

Revisions to Text Based on ADEQ
Comment #1

Section 7.3.1 and 7.3.2

Section 7.10

Section 9



7.3 Summary of Polycyclic Aromatic Hydrocarbon Concentrations in Sediment Samples

Figures 7-1.1, 7-2.1, and 7-3.1 show the maximum concentrations of total LMW and HMW PAHs (Priority+2 List and Long List; see Section 5) measured at each sediment location for the drainage ways, Dawson Cove, and Lake Conway, respectively. PAHs were detected in all site background sediment samples, and in all sediment sample locations in the drainage ways, Dawson Cove, and Lake Conway. PAH concentrations in sediment samples collected from the drainage ways, Dawson Cove, and Lake Conway are discussed in Sections 7.3.1, 7.3.2, and 7.3.3.

7.3.1 Summary of Polycyclic Aromatic Hydrocarbon Concentrations in Drainage Ways

The statistics for the individual and total PAHs are presented for the drainage ways in Table 7-5. None of the individual PAHs exceeded their respective ESVs. The FOD for the total LMW and HMW PAHs compared to their respective ESVs is summarized in the table below.

Analyte	Drainage Way		Site Background
	N > ESV	N > Site Bkg	N > ESV
Priority+2 List			
Total HMW PAHs	1	0	3
Total LMW PAHs	0	0	2
Long List			
Total HMW PAHs	2	0	3
Total LMW PAHs	3	2	2
Toxic Unit			
One-Carbon Model TU*	0	0	0

Notes:

N > ESV = Number of samples (excludes duplicates) above the respective sediment ESVs

Site background refers to background sediment locations in the drainage ways.

* Summary for surface sediment samples only. The TU calculations for drainage way sediment samples are provided in Appendix J.

In 33 of 35 samples in the drainage ways, the total HMW and LMW PAHs (both Priority+2 and Long Lists) are below the sediment ESVs. The TUs for the surface sediment samples were all 1.0 or less. In two samples (and one duplicate) in the drainage ways, PAH summations were detected above the ESVs; these samples are discussed below:

- *SED-DA-004*. In the surface sample at this location, the total HMW PAHs (Priority+2 List) and the total HMW and LMW PAHs (Long List) summations were above the sediment ESVs. The one-carbon model TU for the surface sample was 1.0, indicating no unacceptable risk to benthic ecological receptors.
- *SED-DA-006*. In the subsurface sediment sample collected at the 0.5 to 1.0 foot bgs, the total LMW PAHs (Long List) summation was above the sediment ESV. The one-carbon model TU was 1.3 using the TOC value for the surface sample at this location, which, indicating no unacceptable risk to benthic ecological receptors, was slightly above 1.0. The TU values cannot be evaluated further using the two-carbon model because black carbon was not detected in the surface sample. However, benthic and aquatic receptors are not generally exposed to sediment at depth intervals below the biologically active zone, which is typically about 10 centimeters thick. The 0 to 0.5-foot surface sediment sample interval includes the biologically active zone, and therefore, there is not a complete exposure pathway to subsurface samples at deeper depth intervals. Because it is unlikely that benthic receptors will be exposed to sediments deeper than 0.5 foot, and moreover, the TU value only slightly exceeds 1.0 using the one-carbon model; it is concluded that risks to benthic and aquatic receptors are not expected at this location.
- *SED-DA-007 (Duplicate Sample)*. In the duplicate for the surface sample at this location, the total HMW and LMW PAHs (Long List) summations were above the sediment ESVs. The one-carbon model TU for the surface sample was 0.5, indicating no unacceptable risk to benthic ecological receptors.

Therefore, no further evaluation of PAHs in drainage way sediment is necessary.

7.3.2 Summary of Polycyclic Aromatic Hydrocarbon Concentrations in Dawson Cove

The statistics for the individual and total PAH summations are presented for Dawson Cove in Table 7-6. The individual PAHs were below sediment ESVs in 101 of 105 samples in Dawson Cove; four samples had one or more individual PAHs above the sediment ESV of 330 µg/kg and are described below:

- *SED-DA-015*. The surface sediment sample (0 to 0.5 foot bgs) had a phenanthrene concentration of 331 µg/kg.



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- *SED-DA-017*. The subsurface sediment sample (0.5 to 1 foot bgs) had a phenanthrene concentration of 416 µg/kg and a 2-methylnaphthalene concentration of 395 µg/kg.
- *SED-DA-028*. The surface sediment sample (0 to 0.5 foot bgs) had a benzo(b)fluoranthene concentration of 386 µg/kg.
- *SED-DA-045*. The surface sediment sample (0 to 0.5 foot bgs) had a phenanthrene concentration of 669 µg/kg.

These samples are evaluated further using the PAH summations and the TU calculation. Total LMW and HMW PAHs compared to their respective ESVs and to the maximum detection in the site background locations are summarized in the table below.

Analyte	Dawson Cove		Site Background
	N > ESV	N > Site BKG	N > ESV
Priority+2 List			
Total HMW PAHs	4	2	1
Total LMW PAHs	14	25	0
Long List			
Total HMW PAHs	47	16	5
Total LMW PAHs	47	21	4
Toxic Unit			
One-Carbon Model TU*	<u>01</u>	0	0

Notes:

N > ESV = Number of samples above the respective sediment ESVs.

Site background refers to background sediment locations in Lake Conway.

* Summary for surface sediment samples only. The TU calculations for Dawson Cove sediment samples are provided in Appendix J.

In 52 of 105 samples in Dawson Cove, the total HMW and LMW PAHs (both Priority+2 and Long Lists) were below the sediment ESVs. In the remaining 53 samples (32 surface and 21 subsurface), at least one of the summations was above the sediment ESVs. The TU calculation is applicable to the surface sediment sample concentration, which is where ecological exposures occur. For ~~all~~ 31 of the 32 surface sediment samples, the one-carbon model TU was 1.0 or less, indicating no unacceptable risk to benthic ecological receptors. ~~The TU calculation is applicable to the surface sediment sample concentration, which is where ecological exposures occur.~~ The one-carbon model TU in one surface sediment sample (SED-DA-045) was 1.2, which was slightly above 1.0. The TU was recalculated using the two-carbon model and the result was



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0.4, which was below 1.0 (Appendix I, Table I-2). Therefore, risk to benthic receptors from exposure to PAHs in surface sediments is not expected in Dawson Cove.

The TU was also calculated for the 21 subsurface samples, with at least one of the PAH summations above the sediment ESV, to provide additional information regarding these samples. The TOC value for the surface sample at each location was used for the TU calculation. For ~~all 20 21~~ of these 21 subsurface samples, the TU was also 1.0 or less, indicating no unacceptable risk to benthic ecological receptors. The TU value for one sample (SED-DA-017, 0.5 to 1 foot) was 1.3, which was slightly above 1.0. The TU value cannot be further evaluated using the two-carbon model because black carbon was not detected in the surface sediment sample at this location. However, benthic and aquatic receptors are not generally exposed to sediment at depth intervals below the biologically active zone, which is typically about 10 centimeters thick. The 0 to 0.5-foot surface sediment sample interval includes the biologically active zone, and therefore, there is not a complete exposure pathway to subsurface samples at deeper depth intervals. Because it is unlikely that benthic receptors will be exposed to sediments deeper than 0.5 foot, and moreover, the TU value only slightly exceeds 1.0 using the one-carbon model; it is concluded that risks to benthic and aquatic receptors are not expected at this location.

Therefore, no further evaluation of PAHs in Dawson Cove sediment is necessary.

7.3.3 Summary of Polycyclic Aromatic Hydrocarbon Concentrations in Lake Conway

The statistics for the individual and total PAHs summations are presented for Lake Conway in Table 7-7. None of the individual PAHs exceeded their respective ESVs. Total LMW and HMW PAHs compared to their respective ESVs are summarized in the table below.

Analyte	Lake Conway		Site Background
	N > ESV	N > Site BKG	N > ESV
Priority+2 List			
Total HMW PAHs	0	0	1
Total LMW PAHs	0	0	0
Long List			
Total HMW PAHs	12	0	5
Total LMW PAHs	3	0	4
Toxic Unit			
One-Carbon Model TU*	0	0	0



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7.10 Conclusions

A total of 178 sediment samples were collected at 53 locations within the drainage ways, Dawson Cove, and Lake Conway. Based on the screening results, concentrations in 172 of 178 samples were at levels that do not warrant further evaluation. In the remaining samples, one analyte was above the screening criteria. The following presents a summary, by chemical class (i.e., VOCs, PAHs, and metals).

VOCs. Crude-oil-related VOC concentrations were either non-detect or below ESVs in all sediment samples in the drainage ways and Lake Conway. Total xylenes and isopropylbenzene were detected above ESVs (25.2 µg/kg and 86 µg/kg, respectively) at the following five locations in Dawson Cove that warrant further consideration (see Section 9).

Area	Location	Sample Depth	Analyte	Value
Dawson Cove	SED-DA-015	Surface (0 to 0.5 feet bgs)	Total xylenes	730 µg/kg
		Subsurface (0.5 to 1.0 feet bgs)	Total xylenes	420 µg/kg
	SED-DA-017	Subsurface (0.5 to 1.0 feet bgs)	Isopropylbenzene	280 µg/kg
			Total xylenes	2,600 µg/kg
	SED-DA-039	Subsurface (0.5 <u>1.0</u> to 1.0 <u>1.5</u> feet bgs)	Total xylenes	26 µg/kg
	SED-DA-045	Surface (0 to 0.5 feet bgs)	Total xylenes	110 µg/kg
		Subsurface (0.5 to 1.0 feet bgs)	Total xylenes	61 µg/kg
	SED-DA-048	Surface (0 to 0.5 feet bgs)	Total xylenes	81 µg/kg

PAHs. Fifty-three of the sediment samples collected in the drainage ways and Dawson Cove had individual PAHs and/or PAH summations above ESVs. However, the TU for each surface sample, which accounts for the specific mixture and concentrations of PAHs in pore water and provides a rigorous indication of potential risk to benthic invertebrates, was 1.0 or less in all samples, indicating no unacceptable risk to benthic ecological receptors. Two of the subsurface samples had a TU slightly above 1.0, but because it is unlikely that benthic receptors will be exposed to sediments deeper than 0.5 foot and value only slightly exceeded 1.0 using the one-carbon model, it was concluded that risks to benthic and aquatic receptors are not expected at these locations. Twelve of the 18 samples in Lake Conway had a total LMW PAH (Long List only) summation above the ESV; however, the TU for the samples were well below 1. Therefore, no further assessment of PAHs in sediment in the drainage ways, Dawson Cove, or Lake Conway is necessary.



9. Summary of Analytical Findings

Three areas downstream of the release location were assessed to determine post-response conditions; these include the drainage ways from the residential area to Dawson Cove, Dawson Cove, and Lake Conway. Soil, sediment, and surface water samples were collected as part of the response. The following provides a summary of soil and sediment findings by area, and a summary of the overall surface water sampling results.

Drainage Ways Soil and Sediment Results

A total of 45 soil samples were collected at 15 locations along the banks of the drainage ways. Based on the screening results, concentrations in 42 of the 45 samples were at levels that do not warrant further evaluation. Crude-oil-related VOC concentrations were either non-detect or below ESVs in all soil samples except for benzene in one sample. Only two samples had PAH summations above the associated soil ESV. The screening of metals results indicates the concentrations in soil were consistent with background conditions in the area and are not associated with crude oil. The following table summarizes the three soil locations along the drainage ways that warrant further evaluation.

Media	Location	Sample Depth	Analyte	Value
Soil	SO-DA-003	Surface (0 to 0.5 feet bgs)	Total HMW PAH	2,280 µg/kg
	SO-DA-005	Surface (0 to 0.5 feet bgs)	Total HMW PAH	1,640 µg/kg
	SO-DA-015	Surface (0 to 0.5 feet bgs)	Benzene	34 µg/kg

A total of 35 sediment samples were collected at 13 locations in the drainage ways. Crude-oil-related VOC concentrations were either non-detect or below ESVs in all sediment samples. Several sediment samples in the drainage ways and Dawson Cove had individual PAHs and/or PAH summations above ESVs. However, the TU for each of the surface samples, which accounts for the specific mixture and concentrations of PAHs, was 1.0 or less in all samples. One of the subsurface samples had a TU slightly above 1.0, but because it is unlikely that benthic receptors will be exposed to sediments deeper than 0.5 foot and value only slightly exceeded 1.0 using the one-carbon model, it was concluded that risks to benthic and aquatic receptors are not expected at this location. The metals screening indicated the concentrations in sediment were consistent with background conditions in the area and/or below ESVs.



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Based on these results, sediments in the drainage ways do not require further assessment or evaluation.

Dawson Cove Soil and Sediment Results

A total of 54 soil samples were collected at 15 locations in Dawson Cove. Based on the screening results, concentrations in 50 of the 54 samples were at levels that do not warrant further evaluation. Crude-oil-related VOC concentrations were either non-detect or below ESVs in all soil samples. A limited number of samples had detections above the associated soil ESV for Total HMW PAH (Long List). In addition, the metals screening indicated the concentrations in soil were consistent with background conditions in the area and/or below ESVs. The following table summarizes the three soil locations in Dawson Cove that warrant further evaluation based on the outcome of the screening process.

Media	Location	Sample Depth	Analyte	Value
Soil	SO-DA-019	Surface (0 to 0.5 feet bgs)	Total HMW PAH	1,180 µg/kg
		Subsurface (0.5 to 1.0 feet bgs)	Total HMW PAH	1,270 µg/kg
	SO-DA-022	Surface (0 to 0.5 feet bgs)	Total HMW PAH	1,760 µg/kg
	SO-DA-023	Surface (0 to 0.5 feet bgs)	Total HMW PAH	1,220 µg/kg

A total of 125 sediment samples were collected at 34 locations in Dawson Cove. Based on the screening results, concentrations in 118 of 125 samples were at levels that do not warrant further evaluation. Crude-oil-related VOC concentrations were either non-detect or below ESVs at all sediment sample locations, with the exception of five locations that had concentrations above the ESVs for total xylenes and isopropylbenzene (25.2 and 86 µg/kg, respectively). Fifty-three sediment samples in Dawson Cove had individual PAHs and/or PAH summations above ESVs; however, the TU for each of the surface samples was 1.0 or less. One of the subsurface samples had a TU slightly above 1.0, but because it is unlikely that benthic receptors will be exposed to sediments deeper than 0.5 foot and value only slightly exceeded 1.0 using the one-carbon model, it was concluded that risks to benthic and aquatic receptors are not expected at these locations. The metals screening indicated the concentrations in sediment were consistent with background conditions in the area and/or below ESVs. The following table summarizes the sediment locations in Dawson Cove that warrant further evaluation.

Media	Location	Sample Depth	Analyte	Value
Sediment	SED-DA-015	Surface (0 to 0.5 feet bgs)	Total xylenes	730 µg/kg

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Comments #2

Appendix I: Attachment I-3



Attachment I-3

Comparison of USEPA Region 4

Soil ESVs

Comparison of USEPA Region 4 Soil ESVs

1. Region 4 Soil Ecological Screening Values

This attachment provides a comparison of the Draft Region 4 Soil Screening Levels revised by U.S. Environmental Protection Agency (USEPA) in October 2011 (USEPA 2011) to the Region 4 Soil Screening Levels published in November 2001 (USEPA 2001). Although the Draft 2011 Ecological Screening Values (ESVs) have not been published by USEPA Region 4, USEPA Region 4 staff have been distributing them and requesting that they be used (see Attachment I-2). Further, the source documents for the ESVs are publicly available. The Draft USEPA 2011 ESVs represent a more current understanding of the science. The 2011 USEPA Region 4 ESVs default to USEPA Ecological Soil Screening Levels where available. Further, the 2011 ESVs contain updated ESVs for some organic compounds. The 2011 USEPA Region 4 ESV table provided to ARCADIS is provided in Attachment I-2, along with the associated correspondence (USEPA 2011). This attachment also compares the Draft revised 2011 USEPA Region 4 soil ESVs to the 2001 ESVs for constituents whose ESV was based on a Region 4 value in this report. Further, this attachment shows the comparison of detected levels of those constituents in the soil to the 2001 USEPA Region 4 soil ESVs.

2. Comparison of 2001 and 2011 Ecological Screening Values

The USEPA Region 4 ESVs are based on contaminant levels associated with a low probability of unacceptable risks to ecological receptors. As these numbers are based on conservative endpoints and sensitive ecological effects data, they represent a preliminary screening of site contaminant levels to determine if there is a need to conduct further investigations at the site (USEPA 2001). For the assessment of the data collected during as part of the Downstream Areas Remedial Sampling Plan (ARCADIS 2013), the ESVs for one metal (mercury) and some volatile organic compounds (VOCs) were identified from Region 4. There was no change in the Region 4 ESV (0.1 milligram per kilogram) for mercury. However, the 2001 ESVs for following VOCs were updated in 2011 (USEPA 2011):

Analyte	CAS Number	2001 Region 4 ESVs	Revised 2011 Region 4 ESVs	Units	Detected in Crude Oil?	Detected in Soil Samples?
Benzene	71-43-2	50	10	µg/kg	Yes	Yes
Ethylbenzene	100-41-4	50	30	µg/kg	Yes	No
Methylene Chloride	75-09-2	2000	400	µg/kg	No	No
Toluene	108-88-3	50	10	µg/kg	Yes	Yes
Trichloroethene	79-01-6	1	100	µg/kg	No	Yes
Xylene (Total)	1330-20-7	50	100	µg/kg	Yes	No

Note:

µg/kg = micrograms per kilogram

Comparison of USEPA Region 4 Soil ESVs

The above comparison indicates that the associated ESVs for benzene, ethylbenzene, methylene chloride, and toluene were lowered in 2011, and the associated ESVs for trichloroethene and total xylenes were raised in 2011.

3. Summary of Screening Assessment

As described in Section 2 above, the ESVs for seven VOCs were revised in 2011. Of these, only three VOCs (benzene, toluene, and trichloroethene) were detected in soil samples from the drainage ways and Dawson Cove. The screening of the detected VOCs in the soil samples against the 2001 USEPA Region 4 soil ESVs is included in the attached screening tables. The screening of the detected VOCs in the soil samples against the 2011 revised ESVs is included in Tables 6-2 and 6-3 of the report. The screening of detected VOCs in the soils against the 2001 ESVs indicates exceedances only for trichloroethene, which was above the ESV of 1 µg/kg. There were no other exceedances of the 2001 ESVs. The following table summarizes the screening of detected VOCs in soil samples to the 2001 and 2011 USEPA Region 4 soil ESVs.

Drainage Ways

Analyte	Frequency of Detection	Range of Detected Values (µg/kg)	2001 ESV Screening		2011 ESV Screening	
			2001 ESV (µg/kg)	Numbers Above ESV	2011 ESV (µg/kg)	Numbers Above ESV
Benzene	3/45 (7%)	0.6 - 34	50	0	10	1
Toluene	6/45 (13%)	1 - 5	50	0	10	0
Trichloroethene	21/45 (47%)	1 - 4	1	15	100	0

Dawson Cove

Analyte	Frequency of Detection	Range of Detected Values (µg/kg)	2001 ESV Screening		2011 ESV Screening	
			2001 ESV (µg/kg)	Numbers Above ESV	2011 ESV (µg/kg)	Numbers Above ESV
Toluene	0/54 (0%)	-	50	0	10	0
Trichloroethene	30/54 (56%)	1 - 5	1	22	100	0

This comparison of the screening results indicates that the more conservative approach is to screen the soil samples against the 2011 ESVs, which was done in the report. Although trichloroethene results exceed the 2001 soil ESV, this analyte is not a typical petroleum hydrocarbon constituent, and there was no need to



Comparison of USEPA Region 4 Soil ESVs

further evaluate this analyte. Therefore, using the revised 2011 USEPA Region 4 soil ESVs was a conservative screening evaluation of soils.

4. References

ARCADIS. 2013. Downstream Areas Remedial Sampling Plan. Mayflower Pipeline Incident, Mayflower, Arkansas. July.

USEPA. 2001. Region 4 Ecological Risk Assessment Bulletins - Supplement to RAGS. Available at:
<http://www.epa.gov/region4/superfund/programs/riskassess/ecolbul.html>

USEPA. 2011. USEPA Region 4 Soil Ecological Screening Values - Oct 2011 draft values, obtained by personal communication from Mr. Brett Thomas, USEPA Region 4 and Lance Fontenot, ARCADIS electronic mail dated July 2012.

Attachment I-3
Drainage Way Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

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Location Depths (ft) Sample Date Sample ID					SO-DA-001 0-0.5 ft 8/13/2013 SO-DA-001(0.0-0.5)	SO-DA-001 0.5-1 ft 8/13/2013 SO-DA-001(0.5-1.0)	SO-DA-001 1-1.5 ft 8/13/2013 SO-DA-001(1.0-1.5)	SO-DA-002 0-0.5 ft 8/13/2013 SO-DA-002(0.0-0.5)	SO-DA-002 0.5-1 ft 8/13/2013 SO-DA-002(0.5-1.0)	SO-DA-002 1-1.5 ft 8/13/2013 SO-DA-002(1.0-1.5)	SO-DA-003 0-0.5 ft 8/13/2013 SO-DA-003(0.0-0.5)	SO-DA-003 0-0.5 ft 8/13/2013 SO-DA-DUP-06-081313FD	SO-DA-003 0.5-1 ft 8/13/2013 SO-DA-003(0.5-1.0)	SO-DA-003 1-1.5 ft 8/13/2013 SO-DA-003(1.0-1.5)	SO-DA-004 0-0.5 ft 8/13/2013 SO-DA-004(0.0-0.5)	SO-DA-004 0.5-1 ft 8/13/2013 SO-DA-004(0.5-1.0)	SO-DA-004 1-1.5 ft 8/13/2013 SO-DA-004(1.0-1.5)
Analyte ¹	CAS Number	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³													
VOCs																	
Benzene	71-43-2	µg/kg	Yes	50	< 5 U	< 6 U	< 5 U	< 6 U	< 6 U	< 6 U	0.7 J	0.7 J	< 5 U	< 6 U	< 5 U	< 6 U	< 5 U
Toluene	108-88-3	µg/kg	Yes	50	2 J	2 J	< 5 U	< 6 U	< 6 U	< 6 U	1 J	1 J	< 5 U	< 6 U	< 5 U	< 6 U	< 5 U
Trichloroethene	79-01-6	µg/kg	No	1	3 J	4 J	3 J	2 J	3 J	< 6 U	2 J	3 J	1 J	2 J	3 J	< 6 U	< 5 U

Attachment I-3
Drainage Way Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

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Mayflower Pipeline Incident Response, Mayflower, Arkansas

Location Depths (ft) Sample Date Sample ID					SO-DA-005 0-0.5 ft 8/13/2013 SO-DA-005(0.0-0.5)	SO-DA-005 0.5-1 ft 8/13/2013 SO-DA-005(0.5-1.0)	SO-DA-005 1-1.5 ft 8/13/2013 SO-DA-005(1.0-1.5)	SO-DA-006 0-0.5 ft 8/13/2013 SO-DA-006(0.0-0.5)	SO-DA-006 0.5-1 ft 8/13/2013 SO-DA-006(0.5-1.0)	SO-DA-006 1-1.5 ft 8/13/2013 SO-DA-006(1.0-1.5)	SO-DA-007 0-0.5 ft 8/2/2013 SO-DA-007(0.0-0.5)	SO-DA-007 0.5-1 ft 8/2/2013 SO-DA-007(0.5-1.0)	SO-DA-007 1-1.5 ft 8/2/2013 SO-DA-007(1.0-1.5)	SO-DA-008 0-0.5 ft 8/2/2013 SO-DA-008(0.0-0.5)	SO-DA-008 0.5-1 ft 8/2/2013 SO-DA-008(0.5-1.0)	SO-DA-008 1-1.5 ft 8/2/2013 SO-DA-008(1.0-1.5)	SO-DA-009 0-0.5 ft 8/2/2013 SO-DA-009(0.0-0.5)
Analyte ¹	CAS Number	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³													
VOCs																	
Benzene	71-43-2	µg/kg	Yes	50	< 5 U	< 6 U	< 6 U	< 6 U	< 6 U	0.6 J	< 5 U	< 5 U	< 5 U	< 5 U	< 6 U	< 5 U	< 6 U
Toluene	108-88-3	µg/kg	Yes	50	< 5 U	< 6 U	< 6 U	< 6 U	< 6 U	< 6 U	< 5 U	< 5 U	< 5 U	< 5 U	< 6 U	< 5 U	< 6 U
Trichloroethene	79-01-6	µg/kg	No	1	< 5 U	3 J	3 J	4 J	3 J	3 J	< 5 U	< 5 U	< 5 U	< 5 U	1 J	< 5 U	< 6 U

Attachment I-3
Drainage Way Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

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Location Depths (ft) Sample Date Sample ID					SO-DA-009 0.5-1 ft 8/2/2013 SO-DA-009(0.5-1.0)	SO-DA-009 1-1.5 ft 8/2/2013 SO-DA-009(1.0-1.5)	SO-DA-010 0-0.5 ft 8/2/2013 SO-DA-010(0.0-0.5)	SO-DA-010 0-0.5 ft 8/2/2013 SO-DA-DUP-02-080213FD	SO-DA-010 0.5-1 ft 8/2/2013 SO-DA-010(0.5-1.0)	SO-DA-010 1-1.5 ft 8/2/2013 SO-DA-010(1.0-1.5)	SO-DA-011 0-0.5 ft 8/2/2013 SO-DA-011(0.0-0.5)	SO-DA-011 0.5-1 ft 8/2/2013 SO-DA-011(0.5-1.0)	SO-DA-011 1-1.5 ft 8/2/2013 SO-DA-011(1.0-1.5)	SO-DA-012 0-0.5 ft 8/1/2013 SO-DA-012(0.0-0.5)	SO-DA-012 0.5-1 ft 8/1/2013 SO-DA-012(0.5-1.0)	SO-DA-012 1-1.5 ft 8/1/2013 SO-DA-012(1.0-1.5)	SO-DA-013 0-0.5 ft 8/1/2013 SO-DA-013(0.0-0.5)
Analyte ¹	CAS Number	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³													
VOCs																	
Benzene	71-43-2	µg/kg	Yes	50	< 5 U	< 6 U	< 6 U	< 8 U	< 5 U	< 6 U	< 6 U	< 6 U	< 5 U	< 5 U	< 6 U	< 5 U	< 5 U
Toluene	108-88-3	µg/kg	Yes	50	< 5 U	< 6 U	1 J	2 J	< 5 U	< 6 U	2 J	< 5 U	< 5 U	< 6 U	< 5 U	< 5 U	< 5 U
Trichloroethene	79-01-6	µg/kg	No	1	< 5 U	2 J	< 6 U	< 8 U	< 5 U	< 6 U	< 6 U	< 5 U	< 5 U	< 6 U	< 5 U	< 5 U	1 J

Attachment I-3
Drainage Way Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

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Location Depths (ft) Sample Date Sample ID					SO-DA-013 0.5-1 ft 8/1/2013 SO-DA-013(0.5-1.0)	SO-DA-013 1-1.5 ft 8/1/2013 SO-DA-013(1.0-1.5)	SO-DA-014 0-0.5 ft 8/1/2013 SO-DA-014(0.0-0.5)	SO-DA-014 0-0.5 ft 8/1/2013 SO-DA-DUP-01-080113FD	SO-DA-014 0.5-1 ft 8/1/2013 SO-DA-014(0.5-1.0)	SO-DA-014 1-1.5 ft 8/1/2013 SO-DA-014(1.0-1.5)	SO-DA-015 0-0.5 ft 8/1/2013 SO-DA-015(0.0-0.5)	SO-DA-015 0.5-1 ft 8/1/2013 SO-DA-015(0.5-1.0)	SO-DA-015 1-1.5 ft 8/1/2013 SO-DA-015(1.0-1.5)
Analyte ¹	CAS Number	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³									
VOCs													
Benzene	71-43-2	µg/kg	Yes	50	< 5 U	< 5 U	< 6 U	< 6 U	< 5 U	< 4 U	34 J	< 6 U	< 6 U
Toluene	108-88-3	µg/kg	Yes	50	< 5 U	< 5 U	< 6 U	< 6 U	< 5 U	< 4 U	< 310 U	5 J	< 6 U
Trichloroethene	79-01-6	µg/kg	No	1	1 J	1 J	< 6 U	2 J	1 J	2 J	< 310 U	< 6 U	< 6 U

Attachment I-3
Drainage Way Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

Downstream Areas Data Assessment Report
ExxonMobil Environmental Services Company
Mayflower Pipeline Incident Response, Mayflower, Arkansas

Notes:

1. For analytes that were detected in soil samples collected under the Downstream Areas Remedial Sampling Plan (ARCADIS 2013), but were not detected in crude oil samples, the data and associated ESVs are presented, if available, for completeness; however, the analytes were not evaluated further. In addition, only the PAHs associated with the risk screening (as discussed in Section 5) are presented in this table. Complete analytical data are included in Appendix F.
2. As discussed in Section 5 of the report, analytes are screened further if the analyte is associated with the crude oil at concentrations that could have resulted in the observed concentrations in soil. The following screening is utilized:
- Bold** = Analyte above the soil ESV but not highlighted since the analyte was not detected in the crude oi
- Highlight** = Analyte above the soil ESV
3. USEPA Region 4 Soil ESVs published in November 2001. Available at: <http://www.epa.gov/region4/superfund/programs/riskassess/ecolbul.html>

Acronyms and Abbreviations:

-- = not available or not applicable
ESV = ecological screening value
ft = foot/feet
µg/kg = micrograms per kilogram
USEPA = U.S. Environmental Protection Agency
VOC = volatile organic compound

Laboratory Data Qualifiers:

< = less than the reporting limit
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
U = Compound was not detected.

Reference:

ARCADIS. 2013. Downstream Areas Remedial Sampling Plan. Mayflower Pipeline Incident, Mayflower, Arkansas. July

Attachment I-3
Dawson Cove Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

Downstream Areas Data Assessment Report
ExxonMobil Environmental Services Company
Mayflower Pipeline Incident Response, Mayflower, Arkansas

Location Depths (ft) Sample Date Sample ID				SO-DA-016 0-0.5 ft 8/6/2013 SO-DA-016(0.0-0.5)	SO-DA-016 0.5-1 ft 8/6/2013 SO-DA-016(0.5-1.0)	SO-DA-016 1-1.5 ft 8/6/2013 SO-DA-016(1.0-1.5)	SO-DA-017 0-0.5 ft 8/6/2013 SO-DA-017(0.0-0.5)	SO-DA-017 0.5-1 ft 8/6/2013 SO-DA-017(0.5-1.0)	SO-DA-017 1-1.5 ft 8/6/2013 SO-DA-017(1.0-1.5)	SO-DA-018 0-0.5 ft 8/6/2013 SO-DA-018(0.0-0.5)	SO-DA-018 0-0.5 ft 8/6/2013 SO-DA-DUP-03-080613FD	SO-DA-018 0.5-1 ft 8/6/2013 SO-DA-018(0.5-1.0)	SO-DA-018 1-1.5 ft 8/6/2013 SO-DA-018(1.0-1.5)	SO-DA-019 0-0.5 ft 8/8/2013 SO-DA-019(0.0-0.5)	SO-DA-019 0.5-1 ft 8/8/2013 SO-DA-019(0.5-1.0)
Chemical	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³												
VOCs															
Toluene	µg/kg	Yes	50	< 7 U	< 5 U	< 5 U	< 7 U	< 5 U	< 5 U	< 6 U	< 6 U	< 5 U	< 5 U	< 6 U	< 6 U
Trichloroethene	µg/kg	No	1	< 7 U	< 5 U	< 5 U	< 7 U	< 5 U	< 5 U	< 6 U	< 6 U	< 5 U	1 J	< 6 U	< 6 U

Attachment I-3
Dawson Cove Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

Downstream Areas Data Assessment Report
ExxonMobil Environmental Services Company
Mayflower Pipeline Incident Response, Mayflower, Arkansas

Location Depths (ft) Sample Date Sample ID				SO-DA-019 1-1.5 ft 8/8/2013 SO-DA-019(1.0-1.5)	SO-DA-019 1.5-2 ft 8/8/2013 SO-DA-019(1.5-2.0)	SO-DA-019 2-3 ft 8/8/2013 SO-DA-019(2.0-3.0)	SO-DA-019 3-4 ft 8/8/2013 SO-DA-019(3.0-4.0)	SO-DA-020 0-0.5 ft 8/7/2013 SO-DA-020(0.0-0.5)	SO-DA-020 0.5-1 ft 8/7/2013 SO-DA-020(0.5-1.0)	SO-DA-020 1-1.5 ft 8/7/2013 SO-DA-020(1.0-1.5)	SO-DA-021 0-0.5 ft 8/8/2013 SO-DA-021(0.0-0.5)	SO-DA-021 0.5-1 ft 8/8/2013 SO-DA-021(0.5-1.0)	SO-DA-021 1-1.5 ft 8/8/2013 SO-DA-021(1.0-1.5)	SO-DA-021 1.5-2 ft 8/8/2013 SO-DA-021(1.5-2.0)	SO-DA-021 2-3 ft 8/8/2013 SO-DA-021(2.0-3.0)
Chemical	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³												
VOCs															
Toluene	µg/kg	Yes	50	< 5 U	< 6 U	< 6 U	< 9 U	< 6 U	< 6 U	< 6 U	< 6 U	< 6 U	< 6 U	< 5 U	< 5 U
Trichloroethene	µg/kg	No	1	< 5 U	1 J	1 J	< 9 U	1 J	1 J	1 J	< 6 U	< 6 U	2 J	2 J	2 J

Attachment I-3
Dawson Cove Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

Downstream Areas Data Assessment Report
ExxonMobil Environmental Services Company
Mayflower Pipeline Incident Response, Mayflower, Arkansas

Location Depths (ft) Sample Date Sample ID				SO-DA-021 3-4 ft 8/8/2013 SO-DA-021(3.0-4.0)	SO-DA-022 0-0.5 ft 8/7/2013 SO-DA-022(0.0-0.5)	SO-DA-022 0-0.5 ft 8/7/2013 SO-DA-DUP-04-080713FD	SO-DA-022 0.5-1 ft 8/7/2013 SO-DA-022(0.5-1.0)	SO-DA-022 1-1.5 ft 8/7/2013 SO-DA-022(1.0-1.5)	SO-DA-023 0-0.5 ft 8/8/2013 SO-DA-023(0.0-0.5)	SO-DA-023 0-0.5 ft 8/8/2013 SO-DA-DUP-05-080813FD	SO-DA-023 0.5-1 ft 8/8/2013 SO-DA-023(0.5-1.0)	SO-DA-023 1-1.5 ft 8/8/2013 SO-DA-023(1.0-1.5)	SO-DA-023 1.5-2 ft 8/8/2013 SO-DA-023(1.5-2.0)	SO-DA-023 2-3 ft 8/8/2013 SO-DA-023(2.0-3.0)	SO-DA-023 3-4 ft 8/8/2013 SO-DA-023(3.0-4.0)
Chemical	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³												
VOCs															
Toluene	µg/kg	Yes	50	< 6 U	< 7 U	2 J	< 6 U	< 7 U	< 7 U	< 6 U	< 5 U	< 5 U	< 6 U	< 5 U	< 6 U
Trichloroethene	µg/kg	No	1	2 J	2 J	< 6 U	2 J	3 J	5 J	3 J	2 J	2 J	3 J	2 J	4 J

Attachment I-3
Dawson Cove Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

Downstream Areas Data Assessment Report
ExxonMobil Environmental Services Company
Mayflower Pipeline Incident Response, Mayflower, Arkansas

Location Depths (ft) Sample Date Sample ID				SO-DA-024 0-0.5 ft 8/8/2013 SO-DA-024(0.0-0.5)	SO-DA-024 0.5-1 ft 8/8/2013 SO-DA-024(0.5-1.0)	SO-DA-024 1-1.5 ft 8/8/2013 SO-DA-024(1.0-1.5)	SO-DA-025 0-0.5 ft 8/7/2013 SO-DA-025(0.0-0.5)	SO-DA-025 0.5-1 ft 8/7/2013 SO-DA-025(0.5-1.0)	SO-DA-025 1-1.5 ft 8/7/2013 SO-DA-025(1.0-1.5)	SO-DA-026 0-0.5 ft 8/11/2013 SO-DA-026-(0.0-0.5)	SO-DA-026 0.5-1 ft 8/11/2013 SO-DA-026-(0.5-1.0)	SO-DA-026 1-1.5 ft 8/11/2013 SO-DA-026-(1.0-1.5)	SO-DA-027 0-0.5 ft 8/8/2013 SO-DA-027(0.0-0.5)	SO-DA-027 0.5-1 ft 8/8/2013 SO-DA-027(0.5-1.0)	SO-DA-027 1-1.5 ft 8/8/2013 SO-DA-027(1.0-1.5)
Chemical	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³												
VOCs															
Toluene	µg/kg	Yes	50	< 5 U	< 5 U	< 6 U	< 8 U	< 5 U	< 5 U	< 6 U	< 6 U	< 7 U	< 6 U	< 5 U	< 6 U
Trichloroethene	µg/kg	No	1	5 J	3 J	2 J	< 8 U	1 J	< 5 U	4 J	1 J	2 J	2 J	2 J	3 J

Attachment I-3
Dawson Cove Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

Downstream Areas Data Assessment Report
ExxonMobil Environmental Services Company
Mayflower Pipeline Incident Response, Mayflower, Arkansas

Location Depths (ft) Sample Date Sample ID				SO-DA-028 0-0.5 ft 8/11/2013 SO-DA-028-(0.0-0.5)	SO-DA-028 0.5-1 ft 8/11/2013 SO-DA-028-(0.5-1.0)	SO-DA-028 1-1.5 ft 8/11/2013 SO-DA-028-(1.0-1.5)	SO-DA-029 0-0.5 ft 8/11/2013 SO-DA-029-(0.0-0.5)	SO-DA-029 0.5-1 ft 8/11/2013 SO-DA-029-(0.5-1.0)	SO-DA-029 1-1.5 ft 8/11/2013 SO-DA-029-(1.0-1.5)	SO-DA-032 0-0.5 ft 8/7/2013 SO-DA-032(0.0-0.5)	SO-DA-032 0.5-1 ft 8/7/2013 SO-DA-032(0.5-1.0)	SO-DA-032 1-1.5 ft 8/7/2013 SO-DA-032(1.0-1.5)
Chemical	Units	Is Analyte Screened Further? ²	2001 USEPA Region 4 Soil ESV ³									
VOCs												
Toluene	µg/kg	Yes	50	< 9 U	< 5 U	< 5 U	< 7 U	< 6 U	< 5 U	< 8 U	< 5 U	< 7 U
Trichloroethene	µg/kg	No	1	< 9 U	< 5 U	2 J	< 7 U	< 6 U	< 5 U	< 8 U	< 5 U	< 7 U

Attachment I-3
Dawson Cove Soil Sampling Results Screened against 2001 USEPA Region 4 Soil ESVs

Downstream Areas Data Assessment Report
ExxonMobil Environmental Services Company
Mayflower Pipeline Incident Response, Mayflower, Arkansas

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VOC = volatile organic compound

Laboratory Data Qualifiers:

< = less than the reporting limit
J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
U = Compound was not detected.

Reference:

ARCADIS. 2013. Downstream Areas Remedial Sampling Plan. Mayflower Pipeline Incident, Mayflower, Arkansas. July