Table 1. Laboratory Key Elements for Sulfolane Analysis in Water

Key Element	Method Criteria
Reference Method	SOP shall include references for method basis.
Internal Standard (sulfolane-d8)	Quantitation of sulfolane based on isotope dilution method using sulfolane-d8. Sulfolane-d8 added pre-extraction. Final extract concentration near the mid-point calibration concentration. Use m/z 128 for quantifying and m/z 46, 62, and 64 as qualifier ions. See ion ratio criteria below. In the case of dilution that results in a sulfolane-d8 that is less than 10x noise, then re-extract sample using a lesser volume. In these cases, holding time considerations are waived.
Recovery Criteria for Internal Standard	Absolute recovery (quantitation based on recovery standard) 40 – 100%.
Recovery Standard	Naphthalene-d8 added post-extraction.
Recovery Criteria for Recovery Standard	Area count -40 to +100% relative to the continuing calibration verification.
Extraction Sample Amounts	Extraction volume sufficient to meet detection criteria, generally, 100 mL to 1 L should be sufficient. Extraction volume and the final extract volume must be specified in SOP.
Extraction Method	At discretion of labs sufficient to meet data quality objectives.
GC/MSD Method	Full Scan Mode, recommended mass range m/z 40 to 250 or higher. Scan rate greater than 10 scans across peak (at 10% peak height). Daily tune MS consistent with laboratory quality assurance project plan (QAPP).
GC/MSD Calibration	Low calibration point needs to be able to quantitate 5 parts per billion (ppb) at a minimum in water. At least two calibration points need to be set below the groundwater action level, currently set at 16 ppb. The concentration of the internal standard, sulfolane-d8, should be the same in all calibration standards and sample extract.
Quant/Qual Ions for Sulfolane	Quantification ion on m/z 120; Qualifier ions (QI) at m/z 41, 55 and 56. All four ions should be used and QI ratios defined.

Key Element	Method Criteria
Ion Ratios (sulfolane and sulfolane-d8)	Relative intensities of the qualifier ions need to be within 30% of the daily reference standard for two of three QI. If do not meet ratio criteria in at least two QI, attempt to resolve the matrix interference. If matrix interference cannot be resolved, QI failure must be reported to DEC Project Managers within 1 week of failure. Ion ratios must be displayed in the raw data. If <25% resolution relative to the sulfolane-d8 peak cannot be obtained attempt the following: 1. Optimize chromatographic conditions in an attempt to enhance resolution, and 2. Attempt additional cleanup techniques to remove the apparent interferences. If items 1 or 2 fail to achieve less than 25% resolution then for the primary quantitation ion (m/z 128) between sulfolane-d8 and an adjacent peak (naphthalene or other non-target analyte), the quantitation ion for sulfolane-d8 in the impacted sample should be switched to m/z 46 as long as baseline resolution is obtained for m/z 46. In these cases, quantitation using m/z 46 for sulfolane-d8 should be used for both sulfolane (as the internal standard) and sulfolane-d8 in the impacted sample as well as all associated calibration standards, calibration check standards, and quality control samples (laboratory control samples, method blanks, matrix spikes, laboratory duplicates, instrument blanks, etc.). As a result, some initial calibration standards, calibration check standards and quality control samples may need to be quantified and reported using both m/z 46 and m/z 128 for quantitation. Also, in these cases, the laboratory is not required to inform DEC of the presence of interference. Separation of sulfolane-d8 from the interferent should be defined, documented, and submitted as part of the final laboratory report, through chromatographs and ion ratio criteria.
Detection Limit (DL)	DL not to exceed 5 ppb in water. LOQ (limit of quantitation) not to exceed 10 ppb in water. Report J-values between DL and LOQ. Detection Limit studies are

Key Element	Method Criteria
	performed for new instruments or if major maintenance has been performed. The Limit of Detection (LOD) is verified with quarterly LOD Studies. Annual DL and quarterly verification at 1 to 2 times the DL with 70 – 130% recovery is recommended, subject to revision. Annual DL must be immediately followed with verification.
Tailing criteria and integration	Sulfolane and sulfolane-d8 peak tailing not to exceed a factor of two calculated on the unmodified software integrated peak (consistent with tailing factor equation from SW-846 Method 8270D). Manual integration only performed if necessary. Submit before and after extracted ion current profile (EICP) documentation with the report.
Minimum Separation Criteria	For standards and as part of each initial calibration, a demonstration of at least 10 ng of naphthalene and 25 ng sulfolane-d8 when monitoring all target mass ions for sulfolane-d8. Full baseline chromatographic resolution must be achieved.
Data flagging	Data flagged based on laboratory standard practices. All flags used should be defined.
Sample Collection, Handling, and Preservation	Pre-cleaned appropriate sized amber bottle. Placed on ice and kept above freezing but below 6°C. Samples must be extracted within 7 days and the extract must be analyzed within 40 days of extraction.
Demonstration Criteria	For initial demonstration of performance, analyze a minimum of five extracted LCS QC samples at 15 ppb, each showing recoveries of ± 20% and RSD ≤ 30%.

Table 2. Quality Control Requirements

Description	Frequency	Criteria	Corrective Action
Initial Calibration	As needed	For regression: $r^2 \geq 0.99$ or $r \geq 0.995$; For average RRF: RSD $\leq 15\%$	Repeat initial calibration.
Initial Calibration Verification (ICV)	Immediately following Initial Calibration	Second source, %Drift $\leq$ 20%	Investigate, reanalyze, recalibrate.
Continuous Calibration Verification (CCV)	After MS tuning and before sample analysis, every 20 injections thereafter, and at end of analytical sequence, or within a 12 hour tuning period, whichever is shorter. CCV concentration equivalent to 25 ppb in a sample.	%Drift $\leq$ 20%	Reanalyze CCV. If second re-analysis fails then perform initial calibration. Samples that were not bracketed by acceptable CCV must be reanalyzed.
Method Blank (MB)	Every preparation batch/event, or 20 samples, whichever is less	< DL	Re-analyze MB. If MB > DL or LOQ but ND (<DL) in samples then no action needed. If MB > DL then re-extract and re-analyze batch. Flag data with "B" qualifier, if insufficient sample for extraction.
Laboratory Control Sample (LCS)	Every preparation batch/event, or 20 samples, whichever is less. LCS concentration equivalent to 15 ppb in a sample. Spiking standard is prepared in water or a water-miscible solvent.	70 – 120%	Re-analyze LCS. If %R > acceptance criteria but ND (<DL) in samples no action needed. Otherwise re-extract and re-analyze batch.
Matrix Spike/Matrix Spike	An MS/MSD pair every	RPD for DUP and MS/MSD $\leq$	Qualify data and narrative any

Description	Frequency	Criteria	Corrective Action
Duplicate (MS/MSD) and Laboratory Duplicate Sample (DUP)	preparation batch with 10 or more samples, up to 20. If preparation batch is less than 10 samples, analyze laboratory sample duplicate. Spiking standard is prepared in water or a water-miscible solvent.	25%; MS/MSD Recovery 60 – 140%	obvious matrix effects.
Internal Standard (sulfolane-d8) Recovery	Each sample and QC. Spiking standard is prepared in water or a water-miscible solvent.	40-100%	Re-extract and flag if second re-extraction/re-analysis fails criteria.
Recovery Standard (naphthalene-d8)	Each sample and QC	Area Count -50 – +100% relative to the continuing calibration verification	Re-analyze and flag if second analysis fails criteria.

Table 1. Laboratory Key Elements for Sulfolane Analysis in Soil

Key Element	Decision
Reference Method	8270D Analytical with SW846 Preparation 3540C or 3550C, preference is 3540. SOP shall include references for method basis.
Extraction Solvent	MeCl2. If the presence of significant petroleum hydrocarbons has been noted on the Chain-of-Custody Record based on field PID readings or observation, the sample should first be extracted with water followed by solid-phase extraction cleanup prior to MeCl2 extraction. The presence of significant petroleum hydrocarbons may preclude the proper identification of sulfolane as defined below. (Note that SOPs for alternative extraction and cleanup procedures must be submitted to and approved by DEC prior to receiving samples. All key elements should also be met by the alternative extraction and cleanup procedures.)
Internal Standard (sulfolane-d8)	Quantitation of sulfolane based on isotope dilution method using sulfolane-d8. Sulfolane-d8 added pre-extraction. Final extract concentration near the mid-point calibration concentration. Use m/z 128 for quantifying and m/z 46, 62, and 64 as qualifier ions. See ion ratio criteria below. Laboratory shall notify project manager to discuss extracting or analyzing a sample outside holding time criteria. Samples should not be extracted or analyzed outside holding time criteria without preapproval from the project manager. Consider using the Solid Phase Extraction Cleanup procedure if sample contains fuel interference.
Recovery Criteria for Internal Standard	Absolute recovery (quantitation based on recovery standard) 50 – 120%.
Recovery Standard	Naphthalene-d8 added post-extraction.
Recovery Criteria for Recovery Standard	Area count -50 to +100% relative to the continuing calibration verification.

Key Element	Decision
Extraction Sample Amounts	Extraction mass sufficient to meet detection criteria, generally, 10 to 30 g should be sufficient. Extraction mass and the final extract volume must be specified in SOP. Percent solids determined and results reported on a dry-weight basis.
Extraction Method	Sonication or soxhlet, with preference to soxhlet.
GC/MSD Method	Daily tune MS consistent with laboratory quality assurance project plan (QAPP). Dwell Time per ion: 25 to 100 μS.
GC/MSD Calibration	Low calibration point needs to be able to quantitate 10 parts per billion (ppb) at a minimum in soils. At least two calibration points need to be set below the general migration to groundwater action level of 43 ppb. The concentration of the internal standard, sulfolane-d8, should be the same in all calibration standards and sample extract.
Quant/Qual Ions for Sulfolane	Quantification ion on m/z 120; Qualifier ions (QI) at m/z 41, 55 and 56. All four ions should be used and QI ratios defined.
Ion Ratios (sulfolane and sulfolane-d8)	Relative intensities of the qualifier ions need to be within 30% of the daily reference standard for two of three QI. If they do not meet ratio criteria in at least two QI, attempt to resolve the matrix interference. If matrix interference cannot be resolved, QI failure must be reported to DEC Project Managers within 1 week of failure. Ion ratios must be displayed in the raw data. If <25% resolution relative to the sulfolane-d8 peak cannot be obtained attempt the following: 1. Optimize chromatographic conditions in an attempt to enhance resolution, or 2. Attempt additional cleanup techniques to remove the

Key Element	Decision
	apparent interferences. If items 1 or 2 fail to achieve less than 25% resolution then for the primary quantitation ion (m/z 128) between sulfolane-d8 and an adjacent peak (naphthalene or other non-target analyte), the quantitation ion for sulfolane-d8 in the impacted sample should be switched to m/z 46 as long as baseline resolution is obtained for m/z 46. In these cases, quantitation using m/z 46 for sulfolane-d8 should be used for both sulfolane (as the internal standard) and sulfolane-d8 in the impacted sample as well as all associated calibration standards, calibration check standards, and quality control samples (laboratory control samples, method blanks, matrix spikes, laboratory duplicates, instrument blanks, etc.). As a result, some initial calibration standards, calibration check standards and quality control samples may need to be quantified and reported using both m/z 46 and m/z 128 for quantitation. Also, in these cases, the laboratory is not required to inform DEC of the presence of interference. Separation of sulfolane-d8 from the interferent should be defined, documented, and submitted as part of the final laboratory report, through chromatographs and ion ratio criteria.
Qualitative Identification	If significant non-target analytes precludes the proper identification of sulfolane as defined above, DEC should be notified within two business days of discovery for discussion with DEC regarding the applicability of alternate extraction procedures, such as water extraction followed by solid-phase extraction cleanup (note SOPs for alternative extraction and cleanup procedures must be submitted to and approved by DEC prior to receiving samples). If hydrocarbon interference is identified by the laboratory, the

Key Element	Decision
	laboratory should proceed with water extraction followed by solid-phase extraction cleanup and the interference should be identified the laboratory narrative.
Detection Limit (DL)	DL not to exceed 5 ppb in soil. LOQ (limit of quantitation) not to exceed 10 ppb in soil. Report J-values between DL and LOQ. Detection Limit studies are performed for new instruments or if major maintenance has been performed. The Limit of Detection (LOD) is verified with quarterly LOD Studies. Annual DL and quarterly verification at 1 to 2 times the DL with 70 – 130% recovery is recommended, subject to revision. Annual DL must be immediately followed with verification.
Tailing criteria and integration	Sulfolane and sulfolane-d8 peak tailing not to exceed a factor of two calculated on the unmodified software integrated peak (consistent with tailing factor equation from SW-846 Method 8270D). Manual integration only performed if necessary. Submit before and after extracted ion current profile (EICP) documentation with the report.
Minimum Separation Criteria	For standards and as part of each initial calibration, a demonstration of at least 10 ng of naphthalene and 25 ng sulfolane-d8 when monitoring all target mass ions for sulfolane-d8. Full baseline chromatographic resolution must be achieved.
Data flagging	Data flagged based on laboratory standard practices. All flags used should be defined.
Sample Collection, Handling, and Preservation	8 oz. glass jar or equivalent with Teflon-lined lid. Placed on ice and kept above freezing but below 6°C. Samples must be extracted within 14 days and the extract must be analyzed within 40 days of extraction. Storage of soil samples at less than -10°C should be considered on a project specific basis.
Demonstration Criteria	For initial demonstration of performance, analyze a minimum of

Key Element	Decision
	five extracted LCS QC samples at 50 ppb, each showing recoveries of ± 20% and RSD ≤ 30%. Provide Level IV data package.

Table 2. Quality Control Requirements for Soil

Description	Frequency	Criteria	Corrective Action
Initial Calibration	As needed	For regression: $r^2 \geq 0.99$ or $r \geq 0.995$; For average RRF: RSD $\leq 15\%$	Repeat initial calibration.
Initial Calibration Verification (ICV)	Immediately following Initial Calibration	Second source, %Drift $\leq$ 20%	Investigate, reanalyze, recalibrate.
Continuous Calibration Verification (CCV)	After MS tuning and before sample analysis, every 20 injections thereafter, and at end of analytical sequence, or within a 12 hour tuning period, whichever is shorter. CCV concentration at action level, equivalent to 50 ppb in a sample.	%Drift $\leq$ 20%	Reanalyze CCV. If second re-analysis fails then perform initial calibration. Samples that were not bracketed by acceptable CCV must be reanalyzed.
Method Blank (MB)	Every preparation batch/event, or 20 samples, whichever is less	< DL	Re-analyze MB. If MB > DL or LOQ but ND (<DL) in samples then no action needed. If MB > DL then re-extract and re-analyze batch. Flag data with "B" qualifier, if insufficient sample for extraction.
Laboratory Control Sample (LCS)	Every preparation batch/event, or 20 samples, whichever is less. LCS concentration equivalent to 50 ppb in a sample, near action level. Spiking standard is prepared in water or a	70 – 120%	Re-analyze LCS. If %R > acceptance criteria but ND (<DL) in samples no action needed. Otherwise re-extract and re-analyze batch.

Description	Frequency	Criteria	Corrective Action
	water-miscible solvent.		
Matrix Spike/Matrix Spike Duplicate (MS/MSD) and Laboratory Duplicate Sample (DUP)	An MS/MSD pair every preparation batch with 10 or more samples, up to 20. If preparation batch is less than 10 samples, analyze laboratory sample duplicate. Spiking standard is prepared in water or a water-miscible solvent.	RPD for DUP and MS/MSD $\leq$ 25%; MS/MSD Recovery 60 – 140%	Qualify data and narrative any obvious matrix effects.
Internal Standard (sulfolane-d8) Recovery	Each sample and QC. Spiking standard is prepared in water or a water-miscible solvent.	50-120%	Re-extract and flag if second re-extraction/re-analysis fails criteria.
Recovery Standard (naphthalene-d8)	Each sample and QC	Area Count -50 – +100% relative to the continuing calibration verification	Re-analyze and flag if second analysis fails criteria.

Table 1. Laboratory Key Elements for Sulfolane Analysis in Plant Material

Key Element	Decision
Reference Method	SW846 8270D Analytical. Extraction procedure references include Headley et al. (2002) and Doucette et al. (2005). SOP shall include references for method basis. References: Doucette, W.J., J.K. Chard, B.J. Moore, W.J. Staudt, and J.V. Headley. 2005. Uptake of sulfolane and diisopropanolamine (DIPA) by cattails (Typha latifolia). *Microchemical Journal*. Volume 81, pp. 41– 49. Headley, John V, Leslie C. Dickson, and Kerry M. Peru. 2002. Comparison of Levels of Sulfolane and Diisopropanolamine in Natural Wetland Vegetation Exposed to Gas-Condensate Contaminated Groundwater. *Communications in Soil Science and Plant Analysis*. Vol. 33, Nos. 15–18, pp. 3531–3544.
Extraction	Extraction procedure to include the following: • Process plant material as a whole sample and grind/cut-up to minimize the sample size (<1/2" pieces in size) and to assist in the pulverization process. • Liquid nitrogen should be added to the pieces to freeze the vegetables until the vegetables are solidified. • Once frozen, sample should be pulverized using a blender (consistency of the vegetable should resemble a powder). • 20 grams of the pulverized, frozen vegetable should be weighed and placed into a 250 mL jar. • The sample should be allowed to thaw. • Add internal standard (sulfolane-d8) after weighing 20 g aliquot of pulverized material.

Key Element	Decision
	• Add 200 mL of DI water to the 20 gram sample and place sample on a mechanical shaker for 30 minutes • Vacuum filter sample through a Buchner funnel using a Whatman No 41 filter paper (or equivalent) into a 500 mL filtration flask. • The water portion of the sample should then extracted with methylene chloride, in accordance with the Department approved analysis of sulfolane in water SOP. Previous analyses with separatory funnel backwash have shown emulsions occurring for most vegetable matrices, requiring separation by mechanical means (e.g. centrifugation). How emulsions will be handled should be addressed in the SOP.
Internal Standard (sulfolane-d8)	Internal standard in water or water-miscible solvent. Quantitation of sulfolane based on isotope dilution method using sulfolane-d8. Sulfolane-d8 added pre-extraction. Final extract concentration near the mid-point calibration concentration. Use m/z 128 for quantifying and m/z 46, 62, and 64 as qualifier ions. See ion ratio criteria below. In the case of dilution that results in a sulfolane-d8 that is less than 10x noise, then re-extract sample using a lesser mass. Laboratory shall notify project manager to discuss extracting or analyzing a sample outside holding time criteria. Samples should not be extracted or analyzed outside holding time criteria without preapproval from the project manager. In these cases, holding time considerations are waived.
Recovery Criteria for Internal Standard	Absolute recovery (quantitation based on recovery standard) 50 – 120%.
Recovery Standard	Naphthalene-d8 added post-extraction.
Recovery Criteria for Recovery Standard	Area count -50 to +100% relative to the continuing calibration verification.

Key Element	Decision
Extraction Sample Amounts	Extraction mass sufficient to meet detection criteria, generally, 10 to 30 g should be sufficient. Extraction mass and the final extract volume must be specified in SOP.
GC/MSD Method	Daily tune MS consistent with laboratory quality assurance project plan (QAPP). Dwell Time per ion: 25 to 100 μS.
GC/MSD Calibration	Low calibration point needs to be able to quantitate 10 parts per billion (ppb) at a minimum in plant material. At least two calibration points need to be set below the screening level of 25 ppb. The concentration of the internal standard, sulfolane-d8, should be the same in all calibration standards and sample extract.
Quant/Qual Ions for Sulfolane	Quantification ion on m/z 120; Qualifier ions (QI) at m/z 41, 55 and 56. All four ions should be used and QI ratios defined.
Ion Ratios (sulfolane and sulfolane-d8)	Relative intensities of the qualifier ions need to be within 30% of the daily reference standard for two of three QI. If they do not meet ratio criteria in at least two QI, attempt to resolve the matrix interference. If matrix interference cannot be resolved, QI failure must be reported to DEC Project Managers within 1 week of failure. Ion ratios must be displayed in the raw data. If <25% resolution relative to the sulfolane-d8 peak cannot be obtained attempt the following: 1. Optimize chromatographic conditions in an attempt to enhance resolution, or 2. Attempt additional cleanup techniques to remove the apparent interferences. If items 1 or 2 fail to achieve less than 25% resolution then for the primary quantitation ion (m/z 128) between sulfolane-d8 and an adjacent peak (non-target analytes), the quantitation ion for

Key Element	Decision
	sulfolane-d8 in the impacted sample should be switched to m/z 46 as long as baseline resolution is obtained for m/z 46. In these cases, quantitation using m/z 46 for sulfolane-d8 should be used for both sulfolane (as the internal standard) and sulfolane-d8 in the impacted sample as well as all associated calibration standards, calibration check standards, and quality control samples (laboratory control samples, method blanks, matrix spikes, laboratory duplicates, instrument blanks, etc.). As a result, some initial calibration standards, calibration check standards and quality control samples may need to be quantified and reported using both m/z 46 and m/z 128 for quantitation. Also, in these cases, the laboratory is not required to inform DEC of the presence of interference. Separation of sulfolane-d8 from the interferent should be defined, documented, and submitted as part of the final laboratory report, through chromatographs and ion ratio criteria.
Detection Limit (DL)	DL not to exceed 5 ppb in plant material. LOQ (limit of quantitation) not to exceed 10 ppb in plant material. Report J-values between DL and LOQ. Detection Limit studies are performed for new instruments or if major maintenance has been performed. The Limit of Detection (LOD) is verified with quarterly LOD Studies. Annual DL and quarterly verification at 1 to 2 times the DL with 70 – 130% recovery is recommended, subject to revision. Annual DL must be immediately followed with verification.
Tailing criteria and integration	Sulfolane and sulfolane-d8 peak tailing not to exceed a factor of two calculated on the unmodified software integrated peak (consistent with tailing factor equation from SW-846 Method 8270D). Manual integration only performed if necessary. Submit before and after extracted ion current profile (EICP) documentation

Key Element	Decision
	with the report.
Minimum Separation Criteria	For standards and as part of each initial calibration, a demonstration of at least 10 ng of naphthalene and 25 ng sulfolane-d8 when monitoring all target mass ions for sulfolane-d8. Full baseline chromatographic resolution must be achieved.
Data flagging	Data flagged based on laboratory standard practices. All flags used should be defined.
Sample Collection, Handling, and Preservation	Appropriate sample containers should be used. Placed on ice and kept above freezing but below 6°C. Samples must be extracted within 14 days and the extract must be analyzed within 40 days of extraction. Archive sample at conclusion of initial sample extraction. Archive remaining residual sample in a freezer at -20°C until such time the sample would normally be disposed. At that time, contact Project Manager for further instruction regarding continuing retaining or disposal of sample.
Demonstration Criteria	For initial demonstration of performance, analyze a minimum of five extracted LCS QC samples at 50 ppb, each showing recoveries of ± 20% and RSD ≤ 30%. Provide Level IV data package.

Table 2. Quality Control Requirements for Plant Material

Description	Frequency	Criteria	Corrective Action
Initial Calibration	As needed	For regression: $r^2 \geq 0.99$ or $r \geq 0.995$; For average RRF: RSD $\leq 15\%$	Repeat initial calibration.
Initial Calibration Verification (ICV)	Immediately following Initial Calibration	Second source, %Drift $\leq$ 20%	Investigate, reanalyze, recalibrate.
Continuous Calibration Verification (CCV)	After MS tuning and before sample analysis, every 20 injections thereafter, and at end of analytical sequence, or within a 12 hour tuning period, whichever is shorter. CCV concentration at screening level, equivalent to 25 ppb in a sample.	%Drift $\leq$ 20%	Reanalyze CCV. If second re-analysis fails then perform initial calibration. Samples that were not bracketed by acceptable CCV must be reanalyzed.
Method Blank (MB)	Every preparation batch/event, or 20 samples, whichever is less	< DL	Re-analyze MB. If MB > DL or LOQ but ND (<DL) in samples then no action needed. If MB > DL then re-extract and re-analyze batch. Flag data with "B" qualifier, if insufficient sample for extraction.
Laboratory Control Sample (LCS)	Every preparation batch/event, or 20 samples, whichever is less. LCS concentration at screening level, equivalent to 25 ppb in a sample. Spiking standard	70 – 120%	Re-analyze LCS. If %R > acceptance criteria but ND (<DL) in samples no action needed. Otherwise re-extract and re-analyze batch.

Description	Frequency	Criteria	Corrective Action
	is prepared in water or a water-miscible solvent.		
Matrix Spike/Matrix Spike Duplicate (MS/MSD) and Laboratory Duplicate Sample (DUP)	An MS/MSD pair every preparation batch with 10 or more samples, up to 20. If preparation batch is less than 10 samples, analyze laboratory sample duplicate. Spiking standard is prepared in water or a water-miscible solvent.	RPD for DUP and MS/MSD ≤ 25%; MS/MSD Recovery 60 – 140%	Qualify data and narrative any obvious matrix effects.
Internal Standard (sulfolane-d8) Recovery	Each sample and QC. Spiking standard is prepared in water or a water-miscible solvent.	50-120%	Re-extract and flag if second re-extraction/re-analysis fails criteria.
Recovery Standard (naphthalene-d8)	Each sample and QC	Area Count -50 – +100% relative to the continuing calibration verification	Re-analyze and flag if second analysis fails criteria.