PY0 | PYRENE | 2.37 | | 2.30 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 3.93 | | 2.30 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 3.36 | | 2.30 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 5.09 | | 2.30 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 6.78 | | 2.30 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 1.71 | J | 2.30 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 3.65 | | 2.30 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.30 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.30 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 1.87 | J | 2.30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 1.94 | J | 2.30 |
| 4 | BC1 | C1-CHRYSENES | 1.84 | J | 2.30 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.30 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.30 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 1.80 | J | 2.30 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC PCH 28AGO2023 | |
| Lab ID | L2352167-06 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/7/2023 | |
| Sample Size(wet) | 0.00434 | g |
| % Solid | 100 | |
| File ID | F1210052339 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.15 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 1.27 | J | 2.30 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.30 |
| 5 | BEP | BENZO(E)PYRENE | 1.31 | J | 2.30 |
| 5 | BAP | BENZO(A)PYRENE | 1.63 | J | 2.30 |
| 5 | PER | PERYLENE | | U | 2.30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 1.23 | J | 2.30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 0.971 | J | 2.30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 1.45 | J | 2.30 |
| O | CAR | CARBAZOLE | 0.439 | J | 2.30 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 2.23 | J | 2.30 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.30 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.817 | J | 2.30 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.27 | J | 2.30 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.18 | J | 2.30 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 0.175 | J | 2.30 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.75 | J | 2.30 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.40 | J | 2.30 |
| A | 1MN | 1-METHYLNAPHTHALENE | 114 | | 2.30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 176 | | 2.30 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 48.0 | | 2.30 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 5.59 | | 2.30 |
| H30 | T19 | HOPANE (T19) | 195 | | 2.30 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 9.52 | | 2.30 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 5.45 | | 2.30 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 6.69 | | 2.30 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 5.72 | | 2.30 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.65 | | 2.30 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 3.40 | | 2.30 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 6.32 | | 2.30 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 6.02 | | 2.30 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 7.82 | | 2.30 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 9.24 | | 2.30 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 21.9 | | 2.30 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 9.95 | | 2.30 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 8.64 | | 2.30 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 26.0 | | 2.30 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 10.2 | | 2.30 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 5.09 | | 2.30 |
| H29 | T15 | 30-NORHOPANE (T15) | 123 | | 2.30 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 25.0 | | 2.30 |
| X | X | 17A(H)-DIAHOPANE (X) | 11.1 | | 2.30 |
| M29 | T17 | 30-NORMORETANE (T17) | 15.4 | | 2.30 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | 5.49 | | 2.30 |
| M30 | T20 | MORETANE (T20) | 22.6 | | 2.30 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 114 | | 2.30 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 108 | | 2.30 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 35.2 | | 2.30 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 90.9 | | 2.30 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 71.2 | | 2.30 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 84.6 | | 2.30 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 62.0 | | 2.30 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 82.8 | | 2.30 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 57.8 | | 2.30 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 97.8 | | 2.30 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC PCH 28AGO2023 | |
| Lab ID | L2352167-06 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/7/2023 | |
| Sample Size(wet) | 0.00434 | g |
| % Solid | 100 | |
| File ID | F1210052339 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.15 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 107 | 2.30 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 23.7 | 2.30 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 12.5 | 2.30 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 13.3 | 2.30 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 44.3 | 2.30 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 54.6 | 2.30 |
| d29R | S18 | UNKNOWN STERANE (S18) | 11.8 | 2.30 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 3.20 | 2.30 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 19.8 | 2.30 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 26.0 | 2.30 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 29.8 | 2.30 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 49.2 | 2.30 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 42.4 | 2.30 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 38.0 | 2.30 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 41.3 | 2.30 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 61.7 | 2.30 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 74.1 | 2.30 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 47.0 | 2.30 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 7.23 | 2.30 |
| SC28TAS | TAS02 | C28,20S TAS | 9.38 | 2.30 |
| RC27TAS | TAS03 | C27,20R TAS | 11.0 | 2.30 |
| RC28TAS | TAS04 | C28,20R TAS | 3.05 | 2.30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 96 |
| BENZO(A)PYRENE-D12 | 94 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.20 |
| 2 | D1 | C1-DECALINS | | U | 2.41 |
| 2 | D2 | C2-DECALINS | | U | 2.41 |
| 2 | D3 | C3-DECALINS | | U | 2.41 |
| 2 | D4 | C4-DECALINS | | U | 2.41 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.41 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.41 |
| A | N0 | NAPHTHALENE | 0.196 | J | 2.41 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.41 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.41 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.41 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.41 |
| 2 | B | BIPHENYL | | U | 2.41 |
| 3 | DF | DIBENZOFURAN | | U | 2.41 |
| 3 | AY | ACENAPHTHYLENE | 0.0576 | J | 2.41 |
| 3 | AE | ACENAPHTHENE | | U | 2.41 |
| 3 | F0 | FLUORENE | | U | 2.41 |
| 3 | F1 | C1-FLUORENES | | U | 2.41 |
| 3 | F2 | C2-FLUORENES | | U | 2.41 |
| 3 | F3 | C3-FLUORENES | | U | 2.41 |
| 3 | A0 | ANTHRACENE | | U | 2.41 |
| 3 | P0 | PHENANTHRENE | 0.143 | J | 2.41 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 1.81 | J | 2.41 |
| 3 | RET | RETENE | 0.562 | J | 2.41 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.0422 | J | 2.41 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.41 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.41 |
| 4 | FL0 | FLUORANTHENE | 0.129 | J | 2.41 |
| 4 | PY0 | PYRENE | 0.163 | J | 2.41 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | | U | 2.41 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.0940 | J | 2.41 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.141 | J | 2.41 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.41 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.41 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.41 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.41 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.163 | J | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.41 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.41 |
| 5 | BEP | BENZO(E)PYRENE | 0.0901 | J | 2.41 |
| 5 | BAP | BENZO(A)PYRENE | 0.121 | J | 2.41 |
| 5 | PER | PERYLENE | | U | 2.41 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.41 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.41 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.41 |
| O | CAR | CARBAZOLE | | U | 2.41 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.41 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.41 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.41 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.41 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.41 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.41 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.41 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.41 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.41 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.41 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.41 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.41 |
| H30 | T19 | HOPANE (T19) | | U | 2.41 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.41 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.41 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.41 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.41 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.41 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.41 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.41 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.41 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.41 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.41 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.41 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.41 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.41 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.41 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.41 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.41 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.41 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.41 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.41 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.41 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.41 |
| M30 | T20 | MORETANE (T20) | | U | 2.41 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.41 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.41 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.41 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.41 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.41 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.41 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.41 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.41 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.41 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.41 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.41 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.41 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.41 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.41 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.41 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.41 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.41 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.41 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.41 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.41 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.41 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.41 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.41 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.41 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.41 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.41 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.41 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.41 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.41 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.41 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.41 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 100 |
| 5B(H)CHOLANE | 88 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1829653-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052342 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 238 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 220 | 2.41 | 91 | 241 | 50 | 130 |
| 3 | F0 | FLUORENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 241 | 2.41 | 100 | 241 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 231 | 2.41 | 96 | 241 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 179 | 2.41 | 74 | 241 | 50 | 130 |
| 4 | PY0 | PYRENE | 184 | 2.41 | 76 | 241 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 219 | 2.41 | 91 | 241 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 214 | 2.41 | 89 | 241 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 204 | 2.41 | 84 | 241 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 210 | 2.41 | 87 | 241 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 205 | 2.41 | 85 | 241 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 213 | 2.41 | 88 | 241 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 213 | 2.41 | 88 | 241 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 97 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052334 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 252 | 2.41 | 104 | 241 | 50 | 130 | 6 | 30 |
| 3 | AY | ACENAPHTHYLENE | 240 | 2.41 | 99 | 241 | 50 | 130 | 1 | 30 |
| 3 | AE | ACENAPHTHENE | 225 | 2.41 | 94 | 241 | 50 | 130 | 3 | 30 |
| 3 | F0 | FLUORENE | 242 | 2.41 | 100 | 241 | 50 | 130 | 2 | 30 |
| 3 | A0 | ANTHRACENE | 250 | 2.41 | 104 | 241 | 50 | 130 | 4 | 30 |
| 3 | P0 | PHENANTHRENE | 240 | 2.41 | 100 | 241 | 50 | 130 | 4 | 30 |
| 4 | FL0 | FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 18 | 30 |
| 4 | PY0 | PYRENE | 231 | 2.41 | 96 | 241 | 50 | 130 | 23 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 229 | 2.41 | 95 | 241 | 50 | 130 | 4 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 5 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 221 | 2.41 | 92 | 241 | 50 | 130 | 9 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 8 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 215 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 220 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 213 | 2.41 | 88 | 241 | 50 | 130 | 3 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 219 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 98 |
| PHENANTHRENE-D10 | 99 |
| BENZO(A)PYRENE-D12 | 98 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

# HC OVA 28AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 13, 2023

**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 August 28, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC OVA 28AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA and arrived at a temperature of 26.5°C on September 8, 2023 with a DHL Tracking # 7103324546 (Seal number 0203905). The sample arrived without a chain of custody however a chain of custody (Attachment 1) was supplied via email prior to sample arrival and was consistent with the sample received.

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC OVA 28AGO2023 (HC OVA28) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC OVA28 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are four (4) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC OVA28 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 HC OVA28 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC OVA28 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC OVA28 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC OVA28 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC OVA28 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC OVA28 sample and source oil are derived from a different source of petroleum.

---

[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.

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 HC OVA28 sample plot away from each other indicating a different source of petroleum**.**

**Conclusion**

The HC OVA 28AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC OVA 28AGO2023 sample are chemically different and were derived from a different source of petroleum.

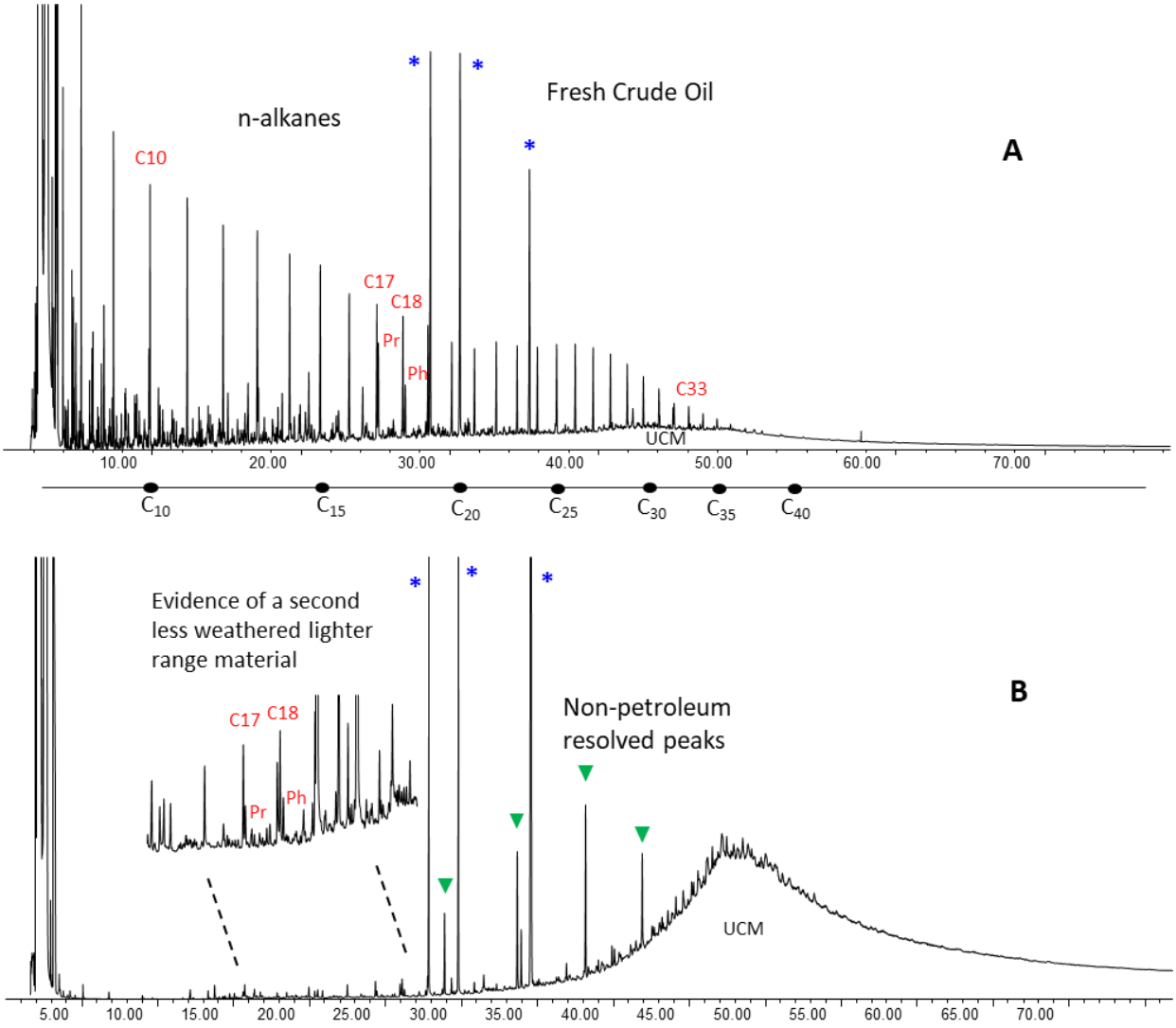


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC OVA 28AGO2023**
'*': Laboratory-added Internal Standard

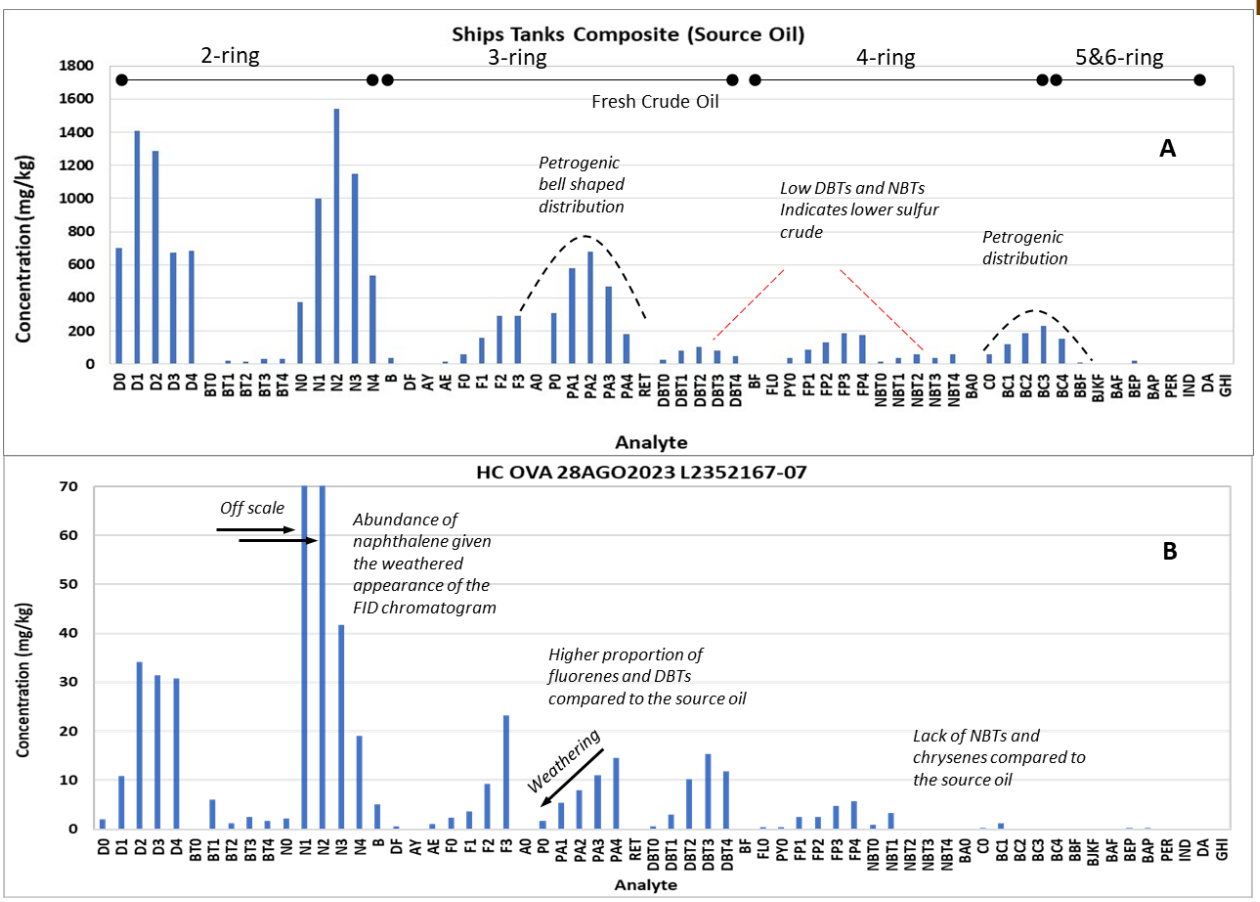


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC OVA 28AGO2023**

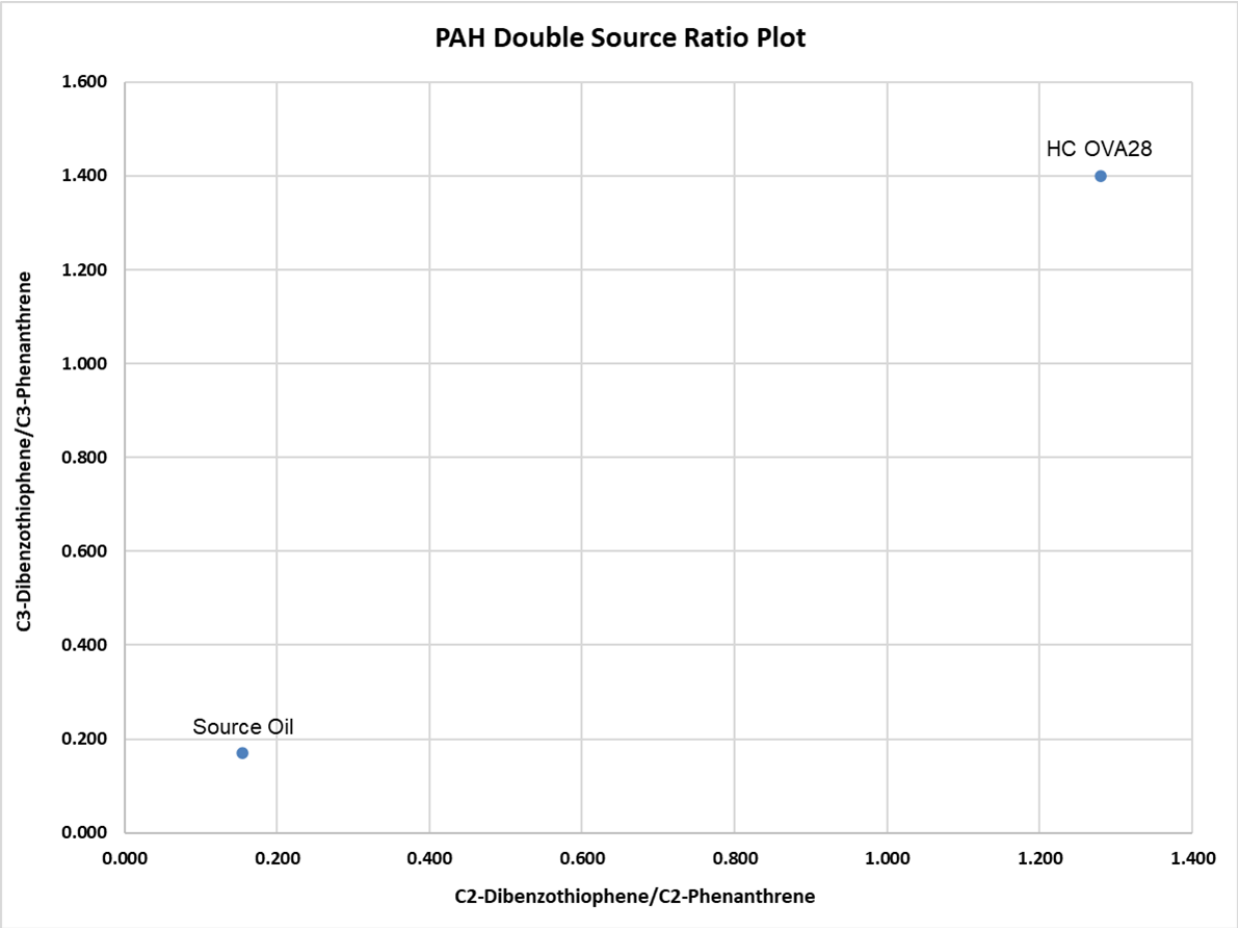


**Figure 3. PAH Double Source Ratio Plot**

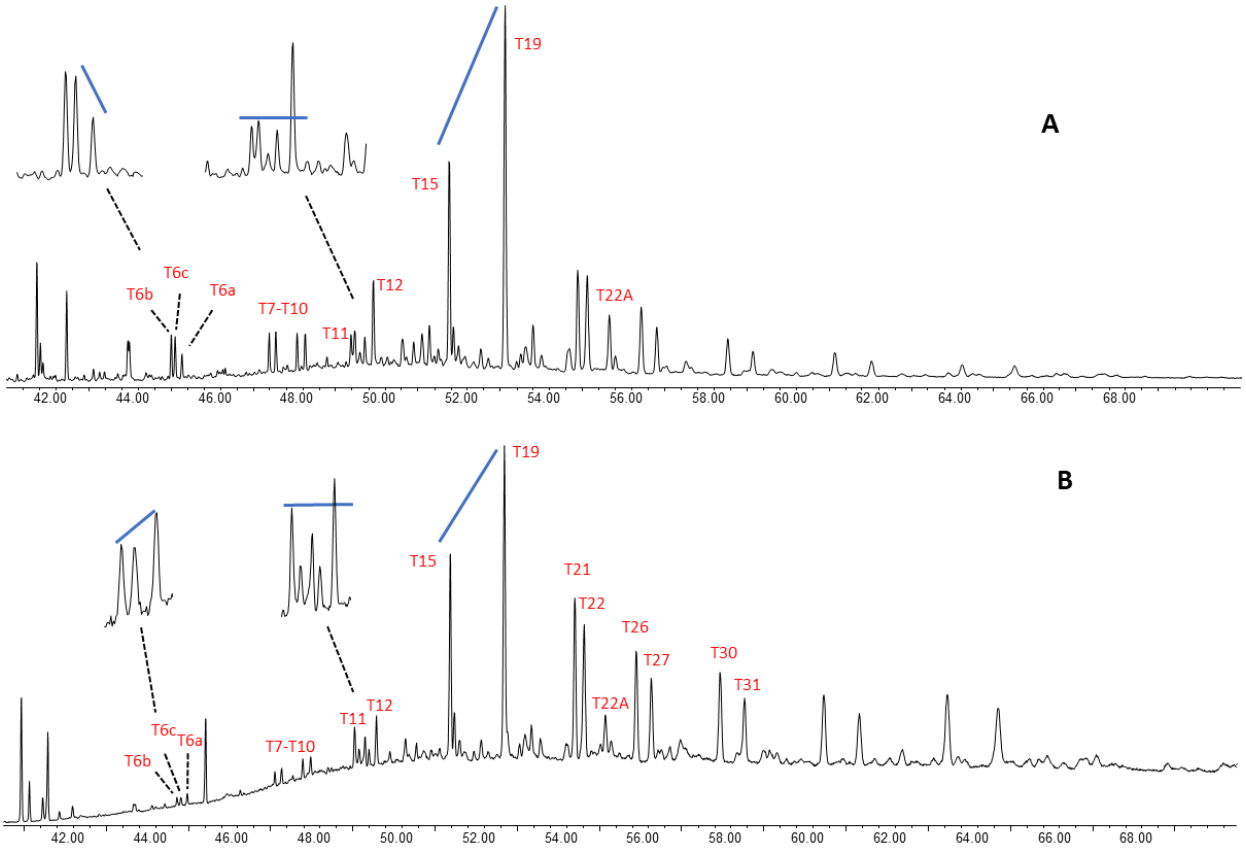


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC OVA 28AGO2023**

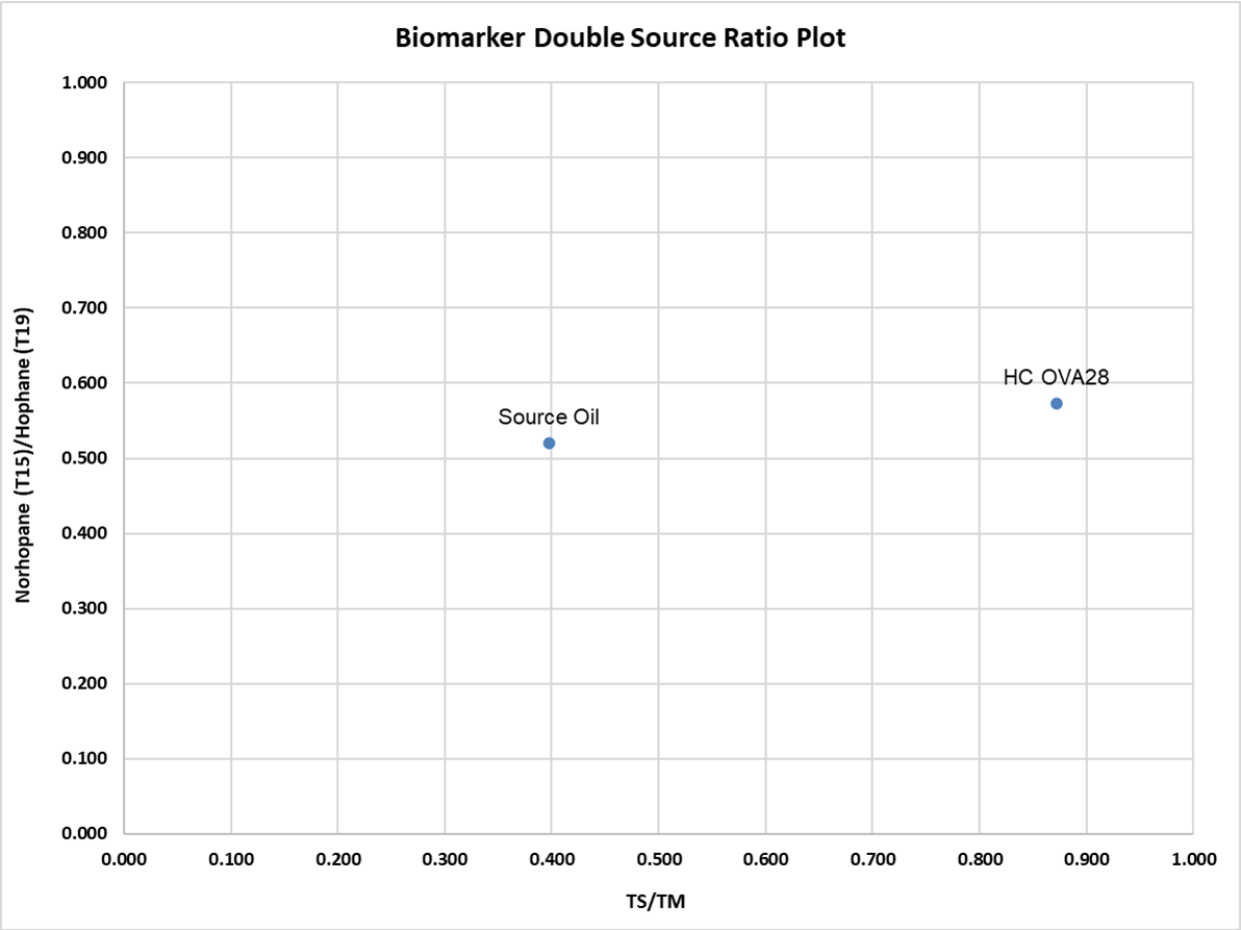


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC OVA 28AGO2023 | L2352167-07 | 08/28/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

5/8/23

L2352167

Nº 007935

CERPER
CERTIFICACIONES DEL PERÚ S.A.

# CADENA DE CUSTODIA
(Registro de Campo -Toma de muestra de aguas, suelos, lodos y sedimentos)

Página 01 de 01

EXPEDIENTE: EXMA-11659-2023
HS: 23006017
JOB NUMBER: 23LM002623 46741

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A.
LUGAR: PLAYA DEL OVALO
Distrito: CHANCAY
Provincia: HUARAL
Departamento: LIMA
PERSONA DE CONTACTO: Carlos Torres

NORMA:
1 SMEWW - APHA - AWWA - WEF, 23rd Ed. 2017 Collection and preservation of samples. Part 9060 A-B ( ) 1060 B-C ( ) 1020 B ( ) 1030 B ( ) 1060 B ( ) 1070 B ( )
2 Instrucción RDM Toma de muestras de sedimentos ( )
3 NTP 214.005 - 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RM N° 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto.
5 RJ N° 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales.
6 NTP ISO 5667-10:2012 (Revisada el 2018) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales
7 NTP 214.060:2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado
8 RM N° 273-2013-VIVIENDA. Protocolo de muestreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales PTAR
9 RM N° 085-2014-MINAM. Guía para el muestreo de suelos
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-EM
11 Otros: ( )

## DESCRIPCIÓN DE LA MUESTRA

| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17,18,19) (K,L,M) | CANTIDAD DE ENVASES |
|---|---|---|---|---|---|---|---|
| 07 HC OVA 28AGO2023 | 28.08.23 | 18:27 | * | 0255538 | 8714465 | 18L | 01 |
| | | | | | | Total de Envases | 01 |

## PARÁMETROS DE ANÁLISIS EN EL LABORATORIO

FINGER PRINT ✓

## PARÁMETROS DE CAMPO

pH (Unidades de pH) | Temperatura Ambiente (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg $Cl_2$/L Libre ( ) Total ( ) | Turbiedad (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( ) | Nivel freático cm ( ) m ( ) | ORP (mV)

(1) Matriz (s)
AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro RESTOS SOLIDOS DE HIDROCARBUROS

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (✓) Congelada ( ) Caja conservadora (✓)
Herméticamente cerrada (✓) Ice pack (✓) Hielo de calidad potable ( )

Equipos Utilizados

| | Equipo | Código | | Equipo | Código |
|---|---|---|---|---|---|
| 1 | GPS | 033 | 4 | | |
| 2 | | | 5 | | |
| 3 | | | 6 | | |

Observaciones: SE PROCEDIO A LLEGAR AL PUNTO DE MUESTREO INDICADO Y DENOMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZO EL PROCEDIMIENTO DE CARACTERIZACION DE LA MUESTRA LA CUAL PRESENTO UNA COLORACION AZUL VERDOSA CON OLOR A HIDROCARBUROS. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRECINTO Nº 0203905. SE TOMARON COORDENADAS INSITU

**Responsable de la toma de muestra:**
Firma:
Inspector Cerper: ROBERTO LOYVA
Inspectores de apoyo: JUNIOR CHUNGA
Hora de inicio: 08:00 Hora de término: 20:00

**Representante del cliente**
Firma:
Nombre: CARLOS TORRES TACHACHIN
DNI: 43001656
Cargo: SUPERVISOR PLAYA

**Recepción de muestras**
Nombre: Noelia Machuca A.
Fecha: 02.09.23 Hora: 08:00

intertek
02 SEP. 2023
LAB. CALEB BRETT
RECEIVED
DI-R-CMAS Versión 06 2023-05-20

9/8/23 1444

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC OVA 28AGO2023 | |
| Lab ID | L2352167-07 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/6/2023 | |
| Sample Size(wet) | 0.00415 | g |
| % Solid | 100 | |
| File ID | F18100523051 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 241 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 78.6 | J | 241 |
| SHC | C10 | DECANE (C10) | 8.19 | J | 241 |
| SHC | C11 | UNDECANE | 23.8 | J | 241 |
| SHC | C12 | DODECANE (C12) | 40.0 | J | 241 |
| SHC | C13 | TRIDECANE | 58.1 | J | 241 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 27.7 | J | 241 |
| SHC | C14 | TETRADECANE (C14) | 86.5 | J | 241 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 46.5 | J | 241 |
| SHC | C15 | PENTADECANE (C15) | 163 | J | 241 |
| SHC | C16 | HEXADECANE (C16) | 226 | J | 241 |
| SHC | 1650 | NORPRISTANE (1650) | 72.0 | J | 241 |
| SHC | C17 | HEPTADECANE (C17) | 233 | J | 241 |
| SHC | Pr | PRISTANE | 122 | J | 241 |
| SHC | C18 | OCTADECANE (C18) | 276 | | 241 |
| SHC | Ph | PHYTANE | 144 | J | 241 |
| SHC | C19 | NONADECANE (C19) | 263 | | 241 |
| SHC | C20 | EICOSANE (C20) | 244 | | 241 |
| SHC | C21 | HENEICOSANE (C21) | 152 | J | 241 |
| SHC | C22 | DOCOSANE (C22) | 113 | J | 241 |
| SHC | C23 | TRICOSANE (C23) | | U | 241 |
| SHC | C24 | TETRACOSANE (C24) | 139 | J | 241 |
| SHC | C25 | PENTACOSANE (C25) | 168 | J | 241 |
| SHC | C26 | HEXACOSANE (C26) | | U | 241 |
| SHC | C27 | HEPTACOSANE (C27) | | U | 241 |
| SHC | C28 | OCTACOSANE (C28) | | U | 241 |
| SHC | C29 | NONACOSANE (C29) | 305 | CB | 241 |
| SHC | C30 | TRIACONTANE (C30) | | U | 241 |
| SHC | C31 | HENTATRIACONTANE (C31) | 160 | J | 241 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 241 |
| SHC | C33 | TRITRIACONTANE (C33) | 336 | | 241 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 241 |
| SHC | C35 | PENTATRIACONTANE (C35) | 1620 | | 241 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 241 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 241 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 241 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 241 |
| SHC | C40 | TETRACONTANE (C40) | | U | 241 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 711000 | | 7950 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 5110 | J | 241 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 100 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F18100523011 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 241 |
| SHC | C10 | DECANE (C10) | U | 241 |
| SHC | C11 | UNDECANE | U | 241 |
| SHC | C12 | DODECANE (C12) | U | 241 |
| SHC | C13 | TRIDECANE | U | 241 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 241 |
| SHC | C14 | TETRADECANE (C14) | U | 241 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 241 |
| SHC | C15 | PENTADECANE (C15) | U | 241 |
| SHC | C16 | HEXADECANE (C16) | U | 241 |
| SHC | 1650 | NORPRISTANE (1650) | U | 241 |
| SHC | C17 | HEPTADECANE (C17) | U | 241 |
| SHC | Pr | PRISTANE | U | 241 |
| SHC | C18 | OCTADECANE (C18) | U | 241 |
| SHC | Ph | PHYTANE | U | 241 |
| SHC | C19 | NONADECANE (C19) | U | 241 |
| SHC | C20 | EICOSANE (C20) | U | 241 |
| SHC | C21 | HENEICOSANE (C21) | U | 241 |
| SHC | C22 | DOCOSANE (C22) | U | 241 |
| SHC | C23 | TRICOSANE (C23) | U | 241 |
| SHC | C24 | TETRACOSANE (C24) | 10.1 J | 241 |
| SHC | C25 | PENTACOSANE (C25) | U | 241 |
| SHC | C26 | HEXACOSANE (C26) | U | 241 |
| SHC | C27 | HEPTACOSANE (C27) | U | 241 |
| SHC | C28 | OCTACOSANE (C28) | U | 241 |
| SHC | C29 | NONACOSANE (C29) | 216 JC | 241 |
| SHC | C30 | TRIACONTANE (C30) | U | 241 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 241 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 241 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 241 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 241 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 241 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 241 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 241 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 241 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 241 |
| SHC | C40 | TETRACONTANE (C40) | U | 241 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 7950 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 226 J | 241 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1829653-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | NA | |
| Date Received | 9/20/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00415 | g |
| % Solid | 100 | |
| File ID | f18100523015 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 241 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4880 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 4820 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 4970 | 241 | 103 | 4820 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 4930 | 241 | 102 | 4820 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5060 | 241 | 105 | 4820 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5240 | 241 | 109 | 4820 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 4870 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 4990 | 241 | 104 | 4820 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 4830 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 4790 | 241 | 99 | 4820 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 4610 | 241 | 96 | 4820 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4050 | 241 | 84 | 4820 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | f18100523017 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4920 | 241 | 102 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C10 | DECANE (C10) | 4880 | 241 | 101 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5030 | 241 | 104 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C14 | TETRADECANE (C14) | 4990 | 241 | 104 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5090 | 241 | 106 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5300 | 241 | 110 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C19 | NONADECANE (C19) | 4960 | 241 | 103 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C20 | EICOSANE (C20) | 5050 | 241 | 105 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 4750 | 241 | 98 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 4900 | 241 | 102 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 4760 | 241 | 99 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 4880 | 241 | 101 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 4700 | 241 | 98 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4120 | 241 | 85 | 4820 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1762020-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1762020-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 3/29/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F18032823029 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6880 | 0.983 | 109 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5560 | 0.983 | 110 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 5120 | 0.983 | 109 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4740 | 0.983 | 114 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4380 | 0.983 | 108 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 1000 | 0.983 | 118 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3960 | 0.983 | 108 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1480 | 0.983 | 108 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 3910 | 0.983 | 107 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3500 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1190 | 0.983 | 109 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 3040 | 0.983 | 101 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2400 | 0.983 | 112 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2700 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1450 | 0.983 | 119 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2540 | 0.983 | 109 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2240 | 0.983 | 110 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2120 | 0.983 | 108 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1920 | 0.983 | 110 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1820 | 0.983 | 111 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1750 | 0.983 | 112 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1520 | 0.983 | 110 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1180 | 0.983 | 109 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 840 | 0.983 | 108 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 817 | 0.983 | 111 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 652 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 549 | 0.983 | 107 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 565 | 0.983 | 123 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 330 | 0.983 | 85 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 313 | 0.983 | 90 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 282 | 0.983 | 101 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 157 | 0.983 | 84 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 150 | 0.983 | 99 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 130 | 0.983 | 99 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 85.2 | 0.983 | 96 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 81.4 | 0.983 | 88 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 586000 | 0.983 | 106 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 83312 | 0.983 | 122 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC OVA 28AGO2023 |
| Lab ID | L2352167-07 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | 8/28/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052340 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 2.06 | | 1.20 |
| 2 | D1 | C1-DECALINS | 10.8 | | 2.41 |
| 2 | D2 | C2-DECALINS | 34.2 | | 2.41 |
| 2 | D3 | C3-DECALINS | 31.4 | | 2.41 |
| 2 | D4 | C4-DECALINS | 30.8 | | 2.41 |
| S | BT0 | BENZOTHIOPHENE | 0.172 | J | 2.41 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 5.97 | | 2.41 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 1.16 | J | 2.41 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 2.44 | | 2.41 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 1.70 | J | 2.41 |
| A | N0 | NAPHTHALENE | 2.14 | J | 2.41 |
| 2 | N1 | C1-NAPHTHALENES | 146 | | 2.41 |
| 2 | N2 | C2-NAPHTHALENES | 89.6 | | 2.41 |
| 2 | N3 | C3-NAPHTHALENES | 41.7 | | 2.41 |
| 2 | N4 | C4-NAPHTHALENES | 19.1 | | 2.41 |
| 2 | B | BIPHENYL | 5.03 | | 2.41 |
| 3 | DF | DIBENZOFURAN | 0.609 | J | 2.41 |
| 3 | AY | ACENAPHTHYLENE | 0.123 | JB | 2.41 |
| 3 | AE | ACENAPHTHENE | 1.14 | J | 2.41 |
| 3 | F0 | FLUORENE | 2.30 | J | 2.41 |
| 3 | F1 | C1-FLUORENES | 3.63 | | 2.41 |
| 3 | F2 | C2-FLUORENES | 9.30 | | 2.41 |
| 3 | F3 | C3-FLUORENES | 23.3 | G | 2.41 |
| 3 | A0 | ANTHRACENE | | U | 2.41 |
| 3 | P0 | PHENANTHRENE | 1.68 | J | 2.41 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 5.33 | | 2.41 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 8.05 | | 2.41 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 11.0 | | 2.41 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 14.5 | B | 2.41 |
| 3 | RET | RETENE | | U | 2.41 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.549 | J | 2.41 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 2.99 | | 2.41 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 10.3 | | 2.41 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 15.4 | | 2.41 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 11.9 | | 2.41 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.41 |
| 4 | FL0 | FLUORANTHENE | 0.460 | JB | 2.41 |
| 4 | PY0 | PYRENE | 0.384 | JB | 2.41 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 2.55 | | 2.41 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 2.59 | | 2.41 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 4.76 | | 2.41 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 5.68 | | 2.41 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.848 | J | 2.41 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 3.30 | | 2.41 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | BA0 | BENZ(A)ANTHRACENE | | U | 2.41 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.266 | JB | 2.41 |
| 4 | BC1 | C1-CHRYSENES | 1.28 | J | 2.41 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.41 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.41 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.41 |
| 5 | BBF | BENZO(B)FLUORANTHENE | | U | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC OVA 28AGO2023 |
| Lab ID | L2352167-07 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | 8/28/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052340 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.41 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.41 |
| 5 | BEP | BENZO(E)PYRENE | 0.295 | JB | 2.41 |
| 5 | BAP | BENZO(A)PYRENE | 0.248 | JB | 2.41 |
| 5 | PER | PERYLENE | | U | 2.41 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.41 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.41 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.41 |
| O | CAR | CARBAZOLE | 0.334 | J | 2.41 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 1.93 | J | 2.41 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.41 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.646 | J | 2.41 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.06 | J | 2.41 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.07 | J | 2.41 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 0.124 | J | 2.41 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.43 | J | 2.41 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 0.923 | J | 2.41 |
| A | 1MN | 1-METHYLNAPHTHALENE | 84.5 | | 2.41 |
| A | 2MN | 2-METHYLNAPHTHALENE | 134 | | 2.41 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 40.2 | | 2.41 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 4.08 | | 2.41 |
| H30 | T19 | HOPANE (T19) | 187 | | 2.41 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 10.1 | | 2.41 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 4.88 | | 2.41 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 6.24 | | 2.41 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 5.26 | | 2.41 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.64 | | 2.41 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 3.66 | | 2.41 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 5.17 | | 2.41 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 6.77 | | 2.41 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 8.29 | | 2.41 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 9.22 | | 2.41 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 19.8 | | 2.41 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 9.26 | | 2.41 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 7.97 | | 2.41 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 22.7 | | 2.41 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 5.74 | | 2.41 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 5.91 | | 2.41 |
| H29 | T15 | 30-NORHOPANE (T15) | 107 | | 2.41 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 23.8 | | 2.41 |
| X | X | 17A(H)-DIAHOPANE (X) | 13.0 | | 2.41 |
| M29 | T17 | 30-NORMORETANE (T17) | 13.6 | | 2.41 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.41 |
| M30 | T20 | MORETANE (T20) | 18.6 | | 2.41 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 98.3 | | 2.41 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 95.9 | | 2.41 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 28.9 | | 2.41 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 81.8 | | 2.41 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 64.0 | | 2.41 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 71.1 | | 2.41 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 52.8 | | 2.41 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 66.9 | | 2.41 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 50.4 | | 2.41 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 82.9 | | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC OVA 28AGO2023 | |
| Lab ID | L2352167-07 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/7/2023 | |
| Sample Size(wet) | 0.00415 | g |
| % Solid | 100 | |
| File ID | F1210052340 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.2 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 87.6 | 2.41 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 20.9 | 2.41 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 13.4 | 2.41 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 13.0 | 2.41 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 42.8 | 2.41 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 50.5 | 2.41 |
| d29R | S18 | UNKNOWN STERANE (S18) | 10.2 | 2.41 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 2.85 | 2.41 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 23.1 | 2.41 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 23.8 | 2.41 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 28.0 | 2.41 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 45.1 | 2.41 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 40.0 | 2.41 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 34.7 | 2.41 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 40.8 | 2.41 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 52.3 | 2.41 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 60.6 | 2.41 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 49.5 | 2.41 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 6.87 | 2.41 |
| SC28TAS | TAS02 | C28,20S TAS | 8.34 | 2.41 |
| RC27TAS | TAS03 | C27,20R TAS | 11.5 | 2.41 |
| RC28TAS | TAS04 | C28,20R TAS | 3.38 | 2.41 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 95 |
| PHENANTHRENE-D10 | 95 |
| BENZO(A)PYRENE-D12 | 94 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.20 |
| 2 | D1 | C1-DECALINS | | U | 2.41 |
| 2 | D2 | C2-DECALINS | | U | 2.41 |
| 2 | D3 | C3-DECALINS | | U | 2.41 |
| 2 | D4 | C4-DECALINS | | U | 2.41 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.41 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.41 |
| A | N0 | NAPHTHALENE | 0.196 | J | 2.41 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.41 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.41 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.41 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.41 |
| 2 | B | BIPHENYL | | U | 2.41 |
| 3 | DF | DIBENZOFURAN | | U | 2.41 |
| 3 | AY | ACENAPHTHYLENE | 0.0576 | J | 2.41 |
| 3 | AE | ACENAPHTHENE | | U | 2.41 |
| 3 | F0 | FLUORENE | | U | 2.41 |
| 3 | F1 | C1-FLUORENES | | U | 2.41 |
| 3 | F2 | C2-FLUORENES | | U | 2.41 |
| 3 | F3 | C3-FLUORENES | | U | 2.41 |
| 3 | A0 | ANTHRACENE | | U | 2.41 |
| 3 | P0 | PHENANTHRENE | 0.143 | J | 2.41 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 1.81 | J | 2.41 |
| 3 | RET | RETENE | 0.562 | J | 2.41 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.0422 | J | 2.41 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.41 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.41 |
| 4 | FL0 | FLUORANTHENE | 0.129 | J | 2.41 |
| 4 | PY0 | PYRENE | 0.163 | J | 2.41 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | | U | 2.41 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.0940 | J | 2.41 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.141 | J | 2.41 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.41 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.41 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.41 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.41 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.163 | J | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.41 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.41 |
| 5 | BEP | BENZO(E)PYRENE | 0.0901 | J | 2.41 |
| 5 | BAP | BENZO(A)PYRENE | 0.121 | J | 2.41 |
| 5 | PER | PERYLENE | | U | 2.41 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.41 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.41 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.41 |
| O | CAR | CARBAZOLE | | U | 2.41 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.41 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.41 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.41 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.41 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.41 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.41 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.41 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.41 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.41 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.41 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.41 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.41 |
| H30 | T19 | HOPANE (T19) | | U | 2.41 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.41 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.41 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.41 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.41 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.41 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.41 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.41 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.41 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.41 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.41 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.41 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.41 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.41 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.41 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.41 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.41 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.41 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.41 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.41 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.41 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.41 |
| M30 | T20 | MORETANE (T20) | | U | 2.41 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.41 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.41 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.41 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.41 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.41 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.41 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.41 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.41 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.41 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.41 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.41 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.41 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.41 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.41 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.41 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.41 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.41 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.41 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.41 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.41 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.41 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.41 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.41 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.41 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.41 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.41 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.41 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.41 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.41 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.41 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.41 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 100 |
| 5B(H)CHOLANE | 88 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1829653-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052342 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 238 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 220 | 2.41 | 91 | 241 | 50 | 130 |
| 3 | F0 | FLUORENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 241 | 2.41 | 100 | 241 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 231 | 2.41 | 96 | 241 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 179 | 2.41 | 74 | 241 | 50 | 130 |
| 4 | PY0 | PYRENE | 184 | 2.41 | 76 | 241 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 219 | 2.41 | 91 | 241 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 214 | 2.41 | 89 | 241 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 204 | 2.41 | 84 | 241 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 210 | 2.41 | 87 | 241 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 205 | 2.41 | 85 | 241 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 213 | 2.41 | 88 | 241 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 213 | 2.41 | 88 | 241 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 97 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052334 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 252 | 2.41 | 104 | 241 | 50 | 130 | 6 | 30 |
| 3 | AY | ACENAPHTHYLENE | 240 | 2.41 | 99 | 241 | 50 | 130 | 1 | 30 |
| 3 | AE | ACENAPHTHENE | 225 | 2.41 | 94 | 241 | 50 | 130 | 3 | 30 |
| 3 | F0 | FLUORENE | 242 | 2.41 | 100 | 241 | 50 | 130 | 2 | 30 |
| 3 | A0 | ANTHRACENE | 250 | 2.41 | 104 | 241 | 50 | 130 | 4 | 30 |
| 3 | P0 | PHENANTHRENE | 240 | 2.41 | 100 | 241 | 50 | 130 | 4 | 30 |
| 4 | FL0 | FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 18 | 30 |
| 4 | PY0 | PYRENE | 231 | 2.41 | 96 | 241 | 50 | 130 | 23 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 229 | 2.41 | 95 | 241 | 50 | 130 | 4 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 5 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 221 | 2.41 | 92 | 241 | 50 | 130 | 9 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 8 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 215 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 220 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 213 | 2.41 | 88 | 241 | 50 | 130 | 3 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 219 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 98 |
| PHENANTHRENE-D10 | 99 |
| BENZO(A)PYRENE-D12 | 98 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

# HC CRI 28AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 13, 2023

**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 August 28, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC CRI 28AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA and arrived at a temperature of 26.5°C on September 8, 2023 with a DHL Tracking # 7103324546 (Seal number 0203906). The sample arrived without a chain of custody however a chain of custody (Attachment 1) was supplied via email prior to sample arrival and was consistent with the sample received.

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC CRI 28AGO2023 (HC CRI28) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC CRI28 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are four (4) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC CRI28 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 HC CRI28 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC CRI28 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC CRI28 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC CRI28 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC CRI28 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC CRI28 sample and source oil are derived from a different source of petroleum.

---

[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.

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 HC CRI28 sample plot away from each other indicating a different source of petroleum**.**

**Conclusion**

The HC CRI 28AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC CRI 28AGO2023 sample are chemically different and were derived from a different source of petroleum.

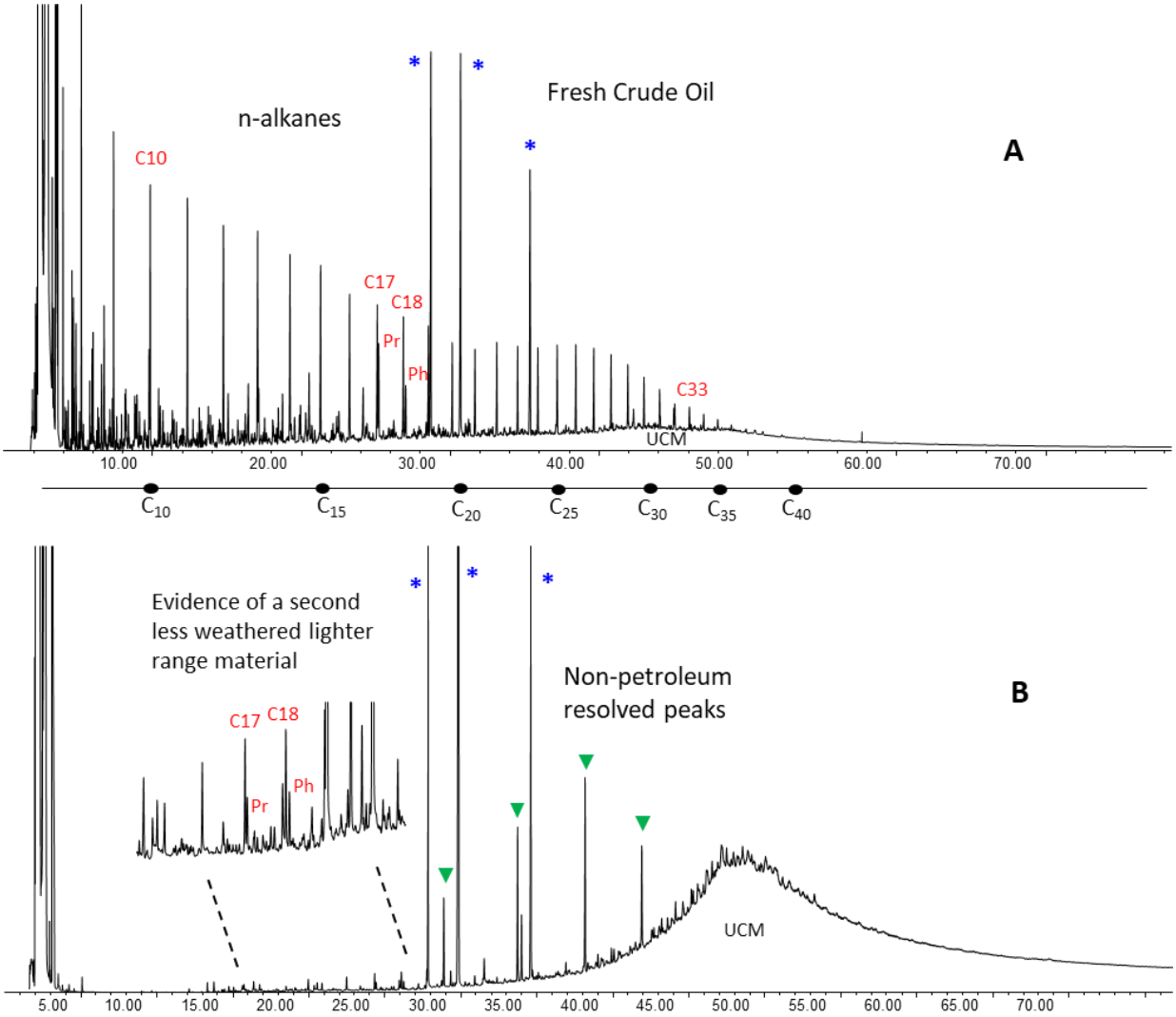


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC CRI 28AGO2023**
'*': Laboratory-added Internal Standard

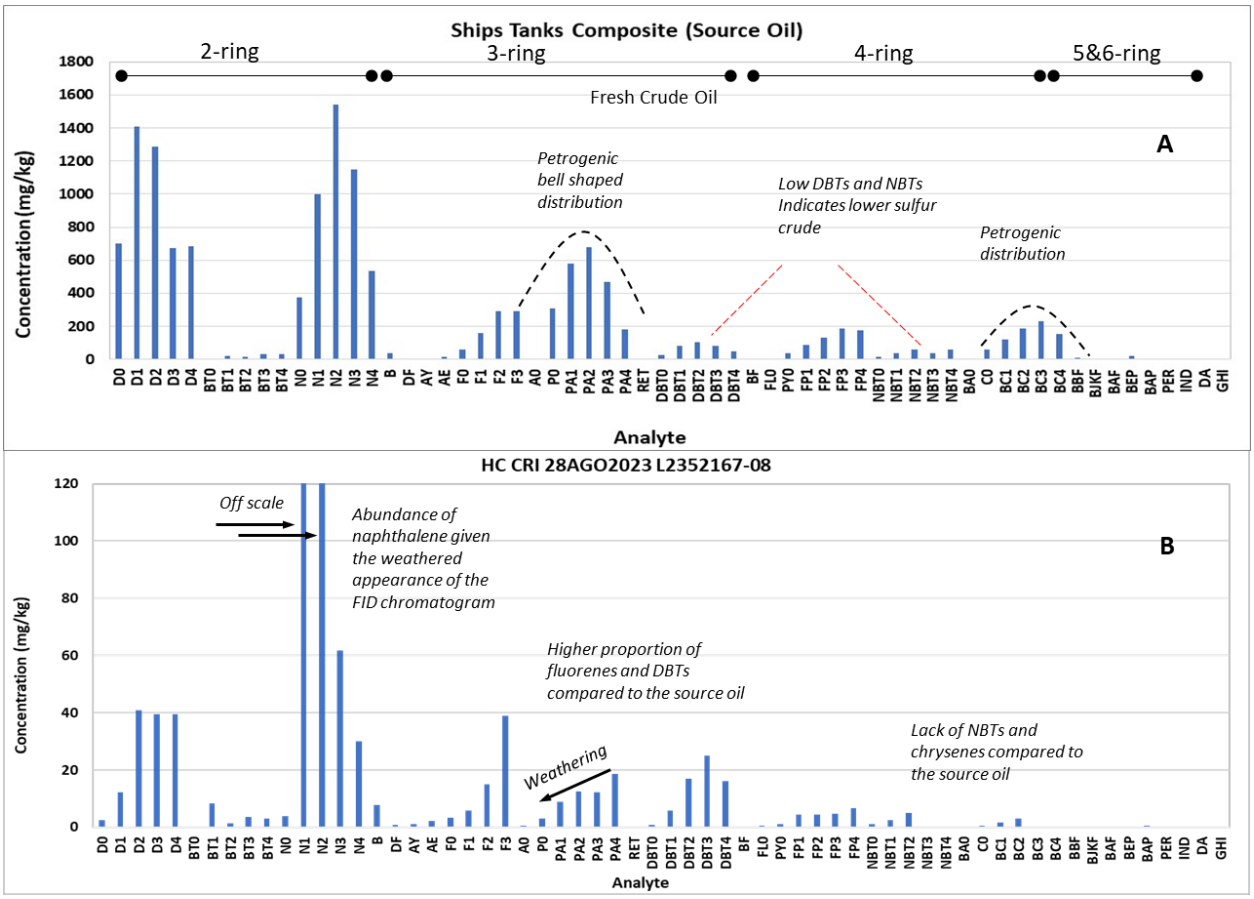


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**

**B) HC CRI 28AGO2023**

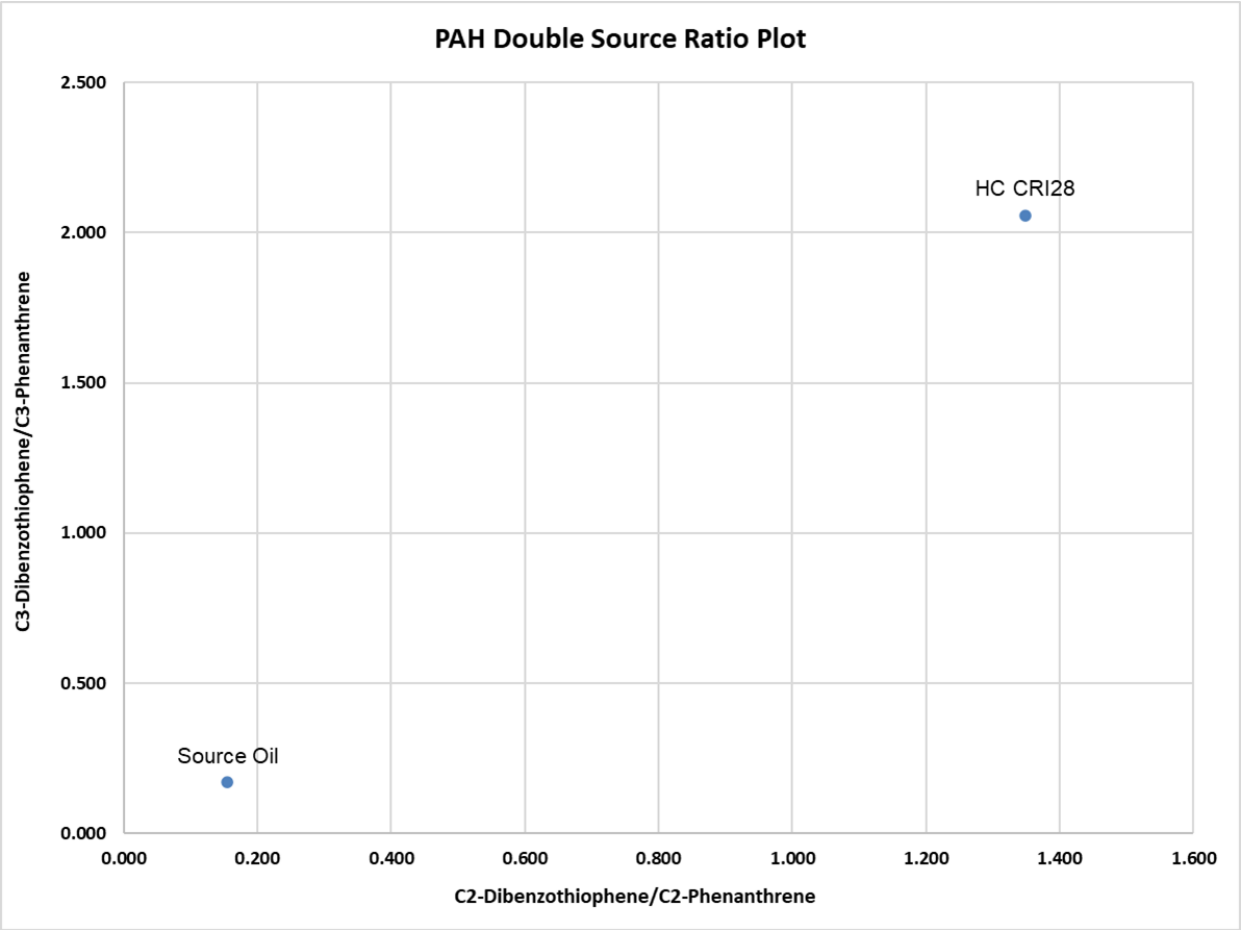


**Figure 3. PAH Double Source Ratio Plot**

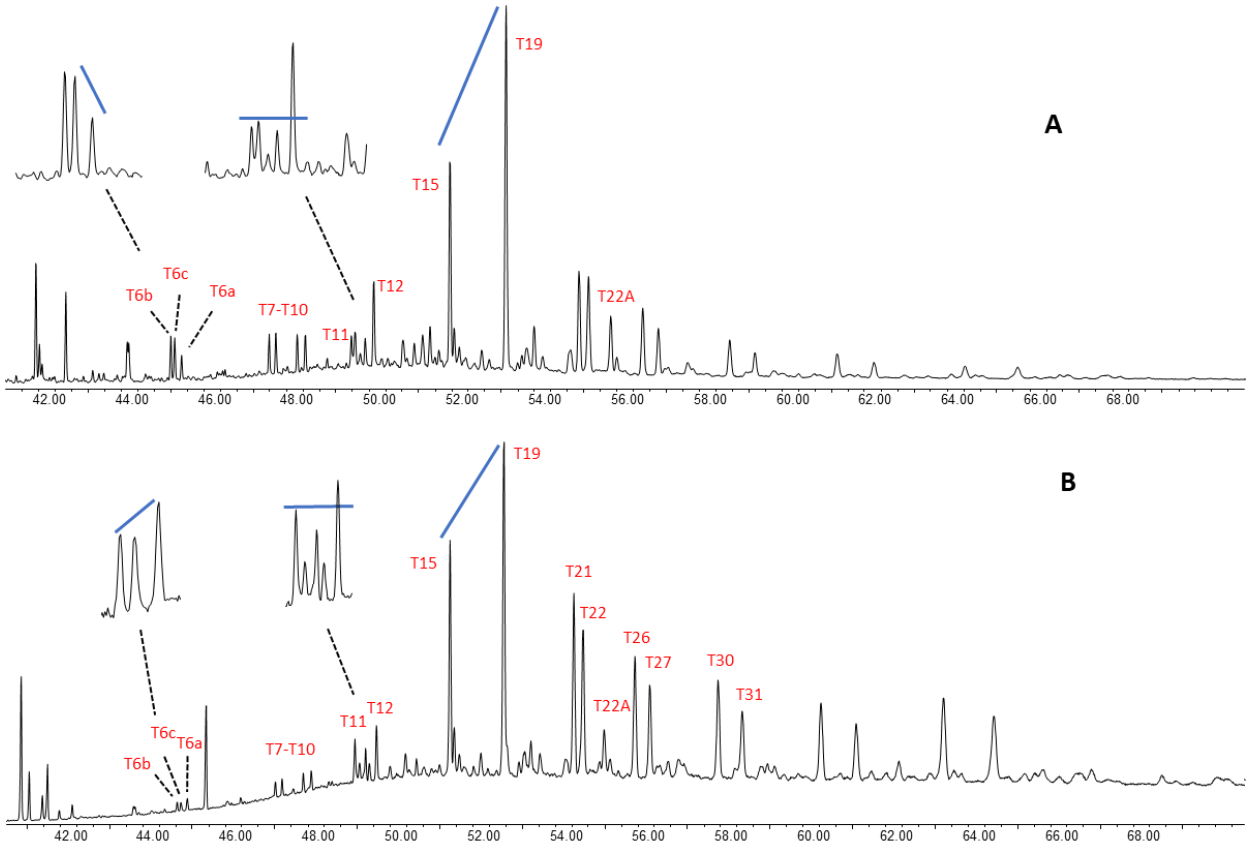


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC CRI 28AGO2023**

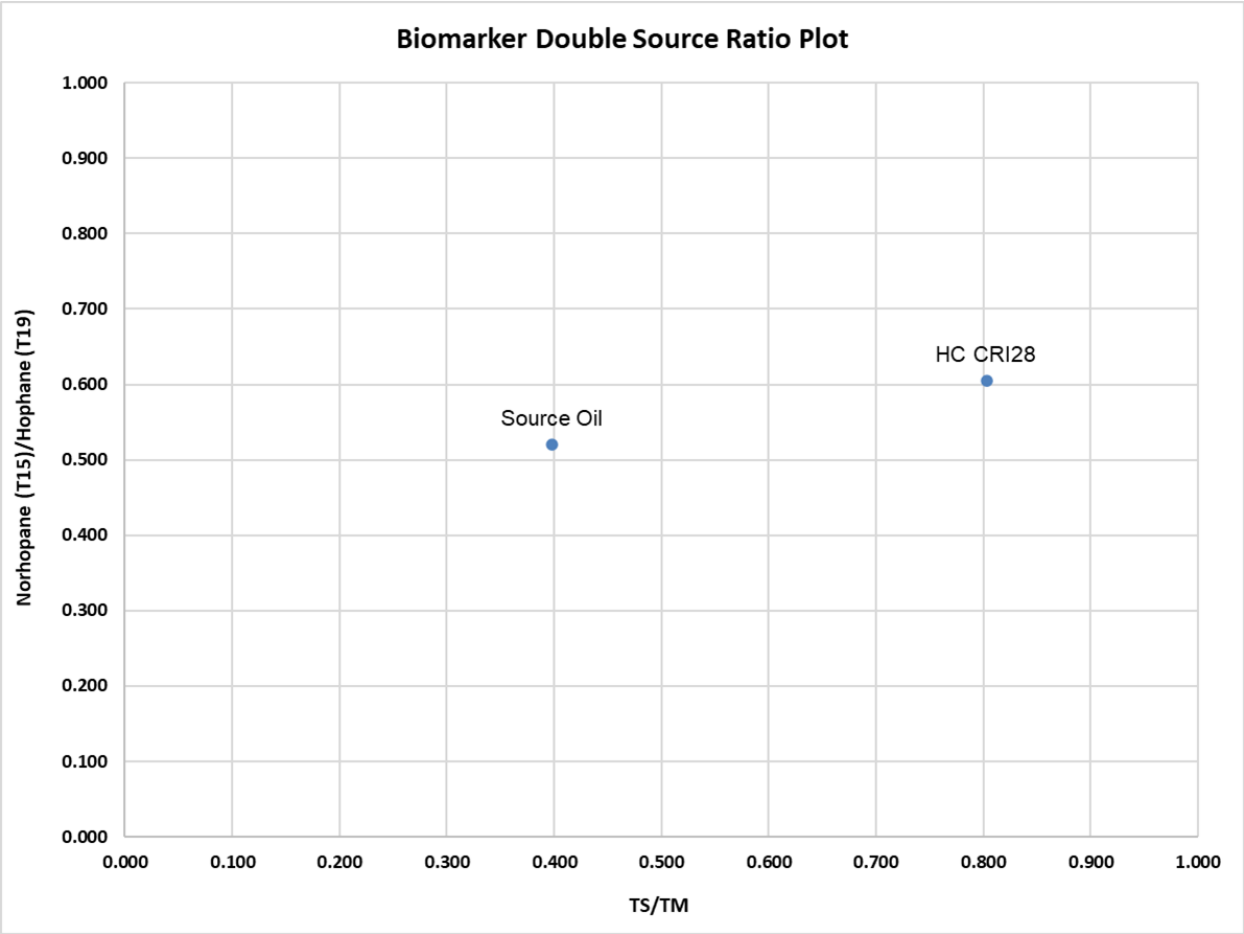


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC CRI 28AGO2023 | L2352167-08 | 08/28/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/8/23 L235467

CERPER CERTIFICACIONES DEL PERU S.A.

# CADENA DE CUSTODIA
## (Registro de Campo - Toma de muestra de aguas, suelos, lodos y sedimentos)

Nº 005336

Página 01 de 01

EXPEDIENTE: EXMA-11689-2023

HS: 23006017

JOB NUMBER: 23LM0026234 6741

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A

PERSONA DE CONTACTO: Carlos Torres

LUGAR: PLAYA CRISANTEMOS | Distrito: CHANCAY | Provincia: HUARAL | Departamento: LIMA

NORMA:

1 SMEWW – APHA – AWWA – WEF, 23rd Ed. 2017, Collection and preservation of samples, Part. 9060 A-B ( ) 1060 B-C ( ) 10200 B ( ) 10300 B ( ) 10400 B ( ) 10750 B ( )
2 Instrucción RSB-Toma de muestras de sedimentos ( )
3 NTP 214.005 - 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RM Nº 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto ( )
5 RJ Nº 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO 5667-10:2012 (Revisada el 2018) Calidad de aguas. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.046:2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM Nº 273-2013-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales - PTAR ( )
9 RM Nº 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-EM ( )
11 Otros: ( )

### DESCRIPCIÓN DE LA MUESTRA

| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (T.L.R.N) (L.L.M) | CANTIDAD DE ENVASES |
|---|---|---|---|---|---|---|---|
| HC CRI 28AG02023 | 28-08-23 | 19:25 | * | 0257997 | 8745835 | 18L | 01 |
| | | | | | | Total de Envases | 01 |

PARÁMETROS DE ANÁLISIS EN EL LABORATORIO: FINGERPRINT

PARÁMETROS DE CAMPO: pH | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg/L Libre ( ) Total ( ) | Turbiedad (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( ) | Nivel freático cm ( ) m ( ) | ORP (mV)

(1) Matriz (s)
AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro: RESTOS SOLIDOS DE HIDROCARBUROS.

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (✓) Congelada ( ) Caja conservadora (✓)
Hermeticamente cerrada (✓) Ice pack (✓) Hielo de calidad potable ( )

Equipos: Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 033 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: SE PROCEDIO A LLEGAR AL PUNTO DE MUESTREO, INDICADO Y DETERMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZO EL PROCEDIMIENTO DE CARACTERIZACION DE LA MUESTRA LA CUAL PRESENTO UNA COLORACION AZUL VERDOSA CON OLOR A HIDROCARBURO. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRESINTO Nº 0203906. SE TOMARON COORDENADAS INSITU.

Responsable de la toma de muestra:
Firma:
Inspector Cerper: ROBERTO LOYOLA
Inspectores de apoyo: JUNIOR CHUNGA
Hora de inicio: 08:00 Hora de término: 20:00

Representante del cliente
Firma:
Nombre: CARLOS TORRES YACHACHIN
DNI: 48001656
Cargo: SUPERVISOR PLAYA

Recepción de muestras
Nombre: Noelia Mochica A.
Fecha: 02.09.23 Hora: 08:00 a.m.

intertek
LAB. CALEB BRETT
RECEIVED

F-R-CMS
Version 05
2023-04-19

9/8/23 14:44

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC CRI 28AGO2023 | |
| Lab ID | L2352167-08 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/6/2023 | |
| Sample Size(wet) | 0.00432 | g |
| % Solid | 100 | |
| File ID | F18100523053 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 231 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 231 |
| SHC | C10 | DECANE (C10) | 9.03 | J | 231 |
| SHC | C11 | UNDECANE | | U | 231 |
| SHC | C12 | DODECANE (C12) | 37.7 | J | 231 |
| SHC | C13 | TRIDECANE | 52.5 | J | 231 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 30.8 | J | 231 |
| SHC | C14 | TETRADECANE (C14) | 107 | J | 231 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 66.0 | J | 231 |
| SHC | C15 | PENTADECANE (C15) | 188 | J | 231 |
| SHC | C16 | HEXADECANE (C16) | 302 | | 231 |
| SHC | 1650 | NORPRISTANE (1650) | 128 | J | 231 |
| SHC | C17 | HEPTADECANE (C17) | 324 | | 231 |
| SHC | Pr | PRISTANE | 204 | J | 231 |
| SHC | C18 | OCTADECANE (C18) | 375 | | 231 |
| SHC | Ph | PHYTANE | 221 | J | 231 |
| SHC | C19 | NONADECANE (C19) | 356 | | 231 |
| SHC | C20 | EICOSANE (C20) | 316 | | 231 |
| SHC | C21 | HENEICOSANE (C21) | 183 | J | 231 |
| SHC | C22 | DOCOSANE (C22) | 140 | J | 231 |
| SHC | C23 | TRICOSANE (C23) | 2750 | | 231 |
| SHC | C24 | TETRACOSANE (C24) | 177 | J | 231 |
| SHC | C25 | PENTACOSANE (C25) | 189 | J | 231 |
| SHC | C26 | HEXACOSANE (C26) | | U | 231 |
| SHC | C27 | HEPTACOSANE (C27) | 209 | J | 231 |
| SHC | C28 | OCTACOSANE (C28) | | U | 231 |
| SHC | C29 | NONACOSANE (C29) | 326 | CB | 231 |
| SHC | C30 | TRIACONTANE (C30) | | U | 231 |
| SHC | C31 | HENTATRIACONTANE (C31) | 172 | J | 231 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 231 |
| SHC | C33 | TRITRIACONTANE (C33) | 418 | | 231 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 231 |
| SHC | C35 | PENTATRIACONTANE (C35) | 1860 | | 231 |
| SHC | C36 | HEXATRIACONTANE (C36) | 412 | | 231 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 231 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 231 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 231 |
| SHC | C40 | TETRACONTANE (C40) | | U | 231 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 872000 | | 7640 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 9550 | J | 231 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 101 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F18100523011 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 241 |
| SHC | C10 | DECANE (C10) | U | 241 |
| SHC | C11 | UNDECANE | U | 241 |
| SHC | C12 | DODECANE (C12) | U | 241 |
| SHC | C13 | TRIDECANE | U | 241 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 241 |
| SHC | C14 | TETRADECANE (C14) | U | 241 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 241 |
| SHC | C15 | PENTADECANE (C15) | U | 241 |
| SHC | C16 | HEXADECANE (C16) | U | 241 |
| SHC | 1650 | NORPRISTANE (1650) | U | 241 |
| SHC | C17 | HEPTADECANE (C17) | U | 241 |
| SHC | Pr | PRISTANE | U | 241 |
| SHC | C18 | OCTADECANE (C18) | U | 241 |
| SHC | Ph | PHYTANE | U | 241 |
| SHC | C19 | NONADECANE (C19) | U | 241 |
| SHC | C20 | EICOSANE (C20) | U | 241 |
| SHC | C21 | HENEICOSANE (C21) | U | 241 |
| SHC | C22 | DOCOSANE (C22) | U | 241 |
| SHC | C23 | TRICOSANE (C23) | U | 241 |
| SHC | C24 | TETRACOSANE (C24) | 10.1 J | 241 |
| SHC | C25 | PENTACOSANE (C25) | U | 241 |
| SHC | C26 | HEXACOSANE (C26) | U | 241 |
| SHC | C27 | HEPTACOSANE (C27) | U | 241 |
| SHC | C28 | OCTACOSANE (C28) | U | 241 |
| SHC | C29 | NONACOSANE (C29) | 216 JC | 241 |
| SHC | C30 | TRIACONTANE (C30) | U | 241 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 241 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 241 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 241 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 241 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 241 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 241 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 241 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 241 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 241 |
| SHC | C40 | TETRACONTANE (C40) | U | 241 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 7950 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 226 J | 241 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1829653-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1829653 | |
| Date Collected | NA | |
| Date Received | 9/20/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/5/2023 | |
| Sample Size(wet) | 0.00415 | g |
| % Solid | 100 | |
| File ID | f18100523015 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 241 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4880 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 4820 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 4970 | 241 | 103 | 4820 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 4930 | 241 | 102 | 4820 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5060 | 241 | 105 | 4820 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5240 | 241 | 109 | 4820 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 4870 | 241 | 101 | 4820 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 4990 | 241 | 104 | 4820 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 4830 | 241 | 100 | 4820 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 4680 | 241 | 97 | 4820 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 4790 | 241 | 99 | 4820 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 4610 | 241 | 96 | 4820 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4050 | 241 | 84 | 4820 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 101 |
| D50-TETRACOSANE | 98 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/5/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | f18100523017 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 241 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 4920 | 241 | 102 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C10 | DECANE (C10) | 4880 | 241 | 101 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5030 | 241 | 104 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C14 | TETRADECANE (C14) | 4990 | 241 | 104 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5090 | 241 | 106 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5300 | 241 | 110 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C19 | NONADECANE (C19) | 4960 | 241 | 103 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C20 | EICOSANE (C20) | 5050 | 241 | 105 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 4750 | 241 | 98 | 4820 | 50 | 130 | 1 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 4900 | 241 | 102 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 4760 | 241 | 99 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 4880 | 241 | 101 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 4700 | 241 | 98 | 4820 | 50 | 130 | 2 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 4120 | 241 | 85 | 4820 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 100 |
| D50-TETRACOSANE | 99 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1762020-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1762020-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 3/29/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F18032823029 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6880 | 0.983 | 109 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5560 | 0.983 | 110 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 5120 | 0.983 | 109 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4740 | 0.983 | 114 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4380 | 0.983 | 108 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 1000 | 0.983 | 118 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3960 | 0.983 | 108 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1480 | 0.983 | 108 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 3910 | 0.983 | 107 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3500 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1190 | 0.983 | 109 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 3040 | 0.983 | 101 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2400 | 0.983 | 112 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2700 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1450 | 0.983 | 119 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2540 | 0.983 | 109 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2240 | 0.983 | 110 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2120 | 0.983 | 108 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1920 | 0.983 | 110 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1820 | 0.983 | 111 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1750 | 0.983 | 112 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1520 | 0.983 | 110 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1180 | 0.983 | 109 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 840 | 0.983 | 108 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 817 | 0.983 | 111 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 652 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 549 | 0.983 | 107 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 565 | 0.983 | 123 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 330 | 0.983 | 85 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 313 | 0.983 | 90 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 282 | 0.983 | 101 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 157 | 0.983 | 84 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 150 | 0.983 | 99 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 130 | 0.983 | 99 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 85.2 | 0.983 | 96 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 81.4 | 0.983 | 88 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 586000 | 0.983 | 106 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 83312 | 0.983 | 122 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC CRI 28AGO2023 | |
| Lab ID | L2352167-08 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/10/2023 | |
| Sample Size(wet) | 0.00432 | g |
| % Solid | 100 | |
| File ID | F1210092314 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.16 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 2.56 | | 1.16 |
| 2 | D1 | C1-DECALINS | 12.3 | | 2.31 |
| 2 | D2 | C2-DECALINS | 41.0 | | 2.31 |
| 2 | D3 | C3-DECALINS | 39.4 | | 2.31 |
| 2 | D4 | C4-DECALINS | 39.4 | | 2.31 |
| S | BT0 | BENZOTHIOPHENE | 0.227 | J | 2.31 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 8.25 | | 2.31 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 1.29 | J | 2.31 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 3.48 | | 2.31 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 2.95 | | 2.31 |
| A | N0 | NAPHTHALENE | 3.74 | | 2.31 |
| 2 | N1 | C1-NAPHTHALENES | 213 | | 2.31 |
| 2 | N2 | C2-NAPHTHALENES | 128 | | 2.31 |
| 2 | N3 | C3-NAPHTHALENES | 61.6 | | 2.31 |
| 2 | N4 | C4-NAPHTHALENES | 30.0 | | 2.31 |
| 2 | B | BIPHENYL | 7.73 | | 2.31 |
| 3 | DF | DIBENZOFURAN | 0.894 | J | 2.31 |
| 3 | AY | ACENAPHTHYLENE | 1.12 | J | 2.31 |
| 3 | AE | ACENAPHTHENE | 2.22 | J | 2.31 |
| 3 | F0 | FLUORENE | 3.27 | | 2.31 |
| 3 | F1 | C1-FLUORENES | 5.71 | | 2.31 |
| 3 | F2 | C2-FLUORENES | 15.0 | | 2.31 |
| 3 | F3 | C3-FLUORENES | 39.0 | G | 2.31 |
| 3 | A0 | ANTHRACENE | 0.612 | J | 2.31 |
| 3 | P0 | PHENANTHRENE | 3.12 | | 2.31 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 8.88 | | 2.31 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 12.6 | | 2.31 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 12.1 | | 2.31 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 18.7 | | 2.31 |
| 3 | RET | RETENE | | U | 2.31 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.817 | J | 2.31 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 5.84 | | 2.31 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 17.0 | | 2.31 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 24.9 | | 2.31 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 16.1 | | 2.31 |
| 4 | BF | BENZO(B)FLUORENE | 0.183 | J | 2.31 |
| 4 | FL0 | FLUORANTHENE | 0.527 | JB | 2.31 |
| 4 | PY0 | PYRENE | 1.10 | JB | 2.31 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 4.50 | | 2.31 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 4.33 | | 2.31 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 4.72 | | 2.31 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 6.53 | | 2.31 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 1.01 | J | 2.31 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 2.48 | | 2.31 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 4.88 | | 2.31 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.31 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.31 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.230 | JB | 2.31 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.508 | JB | 2.31 |
| 4 | BC1 | C1-CHRYSENES | 1.62 | J | 2.31 |
| 4 | BC2 | C2-CHRYSENES | 3.01 | | 2.31 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.31 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.31 |
| 5 | BBF | BENZO(B)FLUORANTHENE | | U | 2.31 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC CRI 28AGO2023 |
| Lab ID | L2352167-08 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | 8/28/2023 |
| Date Received | 9/8/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/10/2023 |
| Sample Size(wet) | 0.00432 g |
| % Solid | 100 |
| File ID | F1210092314 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.16 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.31 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.31 |
| 5 | BEP | BENZO(E)PYRENE | 0.241 | JB | 2.31 |
| 5 | BAP | BENZO(A)PYRENE | 0.540 | JB | 2.31 |
| 5 | PER | PERYLENE | | U | 2.31 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.31 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.31 |
| 6 | GHI | BENZO(GHI)PERYLENE | 0.366 | J | 2.31 |
| O | CAR | CARBAZOLE | 0.652 | J | 2.31 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 2.87 | | 2.31 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 1.31 | J | 2.31 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 1.04 | J | 2.31 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.88 | J | 2.31 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.79 | J | 2.31 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 0.170 | J | 2.31 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 2.33 | | 2.31 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.59 | J | 2.31 |
| A | 1MN | 1-METHYLNAPHTHALENE | 127 | | 2.31 |
| A | 2MN | 2-METHYLNAPHTHALENE | 196 | | 2.31 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 58.2 | | 2.31 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 8.25 | | 2.31 |
| H30 | T19 | HOPANE (T19) | 248 | | 2.31 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 12.1 | | 2.31 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 7.96 | | 2.31 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 8.24 | | 2.31 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 6.84 | | 2.31 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 4.55 | | 2.31 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 4.52 | | 2.31 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 7.32 | | 2.31 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 9.10 | | 2.31 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 9.22 | | 2.31 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 10.0 | | 2.31 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 25.7 | | 2.31 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 11.7 | | 2.31 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 9.35 | | 2.31 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 32.0 | | 2.31 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 8.71 | | 2.31 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 6.02 | | 2.31 |
| H29 | T15 | 30-NORHOPANE (T15) | 150 | | 2.31 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 31.3 | | 2.31 |
| X | X | 17A(H)-DIAHOPANE (X) | 17.9 | | 2.31 |
| M29 | T17 | 30-NORMORETANE (T17) | 17.0 | | 2.31 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | 4.40 | | 2.31 |
| M30 | T20 | MORETANE (T20) | 25.6 | | 2.31 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 139 | | 2.31 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 131 | | 2.31 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 36.4 | | 2.31 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 108 | | 2.31 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 85.5 | | 2.31 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 103 | | 2.31 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 74.3 | | 2.31 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 94.2 | | 2.31 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 71.4 | | 2.31 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 113 | | 2.31 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC CRI 28AGO2023 | |
| Lab ID | L2352167-08 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1829653 | |
| Date Collected | 8/28/2023 | |
| Date Received | 9/8/2023 | |
| Date Prepped | 10/4/2023 | |
| Date Analyzed | 10/10/2023 | |
| Sample Size(wet) | 0.00432 | g |
| % Solid | 100 | |
| File ID | F1210092314 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.16 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 116 | 2.31 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 27.0 | 2.31 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 17.2 | 2.31 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 16.8 | 2.31 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 57.2 | 2.31 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 69.5 | 2.31 |
| d29R | S18 | UNKNOWN STERANE (S18) | 13.6 | 2.31 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 3.85 | 2.31 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 27.2 | 2.31 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 33.2 | 2.31 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 36.1 | 2.31 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 60.2 | 2.31 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 51.1 | 2.31 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 48.2 | 2.31 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 45.8 | 2.31 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 81.3 | 2.31 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 81.3 | 2.31 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 64.7 | 2.31 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 7.46 | 2.31 |
| SC28TAS | TAS02 | C28,20S TAS | 12.1 | 2.31 |
| RC27TAS | TAS03 | C27,20R TAS | 13.6 | 2.31 |
| RC28TAS | TAS04 | C28,20R TAS | 3.53 | 2.31 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 95 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.20 |
| 2 | D1 | C1-DECALINS | | U | 2.41 |
| 2 | D2 | C2-DECALINS | | U | 2.41 |
| 2 | D3 | C3-DECALINS | | U | 2.41 |
| 2 | D4 | C4-DECALINS | | U | 2.41 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.41 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.41 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.41 |
| A | N0 | NAPHTHALENE | 0.196 | J | 2.41 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.41 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.41 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.41 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.41 |
| 2 | B | BIPHENYL | | U | 2.41 |
| 3 | DF | DIBENZOFURAN | | U | 2.41 |
| 3 | AY | ACENAPHTHYLENE | 0.0576 | J | 2.41 |
| 3 | AE | ACENAPHTHENE | | U | 2.41 |
| 3 | F0 | FLUORENE | | U | 2.41 |
| 3 | F1 | C1-FLUORENES | | U | 2.41 |
| 3 | F2 | C2-FLUORENES | | U | 2.41 |
| 3 | F3 | C3-FLUORENES | | U | 2.41 |
| 3 | A0 | ANTHRACENE | | U | 2.41 |
| 3 | P0 | PHENANTHRENE | 0.143 | J | 2.41 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.41 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 1.81 | J | 2.41 |
| 3 | RET | RETENE | 0.562 | J | 2.41 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.0422 | J | 2.41 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.41 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.41 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.41 |
| 4 | FL0 | FLUORANTHENE | 0.129 | J | 2.41 |
| 4 | PY0 | PYRENE | 0.163 | J | 2.41 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.41 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | | U | 2.41 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.41 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.0940 | J | 2.41 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.141 | J | 2.41 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.41 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.41 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.41 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.41 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.163 | J | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.41 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.41 |
| 5 | BEP | BENZO(E)PYRENE | 0.0901 | J | 2.41 |
| 5 | BAP | BENZO(A)PYRENE | 0.121 | J | 2.41 |
| 5 | PER | PERYLENE | | U | 2.41 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.41 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.41 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.41 |
| O | CAR | CARBAZOLE | | U | 2.41 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.41 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.41 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.41 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.41 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.41 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.41 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.41 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.41 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.41 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.41 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.41 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.41 |
| H30 | T19 | HOPANE (T19) | | U | 2.41 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.41 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.41 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.41 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.41 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.41 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.41 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.41 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.41 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.41 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.41 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.41 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.41 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.41 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.41 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.41 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.41 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.41 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.41 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.41 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.41 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.41 |
| M30 | T20 | MORETANE (T20) | | U | 2.41 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.41 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.41 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.41 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.41 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.41 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.41 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.41 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.41 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.41 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.41 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1829653-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052333 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.2 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.41 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.41 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.41 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.41 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.41 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.41 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.41 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.41 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.41 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.41 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.41 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.41 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.41 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.41 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.41 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.41 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.41 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.41 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.41 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.41 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.41 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.41 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 100 |
| 5B(H)CHOLANE | 88 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1829653-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052342 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 238 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 220 | 2.41 | 91 | 241 | 50 | 130 |
| 3 | F0 | FLUORENE | 236 | 2.41 | 98 | 241 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 241 | 2.41 | 100 | 241 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 231 | 2.41 | 96 | 241 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 179 | 2.41 | 74 | 241 | 50 | 130 |
| 4 | PY0 | PYRENE | 184 | 2.41 | 76 | 241 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 219 | 2.41 | 91 | 241 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 214 | 2.41 | 89 | 241 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 204 | 2.41 | 84 | 241 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 210 | 2.41 | 87 | 241 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 205 | 2.41 | 85 | 241 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 213 | 2.41 | 88 | 241 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 204 | 2.41 | 85 | 241 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 213 | 2.41 | 88 | 241 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 96 |
| PHENANTHRENE-D10 | 98 |
| BENZO(A)PYRENE-D12 | 97 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | LCS Duplicate |
| Lab ID | WG1829653-3 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1829653 |
| Date Collected | NA |
| Date Received | 9/20/2023 |
| Date Prepped | 10/4/2023 |
| Date Analyzed | 10/7/2023 |
| Sample Size(wet) | 0.00415 g |
| % Solid | 100 |
| File ID | F1210052334 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.41 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 252 | 2.41 | 104 | 241 | 50 | 130 | 6 | 30 |
| 3 | AY | ACENAPHTHYLENE | 240 | 2.41 | 99 | 241 | 50 | 130 | 1 | 30 |
| 3 | AE | ACENAPHTHENE | 225 | 2.41 | 94 | 241 | 50 | 130 | 3 | 30 |
| 3 | F0 | FLUORENE | 242 | 2.41 | 100 | 241 | 50 | 130 | 2 | 30 |
| 3 | A0 | ANTHRACENE | 250 | 2.41 | 104 | 241 | 50 | 130 | 4 | 30 |
| 3 | P0 | PHENANTHRENE | 240 | 2.41 | 100 | 241 | 50 | 130 | 4 | 30 |
| 4 | FL0 | FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 18 | 30 |
| 4 | PY0 | PYRENE | 231 | 2.41 | 96 | 241 | 50 | 130 | 23 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 229 | 2.41 | 95 | 241 | 50 | 130 | 4 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 5 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 214 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 221 | 2.41 | 92 | 241 | 50 | 130 | 9 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 228 | 2.41 | 94 | 241 | 50 | 130 | 8 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 215 | 2.41 | 89 | 241 | 50 | 130 | 5 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 220 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 213 | 2.41 | 88 | 241 | 50 | 130 | 3 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 219 | 2.41 | 91 | 241 | 50 | 130 | 3 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 98 |
| PHENANTHRENE-D10 | 99 |
| BENZO(A)PYRENE-D12 | 98 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

HC SRG 29AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 28, 2023

**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 August 29, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC SRG 29AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA under chain of custody and arrived at a temperature of 24.4°C on September 11, 2023 with a DHL Tracking # 2743409222 (Seal number 0203907).

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC SRG 29AGO2023 (HC SRG29) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC SRG29 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are three (3) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC SRG29 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 HC SRG29 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC SRG29 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC SRG29 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC SRG29 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC SRG29 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC SRG29 sample and source oil are derived from 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.

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 HC SRG29 sample plot away from each other indicating a different source of petroleum**.**

**Conclusion**

The HC SRG 29AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC SRG 29AGO2023 sample are chemically different and were derived from a different source of petroleum.

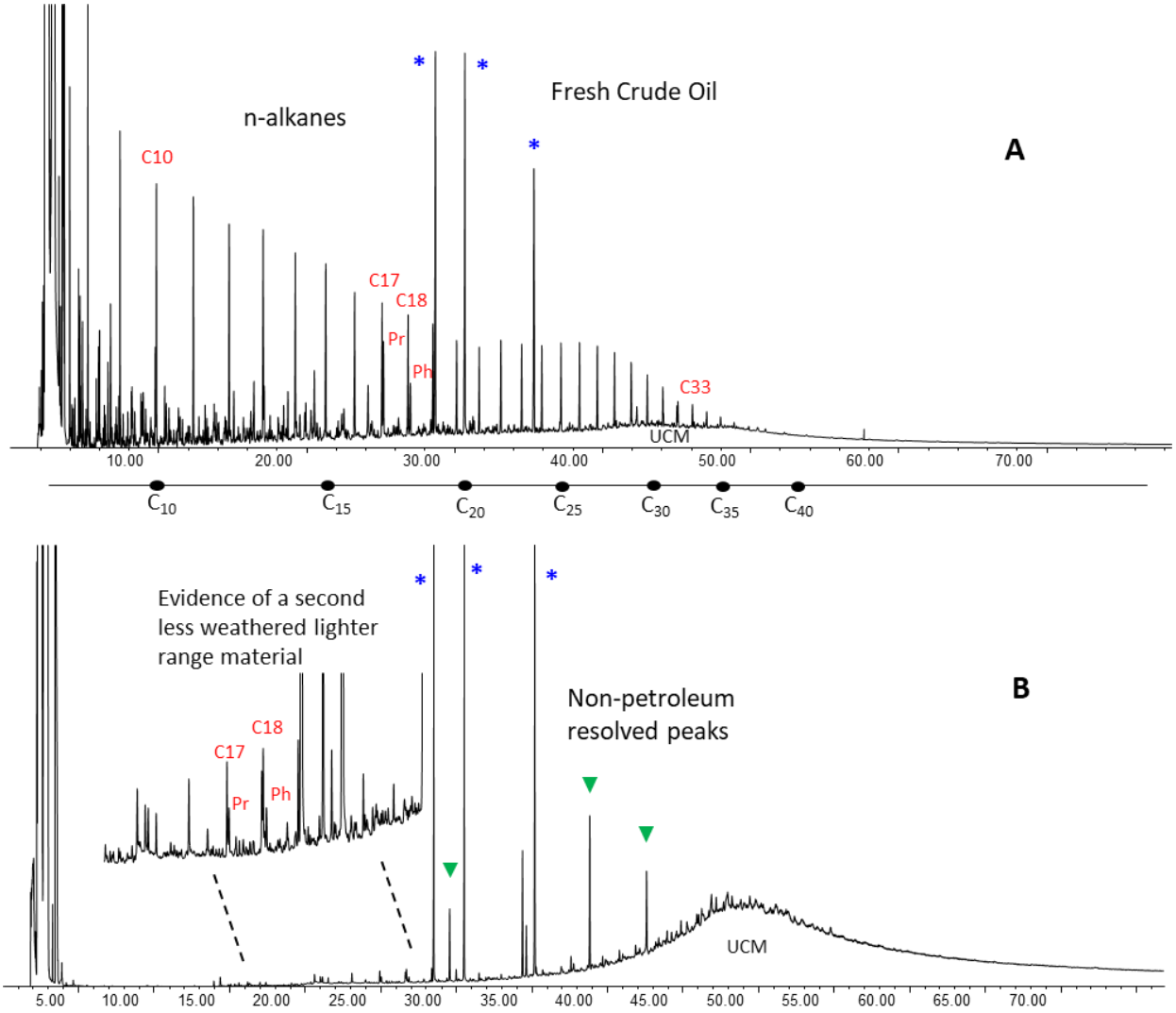


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC SRG 29AGO2023**
'*': Laboratory-added Internal Standard

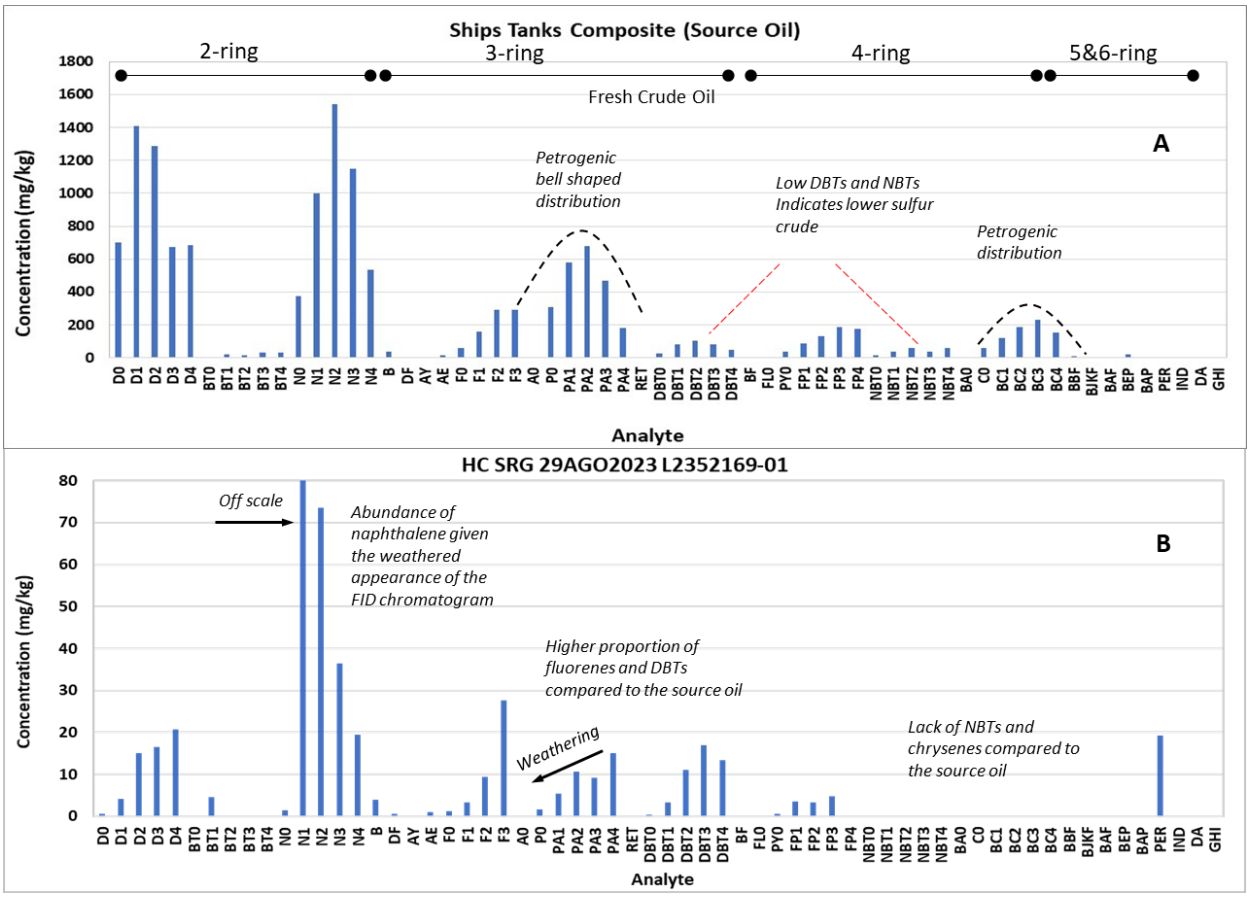


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC SRG 29AGO2023**

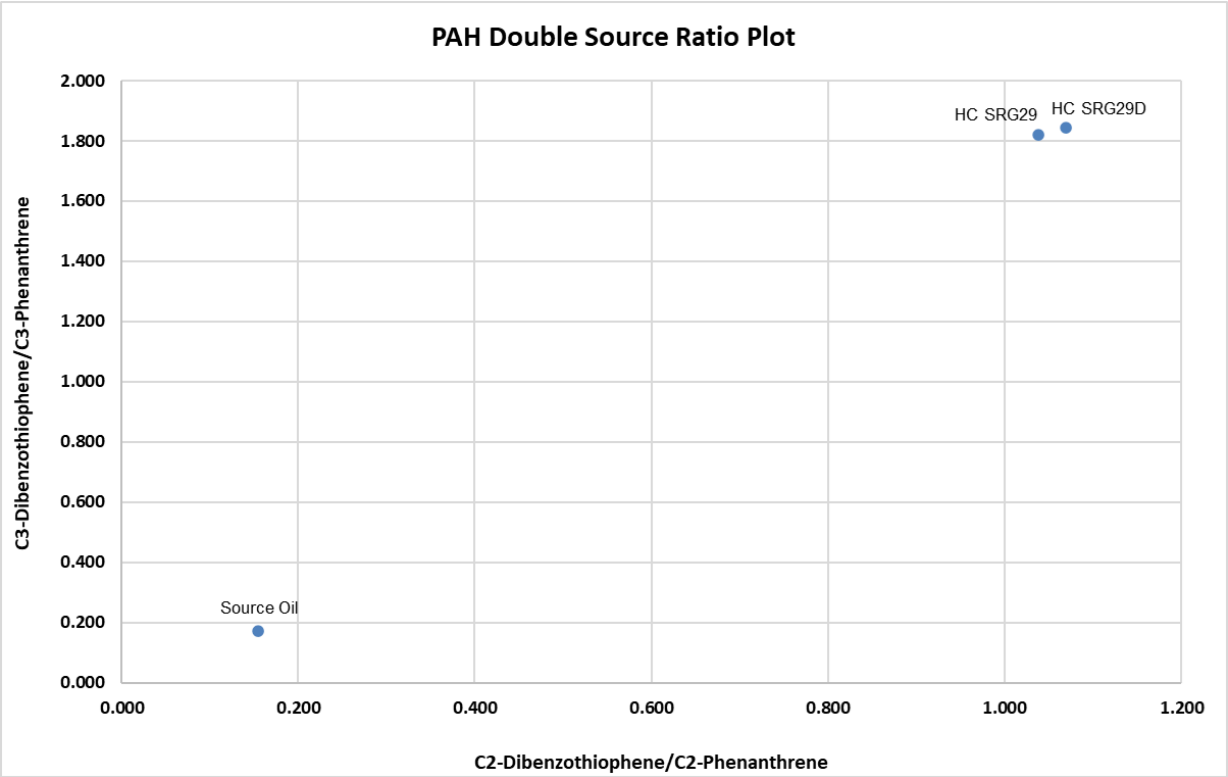


**Figure 3. PAH Double Source Ratio Plot**

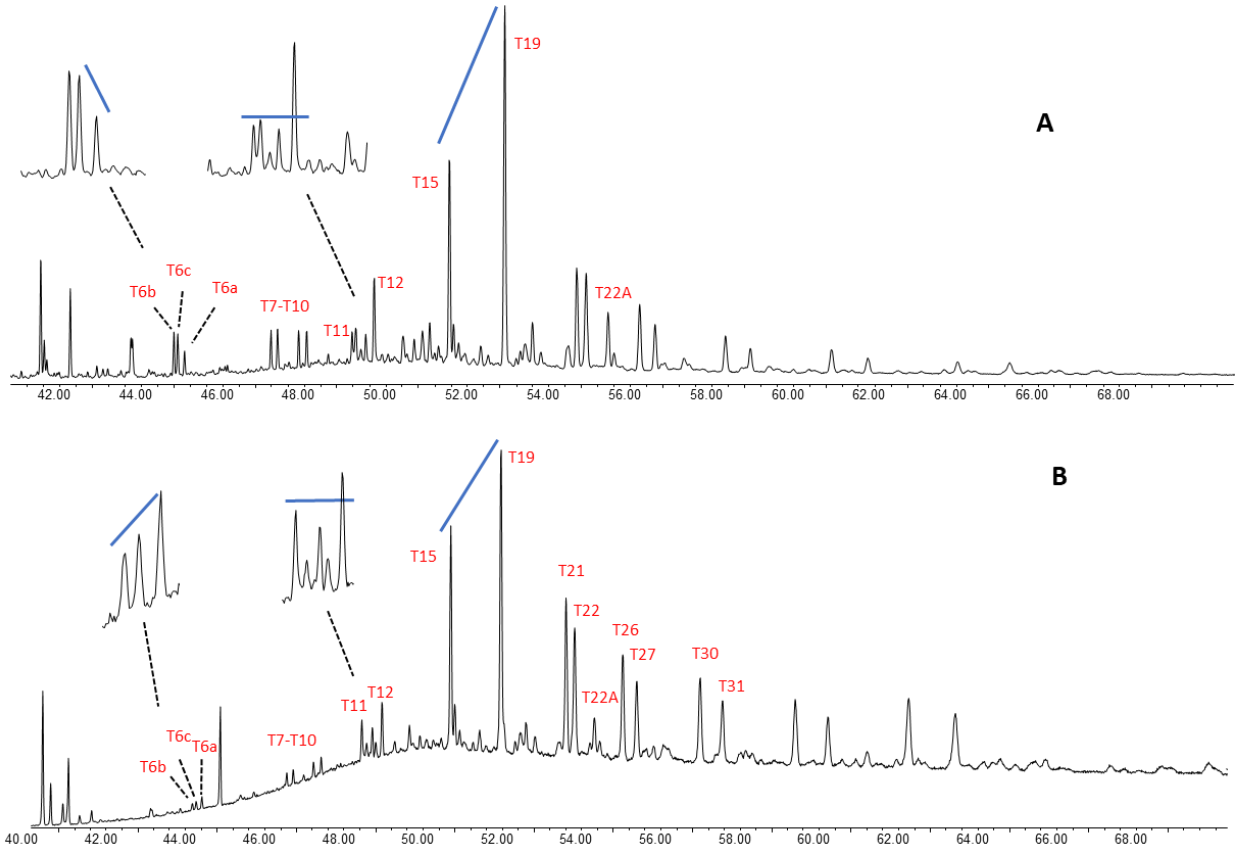


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC SRG 29AGO2023**

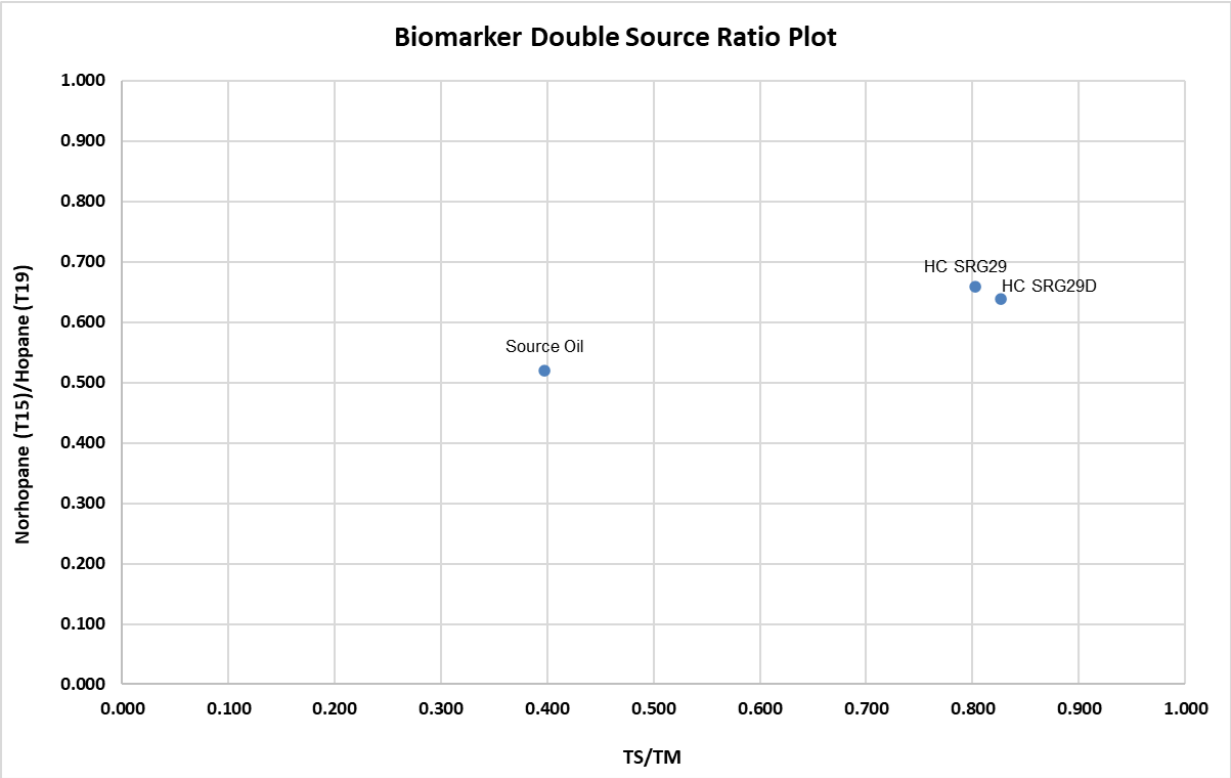


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC SRG 29AGO2023 | L2352169-01 | 08/29/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/11/23

L2352169

Nº 007218

CERPER
CERTIFICACIONES DEL PERÚ S.A.

# CADENA DE CUSTODIA
## (Registro de Campo -Toma de muestra de aguas, suelos, lodos y sedimentos)

Página 1 de 1

EXPEDIENTE: 12103-2023

HS: 23006017

JOB NUMBER: 23LM002693467

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A

LUGAR: PLAYA SANTA ROSA GRANDE

Distrito: SANTA ROSA

Provincia: LIMA

Departamento: LIMA

PERSONA DE CONTACTO: Milagros Rodríguez R.

NORMA:

1 SMEWW - APHA - AWWA - WEF, 23rd Ed. 2017, Collection and preservation of samples. Part 1060 A-B ( ) 1060 B-C ( ) 10300 B ( ) 10300 B ( ) 10300 G ( ) 10750 B ( )
2 Instrucción 6560-I Toma de muestras de sedimentos ( )
3 NTP 214.035 - 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RJ Nº 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto ( )
5 RJ Nº 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO-5667-10:2012 (Revisada el 2016) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060.2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM Nº 273-2013-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales - PTAR ( )
9 RM Nº 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua cada sector hidrocarburos DGAAE-EN ( )
11 Otros: ( )

PARÁMETROS DE ANÁLISIS EN EL LABORATORIO

PARÁMETROS DE CAMP

FINGER PRINT

DESCRIPCIÓN DE LA MUESTRA

52169 - 01

| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17,18,19) (K,L,M) | CANTIDAD DE ENVASES | pH (Unidades de pH) | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg $Cl_2$/L Libre ( ) Total ( ) | Turbiedad (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( ) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HC SRG 29AGO2023 | 29.08.23 | 10:12 | * | 0261810 | 8695911 | 18L | 01 | ✓ | | | | | | | | | |
| Total de Envases | | | | | | | 01 | | | | | | | | | | |

(1) Matriz (s)

AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro (*) RESIDUOS SOLIDOS DE HIDROCARBUROS

Condiciones de las muestras:

Temperatura ambiente ( ) Refrigerada (X) Congelada ( ) Caja conservadora (X)

Herméticamente cerrada (X) Ice pack (X) Hielo de calidad potable ( )

Equipos: Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 003 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: SE PROCEDIO A LLEGAR AL PUNTO DE MUESTREO INDICADO Y DENOMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZÓ EL PROCEDIMIENTO DE CARACTERIZACIÓN DE LA MUESTRA LA CUAL PRESENTÓ UNA COLORACIÓN AZUL VERDOSA Y OLOR A HIDROCARBURO. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRECINTO Nº 0203907. LAS COORDENADAS SE TOMARON IN SITU.

Responsable de la toma de muestra:

Firma:

Inspector Cerper: FRANCO NINA

Inspectores de apoyo: JUNIOR CHUNGA

Hora de inicio: 07:30 Hora de término: 15:00

Representante del cliente

Firma:

Nombre: Rodriguez Ramirez Milagros

DNI: 47209303

Cargo: Supervision

Rec: 9/11/23 09:41

Recepción de muestras

Nombre: Noelia Machuca A.

Fecha: 06.09.23 Hora: 16:38

intertek

06 SEP. 2023

LAB: CALEB BRETT

RECEIVED

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC SRG 29AGO2023 |
| Lab ID | L2352169-01 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1843204 |
| Date Collected | 8/29/2023 |
| Date Received | 9/11/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/24/2023 |
| Sample Size(wet) | 0.00389 g |
| % Solid | 100 |
| File ID | F1710232339 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 257 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 257 |
| SHC | C10 | DECANE (C10) | 8.74 | J | 257 |
| SHC | C11 | UNDECANE | | U | 257 |
| SHC | C12 | DODECANE (C12) | 13.9 | J | 257 |
| SHC | C13 | TRIDECANE | 17.7 | J | 257 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 18.5 | J | 257 |
| SHC | C14 | TETRADECANE (C14) | 50.6 | J | 257 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 51.7 | J | 257 |
| SHC | C15 | PENTADECANE (C15) | 143 | J | 257 |
| SHC | C16 | HEXADECANE (C16) | 202 | J | 257 |
| SHC | 1650 | NORPRISTANE (1650) | 74.6 | J | 257 |
| SHC | C17 | HEPTADECANE (C17) | 223 | J | 257 |
| SHC | Pr | PRISTANE | 145 | J | 257 |
| SHC | C18 | OCTADECANE (C18) | 234 | JCB | 257 |
| SHC | Ph | PHYTANE | 163 | J | 257 |
| SHC | C19 | NONADECANE (C19) | 224 | J | 257 |
| SHC | C20 | EICOSANE (C20) | 202 | J | 257 |
| SHC | C21 | HENEICOSANE (C21) | 146 | J | 257 |
| SHC | C22 | DOCOSANE (C22) | 86.4 | J | 257 |
| SHC | C23 | TRICOSANE (C23) | 1980 | | 257 |
| SHC | C24 | TETRACOSANE (C24) | 146 | J | 257 |
| SHC | C25 | PENTACOSANE (C25) | 118 | J | 257 |
| SHC | C26 | HEXACOSANE (C26) | 89.7 | J | 257 |
| SHC | C27 | HEPTACOSANE (C27) | 72.0 | J | 257 |
| SHC | C28 | OCTACOSANE (C28) | | U | 257 |
| SHC | C29 | NONACOSANE (C29) | | U | 257 |
| SHC | C30 | TRIACONTANE (C30) | | U | 257 |
| SHC | C31 | HENTATRIACONTANE (C31) | 307 | | 257 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 257 |
| SHC | C33 | TRITRIACONTANE (C33) | | U | 257 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 257 |
| SHC | C35 | PENTATRIACONTANE (C35) | | U | 257 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 257 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 257 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 257 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 257 |
| SHC | C40 | TETRACONTANE (C40) | | U | 257 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 592000 | | 8480 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 4720 | J | 257 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 98 |
| D50-TETRACOSANE | 100 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/24/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1710232331 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 278 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 278 |
| SHC | C10 | DECANE (C10) | U | 278 |
| SHC | C11 | UNDECANE | U | 278 |
| SHC | C12 | DODECANE (C12) | U | 278 |
| SHC | C13 | TRIDECANE | U | 278 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 278 |
| SHC | C14 | TETRADECANE (C14) | U | 278 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 278 |
| SHC | C15 | PENTADECANE (C15) | U | 278 |
| SHC | C16 | HEXADECANE (C16) | U | 278 |
| SHC | 1650 | NORPRISTANE (1650) | U | 278 |
| SHC | C17 | HEPTADECANE (C17) | U | 278 |
| SHC | Pr | PRISTANE | U | 278 |
| SHC | C18 | OCTADECANE (C18) | 267 JC | 278 |
| SHC | Ph | PHYTANE | U | 278 |
| SHC | C19 | NONADECANE (C19) | U | 278 |
| SHC | C20 | EICOSANE (C20) | U | 278 |
| SHC | C21 | HENEICOSANE (C21) | U | 278 |
| SHC | C22 | DOCOSANE (C22) | U | 278 |
| SHC | C23 | TRICOSANE (C23) | U | 278 |
| SHC | C24 | TETRACOSANE (C24) | U | 278 |
| SHC | C25 | PENTACOSANE (C25) | U | 278 |
| SHC | C26 | HEXACOSANE (C26) | 3.90 J | 278 |
| SHC | C27 | HEPTACOSANE (C27) | 4.18 J | 278 |
| SHC | C28 | OCTACOSANE (C28) | 12.8 J | 278 |
| SHC | C29 | NONACOSANE (C29) | U | 278 |
| SHC | C30 | TRIACONTANE (C30) | U | 278 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 278 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 278 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 278 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 278 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 278 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 278 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 278 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 278 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 278 |
| SHC | C40 | TETRACONTANE (C40) | U | 278 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 9190 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 288 J | 278 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1843204-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/24/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1710232333 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 278 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5390 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 5180 | 278 | 93 | 5570 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 5350 | 278 | 96 | 5570 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 5340 | 278 | 96 | 5570 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5750 | 278 | 103 | 5570 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5820 | 278 | 104 | 5570 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 5390 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 5540 | 278 | 100 | 5570 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 5420 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 5680 | 278 | 102 | 5570 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 5560 | 278 | 100 | 5570 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 5540 | 278 | 99 | 5570 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 5620 | 278 | 101 | 5570 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 5170 | 278 | 93 | 5570 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1843204-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/24/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1710232335 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 278 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5500 | 278 | 99 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C10 | DECANE (C10) | 5270 | 278 | 94 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5370 | 278 | 96 | 5570 | 50 | 130 | 0 | 30 |
| SHC | C14 | TETRADECANE (C14) | 5420 | 278 | 97 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5820 | 278 | 104 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5920 | 278 | 106 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C19 | NONADECANE (C19) | 5460 | 278 | 98 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C20 | EICOSANE (C20) | 5620 | 278 | 101 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 5500 | 278 | 99 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 5760 | 278 | 103 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 5640 | 278 | 101 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 5640 | 278 | 101 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 5700 | 278 | 102 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 5240 | 278 | 94 | 5570 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Client ID | | HC SRG 29AGO2023 | | | Duplicate Sample | | | |
| Lab ID | | L2352169-01 | | | WG1843204-4 | | | |
| Matrix | | SOLID | | | SOLID | | | |
| Matrix Description | | | | | | | | |
| Reference Method | | 8015D(M) | | | 8015D(M) | | | |
| Batch ID | | WG1843204 | | | WG1843204 | | | |
| Date Collected | | 8/29/2023 | | | NA | | | |
| Date Received | | 9/11/2023 | | | 10/23/2023 | | | |
| Date Prepped | | 10/23/2023 | | | 10/23/2023 | | | |
| Date Analyzed | | 10/24/2023 | | | 10/24/2023 | | | |
| Sample Size(wet) | | 0.00389 | g | | 0.00424 | g | | |
| % Solid | | 100 | | | 100 | | | |
| File ID | | F1710232339 | | | F1710232341 | | | |
| Units | | mg/kg | | | mg/kg | | | |
| Final Volume | | 1 | | | 1 | | | |
| Dilution | | 1 | | | 1 | | | |
| Reporting Limit | | 257 | | | 236 | | | |
| Class Abbrev | Analytes | Result | | SSRL | Result | | SSRL | RPD | RPD Limit |
| SHC C9 | NONANE (C9) | | U | 257 | | U | 236 | | 30 NC |
| SHC C10 | DECANE (C10) | 8.74 | J | 257 | 8.25 | J | 236 | | 30 NC |
| SHC C11 | UNDECANE | | U | 257 | | U | 236 | | 30 NC |
| SHC C12 | DODECANE (C12) | 13.9 | J | 257 | 11.1 | J | 236 | | 30 NC |
| SHC C13 | TRIDECANE | 17.7 | J | 257 | 21.9 | J | 236 | | 30 NC |
| SHC 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 18.5 | J | 257 | 17.2 | J | 236 | | 30 NC |
| SHC C14 | TETRADECANE (C14) | 50.6 | J | 257 | 44.3 | J | 236 | | 30 NC |
| SHC 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 51.7 | J | 257 | 52.6 | J | 236 | | 30 NC |
| SHC C15 | PENTADECANE (C15) | 143 | J | 257 | 133 | J | 236 | | 30 NC |
| SHC C16 | HEXADECANE (C16) | 202 | J | 257 | 197 | J | 236 | | 30 NC |
| SHC 1650 | NORPRISTANE (1650) | 74.6 | J | 257 | 79.0 | J | 236 | | 30 NC |
| SHC C17 | HEPTADECANE (C17) | 223 | J | 257 | 235 | J | 236 | | 30 NC |
| SHC Pr | PRISTANE | 145 | J | 257 | 147 | J | 236 | | 30 NC |
| SHC C18 | OCTADECANE (C18) | 234 | JCB | 257 | 231 | JCB | 236 | | 30 NC |
| SHC Ph | PHYTANE | 163 | J | 257 | 154 | J | 236 | | 30 NC |
| SHC C19 | NONADECANE (C19) | 224 | J | 257 | 236 | | 236 | | 30 NC |
| SHC C20 | EICOSANE (C20) | 202 | J | 257 | 214 | J | 236 | | 30 NC |
| SHC C21 | HENEICOSANE (C21) | 146 | J | 257 | 154 | J | 236 | | 30 NC |
| SHC C22 | DOCOSANE (C22) | 86.4 | J | 257 | 83.5 | J | 236 | | 30 NC |
| SHC C23 | TRICOSANE (C23) | 1980 | | 257 | 2030 | | 236 | 2 | 30 |
| SHC C24 | TETRACOSANE (C24) | 146 | J | 257 | 152 | J | 236 | | 30 NC |
| SHC C25 | PENTACOSANE (C25) | 118 | J | 257 | 115 | J | 236 | | 30 NC |
| SHC C26 | HEXACOSANE (C26) | 89.7 | J | 257 | 69.1 | J | 236 | | 30 NC |
| SHC C27 | HEPTACOSANE (C27) | 72.0 | J | 257 | 57.8 | J | 236 | | 30 NC |
| SHC C28 | OCTACOSANE (C28) | | U | 257 | | U | 236 | | 30 NC |
| SHC C29 | NONACOSANE (C29) | | U | 257 | | U | 236 | | 30 NC |
| SHC C30 | TRIACONTANE (C30) | | U | 257 | | U | 236 | | 30 NC |
| SHC C31 | HENTATRIACONTANE (C31) | 307 | | 257 | 296 | | 236 | 4 | 30 |
| SHC C32 | DOTRIACONTANE (C32) | | U | 257 | | U | 236 | | 30 NC |
| SHC C33 | TRITRIACONTANE (C33) | | U | 257 | | U | 236 | | 30 NC |
| SHC C34 | TETRATRIACONTANE (C34) | | U | 257 | | U | 236 | | 30 NC |
| SHC C35 | PENTATRIACONTANE (C35) | | U | 257 | | U | 236 | | 30 NC |
| SHC C36 | HEXATRIACONTANE (C36) | | U | 257 | | U | 236 | | 30 NC |
| SHC C37 | HEPTATRIACONTANE (C37) | | U | 257 | | U | 236 | | 30 NC |
| SHC C38 | OCTATRIACONTANE (C38) | | U | 257 | | U | 236 | | 30 NC |
| SHC C39 | NONATRIACONTANE (C39) | | U | 257 | | U | 236 | | 30 NC |
| SHC C40 | TETRACONTANE (C40) | | U | 257 | | U | 236 | | 30 NC |
| SHC TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 592000 | | 8480 | 677000 | | 7780 | 13 | 30 |
| SHC TSH | TOTAL SATURATED HYDROCARBONS | 4720 | J | 257 | 4740 | J | 236 | | 30 NC |

| Surrogates (% Recovery) | | |
|---|---|---|
| O-TERPHENYL | 98 | 99 |
| D50-TETRACOSANE | 100 | 101 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1786523-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1786523-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 4/25/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F1704242329 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6700 | 0.983 | 106 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5260 | 0.983 | 104 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 4920 | 0.983 | 105 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4450 | 0.983 | 107 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4200 | 0.983 | 103 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 957 | 0.983 | 113 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3820 | 0.983 | 104 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1460 | 0.983 | 107 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 4300 | 0.983 | 117 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3490 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1140 | 0.983 | 104 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 2980 | 0.983 | 99 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2340 | 0.983 | 109 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2710 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1480 | 0.983 | 122 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2600 | 0.983 | 111 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2270 | 0.983 | 111 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2030 | 0.983 | 103 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1970 | 0.983 | 113 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1800 | 0.983 | 110 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1800 | 0.983 | 115 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1440 | 0.983 | 104 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1220 | 0.983 | 113 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 866 | 0.983 | 112 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 877 | 0.983 | 119 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 655 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 640 | 0.983 | 124 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 406 | 0.983 | 89 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 378 | 0.983 | 97 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 326 | 0.983 | 94 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 324 | 0.983 | 116 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 182 | 0.983 | 98 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 180 | 0.983 | 118 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 148 | 0.983 | 113 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 100 | 0.983 | 112 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 94.8 | 0.983 | 103 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 566000 | 0.983 | 102 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 82694 | 0.983 | 121 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC SRG 29AGO2023 |
| Lab ID | L2352169-01 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | 8/29/2023 |
| Date Received | 9/11/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00389 g |
| % Solid | 100 |
| File ID | F1210262310 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.28 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 0.693 | J | 1.28 |
| 2 | D1 | C1-DECALINS | 4.20 | | 2.57 |
| 2 | D2 | C2-DECALINS | 15.1 | | 2.57 |
| 2 | D3 | C3-DECALINS | 16.6 | | 2.57 |
| 2 | D4 | C4-DECALINS | 20.8 | | 2.57 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.57 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 4.61 | | 2.57 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.57 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.57 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.57 |
| A | N0 | NAPHTHALENE | 1.35 | JB | 2.57 |
| 2 | N1 | C1-NAPHTHALENES | 117 | | 2.57 |
| 2 | N2 | C2-NAPHTHALENES | 73.6 | | 2.57 |
| 2 | N3 | C3-NAPHTHALENES | 36.4 | | 2.57 |
| 2 | N4 | C4-NAPHTHALENES | 19.4 | | 2.57 |
| 2 | B | BIPHENYL | 3.91 | | 2.57 |
| 3 | DF | DIBENZOFURAN | 0.609 | J | 2.57 |
| 3 | AY | ACENAPHTHYLENE | 0.145 | JB | 2.57 |
| 3 | AE | ACENAPHTHENE | 1.11 | J | 2.57 |
| 3 | F0 | FLUORENE | 1.25 | J | 2.57 |
| 3 | F1 | C1-FLUORENES | 3.40 | | 2.57 |
| 3 | F2 | C2-FLUORENES | 9.38 | | 2.57 |
| 3 | F3 | C3-FLUORENES | 27.7 | G | 2.57 |
| 3 | A0 | ANTHRACENE | 0.285 | JB | 2.57 |
| 3 | P0 | PHENANTHRENE | 1.56 | JB | 2.57 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 5.48 | | 2.57 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 10.6 | | 2.57 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 9.28 | | 2.57 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 15.1 | | 2.57 |
| 3 | RET | RETENE | | U | 2.57 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.492 | J | 2.57 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 3.38 | | 2.57 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 11.0 | | 2.57 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 16.9 | | 2.57 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 13.3 | | 2.57 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.57 |
| 4 | FL0 | FLUORANTHENE | | U | 2.57 |
| 4 | PY0 | PYRENE | 0.660 | JB | 2.57 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 3.55 | B | 2.57 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 3.37 | | 2.57 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 4.83 | | 2.57 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.57 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | | U | 2.57 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.57 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.57 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.57 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.57 |
| 4 | BA0 | BENZ(A)ANTHRACENE | | U | 2.57 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.215 | JB | 2.57 |
| 4 | BC1 | C1-CHRYSENES | | U | 2.57 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.57 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.57 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.57 |
| 5 | BBF | BENZO(B)FLUORANTHENE | | U | 2.57 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC SRG 29AGO2023 |
| Lab ID | L2352169-01 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | 8/29/2023 |
| Date Received | 9/11/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00389 g |
| % Solid | 100 |
| File ID | F1210262310 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.28 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.57 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.57 |
| 5 | BEP | BENZO(E)PYRENE | | U | 2.57 |
| 5 | BAP | BENZO(A)PYRENE | | U | 2.57 |
| 5 | PER | PERYLENE | 19.2 | | 2.57 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.57 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.57 |
| 6 | GHI | BENZO(GHI)PERYLENE | | U | 2.57 |
| O | CAR | CARBAZOLE | | U | 2.57 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 1.98 | J | 2.57 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.57 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.678 | J | 2.57 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.10 | J | 2.57 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.48 | J | 2.57 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.57 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.43 | J | 2.57 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.11 | J | 2.57 |
| A | 1MN | 1-METHYLNAPHTHALENE | 72.7 | | 2.57 |
| A | 2MN | 2-METHYLNAPHTHALENE | 105 | | 2.57 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 32.0 | | 2.57 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 3.68 | | 2.57 |
| H30 | T19 | HOPANE (T19) | 185 | | 2.57 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 9.76 | | 2.57 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 5.73 | | 2.57 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 6.56 | | 2.57 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 5.28 | | 2.57 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.58 | | 2.57 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 3.51 | | 2.57 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 5.88 | | 2.57 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 7.16 | | 2.57 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 7.99 | | 2.57 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 7.69 | | 2.57 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 21.2 | | 2.57 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 9.98 | | 2.57 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 7.92 | | 2.57 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 26.4 | | 2.57 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.06 | | 2.57 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 5.65 | | 2.57 |
| H29 | T15 | 30-NORHOPANE (T15) | 122 | | 2.57 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 22.4 | | 2.57 |
| X | X | 17A(H)-DIAHOPANE (X) | 12.4 | | 2.57 |
| M29 | T17 | 30-NORMORETANE (T17) | 13.7 | | 2.57 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.57 |
| M30 | T20 | MORETANE (T20) | 19.9 | | 2.57 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 101 | | 2.57 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 98.7 | | 2.57 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 26.9 | | 2.57 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 84.9 | | 2.57 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 63.3 | | 2.57 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 75.8 | | 2.57 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 59.4 | | 2.57 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 68.1 | | 2.57 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 48.5 | | 2.57 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 82.6 | | 2.57 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC SRG 29AGO2023 | |
| Lab ID | L2352169-01 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | 8/29/2023 | |
| Date Received | 9/11/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | |
| Sample Size(wet) | 0.00389 | g |
| % Solid | 100 | |
| File ID | F1210262310 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.28 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 84.4 | | 2.57 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 20.8 | | 2.57 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 13.7 | | 2.57 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 12.6 | | 2.57 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 42.2 | | 2.57 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 50.1 | | 2.57 |
| d29R | S18 | UNKNOWN STERANE (S18) | 9.83 | | 2.57 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 2.39 | J | 2.57 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 18.3 | | 2.57 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 25.1 | | 2.57 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 29.0 | | 2.57 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 43.5 | | 2.57 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 35.8 | | 2.57 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 36.0 | | 2.57 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 35.2 | | 2.57 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 62.7 | | 2.57 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 61.1 | | 2.57 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 44.4 | | 2.57 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 8.78 | | 2.57 |
| SC28TAS | TAS02 | C28,20S TAS | 9.21 | | 2.57 |
| RC27TAS | TAS03 | C27,20R TAS | 12.0 | | 2.57 |
| RC28TAS | TAS04 | C28,20R TAS | 2.46 | J | 2.57 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 94 |
| PHENANTHRENE-D10 | 96 |
| BENZO(A)PYRENE-D12 | 96 |
| 5B(H)CHOLANE | 90 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262307 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.39 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.39 |
| 2 | D1 | C1-DECALINS | | U | 2.78 |
| 2 | D2 | C2-DECALINS | | U | 2.78 |
| 2 | D3 | C3-DECALINS | | U | 2.78 |
| 2 | D4 | C4-DECALINS | | U | 2.78 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.78 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.78 |
| A | N0 | NAPHTHALENE | 0.224 | J | 2.78 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.78 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.78 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.78 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.78 |
| 2 | B | BIPHENYL | | U | 2.78 |
| 3 | DF | DIBENZOFURAN | | U | 2.78 |
| 3 | AY | ACENAPHTHYLENE | 0.248 | J | 2.78 |
| 3 | AE | ACENAPHTHENE | | U | 2.78 |
| 3 | F0 | FLUORENE | | U | 2.78 |
| 3 | F1 | C1-FLUORENES | | U | 2.78 |
| 3 | F2 | C2-FLUORENES | | U | 2.78 |
| 3 | F3 | C3-FLUORENES | | U | 2.78 |
| 3 | A0 | ANTHRACENE | 0.230 | J | 2.78 |
| 3 | P0 | PHENANTHRENE | 0.697 | J | 2.78 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | RET | RETENE | | U | 2.78 |
| 3 | DBT0 | DIBENZOTHIOPHENE | | U | 2.78 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.78 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.78 |
| 4 | FL0 | FLUORANTHENE | 0.609 | J | 2.78 |
| 4 | PY0 | PYRENE | 0.904 | J | 2.78 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 1.21 | J | 2.78 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.254 | J | 2.78 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.509 | J | 2.78 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 1.07 | J | 2.78 |
| 4 | BC1 | C1-CHRYSENES | 0.561 | J | 2.78 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.78 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.78 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.78 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 1.80 | J | 2.78 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262307 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.39 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.912 | J | 2.78 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.78 |
| 5 | BEP | BENZO(E)PYRENE | 1.47 | J | 2.78 |
| 5 | BAP | BENZO(A)PYRENE | 1.18 | J | 2.78 |
| 5 | PER | PERYLENE | 0.543 | J | 2.78 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 1.36 | J | 2.78 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 0.670 | J | 2.78 |
| 6 | GHI | BENZO(GHI)PERYLENE | 1.43 | J | 2.78 |
| O | CAR | CARBAZOLE | | U | 2.78 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.78 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.78 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.78 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.78 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.78 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.78 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.78 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.78 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.78 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.78 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.78 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.78 |
| H30 | T19 | HOPANE (T19) | | U | 2.78 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.78 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.78 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.78 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.78 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.78 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.78 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.78 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.78 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.78 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.78 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.78 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.78 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.78 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.78 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.78 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.78 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.78 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.78 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.78 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.78 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.78 |
| M30 | T20 | MORETANE (T20) | | U | 2.78 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.78 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.78 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.78 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.78 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.78 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.78 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.78 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.78 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.78 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.78 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Method Bl | |
| Lab ID | WG1843204-1 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1210262307 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.39 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.78 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.78 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.78 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.78 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.78 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.78 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.78 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.78 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.78 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.78 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.78 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.78 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.78 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.78 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.78 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.78 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.78 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.78 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.78 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.78 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.78 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.78 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 100 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 104 |
| 5B(H)CHOLANE | 91 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1843204-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262308 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.78 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 279 | 2.78 | 100 | 278 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 268 | 2.78 | 96 | 278 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 254 | 2.78 | 91 | 278 | 50 | 130 |
| 3 | F0 | FLUORENE | 277 | 2.78 | 99 | 278 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 286 | 2.78 | 103 | 278 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 276 | 2.78 | 99 | 278 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 259 | 2.78 | 93 | 278 | 50 | 130 |
| 4 | PY0 | PYRENE | 275 | 2.78 | 99 | 278 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 262 | 2.78 | 94 | 278 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 266 | 2.78 | 96 | 278 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 262 | 2.78 | 94 | 278 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 279 | 2.78 | 100 | 278 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 285 | 2.78 | 102 | 278 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 272 | 2.78 | 98 | 278 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 278 | 2.78 | 100 | 278 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 270 | 2.78 | 97 | 278 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 245 | 2.78 | 88 | 278 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 99 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 101 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1843204-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1210262309 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 2.78 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 285 | 2.78 | 102 | 278 | 50 | 130 | 2 | 30 |
| 3 | AY | ACENAPHTHYLENE | 272 | 2.78 | 98 | 278 | 50 | 130 | 2 | 30 |
| 3 | AE | ACENAPHTHENE | 258 | 2.78 | 92 | 278 | 50 | 130 | 1 | 30 |
| 3 | F0 | FLUORENE | 280 | 2.78 | 100 | 278 | 50 | 130 | 1 | 30 |
| 3 | A0 | ANTHRACENE | 289 | 2.78 | 104 | 278 | 50 | 130 | 1 | 30 |
| 3 | P0 | PHENANTHRENE | 280 | 2.78 | 100 | 278 | 50 | 130 | 1 | 30 |
| 4 | FL0 | FLUORANTHENE | 264 | 2.78 | 95 | 278 | 50 | 130 | 2 | 30 |
| 4 | PY0 | PYRENE | 280 | 2.78 | 101 | 278 | 50 | 130 | 2 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 265 | 2.78 | 95 | 278 | 50 | 130 | 1 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 273 | 2.78 | 98 | 278 | 50 | 130 | 2 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 265 | 2.78 | 95 | 278 | 50 | 130 | 1 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 286 | 2.78 | 103 | 278 | 50 | 130 | 3 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 288 | 2.78 | 104 | 278 | 50 | 130 | 2 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 285 | 2.78 | 102 | 278 | 50 | 130 | 4 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 282 | 2.78 | 101 | 278 | 50 | 130 | 1 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 274 | 2.78 | 98 | 278 | 50 | 130 | 1 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 249 | 2.78 | 89 | 278 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 100 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 102 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Client ID | | | HC SRG 29AGO2023 | | | Duplicate Sample | | | |
| Lab ID | | | L2352169-01 | | | WG1843204-4 | | | |
| Matrix | | | SOLID | | | SOLID | | | |
| Matrix Description | | | | | | | | | |
| Reference Method | | | 8270E-SIM(M) | | | 8270E-SIM(M) | | | |
| Batch ID | | | WG1843204 | | | WG1843204 | | | |
| Date Collected | | | 8/29/2023 | | | NA | | | |
| Date Received | | | 9/11/2023 | | | 10/23/2023 | | | |
| Date Prepped | | | 10/23/2023 | | | 10/23/2023 | | | |
| Date Analyzed | | | 10/26/2023 | | | 10/27/2023 | | | |
| Sample Size(wet) | | | 0.00389 | g | | 0.00424 | g | | |
| % Solid | | | 100 | | | 100 | | | |
| File ID | | | F1210262310 | | | F1210262311 | | | |
| Units | | | mg/kg | | | mg/kg | | | |
| Final Volume | | | 1 | | | 1 | | | |
| Dilution | | | 1 | | | 1 | | | |
| Reporting Limit | | | 1.28 | | | 1.18 | | | |
| Class | Abbrev | Analytes | Result | | SSRL | Result | | SSRL | RPD | RPD Limit | |
| 2 | D0 | CIS/TRANS-DECALIN | 0.693 | J | 1.28 | 0.830 | J | 1.18 | | 30 | NC |
| 2 | D1 | C1-DECALINS | 4.20 | | 2.57 | 4.74 | | 2.36 | 12 | 30 | |
| 2 | D2 | C2-DECALINS | 15.1 | | 2.57 | 16.0 | | 2.36 | 6 | 30 | |
| 2 | D3 | C3-DECALINS | 16.6 | | 2.57 | 17.5 | | 2.36 | 5 | 30 | |
| 2 | D4 | C4-DECALINS | 20.8 | | 2.57 | 21.0 | | 2.36 | 1 | 30 | |
| S | BT0 | BENZOTHIOPHENE | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 4.61 | | 2.57 | 4.61 | | 2.36 | 0 | 30 | |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| A | N0 | NAPHTHALENE | 1.35 | JB | 2.57 | 1.30 | JB | 2.36 | | 30 | NC |
| 2 | N1 | C1-NAPHTHALENES | 117 | | 2.57 | 121 | | 2.36 | 3 | 30 | |
| 2 | N2 | C2-NAPHTHALENES | 73.6 | | 2.57 | 75.6 | | 2.36 | 3 | 30 | |
| 2 | N3 | C3-NAPHTHALENES | 36.4 | | 2.57 | 37.4 | | 2.36 | 3 | 30 | |
| 2 | N4 | C4-NAPHTHALENES | 19.4 | | 2.57 | 20.6 | | 2.36 | 6 | 30 | |
| 2 | B | BIPHENYL | 3.91 | | 2.57 | 3.82 | | 2.36 | 2 | 30 | |
| 3 | DF | DIBENZOFURAN | 0.609 | J | 2.57 | 0.532 | J | 2.36 | | 30 | NC |
| 3 | AY | ACENAPHTHYLENE | 0.145 | JB | 2.57 | 0.201 | JB | 2.36 | | 30 | NC |
| 3 | AE | ACENAPHTHENE | 1.11 | J | 2.57 | 1.20 | J | 2.36 | | 30 | NC |
| 3 | F0 | FLUORENE | 1.25 | J | 2.57 | 1.47 | J | 2.36 | | 30 | NC |
| 3 | F1 | C1-FLUORENES | 3.40 | | 2.57 | 3.51 | | 2.36 | 3 | 30 | |
| 3 | F2 | C2-FLUORENES | 9.38 | | 2.57 | 9.86 | | 2.36 | 5 | 30 | |
| 3 | F3 | C3-FLUORENES | 27.7 | G | 2.57 | 27.8 | G | 2.36 | 0 | 30 | |
| 3 | A0 | ANTHRACENE | 0.285 | JB | 2.57 | 0.300 | JB | 2.36 | | 30 | NC |
| 3 | P0 | PHENANTHRENE | 1.56 | JB | 2.57 | 2.10 | JB | 2.36 | | 30 | NC |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 5.48 | | 2.57 | 5.71 | | 2.36 | 4 | 30 | |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 10.6 | | 2.57 | 10.1 | | 2.36 | 5 | 30 | |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 9.28 | | 2.57 | 9.77 | | 2.36 | 5 | 30 | |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 15.1 | | 2.57 | 15.8 | | 2.36 | 5 | 30 | |
| 3 | RET | RETENE | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.492 | J | 2.57 | 0.578 | J | 2.36 | | 30 | NC |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 3.38 | | 2.57 | 3.51 | | 2.36 | 4 | 30 | |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 11.0 | | 2.57 | 10.8 | | 2.36 | 2 | 30 | |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 16.9 | | 2.57 | 18.0 | | 2.36 | 6 | 30 | |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 13.3 | | 2.57 | 13.0 | | 2.36 | 2 | 30 | |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | FL0 | FLUORANTHENE | | U | 2.57 | 0.198 | JB | 2.36 | | 30 | X |
| 4 | PY0 | PYRENE | 0.660 | JB | 2.57 | 0.971 | JB | 2.36 | | 30 | NC |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 3.55 | B | 2.57 | 3.68 | B | 2.36 | 4 | 30 | |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 3.37 | | 2.57 | 3.76 | | 2.36 | 11 | 30 | |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 4.83 | | 2.57 | 5.07 | | 2.36 | 5 | 30 | |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | BA0 | BENZ(A)ANTHRACENE | | U | 2.57 | 0.257 | JB | 2.36 | | 30 | X |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.215 | JB | 2.57 | 0.470 | JB | 2.36 | | 30 | NC |
| 4 | BC1 | C1-CHRYSENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | BC2 | C2-CHRYSENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | BC3 | C3-CHRYSENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 4 | BC4 | C4-CHRYSENES | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 5 | BBF | BENZO(B)FLUORANTHENE | | U | 2.57 | 0.474 | JB | 2.36 | | 30 | X |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 5 | BEP | BENZO(E)PYRENE | | U | 2.57 | 0.508 | JB | 2.36 | | 30 | X |
| 5 | BAP | BENZO(A)PYRENE | | U | 2.57 | 0.510 | JB | 2.36 | | 30 | X |
| 5 | PER | PERYLENE | 19.2 | | 2.57 | 20.1 | | 2.36 | 5 | 30 | |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | | U | 2.57 | | U | 2.36 | | 30 | NC |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.57 | | U | 2.36 | | 30 | NC |

Project Name: PAMPILLA 2
Project Number:

| | | | | | | |
|---|---|---|---|---|---|---|
| Client ID | HC SRG 29AGO2023 | | | Duplicate Sample | | |
| Lab ID | L2352169-01 | | | WG1843204-4 | | |
| Matrix | SOLID | | | SOLID | | |
| Matrix Description | | | | | | |
| Reference Method | 8270E-SIM(M) | | | 8270E-SIM(M) | | |
| Batch ID | WG1843204 | | | WG1843204 | | |
| Date Collected | 8/29/2023 | | | NA | | |
| Date Received | 9/11/2023 | | | 10/23/2023 | | |
| Date Prepped | 10/23/2023 | | | 10/23/2023 | | |
| Date Analyzed | 10/26/2023 | | | 10/27/2023 | | |
| Sample Size(wet) | 0.00389 | g | | 0.00424 | g | |
| % Solid | 100 | | | 100 | | |
| File ID | F1210262310 | | | F1210262311 | | |
| Units | mg/kg | | | mg/kg | | |
| Final Volume | 1 | | | 1 | | |
| Dilution | 1 | | | 1 | | |
| Reporting Limit | 1.28 | | | 1.18 | | |

| Class | Abbrev | Analytes | Result | | SSRL | Result | | SSRL | RPD | RPD Limit | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | GHI | BENZO(GHI)PERYLENE | U | | 2.57 | 0.468 | JB | 2.36 | | 30 | X |
| O | CAR | CARBAZOLE | U | | 2.57 | U | | 2.36 | | 30 | NC |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 1.98 | J | 2.57 | 1.66 | J | 2.36 | | 30 | NC |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | U | | 2.57 | U | | 2.36 | | 30 | NC |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.678 | J | 2.57 | 0.701 | J | 2.36 | | 30 | NC |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 1.10 | J | 2.57 | 1.10 | J | 2.36 | | 30 | NC |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.48 | J | 2.57 | 1.41 | J | 2.36 | | 30 | NC |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | U | | 2.57 | U | | 2.36 | | 30 | NC |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.43 | J | 2.57 | 1.57 | J | 2.36 | | 30 | NC |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.11 | J | 2.57 | 1.14 | J | 2.36 | | 30 | NC |
| A | 1MN | 1-METHYLNAPHTHALENE | 72.7 | | 2.57 | 75.0 | | 2.36 | 3 | 30 | |
| A | 2MN | 2-METHYLNAPHTHALENE | 105 | | 2.57 | 109 | | 2.36 | 4 | 30 | |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 32.0 | | 2.57 | 33.2 | | 2.36 | 4 | 30 | |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 3.68 | | 2.57 | 3.96 | | 2.36 | 7 | 30 | |
| H30 | T19 | HOPANE (T19) | 185 | | 2.57 | 191 | | 2.36 | 3 | 30 | |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 9.76 | | 2.57 | 10.4 | | 2.36 | 6 | 30 | |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 5.73 | | 2.57 | 5.85 | | 2.36 | 2 | 30 | |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 6.56 | | 2.57 | 6.86 | | 2.36 | 4 | 30 | |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 5.28 | | 2.57 | 4.66 | | 2.36 | 12 | 30 | |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.58 | | 2.57 | 3.73 | | 2.36 | 4 | 30 | |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 3.51 | | 2.57 | 3.24 | | 2.36 | 8 | 30 | |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 5.88 | | 2.57 | 5.40 | | 2.36 | 9 | 30 | |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 7.16 | | 2.57 | 6.88 | | 2.36 | 4 | 30 | |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 7.99 | | 2.57 | 7.46 | | 2.36 | 7 | 30 | |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 7.69 | | 2.57 | 7.97 | | 2.36 | 4 | 30 | |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 21.2 | | 2.57 | 21.5 | | 2.36 | 1 | 30 | |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 9.98 | | 2.57 | 9.45 | | 2.36 | 5 | 30 | |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 7.92 | | 2.57 | 7.36 | | 2.36 | 7 | 30 | |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 26.4 | | 2.57 | 26.0 | | 2.36 | 2 | 30 | |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.06 | | 2.57 | 6.00 | | 2.36 | 1 | 30 | |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 5.65 | | 2.57 | 7.27 | | 2.36 | 25 | 30 | |
| H29 | T15 | 30-NORHOPANE (T15) | 122 | | 2.57 | 122 | | 2.36 | 0 | 30 | |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 22.4 | | 2.57 | 24.7 | | 2.36 | 10 | 30 | |
| X | X | 17A(H)-DIAHOPANE (X) | 12.4 | | 2.57 | 13.1 | | 2.36 | 5 | 30 | |
| M29 | T17 | 30-NORMORETANE (T17) | 13.7 | | 2.57 | 13.8 | | 2.36 | 1 | 30 | |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | U | | 2.57 | U | | 2.36 | | 30 | NC |
| M30 | T20 | MORETANE (T20) | 19.9 | | 2.57 | 24.6 | | 2.36 | 21 | 30 | |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 101 | | 2.57 | 107 | | 2.36 | 6 | 30 | |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 98.7 | | 2.57 | 101 | | 2.36 | 2 | 30 | |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 26.9 | | 2.57 | 29.1 | | 2.36 | 8 | 30 | |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 84.9 | | 2.57 | 87.0 | | 2.36 | 2 | 30 | |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 63.3 | | 2.57 | 64.2 | | 2.36 | 1 | 30 | |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 75.8 | | 2.57 | 80.0 | | 2.36 | 5 | 30 | |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 59.4 | | 2.57 | 57.0 | | 2.36 | 4 | 30 | |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 68.1 | | 2.57 | 69.5 | | 2.36 | 2 | 30 | |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 48.5 | | 2.57 | 52.6 | | 2.36 | 8 | 30 | |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 82.6 | | 2.57 | 86.4 | | 2.36 | 4 | 30 | |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 84.4 | | 2.57 | 85.5 | | 2.36 | 1 | 30 | |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 20.8 | | 2.57 | 19.3 | | 2.36 | 7 | 30 | |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 13.7 | | 2.57 | 13.0 | | 2.36 | 5 | 30 | |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 12.6 | | 2.57 | 12.7 | | 2.36 | 1 | 30 | |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 42.2 | | 2.57 | 41.4 | | 2.36 | 2 | 30 | |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 50.1 | | 2.57 | 52.2 | | 2.36 | 4 | 30 | |
| d29R | S18 | UNKNOWN STERANE (S18) | 9.83 | | 2.57 | 10.2 | | 2.36 | 4 | 30 | |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 2.39 | J | 2.57 | 2.57 | | 2.36 | | 30 | NC |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 18.3 | | 2.57 | 18.5 | | 2.36 | 1 | 30 | |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 25.1 | | 2.57 | 25.1 | | 2.36 | 0 | 30 | |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 29.0 | | 2.57 | 29.7 | | 2.36 | 2 | 30 | |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 43.5 | | 2.57 | 43.0 | | 2.36 | 1 | 30 | |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 35.8 | | 2.57 | 36.2 | | 2.36 | 1 | 30 | |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 36.0 | | 2.57 | 38.3 | | 2.36 | 6 | 30 | |

Project Name: PAMPILLA 2
Project Number:

| | | | |
|---|---|---|---|
| Client ID | HC SRG 29AGO2023 | Duplicate Sample | |
| Lab ID | L2352169-01 | WG1843204-4 | |
| Matrix | SOLID | SOLID | |
| Matrix Description | | | |
| Reference Method | 8270E-SIM(M) | 8270E-SIM(M) | |
| Batch ID | WG1843204 | WG1843204 | |
| Date Collected | 8/29/2023 | NA | |
| Date Received | 9/11/2023 | 10/23/2023 | |
| Date Prepped | 10/23/2023 | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | 10/27/2023 | |
| Sample Size(wet) | 0.00389 g | 0.00424 g | |
| % Solid | 100 | 100 | |
| File ID | F1210262310 | F1210262311 | |
| Units | mg/kg | mg/kg | |
| Final Volume | 1 | 1 | |
| Dilution | 1 | 1 | |
| Reporting Limit | 1.28 | 1.18 | |

| Class | Abbrev | Analytes | Result | SSRL | Result | SSRL | RPD | RPD Limit | |
|---|---|---|---|---|---|---|---|---|---|
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 35.2 | 2.57 | 37.0 | 2.36 | 5 | 30 | |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 62.7 | 2.57 | 61.6 | 2.36 | 2 | 30 | |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 61.1 | 2.57 | 66.2 | 2.36 | 8 | 30 | |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 44.4 | 2.57 | 46.0 | 2.36 | 4 | 30 | |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 8.78 | 2.57 | 6.53 | 2.36 | 29 | 30 | |
| SC28TAS | TAS02 | C28,20S TAS | 9.21 | 2.57 | 9.45 | 2.36 | 3 | 30 | |
| RC27TAS | TAS03 | C27,20R TAS | 12.0 | 2.57 | 12.1 | 2.36 | 1 | 30 | |
| RC28TAS | TAS04 | C28,20R TAS | 2.46 J | 2.57 | 2.82 | 2.36 | | 30 | NC |

| Surrogates (% Recovery) | | |
|---|---|---|
| NAPHTHALENE-D8 | 94 | 98 |
| PHENANTHRENE-D10 | 96 | 98 |
| BENZO(A)PYRENE-D12 | 96 | 95 |
| 5B(H)CHOLANE | 90 | 89 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

# HC OVA 29AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 28, 2023

**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 August 29, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC OVA 29AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA under chain of custody and arrived at a temperature of 24.4°C on September 11, 2023 with a DHL Tracking # 2743409222 (Seal number 200980).

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC OVA 29AGO2023 (HC OVA29) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC OVA29 sample (Figure 1B), contains a broad $C_{15}$ – $C_{44}$ range material consisting of resolved n-alkanes and an unresolved complex mixture (UCM) which appears as a "hump" in the chromatogram. This sample is significantly weathered in the light alkane range ($C_{10}$-$C_{15}$) relative to the source oil sample mostly due to evaporation. In addition, there is a relative increase in the UCM relative to the source oil (Figure 1A). The petroleum GC/FID signature is consistent with a moderately weathered crude or heavy fuel 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 HC OVA29 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 HC OVA29 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC OVA29 sample (Figure 2B) shows this sample is weathered as indicated by the loss of decalins and reduction of naphthalenes compared to the source oil. Elevated fluoranthenes/pyrenes, napthobenzothiophenes, and chrysenes relative to the source oil are also observed in this sample.

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 HC OVA29 sample plot away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC OVA29 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC OVA29 show differences in the proportions of TS and TM (T11 and T12)[2] and the presence of oleanane (T18) which is absent in the source oil. These differences indicate the HC OVA29 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 HC OVA29 sample plot away from each other indicating a different source of petroleum.

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

**Conclusion**

The HC OVA 29AGO2023 sample consists of a moderately weathered crude or heavy oil. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC OVA 29AGO2023 sample are chemically different and were derived from a different source of petroleum.

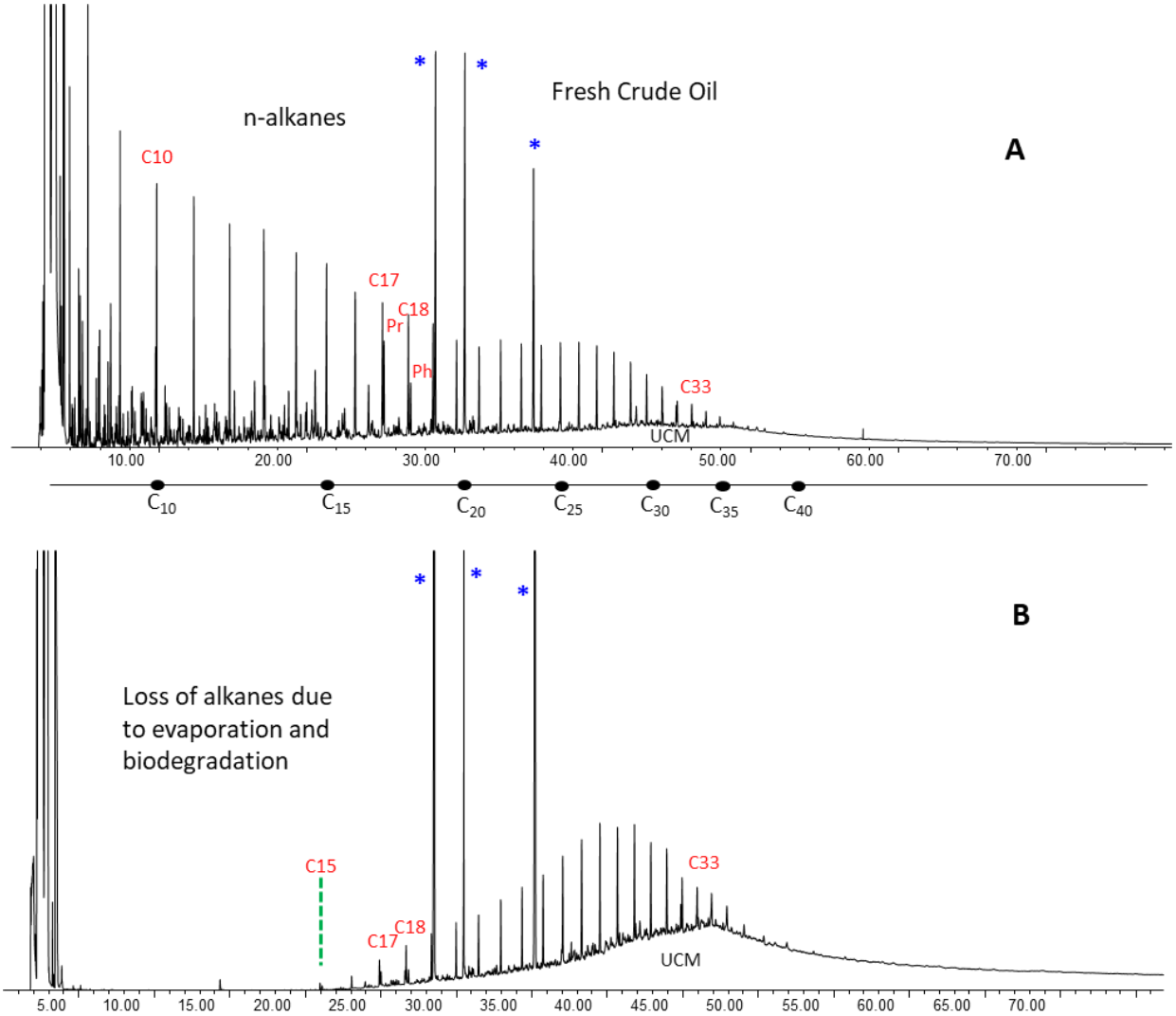


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC OVA 29AGO2023**
'*': Laboratory-added Internal Standard

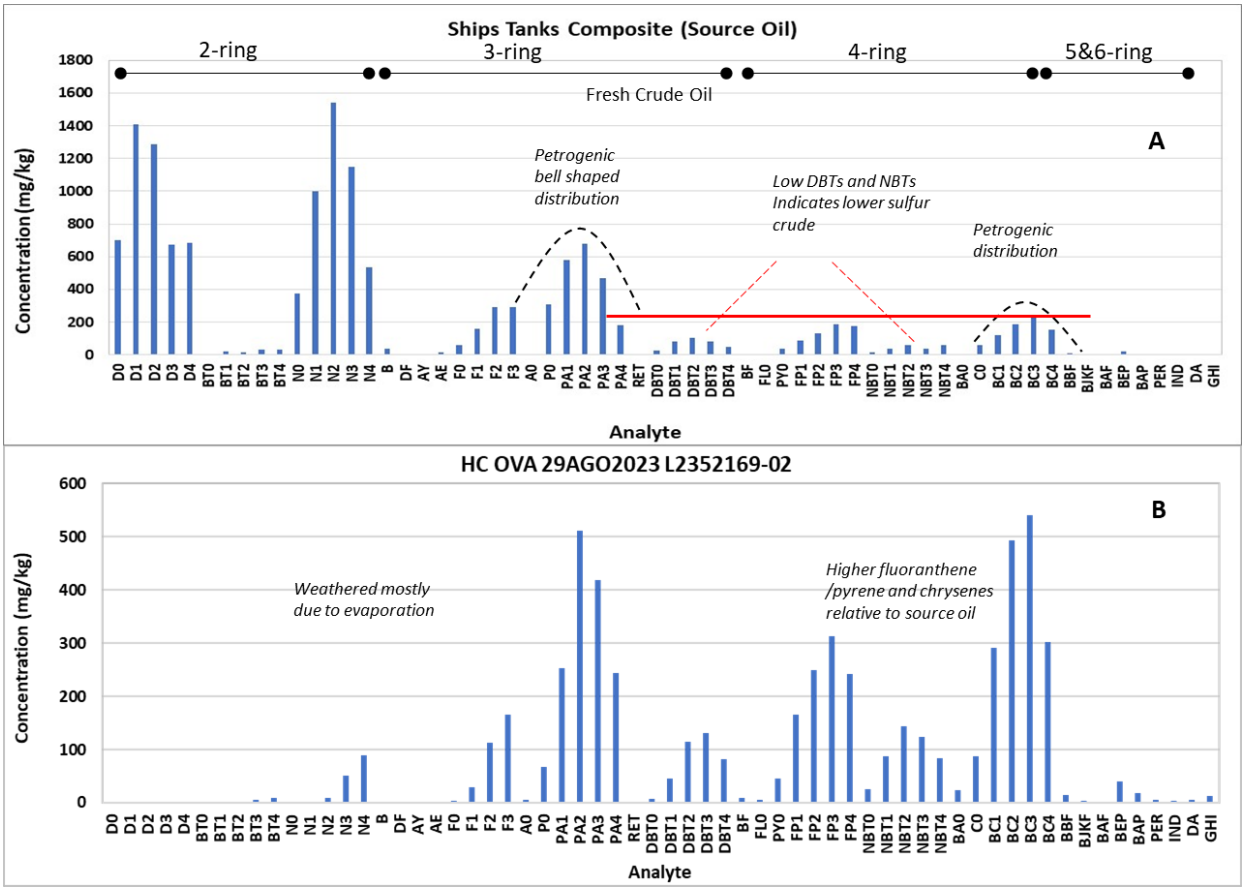


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC OVA 29AGO2023**

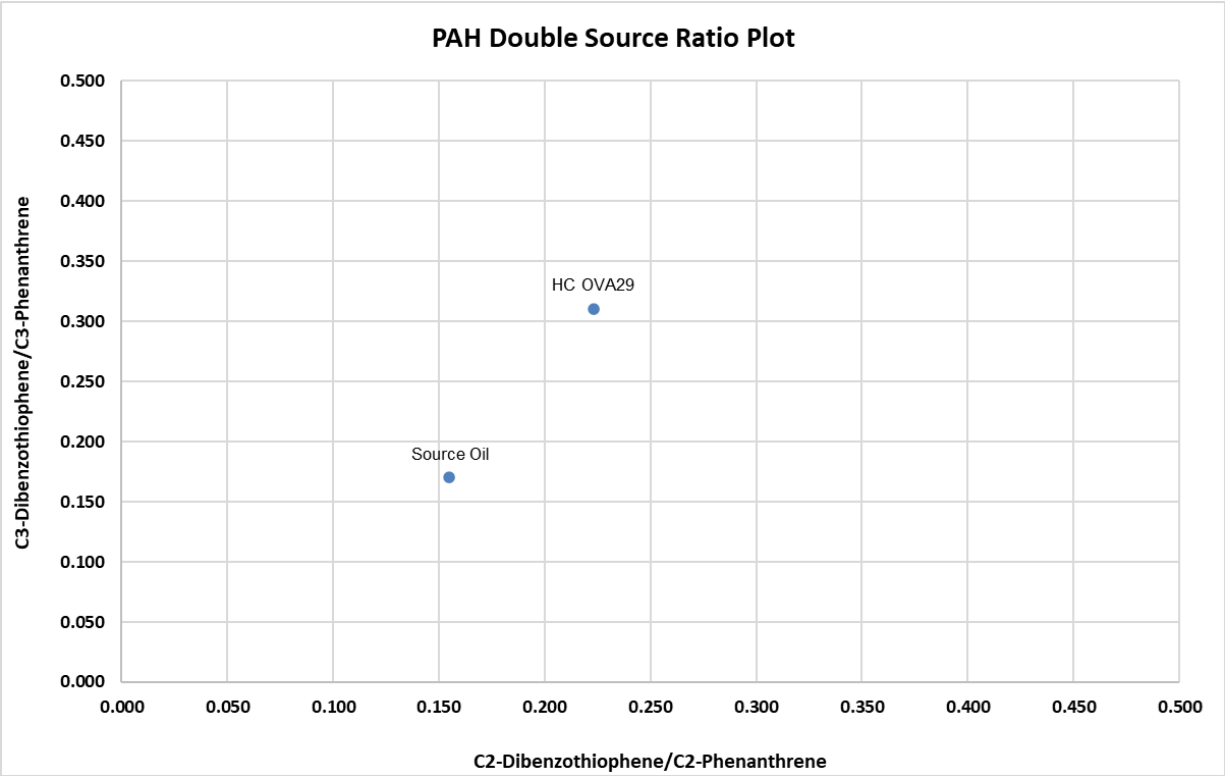


**Figure 3. PAH Double Source Ratio Plot**

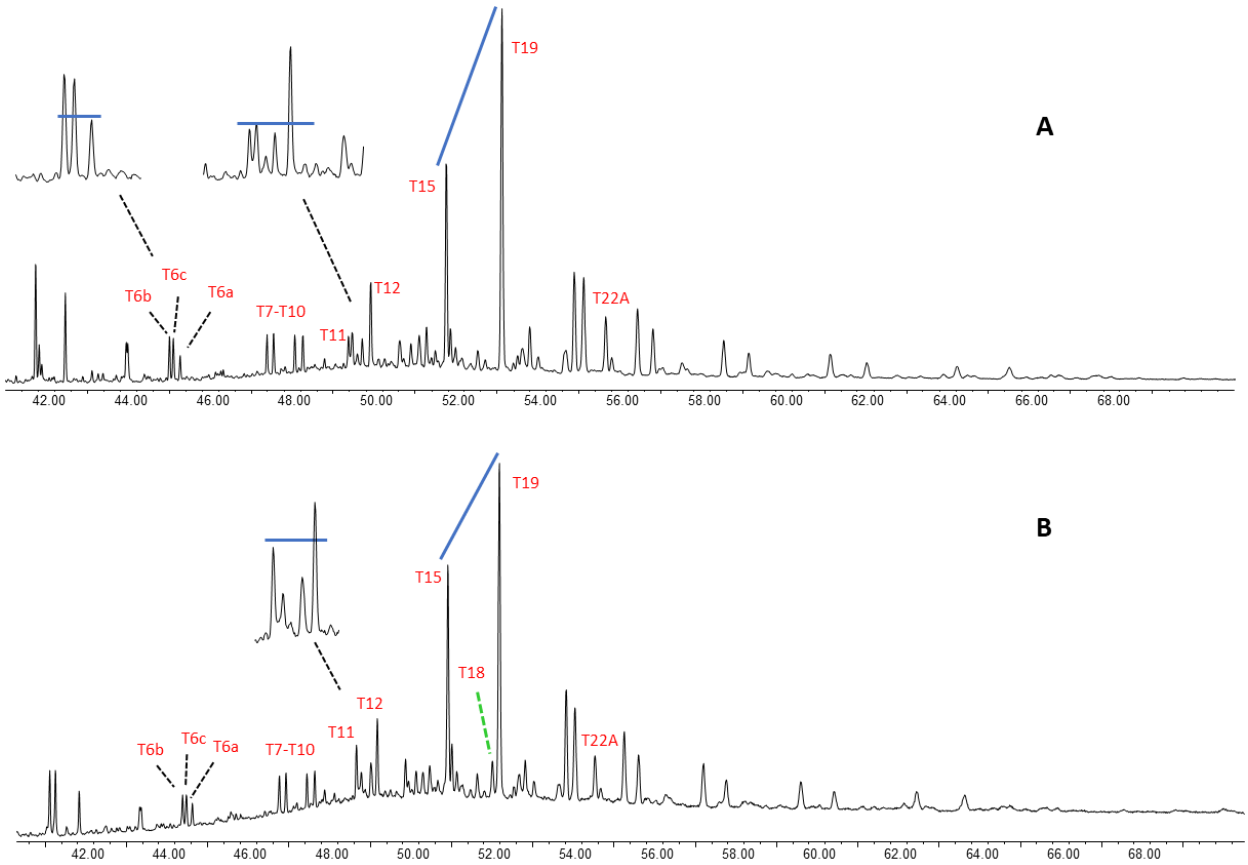


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC OVA 29AGO2023**

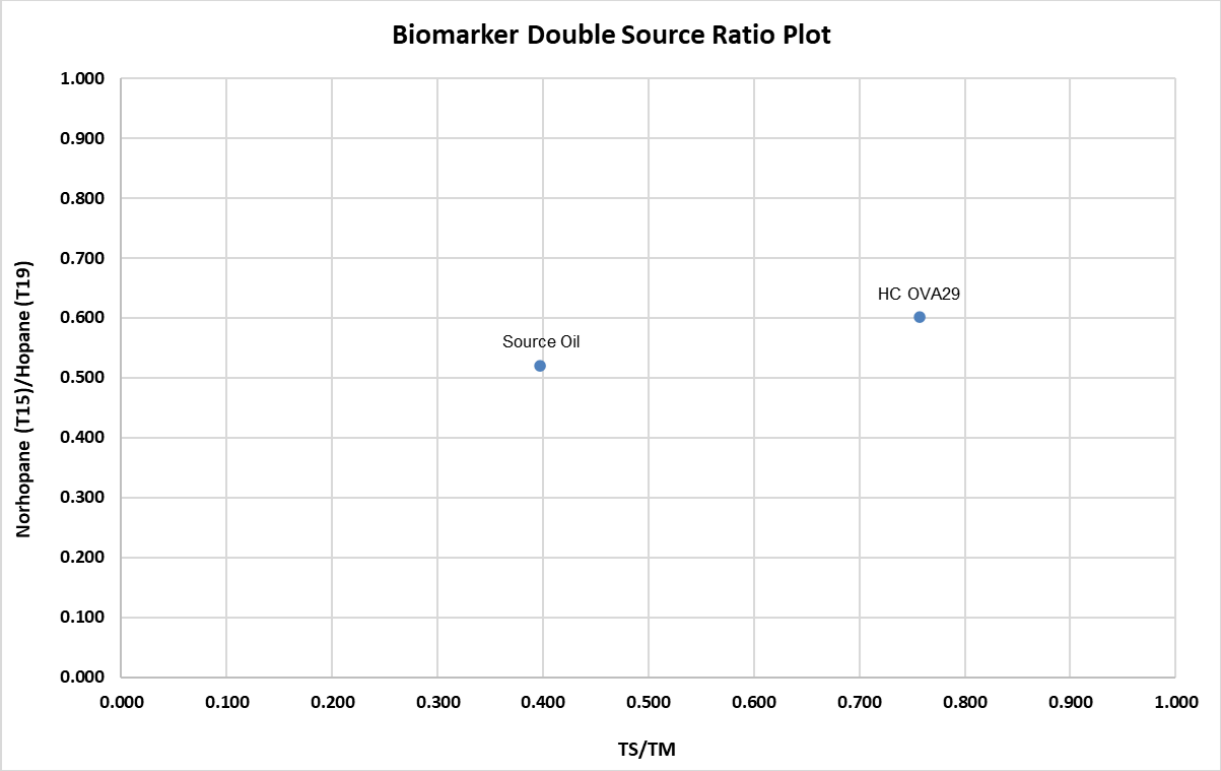


**Figure 5. Biomarker Double Source Ratio Plot**

**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 |
| HC OVA 29AGO2023 | L2352169-02 | 08/29/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/11/23 L23S2169

Nº 007220

CERPER CERTIFICACIONES DEL PERÚ S.A.

# CADENA DE CUSTODIA
## (Registro de Campo -Toma de muestra de aguas, suelos, lodos y sedimentos)

Página 1 de 1

EXPEDIENTE: 12103-2023

HS: 23006017

JOB NUMBER: 23LM0026934674

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A

PERSONA DE CONTACTO: Carlos Torres

LUGAR: PLAYA DEL OVALO | Distrito: AUCALLAMA | Provincia: HUARAL | Departamento: LIMA

NORMA:

1 SMEWW - APHA - AWWA - WEF. 22ed Ed. 2017. Collection and preservation of samples. Part 9060 A-B ( ) 1060 B-C ( ) 10030 B ( ) 10300 B ( ) 10500 B ( ) 10700 B ( )
2 Instrucción 6868-I Toma de muestras de sedimentos ( )
3 NTP 214.005 - 1997 (Revisada al 2018) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.5 ( )
4 RM N° 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto ( )
5 RJ N° 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO-5667-10:2012 (Revisada al 2016) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060:2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM N° 273-2015-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de las plantas de tratamiento de aguas residuales domésticas o municipales - PTAR ( )
9 RM N° 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAAE-EM ( )
11 Otros: ( )

PARÁMETROS DE ANÁLISIS EN EL LABORATORIO

PARÁMETROS DE CAMP

FINGER PRINT

DESCRIPCIÓN DE LA MUESTRA

| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17,18,19) (K,L,M) | CANTIDAD DE ENVASES | FINGER PRINT |
|---|---|---|---|---|---|---|---|---|
| HC OVA 29AGO2023 | 29.08.23 | 12:10 | * | 0255781 | 8714320 | 18L | 01 | ✓ |
| | | | | | | Total de Envases | 01 | |

52169-02

pH (Unidades de pH) | Temperatura Ambiental (°C) | Temperatura (°C) | Oxigeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg $Cl_2$L Libre ( ) Total ( ) | Turbiedad (UNT) | Caudal (m³/s) | Transparencia cm ( ) m ( )

(1) Matriz (s)

AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro (Especificar) SOLIDOS DE HIDROCARBUROS

Condiciones de las muestras:

Temperatura ambiente ( ) Refrigerada (X) Congelada ( ) Caja conservadora (X)

Herméticamente cerrada (X) Ice pack (X) Hielo de calidad potable ( )

Equipos Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 003 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: SE PROCEDIÓ A LLEGAR AL PUNTO DE MUESTREO INDICADO Y DENOMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZÓ EL PROCEDIMIENTO DE CARACTERIZACIÓN DE LA MUESTRA LA CUAL PRESENTÓ UNA COLORACIÓN OSCURA Y OLOR A HIDROCARBURO. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRECINTO Nº 200980. LAS COORDENADAS SE TOMARON IN SITU.

**Responsable de la toma de muestra:**

Firma:
Inspector Cerper: FRANCO NINA
Inspectores de apoyo: JUNIOR CHUNGA
Hora de inicio: 07:30 Hora de término: 15:00

**Representante del cliente**

Firma:
Nombre: CARLOS TORRES YACHACHIN
DNI: 48006616
Cargo: SUPERVISOR PLAYA

Rec: 9/11/23 09:41

**Recepción de muestras**

Nombre: Noelia Machuca A.
Fecha: 06.09.23 Hora: 16:38

intertek 06 SEP. 2023 LAB: CALEB BRETT RECEIVED

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC OVA 29AGO2023 |
| Lab ID | L2352169-02 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1843204 |
| Date Collected | 8/29/2023 |
| Date Received | 9/11/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/24/2023 |
| Sample Size(wet) | 0.00302 g |
| % Solid | 100 |
| File ID | F1710232343 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 331 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 331 |
| SHC | C10 | DECANE (C10) | | U | 331 |
| SHC | C11 | UNDECANE | | U | 331 |
| SHC | C12 | DODECANE (C12) | | U | 331 |
| SHC | C13 | TRIDECANE | | U | 331 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | | U | 331 |
| SHC | C14 | TETRADECANE (C14) | 13.6 | J | 331 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 16.2 | J | 331 |
| SHC | C15 | PENTADECANE (C15) | 90.4 | J | 331 |
| SHC | C16 | HEXADECANE (C16) | 276 | J | 331 |
| SHC | 1650 | NORPRISTANE (1650) | 168 | J | 331 |
| SHC | C17 | HEPTADECANE (C17) | 516 | | 331 |
| SHC | Pr | PRISTANE | 425 | | 331 |
| SHC | C18 | OCTADECANE (C18) | 780 | CB | 331 |
| SHC | Ph | PHYTANE | 414 | | 331 |
| SHC | C19 | NONADECANE (C19) | 866 | | 331 |
| SHC | C20 | EICOSANE (C20) | 1060 | | 331 |
| SHC | C21 | HENEICOSANE (C21) | 1210 | | 331 |
| SHC | C22 | DOCOSANE (C22) | 1470 | | 331 |
| SHC | C23 | TRICOSANE (C23) | 1590 | | 331 |
| SHC | C24 | TETRACOSANE (C24) | 1810 | | 331 |
| SHC | C25 | PENTACOSANE (C25) | 2350 | | 331 |
| SHC | C26 | HEXACOSANE (C26) | 2620 | | 331 |
| SHC | C27 | HEPTACOSANE (C27) | 2740 | | 331 |
| SHC | C28 | OCTACOSANE (C28) | 2400 | | 331 |
| SHC | C29 | NONACOSANE (C29) | 2340 | | 331 |
| SHC | C30 | TRIACONTANE (C30) | 2000 | | 331 |
| SHC | C31 | HENTATRIACONTANE (C31) | 2070 | | 331 |
| SHC | C32 | DOTRIACONTANE (C32) | 1180 | | 331 |
| SHC | C33 | TRITRIACONTANE (C33) | 946 | | 331 |
| SHC | C34 | TETRATRIACONTANE (C34) | 1240 | | 331 |
| SHC | C35 | PENTATRIACONTANE (C35) | 897 | | 331 |
| SHC | C36 | HEXATRIACONTANE (C36) | 392 | | 331 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 297 | J | 331 |
| SHC | C38 | OCTATRIACONTANE (C38) | 314 | J | 331 |
| SHC | C39 | NONATRIACONTANE (C39) | 156 | J | 331 |
| SHC | C40 | TETRACONTANE (C40) | 160 | J | 331 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 684000 | | 10900 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 32800 | J | 331 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/24/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1710232331 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 278 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 278 |
| SHC | C10 | DECANE (C10) | U | 278 |
| SHC | C11 | UNDECANE | U | 278 |
| SHC | C12 | DODECANE (C12) | U | 278 |
| SHC | C13 | TRIDECANE | U | 278 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 278 |
| SHC | C14 | TETRADECANE (C14) | U | 278 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 278 |
| SHC | C15 | PENTADECANE (C15) | U | 278 |
| SHC | C16 | HEXADECANE (C16) | U | 278 |
| SHC | 1650 | NORPRISTANE (1650) | U | 278 |
| SHC | C17 | HEPTADECANE (C17) | U | 278 |
| SHC | Pr | PRISTANE | U | 278 |
| SHC | C18 | OCTADECANE (C18) | 267 JC | 278 |
| SHC | Ph | PHYTANE | U | 278 |
| SHC | C19 | NONADECANE (C19) | U | 278 |
| SHC | C20 | EICOSANE (C20) | U | 278 |
| SHC | C21 | HENEICOSANE (C21) | U | 278 |
| SHC | C22 | DOCOSANE (C22) | U | 278 |
| SHC | C23 | TRICOSANE (C23) | U | 278 |
| SHC | C24 | TETRACOSANE (C24) | U | 278 |
| SHC | C25 | PENTACOSANE (C25) | U | 278 |
| SHC | C26 | HEXACOSANE (C26) | 3.90 J | 278 |
| SHC | C27 | HEPTACOSANE (C27) | 4.18 J | 278 |
| SHC | C28 | OCTACOSANE (C28) | 12.8 J | 278 |
| SHC | C29 | NONACOSANE (C29) | U | 278 |
| SHC | C30 | TRIACONTANE (C30) | U | 278 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 278 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 278 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 278 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 278 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 278 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 278 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 278 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 278 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 278 |
| SHC | C40 | TETRACONTANE (C40) | U | 278 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 9190 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 288 J | 278 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1843204-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/24/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1710232333 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 278 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5390 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 5180 | 278 | 93 | 5570 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 5350 | 278 | 96 | 5570 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 5340 | 278 | 96 | 5570 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5750 | 278 | 103 | 5570 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5820 | 278 | 104 | 5570 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 5390 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 5540 | 278 | 100 | 5570 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 5420 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 5680 | 278 | 102 | 5570 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 5560 | 278 | 100 | 5570 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 5540 | 278 | 99 | 5570 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 5620 | 278 | 101 | 5570 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 5170 | 278 | 93 | 5570 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1843204-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/24/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1710232335 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 278 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5500 | 278 | 99 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C10 | DECANE (C10) | 5270 | 278 | 94 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5370 | 278 | 96 | 5570 | 50 | 130 | 0 | 30 |
| SHC | C14 | TETRADECANE (C14) | 5420 | 278 | 97 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5820 | 278 | 104 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5920 | 278 | 106 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C19 | NONADECANE (C19) | 5460 | 278 | 98 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C20 | EICOSANE (C20) | 5620 | 278 | 101 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 5500 | 278 | 99 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 5760 | 278 | 103 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 5640 | 278 | 101 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 5640 | 278 | 101 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 5700 | 278 | 102 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 5240 | 278 | 94 | 5570 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1786523-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1786523-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 4/25/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F1704242329 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6700 | 0.983 | 106 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5260 | 0.983 | 104 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 4920 | 0.983 | 105 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4450 | 0.983 | 107 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4200 | 0.983 | 103 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 957 | 0.983 | 113 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3820 | 0.983 | 104 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1460 | 0.983 | 107 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 4300 | 0.983 | 117 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3490 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1140 | 0.983 | 104 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 2980 | 0.983 | 99 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2340 | 0.983 | 109 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2710 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1480 | 0.983 | 122 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2600 | 0.983 | 111 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2270 | 0.983 | 111 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2030 | 0.983 | 103 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1970 | 0.983 | 113 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1800 | 0.983 | 110 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1800 | 0.983 | 115 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1440 | 0.983 | 104 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1220 | 0.983 | 113 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 866 | 0.983 | 112 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 877 | 0.983 | 119 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 655 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 640 | 0.983 | 124 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 406 | 0.983 | 89 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 378 | 0.983 | 97 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 326 | 0.983 | 94 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 324 | 0.983 | 116 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 182 | 0.983 | 98 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 180 | 0.983 | 118 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 148 | 0.983 | 113 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 100 | 0.983 | 112 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 94.8 | 0.983 | 103 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 566000 | 0.983 | 102 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 82694 | 0.983 | 121 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC OVA 29AGO2023 |
| Lab ID | L2352169-02 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | 8/29/2023 |
| Date Received | 9/11/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/27/2023 |
| Sample Size(wet) | 0.00302 g |
| % Solid | 100 |
| File ID | F1210262312 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.66 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.66 |
| 2 | D1 | C1-DECALINS | | U | 3.31 |
| 2 | D2 | C2-DECALINS | | U | 3.31 |
| 2 | D3 | C3-DECALINS | | U | 3.31 |
| 2 | D4 | C4-DECALINS | | U | 3.31 |
| S | BT0 | BENZOTHIOPHENE | | U | 3.31 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 3.31 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 3.31 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 4.46 | | 3.31 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 8.40 | | 3.31 |
| A | N0 | NAPHTHALENE | 0.589 | JB | 3.31 |
| 2 | N1 | C1-NAPHTHALENES | 0.684 | J | 3.31 |
| 2 | N2 | C2-NAPHTHALENES | 9.13 | | 3.31 |
| 2 | N3 | C3-NAPHTHALENES | 50.0 | | 3.31 |
| 2 | N4 | C4-NAPHTHALENES | 89.7 | | 3.31 |
| 2 | B | BIPHENYL | 0.464 | J | 3.31 |
| 3 | DF | DIBENZOFURAN | 0.348 | J | 3.31 |
| 3 | AY | ACENAPHTHYLENE | 0.881 | JB | 3.31 |
| 3 | AE | ACENAPHTHENE | 0.915 | J | 3.31 |
| 3 | F0 | FLUORENE | 4.01 | | 3.31 |
| 3 | F1 | C1-FLUORENES | 29.0 | | 3.31 |
| 3 | F2 | C2-FLUORENES | 113 | | 3.31 |
| 3 | F3 | C3-FLUORENES | 166 | | 3.31 |
| 3 | A0 | ANTHRACENE | 5.75 | | 3.31 |
| 3 | P0 | PHENANTHRENE | 67.0 | | 3.31 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 252 | | 3.31 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 511 | | 3.31 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 419 | | 3.31 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 243 | | 3.31 |
| 3 | RET | RETENE | | U | 3.31 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 7.64 | | 3.31 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 45.2 | | 3.31 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 114 | | 3.31 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 130 | | 3.31 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 81.4 | | 3.31 |
| 4 | BF | BENZO(B)FLUORENE | 9.03 | | 3.31 |
| 4 | FL0 | FLUORANTHENE | 6.22 | | 3.31 |
| 4 | PY0 | PYRENE | 45.5 | | 3.31 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 166 | | 3.31 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 250 | | 3.31 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 313 | | 3.31 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 241 | | 3.31 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 24.8 | | 3.31 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 87.3 | | 3.31 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 143 | | 3.31 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 124 | | 3.31 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 83.8 | | 3.31 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 24.2 | | 3.31 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 87.7 | | 3.31 |
| 4 | BC1 | C1-CHRYSENES | 291 | | 3.31 |
| 4 | BC2 | C2-CHRYSENES | 493 | | 3.31 |
| 4 | BC3 | C3-CHRYSENES | 541 | | 3.31 |
| 4 | BC4 | C4-CHRYSENES | 301 | | 3.31 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 15.3 | B | 3.31 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC OVA 29AGO2023 | |
| Lab ID | L2352169-02 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | 8/29/2023 | |
| Date Received | 9/11/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/27/2023 | |
| Sample Size(wet) | 0.00302 | g |
| % Solid | 100 | |
| File ID | F1210262312 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.66 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 2.69 | JB | 3.31 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 3.31 |
| 5 | BEP | BENZO(E)PYRENE | 40.0 | | 3.31 |
| 5 | BAP | BENZO(A)PYRENE | 18.2 | | 3.31 |
| 5 | PER | PERYLENE | 6.20 | | 3.31 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 4.24 | B | 3.31 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 6.07 | B | 3.31 |
| 6 | GHI | BENZO(GHI)PERYLENE | 13.0 | B | 3.31 |
| O | CAR | CARBAZOLE | | U | 3.31 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 20.6 | | 3.31 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 11.3 | | 3.31 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 5.62 | | 3.31 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 63.9 | | 3.31 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 78.6 | | 3.31 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 6.98 | | 3.31 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 58.5 | | 3.31 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 43.4 | | 3.31 |
| A | 1MN | 1-METHYLNAPHTHALENE | 0.431 | J | 3.31 |
| A | 2MN | 2-METHYLNAPHTHALENE | 0.268 | J | 3.31 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 2.51 | J | 3.31 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 7.50 | | 3.31 |
| H30 | T19 | HOPANE (T19) | 391 | | 3.31 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 52.7 | | 3.31 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 34.5 | | 3.31 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.7 | | 3.31 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 18.4 | | 3.31 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 26.7 | | 3.31 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 25.6 | | 3.31 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 31.5 | | 3.31 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 31.3 | | 3.31 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 25.0 | | 3.31 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 27.2 | | 3.31 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 49.6 | | 3.31 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 26.7 | | 3.31 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 39.2 | | 3.31 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 65.5 | | 3.31 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 27.0 | | 3.31 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 34.1 | | 3.31 |
| H29 | T15 | 30-NORHOPANE (T15) | 235 | | 3.31 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 41.2 | | 3.31 |
| X | X | 17A(H)-DIAHOPANE (X) | 28.6 | | 3.31 |
| M29 | T17 | 30-NORMORETANE (T17) | 29.0 | | 3.31 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | 46.6 | | 3.31 |
| M30 | T20 | MORETANE (T20) | 46.9 | | 3.31 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 134 | | 3.31 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 134 | | 3.31 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 58.7 | | 3.31 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 103 | | 3.31 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 70.8 | | 3.31 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 70.7 | | 3.31 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 46.3 | | 3.31 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 53.2 | | 3.31 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 33.9 | | 3.31 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 42.2 | | 3.31 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC OVA 29AGO2023 | |
| Lab ID | L2352169-02 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | 8/29/2023 | |
| Date Received | 9/11/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/27/2023 | |
| Sample Size(wet) | 0.00302 | g |
| % Solid | 100 | |
| File ID | F1210262312 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.66 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 41.0 | | 3.31 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 35.8 | | 3.31 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 20.4 | | 3.31 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 18.1 | | 3.31 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.3 | | 3.31 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 65.2 | | 3.31 |
| d29R | S18 | UNKNOWN STERANE (S18) | 10.3 | | 3.31 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 3.23 | J | 3.31 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 26.0 | | 3.31 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 27.7 | | 3.31 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 34.2 | | 3.31 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 38.9 | | 3.31 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 47.9 | | 3.31 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 42.0 | | 3.31 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 33.6 | | 3.31 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 40.8 | | 3.31 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 61.5 | | 3.31 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 37.4 | | 3.31 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 41.1 | | 3.31 |
| SC28TAS | TAS02 | C28,20S TAS | 28.4 | | 3.31 |
| RC27TAS | TAS03 | C27,20R TAS | 31.7 | | 3.31 |
| RC28TAS | TAS04 | C28,20R TAS | 25.9 | | 3.31 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 98 |
| PHENANTHRENE-D10 | 95 |
| BENZO(A)PYRENE-D12 | 94 |
| 5B(H)CHOLANE | 84 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262307 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.39 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.39 |
| 2 | D1 | C1-DECALINS | | U | 2.78 |
| 2 | D2 | C2-DECALINS | | U | 2.78 |
| 2 | D3 | C3-DECALINS | | U | 2.78 |
| 2 | D4 | C4-DECALINS | | U | 2.78 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.78 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.78 |
| A | N0 | NAPHTHALENE | 0.224 | J | 2.78 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.78 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.78 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.78 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.78 |
| 2 | B | BIPHENYL | | U | 2.78 |
| 3 | DF | DIBENZOFURAN | | U | 2.78 |
| 3 | AY | ACENAPHTHYLENE | 0.248 | J | 2.78 |
| 3 | AE | ACENAPHTHENE | | U | 2.78 |
| 3 | F0 | FLUORENE | | U | 2.78 |
| 3 | F1 | C1-FLUORENES | | U | 2.78 |
| 3 | F2 | C2-FLUORENES | | U | 2.78 |
| 3 | F3 | C3-FLUORENES | | U | 2.78 |
| 3 | A0 | ANTHRACENE | 0.230 | J | 2.78 |
| 3 | P0 | PHENANTHRENE | 0.697 | J | 2.78 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | RET | RETENE | | U | 2.78 |
| 3 | DBT0 | DIBENZOTHIOPHENE | | U | 2.78 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.78 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.78 |
| 4 | FL0 | FLUORANTHENE | 0.609 | J | 2.78 |
| 4 | PY0 | PYRENE | 0.904 | J | 2.78 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 1.21 | J | 2.78 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.254 | J | 2.78 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.509 | J | 2.78 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 1.07 | J | 2.78 |
| 4 | BC1 | C1-CHRYSENES | 0.561 | J | 2.78 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.78 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.78 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.78 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 1.80 | J | 2.78 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262307 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.39 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.912 | J | 2.78 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.78 |
| 5 | BEP | BENZO(E)PYRENE | 1.47 | J | 2.78 |
| 5 | BAP | BENZO(A)PYRENE | 1.18 | J | 2.78 |
| 5 | PER | PERYLENE | 0.543 | J | 2.78 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 1.36 | J | 2.78 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 0.670 | J | 2.78 |
| 6 | GHI | BENZO(GHI)PERYLENE | 1.43 | J | 2.78 |
| O | CAR | CARBAZOLE | | U | 2.78 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.78 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.78 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.78 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.78 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.78 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.78 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.78 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.78 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.78 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.78 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.78 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.78 |
| H30 | T19 | HOPANE (T19) | | U | 2.78 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.78 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.78 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.78 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.78 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.78 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.78 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.78 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.78 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.78 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.78 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.78 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.78 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.78 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.78 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.78 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.78 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.78 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.78 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.78 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.78 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.78 |
| M30 | T20 | MORETANE (T20) | | U | 2.78 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.78 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.78 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.78 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.78 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.78 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.78 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.78 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.78 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.78 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.78 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Method Bl | |
| Lab ID | WG1843204-1 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1210262307 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.39 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.78 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.78 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.78 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.78 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.78 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.78 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.78 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.78 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.78 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.78 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.78 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.78 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.78 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.78 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.78 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.78 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.78 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.78 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.78 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.78 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.78 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.78 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 100 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 104 |
| 5B(H)CHOLANE | 91 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1843204-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262308 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.78 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 279 | 2.78 | 100 | 278 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 268 | 2.78 | 96 | 278 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 254 | 2.78 | 91 | 278 | 50 | 130 |
| 3 | F0 | FLUORENE | 277 | 2.78 | 99 | 278 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 286 | 2.78 | 103 | 278 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 276 | 2.78 | 99 | 278 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 259 | 2.78 | 93 | 278 | 50 | 130 |
| 4 | PY0 | PYRENE | 275 | 2.78 | 99 | 278 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 262 | 2.78 | 94 | 278 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 266 | 2.78 | 96 | 278 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 262 | 2.78 | 94 | 278 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 279 | 2.78 | 100 | 278 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 285 | 2.78 | 102 | 278 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 272 | 2.78 | 98 | 278 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 278 | 2.78 | 100 | 278 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 270 | 2.78 | 97 | 278 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 245 | 2.78 | 88 | 278 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 99 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 101 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1843204-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1210262309 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 2.78 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 285 | 2.78 | 102 | 278 | 50 | 130 | 2 | 30 |
| 3 | AY | ACENAPHTHYLENE | 272 | 2.78 | 98 | 278 | 50 | 130 | 2 | 30 |
| 3 | AE | ACENAPHTHENE | 258 | 2.78 | 92 | 278 | 50 | 130 | 1 | 30 |
| 3 | F0 | FLUORENE | 280 | 2.78 | 100 | 278 | 50 | 130 | 1 | 30 |
| 3 | A0 | ANTHRACENE | 289 | 2.78 | 104 | 278 | 50 | 130 | 1 | 30 |
| 3 | P0 | PHENANTHRENE | 280 | 2.78 | 100 | 278 | 50 | 130 | 1 | 30 |
| 4 | FL0 | FLUORANTHENE | 264 | 2.78 | 95 | 278 | 50 | 130 | 2 | 30 |
| 4 | PY0 | PYRENE | 280 | 2.78 | 101 | 278 | 50 | 130 | 2 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 265 | 2.78 | 95 | 278 | 50 | 130 | 1 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 273 | 2.78 | 98 | 278 | 50 | 130 | 2 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 265 | 2.78 | 95 | 278 | 50 | 130 | 1 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 286 | 2.78 | 103 | 278 | 50 | 130 | 3 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 288 | 2.78 | 104 | 278 | 50 | 130 | 2 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 285 | 2.78 | 102 | 278 | 50 | 130 | 4 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 282 | 2.78 | 101 | 278 | 50 | 130 | 1 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 274 | 2.78 | 98 | 278 | 50 | 130 | 1 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 249 | 2.78 | 89 | 278 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 100 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 102 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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.)

HC PS 29AGO2023

**To:** Refinería La Pampilla S.A.A.

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

**Date:** October 29, 2023

**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 August 29, 2023 (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 sample of suspected petroleum was collected by Repsol contractors in an amber glass bottle consisting of petroleum residues. Sample "HC PS 29AGO2023" was shipped to Alpha Analytical Labs in Mansfield, MA under chain of custody and arrived at a temperature of 24.4°C on September 11, 2023 with a DHL Tracking # 2743409222 (Seal number 0202370).

Samples were extracted using methylene chloride and diluted to volume. A portion of the extract was removed for gravimetric weight determination. A portion of the extract was removed (based on the gravimetric weight), spiked with surrogates and 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 mg/kg (oils) 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 mg/kg (oils) basis.

[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.

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.

**Findings**

The gas chromatographic "fingerprints" of the source oil, and HC PS 29AGO2023 (HC PS29) are shown in Figures 1A and1B respectively.

**GC/FID Analysis**

The GC/FID chromatogram for the HC PS29 sample (Figure 1B) indicates this samples consists of a $C_{19}$ – $C_{44}$ range material that has undergone significant weathering by evaporation and biodegradation as indicated by the loss of alkanes and relative increase in the UCM. There are three (3) resolved peaks identified in the chromatogram that are not alkanes and appear to be non-petroleum in nature. In addition, the presence of low level $C_{14}$ - $C_{21}$ alkanes is evidence that a second lighter range material may be present. The petroleum signature is consistent with a severely weathered crude or heavy oil that possibly contains a second source of lighter petroleum.

**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 HC PS29 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 HC PS29 sample are provided in Figures 2A and 2B respectively. The PAH histogram for the HC PS29 sample (Figure 2B) shows an abundance of naphthalenes which is likely due to the lighter $C_{14}$ - $C_{21}$ range material identified in the FID chromatogram (Figure 1B) and further indicates the presence of a second source of petroleum. There are differences in the proportion of fluorenes as well as a lack of naphthobenzothiophenes and chrysenes. The proportion of phenanthrenes to the sulfur containing dibenzothiophenes indicates a higher sulfur petroleum 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 HC PS29 sample plot well away from each other indicating a different oil source.

The biomarker triterpene m/z 191 ion traces for the source oil and the HC PS29 sample are presented in Figures 4A and 4B respectively. The biomarker traces for HC PS29 show differences in the proportion of tri and tetracyclic terpane triplet (T6a, T6b, T6c)[3], TS and TM (T11 and T12), and a decrease in the tricyclic terpanes (T7-T10) and gammacerane (T22A). In addition, there is an increase in the homohopanes (T21, T22, T26, T27, T30, and T31) relative to the source oil. These differences indicate the HC PS29 sample and source oil are derived from 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.

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 HC PS29 sample plot away from each other indicating a different source of petroleum**.**

**Conclusion**

The HC PS 29AGO2023 sample consists of a weathered crude or heavy oil that contains low levels of a lighter product. The PAH and biomarker analysis indicate the petroleum detected in the source oil and HC PS 29AGO2023 sample are chemically different and were derived from a different source of petroleum.

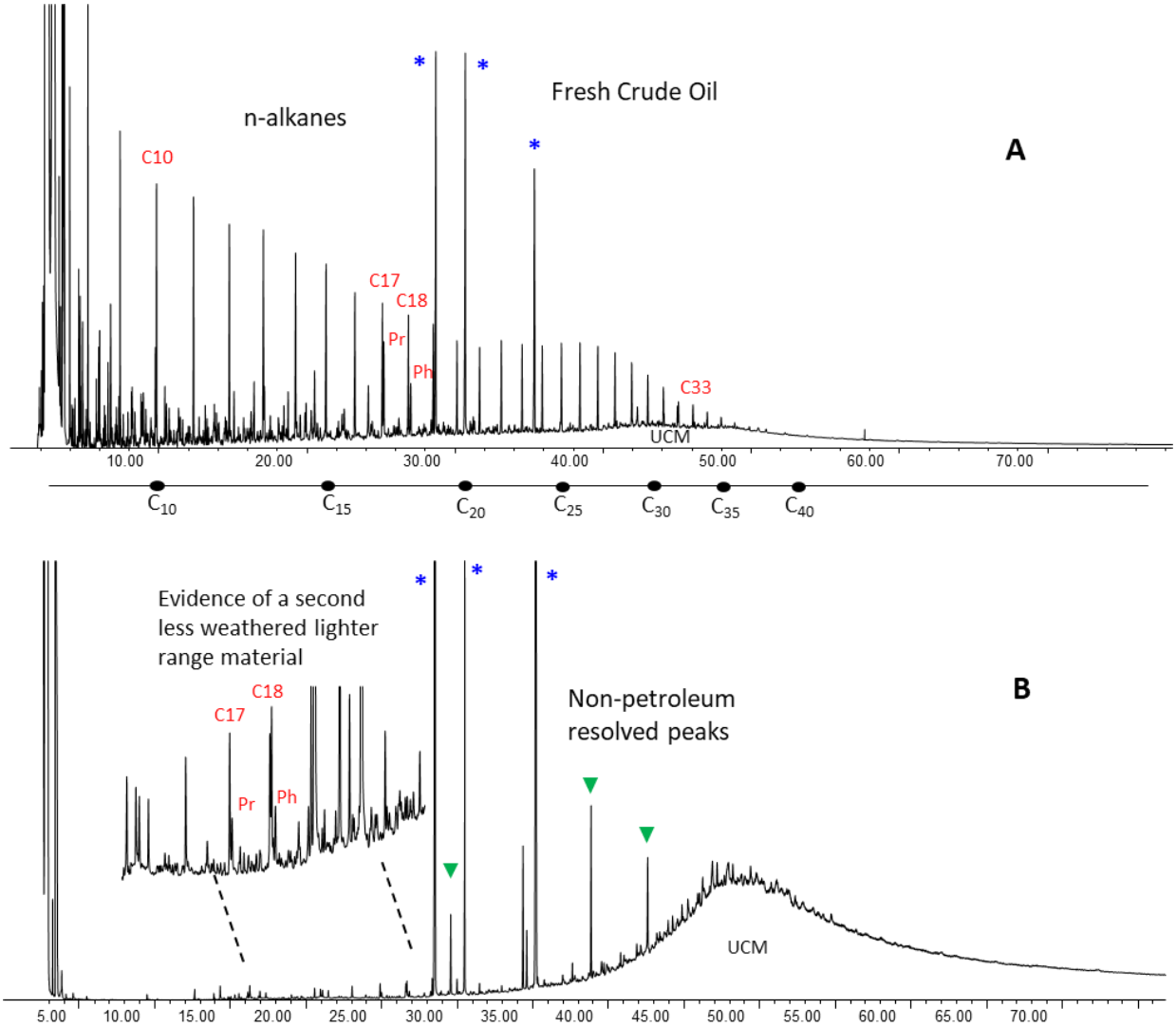


**Figure 1. GC/FID "fingerprints" for the field samples.**
**Carbon ranges annotated below the x-axis analysis time scale.**

**A) Ship's Tanks Composite Sample**
**B) HC PS 29AGO2023**
'*': Laboratory-added Internal Standard

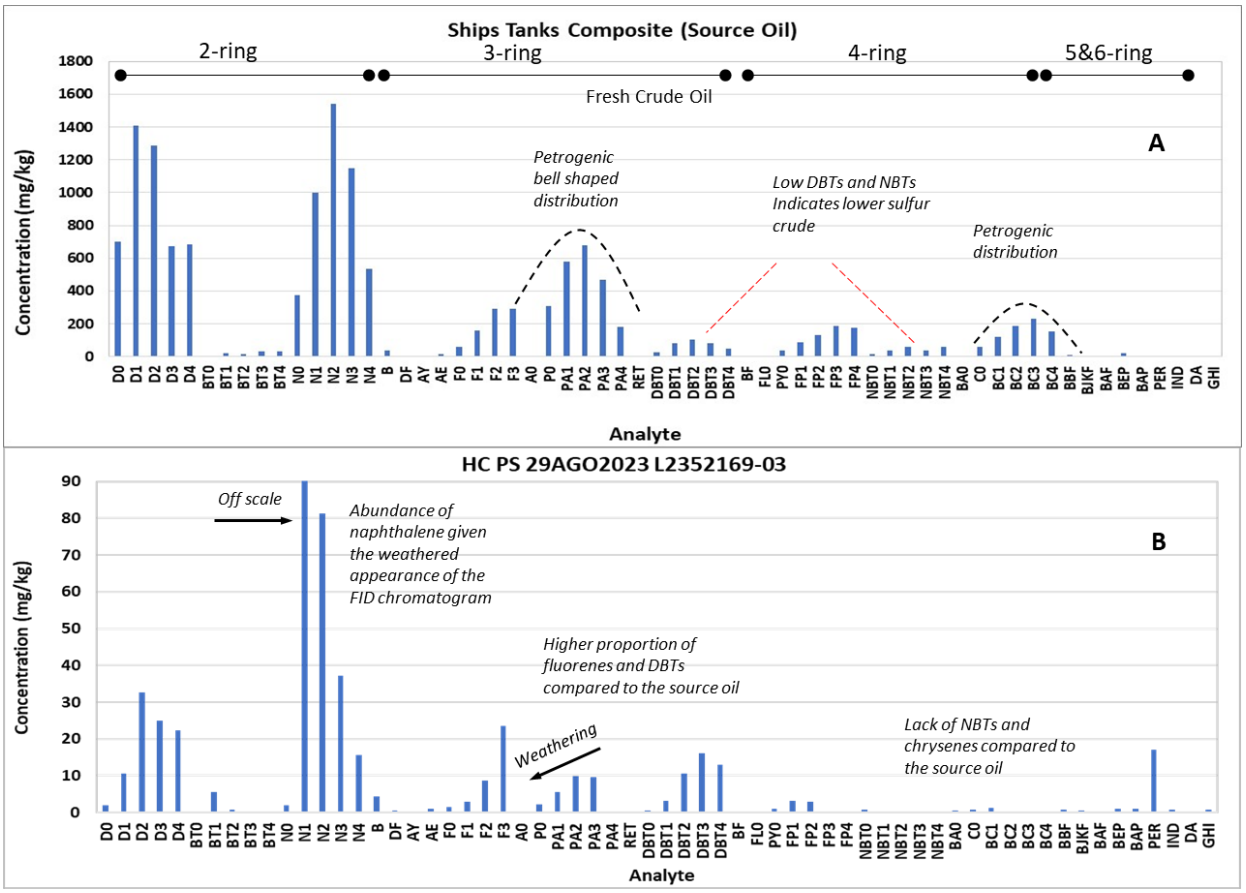


**Figure 2. PAH Histograms**

**A) Ship's Tanks Composite Sample**
**B) HC PS 29AGO2023**

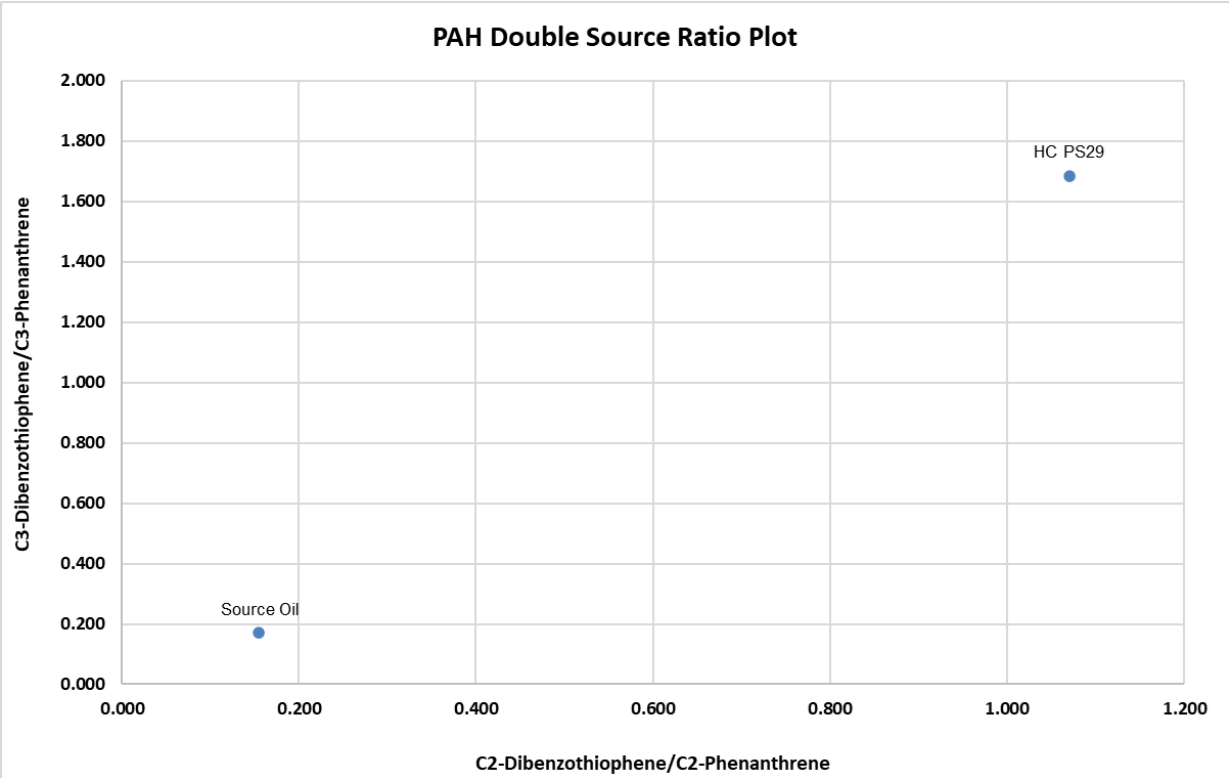


**Figure 3. PAH Double Source Ratio Plot**

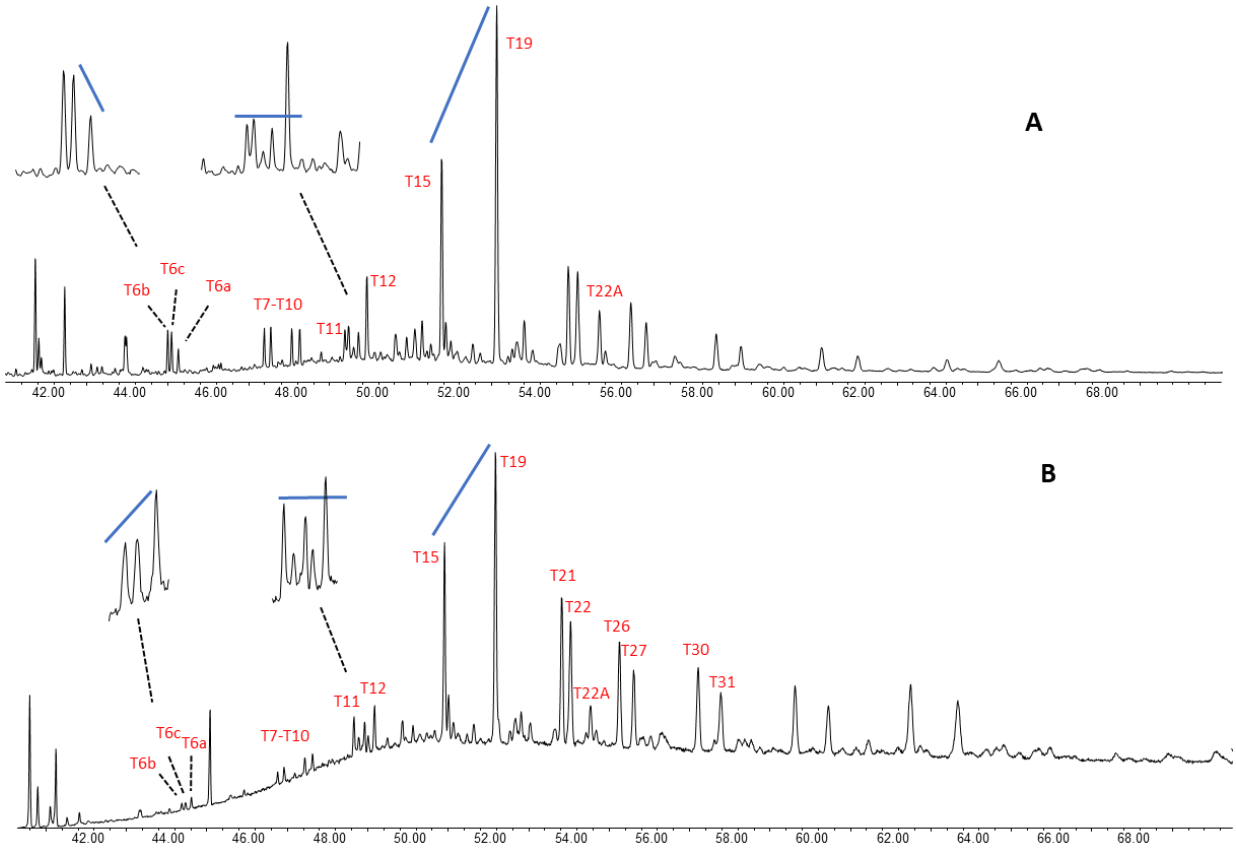


**Figure 4. Biomarker m/z 191 Triterpane Fingerprint Traces**

**A) Ship's Tanks Composite Sample**
**B) HC PS 29AGO2023**

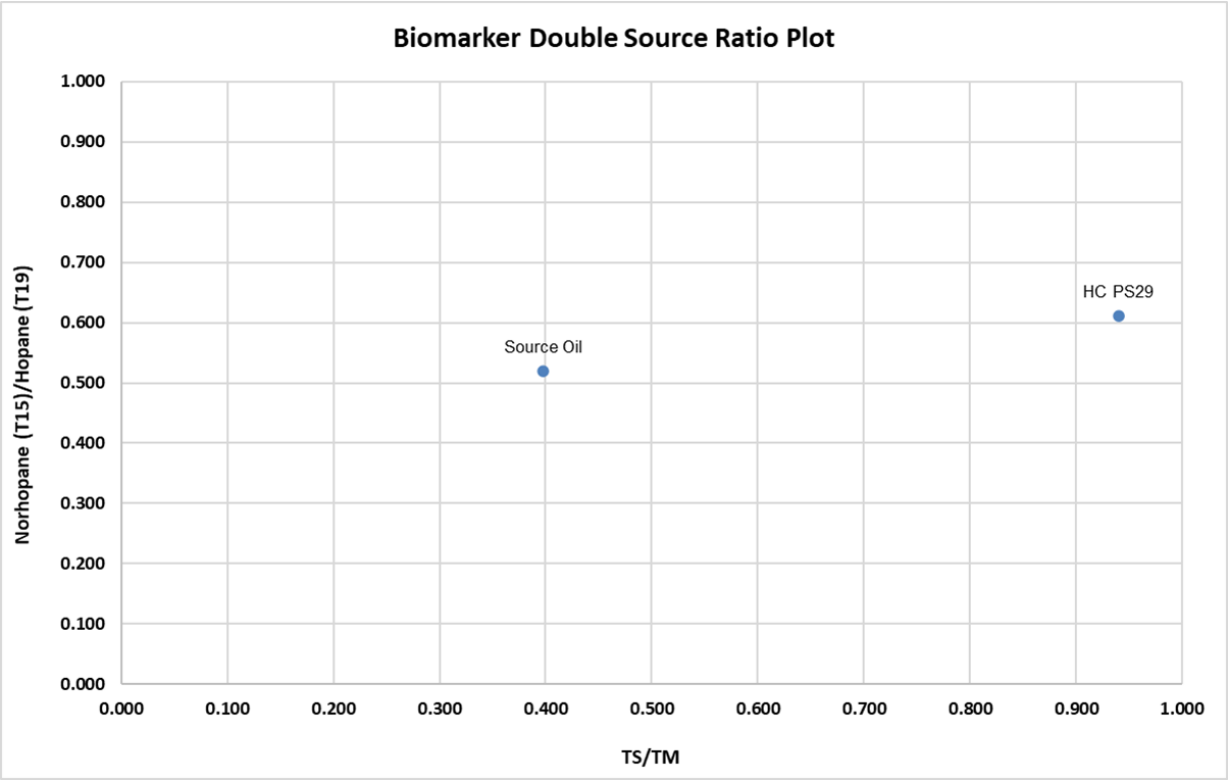


**Figure 5. Biomarker Double Source Ratio Plots**

**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 |
| HC PS 29AGO2023 | L2352169-03 | 08/29/2023 | Oily Solid | 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_2$9) |
| C30 | n-Triacontane ($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**

9/11/23 L2352169 Nº 007222

CERPER CERTIFICACIONES DEL PERÚ S.A.

# CADENA DE CUSTODIA
## (Registro de Campo -Toma de muestra de aguas, suelos, lodos y sedimentos)

Página 1 de 1

EXPEDIENTE: 12103-2023

HS: 23006017

JOB NUMBER: 23LM00269346748

SOLICITANTE: REFINERIA LA PAMPILLA S.A.A

LUGAR: PLAYA PASAMAYO | Distrito: AUCALLAMA | Provincia: HUARAL | Departamento: LIMA

PERSONA DE CONTACTO: Carlos Torres

NORMA:

1 SMEWW – APHA – AWWA – WEF 23rd Ed. 2017. Collection and preservation of samples. Part 9060 A-B ( ) 1060 B-C ( ) 1020 B ( ) 1030 B ( ) 1060 B ( ) 1070 B ( )
2 Instructivo 6059-I Toma de muestras de sedimentos ( )
3 NTP 214.305 - 1987 (Revisada el 2016) Agua Potable. Toma de muestra. ITEM 4.4 ( ) ITEM 4.3 ( )
4 RM N° 271-2020-PRODUCE. Protocolo para el Monitoreo de efluentes de los establecimientos industriales pesqueros de consumo humano directo e indirecto ( )
5 RJ N° 010-2016-ANA. Protocolo nacional para el monitoreo de la calidad de los recursos hídricos superficiales ( )
6 NTP-ISO 9867-1:2013 (Revisada el 2018) Calidad de agua. Muestreo. Parte 10 - Guía para el muestreo de aguas residuales ( )
7 NTP 214.060.2016 AGUAS RESIDUALES. Protocolo de muestreo de aguas residuales no domésticas que se descargan en la red de alcantarillado ( )
8 RM N° 273-2013-VIVIENDA. Protocolo de monitoreo de la calidad de los efluentes de los plantas de tratamiento de aguas residuales domésticas o municipales. PTAR ( )
9 RM N° 085-2014-MINAM. Guía para el muestreo de suelos ( )
10 Protocolo de muestreo de calidad de agua sub sector hidrocarburos DGAE-EM ( )
11 Otros: ( )

| DESCRIPCIÓN DE LA MUESTRA | | | | | | | | PARÁMETROS DE ANÁLISIS EN EL LABORATORIO | PARÁMETROS DE CAMPO | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PUNTO DE LA TOMA DE MUESTRA | MUESTREO FECHA | MUESTREO HORA | MATRIZ (1) | GEOREFERENCIA (UTM WGS84) ESTE (m) | GEOREFERENCIA (UTM WGS84) NORTE (m) | ALTITUD (m.s.n.m) ZONA (17,18,19) (K,L,M) | CANTIDAD DE ENVASES | FINGER PRINT | pH (Unidades de pH) | Temperatura Ambiental (°C) | Temperatura (°C) | Oxígeno Disuelto (mg/L) | Conductividad µS/cm ( ) mS/cm ( ) | Salinidad (UPS) | Cloro residual mg $Cl_2$/L Libre ( ) Total ( ) | Turbiedad (UNT) | Caudal ($m^3$/s) | Transparencia cm ( ) m ( ) |
| HC PS 29AGO2023 | 29.08.23 | 13:11 | * | 0257474 | 8712997 | 18L | 01 | ✓ | | | | | | | | | | |
| Total de Envases | | | | | | | 01 | | | | | | | | | | | |

52169 03

(1) Matriz (s)

AC = Agua para uso y consumo humano:
AN = Agua Natural:
AP = Agua de proceso:
ASAL = Agua Salina:
AR = Agua Residual:
SM = Sedimento:
SU = Suelo
Otro (*) RESTOS SOLIDOS DE HIDROCARBUROS

Condiciones de las muestras:
Temperatura ambiente ( ) Refrigerada (X) Congelada ( ) Caja conservadora (X)
Herméticamente cerrada (X) Ice pack (X) Hielo de calidad potable ( )

Equipos: Utilizados

| Equipo | Código | Equipo | Código |
|---|---|---|---|
| 1 GPS | 003 | 4 | |
| 2 | | 5 | |
| 3 | | 6 | |

Observaciones: SE PROCEDIÓ A LLEGAR AL PUNTO DE MUESTREO INDICADO Y DENOMINADO POR EL REPRESENTANTE DEL CLIENTE QUIEN ESTUVO PRESENTE DURANTE EL MUESTREO. SE REALIZÓ EL PROCESO DE CARACTERIZACIÓN DE LA MUESTRA LA CUAL PRESENTO COLORACIÓN AZUL VERDOSA Y OLOR A HIDROCARBURO. LA MUESTRA FUE PRECINTADA EN CAMPO CON PRECINTO N° 0202370. LAS COORDENADASSE TOMARON IN SITU.

Responsable de la toma de muestra:
Firma:
Inspector Cerper: FRANCO ALVA
Inspectores de apoyo: JUNIER CHUNGA
Hora de inicio: 07:30 Hora de término: 15:00

Representante del cliente: Rec: 9/11/23 09:41
Firma:
Nombre: CARLOS TORRES YACHACHIN
DNI: 48001656
Cargo: SUPERVISOR PLAYA

Recepción de muestras
Nombre: Maelia Machuca Acuña
Fecha: 06-09-23 Hora: 16:38

interte
06 SEP. 2023
LAB. CALEB BRE
RECEIVE

**Attachment 2**

**Analytical Data**

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC PS 29AGO2023 | |
| Lab ID | L2352169-03 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1843204 | |
| Date Collected | 8/29/2023 | |
| Date Received | 9/11/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/24/2023 | |
| Sample Size(wet) | 0.00397 | g |
| % Solid | 100 | |
| File ID | F1710232345 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 252 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | | U | 252 |
| SHC | C10 | DECANE (C10) | 11.3 | J | 252 |
| SHC | C11 | UNDECANE | | U | 252 |
| SHC | C12 | DODECANE (C12) | 26.7 | J | 252 |
| SHC | C13 | TRIDECANE | 38.3 | J | 252 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 16.6 | J | 252 |
| SHC | C14 | TETRADECANE (C14) | 53.1 | J | 252 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 37.5 | J | 252 |
| SHC | C15 | PENTADECANE (C15) | 125 | J | 252 |
| SHC | C16 | HEXADECANE (C16) | 170 | J | 252 |
| SHC | 1650 | NORPRISTANE (1650) | 55.4 | J | 252 |
| SHC | C17 | HEPTADECANE (C17) | 207 | J | 252 |
| SHC | Pr | PRISTANE | 108 | J | 252 |
| SHC | C18 | OCTADECANE (C18) | 220 | JCB | 252 |
| SHC | Ph | PHYTANE | 136 | J | 252 |
| SHC | C19 | NONADECANE (C19) | 239 | J | 252 |
| SHC | C20 | EICOSANE (C20) | 212 | J | 252 |
| SHC | C21 | HENEICOSANE (C21) | 148 | J | 252 |
| SHC | C22 | DOCOSANE (C22) | 89.9 | J | 252 |
| SHC | C23 | TRICOSANE (C23) | 1770 | | 252 |
| SHC | C24 | TETRACOSANE (C24) | 131 | J | 252 |
| SHC | C25 | PENTACOSANE (C25) | 110 | J | 252 |
| SHC | C26 | HEXACOSANE (C26) | 83.4 | J | 252 |
| SHC | C27 | HEPTACOSANE (C27) | 370 | | 252 |
| SHC | C28 | OCTACOSANE (C28) | | U | 252 |
| SHC | C29 | NONACOSANE (C29) | | U | 252 |
| SHC | C30 | TRIACONTANE (C30) | | U | 252 |
| SHC | C31 | HENTATRIACONTANE (C31) | 284 | | 252 |
| SHC | C32 | DOTRIACONTANE (C32) | | U | 252 |
| SHC | C33 | TRITRIACONTANE (C33) | | U | 252 |
| SHC | C34 | TETRATRIACONTANE (C34) | | U | 252 |
| SHC | C35 | PENTATRIACONTANE (C35) | | U | 252 |
| SHC | C36 | HEXATRIACONTANE (C36) | | U | 252 |
| SHC | C37 | HEPTATRIACONTANE (C37) | | U | 252 |
| SHC | C38 | OCTATRIACONTANE (C38) | | U | 252 |
| SHC | C39 | NONATRIACONTANE (C39) | | U | 252 |
| SHC | C40 | TETRACONTANE (C40) | | U | 252 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 697000 | | 8310 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 4640 | J | 252 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 98 |
| D50-TETRACOSANE | 100 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8015D(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/24/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1710232331 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 278 |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | U | 278 |
| SHC | C10 | DECANE (C10) | U | 278 |
| SHC | C11 | UNDECANE | U | 278 |
| SHC | C12 | DODECANE (C12) | U | 278 |
| SHC | C13 | TRIDECANE | U | 278 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | U | 278 |
| SHC | C14 | TETRADECANE (C14) | U | 278 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | U | 278 |
| SHC | C15 | PENTADECANE (C15) | U | 278 |
| SHC | C16 | HEXADECANE (C16) | U | 278 |
| SHC | 1650 | NORPRISTANE (1650) | U | 278 |
| SHC | C17 | HEPTADECANE (C17) | U | 278 |
| SHC | Pr | PRISTANE | U | 278 |
| SHC | C18 | OCTADECANE (C18) | 267 JC | 278 |
| SHC | Ph | PHYTANE | U | 278 |
| SHC | C19 | NONADECANE (C19) | U | 278 |
| SHC | C20 | EICOSANE (C20) | U | 278 |
| SHC | C21 | HENEICOSANE (C21) | U | 278 |
| SHC | C22 | DOCOSANE (C22) | U | 278 |
| SHC | C23 | TRICOSANE (C23) | U | 278 |
| SHC | C24 | TETRACOSANE (C24) | U | 278 |
| SHC | C25 | PENTACOSANE (C25) | U | 278 |
| SHC | C26 | HEXACOSANE (C26) | 3.90 J | 278 |
| SHC | C27 | HEPTACOSANE (C27) | 4.18 J | 278 |
| SHC | C28 | OCTACOSANE (C28) | 12.8 J | 278 |
| SHC | C29 | NONACOSANE (C29) | U | 278 |
| SHC | C30 | TRIACONTANE (C30) | U | 278 |
| SHC | C31 | HENTATRIACONTANE (C31) | U | 278 |
| SHC | C32 | DOTRIACONTANE (C32) | U | 278 |
| SHC | C33 | TRITRIACONTANE (C33) | U | 278 |
| SHC | C34 | TETRATRIACONTANE (C34) | U | 278 |
| SHC | C35 | PENTATRIACONTANE (C35) | U | 278 |
| SHC | C36 | HEXATRIACONTANE (C36) | U | 278 |
| SHC | C37 | HEPTATRIACONTANE (C37) | U | 278 |
| SHC | C38 | OCTATRIACONTANE (C38) | U | 278 |
| SHC | C39 | NONATRIACONTANE (C39) | U | 278 |
| SHC | C40 | TETRACONTANE (C40) | U | 278 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | U | 9190 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 288 J | 278 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Control S | |
| Lab ID | WG1843204-2 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/24/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1710232333 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 278 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5390 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C10 | DECANE (C10) | 5180 | 278 | 93 | 5570 | 50 | 130 |
| SHC | C12 | DODECANE (C12) | 5350 | 278 | 96 | 5570 | 50 | 130 |
| SHC | C14 | TETRADECANE (C14) | 5340 | 278 | 96 | 5570 | 50 | 130 |
| SHC | C16 | HEXADECANE (C16) | 5750 | 278 | 103 | 5570 | 50 | 130 |
| SHC | C18 | OCTADECANE (C18) | 5820 | 278 | 104 | 5570 | 50 | 130 |
| SHC | C19 | NONADECANE (C19) | 5390 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C20 | EICOSANE (C20) | 5540 | 278 | 100 | 5570 | 50 | 130 |
| SHC | C22 | DOCOSANE (C22) | 5420 | 278 | 97 | 5570 | 50 | 130 |
| SHC | C24 | TETRACOSANE (C24) | 5680 | 278 | 102 | 5570 | 50 | 130 |
| SHC | C26 | HEXACOSANE (C26) | 5560 | 278 | 100 | 5570 | 50 | 130 |
| SHC | C28 | OCTACOSANE (C28) | 5540 | 278 | 99 | 5570 | 50 | 130 |
| SHC | C30 | TRIACONTANE (C30) | 5620 | 278 | 101 | 5570 | 50 | 130 |
| SHC | C36 | HEXATRIACONTANE (C36) | 5170 | 278 | 93 | 5570 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1843204-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8015D(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/24/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1710232335 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 278 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 5500 | 278 | 99 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C10 | DECANE (C10) | 5270 | 278 | 94 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C12 | DODECANE (C12) | 5370 | 278 | 96 | 5570 | 50 | 130 | 0 | 30 |
| SHC | C14 | TETRADECANE (C14) | 5420 | 278 | 97 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C16 | HEXADECANE (C16) | 5820 | 278 | 104 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C18 | OCTADECANE (C18) | 5920 | 278 | 106 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C19 | NONADECANE (C19) | 5460 | 278 | 98 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C20 | EICOSANE (C20) | 5620 | 278 | 101 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C22 | DOCOSANE (C22) | 5500 | 278 | 99 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C24 | TETRACOSANE (C24) | 5760 | 278 | 103 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C26 | HEXACOSANE (C26) | 5640 | 278 | 101 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C28 | OCTACOSANE (C28) | 5640 | 278 | 101 | 5570 | 50 | 130 | 2 | 30 |
| SHC | C30 | TRIACONTANE (C30) | 5700 | 278 | 102 | 5570 | 50 | 130 | 1 | 30 |
| SHC | C36 | HEXATRIACONTANE (C36) | 5240 | 278 | 94 | 5570 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| O-TERPHENYL | 99 |
| D50-TETRACOSANE | 102 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1786523-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8015D(M)-A2-NFSHC |
| Batch ID | WG1786523-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 4/25/2023 |
| Sample Size(wet) | 0.10176 g |
| % Solid | 100 |
| File ID | F1704242329 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 0.983 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| SHC | C9 | NONANE (C9) | 6700 | 0.983 | 106 | 6286 | 65 | 135 |
| SHC | C10 | DECANE (C10) | 5260 | 0.983 | 104 | 5047 | 65 | 135 |
| SHC | C11 | UNDECANE | 4920 | 0.983 | 105 | 4703 | 65 | 135 |
| SHC | C12 | DODECANE (C12) | 4450 | 0.983 | 107 | 4155 | 65 | 135 |
| SHC | C13 | TRIDECANE | 4200 | 0.983 | 103 | 4058 | 65 | 135 |
| SHC | 1380 | 2,6,10-TRIMETHYLDODECANE (1380) | 957 | 0.983 | 113 | 845 | 65 | 135 |
| SHC | C14 | TETRADECANE (C14) | 3820 | 0.983 | 104 | 3670 | 65 | 135 |
| SHC | 1470 | 2,6,10-TRIMETHYLTRIDECANE (1470) | 1460 | 0.983 | 107 | 1367 | 65 | 135 |
| SHC | C15 | PENTADECANE (C15) | 4300 | 0.983 | 117 | 3660 | 65 | 135 |
| SHC | C16 | HEXADECANE (C16) | 3490 | 0.983 | 105 | 3330 | 65 | 135 |
| SHC | 1650 | NORPRISTANE (1650) | 1140 | 0.983 | 104 | 1093 | 65 | 135 |
| SHC | C17 | HEPTADECANE (C17) | 2980 | 0.983 | 99 | 3012 | 65 | 135 |
| SHC | Pr | PRISTANE | 2340 | 0.983 | 109 | 2145 | 65 | 135 |
| SHC | C18 | OCTADECANE (C18) | 2710 | 0.983 | 100 | 2700 | 65 | 135 |
| SHC | Ph | PHYTANE | 1480 | 0.983 | 122 | 1215 | 65 | 135 |
| SHC | C19 | NONADECANE (C19) | 2580 | 0.983 | 112 | 2305 | 65 | 135 |
| SHC | C20 | EICOSANE (C20) | 2600 | 0.983 | 111 | 2337 | 65 | 135 |
| SHC | C21 | HENEICOSANE (C21) | 2270 | 0.983 | 111 | 2044 | 65 | 135 |
| SHC | C22 | DOCOSANE (C22) | 2030 | 0.983 | 103 | 1972 | 65 | 135 |
| SHC | C23 | TRICOSANE (C23) | 1970 | 0.983 | 113 | 1745 | 65 | 135 |
| SHC | C24 | TETRACOSANE (C24) | 1800 | 0.983 | 110 | 1641 | 65 | 135 |
| SHC | C25 | PENTACOSANE (C25) | 1800 | 0.983 | 115 | 1562 | 65 | 135 |
| SHC | C26 | HEXACOSANE (C26) | 1440 | 0.983 | 104 | 1378 | 65 | 135 |
| SHC | C27 | HEPTACOSANE (C27) | 1220 | 0.983 | 113 | 1083 | 65 | 135 |
| SHC | C28 | OCTACOSANE (C28) | 866 | 0.983 | 112 | 776 | 65 | 135 |
| SHC | C29 | NONACOSANE (C29) | 877 | 0.983 | 119 | 734 | 65 | 135 |
| SHC | C30 | TRIACONTANE (C30) | 655 | 0.983 | 104 | 627 | 65 | 135 |
| SHC | C31 | HENTATRIACONTANE (C31) | 640 | 0.983 | 124 | 514 | 65 | 135 |
| SHC | C32 | DOTRIACONTANE (C32) | 406 | 0.983 | 89 | 458 | 65 | 135 |
| SHC | C33 | TRITRIACONTANE (C33) | 378 | 0.983 | 97 | 388 | 65 | 135 |
| SHC | C34 | TETRATRIACONTANE (C34) | 326 | 0.983 | 94 | 347 | 65 | 135 |
| SHC | C35 | PENTATRIACONTANE (C35) | 324 | 0.983 | 116 | 278 | 65 | 135 |
| SHC | C36 | HEXATRIACONTANE (C36) | 182 | 0.983 | 98 | 186 | 65 | 135 |
| SHC | C37 | HEPTATRIACONTANE (C37) | 180 | 0.983 | 118 | 152 | 65 | 135 |
| SHC | C38 | OCTATRIACONTANE (C38) | 148 | 0.983 | 113 | 131 | 65 | 135 |
| SHC | C39 | NONATRIACONTANE (C39) | 100 | 0.983 | 112 | 89 | 65 | 135 |
| SHC | C40 | TETRACONTANE (C40) | 94.8 | 0.983 | 103 | 92 | 65 | 135 |
| SHC | TPH | TOTAL PETROLEUM HYDROCARBONS (C9-C44) | 566000 | 0.983 | 102 | 554993 | 65 | 135 |
| SHC | TSH | TOTAL SATURATED HYDROCARBONS | 82694 | 0.983 | 121 | 68122 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC PS 29AGO2023 |
| Lab ID | L2352169-03 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | 8/29/2023 |
| Date Received | 9/11/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/27/2023 |
| Sample Size(wet) | 0.00397 g |
| % Solid | 100 |
| File ID | F1210262313 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.26 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 1.90 | | 1.26 |
| 2 | D1 | C1-DECALINS | 10.6 | | 2.52 |
| 2 | D2 | C2-DECALINS | 32.6 | | 2.52 |
| 2 | D3 | C3-DECALINS | 25.0 | | 2.52 |
| 2 | D4 | C4-DECALINS | 22.3 | | 2.52 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.52 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 5.47 | | 2.52 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 0.867 | J | 2.52 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.52 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.52 |
| A | N0 | NAPHTHALENE | 1.85 | JB | 2.52 |
| 2 | N1 | C1-NAPHTHALENES | 141 | | 2.52 |
| 2 | N2 | C2-NAPHTHALENES | 81.4 | | 2.52 |
| 2 | N3 | C3-NAPHTHALENES | 37.3 | | 2.52 |
| 2 | N4 | C4-NAPHTHALENES | 15.5 | | 2.52 |
| 2 | B | BIPHENYL | 4.40 | | 2.52 |
| 3 | DF | DIBENZOFURAN | 0.470 | J | 2.52 |
| 3 | AY | ACENAPHTHYLENE | 0.198 | JB | 2.52 |
| 3 | AE | ACENAPHTHENE | 1.06 | J | 2.52 |
| 3 | F0 | FLUORENE | 1.48 | J | 2.52 |
| 3 | F1 | C1-FLUORENES | 2.99 | | 2.52 |
| 3 | F2 | C2-FLUORENES | 8.60 | | 2.52 |
| 3 | F3 | C3-FLUORENES | 23.6 | G | 2.52 |
| 3 | A0 | ANTHRACENE | 0.370 | JB | 2.52 |
| 3 | P0 | PHENANTHRENE | 2.20 | JB | 2.52 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 5.58 | | 2.52 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 9.90 | | 2.52 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 9.56 | | 2.52 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | | U | 2.52 |
| 3 | RET | RETENE | | U | 2.52 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 0.578 | J | 2.52 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 3.20 | | 2.52 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 10.6 | | 2.52 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 16.1 | | 2.52 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 12.9 | | 2.52 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.52 |
| 4 | FL0 | FLUORANTHENE | 0.385 | JB | 2.52 |
| 4 | PY0 | PYRENE | 1.06 | JB | 2.52 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 3.25 | B | 2.52 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 2.98 | | 2.52 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.52 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.52 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.730 | JB | 2.52 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.52 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.52 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.52 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.52 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.598 | JB | 2.52 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 0.784 | JB | 2.52 |
| 4 | BC1 | C1-CHRYSENES | 1.22 | JB | 2.52 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.52 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.52 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.52 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 0.864 | JB | 2.52 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | HC PS 29AGO2023 |
| Lab ID | L2352169-03 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | 8/29/2023 |
| Date Received | 9/11/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/27/2023 |
| Sample Size(wet) | 0.00397 g |
| % Solid | 100 |
| File ID | F1210262313 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.26 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.502 | JB | 2.52 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.52 |
| 5 | BEP | BENZO(E)PYRENE | 1.07 | JB | 2.52 |
| 5 | BAP | BENZO(A)PYRENE | 0.869 | JB | 2.52 |
| 5 | PER | PERYLENE | 17.1 | | 2.52 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 0.767 | JB | 2.52 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | | U | 2.52 |
| 6 | GHI | BENZO(GHI)PERYLENE | 0.738 | JB | 2.52 |
| O | CAR | CARBAZOLE | | U | 2.52 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 1.90 | J | 2.52 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.52 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 0.692 | J | 2.52 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 0.959 | J | 2.52 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | 1.04 | J | 2.52 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.52 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | 1.47 | J | 2.52 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 1.17 | J | 2.52 |
| A | 1MN | 1-METHYLNAPHTHALENE | 84.8 | | 2.52 |
| A | 2MN | 2-METHYLNAPHTHALENE | 130 | | 2.52 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 35.9 | | 2.52 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 3.79 | | 2.52 |
| H30 | T19 | HOPANE (T19) | 160 | | 2.52 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 8.04 | | 2.52 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 4.51 | | 2.52 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 5.51 | | 2.52 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 3.92 | | 2.52 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 3.20 | | 2.52 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 3.64 | | 2.52 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 4.77 | | 2.52 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 6.38 | | 2.52 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 7.45 | | 2.52 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 9.01 | | 2.52 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 19.0 | | 2.52 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 9.08 | | 2.52 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 7.01 | | 2.52 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 20.2 | | 2.52 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 7.75 | | 2.52 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | 6.32 | | 2.52 |
| H29 | T15 | 30-NORHOPANE (T15) | 97.9 | | 2.52 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 22.6 | | 2.52 |
| X | X | 17A(H)-DIAHOPANE (X) | 12.4 | | 2.52 |
| M29 | T17 | 30-NORMORETANE (T17) | 11.2 | | 2.52 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.52 |
| M30 | T20 | MORETANE (T20) | 18.8 | | 2.52 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 89.1 | | 2.52 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 89.0 | | 2.52 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | 24.7 | | 2.52 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 73.2 | | 2.52 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 55.4 | | 2.52 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 66.2 | | 2.52 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 51.2 | | 2.52 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 59.0 | | 2.52 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 48.6 | | 2.52 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 72.3 | | 2.52 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | HC PS 29AGO2023 | |
| Lab ID | L2352169-03 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | 8/29/2023 | |
| Date Received | 9/11/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/27/2023 | |
| Sample Size(wet) | 0.00397 | g |
| % Solid | 100 | |
| File ID | F1210262313 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.26 | |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 79.2 | | 2.52 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 19.0 | | 2.52 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 13.6 | | 2.52 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 11.7 | | 2.52 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 40.1 | | 2.52 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 48.4 | | 2.52 |
| d29R | S18 | UNKNOWN STERANE (S18) | 10.0 | | 2.52 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 1.99 | J | 2.52 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 16.4 | | 2.52 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 23.4 | | 2.52 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 25.7 | | 2.52 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 39.2 | | 2.52 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 32.7 | | 2.52 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 32.8 | | 2.52 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 34.0 | | 2.52 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 52.3 | | 2.52 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 60.6 | | 2.52 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 35.2 | | 2.52 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 5.85 | | 2.52 |
| SC28TAS | TAS02 | C28,20S TAS | 7.19 | | 2.52 |
| RC27TAS | TAS03 | C27,20R TAS | 9.47 | | 2.52 |
| RC28TAS | TAS04 | C28,20R TAS | 1.81 | J | 2.52 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 95 |
| PHENANTHRENE-D10 | 94 |
| BENZO(A)PYRENE-D12 | 94 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262307 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.39 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | | U | 1.39 |
| 2 | D1 | C1-DECALINS | | U | 2.78 |
| 2 | D2 | C2-DECALINS | | U | 2.78 |
| 2 | D3 | C3-DECALINS | | U | 2.78 |
| 2 | D4 | C4-DECALINS | | U | 2.78 |
| S | BT0 | BENZOTHIOPHENE | | U | 2.78 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | | U | 2.78 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | | U | 2.78 |
| A | N0 | NAPHTHALENE | 0.224 | J | 2.78 |
| 2 | N1 | C1-NAPHTHALENES | | U | 2.78 |
| 2 | N2 | C2-NAPHTHALENES | | U | 2.78 |
| 2 | N3 | C3-NAPHTHALENES | | U | 2.78 |
| 2 | N4 | C4-NAPHTHALENES | | U | 2.78 |
| 2 | B | BIPHENYL | | U | 2.78 |
| 3 | DF | DIBENZOFURAN | | U | 2.78 |
| 3 | AY | ACENAPHTHYLENE | 0.248 | J | 2.78 |
| 3 | AE | ACENAPHTHENE | | U | 2.78 |
| 3 | F0 | FLUORENE | | U | 2.78 |
| 3 | F1 | C1-FLUORENES | | U | 2.78 |
| 3 | F2 | C2-FLUORENES | | U | 2.78 |
| 3 | F3 | C3-FLUORENES | | U | 2.78 |
| 3 | A0 | ANTHRACENE | 0.230 | J | 2.78 |
| 3 | P0 | PHENANTHRENE | 0.697 | J | 2.78 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | | U | 2.78 |
| 3 | RET | RETENE | | U | 2.78 |
| 3 | DBT0 | DIBENZOTHIOPHENE | | U | 2.78 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | | U | 2.78 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | | U | 2.78 |
| 4 | BF | BENZO(B)FLUORENE | | U | 2.78 |
| 4 | FL0 | FLUORANTHENE | 0.609 | J | 2.78 |
| 4 | PY0 | PYRENE | 0.904 | J | 2.78 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 1.21 | J | 2.78 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | | U | 2.78 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 0.254 | J | 2.78 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | | U | 2.78 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 0.509 | J | 2.78 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 1.07 | J | 2.78 |
| 4 | BC1 | C1-CHRYSENES | 0.561 | J | 2.78 |
| 4 | BC2 | C2-CHRYSENES | | U | 2.78 |
| 4 | BC3 | C3-CHRYSENES | | U | 2.78 |
| 4 | BC4 | C4-CHRYSENES | | U | 2.78 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 1.80 | J | 2.78 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Method Bl |
| Lab ID | WG1843204-1 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262307 |
| Units | mg/kg |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 1.39 |

| Class | Abbrev | Analytes | Result | | SSRL |
|---|---|---|---|---|---|
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 0.912 | J | 2.78 |
| 5 | BAF | BENZO(A)FLUORANTHENE | | U | 2.78 |
| 5 | BEP | BENZO(E)PYRENE | 1.47 | J | 2.78 |
| 5 | BAP | BENZO(A)PYRENE | 1.18 | J | 2.78 |
| 5 | PER | PERYLENE | 0.543 | J | 2.78 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 1.36 | J | 2.78 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 0.670 | J | 2.78 |
| 6 | GHI | BENZO(GHI)PERYLENE | 1.43 | J | 2.78 |
| O | CAR | CARBAZOLE | | U | 2.78 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | | U | 2.78 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | | U | 2.78 |
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | | U | 2.78 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | | U | 2.78 |
| 3 | 2MP | 2-METHYLPHENANTHRENE (2MP) | | U | 2.78 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | | U | 2.78 |
| 3 | 9MP | 9/4-METHYLPHENANTHRENE (9MP) | | U | 2.78 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | | U | 2.78 |
| A | 1MN | 1-METHYLNAPHTHALENE | | U | 2.78 |
| A | 2MN | 2-METHYLNAPHTHALENE | | U | 2.78 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | | U | 2.78 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | | U | 2.78 |
| H30 | T19 | HOPANE (T19) | | U | 2.78 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | | U | 2.78 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | | U | 2.78 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | | U | 2.78 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | | U | 2.78 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | | U | 2.78 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | | U | 2.78 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | | U | 2.78 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | | U | 2.78 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | | U | 2.78 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | | U | 2.78 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | | U | 2.78 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | | U | 2.78 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | | U | 2.78 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | | U | 2.78 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | | U | 2.78 |
| 25N | T14b | 17A(H),21B(H)-25-NORHOPANE (T14B) | | U | 2.78 |
| H29 | T15 | 30-NORHOPANE (T15) | | U | 2.78 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | | U | 2.78 |
| X | X | 17A(H)-DIAHOPANE (X) | | U | 2.78 |
| M29 | T17 | 30-NORMORETANE (T17) | | U | 2.78 |
| OL | T18 | 18A(H)&18B(H)-OLEANANES (T18) | | U | 2.78 |
| M30 | T20 | MORETANE (T20) | | U | 2.78 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | | U | 2.78 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | | U | 2.78 |
| T22A | T22A | GAMMACERANE/C32-DIAHOPANE | | U | 2.78 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | | U | 2.78 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | | U | 2.78 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | | U | 2.78 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | | U | 2.78 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | | U | 2.78 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | | U | 2.78 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | | U | 2.78 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Laboratory Method Bl | |
| Lab ID | WG1843204-1 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1210262307 | |
| Units | mg/kg | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 1.39 | |

| Class | Abbrev | Analytes | Result | SSRL |
|---|---|---|---|---|
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | U | 2.78 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | U | 2.78 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | U | 2.78 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | U | 2.78 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | U | 2.78 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | U | 2.78 |
| d29R | S18 | UNKNOWN STERANE (S18) | U | 2.78 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | U | 2.78 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | U | 2.78 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | U | 2.78 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | U | 2.78 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | U | 2.78 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | U | 2.78 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | U | 2.78 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | U | 2.78 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | U | 2.78 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | U | 2.78 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | U | 2.78 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | U | 2.78 |
| SC28TAS | TAS02 | C28,20S TAS | U | 2.78 |
| RC27TAS | TAS03 | C27,20R TAS | U | 2.78 |
| RC28TAS | TAS04 | C28,20R TAS | U | 2.78 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 100 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 104 |
| 5B(H)CHOLANE | 91 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Laboratory Control S |
| Lab ID | WG1843204-2 |
| Matrix | SOLID |
| Matrix Description | |
| Reference Method | 8270E-SIM(M) |
| Batch ID | WG1843204 |
| Date Collected | NA |
| Date Received | 10/23/2023 |
| Date Prepped | 10/23/2023 |
| Date Analyzed | 10/26/2023 |
| Sample Size(wet) | 0.00359 g |
| % Solid | 100 |
| File ID | F1210262308 |
| Units | % |
| Final Volume | 1 |
| Dilution | 1 |
| Reporting Limit | 2.78 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 279 | 2.78 | 100 | 278 | 50 | 130 |
| 3 | AY | ACENAPHTHYLENE | 268 | 2.78 | 96 | 278 | 50 | 130 |
| 3 | AE | ACENAPHTHENE | 254 | 2.78 | 91 | 278 | 50 | 130 |
| 3 | F0 | FLUORENE | 277 | 2.78 | 99 | 278 | 50 | 130 |
| 3 | A0 | ANTHRACENE | 286 | 2.78 | 103 | 278 | 50 | 130 |
| 3 | P0 | PHENANTHRENE | 276 | 2.78 | 99 | 278 | 50 | 130 |
| 4 | FL0 | FLUORANTHENE | 259 | 2.78 | 93 | 278 | 50 | 130 |
| 4 | PY0 | PYRENE | 275 | 2.78 | 99 | 278 | 50 | 130 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 262 | 2.78 | 94 | 278 | 50 | 130 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 266 | 2.78 | 96 | 278 | 50 | 130 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 262 | 2.78 | 94 | 278 | 50 | 130 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 279 | 2.78 | 100 | 278 | 50 | 130 |
| 5 | BAP | BENZO(A)PYRENE | 285 | 2.78 | 102 | 278 | 50 | 130 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 272 | 2.78 | 98 | 278 | 50 | 130 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 278 | 2.78 | 100 | 278 | 50 | 130 |
| 6 | GHI | BENZO(GHI)PERYLENE | 270 | 2.78 | 97 | 278 | 50 | 130 |
| A | 2MN | 2-METHYLNAPHTHALENE | 245 | 2.78 | 88 | 278 | 50 | 130 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 99 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 101 |
| 5B(H)CHOLANE | 86 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | LCS Duplicate | |
| Lab ID | WG1843204-3 | |
| Matrix | SOLID | |
| Matrix Description | | |
| Reference Method | 8270E-SIM(M) | |
| Batch ID | WG1843204 | |
| Date Collected | NA | |
| Date Received | 10/23/2023 | |
| Date Prepped | 10/23/2023 | |
| Date Analyzed | 10/26/2023 | |
| Sample Size(wet) | 0.00359 | g |
| % Solid | 100 | |
| File ID | F1210262309 | |
| Units | % | |
| Final Volume | 1 | |
| Dilution | 1 | |
| Reporting Limit | 2.78 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| A | N0 | NAPHTHALENE | 285 | 2.78 | 102 | 278 | 50 | 130 | 2 | 30 |
| 3 | AY | ACENAPHTHYLENE | 272 | 2.78 | 98 | 278 | 50 | 130 | 2 | 30 |
| 3 | AE | ACENAPHTHENE | 258 | 2.78 | 92 | 278 | 50 | 130 | 1 | 30 |
| 3 | F0 | FLUORENE | 280 | 2.78 | 100 | 278 | 50 | 130 | 1 | 30 |
| 3 | A0 | ANTHRACENE | 289 | 2.78 | 104 | 278 | 50 | 130 | 1 | 30 |
| 3 | P0 | PHENANTHRENE | 280 | 2.78 | 100 | 278 | 50 | 130 | 1 | 30 |
| 4 | FL0 | FLUORANTHENE | 264 | 2.78 | 95 | 278 | 50 | 130 | 2 | 30 |
| 4 | PY0 | PYRENE | 280 | 2.78 | 101 | 278 | 50 | 130 | 2 | 30 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 265 | 2.78 | 95 | 278 | 50 | 130 | 1 | 30 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 273 | 2.78 | 98 | 278 | 50 | 130 | 2 | 30 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 265 | 2.78 | 95 | 278 | 50 | 130 | 1 | 30 |
| 5 | BJKF | BENZO(J)+(K)FLUORANTHENE | 286 | 2.78 | 103 | 278 | 50 | 130 | 3 | 30 |
| 5 | BAP | BENZO(A)PYRENE | 288 | 2.78 | 104 | 278 | 50 | 130 | 2 | 30 |
| 6 | IND | INDENO(1,2,3-CD)PYRENE | 285 | 2.78 | 102 | 278 | 50 | 130 | 4 | 30 |
| 6 | DA | DIBENZ(A,H)+(A,C)ANTHRACENE | 282 | 2.78 | 101 | 278 | 50 | 130 | 1 | 30 |
| 6 | GHI | BENZO(GHI)PERYLENE | 274 | 2.78 | 98 | 278 | 50 | 130 | 1 | 30 |
| A | 2MN | 2-METHYLNAPHTHALENE | 249 | 2.78 | 89 | 278 | 50 | 130 | 1 | 30 |

| Surrogates (% Recovery) | |
|---|---|
| NAPHTHALENE-D8 | 100 |
| PHENANTHRENE-D10 | 100 |
| BENZO(A)PYRENE-D12 | 102 |
| 5B(H)CHOLANE | 87 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 2 | D0 | CIS/TRANS-DECALIN | 484 | 1.94 | 101 | 477.66 | 65 | 135 |
| 2 | D1 | C1-DECALINS | 784 | 1.94 | 103 | 760.39 | 65 | 135 |
| 2 | D2 | C2-DECALINS | 732 | 1.94 | 108 | 675.98 | 65 | 135 |
| 2 | D3 | C3-DECALINS | 437 | 1.94 | 119 | 366.46 | 65 | 135 |
| 2 | D4 | C4-DECALINS | 447 | 1.94 | 123 | 362.78 | 65 | 135 |
| S | BT0 | BENZOTHIOPHENE | 6.82 | 1.94 | 119 | 5.75 | 65 | 135 |
| 2 | BT1 | C1-BENZO(B)THIOPHENES | 33.2 | 1.94 | 111 | 29.96 | 65 | 135 |
| 2 | BT2 | C2-BENZO(B)THIOPHENES | 48.2 | 1.94 | 95 | 50.93 | 65 | 135 |
| 2 | BT3 | C3-BENZO(B)THIOPHENES | 102 | 1.94 | 99 | 103.18 | 65 | 135 |
| 2 | BT4 | C4-BENZO(B)THIOPHENES | 92.8 | 1.94 | 102 | 90.8 | 65 | 135 |
| A | N0 | NAPHTHALENE | 583 | 1.94 | 103 | 565.56 | 65 | 135 |
| 2 | N1 | C1-NAPHTHALENES | 1180 | 1.94 | 98 | 1208.32 | 65 | 135 |
| 2 | N2 | C2-NAPHTHALENES | 1410 | 1.94 | 97 | 1450.37 | 65 | 135 |
| 2 | N3 | C3-NAPHTHALENES | 1020 | 1.94 | 97 | 1052.74 | 65 | 135 |
| 2 | N4 | C4-NAPHTHALENES | 608 | 1.94 | 104 | 583.65 | 65 | 135 |
| 2 | B | BIPHENYL | 144 | 1.94 | 99 | 145.7 | 65 | 135 |
| 3 | DF | DIBENZOFURAN | 50.2 | 1.94 | 101 | 49.63 | 65 | 135 |
| 3 | AY | ACENAPHTHYLENE | 6.48 | 1.94 | 94 | 6.91 | 65 | 135 |
| 3 | AE | ACENAPHTHENE | 16.6 | 1.94 | 90 | 18.35 | 65 | 135 |
| 3 | F0 | FLUORENE | 61.2 | 1.94 | 87 | 70.69 | 65 | 135 |
| 3 | F1 | C1-FLUORENES | 144 | 1.94 | 88 | 162.7 | 65 | 135 |
| 3 | F2 | C2-FLUORENES | 233 | 1.94 | 92 | 251.87 | 65 | 135 |
| 3 | F3 | C3-FLUORENES | 228 | 1.94 | 94 | 242.29 | 65 | 135 |
| 3 | P0 | PHENANTHRENE | 162 | 1.94 | 86 | 188.41 | 65 | 135 |
| 3 | PA1 | C1-PHENANTHRENES/ANTHRACENES | 327 | 1.94 | 84 | 388.12 | 65 | 135 |
| 3 | PA2 | C2-PHENANTHRENES/ANTHRACENES | 412 | 1.94 | 95 | 434.38 | 65 | 135 |
| 3 | PA3 | C3-PHENANTHRENES/ANTHRACENES | 300 | 1.94 | 97 | 308.67 | 65 | 135 |
| 3 | PA4 | C4-PHENANTHRENES/ANTHRACENES | 132 | 1.94 | 102 | 129.94 | 65 | 135 |
| 3 | DBT0 | DIBENZOTHIOPHENE | 110 | 1.94 | 84 | 130.56 | 65 | 135 |
| 3 | DBT1 | C1-DIBENZOTHIOPHENES | 250 | 1.94 | 91 | 275.34 | 65 | 135 |
| 3 | DBT2 | C2-DIBENZOTHIOPHENES | 314 | 1.94 | 85 | 369.42 | 65 | 135 |
| 3 | DBT3 | C3-DIBENZOTHIOPHENES | 309 | 1.94 | 90 | 345.39 | 65 | 135 |
| 3 | DBT4 | C4-DIBENZOTHIOPHENES | 180 | 1.94 | 93 | 193.51 | 65 | 135 |
| 4 | FL0 | FLUORANTHENE | 3.13 | 1.94 | 83 | 3.77 | 65 | 135 |
| 4 | PY0 | PYRENE | 9.18 | 1.94 | 79 | 11.65 | 65 | 135 |
| 4 | FP1 | C1-FLUORANTHENES/PYRENES | 47.6 | 1.94 | 87 | 54.43 | 65 | 135 |
| 4 | FP2 | C2-FLUORANTHENES/PYRENES | 77.6 | 1.94 | 87 | 89.07 | 65 | 135 |
| 4 | FP3 | C3-FLUORANTHENES/PYRENES | 104 | 1.94 | 95 | 109.78 | 65 | 135 |
| 4 | FP4 | C4-FLUORANTHENES/PYRENES | 93.8 | 1.94 | 96 | 97.22 | 65 | 135 |
| 4 | NBT0 | NAPHTHOBENZOTHIOPHENE | 30.3 | 1.94 | 78 | 39.13 | 65 | 135 |
| 4 | NBT1 | C1-NAPHTHOBENZOTHIOPHENES | 86.0 | 1.94 | 81 | 106.13 | 65 | 135 |
| 4 | NBT2 | C2-NAPHTHOBENZOTHIOPHENES | 126 | 1.94 | 84 | 150.09 | 65 | 135 |
| 4 | NBT3 | C3-NAPHTHOBENZOTHIOPHENES | 105 | 1.94 | 87 | 120.77 | 65 | 135 |
| 4 | NBT4 | C4-NAPHTHOBENZOTHIOPHENES | 81.8 | 1.94 | 96 | 85.38 | 65 | 135 |
| 4 | BA0 | BENZ(A)ANTHRACENE | 2.08 | 1.94 | 91 | 2.28 | 65 | 135 |
| 4 | C0 | CHRYSENE/TRIPHENYLENE | 32.5 | 1.94 | 89 | 36.66 | 65 | 135 |
| 4 | BC1 | C1-CHRYSENES | 60.7 | 1.94 | 94 | 64.59 | 65 | 135 |
| 4 | BC2 | C2-CHRYSENES | 88.2 | 1.94 | 101 | 87.41 | 65 | 135 |
| 4 | BC3 | C3-CHRYSENES | 103 | 1.94 | 102 | 101.29 | 65 | 135 |
| 4 | BC4 | C4-CHRYSENES | 67.2 | 1.94 | 106 | 63.42 | 65 | 135 |
| 5 | BBF | BENZO(B)FLUORANTHENE | 4.19 | 1.94 | 78 | 5.4 | 65 | 135 |
| 5 | BEP | BENZO(E)PYRENE | 9.82 | 1.94 | 99 | 9.88 | 65 | 135 |
| 5 | BAP | BENZO(A)PYRENE | 1.85 | 1.94 | 91 | 2.03 | 65 | 135 |
| 5 | PER | PERYLENE | 3.02 | 1.94 | 90 | 3.34 | 65 | 135 |
| 6 | GHI | BENZO(GHI)PERYLENE | 3.06 | 1.94 | 85 | 3.59 | 65 | 135 |
| O | CAR | CARBAZOLE | 5.36 | 1.94 | 88 | 6.09 | 65 | 135 |
| 3 | 4MDT | 4-METHYLDIBENZOTHIOPHENE(4MDT) | 124 | 1.94 | 94 | 131.38 | 65 | 135 |
| 3 | 2DMT | 2/3-METHYLDIBENZOTHIOPHENE(2MDT) | 89.6 | 1.94 | 91 | 98.05 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | |
|---|---|
| Client ID | Alaska North Slope Crude |
| Lab ID | WG1818635-1 |
| Matrix | OIL |
| Matrix Description | Crude Oil |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER |
| Batch ID | WG1818635-1 |
| Date Collected | N/A |
| Date Received | N/A |
| Date Prepped | N/A |
| Date Analyzed | 8/22/2023 |
| Sample Size(wet) | 0.0514 g |
| % Solid | 100 |
| File ID | F1208212314 |
| Units | mg/kg |
| Final Volume | 10 |
| Dilution | 1 |
| Reporting Limit | 1.94 |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| 3 | 1DMT | 1-METHYLDIBENZOTHIOPHENE(1MDT) | 31.5 | 1.94 | 78 | 40.36 | 65 | 135 |
| 3 | 3MP | 3-METHYLPHENANTHRENE (3MP) | 69.0 | 1.94 | 87 | 79.32 | 65 | 135 |
| 3 | 2MA | 2-METHYLANTHRACENE (2MA) | 2.11 | 1.94 | 70 | 3 | 65 | 135 |
| 3 | 1MP | 1-METHYLPHENANTHRENE (1MP) | 74.9 | 1.94 | 85 | 87.93 | 65 | 135 |
| A | 1MN | 1-METHYLNAPHTHALENE | 795 | 1.94 | 100 | 793.54 | 65 | 135 |
| A | 2MN | 2-METHYLNAPHTHALENE | 1010 | 1.94 | 93 | 1087.89 | 65 | 135 |
| 2 | 26DMN | 2,6-DIMETHYLNAPHTHALENE | 598 | 1.94 | 94 | 635.33 | 65 | 135 |
| 2 | 235TMN | 2,3,5-TRIMETHYLNAPHTHALENE | 138 | 1.94 | 94 | 147.12 | 65 | 135 |
| H30 | T19 | HOPANE (T19) | 143 | 1.94 | 89 | 161.24 | 65 | 135 |
| t23 | T4 | C23 TRICYCLIC TERPANE (T4) | 70.1 | 1.94 | 100 | 69.8 | 65 | 135 |
| t24 | T5 | C24 TRICYCLIC TERPANE (T5) | 35.6 | 1.94 | 85 | 42.1 | 65 | 135 |
| t25 | T6 | C25 TRICYCLIC TERPANE (T6) | 33.9 | 1.94 | 84 | 40.4 | 65 | 135 |
| te24 | T6a | C24 TETRACYCLIC TERPANE (T6A) | 13.5 | 1.94 | 95 | 14.2 | 65 | 135 |
| t26S | T6b | C26 TRICYCLIC TERPANE-22S (T6B) | 14.2 | 1.94 | 87 | 16.3 | 65 | 135 |
| t26R | T6c | C26 TRICYCLIC TERPANE-22R (T6C) | 12.2 | 1.94 | 84 | 14.6 | 65 | 135 |
| t28S | T7 | C28 TRICYCLIC TERPANE-22S (T7) | 15.8 | 1.94 | 98 | 16.2 | 65 | 135 |
| t28R | T8 | C28 TRICYCLIC TERPANE-22R (T8) | 15.0 | 1.94 | 85 | 17.6 | 65 | 135 |
| t29S | T9 | C29 TRICYCLIC TERPANE-22S (T9) | 16.4 | 1.94 | 85 | 19.2 | 65 | 135 |
| t29R | T10 | C29 TRICYCLIC TERPANE-22R (T10) | 17.7 | 1.94 | 84 | 21 | 65 | 135 |
| Ts | T11 | 18A-22,29,30-TRISNORNEOHOPANE-TS (T11) | 24.1 | 1.94 | 85 | 28.3 | 65 | 135 |
| t30S | T11a | C30 TRICYCLIC TERPANE-22S | 12.4 | 1.94 | 81 | 15.3 | 65 | 135 |
| t30R | T11b | C30 TRICYCLIC TERPANE-22R | 14.7 | 1.94 | 97 | 15.2 | 65 | 135 |
| Tm | T12 | 17A(H)-22,29,30-TRISNORHOPANE-TM (T12) | 31.4 | 1.94 | 91 | 34.4 | 65 | 135 |
| BNH | T14a | 17A/B,21B/A 28,30-BISNORHOPANE (T14A) | 6.05 | 1.94 | 86 | 7 | 65 | 135 |
| H29 | T15 | 30-NORHOPANE (T15) | 75.6 | 1.94 | 83 | 90.7 | 65 | 135 |
| C29Ts | T16 | 18A(H)-30-NORNEOHOPANE-C29TS (T16) | 18.0 | 1.94 | 77 | 23.3 | 65 | 135 |
| X | X | 17A(H)-DIAHOPANE (X) | 10.2 | 1.94 | 78 | 13 | 65 | 135 |
| M29 | T17 | 30-NORMORETANE (T17) | 10.4 | 1.94 | 93 | 11.2 | 65 | 135 |
| M30 | T20 | MORETANE (T20) | 15.0 | 1.94 | 92 | 16.3 | 65 | 135 |
| H31S | T21 | 30-HOMOHOPANE-22S (T21) | 62.0 | 1.94 | 92 | 67.6 | 65 | 135 |
| H31R | T22 | 30-HOMOHOPANE-22R (T22) | 52.5 | 1.94 | 90 | 58.3 | 65 | 135 |
| H32S | T26 | 30,31-BISHOMOHOPANE-22S (T26) | 45.4 | 1.94 | 93 | 48.9 | 65 | 135 |
| H32R | T27 | 30,31-BISHOMOHOPANE-22R (T27) | 32.4 | 1.94 | 91 | 35.6 | 65 | 135 |
| H33S | T30 | 30,31-TRISHOMOHOPANE-22S (T30) | 36.2 | 1.94 | 93 | 38.8 | 65 | 135 |
| H33R | T31 | 30,31-TRISHOMOHOPANE-22R (T31) | 23.7 | 1.94 | 93 | 25.6 | 65 | 135 |
| H34S | T32 | TETRAKISHOMOHOPANE-22S (T32) | 26.9 | 1.94 | 96 | 27.9 | 65 | 135 |
| H34R | T33 | TETRAKISHOMOHOPANE-22R (T33) | 18.8 | 1.94 | 95 | 19.8 | 65 | 135 |
| H35S | T34 | PENTAKISHOMOHOPANE-22S (T34) | 28.1 | 1.94 | 98 | 28.8 | 65 | 135 |
| H35R | T35 | PENTAKISHOMOHOPANE-22R (T35) | 21.5 | 1.94 | 96 | 22.3 | 65 | 135 |
| d27S | S4 | 13B(H),17A(H)-20S-DIACHOLESTANE (S4) | 43.4 | 1.94 | 90 | 48.1 | 65 | 135 |
| d27R | S5 | 13B(H),17A(H)-20R-DIACHOLESTANE (S5) | 24.3 | 1.94 | 97 | 25.1 | 65 | 135 |
| d28S | S8 | 13B,17A-20S-METHYLDIACHOLESTANE (S8) | 21.9 | 1.94 | 88 | 24.8 | 65 | 135 |
| aa27S | S12 | 17A(H)20SC27/C29DIA | 55.1 | 1.94 | 92 | 59.74 | 65 | 135 |
| aa27R | S17 | 17A(H)20RC27/C29DIA | 62.3 | 1.94 | 87 | 71.55 | 65 | 135 |
| d29S | S19 | 13A,17B-20S-ETHYLDIACHOLESTANE (S19) | 4.29 | 1.94 | 113 | 3.8 | 65 | 135 |
| aa28S | S20 | 14A,17A-20S-METHYLCHOLESTANE (S20) | 29.1 | 1.94 | 88 | 33 | 65 | 135 |
| aa28R | S24 | 14A,17A-20R-METHYLCHOLESTANE (S24) | 29.0 | 1.94 | 90 | 32.2 | 65 | 135 |
| aa29S | S25 | 14A(H),17A(H)-20S-ETHYLCHOLESTANE (S25) | 38.9 | 1.94 | 75 | 51.7 | 65 | 135 |
| aa29R | S28 | 14A(H),17A(H)-20R-ETHYLCHOLESTANE (S28) | 30.4 | 1.94 | 84 | 36.1 | 65 | 135 |
| bb27R | S14 | 14B(H),17B(H)-20R-CHOLESTANE (S14) | 39.5 | 1.94 | 103 | 38.4 | 65 | 135 |
| bb27S | S15 | 14B(H),17B(H)-20S-CHOLESTANE (S15) | 39.7 | 1.94 | 100 | 39.7 | 65 | 135 |
| bb28R | S22 | 14B,17B-20R-METHYLCHOLESTANE (S22) | 42.1 | 1.94 | 103 | 41 | 65 | 135 |
| bb28S | S23 | 14B,17B-20S-METHYLCHOLESTANE (S23) | 53.2 | 1.94 | 103 | 51.7 | 65 | 135 |
| bb29R | S26 | 14B(H),17B(H)-20R-ETHYLCHOLESTANE (S26) | 59.1 | 1.94 | 108 | 54.6 | 65 | 135 |
| bb29S | S27 | 14B(H),17B(H)-20S-ETHYLCHOLESTANE (S27) | 38.1 | 1.94 | 100 | 38.2 | 65 | 135 |
| RC26/SC27TAS | TAS01 | C26,20R+C27,20S TAS | 218 | 1.94 | 75 | 289.3 | 65 | 135 |
| SC28TAS | TAS02 | C28,20S TAS | 137 | 1.94 | 75 | 182.5 | 65 | 135 |
| RC27TAS | TAS03 | C27,20R TAS | 138 | 1.94 | 78 | 177.1 | 65 | 135 |

Project Name: PAMPILLA 2
Project Number:

| | | |
|---|---|---|
| Client ID | Alaska North Slope Crude | |
| Lab ID | WG1818635-1 | |
| Matrix | OIL | |
| Matrix Description | Crude Oil | |
| Reference Method | 1,8270E-SIM(M)-A2-NFALKPAHBIOMARKER | |
| Batch ID | WG1818635-1 | |
| Date Collected | N/A | |
| Date Received | N/A | |
| Date Prepped | N/A | |
| Date Analyzed | 8/22/2023 | |
| Sample Size(wet) | 0.0514 | g |
| % Solid | 100 | |
| File ID | F1208212314 | |
| Units | mg/kg | |
| Final Volume | 10 | |
| Dilution | 1 | |
| Reporting Limit | 1.94 | |

| Class | Abbrev | Analytes | Result | SSRL | % REC | Spike Conc. | Lower Limit | Upper Limit |
|---|---|---|---|---|---|---|---|---|
| RC28TAS | TAS04 | C28,20R TAS | 114 | 1.94 | 77 | 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

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

Argentina
Australia
Bélgica
Brasil
Canadá
China
Colombia
Francia
Alemania
Ghana
Guyana
Hong Kong
India
Indonesia
Irlanda
Italia
Japón
Kazajistán
Kenia
Malasia
México
Mozambique
Países Bajos
Nueva Zelanda
Perú
Polonia
Portugal
Puerto Rico
Rumania
Senegal
Singapur
Sudáfrica
Corea del Sur
España
Suiza
Taiwán
Tanzania
Tailandia
Emiratos Árabes
Reino Unido
Estados Unidos
Vietnam