REPORT

REPORT ON 32C SOIL REMEDIATION PROGRAM

Marathon Oil Company 596-32C Pond

Facility #421284, COGCC REM #7734

Garfield County, Colorado

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1.0 INTRODUCTION

This report has been prepared for Marathon Oil Company (MOC) by Golder Associates Inc. (Golder) to describe the soil remediation activities conducted for the MOC 596-32C produced water facility located in Garfield County, Colorado. This facility is shown on Figures 1 and 2 and is referred to herein as the 32C pond or pit.

As a result of a monthly inspection, water within the pond's leak detection system was reported to MOC's local leadership on April 12, 2013. As previously reported to the Colorado Oil and Gas Conservation Commission (COGCC), MOC has proactively and systematically responded to the 32C pond liner damage. In support of this response, COGCC submittals have included a Spill/Release Report, an initial Site Investigation and Remediation Work Plan, and the May 31, 2013 *Work Plan, Investigation and Remediation of 596-32C Produced Water Pond, Facility #421284, COGCC REM #7732* (Golder, 2013a), referred to herein as the Work Plan. Other COGCC communications have included a series of 32C conference calls, a June 6, 2013 COGCC site visit, and supplemental technical submittals, such as those described in Section 1.1.

1.1 32C Interim Assessments

In addition to the project activities described in the Work Plan, several interim assessment actions were performed to estimate the extent and volume of contaminated 32C materials that would ultimately need to be addressed. These interim assessments are summarized below.

1. May 8-9, 2013 – On behalf of MOC, a third party environmental contractor sampled the subgrade beneath the pond side-slope in the liner breach area. Results of the initial subgrade analyses are presented in the Work Plan.
2. June 7, 2013 – MOC and Golder sampled the subgrade downslope from the liner breach area to within 2 feet of the water that was present in the pond. Interim assessment actions that were planned on the pond side-slope (referred to herein as the Phase 1 subgrade assessment) were discussed with the COGCC during the June 6, 2013 site visit. Results of the Phase 1 subgrade assessment are presented in a June 17, 2013 Technical Memorandum (Golder, 2013b).
3. June 20, 2013 – After produced water had been removed from the 32C pond, MOC and Golder sampled the subgrade in the northern portion of the 32C pond floor, east of the liner breach area. These investigations of the 32C pond floor are referred to as the Phase 2 subgrade assessment. Results of the Phase 2 subgrade assessment are presented in a June 28, 2013 Technical Memorandum (Golder, 2013c).

1.2 32C Pond Description

Although the 32C pond is currently permitted under COGCC Form 15, MOC plans to permit the pond as a centralized exploration and production waste management facility (Form 28). The 32C pond was constructed 324 feet long, 120 feet wide, approximately 15 feet deep, and with a capacity of 42,272 barrels. Construction features included primary and secondary 60-mil geomembrane liners,

geonet layers between the liners and below the secondary liner, and layers of geotextile fabric above and below the lower geonet layer. This pond was excavated into sedimentary rock of the Uinta Formation, which is up to approximately 1,000 feet thick in the region and is composed of silty sandstone, siltstone, and marlstone. 32C facility drawings and other pertinent background information are provided in the Work Plan so are not included herein.

1.3 Report Organization

Section 2 of this report describes the 32C soil remediation program, confirmatory sampling results are presented in Section 3, a soil remediation summary and corresponding conclusions are provided in Section 4, and references are listed in Section 4. Supporting project documentation is provided in the appendices. While this report focuses on the 32C soil remediation program, the 32C groundwater monitoring program is detailed in a separate report (Golder, 2013d).

2.0 32C SOIL REMEDIATION PROGRAM

The 32C soil remediation program was performed from July 22 through August 5, 2013. Excavation and transportation of contaminated 32C materials were performed by Metcalf Excavation, Inc. and Knowles Enterprises, respectively. Golder was responsible for oversight/direction of 32C remediation, confirmatory sampling, and other technical support to MOC. Additional support with the 32C soil remediation program was provided to MOC by InterTech and Sunland staff. MOC provided health and safety monitoring in connection with these field activities; there were no health and safety incidents during the 32C remediation program.

2.1 Soil Remediation Overview

Beginning July 22, the liner system was removed from portions of the pit where contaminated subgrade materials were to be excavated. This process initially focused on the northern and central portions of the pit (Photo 1), which is referred to as the main excavation area. Subsequent liner removal and material excavation included the southwestern portion of the pit, which is referred to as the sump excavation area. These excavation areas are shown on Figure 3. All 32C pond liner, geonet, and geotextile materials were ultimately removed in anticipation of complete reconstruction of the liner system.

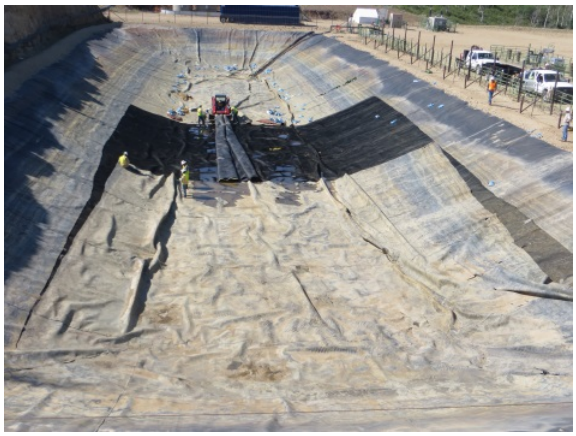


Photo 1 – Looking south at liner removal

During incremental removal of the liner materials, the subgrade was inspected for indications of contaminated materials. Photos 2 and 3 show areas on the side slopes where salt deposits from produced water were noted, as delineated by the orange paint lines. Also shown on Photo 2 are some of the interim assessment subgrade sampling locations (Golder, 2013b and 2013c); contaminated subgrade materials were previously confirmed at these interim assessment locations. The liner breach area and associated staining and salt deposits are shown in the upper right portion of Photo 4.

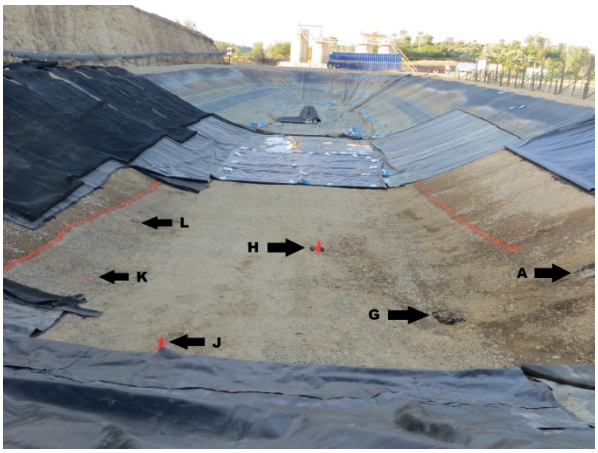


Photo 2 – Looking south at delineation of apparent contamination

Photo 3 – Closeup of delineation of apparent subgrade contamination

Excavation of contaminated 32C soil (Photo 5) began on July 23, and was primarily performed using a Takeuchi TL-12 skidsteer. As shown on Photo 6, these materials

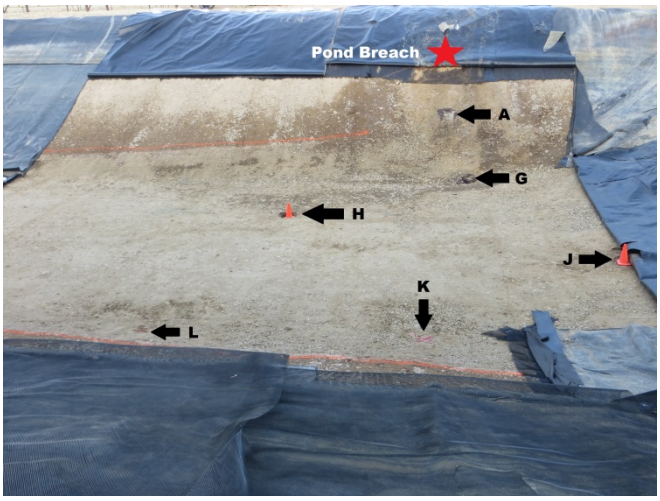


Photo 4 – Looking west at liner breach area

were typically placed by the skidsteer at the west toe of the pit slope and were then removed from the pit using a Case CX-240 trackhoe. Contaminated soil and rock were staged on a plastic-lined area on the 32C pad adjacent to the pit (Photo 7) pending off-site transport and disposal. To allow efficient access to the pit, contaminated materials were removed from the northwest corner of the pit, and clean fill materials were then placed as an access ramp.

Photo 5 – Looking west at contaminated material excavation

Photo 6 – Looking west at excavation and staging of materials

Photo 7 – Contaminated materials staged on plastic liner

Material sampling was performed at representative locations on the sides and floor of the excavation areas to confirm that the pit was remediated to COGCC standards, as detailed in Section 2.2. For example, sample P-1.1 (Photo 8) was collected at a depth of 1.1 feet below ground surface (bgs) at the base of fill materials overlying bedrock to confirm sufficient soil removal near the northeast corner of the main excavation area (Figure 4). In addition, the bedrock floor of the excavations (such as sample U-2.6 shown in Photo 9) was sampled for confirmatory testing at representative locations.

Photo 8 – Confirmation sampling at excavation perimeter

Photo 9 – Confirmation sampling of bedrock on excavation floor

As other areas of the 32C pit subgrade were uncovered, these areas were inspected for staining, unusual odors, salt deposits, and other possible indications of produced water contamination. Based on these inspections and iterative field screening of samples (Table 1), minimum excavation limits were delineated (Photos 10 and 11) and the excavations were extended horizontally and vertically as appropriate for removal of contaminated materials (Photos 12 and 13). The 32C remediation excavations typically extended to bedrock, as shown in Photo 14. Representative photos of the primary excavation area after contaminated materials were removed are provided in Appendix A-1. Representative photos of the sump excavation area during removal of contaminated materials are provided in Appendix A-2.

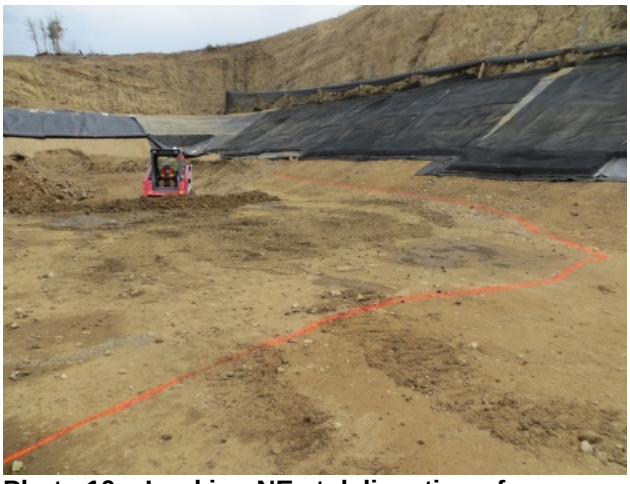


Photo 10 – Looking NE at delineation of minimum excavation limits

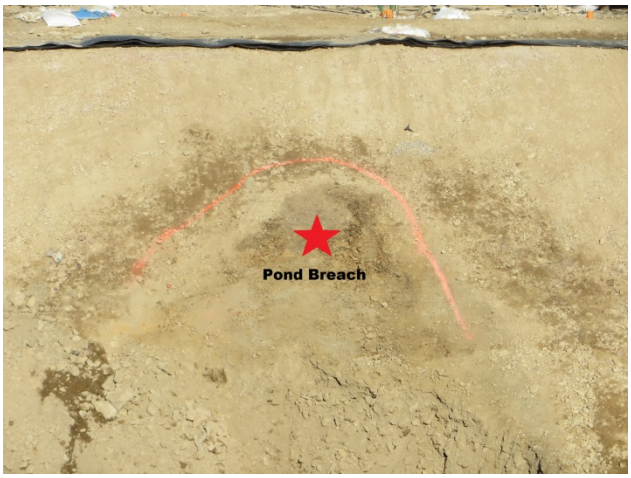


Photo 11 – Looking west at delineation of minimum excavation limits in liner breach area

Photo 12 – Looking SW at initial excavation of liner breach area

Photo 13 – Looking SW after final excavation of liner breach area

Photo 14 – Looking NE at bedrock floor of main excavation area

Photo 15 – Berming beneath plastic-lined waste staging area

During deconstruction of the 32C sump liner system, a hole in the lower liner of the sump was observed by MOC. It was concluded by MOC that this liner breach was created from the liner deconstruction process. However, MOC indicated that there is a remote chance that the hole was present before the liner deconstruction process was initiated.

Photo 16 – Cover over plastic-lined waste staging area

To prevent runoff of contaminated materials onto the 32C pad, the plastic-lined waste staging area was bermed (Photo 15) and was covered with plastic as necessary (Photo 16). Contaminated materials excavated from 32C were transported by truck (Photo 17) to permanent waste disposal facilities. A total of 1,185 tons of special waste was excavated from 32C, and 38 tons were transported to the Republic Services ECDC Environmental facility in East Carbon, Utah. In addition, 1,147 tons of special waste from the 32C excavation were transported to the West Garfield County Landfill, Colorado, with disposal of the final truck load of special waste on August 13, 2013. A summary of special waste disposal documentation from the 32C soil remediation program is provided in Appendix B-1.

Photo 17 – Loading of waste for transport

2.2 Confirmatory Sampling

For the 32C soil remediation program, a total of 37 subgrade samples were collected to confirm that the remediation program conformed to COGCC standards, as summarized below:

- 24 field screening samples were collected from the main excavation area;
- 13 field screening samples were collected from the sump excavation area;
- Of the 24 main excavation area samples, 12 samples were submitted for analytical testing, including two samples of the bedrock floor (samples U-2.6 and V-1.5, as shown in Table 1); and
- Of the 13 sump excavation area samples, 6 samples were submitted for analytical testing, including one sample of the bedrock floor (sample TT-3.0).

Confirmatory sampling during the 32C soil remediation program was performed using the same investigative approach and procedures used for the Phase 1 and Phase 2 subgrade assessments (Golder, 2013b and 2013c). Confirmatory sampling activities are summarized as follows.

1. Subgrade samples were placed in sealable plastic bags using a thoroughly cleaned trowel and new nitrile gloves. Subgrade observations were noted in connection with sampling, as described in Section 3.1.
2. Samples were screened for contamination based on photo-ionization detector (PID) measurements, sample odors, and visual observations, and were then placed in laboratory-supplied containers and stored in a cooler containing ice. PID measurements were typically taken 10 minutes after the samples were sealed in the plastic bags.
3. Selected samples were submitted for laboratory testing using chain of custody procedures described in the Work Plan.

In support of the 32C confirmation sampling program, field screening results and analytical laboratory results from the Phase 1 and Phase 2 subgrade assessments were evaluated to establish approximate correlations between these results. Based on these correlations, a PID threshold value of 30 ppm for field screening samples was conservatively assumed to indicate subgrade materials conforming to COGCC standards. During the iterative soil remediation process, excavation activities continued horizontally and vertically until PID values were less than 30 ppm and there were no other indications of contaminated materials. Samples with PID readings of less than 30 ppm are shown in green and are noted as OK on Figures 4 and 5, and sample locations where additional excavation was required are shown in red.

2.3 Analytical Laboratory Testing

The Phase 1 and Phase 2 subgrade assessments (Golder, 2013b and 2013c) confirmed that diesel range total petroleum hydrocarbons (TPH-DRO) and gasoline range total petroleum hydrocarbons (TPH-GRO) are the primary constituents of concern resulting from the release of produced water to the 32C subgrade soils. In addition, as detailed in the Work Plan, monthly water quality analyses of the 32C produced water confirmed that benzene, toluene, ethylbenzene, and xylene (BTEX) were present. Therefore, confirmatory analyses for the 32C soil remediation program focused on these indicator parameters, and included 18 samples analyzed for TPH-DRO, TPH-GRO, and BTEX. To provide additional comprehensive analyses, six samples were also analyzed for all other soil parameters specified in COGCC Table 910-1.

Analytical testing was performed by Accutest Mountain States. EPA SW 846 analytical testing methods were used in accordance with COGCC requirements. Analytical test results are discussed in Section 3.2.

2.4 Excavation Area Surveying

Surveying of the 32C soil excavation areas was performed by W.H. Smith & Associates Surveying Consultants (Smith). Prior to surveying, Golder designated:

- Survey points 1-14 at key locations on the edges of the main excavation area;
- Survey points 15-23 at key locations on the edges of the sump excavation area; and
- Survey points 101-105 at key locations on the floor of the main excavation area.

These survey points are shown on the Smith drawing provided in Appendix B-2. Based on the survey locations and Golder excavation observations, the actual limits of the excavation areas were delineated, as shown on Figure 3.

Smith estimated that 1,128 cubic yards of fill will be needed in the excavation areas to restore the 32C pond base grades.

3.0 CONFIRMATORY SAMPLE RESULTS

3.1 Field Screening Results

Field screening results from the 32C soil remediation program are summarized in Table 1, and support the following observations and conclusions.

1. Subgrade materials that were present immediately below the 32C pond liner system were generally characterized as brown silty sand with variable gravel and cobbles, and generally classified as SM based on the Unified Soil Classification System.
2. Where these subgrade materials were excavated, thicknesses of up to approximately 3 feet were noted.
3. These fill materials were underlain by bedrock that appeared to have low primary porosity, and was generally comprised of gray shale and fine sandstone.
4. Field screening results (Table 1) supported the conclusion that additional excavation was appropriate in the vicinity of nine samples in the main excavation area and three samples in the sump excavation area, as shown in red on Figures 4 and 5.
5. After this additional excavation was performed, subsequent field screening results confirmed that the remaining subgrade materials are not impacted above COGCC standards (Figures 4 and 5).

3.2 Laboratory Analytical Results

Full 32C soil remediation analytical results and quality control data are presented in the laboratory reports included in Appendix C. In addition, these analytical results are summarized in Table 2 and those results exceeding COGCC standards are shown in Table 3. Analytical results from the 32C soil remediation program support the following observations and conclusions.

1. Consistent with the field screening results, the laboratory results confirm that 32C subgrade materials that were impacted by produced water infiltration have been excavated, and the remaining subgrade materials have not been impacted above COGCC standards.
2. The maximum residual TPH concentration in the main excavation area was 24.9 milligrams per kilogram (mg/kg) as shown on Figure 6, and the maximum residual TPH concentration in the sump excavation area was 13.5 mg/kg (Figure 7). These residual concentrations are below the COGCC standard of 500 mg/kg for TPH.
3. Similar to the arsenic results from the interim assessment samples and background soil samples (Golder, 2013b and 2013c), the COGCC arsenic standard of 0.39 mg/kg was exceeded in all pit remediation samples. This was expected based on the high naturally occurring arsenic concentrations in the site-vicinity bedrock, and because crushed bedrock was used as fill for the 32C pond subgrade. Except for sample TT-3.0, arsenic concentrations in the pit remediation samples ranged from 7.7 to 14.1 mg/kg, compared to the background concentrations of 16.1 mg/kg in BG-1 and 12.4 mg/kg in BG-2. Sample TT-3.0 appears somewhat anomalous, with an arsenic value of 25.1 mg/kg (which is more than 10% above the background concentration). This fine sandstone sample had no indications of contamination based on BTEX, TPH, and sodium adsorption ratio (SAR) results, and it is concluded that the 25.1 mg/kg arsenic value in TT-3.0 reflects naturally occurring conditions and not produced water contamination.

4. Apart from high background concentrations of arsenic, no other exceedances of COGCC standards were noted except for a pH of 9.02 in sample KK-1.5. This sample had no indications of contamination based on BTEX, TPH, and SAR results, and it could be concluded that rounding of this value would not result in an exceedence.

4.0 SUMMARY AND CONCLUSIONS

A total of 1,185 tons of 32C subgrade materials were excavated and were disposed of off-site as special waste in accordance with applicable regulations. In the main excavation area, these contaminated materials typically extended approximately 140 feet north-south and 50 to 60 feet east-west. In the sump excavation area, these contaminated materials typically extended approximately 60 feet north-south and 30 to 40 feet east-west.

Analytical testing of the 32C subgrade materials remaining in the pit confirmed that the soil remediation program was completed in accordance with COGCC standards. Apart from high background concentrations of arsenic, no other exceedances of COGCC standards were noted except for a marginal pH exceedance. None of the residual subgrade materials had any indications of contamination based on BTEX, TPH, and SAR results. Therefore, it is concluded that the 32C contaminant source area has been removed, and that there is no longer a source for ongoing groundwater contamination at the site.

Finally, it is noted that the 32C facility will be reconstructed to be operationally efficient and environmentally protective. For example, the double composite liner system for the new pond will be underlain by a bentonite mat as an additional environmental safeguard and in exceedance of COGCC requirements. In addition, access to the reconstructed pond will be restricted, and access to pond fluids will be provided from beyond locked gates, so vandalism risks to the pond liner system will be minimized. Therefore, with removal of the 32C contaminant source and with complete reconstruction of the 32C pond liner system, it is concluded that significant environmental upgrades and environmentally protective features will be present at the 32C facility.

5.0 REFERENCES

Golder 2013a, Work Plan for Investigation and Remediation of 596-32C Produced Water Pond, issued May 31, 2013.

Golder 2013b, Technical Memorandum on Interim Assessment of 596-32C Produced Water Pond, issued June 17, 2013.

Golder 2013c, Technical Memorandum on Phase 2 Interim Assessment of 596-32C Produced Water Pond, issued June 28, 2013.

Golder 2013d, Draft Report on 32C Groundwater Monitoring Program, Marathon Oil Company 596-32C Pond (report is pending).

TABLES

Table 1: Summary of Sample Field Screening

Sample	Depth (ft bgs)	Excavation Area	Sample Description	PID Reading (ppm)
M-1.0	0.5 - 1.0	Main Excavation	Sandy Fill	8.7
N-3.0	2.5 - 3.0	Main Excavation	Sandy Fill	17.0
O-1.5	1.0 - 1.5	Main Excavation	Sandy Fill	14.9
P-1.1	0.6 - 1.1	Main Excavation	Sandy Fill	16.2
Q-1.5	1.0 - 1.5	Main Excavation	Sandy Fill	748.8
R-1.8	1.3 - 1.8	Main Excavation	Sandy Fill	826.2
S-2.5	2.0 - 2.5	Main Excavation	Gray Shale	660.2
T-1.3	1.0 - 1.3	Main Excavation	Sandy Fill	16.3
U-2.6	2.5 - 2.6	Main Excavation	Fine Sandstone	24.2
V-1.4	1.0 - 1.4	Main Excavation	Sandy Fill	22.3
V-1.5	1.4 - 1.5	Main Excavation	Gray Shale	24.5
X-1.1	0.8 - 1.1	Main Excavation	Sandy Fill	464.7
Y-1.1	0.8 - 1.1	Main Excavation	Sandy Fill	452.1
Z-2.0	1.7 - 2.0	Main Excavation	Sandy Fill	4.0
AA-1.0	0.8 - 1.0	Main Excavation	Sandy Fill	501.2
BB-1.0	0.7 - 1.0	Main Excavation	Sandy Fill	691.7
CC-1.0	0.5 - 1.0	Main Excavation	Sandy Fill	6.9
DD-1.1	0.7 - 1.1	Main Excavation	Sandy Fill	684.2
EE-1.1	0.7 - 1.1	Main Excavation	Sandy Fill	13.0
FF-1.1	0.8 - 1.1	Main Excavation	Sandy Fill	6.8
GG-2.5	2.0 - 2.5	Main Excavation	Sandy Fill	36.3
HH-2.5	2.0 - 2.5	Main Excavation	Sandy Fill	3.4
II-2.0	0.5 - 2.0	Main Excavation	Sandy Fill	11.6
JJ-2.0	0.5 - 2.0	Main Excavation	Sandy Fill	3.6
KK-1.5	1.0 - 1.5	Sump Excavation	Sandy Fill	28.8
LL-1.0	0.5 - 1.0	Sump Excavation	Sandy Fill	53.1
MM-1.0	0.5 - 1.0	Sump Excavation	Sandy Fill	8.6
NN-1.5	1.0 - 1.5	Sump Excavation	Sandy Fill	27.1
OO-1.0	0.5 - 1.0	Sump Excavation	Sandy Fill	8.5
PP-1.0	0.5 - 1.0	Sump Excavation	Sandy Fill	6.5
QQ-2.5	2.3 - 2.5	Sump Excavation	Fine Sandstone	320
RR-1.5	1.3 - 1.5	Sump Excavation	Fine Sandstone	123
SS-1.2	0.7 - 1.2	Sump Excavation	Sandy Fill	24.7
TT-3.0	2.7 - 3.0	Sump Excavation	Fine Sandstone	25.3
UU-2.0	1.5 - 2.0	Sump Excavation	Sandy Fill	22.2
VV-1.0	0.5 - 1.0	Sump Excavation	Sandy Fill	3.6
WW-0.5	0.2 - 0.5	Sump Excavation	Sandy Fill	9.2

Notes:
Depths are in feet below ground surface.
PID measurements are in parts per million.
Additional excavation was performed in highlighted areas where PID readings were > 30 ppm.

Table 2. Summary of Confirmation Sample Analytical Results

Detection | **Exceedance**

Client Sample ID:		CO Soil - Oil and Gas Conservation Commission Levels (2 CCR 404-1 9/30/07)[1]	M-1.0	N-3.0	O-1.5	P-1.1	P-1.1	T-1.3	U-2.6	V-1.4	V-1.5	Z-2.0	Z-2.0	EE-1.1	FF-1.1	HH-2.5	HH-2.5	KK-1.5	KK-1.5	KK-1.5	MM-1.0	MM-1.0	SS-1.2	TT-3.0	TT-3.0	UU-2.0	VV-1.0
Lab Sample ID:			D48662-1	D48662-2	D48662-3	D48662-4	D48662-4F	D48662-5	D48662-6	D48662-8	D48662-7	D48662-9	D48662-9F	D48662-10	D48662-11	D48662-12	D48662-12F	D48846-1	D48846-1A	D48846-1B	D48846-2	D48846-2B	D48863-1	D48863-2	D48863-2A	D48863-3	D48863-4
Date Sampled:			7/23/2013	7/23/2013	7/23/2013	7/24/2013	7/24/2013	7/24/2013	7/25/2013	7/25/2013	7/25/2013	7/25/2013	7/25/2013	7/26/2013	7/26/2013	7/26/2013	7/26/2013	8/1/2013	8/1/2013	8/1/2013	7/31/2013	7/31/2013	8/2/2013	8/2/2013	8/2/2013	8/2/2013	8/2/2013
Matrix:			Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Volatiles (SW846 8260B)																											
Benzene	mg/kg	0.17	ND (0.033)	ND (0.035)	ND (0.034)	ND (0.035)	-	ND (0.035)	ND (0.034)	ND (0.035)	ND (0.034)	ND (0.034)	-	ND (0.032)	ND (0.033)	ND (0.030)	-	-	-	ND (0.035)	-	ND (0.032)	ND (0.033)	ND (0.031)	-	ND (0.035)	ND (0.032)
Toluene	mg/kg	85	ND (0.065)	ND (0.071)	ND (0.069)	ND (0.070)	-	0.0895 J	ND (0.067)	ND (0.071)	ND (0.068)	ND (0.068)	-	ND (0.065)	ND (0.066)	ND (0.059)	-	-	-	ND (0.070)	-	ND (0.064)	ND (0.066)	ND (0.063)	-	ND (0.070)	ND (0.063)
Ethylbenzene	mg/kg	100	ND (0.025)	ND (0.027)	ND (0.026)	ND (0.027)	-	ND (0.027)	ND (0.026)	ND (0.027)	ND (0.026)	ND (0.026)	-	ND (0.025)	ND (0.025)	ND (0.023)	-	-	-	ND (0.027)	-	ND (0.024)	ND (0.025)	ND (0.024)	-	ND (0.026)	ND (0.024)
Xylene (total)	mg/kg	175	ND (0.13)	ND (0.14)	0.250 J	0.143 J	-	0.213 J	ND (0.13)	ND (0.14)	ND (0.14)	ND (0.14)	-	ND (0.13)	0.182 J	ND (0.12)	-	-	-	ND (0.14)	-	ND (0.13)	ND (0.13)	ND (0.13)	-	ND (0.14)	ND (0.13)
GC/MS Semi-volatiles (SW846 8270C BY SIM)																											
Acenaphthene	mg/kg	1000	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Anthracene	mg/kg	1000	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Benzo(a)anthracene	mg/kg	0.22	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Benzo(b)fluoranthene	mg/kg	0.22	-	-	-	0.0117	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Benzo(k)fluoranthene	mg/kg	2.2	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Benzo(a)pyrene	mg/kg	0.022	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Chrysene	mg/kg	22	-	-	-	0.0072 J	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Dibenzo(a,h)anthracene	mg/kg	0.022	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Fluoranthene	mg/kg	1000	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Fluorene	mg/kg	1000	-	-	-	ND (0.0060)	-	-	-	-	-	ND (0.0059)	-	-	-	ND (0.0055)	-	ND (0.0060)	-	-	ND (0.0057)	-	-	ND (0.0057)	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.22	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
Naphthalene	mg/kg	23	-	-	-	ND (0.012)	-	-	-	-	-	ND (0.012)	-	-	-	ND (0.011)	-	0.141	-	-	ND (0.012)	-	-	ND (0.012)	-	-	-
Pyrene	mg/kg	1000	-	-	-	ND (0.0052)	-	-	-	-	-	ND (0.0052)	-	-	-	ND (0.0048)	-	ND (0.0052)	-	-	ND (0.0050)	-	-	ND (0.0049)	-	-	-
GC Volatiles (SW846 8015B)																											
TPH-GRO (C6-C10)	mg/kg	500	ND (6.5)	ND (7.1)	ND (6.9)	ND (7.0)	-	ND (7.0)	ND (6.7)	ND (7.1)	ND (6.8)	ND (6.8)	-	ND (6.5)	ND (6.6)	ND (5.9)	-	-	-	ND (7.0)	-	ND (6.4)	ND (6.6)	ND (6.3)	-	ND (7.0)	ND (6.3)
GC Semi-volatiles (SW846-8015B)																											
TPH-DRO (C10-C28)	mg/kg	500	ND (5.8)	ND (6.1)	8.07	9.23	-	ND (6.0)	ND (5.9)	7.16 J	6.10 J	ND (5.9)	-	ND (5.8)	13	ND (5.5)	-	6.24 J	-	-	10.5	-	6.24 J	ND (5.6)	-	6.68 J	13.5
Metals Analysis																											
Arsenic	mg/kg	0.39	-	-	-	**7.8**	-	-	-	-	-	**7.7**	-	-	-	**10.2**	-	**14.1**	-	-	**11.5**	-	-	**25.1**	-	-	-
Barium	mg/kg	15000	-	-	-	501	-	-	-	-	-	400	-	-	-	410	-	406	-	-	380	-	-	374	-	-	-
Cadmium	mg/kg	70	-	-	-	<1.2	-	-	-	-	-	<1.2	-	-	-	<1.1	-	<1.2	-	-	<1.1	-	-	<1.1	-	-	-
Calcium	mg/l	-	-	-	-	-	313	-	-	-	-	-	26.6	-	-	-	28.3	-	22.2	-	-	-	-	-	12.8	-	-
Chromium	mg/kg	-	-	-	-	69.5	-	-	-	-	-	59	-	-	-	65.3	-	72.7	-	-	67	-	-	83.9	-	-	-
Copper	mg/kg	3100	-	-	-	15.6	-	-	-	-	-	20.5	-	-	-	14.1	-	13.1	-	-	13.5	-	-	12.8	-	-	-
Lead	mg/kg	400	-	-	-	14.7	-	-	-	-	-	14	-	-	-	13	-	14	-	-	13.3	-	-	13.5	-	-	-
Magnesium	mg/l	-	-	-	-	-	25.3	-	-	-	-	-	2.85	-	-	-	4.73	-	2.95	-	-	-	-	-	3.4	-	-
Mercury	mg/kg	23	-	-	-	<0.10	-	-	-	-	-	<0.099	-	-	-	<0.090	-	<0.10	-	-	<0.096	-	-	<0.093	-	-	-
Nickel	mg/kg	1600	-	-	-	33.1	-	-	-	-	-	31.9	-	-	-	31.2	-	36.4	-	-	33.7	-	-	40.5	-	-	-
Selenium	mg/kg	390	-	-	-	<6.0	-	-	-	-	-	<5.9	-	-	-	<5.5	-	<6.0	-	-	<5.7	-	-	<5.7	-	-	-
Silver	mg/kg	390	-	-	-	<3.6	-	-	-	-	-	<3.5	-	-	-	<3.3	-	<3.6	-	-	<3.4	-	-	<3.4	-	-	-
Sodium	mg/l	-	-	-	-	-	39.4	-	-	-	-	-	14	-	-	-	19	-	19.7	-	-	-	-	-	8.31	-	-
Zinc	mg/kg	23000	-	-	-	47.1	-	-	-	-	-	49.5	-	-	-	41.4	-	45.3	-	-	46.5	-	-	46.2	-	-	-
General Chemistry																											
Specific Conductivity	umhos/cm	4000	-	-	-	2450	-	-	-	-	-	216	-	-	-	243	-	241	-	-	-	-	-	108	-	-	-
Chromium, Hexavalent	mg/kg	23	-	-	-	<1.0	-	-	-	-	-	<1.0	-	-	-	<1.0	-	<1.0	-	-	<1.0	-	-	<1.0	-	-	-
Chromium, Trivalent	mg/kg	120000	-	-	-	69.5 [a]	-	-	-	-	-	59.0 [a]	-	-	-	65.3 [a]	-	72.7 [a]	-	-	67.0 [a]	-	-	83.9 [a]	-	-	-
Redox Potential Vs H2	mv	-	-	-	-	338	-	-	-	-	-	294	-	-	-	301	-	190	-	-	183	-	-	174	-	-	-
Sodium Adsorption Ratio	ratio	12	-	-	-	-	0.575 [b]	-	-	-	-	-	0.688 [b]	-	-	-	0.870 [b]	-	1.04 [b]	-	-	-	-	-	0.533 [b]	-	-
Solids, Percent	%	-	86.5	82	83.9	82.9	-	82.8	85.1	82.3	84.1	84.1	-	86.9	85.4	91.1	-	83.1	-	-	87.2	-	86	88.2	-	83.1	87.4
pH	su	6 - 9	-	-	-	8.16	-	-	-	-	-	8.75	-	-	-	8.58	-	**9.02**	-	-	8.96	-	-	8.82	-	-	-

Footnotes:

[a] Calculated as: (Chromium) - (Chromium, Hexavalent)

[b] Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]

[1] **NOTE: The criteria for Specific Conductivity is 4000 umhos/cm OR 2 x background, which must be determined by the user manually.**

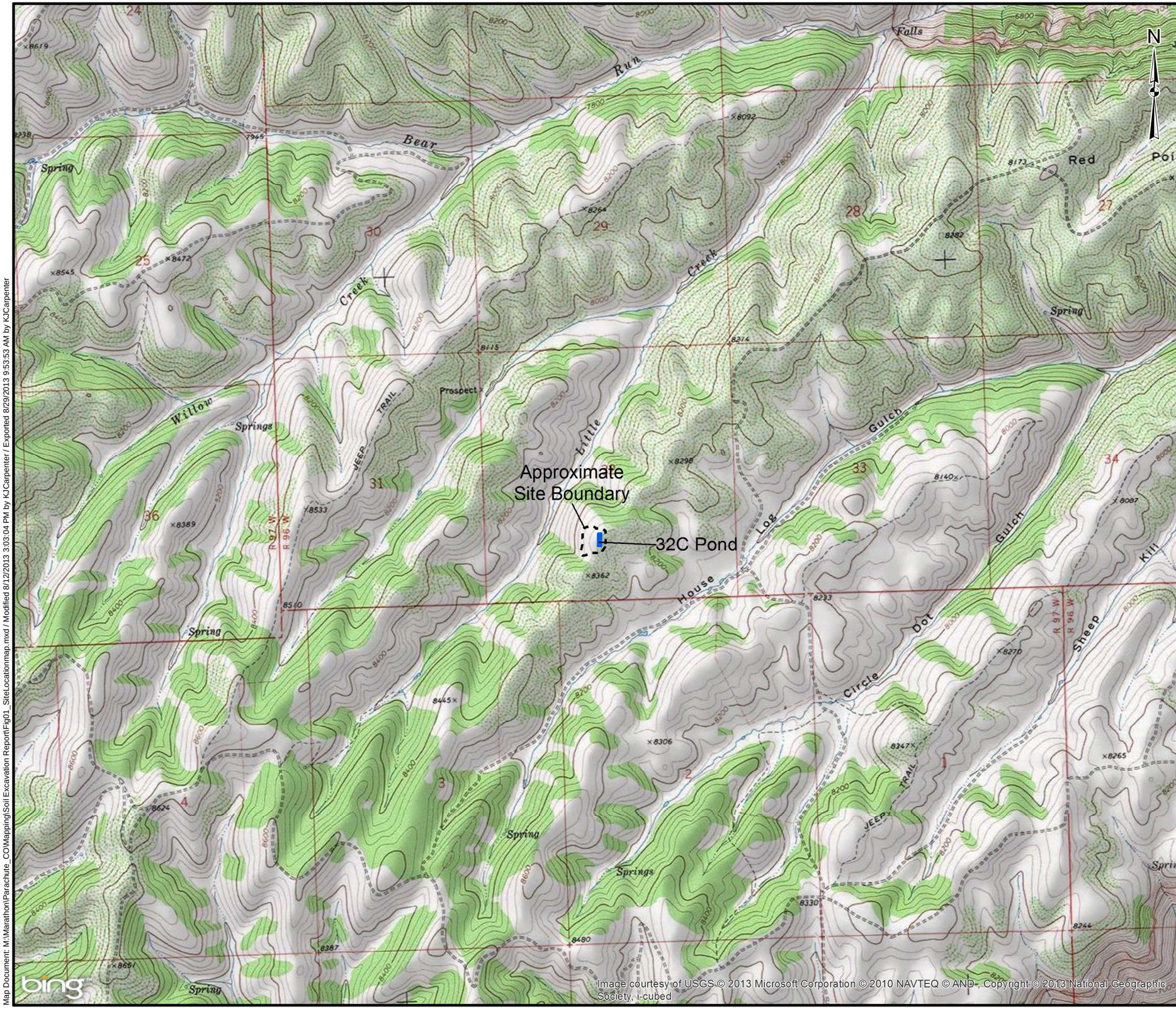
Golder Associates

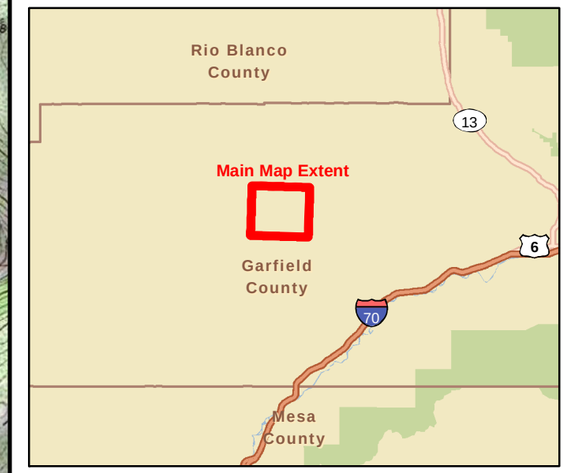
Table 3: COGCC Standard Exceedances for Confirmation Samples

Sample	Parameter	Result	Units	RL	COGCC Limit
P-1.1	Arsenic	7.8	mg/kg	0.12	0.39
Z-2.0	Arsenic	7.7	mg/kg	0.12	0.39
HH-2.5	Arsenic	10.2	mg/kg	0.11	0.39
KK-1.5	pH	9.02			6 - 9
KK-1.5	Arsenic	14.1	mg/kg	0.12	0.39
MM-1.0	Arsenic	11.5	mg/kg	0.11	0.39
TT-3.0	Arsenic	25.1	mg/kg	0.11	0.39

Notes:
Values Exceeding: CO Oil and Gas Conservation Commission Soil Levels (2 CCR 404-1 9/30/07)
RL = Reporting Limit

FIGURES





REFERENCES

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
TOPOGRAPHIC QUADRANGLE BACKGROUND: IMAGE COURTESY OF USGS © 2013 MICROSOFT CORPORATION © 2010 NAVTEQ © AND COPYRIGHT:© 2013 NATIONAL GEOGRAPHIC SOCIETY, I-CUBED.

2,000 0 2,000
Feet

PROJECT
MARATHON OIL COMPANY
32C PRODUCED WATER POND
GARFIELD COUNTY, COLORADO

TITLE
SITE LOCATION MAP

Golder Associates

PROJECT NO. 1300253			FILE No. Fig01_SiteLocationmap.mxd	
DESIGN	RM	8/8/2013	SCALE: AS SHOWN	REV. 0
GIS	KJC	8/12/2013	**FIGURE 1**	
CHECK	RM	8/12/2013		
REVIEW	EK	8/12/2013		

Map Document: M:\Marathon\Parachute_CO\Mapping\Soil Excavation Report\Fig01_SiteLocationmap.mxd / Modified 8/12/2013 3:03:04 PM by KJCarpenter / Exported 8/29/2013 9:53:53 AM by KJCarpenter

60 0 60 Feet

LEGEND

★ Location of Pond Breach

BG-1 Background Sample Location

REFERENCES

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
AERIAL IMAGERY: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.

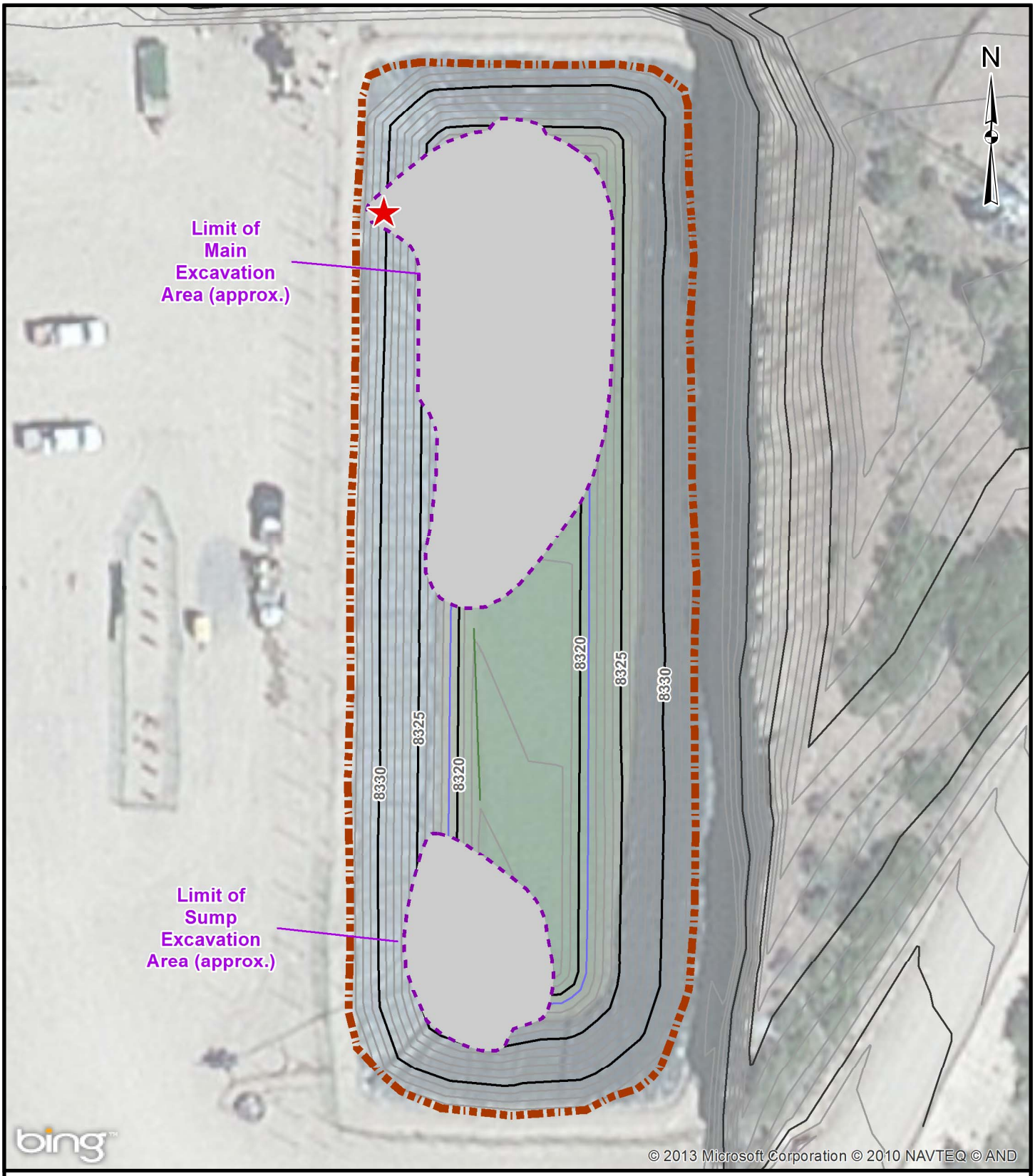
PROJECT
MARATHON OIL COMPANY
32C PRODUCED WATER POND
GARFIELD COUNTY, COLORADO

TITLE
32C PRODUCED WATER POND BEFORE DECONSTRUCTION

Golder Associates

PROJECT NO. 1300253			FILE No. Fig02_32CProducedWaterPond.mxd	
DESIGN	RM	8/8/2013	SCALE: AS SHOWN	REV. 0
GIS	KJC	8/12/2013	**FIGURE 2**	
CHECK	RM	8/12/2013		
REVIEW	EK	8/12/2013		

Map Document: M:\Marathon\Parachute_CO\Mapping\Soil Excavation Report\Fig02_32CProducedWaterPond.mxd / Modified 8/12/2013 3:14:16 PM by KJCarpenter / Exported 8/29/2013 9:55:06 AM by KJCarpenter



40 0 40 Feet

LEGEND

★ Location of Pond Breach

REFERENCES

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
AERIAL IMAGERY: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.

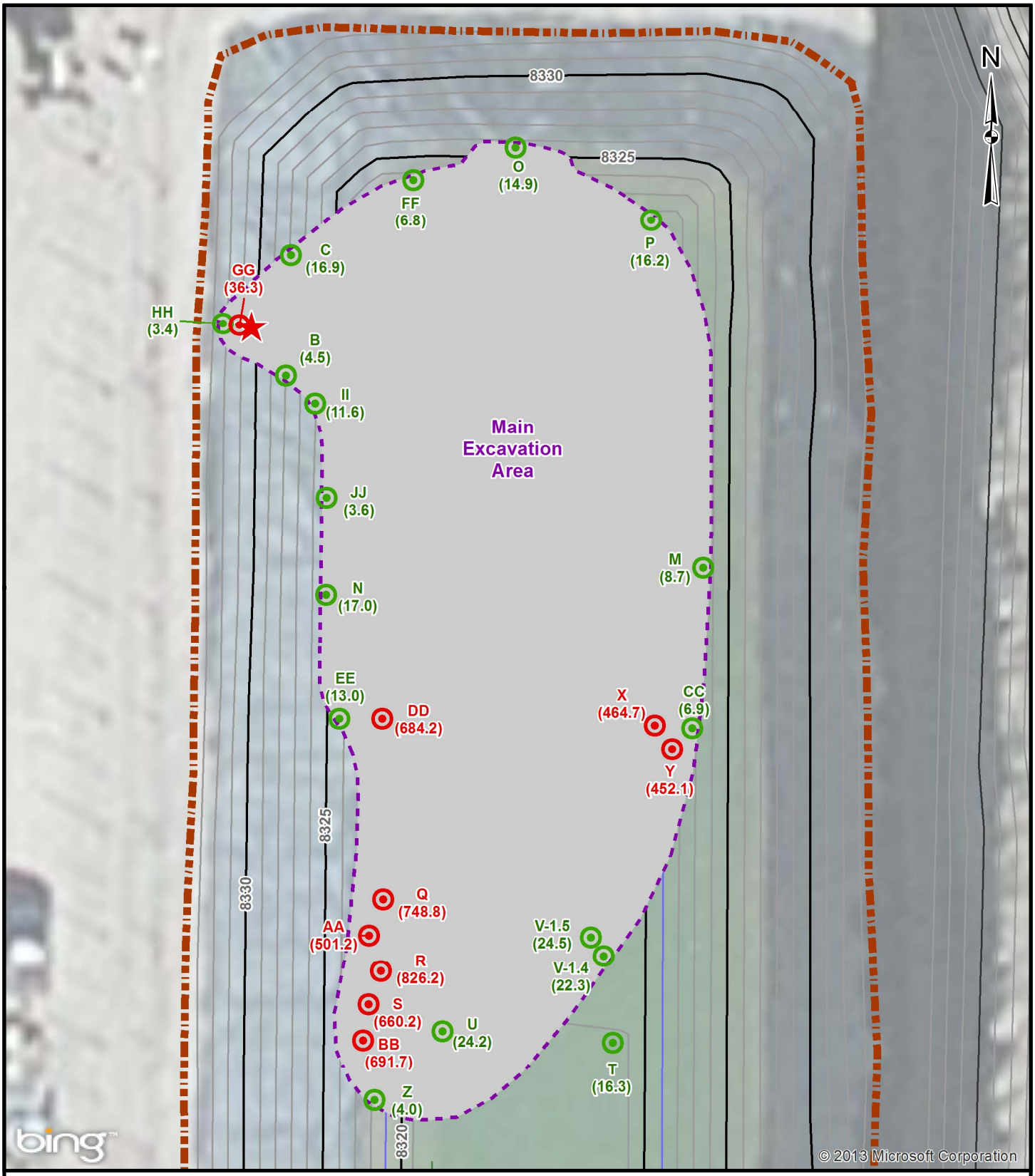
PROJECT
MARATHON OIL COMPANY
32C PRODUCED WATER POND
GARFIELD COUNTY, COLORADO

TITLE
32C EXCAVATION AREAS

Golder Associates

PROJECT NO. 1300253			FILE No. Fig03_32CExcavationAreas.mxd	
DESIGN	RM	8/8/2013	SCALE: AS SHOWN	REV. 0
GIS	KJC	8/12/2013	**FIGURE 3**	
CHECK	RM	8/12/2013		
REVIEW	EK	8/12/2013		

Map Document: M:\Marathon\Parachute_CO\Mapping\Soil Excavation Report\Fig03_32CExcavationAreas.mxd / Modified 8/12/2013 11:19:06 AM by KJCarpenter / Exported 8/29/2013 9:56:17 AM by KJCarpenter



20 0 20 Feet

LEGEND

★ Location of Pond Breach

Sample EE (PID reading OK, ppm)

Sample GG (PID reading, ppm)

REFERENCES

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
AERIAL IMAGERY: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.

PROJECT
MARATHON OIL COMPANY
32C PRODUCED WATER POND
GARFIELD COUNTY, COLORADO

TITLE
FIELD SCREENING LOCATIONS IN MAIN EXCAVATION AREA

Golder Associates

PROJECT NO. 1300253			FILE No. Fig04_MainExcavArea_FieldScreening.mxd	
DESIGN	RM	8/8/2013	SCALE: AS SHOWN	REV. 0
GIS	KJC	8/12/2013	FIGURE 4	
CHECK	RM	8/12/2013		
REVIEW	EK	8/12/2013		

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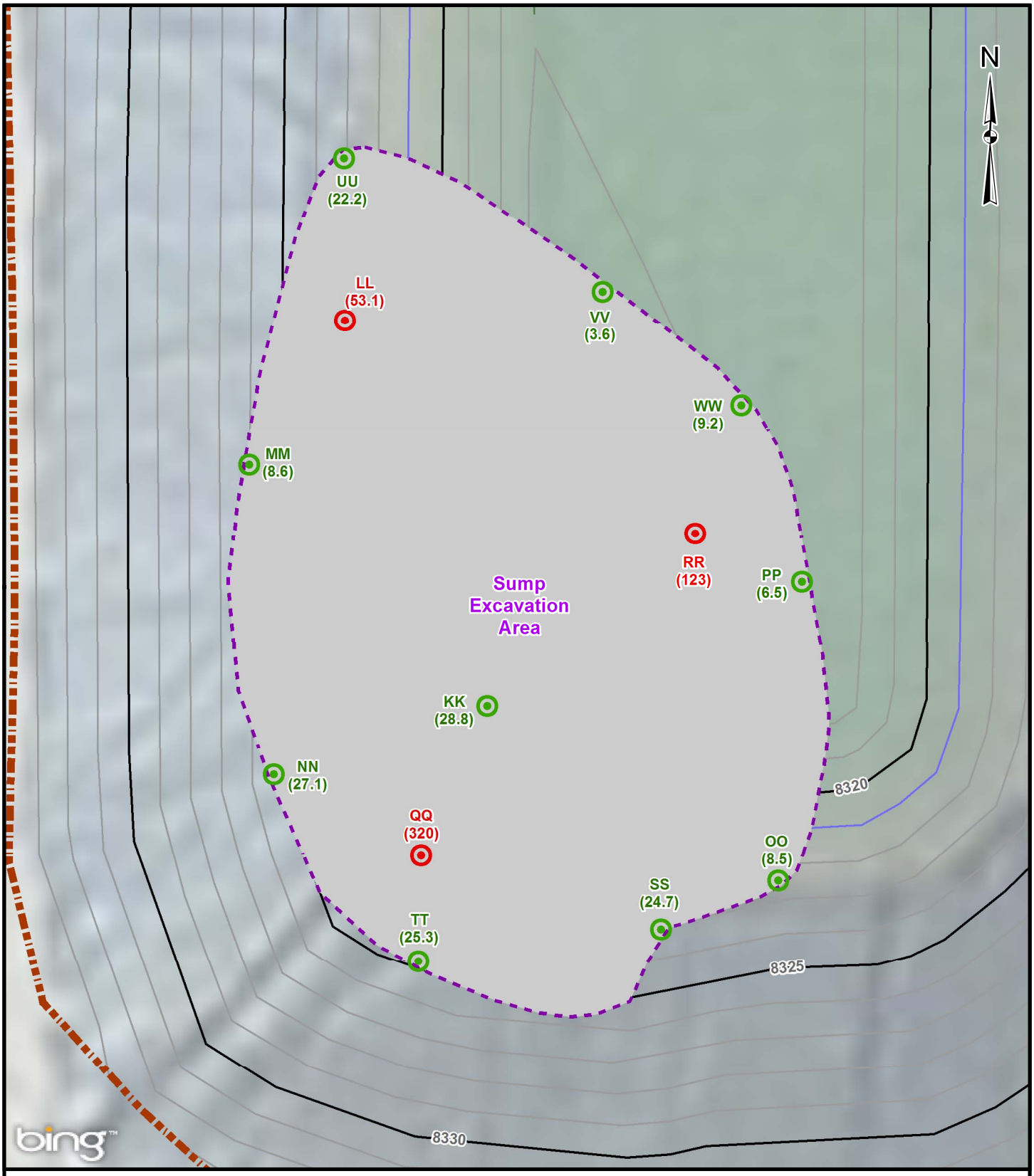


10 0 10 Feet

LEGEND

- Sample MM (PID reading OK, ppm)
- Sample QQ (PID reading, ppm)

REFERENCES

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
AERIAL IMAGERY: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.

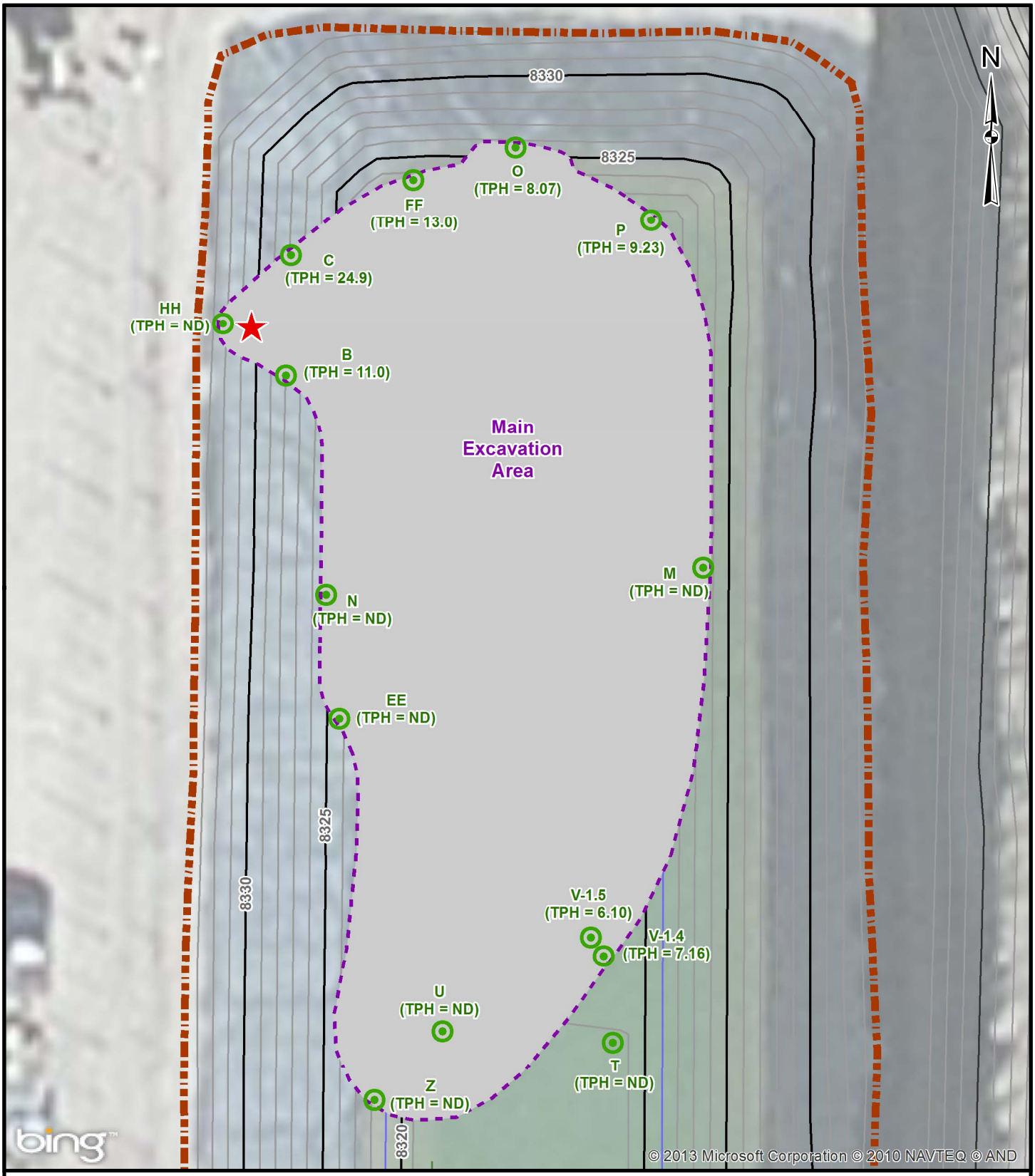
PROJECT
MARATHON OIL COMPANY
32C PRODUCED WATER POND
GARFIELD COUNTY, COLORADO

TITLE
FIELD SCREENING LOCATIONS IN SUMP EXCAVATION AREA

Golder Associates

PROJECT NO. 1300253			FILE No. Fig05_SumpExcavArea_FieldScreening.mxd	
DESIGN	RM	8/8/2013	SCALE: AS SHOWN	REV. 0
GIS	KJC	8/12/2013		
CHECK	RM	8/12/2013	**FIGURE 5**	
REVIEW	EK	8/12/2013		

Map Document: M:\Marathon\Parachute_CO\Mapping\Soil Excavation Report\Fig05_SumpExcavArea_FieldScreening.mxd / Modified 8/12/2013 3:13:30 PM by KJCarpenter / Exported 8/29/2013 9:55:18 AM by KJCarpenter



20 0 20 Feet

LEGEND

★ Location of Pond Breach

◉ Sample FF (GRO & DRO, mg/kg))

REFERENCES

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
AERIAL IMAGERY: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.

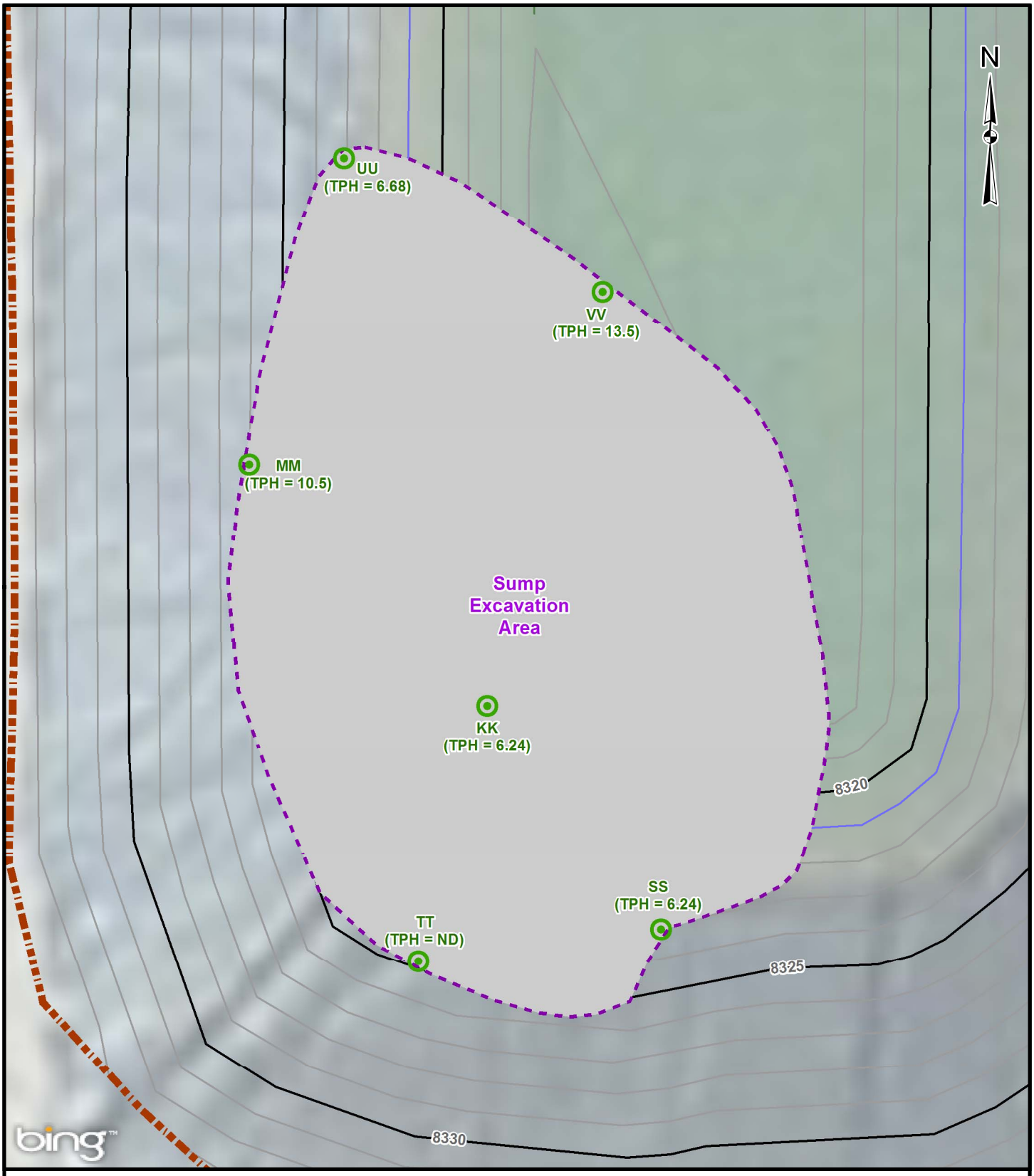
PROJECT
MARATHON OIL COMPANY
32C PRODUCED WATER POND
GARFIELD COUNTY, COLORADO

TITLE
CONFIRMATORY ANALYSES IN MAIN EXCAVATION AREA

Golder Associates

PROJECT NO. 1300253			FILE No. Fig06_MainExcavArea_ConfAnalyses.mxd	
DESIGN	RM	8/8/2013	SCALE: AS SHOWN	REV. 0
GIS	KJC	8/12/2013		
CHECK	RM	8/12/2013	**FIGURE 6**	
REVIEW	EK	8/12/2013		

Map Document: M:\Marathon\Parachute_CO\Mapping\Soil Excavation Report\Fig06_MainExcavArea_ConfAnalyses.mxd / Modified 8/12/2013 3:15:02 PM by KJCarpenter / Exported 8/29/2013 9:56:30 AM by KJCarpenter



10 0 10 Feet

LEGEND

Sample MM (GRO & DRO, mg/kg)

REFERENCES

COORDINATE SYSTEM: NAD 1983 UTM ZONE 12N
AERIAL IMAGERY: (C) 2010 MICROSOFT CORPORATION AND ITS DATA SUPPLIERS.

PROJECT
MARATHON OIL COMPANY
32C PRODUCED WATER POND
GARFIELD COUNTY, COLORADO

TITLE
CONFIRMATORY ANALYSES IN SUMP EXCAVATION AREA

Golder Associates

PROJECT NO. 1300253			FILE No. Fig07_SumpExcavArea_ConfAnalyses.mxd	
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GIS	KJC	8/12/2013	FIGURE 7	
CHECK	RM	8/12/2013		
REVIEW	EK	8/12/2013		

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APPENDIX A

32C PHOTOGRAPHS AFTER REMOVAL OF CONTAMINATED MATERIALS

APPENDIX A-1

REPRESENTATIVE PHOTOGRAPHS OF MAIN EXCAVATION AREA

Photo A-1.1

Looking SW at main excavation area

Photo A-1.2

Looking west at SW portion of main excavation area

Photo A-1.3

Looking west at NW portion of main excavation area

Photo A-1.4

Looking NW at north portion of main excavation area

Photo A-1.5

Closeup of north portion of main excavation area

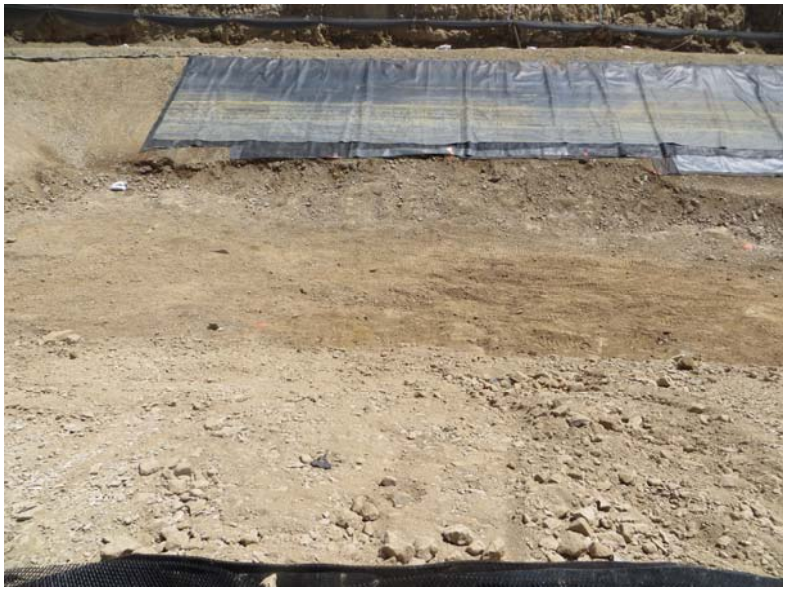


Photo A-1.6

Looking east at main excavation area

APPENDIX A-2

REPRESENTATIVE PHOTOGRAPHS OF SUMP EXCAVATION AREA

Photo A-2.1

Looking SW at partial excavation of sump area

Photo A-2.2

Looking east at partial excavation of sump area

Photo A-2.3

Closeup of bedrock on south edge of sump excavation area

APPENDIX B

32C SOIL REMEDIATION DOCUMENTATION

APPENDIX B-1

SOIL DISPOSAL DOCUMENTATION

32C Surface Impoundment 130-0253

Impacted Soil Disposal

8/21/2013

DATE	TICKET #	TYPE	FROM	TANK #	TO	lbs	
7/25/13	559551	SOIL	596-32C	PIT	WELLINGTON, UT/ECDC	36,440	
7/25/13	484479	SOIL	596-32C	PIT	WELLINGTON, UT/ECDC	40,380	
7/26/13	484481	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	39,880	
7/26/13	559553	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	45,040	
7/27/13	554214	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	50,420	
7/27/13	446448	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	81,420	
7/27/13	554215	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	42,300	
7/29/13	559558	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	33,800	
7/29/13	554851	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	125,040	
7/29/13	559557	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	36,220	
7/30/13	554852	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	126,740	
7/30/13	554217	SOIL	596-32	PIT	W. GARFIELD CO LANDFILL	34,500	
7/30/13	554218	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	41,860	
7/30/13	554216	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	45,600	
7/31/13	559561	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	40,560	
7/31/13	559560	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	38,500	
7/31/13	559559	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	45,220	
7/31/13	554219	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	53,860	
7/31/13	554220	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	37,460	
						995,240	**498 tons**
				76,820	to ECDC		
				918,420	to West Garfield Co Landfill		
8/1/13	554221	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	50,340	
8/1/13	554222	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	47,640	
8/1/13	559563	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	40,420	
8/1/13	559562	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	38,100	
8/2/13	559565	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	49,540	
8/2/13	559564	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	36,700	
8/2/13	484493	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	45,280	
8/2/13	484492	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	46,940	
8/2/13	484494	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	43,440	
8/3/13	559567	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	45,600	
8/3/13	559568	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	43,220	
8/3/13	484495	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	44,880	
8/3/13	484496	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	38,860	
8/3/13	559566	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	49,460	
8/4/13	559570	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	44,180	
8/4/13	559571	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	43,140	
8/4/13	559569	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	45,940	
8/4/13	475860	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	120,320	
8/6/13	559573	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	47,120	
8/6/13	554860	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	86,920	
8/6/13	559572	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	46,200	
8/7/13	559576	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	37,060	
8/7/13	554861	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	85,700	
8/7/13	559574	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	37,340	
8/7/13	559575	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	42,900	
8/9/13	559578	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	58,420	
8/9/13	475869	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	38,140	
8/13/13	307348	SOIL	596-32C	PIT	W. GARFIELD CO LANDFILL	21,880	
						1,375,680	**688 tons**
					GRAND TOTAL	**2,370,920**	**1185 tons**

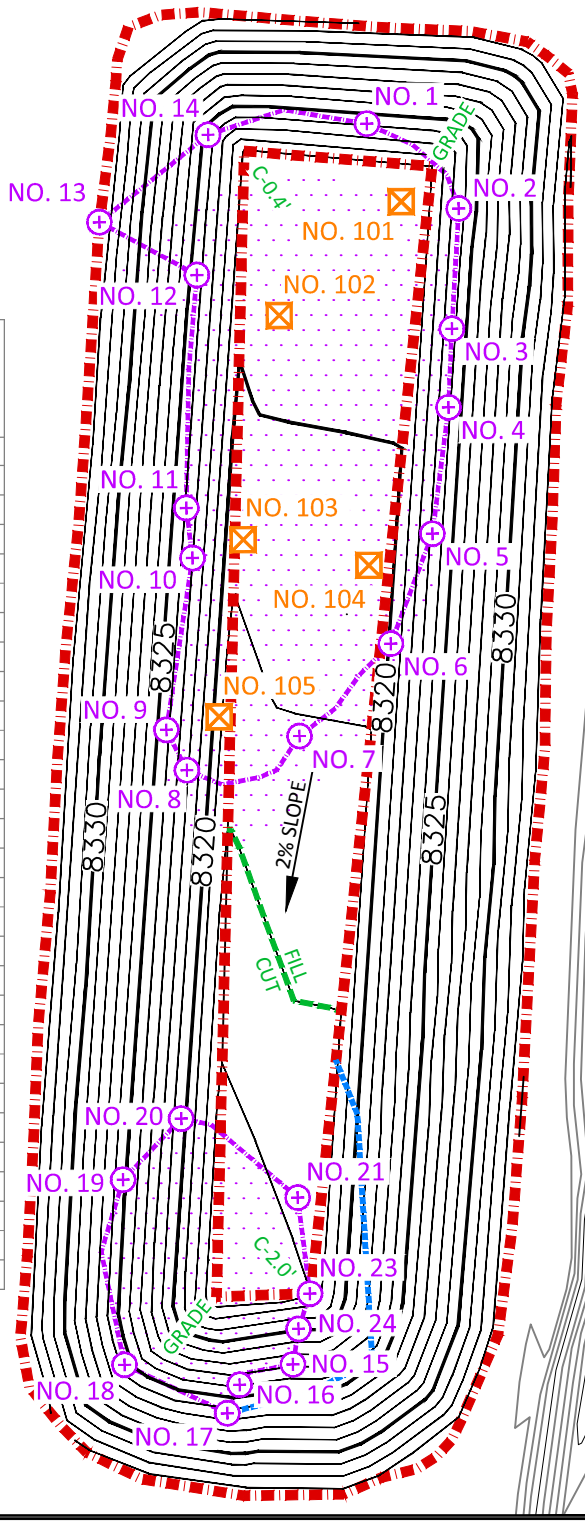
APPENDIX B-2

WH SMITH & ASSOCIATES SURVEY RESULTS

PAD 596-32C

SCALE: 1"= 40'
CONTOUR
INTERVAL 1'

MONITOR WELL: MW3
TOP PVC PIPE
N: 1643050.42
E: 2240698.97
EL: 8333.37
GROUND EL: 8333.7



STATION	COLORADO CENTRAL ZONE NAD83 NORTHING (FEET)	COLORADO CENTRAL ZONE NAD83 EASTING (FEET)	NAVD88 ELEVATION (FEET)
CUT NO. 1	1643073.84	2240778.90	8322.59
CUT NO. 2	1643056.18	2240798.03	8321.64
CUT NO. 3	1643031.13	2240796.60	8322.18
CUT NO. 4	1643014.76	2240795.90	8322.60
CUT NO. 5	1642988.42	2240792.54	8321.48
CUT NO. 6	1642965.53	2240783.89	8319.29
CUT NO. 7	1642946.28	2240764.86	8318.85
CUT NO. 8	1642939.18	2240741.39	8320.79
CUT NO. 9	1642947.56	2240737.13	8322.99
CUT NO. 10	1642983.37	2240742.57	8321.93
CUT NO. 11	1642993.79	2240741.26	8323.02
CUT NO. 12	1643042.33	2240743.47	8323.34
CUT NO. 13	1643053.43	2240723.28	8333.98
CUT NO. 14	1643071.53	2240745.80	8323.51
CUT NO.15	1642815.40	2240763.49	8322.46
CUT NO. 16	1642811.14	2240752.39	8324.29
CUT NO. 17	1642805.22	2240749.81	8326.84
CUT NO. 18	1642815.30	2240728.41	8326.02
CUT NO. 19	1642853.88	2240728.12	8324.45
CUT NO. 19	1642853.87	2240728.11	8324.45
CUT NO. 20	1642866.58	2240740.21	8319.55
CUT NO. 21	1642850.15	2240764.48	8318.38
CUT NO. 23	1642830.11	2240767.03	8318.97
CUT NO. 24	1642822.78	2240764.66	8319.76
BEDROCK NO. 101	1643057.61	2240786.05	8317.90
BEDROCK NO. 102	1643033.89	2240760.63	8315.84
BEDROCK NO. 103	1642987.19	2240753.13	8316.28
BEDROCK NO. 104	1642981.84	2240779.31	8315.40
BEDROCK NO. 105	1642950.30	2240748.12	8317.06

PROPOSED POND RECONSTRUCTION
FILL VOLUME: 1128 CU. YARDS
CUT VOLUME: 140 CU. YARDS

WILLIAM H. SMITH
& ASSOCIATES P.C.
SURVEYING CONSULTANTS
550 EAST SECOND NORTH
GREEN RIVER, WY
PHONE: 307-875-3638
307-875-3639
www.whsmithpc.com

DRAWN BY: RR	CHECKED BY: RR
PROJECT NO: N/A	JOB NO: 26099
REVISIONS:	

LEGEND :

- AREA OF EXCAVATION TO BEDROCK
- NO. 18 — GOLDER REF. NUMBER ON CUT LINE
- NO. 101 — GOLDER REF. NUMBER ON BEDROCK

LOCATION:
596-32C
WITHIN THE SW/4
SECTION 32,
T 5 S, R 96 W,
6TH PM.
GARFIELD COUNTY,
COLORADO

MARATHON OIL COMPANY
PO BOX 3128, HOUSTON TX, 77253
5555 SAN FELIPE, HOUSTON TX, 77056

PROPOSED POND RECONSTRUCTION

SCALE: 1"= 40'	EXHIBIT "A"
DATE: 2013-08-04	SHEET 2 OF 2

APPENDIX C

32C CONFIRMATION SAMPLE ANALYTICAL REPORTS

APPENDIX C-1

JULY 23 – JULY 26 SAMPLE RESULTS

Mountain States ACCUTEST LABORATORIES

07/31/13

Technical Report for

Marathon Oil

Marathon 32C Pond

WBS#TA.13.30788.EXP

Accutest Job Number: D48662

Sampling Dates: 07/23/13 - 07/26/13

Report to:

Marathon Oil
44 Union Blvd, Ste 300
Lakewood, CO 80228
randy_march@golder.com; zjtoellner@marathonoil.com

ATTN: Randy March

Total number of pages in report: **120**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Scott Heideman
Laboratory Director

Client Service contact: Ann Doerr 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), TX (T104704511)

Sections: 1 2 3 4 5 6 7 8 9 10 11

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Accutest Laboratories

Sample Summary

Marathon Oil

Job No: D48662

Marathon 32C Pond
Project No: WBS#TA.13.30788.EXP

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D48662-1	07/23/13	09:00	RM	07/26/13	SO	Soil	M-1.0
D48662-2	07/23/13	10:20	RM	07/26/13	SO	Soil	N-3.0
D48662-3	07/23/13	12:50	RM	07/26/13	SO	Soil	O-1.5
D48662-4	07/24/13	09:30	RM	07/26/13	SO	Soil	P-1.1
D48662-4F	07/24/13	09:30	RM	07/26/13	SO	Soil	P-1.1
D48662-5	07/24/13	14:30	RM	07/26/13	SO	Soil	T-1.3
D48662-6	07/25/13	08:10	RM	07/26/13	SO	Soil	U-2.6
D48662-7	07/25/13	08:30	RM	07/26/13	SO	Soil	V-1.5
D48662-8	07/25/13	08:40	RM	07/26/13	SO	Soil	V-1.4
D48662-9	07/25/13	11:50	RM	07/26/13	SO	Soil	Z-2.0
D48662-9F	07/25/13	11:50	RM	07/26/13	SO	Soil	Z-2.0
D48662-10	07/26/13	09:35	RM	07/26/13	SO	Soil	EE-1.1
D48662-11	07/26/13	10:20	RM	07/26/13	SO	Soil	FF-1.1

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

Sample Summary
(continued)

Marathon Oil

Job No: D48662

Marathon 32C Pond
Project No: WBS#TA.13.30788.EXP

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D48662-12	07/26/13	11:00	RM	07/26/13	SO	Soil	HH-2.5
D48662-12F	07/26/13	11:00	RM	07/26/13	SO	Soil	HH-2.5

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Marathon Oil	**Job No**	D48662
Site:	Marathon 32C Pond	**Report Date**	7/31/2013 7:24:40 AM

On 07/26/2013, 12 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 3.7 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D48662 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix SO **Batch ID:** V5V1709

- All samples were analyzed within the recommended method holding time.
- Sample(s) D48640-1MS, D48640-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Matrix SO **Batch ID:** V5V1710

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48662-10MS, D48662-10MSD were used as the QC samples indicated.

Extractables by GCMS By Method SW846 8270C BY SIM

Matrix SO **Batch ID:** OP8276

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D48350-8AMS, D48350-8AMSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- The matrix spike (MS) recovery(s) of Benzo(b)fluoranthene, Benzo(k)fluoranthene, Fluoranthene are outside control limits. Outside control limits due to possible matrix interference.
- The matrix spike duplicate (MSD) recovery(s) of Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Fluoranthene are outside control limits. Probable cause due to matrix interference.
- The matrix spike (MS) recovery(s) of Benzo(a)pyrene, Chrysene, Fluorene, Pyrene are outside control limits. Outside control limits due to high level in sample relative to spike amount.

Volatiles by GC By Method SW846 8015B

Matrix SO **Batch ID:** GGB1175

- All samples were analyzed within the recommended method holding time.
- Sample(s) D48662-1MS, D48662-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Extractables by GC By Method SW846-8015B

Matrix SO **Batch ID:** OP8275

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D48662-2MS, D48662-2MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Metals By Method SW846 6010C

Matrix AQ	Batch ID: MP10678

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48662-4FMS, D48662-4FMSD, D48662-4FSDL were used as the QC samples for the metals analysis.
- The matrix spike / matrix spike duplicate (MS/MSD) recovery(s) of Calcium are outside control limits. Spike recovery indicates possible matrix interference.
- The serial dilution RPD(s) for Magnesium are outside control limits for sample MP10678-SD1. Probable cause due to sample homogeneity.
- MP10678-SD1 for Magnesium: Serial dilution indicates possible matrix interference.

Matrix SO	Batch ID: MP10659

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48662-4MS, D48662-4MSD, D48662-4SDL were used as the QC samples for the metals analysis.
- The serial dilution RPD(s) for Cadmium, Silver, Copper, Nickel, Zinc are outside control limits for sample MP10659-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP10659-SD1 for Zinc: Serial dilution indicates possible matrix interference.
- MP10659-SD1 for Nickel: Serial dilution indicates possible matrix interference.
- MP10659-SD1 for Copper: Serial dilution indicates possible matrix interference.

Metals By Method SW846 6020A

Matrix SO	Batch ID: MP10660

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48662-4MS, D48662-4MSD, D48662-4SDL were used as the QC samples for the metals analysis.
- The serial dilution RPD(s) for Arsenic are outside control limits for sample MP10660-SD1. Probable cause due to sample homogeneity.
- MP10660-SD1 for Arsenic: Serial dilution indicates possible matrix interference.

Metals By Method SW846 7471B

Matrix SO	Batch ID: MP10655

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48524-1MS, D48524-1MSD were used as the QC samples for the metals analysis.

Wet Chemistry By Method ASTM D1498-76M

Matrix SO	Batch ID: GN21218

- Sample(s) D48431-1DUP were used as the QC samples for the Redox Potential Vs H2 analysis.

Wet Chemistry By Method SM2540B-2011 M

Matrix SO	Batch ID: GN21207

- The data for SM2540B-2011 M meets quality control requirements.

Wet Chemistry By Method SW846 3060A/7196A

Matrix SO	**Batch ID:** GP10548

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48544-1DUP, D48544-1MSD were used as the QC samples for the Chromium, Hexavalent analysis.
- The matrix spike / matrix spike duplicate (MS/MSD) recovery(s) of Chromium, Hexavalent are outside control limits. Spike recovery indicates possible matrix interference and/or sample nonhomogeneity.

Wet Chemistry By Method SW846 3060A/7196A M

Matrix SO	**Batch ID:** R18142

- The data for SW846 3060A/7196A M meets quality control requirements.
- D48662-12 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Matrix SO	**Batch ID:** R18143

- The data for SW846 3060A/7196A M meets quality control requirements.
- D48662-9 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Matrix SO	**Batch ID:** R18144

- The data for SW846 3060A/7196A M meets quality control requirements.
- D48662-4 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Wet Chemistry By Method SW846 9045D

Matrix SO	**Batch ID:** GN21216

- The following samples were run outside of holding time for method SW846 9045D: D48662-12, D48662-4, D48662-9

Wet Chemistry By Method USDA HANDBOOK 60

Matrix SO	**Batch ID:** MP10678

- D48662-4F for Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]
- D48662-9F for Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]
- D48662-12F for Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D48662
Account: Marathon Oil
Project: Marathon 32C Pond
Collected: 07/23/13 thru 07/26/13

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D48662-1	**M-1.0**					
No hits reported in this sample.						
D48662-2	**N-3.0**					
No hits reported in this sample.						
D48662-3	**O-1.5**					
Xylene (total)		0.250 J	0.28	0.14	mg/kg	SW846 8260B
TPH-DRO (C10-C28)		8.07	7.9	5.9	mg/kg	SW846-8015B
D48662-4	**P-1.1**					
Xylene (total)		0.143 J	0.28	0.14	mg/kg	SW846 8260B
Benzo(b)fluoranthene		0.0117	0.010	0.0052	mg/kg	SW846 8270C BY SIM
Chrysene		0.0072 J	0.010	0.0052	mg/kg	SW846 8270C BY SIM
TPH-DRO (C10-C28)		9.23	8.0	6.0	mg/kg	SW846-8015B
Arsenic		7.8	0.12		mg/kg	SW846 6020A
Barium		501	1.2		mg/kg	SW846 6010C
Chromium		69.5	1.2		mg/kg	SW846 6010C
Copper		15.6	1.2		mg/kg	SW846 6010C
Lead		14.7	6.0		mg/kg	SW846 6010C
Nickel		33.1	3.6		mg/kg	SW846 6010C
Zinc		47.1	3.6		mg/kg	SW846 6010C
Specific Conductivity		2450	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent [a]		69.5	2.2		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2		338			mv	ASTM D1498-76M
pH		8.16			su	SW846 9045D
D48662-4F	**P-1.1**					
Calcium		313	2.0		mg/l	SW846 6010C
Magnesium		25.3	1.0		mg/l	SW846 6010C
Sodium		39.4	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [b]		0.575			ratio	USDA HANDBOOK 60
D48662-5	**T-1.3**					
Toluene		0.0895 J	0.14	0.070	mg/kg	SW846 8260B
Xylene (total)		0.213 J	0.28	0.14	mg/kg	SW846 8260B

Summary of Hits

Job Number: D48662
Account: Marathon Oil
Project: Marathon 32C Pond
Collected: 07/23/13 thru 07/26/13

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D48662-6	**U-2.6**					
No hits reported in this sample.						
D48662-7	**V-1.5**					
TPH-DRO (C10-C28)		6.10 J	7.9	5.9	mg/kg	SW846-8015B
D48662-8	**V-1.4**					
TPH-DRO (C10-C28)		7.16 J	8.1	6.1	mg/kg	SW846-8015B
D48662-9	**Z-2.0**					
Arsenic		7.7	0.12		mg/kg	SW846 6020A
Barium		400	1.2		mg/kg	SW846 6010C
Chromium		59.0	1.2		mg/kg	SW846 6010C
Copper		20.5	1.2		mg/kg	SW846 6010C
Lead		14.0	5.9		mg/kg	SW846 6010C
Nickel		31.9	3.5		mg/kg	SW846 6010C
Zinc		49.5	3.5		mg/kg	SW846 6010C
Specific Conductivity		216	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent [a]		59.0	2.2		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2		294			mv	ASTM D1498-76M
pH		8.75			su	SW846 9045D
D48662-9F	**Z-2.0**					
Calcium		26.6	2.0		mg/l	SW846 6010C
Magnesium		2.85	1.0		mg/l	SW846 6010C
Sodium		14.0	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [b]		0.688			ratio	USDA HANDBOOK 60
D48662-10	**EE-1.1**					
No hits reported in this sample.						
D48662-11	**FF-1.1**					
Xylene (total)		0.182 J	0.26	0.13	mg/kg	SW846 8260B
TPH-DRO (C10-C28)		13.0	7.8	5.9	mg/kg	SW846-8015B
D48662-12	**HH-2.5**					
Arsenic		10.2	0.11		mg/kg	SW846 6020A

Summary of Hits

Job Number: D48662
Account: Marathon Oil
Project: Marathon 32C Pond
Collected: 07/23/13 thru 07/26/13

Lab Sample ID Client Sample ID Analyte	Result/ Qual	RL	MDL	Units	Method
Barium	410	1.1		mg/kg	SW846 6010C
Chromium	65.3	1.1		mg/kg	SW846 6010C
Copper	14.1	1.1		mg/kg	SW846 6010C
Lead	13.0	5.5		mg/kg	SW846 6010C
Nickel	31.2	3.3		mg/kg	SW846 6010C
Zinc	41.4	3.3		mg/kg	SW846 6010C
Specific Conductivity	243	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent [a]	65.3	2.1		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2	301			mv	ASTM D1498-76M
pH	8.58			su	SW846 9045D
D48662-12F HH-2.5					
Calcium	28.3	2.0		mg/l	SW846 6010C
Magnesium	4.73	1.0		mg/l	SW846 6010C
Sodium	19.0	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [b]	0.870			ratio	USDA HANDBOOK 60

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)
(b) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

Mountain States ACCUTEST LABORATORIES

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	M-1.0		
Lab Sample ID:	D48662-1	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	86.5
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28283.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.05 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.065	0.033	mg/kg	
108-88-3	Toluene	ND	0.13	0.065	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.025	mg/kg	
1330-20-7	Xylene (total)	ND	0.26	0.13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	94%		64-130%
460-00-4	4-Bromofluorobenzene	103%		62-131%
17060-07-0	1,2-Dichloroethane-D4	101%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	M-1.0		
Lab Sample ID:	D48662-1	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	86.5
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21387.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.5	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	89%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	M-1.0		
Lab Sample ID:	D48662-1	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	86.5
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26961.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.7	5.8	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	65%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	N-3.0		
Lab Sample ID:	D48662-2	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	82.0
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28284.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.10 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.071	0.035	mg/kg	
108-88-3	Toluene	ND	0.14	0.071	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.027	mg/kg	
1330-20-7	Xylene (total)	ND	0.28	0.14	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	94%		64-130%
460-00-4	4-Bromofluorobenzene	104%		62-131%
17060-07-0	1,2-Dichloroethane-D4	100%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	N-3.0		
Lab Sample ID:	D48662-2	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	82.0
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21390.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	7.1	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	90%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	N-3.0		
Lab Sample ID:	D48662-2	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	82.0
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26941.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	8.1	6.1	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	60%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	O-1.5		
Lab Sample ID:	D48662-3	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	83.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28285.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.069	0.034	mg/kg	
108-88-3	Toluene	ND	0.14	0.069	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.026	mg/kg	
1330-20-7	Xylene (total)	0.250	0.28	0.14	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	94%		64-130%
460-00-4	4-Bromofluorobenzene	105%		62-131%
17060-07-0	1,2-Dichloroethane-D4	102%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	O-1.5		
Lab Sample ID:	D48662-3	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	83.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21391.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	6.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	84%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	O-1.5		
Lab Sample ID:	D48662-3	**Date Sampled:**	07/23/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	83.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26963.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	8.07	7.9	5.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	57%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	82.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28286.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.06 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.070	0.035	mg/kg	
108-88-3	Toluene	ND	0.14	0.070	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.027	mg/kg	
1330-20-7	Xylene (total)	0.143	0.28	0.14	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	95%		64-130%
460-00-4	4-Bromofluorobenzene	103%		62-131%
17060-07-0	1,2-Dichloroethane-D4	101%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8270C BY SIM SW846 3546	**Percent Solids:**	82.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G15641.D	1	07/29/13	DC	07/29/13	OP8276	E3G769
Run #2							

	Initial Weight	Final Volume
Run #1	30.2 g	1.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.010	0.0052	mg/kg	
120-12-7	Anthracene	ND	0.010	0.0052	mg/kg	
56-55-3	Benzo(a)anthracene	ND	0.010	0.0052	mg/kg	
205-99-2	Benzo(b)fluoranthene	0.0117	0.010	0.0052	mg/kg	
207-08-9	Benzo(k)fluoranthene	ND	0.010	0.0052	mg/kg	
50-32-8	Benzo(a)pyrene	ND	0.010	0.0052	mg/kg	
218-01-9	Chrysene	0.0072	0.010	0.0052	mg/kg	J
53-70-3	Dibenzo(a,h)anthracene	ND	0.010	0.0052	mg/kg	
206-44-0	Fluoranthene	ND	0.010	0.0052	mg/kg	
86-73-7	Fluorene	ND	0.010	0.0060	mg/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.010	0.0052	mg/kg	
91-20-3	Naphthalene	ND	0.014	0.012	mg/kg	
129-00-0	Pyrene	ND	0.010	0.0052	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	66%		10-159%
321-60-8	2-Fluorobiphenyl	72%		19-131%
1718-51-0	Terphenyl-d14	79%		18-150%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	82.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21392.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	7.0	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	86%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	82.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26965.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	9.23	8.0	6.0	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	70%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	82.9
Project:	Marathon 32C Pond		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	7.8	0.12	mg/kg	5	07/29/13	07/30/13	JB	SW846 6020A [3]	SW846 3050B [7]
Barium	501	1.2	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Cadmium	< 1.2	1.2	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Chromium	69.5	1.2	mg/kg	1	07/29/13	07/30/13	JB	SW846 6010C [4]	SW846 3050B [6]
Copper	15.6	1.2	mg/kg	1	07/29/13	07/30/13	JB	SW846 6010C [4]	SW846 3050B [6]
Lead	14.7	6.0	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Mercury	< 0.10	0.10	mg/kg	1	07/29/13	07/29/13	JB	SW846 7471B [1]	SW846 7471B [5]
Nickel	33.1	3.6	mg/kg	1	07/29/13	07/30/13	JB	SW846 6010C [4]	SW846 3050B [6]
Selenium	< 6.0	6.0	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Silver	< 3.6	3.6	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Zinc	47.1	3.6	mg/kg	1	07/29/13	07/30/13	JB	SW846 6010C [4]	SW846 3050B [6]

(1) Instrument QC Batch: MA3811
(2) Instrument QC Batch: MA3812
(3) Instrument QC Batch: MA3813
(4) Instrument QC Batch: MA3818
(5) Prep QC Batch: MP10655
(6) Prep QC Batch: MP10659
(7) Prep QC Batch: MP10660

RL = Reporting Limit

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	82.9
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	2450	1.0	umhos/cm	1	07/30/13	RW	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	07/29/13	RW	SW846 3060A/7196A
Chromium, Trivalent [a]	69.5	2.2	mg/kg	1	07/30/13 16:31	JB	SW846 3060A/7196A M
Redox Potential Vs H2	338		mv	1	07/29/13	AK	ASTM D1498-76M
Solids, Percent	82.9		%	1	07/28/13	SWT	SM2540B-2011 M
pH	8.16		su	1	07/29/13 14:10	AK	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4F	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	82.9
Project:	Marathon 32C Pond		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	313	2.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	25.3	1.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	39.4	2.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA3818
(2) Prep QC Batch: MP10678

RL = Reporting Limit

Report of Analysis

Client Sample ID:	P-1.1		
Lab Sample ID:	D48662-4F	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	82.9
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.575		ratio	1	07/30/13 15:24	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	T-1.3		
Lab Sample ID:	D48662-5	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	82.8
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28287.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.08 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.070	0.035	mg/kg	
108-88-3	Toluene	0.0895	0.14	0.070	mg/kg	J
100-41-4	Ethylbenzene	ND	0.14	0.027	mg/kg	
1330-20-7	Xylene (total)	0.213	0.28	0.14	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	95%		64-130%
460-00-4	4-Bromofluorobenzene	102%		62-131%
17060-07-0	1,2-Dichloroethane-D4	104%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	T-1.3		
Lab Sample ID:	D48662-5	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	82.8
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21393.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	7.0	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	87%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	T-1.3		
Lab Sample ID:	D48662-5	**Date Sampled:**	07/24/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	82.8
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26967.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	8.0	6.0	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	58%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	U-2.6		
Lab Sample ID:	D48662-6	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	85.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28288.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.03 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.067	0.034	mg/kg	
108-88-3	Toluene	ND	0.13	0.067	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.026	mg/kg	
1330-20-7	Xylene (total)	ND	0.27	0.13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	94%		64-130%
460-00-4	4-Bromofluorobenzene	102%		62-131%
17060-07-0	1,2-Dichloroethane-D4	100%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	U-2.6		
Lab Sample ID:	D48662-6	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	85.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21394.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.7	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	87%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	U-2.6		
Lab Sample ID:	D48662-6	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	85.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26969.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.8	5.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	67%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	V-1.5		
Lab Sample ID:	D48662-7	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	84.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28289.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.068	0.034	mg/kg	
108-88-3	Toluene	ND	0.14	0.068	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.026	mg/kg	
1330-20-7	Xylene (total)	ND	0.27	0.14	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	95%		64-130%
460-00-4	4-Bromofluorobenzene	103%		62-131%
17060-07-0	1,2-Dichloroethane-D4	102%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	V-1.5		
Lab Sample ID:	D48662-7	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	84.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21395.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	6.8	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	89%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	V-1.5		
Lab Sample ID:	D48662-7	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	84.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26971.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	6.10	7.9	5.9	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	74%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	V-1.4		
Lab Sample ID:	D48662-8	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	82.3
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28290.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.06 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.071	0.035	mg/kg	
108-88-3	Toluene	ND	0.14	0.071	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.027	mg/kg	
1330-20-7	Xylene (total)	ND	0.28	0.14	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	93%		64-130%
460-00-4	4-Bromofluorobenzene	101%		62-131%
17060-07-0	1,2-Dichloroethane-D4	105%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	V-1.4		
Lab Sample ID:	D48662-8	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	82.3
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21396.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	7.1	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	89%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	V-1.4		
Lab Sample ID:	D48662-8	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	82.3
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26973.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	7.16	8.1	6.1	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	74%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	84.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28291.D	1	07/27/13	BR	n/a	n/a	V5V1709
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.06 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.068	0.034	mg/kg	
108-88-3	Toluene	ND	0.14	0.068	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.026	mg/kg	
1330-20-7	Xylene (total)	ND	0.27	0.14	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	92%		64-130%
460-00-4	4-Bromofluorobenzene	104%		62-131%
17060-07-0	1,2-Dichloroethane-D4	106%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8270C BY SIM SW846 3546	**Percent Solids:**	84.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G15642.D	1	07/29/13	DC	07/29/13	OP8276	E3G769
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.0099	0.0052	mg/kg	
120-12-7	Anthracene	ND	0.0099	0.0052	mg/kg	
56-55-3	Benzo(a)anthracene	ND	0.0099	0.0052	mg/kg	
205-99-2	Benzo(b)fluoranthene	ND	0.0099	0.0052	mg/kg	
207-08-9	Benzo(k)fluoranthene	ND	0.0099	0.0052	mg/kg	
50-32-8	Benzo(a)pyrene	ND	0.0099	0.0052	mg/kg	
218-01-9	Chrysene	ND	0.0099	0.0052	mg/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	0.0099	0.0052	mg/kg	
206-44-0	Fluoranthene	ND	0.0099	0.0052	mg/kg	
86-73-7	Fluorene	ND	0.0099	0.0059	mg/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.0099	0.0052	mg/kg	
91-20-3	Naphthalene	ND	0.014	0.012	mg/kg	
129-00-0	Pyrene	ND	0.0099	0.0052	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	60%		10-159%
321-60-8	2-Fluorobiphenyl	66%		19-131%
1718-51-0	Terphenyl-d14	70%		18-150%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	84.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21397.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	6.8	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	86%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	84.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26975.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.9	5.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	63%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	84.1
Project:	Marathon 32C Pond		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	7.7	0.12	mg/kg	5	07/29/13	07/30/13	JB	SW846 6020A [3]	SW846 3050B [7]
Barium	400	1.2	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Cadmium	< 1.2	1.2	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Chromium	59.0	1.2	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Copper	20.5	1.2	mg/kg	1	07/29/13	07/30/13	JB	SW846 6010C [4]	SW846 3050B [6]
Lead	14.0	5.9	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Mercury	< 0.099	0.099	mg/kg	1	07/29/13	07/29/13	JB	SW846 7471B [1]	SW846 7471B [5]
Nickel	31.9	3.5	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Selenium	< 5.9	5.9	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Silver	< 3.5	3.5	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Zinc	49.5	3.5	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]

(1) Instrument QC Batch: MA3811
(2) Instrument QC Batch: MA3812
(3) Instrument QC Batch: MA3813
(4) Instrument QC Batch: MA3818
(5) Prep QC Batch: MP10655
(6) Prep QC Batch: MP10659
(7) Prep QC Batch: MP10660

RL = Reporting Limit

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	84.1
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	216	1.0	umhos/cm	1	07/30/13	RW	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	07/29/13	RW	SW846 3060A/7196A
Chromium, Trivalent [a]	59.0	2.2	mg/kg	1	07/29/13 23:36	JB	SW846 3060A/7196A M
Redox Potential Vs H2	294		mv	1	07/29/13	AK	ASTM D1498-76M
Solids, Percent	84.1		%	1	07/28/13	SWT	SM2540B-2011 M
pH	8.75		su	1	07/29/13 14:10	AK	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9F	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	84.1
Project:	Marathon 32C Pond		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	26.6	2.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	2.85	1.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	14.0	2.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA3818
(2) Prep QC Batch: MP10678

RL = Reporting Limit

Report of Analysis

Client Sample ID:	Z-2.0		
Lab Sample ID:	D48662-9F	**Date Sampled:**	07/25/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	84.1
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.688		ratio	1	07/30/13 15:48	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	EE-1.1		
Lab Sample ID:	D48662-10	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	86.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28297.D	1	07/29/13	BR	n/a	n/a	V5V1710
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.02 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.065	0.032	mg/kg	
108-88-3	Toluene	ND	0.13	0.065	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.025	mg/kg	
1330-20-7	Xylene (total)	ND	0.26	0.13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	91%		64-130%
460-00-4	4-Bromofluorobenzene	106%		62-131%
17060-07-0	1,2-Dichloroethane-D4	98%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	EE-1.1		
Lab Sample ID:	D48662-10	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	86.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21398.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.5	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	88%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	EE-1.1		
Lab Sample ID:	D48662-10	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	86.9
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26977.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.7	5.8	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	58%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FF-1.1		
Lab Sample ID:	D48662-11	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	85.4
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28300.D	1	07/29/13	BR	n/a	n/a	V5V1710
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.08 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.066	0.033	mg/kg	
108-88-3	Toluene	ND	0.13	0.066	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.025	mg/kg	
1330-20-7	Xylene (total)	0.182	0.26	0.13	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	92%		64-130%
460-00-4	4-Bromofluorobenzene	107%		62-131%
17060-07-0	1,2-Dichloroethane-D4	95%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FF-1.1		
Lab Sample ID:	D48662-11	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	85.4
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21400.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.6	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	84%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	FF-1.1		
Lab Sample ID:	D48662-11	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	85.4
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26979.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	13.0	7.8	5.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	68%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8260B	**Percent Solids:**	91.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28301.D	1	07/29/13	BR	n/a	n/a	V5V1710
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.059	0.030	mg/kg	
108-88-3	Toluene	ND	0.12	0.059	mg/kg	
100-41-4	Ethylbenzene	ND	0.12	0.023	mg/kg	
1330-20-7	Xylene (total)	ND	0.24	0.12	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	91%		64-130%
460-00-4	4-Bromofluorobenzene	106%		62-131%
17060-07-0	1,2-Dichloroethane-D4	101%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8270C BY SIM SW846 3546	**Percent Solids:**	91.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G15643.D	1	07/29/13	DC	07/29/13	OP8276	E3G769
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.0091	0.0048	mg/kg	
120-12-7	Anthracene	ND	0.0091	0.0048	mg/kg	
56-55-3	Benzo(a)anthracene	ND	0.0091	0.0048	mg/kg	
205-99-2	Benzo(b)fluoranthene	ND	0.0091	0.0048	mg/kg	
207-08-9	Benzo(k)fluoranthene	ND	0.0091	0.0048	mg/kg	
50-32-8	Benzo(a)pyrene	ND	0.0091	0.0048	mg/kg	
218-01-9	Chrysene	ND	0.0091	0.0048	mg/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	0.0091	0.0048	mg/kg	
206-44-0	Fluoranthene	ND	0.0091	0.0048	mg/kg	
86-73-7	Fluorene	ND	0.0091	0.0055	mg/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.0091	0.0048	mg/kg	
91-20-3	Naphthalene	ND	0.013	0.011	mg/kg	
129-00-0	Pyrene	ND	0.0091	0.0048	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	64%		10-159%
321-60-8	2-Fluorobiphenyl	64%		19-131%
1718-51-0	Terphenyl-d14	69%		18-150%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846 8015B	**Percent Solids:**	91.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21401.D	1	07/27/13	EV	n/a	n/a	GGB1175
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	12	5.9	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	86%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	91.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD26983.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.3	5.5	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	55%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	91.1
Project:	Marathon 32C Pond		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	10.2	0.11	mg/kg	5	07/29/13	07/30/13	JB	SW846 6020A [3]	SW846 3050B [7]
Barium	410	1.1	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Cadmium	< 1.1	1.1	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Chromium	65.3	1.1	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Copper	14.1	1.1	mg/kg	1	07/29/13	07/30/13	JB	SW846 6010C [4]	SW846 3050B [6]
Lead	13.0	5.5	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Mercury	< 0.090	0.090	mg/kg	1	07/29/13	07/29/13	JB	SW846 7471B [1]	SW846 7471B [5]
Nickel	31.2	3.3	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Selenium	< 5.5	5.5	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Silver	< 3.3	3.3	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]
Zinc	41.4	3.3	mg/kg	1	07/29/13	07/29/13	JB	SW846 6010C [2]	SW846 3050B [6]

(1) Instrument QC Batch: MA3811
(2) Instrument QC Batch: MA3812
(3) Instrument QC Batch: MA3813
(4) Instrument QC Batch: MA3818
(5) Prep QC Batch: MP10655
(6) Prep QC Batch: MP10659
(7) Prep QC Batch: MP10660

RL = Reporting Limit

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	91.1
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	243	1.0	umhos/cm	1	07/30/13	RW	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	07/29/13	RW	SW846 3060A/7196A
Chromium, Trivalent [a]	65.3	2.1	mg/kg	1	07/29/13 23:42	JB	SW846 3060A/7196A M
Redox Potential Vs H2	301		mv	1	07/29/13	AK	ASTM D1498-76M
Solids, Percent	91.1		%	1	07/28/13	SWT	SM2540B-2011 M
pH	8.58		su	1	07/29/13 14:10	AK	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12F	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	91.1
Project:	Marathon 32C Pond		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	28.3	2.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	4.73	1.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	19.0	2.0	mg/l	1	07/30/13	07/30/13	JB	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA3818
(2) Prep QC Batch: MP10678

RL = Reporting Limit

Report of Analysis

Client Sample ID:	HH-2.5		
Lab Sample ID:	D48662-12F	**Date Sampled:**	07/26/13
Matrix:	SO - Soil	**Date Received:**	07/26/13
		Percent Solids:	91.1
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.870		ratio	1	07/30/13 15:54	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Mountain States ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

PAGE 1 OF 1

Accutest Laboratories Mountain States
4036 Youngfield Street Wheat Ridge, Co 80033
TEL. 303-425-6021 877-737-4521
FAX 303-425-6021

FED-EX Tracking #: | Bottle Order Control #:
Accutest Quote #: | Accutest Job #: D48662

Client / Reporting Information

Company Name: Marathon Oil Company
Street Address:
City State Zip:
Project Contact: Randy March E-mail: rmarch@golder.com
Phone #: 303-980-0540 Fax #:
Sampler(s) Name(s): Randy March Phone #:

Project Information

Project Name: Marathon 32C Pond
Street:
City:
Project#:
Client PO#:
Project Manager:

Billing Information (If different from Report to)

Company Name: MOC
Street Address: 743 Horizon Ct., Suite 220
City State Zip: Grand Junction, CO 81506
Attention: Zach Toellner PO#:

Requested Analysis (see TEST CODE sheet)

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB-Field Blank
EB- Equipment Blank
RB- Rinse Blank
TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	Bisulfate	GRO, DRO, BTEX	COGCC Table 910-1 Soil								LAB USE ONLY
	M-1.0		7/23/13	0900	RM	SO	2										X									01
	N-3.0		"	1020	"	SO	2										X									02
	O-1.5		"	1250	"	SO	2										X									03
	P-1.1		7/24/13	0930	"	SO	4											X								04
	T-1.3		"	1430	"	SO	2										X									05
	U-2.6		7/25/13	0810	"	SO	2										X									06
	V-1.5		"	0830	"	SO	2										X									07
	V-1.4		"	0840	"	SO	2										X						DR 7/24/13			08
	Z-2.0		"	1150	"	SO	4											X								09
	EE-1.1		7/26/13	0935	"	SO	2										X									10
	FF-1.1		"	1020	"	SO	2										X									11
	HH-2.5		"	1100	"	SO	4											X								12

Turnaround Time (Business days)

- [ ] Std. 10 Business Days
- [ ] Std. 5 Business Days (By Contract only)
- [ ] 5 Day RI SH
- [ ] 3 Day EMERGENCY
- [x] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Approved By (Accutest PM): / Date:

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] Commercial "B" +Narrative
- [ ] FULLT1 (Level 3+4)
- [ ] State Forms
- [ ] EDD Format
- [ ] PDF

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 R. March	7/26/13 1650	1 [illegible signature]	2		2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal # HD	Intact / Not Intact	Preserved where applicable	On Ice	Cooler Temp. 3.7

5.1 5

D48662: Chain of Custody
Page 1 of 2

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: D48662 **Client:** MARATHON OIL CO. **Immediate Client Services Action Required:** No

Date / Time Received: 7/26/2013 4:50:00 PM **No. Coolers:** 1 **Client Service Action Required at Login:** No

Project: MARATHON 32C POND **Airbill #'s:** HD

Cooler Security	Y	N		Y	N
1. Custody Seals Present:	☑	☐	3. COC Present:	☑	☐
2. Custody Seals Intact:	☑	☐	4. Smpl Dates/Time OK	☑	☐

Cooler Temperature	Y	N
1. Temp criteria achieved:	☑	☐
2. Cooler temp verification:	Infared gun	
3. Cooler media:	Ice (bag)	

Quality Control Preservation	Y	N	N/A
1. Trip Blank present / cooler:	☐	☐	
2. Trip Blank listed on COC:	☐	☐	
3. Samples preserved properly:	☑	☐	
4. VOCs headspace free:	☐	☐	☑

Sample Integrity - Documentation	Y	N
1. Sample labels present on bottles:	☑	☐
2. Container labeling complete:	☑	☐
3. Sample container label / COC agree:	☑	☐

Sample Integrity - Condition	Y	N
1. Sample recvd within HT:	☑	☐
2. All containers accounted for:	☑	☐
3. Condition of sample:	Intact	

Sample Integrity - Instructions	Y	N	N/A
1. Analysis requested is clear:	☑	☐	
2. Bottles received for unspecified tests	☐	☑	
3. Sufficient volume rec'd for analysis:	☑	☐	
4. Compositing instructions clear:	☐	☐	☑
5. Filtering instructions clear:	☐	☐	☑

Comments

Accutest Laboratories
V:(303) 425-6021
4036 Youngfield Street
F: (303) 425-6854
Wheat Ridge, CO
www/accutest.com

D48662: Chain of Custody
Page 2 of 2

Mountain States ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1709-MB	5V28278.D	1	07/27/13	BR	n/a	n/a	V5V1709

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	49	25	ug/kg	
100-41-4	Ethylbenzene	ND	99	19	ug/kg	
108-88-3	Toluene	ND	99	49	ug/kg	
1330-20-7	Xylene (total)	ND	200	99	ug/kg	

CAS No.	Surrogate Recoveries		Limits
2037-26-5	Toluene-D8	94%	64-130%
460-00-4	4-Bromofluorobenzene	102%	62-131%
17060-07-0	1,2-Dichloroethane-D4	94%	70-130%

Method Blank Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1710-MB	5V28295.D	1	07/29/13	BR	n/a	n/a	V5V1710

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48662-10, D48662-11, D48662-12

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	50	25	ug/kg	
100-41-4	Ethylbenzene	ND	100	19	ug/kg	
108-88-3	Toluene	ND	100	50	ug/kg	
1330-20-7	Xylene (total)	ND	200	100	ug/kg	

CAS No.	Surrogate Recoveries		Limits
2037-26-5	Toluene-D8	90%	64-130%
460-00-4	4-Bromofluorobenzene	106%	62-131%
17060-07-0	1,2-Dichloroethane-D4	101%	70-130%

Blank Spike Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1709-BS	5V28279.D	1	07/27/13	BR	n/a	n/a	V5V1709

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2470	2740	111	70-130
100-41-4	Ethylbenzene	2470	2880	116	70-130
108-88-3	Toluene	2470	2700	109	70-130
1330-20-7	Xylene (total)	7420	8650	117	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	101%	64-130%
460-00-4	4-Bromofluorobenzene	103%	62-131%
17060-07-0	1,2-Dichloroethane-D4	100%	70-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1710-BS	5V28296.D	1	07/29/13	BR	n/a	n/a	V5V1710

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48662-10, D48662-11, D48662-12

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2500	2740	110	70-130
100-41-4	Ethylbenzene	2500	2980	119	70-130
108-88-3	Toluene	2500	2700	108	70-130
1330-20-7	Xylene (total)	7500	9030	120	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	98%	64-130%
460-00-4	4-Bromofluorobenzene	107%	62-131%
17060-07-0	1,2-Dichloroethane-D4	93%	70-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48640-1MS	5V28281.D	1	07/27/13	BR	n/a	n/a	V5V1709
D48640-1MSD	5V28282.D	1	07/27/13	BR	n/a	n/a	V5V1709
D48640-1	5V28280.D	1	07/27/13	BR	n/a	n/a	V5V1709

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9

CAS No.	Compound	D48640-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	224		3180	3210	94	3240	95	1	64-139/30
100-41-4	Ethylbenzene	59.3	J	3180	3350	103	3340	103	0	68-136/30
108-88-3	Toluene	536		3180	3370	89	3400	90	1	60-130/30
1330-20-7	Xylene (total)	518		9540	10700	107	10600	106	1	58-142/30

CAS No.	Surrogate Recoveries	MS	MSD	D48640-1	Limits
2037-26-5	Toluene-D8	93%	96%	95%	64-130%
460-00-4	4-Bromofluorobenzene	110%	108%	104%	62-131%
17060-07-0	1,2-Dichloroethane-D4	96%	96%	95%	70-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48662-10MS	5V28298.D	1	07/29/13	BR	n/a	n/a	V5V1710
D48662-10MSD	5V28299.D	1	07/29/13	BR	n/a	n/a	V5V1710
D48662-10	5V28297.D	1	07/29/13	BR	n/a	n/a	V5V1710

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48662-10, D48662-11, D48662-12

CAS No.	Compound	D48662-10 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND		3250	3490	108	3590	111	3	64-139/30
100-41-4	Ethylbenzene	ND		3250	3630	112	3700	114	2	68-136/30
108-88-3	Toluene	ND		3250	3240	100	3320	102	2	60-130/30
1330-20-7	Xylene (total)	ND		9740	11200	115	11400	117	2	58-142/30

CAS No.	Surrogate Recoveries	MS	MSD	D48662-10	Limits
2037-26-5	Toluene-D8	90%	92%	91%	64-130%
460-00-4	4-Bromofluorobenzene	112%	112%	106%	62-131%
17060-07-0	1,2-Dichloroethane-D4	93%	93%	98%	70-130%

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8276-MB	3G15630.D	1	07/29/13	DC	07/29/13	OP8276	E3G769

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48662-4, D48662-9, D48662-12

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	8.3	4.3	ug/kg	
120-12-7	Anthracene	ND	8.3	4.3	ug/kg	
56-55-3	Benzo(a)anthracene	ND	8.3	4.3	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	8.3	4.3	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	8.3	4.3	ug/kg	
50-32-8	Benzo(a)pyrene	ND	8.3	4.3	ug/kg	
218-01-9	Chrysene	ND	8.3	4.3	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	8.3	4.3	ug/kg	
206-44-0	Fluoranthene	ND	8.3	4.3	ug/kg	
86-73-7	Fluorene	ND	8.3	5.0	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	8.3	4.3	ug/kg	
91-20-3	Naphthalene	ND	12	10	ug/kg	
129-00-0	Pyrene	ND	8.3	4.3	ug/kg	

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	107%	10-159%
321-60-8	2-Fluorobiphenyl	79%	19-131%
1718-51-0	Terphenyl-d14	98%	18-150%

Blank Spike Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8276-BS	3G15631.D	1	07/29/13	DC	07/29/13	OP8276	E3G769

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48662-4, D48662-9, D48662-12

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	83.3	57.3	69	68-130
120-12-7	Anthracene	83.3	62.1	75	67-130
56-55-3	Benzo(a)anthracene	83.3	66.4	80	65-130
205-99-2	Benzo(b)fluoranthene	83.3	64.7	78	44-130
207-08-9	Benzo(k)fluoranthene	83.3	67.0	80	56-131
50-32-8	Benzo(a)pyrene	83.3	65.6	79	62-130
218-01-9	Chrysene	83.3	65.3	78	70-130
53-70-3	Dibenzo(a,h)anthracene	83.3	65.6	79	55-130
206-44-0	Fluoranthene	83.3	58.2	70	70-130
86-73-7	Fluorene	83.3	58.3	70	70-130
193-39-5	Indeno(1,2,3-cd)pyrene	83.3	66.4	80	56-130
91-20-3	Naphthalene	83.3	66.3	80	70-130
129-00-0	Pyrene	83.3	66.3	80	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
4165-60-0	Nitrobenzene-d5	81%	10-159%
321-60-8	2-Fluorobiphenyl	66%	19-131%
1718-51-0	Terphenyl-d14	83%	18-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8276-MS	3G15638.D	4	07/29/13	DC	07/29/13	OP8276	E3G769
OP8276-MSD	3G15639.D	4	07/29/13	DC	07/29/13	OP8276	E3G769
D48350-8A [a]	3G15636.D	4	07/29/13	DC	07/29/13	OP8276	E3G769

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48662-4, D48662-9, D48662-12

CAS No.	Compound	D48350-8A ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
83-32-9	Acenaphthene	ND		95.5	123	129	120	125	2	25-151/30
120-12-7	Anthracene	ND		95.5	121	127	141	147	15	39-159/30
56-55-3	Benzo(a)anthracene	ND		95.5	129	135	140	146	8	39-168/30
205-99-2	Benzo(b)fluoranthene	ND		95.5	202	212* [b]	192	201* [b]	5	24-163/30
207-08-9	Benzo(k)fluoranthene	186		95.5	85.7	-105* [b]	69.8	-121* [b]	20	10-188/30
50-32-8	Benzo(a)pyrene	467		95.5	337	-136* [c]	303	-171* [c]	11	32-144/30
218-01-9	Chrysene	940		95.5	779	-169* [c]	581	-375* [c]	29	43-150/30
53-70-3	Dibenzo(a,h)anthracene	ND		95.5	94.8	99	80.9	85	16	21-152/30
206-44-0	Fluoranthene	ND		95.5	198	207* [b]	179	187* [b]	10	36-157/30
86-73-7	Fluorene	632		95.5	568	-67* [c]	481	-158* [c]	17	10-182/30
193-39-5	Indeno(1,2,3-cd)pyrene	ND		95.5	67.8	71	66.6	70	2	20-154/30
91-20-3	Naphthalene	82.5		95.5	148	69	140	60	6	10-163/30
129-00-0	Pyrene	426		95.5	387	-41* [c]	437	12* [c]	12	25-180/30

CAS No.	Surrogate Recoveries	MS	MSD	D48350-8A	Limits
4165-60-0	Nitrobenzene-d5	59%	63%	79%	10-159%
321-60-8	2-Fluorobiphenyl	78%	78%	83%	19-131%
1718-51-0	Terphenyl-d14	83%	86%	106%	18-150%

(a) Dilution required due to matrix interference. Internal standard failure without dilution.
(b) Outside control limits due to possible matrix interference.
(c) Outside control limits due to high level in sample relative to spike amount.

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1175-MB	GB21385.D	1	07/26/13	EV	n/a	n/a	GGB1175

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9, D48662-10, D48662-11, D48662-12

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	9.9	4.9	mg/kg	

CAS No.	Surrogate Recoveries		Limits
120-82-1	1,2,4-Trichlorobenzene	89%	60-140%

Blank Spike Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1175-BS	GB21386.D	1	07/27/13	EV	n/a	n/a	GGB1175

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9, D48662-10, D48662-11, D48662-12

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-GRO (C6-C10)	109	108	99	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
120-82-1	1,2,4-Trichlorobenzene	97%	60-140%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48662-1MS	GB21388.D	1	07/27/13	EV	n/a	n/a	GGB1175
D48662-1MSD	GB21389.D	1	07/27/13	EV	n/a	n/a	GGB1175
D48662-1	GB21387.D	1	07/27/13	EV	n/a	n/a	GGB1175

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9, D48662-10, D48662-11, D48662-12

CAS No.	Compound	D48662-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND		143	142	99	145	101	2	70-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D48662-1	Limits
120-82-1	1,2,4-Trichlorobenzene	94%	97%	89%	60-140%

8.3.1

8

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8275-MB	FD26933.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9, D48662-10, D48662-11, D48662-12

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	6.7	5.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	68%	35-130%

Blank Spike Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8275-BS	FD26935.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9, D48662-10, D48662-11, D48662-12

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	667	517	78	48-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	75%	35-130%

9.2.1

9

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48662
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8275-MS	FD26937.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
OP8275-MSD	FD26939.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319
D48662-2	FD26941.D	1	07/29/13	TU	07/27/13	OP8275	GFD1319

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48662-1, D48662-2, D48662-3, D48662-4, D48662-5, D48662-6, D48662-7, D48662-8, D48662-9, D48662-10, D48662-11, D48662-12

CAS No.	Compound	D48662-2 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	ND		813	521	64	457	56	13	20-168/30

CAS No.	Surrogate Recoveries	MS	MSD	D48662-2	Limits
84-15-1	o-Terphenyl	67%	56%	60%	35-130%

9.3.1

9

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10655
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 07/29/13

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.10	.0011	.008	-0.00064	<0.10

Associated samples MP10655: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10655
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 07/29/13

Metal	D48524-1 Original	MS	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.0022	0.35	0.336	103.4	75-125

Associated samples MP10655: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10655
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 07/29/13

Metal	D48524-1 Original	MSD	Spikelot HGWSR1	% Rec	MSD RPD	QC Limit
Mercury	0.0022	0.36	0.342	104.6	2.8	20

Associated samples MP10655: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10655
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 07/29/13

Metal	BSP Result	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.41	0.4	102.5	80-120

Associated samples MP10655: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 07/29/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	10	1.1	1.8		
Antimony	3.0	.21	.5		
Arsenic	2.5	.38	.63		
Barium	1.0	.02	.36	0.070	<1.0
Beryllium	1.0	.09	.06		
Boron	5.0	.08	.16		
Cadmium	1.0	.02	.28	0.040	<1.0
Calcium	40	.24	6.8		
Chromium	1.0	.03	.03	0.090	<1.0
Cobalt	0.50	.05	.039		
Copper	1.0	.08	.13	-0.060	<1.0
Iron	7.0	.15	1.8		
Lead	5.0	.21	.25	0.050	<5.0
Lithium	0.50	.04	.13		
Magnesium	20	.68	1.8		
Manganese	0.50	.05	.038		
Molybdenum	1.0	.04	.13		
Nickel	3.0	.05	.07	0.0	<3.0
Phosphorus	10	1.5	1.2		
Potassium	200	9.9	12		
Selenium	5.0	.71	1.1	0.29	<5.0
Silicon	5.0	.47	1.1		
Silver	3.0	.03	.05	0.030	<3.0
Sodium	40	.73	3.7		
Strontium	5.0	.001	.022		
Thallium	1.0	.18	.46		
Tin	5.0	1.2	2.3		
Titanium	1.0	.01	.46		
Uranium	5.0	.29	.31		
Vanadium	1.0	.04	.043		
Zinc	3.0	.04	.16	0.82	<3.0

Associated samples MP10659: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(anr) Analyte not requested

10.2.1

10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 07/29/13

Metal	D48662-4 Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum	anr				
Antimony	anr				
Arsenic	anr				
Barium	484	745	241	101.1	75-125
Beryllium	anr				
Boron					
Cadmium	0.17	54.1	60.3	89.4	75-125
Calcium	anr				
Chromium	69.5	126	60.3	93.7	75-125
Cobalt	anr				
Copper	15.6	78.4	60.3	104.1	75-125
Iron	anr				
Lead	14.7	120	121	87.3	75-125
Lithium					
Magnesium	anr				
Manganese	anr				
Molybdenum					
Nickel	33.1	87.6	60.3	90.4	75-125
Phosphorus					
Potassium	anr				
Selenium	0.0	107	121	88.7	75-125
Silicon					
Silver	0.37	23.6	24.1	96.3	75-125
Sodium	anr				
Strontium					
Thallium	anr				
Tin					
Titanium					
Uranium	anr				
Vanadium	anr				
Zinc	47.1	103	60.3	92.7	75-125

Associated samples MP10659: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

10.2.2

10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 07/29/13

Metal	D48662-4 Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum	anr					
Antimony	anr					
Arsenic	anr					
Barium	484	693	244	78.8	7.2	20
Beryllium	anr					
Boron						
Cadmium	0.17	53.9	60.9	88.2	0.4	20
Calcium	anr					
Chromium	69.5	127	60.9	94.4	0.8	20
Cobalt	anr					
Copper	15.6	78.1	60.9	102.6	0.4	20
Iron	anr					
Lead	14.7	119	122	85.6	0.8	20
Lithium						
Magnesium	anr					
Manganese	anr					
Molybdenum						
Nickel	33.1	86.9	60.9	88.3	0.8	20
Phosphorus						
Potassium	anr					
Selenium	0.0	106	122	87.0	0.9	20
Silicon						
Silver	0.37	23.7	24.4	95.7	0.4	20
Sodium	anr					
Strontium						
Thallium	anr					
Tin						
Titanium						
Uranium	anr					
Vanadium	anr					
Zinc	47.1	103	60.9	91.8	0.0	20

Associated samples MP10659: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

10.2.2

10

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 07/29/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum	anr			
Antimony	anr			
Arsenic	anr			
Barium	197	200	98.5	80-120
Beryllium	anr			
Boron				
Cadmium	46.1	50	92.2	80-120
Calcium	anr			
Chromium	49.5	50	99.0	80-120
Cobalt	anr			
Copper	46.3	50	92.6	80-120
Iron	anr			
Lead	95.4	100	95.4	80-120
Lithium				
Magnesium	anr			
Manganese	anr			
Molybdenum				
Nickel	47.1	50	94.2	80-120
Phosphorus				
Potassium	anr			
Selenium	93.6	100	93.6	80-120
Silicon				
Silver	19.9	20	99.5	80-120
Sodium	anr			
Strontium				
Thallium	anr			
Tin				
Titanium				
Uranium	anr			
Vanadium	anr			
Zinc	47.8	50	95.6	80-120

Associated samples MP10659: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(anr) Analyte not requested

10.2.3

10

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 07/29/13

Metal	D48662-4 Original	SDL 1:5	%DIF	QC Limits
Aluminum	anr			
Antimony	anr			
Arsenic	anr			
Barium	4200	4450	6.1	0-10
Beryllium	anr			
Boron				
Cadmium	1.40	0.00	100.0(a)	0-10
Calcium	anr			
Chromium	596	620	6.5	0-10
Cobalt	anr			
Copper	127	117	10.8*(b)	0-10
Iron	anr			
Lead	123	125	1.1	0-10
Lithium				
Magnesium	anr			
Manganese	anr			
Molybdenum				
Nickel	277	308	11.3*(b)	0-10
Phosphorus				
Potassium	anr			
Selenium	0.00	0.00	NC	0-10
Silicon				
Silver	3.10	9.00	190.3(a)	0-10
Sodium	anr			
Strontium				
Thallium	anr			
Tin				
Titanium				
Uranium	anr			
Vanadium	anr			
Zinc	394	448	13.6*(b)	0-10

Associated samples MP10659: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10659
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

10.2.4

10

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10660
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 07/29/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	25	.55	.75		
Antimony	0.20	.0011	.029		
Arsenic	0.10	.0085	.024	0.015	<0.10
Barium	1.0	.008	.16		
Beryllium	0.10	.008	.049		
Boron	20	.25	.07		
Cadmium	0.050	.018	.038		
Calcium	200	2.8	13		
Chromium	1.0	.027	.11		
Cobalt	0.10	.0025	.0085		
Copper	1.0	.03	.1		
Iron	5.0	1.8	1.8		
Lead	0.25	.004	.0075		
Magnesium	50	.65	.65		
Manganese	0.50	.06	.07		
Molybdenum	0.50	.025	.046		
Nickel	1.0	.0044	.17		
Phosphorus	30	1.3	4.9		
Potassium	100	1.5	2.5		
Selenium	0.20	.03	.13		
Silver	0.050	.00095	.01		
Sodium	250	2.5	5.5		
Strontium	10	.005	.027		
Thallium	0.10	.0012	.0075		
Tin	5.0	.032	2.3		
Titanium	1.0	.03	.085		
Uranium	0.25	.00085	.0015		
Vanadium	2.0	.019	.11		
Zinc	5.0	.11	1.4		

Associated samples MP10660: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10660
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 07/29/13

Metal	D48662-4 Original	MS	Spikelot ICPALL3	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	7.8	134	121	104.6	75-125
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10660: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10660
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 07/29/13

Metal	D48662-4 Original	MSD	Spikelot ICPALL3	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	7.8	136	122	105.2	1.5	20
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silver						
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10660: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10660
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 07/29/13

Metal	BSP Result	Spikelot ICPALL3	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	107	100	107.0	80-120
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10660: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10660
Matrix Type: SOLID

Methods: SW846 6020A
Units: ug/l

Prep Date: 07/29/13

Metal	D48662-4 Original	SDL 5:25	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	65.5	73.5	12.2*(a)	0-10
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10660: D48662-4, D48662-9, D48662-12

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested
(a) Serial dilution indicates possible matrix interference.

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 07/30/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	210		
Antimony	150	11	95		
Arsenic	130	19	28		
Barium	50	1	7		
Beryllium	50	4.5	6		
Boron	250	4	33		
Cadmium	50	1	1.8		
Calcium	2000	12	210	-16	<2000
Chromium	50	1.5	2		
Cobalt	25	2.5	2.9		
Copper	50	4	9.5		
Iron	350	7.5	48		
Lead	250	11	110		
Lithium	25	2	14		
Magnesium	1000	34	95	-13	<1000
Manganese	25	2.5	2.3		
Molybdenum	50	2	4.2		
Nickel	150	2.5	4.4		
Phosphorus	500	75	100		
Potassium	5000	500	1400		
Selenium	250	36	55		
Silicon	250	24	26		
Silver	150	1.5	3		
Sodium	2000	37	850	-170	<2000
Strontium	25	.05	.6		
Thallium	50	9	20		
Tin	250	60	80		
Titanium	50	.5	11		
Uranium	250	15	28		
Vanadium	50	2	2		
Zinc	150	2	16		

Associated samples MP10678: D48662-4F, D48662-9F, D48662-12F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 07/30/13

Metal	D48662-4F Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	313000	473000	125000	128.0N(a	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	25300	153000	125000	102.2	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	39400	168000	125000	102.9	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10678: D48662-4F, D48662-9F, D48662-12F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 07/30/13

Metal	D48662-4F Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	313000	497000	125000	147.2N(a	4.9	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	25300	157000	125000	105.4	2.6	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	39400	174000	125000	107.7	3.5	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10678: D48662-4F, D48662-9F, D48662-12F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 07/30/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	137000	125000	109.6	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	128000	125000	102.4	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	128000	125000	102.4	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10678: D48662-4F, D48662-9F, D48662-12F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

10.4.3

10

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 07/30/13

Metal	D48662-4F Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	62600	68200	9.0	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	5060	5610	11.0*(a)	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	7890	8630	9.4	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10678: D48662-4F, D48662-9F, D48662-12F

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10678
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested
(a) Serial dilution indicates possible matrix interference.

10.4.4

10

Mountain States ACCUTEST LABORATORIES

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chromium, Hexavalent	GP10548/GN21223	1.0	0.0	mg/kg	92.9	81.1	87.0	80-120%
Specific Conductivity	GP10555/GN21239			umhos/cm	10003	9980	99.8	90-110%
pH	GN21216			su	8.00	8.00	100.0	99.3-100.7%

Associated Samples:
Batch GN21216: D48662-4, D48662-9, D48662-12
Batch GP10548: D48662-4, D48662-9, D48662-12
Batch GP10555: D48662-4, D48662-9, D48662-12
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chromium, Hexavalent	GP10548/GN21223	D48544-1	mg/kg	12.4	13.1	5.6	0-20%
Redox Potential Vs H2	GN21218	D48431-1	mv	353	350	0.8	0-20%

Associated Samples:
Batch GN21218: D48662-4, D48662-9, D48662-12
Batch GP10548: D48662-4, D48662-9, D48662-12
(*) Outside of QC limits

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chromium, Hexavalent	GP10548/GN21223	D48544-1	mg/kg	12.4	40	25.6	64.0(a)	75-125%

Associated Samples:
Batch GP10548: D48662-4, D48662-9, D48662-12
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(a) Spike recovery indicates possible matrix interference and/or sample nonhomogeneity.

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48662
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chromium, Hexavalent	GP10548/GN21223	D48544-1	mg/kg	12.4	40	21.5	11.6(a)	20%

Associated Samples:
Batch GP10548: D48662-4, D48662-9, D48662-12
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(a) Spike recovery indicates possible matrix interference and/or sample nonhomogeneity.

APPENDIX C-2

JULY 31 – AUGUST 1 SAMPLE RESULTS

Mountain States ACCUTEST LABORATORIES

08/06/13

Technical Report for

Marathon Oil

Marathon 32C Pond

WBS#TA.13.30788.EXP

Accutest Job Number: D48846

Sampling Dates: 07/31/13 - 08/01/13

Report to:

Marathon Oil
44 Union Blvd, Ste 300
Lakewood, CO 80228
randy_march@golder.com; zjtoellner@marathonoil.com

ATTN: Randy March

Total number of pages in report: **79**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Scott Heideman
Laboratory Director

Client Service contact: Ann Doerr 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), TX (T104704511)

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Accutest Laboratories

Sample Summary

Marathon Oil

Job No: D48846

Marathon 32C Pond
Project No: WBS#TA.13.30788.EXP

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D48846-1	08/01/13	08:40	RM	08/02/13	SO	Soil	KK-1.5
D48846-1A	08/01/13	08:40	RM	08/02/13	SO	Soil	KK-1.5
D48846-1B	08/01/13	08:40	RM	08/02/13	SO	Soil	KK-1.5
D48846-2	07/31/13	13:00	RM	08/02/13	SO	Soil	MM-1.0
D48846-2B	07/31/13	13:00	RM	08/02/13	SO	Soil	MM-1.0

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Marathon Oil	**Job No**	D48846
Site:	Marathon 32C Pond	**Report Date**	8/6/2013 4:52:33 PM

On 08/02/2013, 2 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 3.5 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D48846 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix SO **Batch ID:** V5V1715

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48666-7MS, D48666-7MSD were used as the QC samples indicated.

Extractables by GCMS By Method SW846 8270C BY SIM

Matrix SO **Batch ID:** OP8313

- All samples were extracted and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48840-1MS, D48840-1MSD were used as the QC samples indicated.

Volatiles by GC By Method SW846 8015B

Matrix SO **Batch ID:** GGB1179

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48796-1MS, D48796-1MSD were used as the QC samples indicated.

Extractables by GC By Method SW846-8015B

Matrix SO **Batch ID:** OP8306

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D48795-3MS, D48795-3MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Metals By Method SW846 6010C

Matrix	AQ	Batch ID:	MP10713

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48846-1AMS, D48846-1AMSD, D48846-1ASDL were used as the QC samples for the metals analysis.

Matrix	SO	Batch ID:	MP10709

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48846-1MS, D48846-1MSD, D48846-1SDL were used as the QC samples for the metals analysis.
- The serial dilution RPD(s) for Boron, Cadmium, Silver, Zinc are outside control limits for sample MP10709-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP10709-SD1 for Zinc: Serial dilution indicates possible matrix interference.

Metals By Method SW846 6020A

Matrix	SO	Batch ID:	MP10710

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48846-1MS, D48846-1MSD, D48846-1SDL were used as the QC samples for the metals analysis.

Metals By Method SW846 7471B

Matrix	SO	Batch ID:	MP10714

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48820-1MS, D48820-1MSD were used as the QC samples for the metals analysis.
- The matrix spike duplicate (MSD) recovery(s) of Mercury are outside control limits. Probable cause due to matrix interference.

Wet Chemistry By Method ASTM D1498-76M

Matrix	SO	Batch ID:	GN21311

- Sample(s) D48846-1DUP were used as the QC samples for the Redox Potential Vs H2 analysis.

Wet Chemistry By Method SM2540B-2011 M

Matrix	SO	Batch ID:	GN21304

- The data for SM2540B-2011 M meets quality control requirements.

Wet Chemistry By Method SW846 3060A/7196A

Matrix	SO	Batch ID:	GP10596

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48867-1MS, D48867-1MSD, D48867-1DUP were used as the QC samples for the Chromium, Hexavalent analysis.
- The duplicate RPD(s) for Chromium, Hexavalent are outside control limits for sample GP10596-D1. RPD acceptable due to low duplicate and sample concentrations.

Wet Chemistry By Method SW846 3060A/7196A M

Matrix SO	**Batch ID:** R18214

- The data for SW846 3060A/7196A M meets quality control requirements.
- D48846-2 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Matrix SO	**Batch ID:** R18215

- The data for SW846 3060A/7196A M meets quality control requirements.
- D48846-1 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Wet Chemistry By Method SW846 9045D

Matrix SO	**Batch ID:** GN21316

- The following samples were run outside of holding time for method SW846 9045D: D48846-1, D48846-2

Wet Chemistry By Method USDA HANDBOOK 60

Matrix SO	**Batch ID:** MP10713

- D48846-1A for Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D48846
Account: Marathon Oil
Project: Marathon 32C Pond
Collected: 07/31/13 thru 08/01/13

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D48846-1	**KK-1.5**					
Naphthalene		0.141	0.014	0.012	mg/kg	SW846 8270C BY SIM
TPH-DRO (C10-C28)		6.24 J	8.0	6.0	mg/kg	SW846-8015B
Arsenic		14.1	0.12		mg/kg	SW846 6020A
Barium		406	1.2		mg/kg	SW846 6010C
Chromium		72.7	1.2		mg/kg	SW846 6010C
Copper		13.1	1.2		mg/kg	SW846 6010C
Lead		14.0	6.0		mg/kg	SW846 6010C
Nickel		36.4	3.6		mg/kg	SW846 6010C
Zinc		45.3	3.6		mg/kg	SW846 6010C
Specific Conductivity		241	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent [a]		72.7	2.2		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2		190			mv	ASTM D1498-76M
pH		9.02			su	SW846 9045D
D48846-1A	**KK-1.5**					
Calcium		22.2	2.0		mg/l	SW846 6010C
Magnesium		2.95	1.0		mg/l	SW846 6010C
Sodium		19.7	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [b]		1.04			ratio	USDA HANDBOOK 60
D48846-1B	**KK-1.5**					
No hits reported in this sample.						
D48846-2	**MM-1.0**					
TPH-DRO (C10-C28)		10.5	7.6	5.7	mg/kg	SW846-8015B
Arsenic		11.5	0.11		mg/kg	SW846 6020A
Barium		380	1.1		mg/kg	SW846 6010C
Chromium		67.0	1.1		mg/kg	SW846 6010C
Copper		13.5	1.1		mg/kg	SW846 6010C
Lead		13.3	5.7		mg/kg	SW846 6010C
Nickel		33.7	3.4		mg/kg	SW846 6010C
Zinc		46.5	3.4		mg/kg	SW846 6010C
Chromium, Trivalent [a]		67.0	2.1		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2		183			mv	ASTM D1498-76M
pH		8.96			su	SW846 9045D
D48846-2B	**MM-1.0**					
No hits reported in this sample.						

Summary of Hits

Job Number: D48846
Account: Marathon Oil
Project: Marathon 32C Pond
Collected: 07/31/13 thru 08/01/13

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)
(b) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

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Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846 8270C BY SIM SW846 3546	**Percent Solids:**	83.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G15698.D	1	08/02/13	DC	08/02/13	OP8313	E3G773
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.010	0.0052	mg/kg	
120-12-7	Anthracene	ND	0.010	0.0052	mg/kg	
56-55-3	Benzo(a)anthracene	ND	0.010	0.0052	mg/kg	
205-99-2	Benzo(b)fluoranthene	ND	0.010	0.0052	mg/kg	
207-08-9	Benzo(k)fluoranthene	ND	0.010	0.0052	mg/kg	
50-32-8	Benzo(a)pyrene	ND	0.010	0.0052	mg/kg	
218-01-9	Chrysene	ND	0.010	0.0052	mg/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	0.010	0.0052	mg/kg	
206-44-0	Fluoranthene	ND	0.010	0.0052	mg/kg	
86-73-7	Fluorene	ND	0.010	0.0060	mg/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.010	0.0052	mg/kg	
91-20-3	Naphthalene	0.141	0.014	0.012	mg/kg	
129-00-0	Pyrene	ND	0.010	0.0052	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	62%		10-159%
321-60-8	2-Fluorobiphenyl	49%		19-131%
1718-51-0	Terphenyl-d14	49%		18-150%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	83.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD27288.D	1	08/03/13	TU	08/02/13	OP8306	GFD1330
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	6.24	8.0	6.0	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	86%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
		Percent Solids:	83.1
Project:	Marathon 32C Pond		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	14.1	0.12	mg/kg	5	08/05/13	08/06/13	JB	SW846 6020A [3]	SW846 3050B [5]
Barium	406	1.2	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Boron	< 6.0	6.0	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Cadmium	< 1.2	1.2	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Chromium	72.7	1.2	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Copper	13.1	1.2	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Lead	14.0	6.0	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Mercury	< 0.10	0.10	mg/kg	1	08/05/13	08/05/13	JB	SW846 7471B [2]	SW846 7471B [6]
Nickel	36.4	3.6	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Selenium	< 6.0	6.0	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Silver	< 3.6	3.6	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Zinc	45.3	3.6	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA3839
(2) Instrument QC Batch: MA3840
(3) Instrument QC Batch: MA3843
(4) Prep QC Batch: MP10709
(5) Prep QC Batch: MP10710
(6) Prep QC Batch: MP10714

RL = Reporting Limit

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
		Percent Solids:	83.1
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	241	1.0	umhos/cm	1	08/06/13	BF	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	08/05/13	RW	SW846 3060A/7196A
Chromium, Trivalent [a]	72.7	2.2	mg/kg	1	08/05/13 15:02	JB	SW846 3060A/7196A M
Redox Potential Vs H2	190		mv	1	08/05/13	AK	ASTM D1498-76M
Solids, Percent	83.1		%	1	08/05/13	SWT	SM2540B-2011 M
pH	9.02		su	1	08/05/13 16:00	AK	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1A	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
		Percent Solids:	83.1
Project:	Marathon 32C Pond		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	22.2	2.0	mg/l	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	2.95	1.0	mg/l	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	19.7	2.0	mg/l	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA3839
(2) Prep QC Batch: MP10713

RL = Reporting Limit

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1A	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
		Percent Solids:	83.1
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	1.04		ratio	1	08/05/13 12:50	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1B	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846 8260B	**Percent Solids:**	83.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28425.D	1	08/02/13	BD	n/a	n/a	V5V1715
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.070	0.035	mg/kg	
108-88-3	Toluene	ND	0.14	0.070	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.027	mg/kg	
1330-20-7	Xylene (total)	ND	0.28	0.14	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	92%		64-130%
460-00-4	4-Bromofluorobenzene	107%		62-131%
17060-07-0	1,2-Dichloroethane-D4	102%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	KK-1.5		
Lab Sample ID:	D48846-1B	**Date Sampled:**	08/01/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846 8015B	**Percent Solids:**	83.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21459.D	1	08/02/13	EV	n/a	n/a	GGB1179
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	7.0	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	91%		60-140%

ND = Not detected MDL - Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MM-1.0		
Lab Sample ID:	D48846-2	**Date Sampled:**	07/31/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846 8270C BY SIM SW846 3546	**Percent Solids:**	87.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G15699.D	1	08/02/13	DC	08/02/13	OP8313	E3G773
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.0095	0.0050	mg/kg	
120-12-7	Anthracene	ND	0.0095	0.0050	mg/kg	
56-55-3	Benzo(a)anthracene	ND	0.0095	0.0050	mg/kg	
205-99-2	Benzo(b)fluoranthene	ND	0.0095	0.0050	mg/kg	
207-08-9	Benzo(k)fluoranthene	ND	0.0095	0.0050	mg/kg	
50-32-8	Benzo(a)pyrene	ND	0.0095	0.0050	mg/kg	
218-01-9	Chrysene	ND	0.0095	0.0050	mg/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	0.0095	0.0050	mg/kg	
206-44-0	Fluoranthene	ND	0.0095	0.0050	mg/kg	
86-73-7	Fluorene	ND	0.0095	0.0057	mg/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.0095	0.0050	mg/kg	
91-20-3	Naphthalene	ND	0.013	0.012	mg/kg	
129-00-0	Pyrene	ND	0.0095	0.0050	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	61%		10-159%
321-60-8	2-Fluorobiphenyl	49%		19-131%
1718-51-0	Terphenyl-d14	50%		18-150%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MM-1.0		
Lab Sample ID:	D48846-2	**Date Sampled:**	07/31/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	87.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD27290.D	1	08/03/13	TU	08/02/13	OP8306	GFD1330
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	10.5	7.6	5.7	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	80%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MM-1.0		
Lab Sample ID:	D48846-2	**Date Sampled:**	07/31/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
		Percent Solids:	87.2
Project:	Marathon 32C Pond		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	11.5	0.11	mg/kg	5	08/05/13	08/06/13	JB	SW846 6020A [3]	SW846 3050B [5]
Barium	380	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Boron	< 5.7	5.7	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Cadmium	< 1.1	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Chromium	67.0	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Copper	13.5	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Lead	13.3	5.7	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Mercury	< 0.096	0.096	mg/kg	1	08/05/13	08/05/13	JB	SW846 7471B [2]	SW846 7471B [6]
Nickel	33.7	3.4	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Selenium	< 5.7	5.7	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Silver	< 3.4	3.4	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Zinc	46.5	3.4	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA3839
(2) Instrument QC Batch: MA3840
(3) Instrument QC Batch: MA3843
(4) Prep QC Batch: MP10709
(5) Prep QC Batch: MP10710
(6) Prep QC Batch: MP10714

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MM-1.0		
Lab Sample ID:	D48846-2	**Date Sampled:**	07/31/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
		Percent Solids:	87.2
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	08/05/13	RW	SW846 3060A/7196A
Chromium, Trivalent [a]	67.0	2.1	mg/kg	1	08/05/13 16:29	JB	SW846 3060A/7196A M
Redox Potential Vs H2	183		mv	1	08/05/13	AK	ASTM D1498-76M
Solids, Percent	87.2		%	1	08/05/13	SWT	SM2540B-2011 M
pH	8.96		su	1	08/05/13 16:00	AK	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	MM-1.0		
Lab Sample ID:	D48846-2B	**Date Sampled:**	07/31/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846 8260B	**Percent Solids:**	87.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28426.D	1	08/02/13	BD	n/a	n/a	V5V1715
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.064	0.032	mg/kg	
108-88-3	Toluene	ND	0.13	0.064	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.024	mg/kg	
1330-20-7	Xylene (total)	ND	0.26	0.13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	92%		64-130%
460-00-4	4-Bromofluorobenzene	108%		62-131%
17060-07-0	1,2-Dichloroethane-D4	103%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MM-1.0		
Lab Sample ID:	D48846-2B	**Date Sampled:**	07/31/13
Matrix:	SO - Soil	**Date Received:**	08/02/13
Method:	SW846 8015B	**Percent Solids:**	87.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21460.D	1	08/02/13	EV	n/a	n/a	GGB1179
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.4	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	94%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Mountain States ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

Accutest Laboratories Mountain States
4036 Youngfield Street Wheat Ridge, Co 80033
TEL. 303-425-6021 877-737-4521
FAX 303-425-6021

FED-EX Tracking #:
Bottle Order Control #:
Accutest Quote #:
Accutest Job #: D48846

Client / Reporting Information

Company Name: Marathon Oil Company
Street Address:
City State Zip:
Project Contact: Randy March E-mail: rmarch@golder.com
Phone #: 303-980-0540 Fax #:
Sampler(s) Name(s): Randy March Phone #:

Project Information

Project Name: Marathon 32C Pond
Street:
City:
Project#:
Client PO#:
Project Manager:

Billing Information (if different from Report to)

Company Name: MOC
Street Address: 743 Horizon Ct, Suite 220
City State Zip: Grand Junc, CO 81506
Attention: Zach Toellner PO#:

Requested Analysis (see TEST CODE sheet)

GRO, DRO, BTEX
OGCC Table 910-1 Soil Analysis
SAR

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB-Field Blank
EB- Equipment Blank
RB- Rinse Blank
TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	Bisulfate	GRO, DRO, BTEX	OGCC Table 910-1 Soil Analysis	SAR	LAB USE ONLY
	KK-1.5		8/1/13	0840	RM	SO	3										X		X	01
	MM-1.0		7/31/13	1300	ZT	SO	2										X			02

PD 8/2/13

Data Deliverable Information

- Commercial "A" (Level 1)
- Commercial "B" (Level 2)
- Commercial "B" +Narrative
- FULLT1 (Level 3+4)
- State Forms
- EDD Format
- PDF

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary

Turnaround Time (Business days) — Approved By (Accutest PM): / Date:

- Std. 10 Business Days
- Std. 5 Business Days (By Contract only)
- 5 Day RI SH
- 3 Day EMERGENCY
- 2 Day EMERGENCY
- ☒ 1 Day EMERGENCY

Emergency & Rush T/A data available VIA Lablink

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 R. March	8/1/13 13:45	1 Scott Dystal	2 Scott Dystal	8/1/13 16:30	2
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4 TR 8-2-13 12:30
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal # C	☐ Intact ☐ Not Intact	Preserved where applicable ☐ / On Ice ☑ Cooler Temp. 3.5

D48846: Chain of Custody
Page 1 of 2

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: D48846 **Client:** MARATHON **Immediate Client Services Action Required:** No

Date / Time Received: 8/2/2013 12:30:00 PM **No. Coolers:** 1 **Client Service Action Required at Login:** No

Project: 32C **Airbill #'s:** CO

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:	Infared gun		
3. Cooler media:	Ice (bag)		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	
2. Trip Blank listed on COC:	☐		☐	
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☐		☐	☑

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume rec'd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

Comments

Accutest Laboratories
V:(303) 425-6021
4036 Youngfield Street
F: (303) 425-6854
Wheat Ridge, CO
www/accutest.com

D48846: Chain of Custody
Page 2 of 2

Mountain States ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1715-MB	5V28416.D	1	08/02/13	BD	n/a	n/a	V5V1715

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48846-1B, D48846-2B

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	50	25	ug/kg	
100-41-4	Ethylbenzene	ND	100	19	ug/kg	
108-88-3	Toluene	ND	100	50	ug/kg	
1330-20-7	Xylene (total)	ND	200	100	ug/kg	

CAS No.	Surrogate Recoveries		Limits
2037-26-5	Toluene-D8	97%	64-130%
460-00-4	4-Bromofluorobenzene	94%	62-131%
17060-07-0	1,2-Dichloroethane-D4	101%	70-130%

Blank Spike Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1715-BS	5V28417.D	1	08/02/13	BD	n/a	n/a	V5V1715

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48846-1B, D48846-2B

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2500	2490	100	70-130
100-41-4	Ethylbenzene	2500	2500	100	70-130
108-88-3	Toluene	2500	2370	95	70-130
1330-20-7	Xylene (total)	7500	7630	102	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	97%	64-130%
460-00-4	4-Bromofluorobenzene	99%	62-131%
17060-07-0	1,2-Dichloroethane-D4	96%	70-130%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1715-BS	5V28418.D	1	08/02/13	BD	n/a	n/a	V5V1715

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48846-1B, D48846-2B

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	99%	64-130%
460-00-4	4-Bromofluorobenzene	95%	62-131%
17060-07-0	1,2-Dichloroethane-D4	92%	70-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48666-7MS	5V28420.D	1	08/02/13	BD	n/a	n/a	V5V1715
D48666-7MSD	5V28421.D	1	08/02/13	BD	n/a	n/a	V5V1715
D48666-7	5V28419.D	1	08/02/13	BD	n/a	n/a	V5V1715

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48846-1B, D48846-2B

CAS No.	Compound	D48666-7 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND		3770	3740	99	3910	104	4	64-139/30
100-41-4	Ethylbenzene	ND		3770	3660	97	3800	101	4	68-136/30
108-88-3	Toluene	ND		3770	3330	88	3490	93	5	60-130/30
1330-20-7	Xylene (total)	ND		11300	11400	101	11600	103	2	58-142/30

CAS No.	Surrogate Recoveries	MS	MSD	D48666-7	Limits
2037-26-5	Toluene-D8	92%	92%	95%	64-130%
460-00-4	4-Bromofluorobenzene	112%	108%	107%	62-131%
17060-07-0	1,2-Dichloroethane-D4	92%	94%	101%	70-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48666-7MS	5V28422.D	1	08/02/13	BD	n/a	n/a	V5V1715
D48666-7MSD	5V28423.D	1	08/02/13	BD	n/a	n/a	V5V1715
D48666-7	5V28419.D	1	08/02/13	BD	n/a	n/a	V5V1715

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48846-1B, D48846-2B

CAS No.	Compound	D48666-7 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD

CAS No.	Surrogate Recoveries	MS	MSD	D48666-7	Limits
2037-26-5	Toluene-D8	95%	94%	95%	64-130%
460-00-4	4-Bromofluorobenzene	107%	109%	107%	62-131%
17060-07-0	1,2-Dichloroethane-D4	95%	95%	101%	70-130%

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8313-MB	3G15692.D	1	08/02/13	DC	08/02/13	OP8313	E3G773

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48846-1, D48846-2

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	8.3	4.3	ug/kg	
120-12-7	Anthracene	ND	8.3	4.3	ug/kg	
56-55-3	Benzo(a)anthracene	ND	8.3	4.3	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	8.3	4.3	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	8.3	4.3	ug/kg	
50-32-8	Benzo(a)pyrene	ND	8.3	4.3	ug/kg	
218-01-9	Chrysene	ND	8.3	4.3	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	8.3	4.3	ug/kg	
206-44-0	Fluoranthene	ND	8.3	4.3	ug/kg	
86-73-7	Fluorene	ND	8.3	5.0	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	8.3	4.3	ug/kg	
91-20-3	Naphthalene	ND	12	10	ug/kg	
129-00-0	Pyrene	ND	8.3	4.3	ug/kg	

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	118%	10-159%
321-60-8	2-Fluorobiphenyl	93%	19-131%
1718-51-0	Terphenyl-d14	104%	18-150%

Blank Spike Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8313-BS	3G15693.D	1	08/02/13	DC	08/02/13	OP8313	E3G773

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48846-1, D48846-2

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	83.3	70.1	84	68-130
120-12-7	Anthracene	83.3	77.1	93	67-130
56-55-3	Benzo(a)anthracene	83.3	78.2	94	65-130
205-99-2	Benzo(b)fluoranthene	83.3	71.0	85	44-130
207-08-9	Benzo(k)fluoranthene	83.3	80.4	96	56-131
50-32-8	Benzo(a)pyrene	83.3	75.3	90	62-130
218-01-9	Chrysene	83.3	80.0	96	70-130
53-70-3	Dibenzo(a,h)anthracene	83.3	75.0	90	55-130
206-44-0	Fluoranthene	83.3	75.6	91	70-130
86-73-7	Fluorene	83.3	72.0	86	70-130
193-39-5	Indeno(1,2,3-cd)pyrene	83.3	76.3	92	56-130
91-20-3	Naphthalene	83.3	87.8	105	70-130
129-00-0	Pyrene	83.3	81.0	97	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
4165-60-0	Nitrobenzene-d5	119%	10-159%
321-60-8	2-Fluorobiphenyl	86%	19-131%
1718-51-0	Terphenyl-d14	99%	18-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8313-MS	3G15701.D	1	08/02/13	DC	08/02/13	OP8313	E3G773
OP8313-MSD	3G15702.D	1	08/02/13	DC	08/02/13	OP8313	E3G773
D48840-1	3G15700.D	1	08/02/13	DC	08/02/13	OP8313	E3G773

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48846-1, D48846-2

CAS No.	Compound	D48840-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
83-32-9	Acenaphthene	ND		93.9	85.9	91	80.6	86	6	25-151/30
120-12-7	Anthracene	ND		93.9	90.3	96	85.0	91	6	39-159/30
56-55-3	Benzo(a)anthracene	7.9	J	93.9	99.5	98	95.2	93	4	39-168/30
205-99-2	Benzo(b)fluoranthene	12.1		93.9	115	110	109	103	5	24-163/30
207-08-9	Benzo(k)fluoranthene	ND		93.9	75.7	81	70.3	75	7	10-188/30
50-32-8	Benzo(a)pyrene	7.5	J	93.9	87.9	86	82.8	80	6	32-144/30
218-01-9	Chrysene	25.4		93.9	112	92	102	82	9	43-150/30
53-70-3	Dibenzo(a,h)anthracene	ND		93.9	83.1	88	78.2	83	6	21-152/30
206-44-0	Fluoranthene	10		93.9	97.2	93	96.1	92	1	36-157/30
86-73-7	Fluorene	28.0		93.9	124	102	116	94	7	10-182/30
193-39-5	Indeno(1,2,3-cd)pyrene	ND		93.9	81.6	87	77.1	82	6	20-154/30
91-20-3	Naphthalene	187		93.9	274	93	243	60	12	10-163/30
129-00-0	Pyrene	15.9		93.9	110	100	102	92	8	25-180/30

CAS No.	Surrogate Recoveries	MS	MSD	D48840-1	Limits
4165-60-0	Nitrobenzene-d5	83%	91%	88%	10-159%
321-60-8	2-Fluorobiphenyl	86%	74%	80%	19-131%
1718-51-0	Terphenyl-d14	94%	83%	88%	18-150%

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1179-MB	GB21452.D	1	08/02/13	EV	n/a	n/a	GGB1179

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48846-1B, D48846-2B

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	10	5.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
120-82-1	1,2,4-Trichlorobenzene	91%	60-140%

Blank Spike Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1179-BS	GB21453.D	1	08/02/13	EV	n/a	n/a	GGB1179

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48846-1B, D48846-2B

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-GRO (C6-C10)	110	98.9	90	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
120-82-1	1,2,4-Trichlorobenzene	102%	60-140%

8.2.1

8

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48796-1MS	GB21455.D	1	08/02/13	EV	n/a	n/a	GGB1179
D48796-1MSD	GB21456.D	1	08/02/13	EV	n/a	n/a	GGB1179
D48796-1	GB21454.D	1	08/02/13	EV	n/a	n/a	GGB1179

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48846-1B, D48846-2B

CAS No.	Compound	D48796-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND		126	110	88	108	86	2	70-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D48796-1	Limits
120-82-1	1,2,4-Trichlorobenzene	101%	105%	93%	60-140%

8.3.1

8

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8306-MB	FD27210.D	1	08/02/13	TU	08/02/13	OP8306	GFD1328

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48846-1, D48846-2

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	6.7	5.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	83%	35-130%

Blank Spike Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8306-BS	FD27216.D	1	08/02/13	TU	08/02/13	OP8306	GFD1328

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48846-1, D48846-2

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	667	590	89	48-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	86%	35-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48846
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8306-MS	FD27214.D	1	08/02/13	TU	08/02/13	OP8306	GFD1328
OP8306-MSD	FD27218.D	1	08/02/13	TU	08/02/13	OP8306	GFD1328
D48795-3	FD27224.D	1	08/02/13	TU	08/02/13	OP8306	GFD1328

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48846-1, D48846-2

CAS No.	Compound	D48795-3 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	188		763	789	79	863	88	9	20-168/30

CAS No.	Surrogate Recoveries	MS	MSD	D48795-3	Limits
84-15-1	o-Terphenyl	79%	90%	72%	35-130%

9.3.1

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* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	10	1.1	1.8		
Antimony	3.0	.21	.5		
Arsenic	2.5	.38	.63		
Barium	1.0	.02	.36	0.030	<1.0
Beryllium	1.0	.09	.06		
Boron	5.0	.08	.16	0.19	<5.0
Cadmium	1.0	.02	.28	0.030	<1.0
Calcium	40	.24	6.8		
Chromium	1.0	.03	.03	0.070	<1.0
Cobalt	0.50	.05	.039		
Copper	1.0	.08	.13	0.0	<1.0
Iron	7.0	.15	1.8		
Lead	5.0	.21	.25	-0.030	<5.0
Lithium	0.50	.04	.13		
Magnesium	20	.68	1.8		
Manganese	0.50	.05	.038		
Molybdenum	1.0	.04	.13		
Nickel	3.0	.05	.07	0.080	<3.0
Phosphorus	10	1.5	1.2		
Potassium	200	9.9	12		
Selenium	5.0	.71	1.1	0.010	<5.0
Silicon	5.0	.47	1.1		
Silver	3.0	.03	.05	-0.020	<3.0
Sodium	40	.73	3.7		
Strontium	5.0	.001	.022		
Thallium	1.0	.18	.46		
Tin	5.0	1.2	2.3		
Titanium	1.0	.01	.46		
Uranium	5.0	.29	.31		
Vanadium	1.0	.04	.043		
Zinc	3.0	.04	.16	0.25	<3.0

Associated samples MP10709: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(anr) Analyte not requested

10.1.1

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MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	406	609	241	84.3	75-125
Beryllium					
Boron	3.1	114	120	92.2	75-125
Cadmium	0.11	53.1	60.2	88.1	75-125
Calcium					
Chromium	72.7	127	60.2	90.2	75-125
Cobalt					
Copper	13.1	68.6	60.2	92.2	75-125
Iron					
Lead	14.0	118	120	86.4	75-125
Lithium					
Magnesium					
Manganese					
Molybdenum					
Nickel	36.4	86.1	60.2	82.6	75-125
Phosphorus					
Potassium					
Selenium	0.0	106	120	88.1	75-125
Silicon					
Silver	0.32	22.8	24.1	93.4	75-125
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium	anr				
Vanadium					
Zinc	45.3	98.0	60.2	87.6	75-125

Associated samples MP10709: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	406	609	241	84.3	0.0	20
Beryllium						
Boron	3.1	115	120	93.0	0.9	20
Cadmium	0.11	53.0	60.2	87.9	0.2	20
Calcium						
Chromium	72.7	127	60.2	90.2	0.0	20
Cobalt						
Copper	13.1	68.8	60.2	92.6	0.3	20
Iron						
Lead	14.0	118	120	86.4	0.0	20
Lithium						
Magnesium						
Manganese						
Molybdenum						
Nickel	36.4	86.7	60.2	83.6	0.7	20
Phosphorus						
Potassium						
Selenium	0.0	106	120	88.1	0.0	20
Silicon						
Silver	0.32	22.8	24.1	93.4	0.0	20
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium	anr					
Vanadium						
Zinc	45.3	96.9	60.2	85.8	1.1	20

Associated samples MP10709: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	188	200	94.0	80-120
Beryllium				
Boron	98.7	100	98.7	80-120
Cadmium	46.6	50	93.2	80-120
Calcium				
Chromium	50.0	50	100.0	80-120
Cobalt				
Copper	46.6	50	93.2	80-120
Iron				
Lead	96.6	100	96.6	80-120
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	47.9	50	95.8	80-120
Phosphorus				
Potassium				
Selenium	94.8	100	94.8	80-120
Silicon				
Silver	19.6	20	98.0	80-120
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc	49.0	50	98.0	80-120

Associated samples MP10709: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	3370	3540	5.0	0-10
Beryllium				
Boron	25.5	28.5	11.8 (a)	0-10
Cadmium	0.900	0.00	100.0(a)	0-10
Calcium				
Chromium	604	634	5.0	0-10
Cobalt				
Copper	109	99.5	8.9	0-10
Iron				
Lead	116	117	0.4	0-10
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	302	331	9.4	0-10
Phosphorus				
Potassium				
Selenium	0.00	0.00	NC	0-10
Silicon				
Silver	2.70	5.50	103.7(a)	0-10
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc	377	419	11.2*(b)	0-10

Associated samples MP10709: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

10.1.4

10

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	25	.55	.75		
Antimony	0.20	.0011	.029		
Arsenic	0.10	.0085	.024	0.041	<0.10
Barium	1.0	.008	.16		
Beryllium	0.10	.008	.049		
Boron	20	.25	.07		
Cadmium	0.050	.018	.038		
Calcium	200	2.8	13		
Chromium	1.0	.027	.11		
Cobalt	0.10	.0025	.0085		
Copper	1.0	.03	.1		
Iron	5.0	1.8	1.8		
Lead	0.25	.004	.0075		
Magnesium	50	.65	.65		
Manganese	0.50	.06	.07		
Molybdenum	0.50	.025	.046		
Nickel	1.0	.0044	.17		
Phosphorus	30	1.3	4.9		
Potassium	100	1.5	2.5		
Selenium	0.20	.03	.13		
Silver	0.050	.00095	.01		
Sodium	250	2.5	5.5		
Strontium	10	.005	.027		
Thallium	0.10	.0012	.0075		
Tin	5.0	.032	2.3		
Titanium	1.0	.03	.085		
Uranium	0.25	.00085	.0015		
Vanadium	2.0	.019	.11		
Zinc	5.0	.11	1.4		

Associated samples MP10710: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	14.1	121	120	88.8	75-125
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10710: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	14.1	131	120	97.1	7.9	20
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silver						
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10710: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	98.6	100	98.6	80-120
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10710: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1 Original	SDL 5:25	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	117	111	5.1	0-10
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10710: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	210		
Antimony	150	11	95		
Arsenic	130	19	28		
Barium	50	1	7		
Beryllium	50	4.5	6		
Boron	250	4	33		
Cadmium	50	1	1.8		
Calcium	2000	12	210	32.0	<2000
Chromium	50	1.5	2		
Cobalt	25	2.5	2.9		
Copper	50	4	9.5		
Iron	350	7.5	48		
Lead	250	11	110		
Lithium	25	2	14		
Magnesium	1000	34	95	3.0	<1000
Manganese	25	2.5	2.3		
Molybdenum	50	2	4.2		
Nickel	150	2.5	4.4		
Phosphorus	500	75	100		
Potassium	5000	500	1400		
Selenium	250	36	55		
Silicon	250	24	26		
Silver	150	1.5	3		
Sodium	2000	37	850	-14	<2000
Strontium	25	.05	.6		
Thallium	50	9	20		
Tin	250	60	80		
Titanium	50	.5	11		
Uranium	250	15	28		
Vanadium	50	2	2		
Zinc	150	2	16		

Associated samples MP10713: D48846-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1A Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	22200	159000	125000	109.4	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	2950	131000	125000	102.4	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	19700	146000	125000	101.0	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10713: D48846-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

10.3.2

10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1A Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	22200	159000	125000	109.4	0.0	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	2950	132000	125000	103.2	0.8	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	19700	147000	125000	101.8	0.7	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10713: D48846-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

10.3.2

10

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	142000	125000	113.6	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	130000	125000	104.0	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	130000	125000	104.0	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10713: D48846-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1A Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	4450	4600	3.4	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	590	647	9.7	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	3940	4230	7.3	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10713: D48846-1A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.10	.0011	.008	-0.0018	<0.10

Associated samples MP10714: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 08/05/13

Metal	D48820-1 Original	MS	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.41	0.73	0.378	84.8	75-125

Associated samples MP10714: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714 Methods: SW846 7471B
Matrix Type: SOLID Units: mg/kg

Prep Date: 08/05/13

Metal	D48820-1 Original	MSD	Spikelot HGWSR1	% Rec	MSD RPD	QC Limit
Mercury	0.41	0.69	0.384	62.5N(a)	9.7	20

Associated samples MP10714: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 08/05/13

Metal	BSP Result	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.40	0.4	100.0	80-120

Associated samples MP10714: D48846-1, D48846-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

Mountain States ACCUTEST LABORATORIES

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chromium, Hexavalent	GP10596/GN21315	1.0	0.0	mg/kg	92.9	82.7	89.0	80-120%
Specific Conductivity	GP10607/GN21328			umhos/cm	999	995	99.6	90-110%
pH	GN21316			su	8.00	8.05	100.6	99.3-100.7%

Associated Samples:
Batch GN21316: D48846-1, D48846-2
Batch GP10596: D48846-1, D48846-2
Batch GP10607: D48846-1
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chromium, Hexavalent	GP10596/GN21315	D48867-1	mg/kg	0.0	0.0	29.3(a)	0-20%
Redox Potential Vs H2	GN21311	D48846-1	mv	190	187	1.6	0-20%

Associated Samples:
Batch GN21311: D48846-1, D48846-2
Batch GP10596: D48846-1, D48846-2
(*) Outside of QC limits
(a) RPD acceptable due to low duplicate and sample concentrations.

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chromium, Hexavalent	GP10596/GN21315	D48867-1	mg/kg	0.0	95.5	38.2	95.5	75-125%

Associated Samples:
Batch GP10596: D48846-1, D48846-2
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48846
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chromium, Hexavalent	GP10596/GN21315	D48867-1	mg/kg	0.0	96.6	38.6	1.1	20%

Associated Samples:
Batch GP10596: D48846-1, D48846-2
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

APPENDIX C-3

AUGUST 2 SAMPLE RESULTS

Mountain States ACCUTEST LABORATORIES

08/07/13

Technical Report for

Marathon Oil

Marathon 32C Pond

WBS#TA.13.30788.EXP

Accutest Job Number: D48863

Sampling Date: 08/02/13

Report to:

Marathon Oil
44 Union Blvd, Ste 300
Lakewood, CO 80228
randy_march@golder.com; zjtoellner@marathonoil.com

ATTN: Randy March

Total number of pages in report: **82**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Scott Heideman
Laboratory Director

Client Service contact: Ann Doerr 303-425-6021

Certifications: CO (CO00049), ID, NE (CO00049), ND (R-027), NJ (CO 0007), OK (D9942), UT (NELAP CO00049), TX (T104704511)

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Accutest Laboratories

Sample Summary

Marathon Oil

Job No: D48863

Marathon 32C Pond
Project No: WBS#TA.13.30788.EXP

Sample Number	Collected Date	Time	By	Received	Matrix Code	Type	Client Sample ID
D48863-1	08/02/13	08:25	RM	08/03/13	SO	Soil	SS-1.2
D48863-2	08/02/13	08:35	RM	08/03/13	SO	Soil	TT-3.0
D48863-2A	08/02/13	08:35	RM	08/03/13	SO	Soil	TT-3.0
D48863-3	08/02/13	09:15	RM	08/03/13	SO	Soil	UU-2.0
D48863-4	08/02/13	10:40	RM	08/03/13	SO	Soil	VV-1.0

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client:	Marathon Oil	**Job No**	D48863
Site:	Marathon 32C Pond	**Report Date**	8/7/2013 1:42:06 PM

On 08/03/2013, 4 sample(s), 0 Trip Blank(s), and 0 Field Blank(s) were received at Accutest Mountain States (AMS) at a temperature of 3 °C. The samples were intact and properly preserved, unless noted below. An AMS Job Number of D48863 was assigned to the project. The lab sample ID, client sample ID, and date of sample collection are detailed in the report's Results Summary.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Volatiles by GCMS By Method SW846 8260B

Matrix SO **Batch ID:** V5V1717

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48684-1MS, D48684-1MSD were used as the QC samples indicated.

Extractables by GCMS By Method SW846 8270C BY SIM

Matrix SO **Batch ID:** OP8318

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D48867-1MS, D48867-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Volatiles by GC By Method SW846 8015B

Matrix SO **Batch ID:** GGB1181

- All samples were analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48863-1MS, D48863-1MSD were used as the QC samples indicated.

Matrix SO **Batch ID:** GGB1182

- All samples were analyzed within the recommended method holding time.
- Sample(s) D48863-2MS, D48863-2MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Extractables by GC By Method SW846-8015B

Matrix SO **Batch ID:** OP8319

- All samples were extracted and analyzed within the recommended method holding time.
- Sample(s) D48842-1MS, D48842-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.

Metals By Method SW846 6010C

Matrix	AQ	Batch ID:	MP10713

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48846-1AMS, D48846-1AMSD, D48846-1ASDL were used as the QC samples for the metals analysis.

Matrix	SO	Batch ID:	MP10709

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48846-1MS, D48846-1MSD, D48846-1SDL were used as the QC samples for the metals analysis.
- The serial dilution RPD(s) for Boron, Cadmium, Silver, Zinc are outside control limits for sample MP10709-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
- MP10709-SD1 for Zinc: Serial dilution indicates possible matrix interference.

Metals By Method SW846 6020A

Matrix	SO	Batch ID:	MP10710

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48846-1MS, D48846-1MSD, D48846-1SDL were used as the QC samples for the metals analysis.

Metals By Method SW846 7471B

Matrix	SO	Batch ID:	MP10714

- All samples were digested and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48820-1MS, D48820-1MSD were used as the QC samples for the metals analysis.
- The matrix spike duplicate (MSD) recovery(s) of Mercury are outside control limits. Probable cause due to matrix interference.

Wet Chemistry By Method ASTM D1498-76M

Matrix	SO	Batch ID:	GN21311

- Sample(s) D48846-1DUP were used as the QC samples for the Redox Potential Vs H2 analysis.

Wet Chemistry By Method SM2540B-2011 M

Matrix	SO	Batch ID:	GN21304

- The data for SM2540B-2011 M meets quality control requirements.

Wet Chemistry By Method SW846 3060A/7196A

Matrix	SO	Batch ID:	GP10596

- All samples were prepared and analyzed within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) D48867-1MS, D48867-1MSD, D48867-1DUP were used as the QC samples for the Chromium, Hexavalent analysis.
- The duplicate RPD(s) for Chromium, Hexavalent are outside control limits for sample GP10596-D1. RPD acceptable due to low duplicate and sample concentrations.

Wet Chemistry By Method SW846 3060A/7196A M

Matrix	SO	**Batch ID:**	R18219

- The data for SW846 3060A/7196A M meets quality control requirements.
- D48863-2 for Chromium, Trivalent: Calculated as: (Chromium) - (Chromium, Hexavalent)

Wet Chemistry By Method SW846 9045D

Matrix	SO	**Batch ID:**	GN21316

- The following samples were run outside of holding time for method SW846 9045D: D48863-2

Wet Chemistry By Method USDA HANDBOOK 60

Matrix	SO	**Batch ID:**	MP10713

- D48863-2A for Sodium Adsorption Ratio: Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+(Mg meq/L)/2]

AMS certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting AMS's Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

AMS is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. This report is authorized by AMS indicated via signature on the report cover.

Summary of Hits

Job Number: D48863
Account: Marathon Oil
Project: Marathon 32C Pond
Collected: 08/02/13

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
D48863-1	**SS-1.2**					
TPH-DRO (C10-C28)		6.24 J	7.7	5.8	mg/kg	SW846-8015B
D48863-2	**TT-3.0**					
Arsenic		25.1	0.11		mg/kg	SW846 6020A
Barium		374	1.1		mg/kg	SW846 6010C
Chromium		83.9	1.1		mg/kg	SW846 6010C
Copper		12.8	1.1		mg/kg	SW846 6010C
Lead		13.5	5.7		mg/kg	SW846 6010C
Nickel		40.5	3.4		mg/kg	SW846 6010C
Zinc		46.2	3.4		mg/kg	SW846 6010C
Specific Conductivity		108	1.0		umhos/cm	SM 2510B-2011 MOD
Chromium, Trivalent [a]		83.9	2.1		mg/kg	SW846 3060A/7196A M
Redox Potential Vs H2		174			mv	ASTM D1498-76M
pH		8.82			su	SW846 9045D
D48863-2A	**TT-3.0**					
Calcium		12.8	2.0		mg/l	SW846 6010C
Magnesium		3.40	1.0		mg/l	SW846 6010C
Sodium		8.31	2.0		mg/l	SW846 6010C
Sodium Adsorption Ratio [b]		0.533			ratio	USDA HANDBOOK 60
D48863-3	**UU-2.0**					
TPH-DRO (C10-C28)		6.68 J	8.0	6.0	mg/kg	SW846-8015B
D48863-4	**VV-1.0**					
TPH-DRO (C10-C28)		13.5	7.6	5.7	mg/kg	SW846-8015B

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)
(b) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

Mountain States ACCUTEST LABORATORIES

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID:	SS-1.2		
Lab Sample ID:	D48863-1	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8260B	**Percent Solids:**	86.0
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28476.D	1	08/05/13	BD	n/a	n/a	V5V1717
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.066	0.033	mg/kg	
108-88-3	Toluene	ND	0.13	0.066	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.025	mg/kg	
1330-20-7	Xylene (total)	ND	0.26	0.13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	86%		64-130%
460-00-4	4-Bromofluorobenzene	107%		62-131%
17060-07-0	1,2-Dichloroethane-D4	98%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-1.2		
Lab Sample ID:	D48863-1	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8015B	**Percent Solids:**	86.0
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21504.D	1	08/04/13	EV	n/a	n/a	GGB1181
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.6	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	89%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	SS-1.2		
Lab Sample ID:	D48863-1	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	86.0
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD27319.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	6.24	7.7	5.8	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	60%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8260B	**Percent Solids:**	88.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28477.D	1	08/05/13	BD	n/a	n/a	V5V1717
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.04 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.063	0.031	mg/kg	
108-88-3	Toluene	ND	0.13	0.063	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.024	mg/kg	
1330-20-7	Xylene (total)	ND	0.25	0.13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	86%		64-130%
460-00-4	4-Bromofluorobenzene	110%		62-131%
17060-07-0	1,2-Dichloroethane-D4	101%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8270C BY SIM SW846 3546	**Percent Solids:**	88.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	3G15720.D	1	08/05/13	DC	08/05/13	OP8318	E3G774
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

COGCC Table 910-1 PAH List

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	0.0094	0.0049	mg/kg	
120-12-7	Anthracene	ND	0.0094	0.0049	mg/kg	
56-55-3	Benzo(a)anthracene	ND	0.0094	0.0049	mg/kg	
205-99-2	Benzo(b)fluoranthene	ND	0.0094	0.0049	mg/kg	
207-08-9	Benzo(k)fluoranthene	ND	0.0094	0.0049	mg/kg	
50-32-8	Benzo(a)pyrene	ND	0.0094	0.0049	mg/kg	
218-01-9	Chrysene	ND	0.0094	0.0049	mg/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	0.0094	0.0049	mg/kg	
206-44-0	Fluoranthene	ND	0.0094	0.0049	mg/kg	
86-73-7	Fluorene	ND	0.0094	0.0057	mg/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	0.0094	0.0049	mg/kg	
91-20-3	Naphthalene	ND	0.013	0.012	mg/kg	
129-00-0	Pyrene	ND	0.0094	0.0049	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
4165-60-0	Nitrobenzene-d5	64%		10-159%
321-60-8	2-Fluorobiphenyl	71%		19-131%
1718-51-0	Terphenyl-d14	81%		18-150%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8015B	**Percent Solids:**	88.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21517.D	1	08/06/13	EV	n/a	n/a	GGB1182
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.0 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.3	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	93%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	88.2
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD27321.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333
Run #2							

	Initial Weight	Final Volume
Run #1	30.1 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	7.5	5.6	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	69%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
		Percent Solids:	88.2
Project:	Marathon 32C Pond		

Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Arsenic	25.1	0.11	mg/kg	5	08/05/13	08/06/13	JB	SW846 6020A [3]	SW846 3050B [5]
Barium	374	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Boron	< 5.7	5.7	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Cadmium	< 1.1	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Chromium	83.9	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Copper	12.8	1.1	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Lead	13.5	5.7	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Mercury	< 0.093	0.093	mg/kg	1	08/05/13	08/05/13	JB	SW846 7471B [2]	SW846 7471B [6]
Nickel	40.5	3.4	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Selenium	< 5.7	5.7	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Silver	< 3.4	3.4	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]
Zinc	46.2	3.4	mg/kg	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3050B [4]

(1) Instrument QC Batch: MA3839
(2) Instrument QC Batch: MA3840
(3) Instrument QC Batch: MA3843
(4) Prep QC Batch: MP10709
(5) Prep QC Batch: MP10710
(6) Prep QC Batch: MP10714

RL = Reporting Limit

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
		Percent Solids:	88.2
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
prep: DEPT.OF AG, BOOK N9							
Specific Conductivity	108	1.0	umhos/cm	1	08/06/13	BF	SM 2510B-2011 MOD
Chromium, Hexavalent	< 1.0	1.0	mg/kg	1	08/05/13	RW	SW846 3060A/7196A
Chromium, Trivalent [a]	83.9	2.1	mg/kg	1	08/05/13 16:44	JB	SW846 3060A/7196A M
Redox Potential Vs H2	174		mv	1	08/05/13	AK	ASTM D1498-76M
Solids, Percent	88.2		%	1	08/05/13	SWT	SM2540B-2011 M
pH	8.82		su	1	08/05/13 16:00	AK	SW846 9045D

(a) Calculated as: (Chromium) - (Chromium, Hexavalent)

RL = Reporting Limit

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2A	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
		Percent Solids:	88.2
Project:	Marathon 32C Pond		

SAR Metals Analysis

Analyte	Result	RL	Units	DF	Prep	Analyzed	By	Method	Prep Method
Calcium	12.8	2.0	mg/l	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Magnesium	3.40	1.0	mg/l	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3010A/M [2]
Sodium	8.31	2.0	mg/l	1	08/05/13	08/05/13	JB	SW846 6010C [1]	SW846 3010A/M [2]

(1) Instrument QC Batch: MA3839
(2) Prep QC Batch: MP10713

RL = Reporting Limit

Report of Analysis

Client Sample ID:	TT-3.0		
Lab Sample ID:	D48863-2A	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
		Percent Solids:	88.2
Project:	Marathon 32C Pond		

General Chemistry

Analyte	Result	RL	Units	DF	Analyzed	By	Method
Sodium Adsorption Ratio [a]	0.533		ratio	1	08/05/13 13:15	JB	USDA HANDBOOK 60

(a) Calculated as: (Na meq/L) / sqrt [(Ca meq/L)+ (Mg meq/L)/2]

RL = Reporting Limit

Report of Analysis

Client Sample ID:	UU-2.0		
Lab Sample ID:	D48863-3	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8260B	**Percent Solids:**	83.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28478.D	1	08/05/13	BD	n/a	n/a	V5V1717
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.06 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.070	0.035	mg/kg	
108-88-3	Toluene	ND	0.14	0.070	mg/kg	
100-41-4	Ethylbenzene	ND	0.14	0.026	mg/kg	
1330-20-7	Xylene (total)	ND	0.28	0.14	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	86%		64-130%
460-00-4	4-Bromofluorobenzene	111%		62-131%
17060-07-0	1,2-Dichloroethane-D4	109%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	UU-2.0		
Lab Sample ID:	D48863-3	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8015B	**Percent Solids:**	83.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21507.D	1	08/04/13	EV	n/a	n/a	GGB1181
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	14	7.0	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	89%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	UU-2.0		
Lab Sample ID:	D48863-3	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	83.1
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD27323.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	6.68	8.0	6.0	mg/kg	J

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	65%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VV-1.0		
Lab Sample ID:	D48863-4	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8260B	**Percent Solids:**	87.4
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5V28479.D	1	08/05/13	BD	n/a	n/a	V5V1717
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.10 g	5.0 ml	100 ul
Run #2			

Purgeable Aromatics

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	0.063	0.032	mg/kg	
108-88-3	Toluene	ND	0.13	0.063	mg/kg	
100-41-4	Ethylbenzene	ND	0.13	0.024	mg/kg	
1330-20-7	Xylene (total)	ND	0.25	0.13	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
2037-26-5	Toluene-D8	85%		64-130%
460-00-4	4-Bromofluorobenzene	108%		62-131%
17060-07-0	1,2-Dichloroethane-D4	105%		70-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VV-1.0		
Lab Sample ID:	D48863-4	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846 8015B	**Percent Solids:**	87.4
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	GB21508.D	1	08/04/13	EV	n/a	n/a	GGB1181
Run #2							

	Initial Weight	Final Volume	Methanol Aliquot
Run #1	5.1 g	5.0 ml	100 ul
Run #2			

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	13	6.3	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
120-82-1	1,2,4-Trichlorobenzene	86%		60-140%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	VV-1.0		
Lab Sample ID:	D48863-4	**Date Sampled:**	08/02/13
Matrix:	SO - Soil	**Date Received:**	08/03/13
Method:	SW846-8015B SW846 3546	**Percent Solids:**	87.4
Project:	Marathon 32C Pond		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	FD27325.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333
Run #2							

	Initial Weight	Final Volume
Run #1	30.0 g	1.0 ml
Run #2		

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	13.5	7.6	5.7	mg/kg	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
84-15-1	o-Terphenyl	86%		35-130%

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Mountain States ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

PAGE 1 OF 1

4036 Youngfield Street, Wheat Ridge, CO 80033
TEL. 303-425-6021 FAX: 303-425-6854
www.accutest.com

FED-EX Tracking #:
Bottle Order Control #:
Accutest Quote #:
Accutest Job #: D48863

Client / Reporting Information

Company Name: Marathon Oil
Street Address: 743 Horizon Ct Suite 220
City: Grand Junction Co
Project Contact: Zach Toellner / Randy March
Phone #: 303-980-0540
Sampler(s) Name(s): Randy March

Project Information

Project Name: Marathon 32C Pond
Street:
City: State:
Project #:
Client Purchase Order #:
Project Manager:
Billing Information (If different from Report to)
Company Name:
Street Address:
City:
Attention:

Requested Analysis (see TEST CODE sheet)

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
SED-Sediment
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe
FB-Field Blank
EB-Equipment Blank
RB- Rinse Blank
TB-Trip Blank

Accutest Sample #	Field ID / Point of Collection	MEOH/DI Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	NaOH	HNO3	H2SO4	NONE	DI Water	MEOH	ENCORE	GRO, BTEX	COGCC Table 910-1 Soil Analysis									LAB USE ONLY
	SS-1.2		8/2/13	0825	RM	SO	2									X										01
	TT-3.0		"	0835	RM	SO	4										X									02
	UU-2.0		"	0915	RM	SO	2									X										03
	VV-1.0		"	1040	RM	SO	2									X										04

Turnaround Time (Business days)

- [ ] Std. 15 Business Days
- [ ] Std. 10 Business Days
- [ ] 5 Day RUSH
- [ ] 3 Day Emergency
- [x] 2 Day Emergency
- [ ] 1 Day Emergency
- [ ]

Approved By (Accutest PM): / Date:

Emergency & Rush T/A data available VIA Lablink

Data Deliverable Information

- [ ] Commercial "A" (Level 1)
- [ ] Commercial "B" (Level 2)
- [ ] COMMBN
- [ ] COMMBN+
- [ ]
- [ ] State Forms Required
- [ ] Send Forms to State
- [ ] Report by Fax
- [ ] Report by PDF
- [x] EDD Format

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
Commercial BN = Results/QC/Narrative (+ = chromatograms)

Comments / Special Instructions

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1 R. March	8/2/13 12:00	1 Scott Dietel	2 Scott Dietel	8/2/13 15:00	2
Relinquished by Sampler: 3	Date Time:	Received By: 3 JacobBarker 8/2/13 1615	Relinquished By: 4	Date Time:	Received By: 4
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal # FX	Intact / Not Intact	Preserved where applicable: X	On Ice: X	Cooler Temp. 3.0

D48863: Chain of Custody
Page 1 of 2

Accutest Laboratories Sample Receipt Summary

Accutest Job Number: D48863 **Client:** MARATHON OIL **Immediate Client Services Action Required:** No

Date / Time Received: 8/3/2013 10:15:00 AM **No. Coolers:** 1 **Client Service Action Required at Login:** No

Project: MARATHON 32C POND **Airbill #'s:** Fedex

Cooler Security	Y	or	N		Y	or	N
1. Custody Seals Present:	☑		☐	3. COC Present:	☑		☐
2. Custody Seals Intact:	☑		☐	4. Smpl Dates/Time OK	☑		☐

Cooler Temperature	Y	or	N
1. Temp criteria achieved:	☑		☐
2. Cooler temp verification:	Infared gun		
3. Cooler media:	Ice (bag)		

Quality Control Preservation	Y	or	N	N/A
1. Trip Blank present / cooler:	☐		☐	
2. Trip Blank listed on COC:	☐		☐	
3. Samples preserved properly:	☑		☐	
4. VOCs headspace free:	☐		☐	☑

Sample Integrity - Documentation	Y	or	N
1. Sample labels present on bottles:	☑		☐
2. Container labeling complete:	☑		☐
3. Sample container label / COC agree:	☑		☐

Sample Integrity - Condition	Y	or	N
1. Sample recvd within HT:	☑		☐
2. All containers accounted for:	☑		☐
3. Condition of sample:	Intact		

Sample Integrity - Instructions	Y	or	N	N/A
1. Analysis requested is clear:	☑		☐	
2. Bottles received for unspecified tests	☐		☑	
3. Sufficient volume rec'd for analysis:	☑		☐	
4. Compositing instructions clear:	☐		☐	☑
5. Filtering instructions clear:	☐		☐	☑

Comments

Accutest Laboratories
V:(303) 425-6021
4036 Youngfield Street
F: (303) 425-6854
Wheat Ridge, CO
www/accutest.com

D48863: Chain of Custody
Page 2 of 2

Mountain States ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1717-MB	5V28466.D	1	08/05/13	BD	n/a	n/a	V5V1717

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48863-1, D48863-2, D48863-3, D48863-4

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	50	25	ug/kg	
100-41-4	Ethylbenzene	ND	100	19	ug/kg	
108-88-3	Toluene	ND	100	50	ug/kg	
1330-20-7	Xylene (total)	ND	200	100	ug/kg	

CAS No.	Surrogate Recoveries		Limits
2037-26-5	Toluene-D8	94%	64-130%
460-00-4	4-Bromofluorobenzene	96%	62-131%
17060-07-0	1,2-Dichloroethane-D4	97%	70-130%

Blank Spike Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
V5V1717-BS	5V28467.D	1	08/05/13	BD	n/a	n/a	V5V1717

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48863-1, D48863-2, D48863-3, D48863-4

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
71-43-2	Benzene	2500	2640	106	70-130
100-41-4	Ethylbenzene	2500	2670	107	70-130
108-88-3	Toluene	2500	2490	100	70-130
1330-20-7	Xylene (total)	7500	8070	108	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
2037-26-5	Toluene-D8	94%	64-130%
460-00-4	4-Bromofluorobenzene	105%	62-131%
17060-07-0	1,2-Dichloroethane-D4	93%	70-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48684-1MS	5V28469.D	1	08/05/13	BD	n/a	n/a	V5V1717
D48684-1MSD	5V28470.D	1	08/05/13	BD	n/a	n/a	V5V1717
D48684-1	5V28468.D	1	08/05/13	BD	n/a	n/a	V5V1717

The QC reported here applies to the following samples: **Method:** SW846 8260B

D48863-1, D48863-2, D48863-3, D48863-4

CAS No.	Compound	D48684-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	ND		2720	2780	102	2790	103	0	64-139/30
100-41-4	Ethylbenzene	ND		2720	2690	99	2690	99	0	68-136/30
108-88-3	Toluene	ND		2720	2380	88	2400	88	1	60-130/30
1330-20-7	Xylene (total)	ND		8150	8230	101	8280	102	1	58-142/30

CAS No.	Surrogate Recoveries	MS	MSD	D48684-1	Limits
2037-26-5	Toluene-D8	87%	88%	90%	64-130%
460-00-4	4-Bromofluorobenzene	110%	112%	109%	62-131%
17060-07-0	1,2-Dichloroethane-D4	97%	92%	98%	70-130%

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC/MS Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8318-MB	3G15715.D	1	08/05/13	DC	08/05/13	OP8318	E3G774

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48863-2

CAS No.	Compound	Result	RL	MDL	Units	Q
83-32-9	Acenaphthene	ND	8.3	4.3	ug/kg	
120-12-7	Anthracene	ND	8.3	4.3	ug/kg	
56-55-3	Benzo(a)anthracene	ND	8.3	4.3	ug/kg	
205-99-2	Benzo(b)fluoranthene	ND	8.3	4.3	ug/kg	
207-08-9	Benzo(k)fluoranthene	ND	8.3	4.3	ug/kg	
50-32-8	Benzo(a)pyrene	ND	8.3	4.3	ug/kg	
218-01-9	Chrysene	ND	8.3	4.3	ug/kg	
53-70-3	Dibenzo(a,h)anthracene	ND	8.3	4.3	ug/kg	
206-44-0	Fluoranthene	ND	8.3	4.3	ug/kg	
86-73-7	Fluorene	ND	8.3	5.0	ug/kg	
193-39-5	Indeno(1,2,3-cd)pyrene	ND	8.3	4.3	ug/kg	
91-20-3	Naphthalene	ND	12	10	ug/kg	
129-00-0	Pyrene	ND	8.3	4.3	ug/kg	

CAS No.	Surrogate Recoveries		Limits
4165-60-0	Nitrobenzene-d5	87%	10-159%
321-60-8	2-Fluorobiphenyl	93%	19-131%
1718-51-0	Terphenyl-d14	109%	18-150%

Blank Spike Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8318-BS	3G15716.D	1	08/05/13	DC	08/05/13	OP8318	E3G774

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48863-2

CAS No.	Compound	Spike ug/kg	BSP ug/kg	BSP %	Limits
83-32-9	Acenaphthene	83.3	66.7	80	68-130
120-12-7	Anthracene	83.3	69.8	84	67-130
56-55-3	Benzo(a)anthracene	83.3	72.9	87	65-130
205-99-2	Benzo(b)fluoranthene	83.3	70.6	85	44-130
207-08-9	Benzo(k)fluoranthene	83.3	77.6	93	56-131
50-32-8	Benzo(a)pyrene	83.3	72.6	87	62-130
218-01-9	Chrysene	83.3	74.4	89	70-130
53-70-3	Dibenzo(a,h)anthracene	83.3	74.9	90	55-130
206-44-0	Fluoranthene	83.3	69.6	84	70-130
86-73-7	Fluorene	83.3	69.9	84	70-130
193-39-5	Indeno(1,2,3-cd)pyrene	83.3	74.8	90	56-130
91-20-3	Naphthalene	83.3	68.1	82	70-130
129-00-0	Pyrene	83.3	75.0	90	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
4165-60-0	Nitrobenzene-d5	84%	10-159%
321-60-8	2-Fluorobiphenyl	93%	19-131%
1718-51-0	Terphenyl-d14	104%	18-150%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8318-MS	3G15718.D	1	08/05/13	DC	08/05/13	OP8318	E3G774
OP8318-MSD	3G15719.D	1	08/05/13	DC	08/05/13	OP8318	E3G774
D48867-1	3G15717.D	1	08/05/13	DC	08/05/13	OP8318	E3G774

The QC reported here applies to the following samples: **Method:** SW846 8270C BY SIM

D48863-2

CAS No.	Compound	D48867-1 ug/kg	Q	Spike ug/kg	MS ug/kg	MS %	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
83-32-9	Acenaphthene	ND		95.1	71.9	76	73.7	77	2	25-151/30
120-12-7	Anthracene	ND		95.1	79.4	84	79.2	83	0	39-159/30
56-55-3	Benzo(a)anthracene	ND		95.1	85.0	89	86.4	91	2	39-168/30
205-99-2	Benzo(b)fluoranthene	ND		95.1	81.9	86	82.7	87	1	24-163/30
207-08-9	Benzo(k)fluoranthene	ND		95.1	89.0	94	89.5	94	1	10-188/30
50-32-8	Benzo(a)pyrene	ND		95.1	84.2	89	84.4	89	0	32-144/30
218-01-9	Chrysene	ND		95.1	84.6	89	86.4	91	2	43-150/30
53-70-3	Dibenzo(a,h)anthracene	ND		95.1	83.9	88	86.2	91	3	21-152/30
206-44-0	Fluoranthene	ND		95.1	82.8	87	82.3	86	1	36-157/30
86-73-7	Fluorene	ND		95.1	77.9	82	79.7	84	2	10-182/30
193-39-5	Indeno(1,2,3-cd)pyrene	ND		95.1	83.8	88	87.0	91	4	20-154/30
91-20-3	Naphthalene	ND		95.1	85.0	89	81.1	85	5	10-163/30
129-00-0	Pyrene	ND		95.1	85.0	89	87.0	91	2	25-180/30

CAS No.	Surrogate Recoveries	MS	MSD	D48867-1	Limits
4165-60-0	Nitrobenzene-d5	77%	83%	72%	10-159%
321-60-8	2-Fluorobiphenyl	81%	84%	84%	19-131%
1718-51-0	Terphenyl-d14	94%	100%	94%	18-150%

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1181-MB	GB21502.D	1	08/03/13	EV	n/a	n/a	GGB1181

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48863-1, D48863-3, D48863-4

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	10	5.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
120-82-1	1,2,4-Trichlorobenzene	94%	60-140%

Method Blank Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1182-MB	GB21515.D	1	08/06/13	EV	n/a	n/a	GGB1182

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48863-2

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-GRO (C6-C10)	ND	10	5.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
120-82-1	1,2,4-Trichlorobenzene	97%	60-140%

Blank Spike Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1181-BS	GB21503.D	1	08/04/13	EV	n/a	n/a	GGB1181

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48863-1, D48863-3, D48863-4

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-GRO (C6-C10)	110	106	96	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
120-82-1	1,2,4-Trichlorobenzene	98%	60-140%

* = Outside of Control Limits.

Blank Spike Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
GGB1182-BS	GB21516.D	1	08/06/13	EV	n/a	n/a	GGB1182

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48863-2

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-GRO (C6-C10)	110	103	94	70-130

CAS No.	Surrogate Recoveries	BSP	Limits
120-82-1	1,2,4-Trichlorobenzene	106%	60-140%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48863-1MS	GB21505.D	1	08/04/13	EV	n/a	n/a	GGB1181
D48863-1MSD	GB21506.D	1	08/04/13	EV	n/a	n/a	GGB1181
D48863-1	GB21504.D	1	08/04/13	EV	n/a	n/a	GGB1181

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48863-1, D48863-3, D48863-4

CAS No.	Compound	D48863-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND		145	138	95	139	96	1	70-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D48863-1	Limits
120-82-1	1,2,4-Trichlorobenzene	98%	98%	89%	60-140%

8.3.1

8

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
D48863-2MS	GB21518.D	1	08/06/13	EV	n/a	n/a	GGB1182
D48863-2MSD	GB21519.D	1	08/06/13	EV	n/a	n/a	GGB1182
D48863-2	GB21517.D	1	08/06/13	EV	n/a	n/a	GGB1182

The QC reported here applies to the following samples: **Method:** SW846 8015B

D48863-2

CAS No.	Compound	D48863-2 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-GRO (C6-C10)	ND		138	130	94	130	94	0	70-130/30

CAS No.	Surrogate Recoveries	MS	MSD	D48863-2	Limits
120-82-1	1,2,4-Trichlorobenzene	103%	103%	93%	60-140%

8.3.2

8

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8319-MB	FD27307.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48863-1, D48863-2, D48863-3, D48863-4

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH-DRO (C10-C28)	ND	6.7	5.0	mg/kg	

CAS No.	Surrogate Recoveries		Limits
84-15-1	o-Terphenyl	74%	35-130%

Blank Spike Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8319-BS	FD27309.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48863-1, D48863-2, D48863-3, D48863-4

CAS No.	Compound	Spike mg/kg	BSP mg/kg	BSP %	Limits
	TPH-DRO (C10-C28)	667	515	77	48-130

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	72%	35-130%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: D48863
Account: MOILCOGJ Marathon Oil
Project: Marathon 32C Pond

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP8319-MS	FD27311.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333
OP8319-MSD	FD27315.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333
D48842-1	FD27317.D	1	08/05/13	TU	08/05/13	OP8319	GFD1333

The QC reported here applies to the following samples: **Method:** SW846-8015B

D48863-1, D48863-2, D48863-3, D48863-4

CAS No.	Compound	D48842-1 mg/kg	Q	Spike mg/kg	MS mg/kg	MS %	MSD mg/kg	MSD %	RPD	Limits Rec/RPD
	TPH-DRO (C10-C28)	224		697	684	66	678	65	1	20-168/30

CAS No.	Surrogate Recoveries	MS	MSD	D48842-1	Limits
84-15-1	o-Terphenyl	67%	67%	73%	35-130%

9.3.1

9

* = Outside of Control Limits.

Mountain States ACCUTEST LABORATORIES

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	10	1.1	1.8		
Antimony	3.0	.21	.5		
Arsenic	2.5	.38	.63		
Barium	1.0	.02	.36	0.030	<1.0
Beryllium	1.0	.09	.06		
Boron	5.0	.08	.16	0.19	<5.0
Cadmium	1.0	.02	.28	0.030	<1.0
Calcium	40	.24	6.8		
Chromium	1.0	.03	.03	0.070	<1.0
Cobalt	0.50	.05	.039		
Copper	1.0	.08	.13	0.0	<1.0
Iron	7.0	.15	1.8		
Lead	5.0	.21	.25	-0.030	<5.0
Lithium	0.50	.04	.13		
Magnesium	20	.68	1.8		
Manganese	0.50	.05	.038		
Molybdenum	1.0	.04	.13		
Nickel	3.0	.05	.07	0.080	<3.0
Phosphorus	10	1.5	1.2		
Potassium	200	9.9	12		
Selenium	5.0	.71	1.1	0.010	<5.0
Silicon	5.0	.47	1.1		
Silver	3.0	.03	.05	-0.020	<3.0
Sodium	40	.73	3.7		
Strontium	5.0	.001	.022		
Thallium	1.0	.18	.46		
Tin	5.0	1.2	2.3		
Titanium	1.0	.01	.46		
Uranium	5.0	.29	.31		
Vanadium	1.0	.04	.043		
Zinc	3.0	.04	.16	0.25	<3.0

Associated samples MP10709: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(anr) Analyte not requested

10.1.1

10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	anr				
Barium	406	609	241	84.3	75-125
Beryllium					
Boron	3.1	114	120	92.2	75-125
Cadmium	0.11	53.1	60.2	88.1	75-125
Calcium					
Chromium	72.7	127	60.2	90.2	75-125
Cobalt					
Copper	13.1	68.6	60.2	92.2	75-125
Iron					
Lead	14.0	118	120	86.4	75-125
Lithium					
Magnesium					
Manganese					
Molybdenum					
Nickel	36.4	86.1	60.2	82.6	75-125
Phosphorus					
Potassium					
Selenium	0.0	106	120	88.1	75-125
Silicon					
Silver	0.32	22.8	24.1	93.4	75-125
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium	anr				
Vanadium					
Zinc	45.3	98.0	60.2	87.6	75-125

Associated samples MP10709: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	anr					
Barium	406	609	241	84.3	0.0	20
Beryllium						
Boron	3.1	115	120	93.0	0.9	20
Cadmium	0.11	53.0	60.2	87.9	0.2	20
Calcium						
Chromium	72.7	127	60.2	90.2	0.0	20
Cobalt						
Copper	13.1	68.8	60.2	92.6	0.3	20
Iron						
Lead	14.0	118	120	86.4	0.0	20
Lithium						
Magnesium						
Manganese						
Molybdenum						
Nickel	36.4	86.7	60.2	83.6	0.7	20
Phosphorus						
Potassium						
Selenium	0.0	106	120	88.1	0.0	20
Silicon						
Silver	0.32	22.8	24.1	93.4	0.0	20
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium	anr					
Vanadium						
Zinc	45.3	96.9	60.2	85.8	1.1	20

Associated samples MP10709: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date: 08/05/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	188	200	94.0	80-120
Beryllium				
Boron	98.7	100	98.7	80-120
Cadmium	46.6	50	93.2	80-120
Calcium				
Chromium	50.0	50	100.0	80-120
Cobalt				
Copper	46.6	50	93.2	80-120
Iron				
Lead	96.6	100	96.6	80-120
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	47.9	50	95.8	80-120
Phosphorus				
Potassium				
Selenium	94.8	100	94.8	80-120
Silicon				
Silver	19.6	20	98.0	80-120
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc	49.0	50	98.0	80-120

Associated samples MP10709: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: mg/kg

Prep Date:

Metal

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	3370	3540	5.0	0-10
Beryllium				
Boron	25.5	28.5	11.8 (a)	0-10
Cadmium	0.900	0.00	100.0(a)	0-10
Calcium				
Chromium	604	634	5.0	0-10
Cobalt				
Copper	109	99.5	8.9	0-10
Iron				
Lead	116	117	0.4	0-10
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel	302	331	9.4	0-10
Phosphorus				
Potassium				
Selenium	0.00	0.00	NC	0-10
Silicon				
Silver	2.70	5.50	103.7(a)	0-10
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium	anr			
Vanadium				
Zinc	377	419	11.2*(b)	0-10

Associated samples MP10709: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10709
Matrix Type: SOLID

Methods: SW846 6010C
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested
(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).
(b) Serial dilution indicates possible matrix interference.

10.1.4

10

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	25	.55	.75		
Antimony	0.20	.0011	.029		
Arsenic	0.10	.0085	.024	0.041	<0.10
Barium	1.0	.008	.16		
Beryllium	0.10	.008	.049		
Boron	20	.25	.07		
Cadmium	0.050	.018	.038		
Calcium	200	2.8	13		
Chromium	1.0	.027	.11		
Cobalt	0.10	.0025	.0085		
Copper	1.0	.03	.1		
Iron	5.0	1.8	1.8		
Lead	0.25	.004	.0075		
Magnesium	50	.65	.65		
Manganese	0.50	.06	.07		
Molybdenum	0.50	.025	.046		
Nickel	1.0	.0044	.17		
Phosphorus	30	1.3	4.9		
Potassium	100	1.5	2.5		
Selenium	0.20	.03	.13		
Silver	0.050	.00095	.01		
Sodium	250	2.5	5.5		
Strontium	10	.005	.027		
Thallium	0.10	.0012	.0075		
Tin	5.0	.032	2.3		
Titanium	1.0	.03	.085		
Uranium	0.25	.00085	.0015		
Vanadium	2.0	.019	.11		
Zinc	5.0	.11	1.4		

Associated samples MP10710: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic	14.1	121	120	88.8	75-125
Barium					
Beryllium					
Boron					
Cadmium					
Calcium					
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silver					
Sodium					
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10710: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	D48846-1 Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic	14.1	131	120	97.1	7.9	20
Barium						
Beryllium						
Boron						
Cadmium						
Calcium						
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Magnesium						
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silver						
Sodium						
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10710: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: mg/kg

Prep Date: 08/05/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	98.6	100	98.6	80-120
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10710: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10710
Matrix Type: SOLID

Methods: SW846 6020A
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1 Original	SDL 5:25	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	117	111	5.1	0-10
Barium				
Beryllium				
Boron				
Cadmium				
Calcium				
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10710: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Aluminum	500	55	210		
Antimony	150	11	95		
Arsenic	130	19	28		
Barium	50	1	7		
Beryllium	50	4.5	6		
Boron	250	4	33		
Cadmium	50	1	1.8		
Calcium	2000	12	210	32.0	<2000
Chromium	50	1.5	2		
Cobalt	25	2.5	2.9		
Copper	50	4	9.5		
Iron	350	7.5	48		
Lead	250	11	110		
Lithium	25	2	14		
Magnesium	1000	34	95	3.0	<1000
Manganese	25	2.5	2.3		
Molybdenum	50	2	4.2		
Nickel	150	2.5	4.4		
Phosphorus	500	75	100		
Potassium	5000	500	1400		
Selenium	250	36	55		
Silicon	250	24	26		
Silver	150	1.5	3		
Sodium	2000	37	850	-14	<2000
Strontium	25	.05	.6		
Thallium	50	9	20		
Tin	250	60	80		
Titanium	50	.5	11		
Uranium	250	15	28		
Vanadium	50	2	2		
Zinc	150	2	16		

Associated samples MP10713: D48863-2A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1A Original	MS	Spikelot ICPALL2	% Rec	QC Limits
Aluminum					
Antimony					
Arsenic					
Barium					
Beryllium					
Boron					
Cadmium					
Calcium	22200	159000	125000	109.4	75-125
Chromium					
Cobalt					
Copper					
Iron					
Lead					
Lithium					
Magnesium	2950	131000	125000	102.4	75-125
Manganese					
Molybdenum					
Nickel					
Phosphorus					
Potassium					
Selenium					
Silicon					
Silver					
Sodium	19700	146000	125000	101.0	75-125
Strontium					
Thallium					
Tin					
Titanium					
Uranium					
Vanadium					
Zinc					

Associated samples MP10713: D48863-2A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

10.3.2

10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1A Original	MSD	Spikelot ICPALL2	% Rec	MSD RPD	QC Limit
Aluminum						
Antimony						
Arsenic						
Barium						
Beryllium						
Boron						
Cadmium						
Calcium	22200	159000	125000	109.4	0.0	20
Chromium						
Cobalt						
Copper						
Iron						
Lead						
Lithium						
Magnesium	2950	132000	125000	103.2	0.8	20
Manganese						
Molybdenum						
Nickel						
Phosphorus						
Potassium						
Selenium						
Silicon						
Silver						
Sodium	19700	147000	125000	101.8	0.7	20
Strontium						
Thallium						
Tin						
Titanium						
Uranium						
Vanadium						
Zinc						

Associated samples MP10713: D48863-2A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

10.3.2

10

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	BSP Result	Spikelot ICPALL2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	142000	125000	113.6	80-120
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	130000	125000	104.0	80-120
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	130000	125000	104.0	80-120
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10713: D48863-2A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date: 08/05/13

Metal	D48846-1A Original	SDL 1:5	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic				
Barium				
Beryllium				
Boron				
Cadmium				
Calcium	4450	4600	3.4	0-10
Chromium				
Cobalt				
Copper				
Iron				
Lead				
Lithium				
Magnesium	590	647	9.7	0-10
Manganese				
Molybdenum				
Nickel				
Phosphorus				
Potassium				
Selenium				
Silicon				
Silver				
Sodium	3940	4230	7.3	0-10
Strontium				
Thallium				
Tin				
Titanium				
Uranium				
Vanadium				
Zinc				

Associated samples MP10713: D48863-2A

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits

SERIAL DILUTION RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10713
Matrix Type: AQUEOUS

Methods: SW846 6010C, USDA HANDBOOK 60
Units: ug/l

Prep Date:

Metal

(anr) Analyte not requested

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 08/05/13

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.10	.0011	.008	-0.0018	<0.10

Associated samples MP10714: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 08/05/13

Metal	D48820-1 Original	MS	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.41	0.73	0.378	84.8	75-125

Associated samples MP10714: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 08/05/13

Metal	D48820-1 Original	MSD	Spikelot HGWSR1	% Rec	MSD RPD	QC Limit
Mercury	0.41	0.69	0.384	62.5N(a)	9.7	20

Associated samples MP10714: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested
(a) Spike recovery indicates possible matrix interference.

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

QC Batch ID: MP10714
Matrix Type: SOLID

Methods: SW846 7471B
Units: mg/kg

Prep Date: 08/05/13

Metal	BSP Result	Spikelot HGWSR1	% Rec	QC Limits
Mercury	0.40	0.4	100.0	80-120

Associated samples MP10714: D48863-2

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

10.4.3

10

Mountain States ACCUTEST LABORATORIES

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chromium, Hexavalent	GP10596/GN21315	1.0	0.0	mg/kg	92.9	82.7	89.0	80-120%
Specific Conductivity	GP10607/GN21328			umhos/cm	999	995	99.6	90-110%
pH	GN21316			su	8.00	8.05	100.6	99.3-100.7%

Associated Samples:
Batch GN21316: D48863-2
Batch GP10596: D48863-2
Batch GP10607: D48863-2
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Chromium, Hexavalent	GP10596/GN21315	D48867-1	mg/kg	0.0	0.0	29.3(a)	0-20%
Redox Potential Vs H2	GN21311	D48846-1	mv	190	187	1.6	0-20%

Associated Samples:
Batch GN21311: D48863-2
Batch GP10596: D48863-2
(*) Outside of QC limits
(a) RPD acceptable due to low duplicate and sample concentrations.

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chromium, Hexavalent	GP10596/GN21315	D48867-1	mg/kg	0.0	95.5	38.2	95.5	75-125%

Associated Samples:
Batch GP10596: D48863-2
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: D48863
Account: MOILCOGJ - Marathon Oil
Project: Marathon 32C Pond

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chromium, Hexavalent	GP10596/GN21315	D48867-1	mg/kg	0.0	96.6	38.6	1.1	20%

Associated Samples:
Batch GP10596: D48863-2
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits