



1. APPLICABILITY

This Standard Operating Procedure (SOP) applies to all BRWM staff working on petroleum remediation sites within the Petroleum Program. It is also applicable to all parties that investigate, mitigate, or remediate petroleum releases.

This SOP is not a rule and is not intended to have the force of law, nor does it create or affect any legal rights of any individual, all of which are determined by applicable statutes and law. This SOP does not supersede statutes or rules.

2. PURPOSE

The purpose of this document is to describe the MEDEP procedure for developing and documenting a conceptual site model (CSM) at petroleum release sites.

3. RESPONSIBILITIES

All MEDEP BRWM Staff must follow this procedure when establishing a CSM at a petroleum remediation site. All Managers and Supervisors are responsible for ensuring that their staff are familiar with and adhere to this procedure. MEDEPBRWM staff reviewing data by outside parties are responsible for assuring that the procedure (or an equivalent) was utilized appropriately to develop a risk-based remedial action.

4. DEFINITIONS

4.1 CONCEPTUAL SITE MODEL (CSM) - A written or pictorial representation of an environmental system, the extent of the contaminant source, and the biological, physical and chemical processes that determine the transport of contaminants from sources through environmental media to environmental receptors within the system. (ASTM E1689 - 95 (2014), Standard Guide for Developing Conceptual Site Models for Contaminated Sites)

4.2 CONTAMINANT OF CONCERN (COC) - A contaminant that has been released at a site and risk evaluation indicates that mitigation or remediation is necessary to prevent exposure to the contaminant.

4.3 ENVIRONMENTAL PROFESSIONAL - A person meeting the educational, training, and experience requirements as set forth in 40 CFR Section 312.10(b). 40 CFR Section 312.10(b) includes (1) a person who possess sufficient specific education, training, and experience necessary to exercise professional judgment to develop opinions and conclusions regarding conditions indicative of releases or threatened releases on, at, in, or to a property, sufficient to meet the objectives and performance factors in Section 312.20(e) and (f). (2) Such a person must: (i) hold a current Professional Engineer's or Professional Geologist's license or registration from a state, tribe, or US territory and have the equivalent of three (3) years of full-



time relevant experience ; or (ii) be licensed or certified by the federal government, a state, tribe, or U.S. territory to perform environmental inquiries and have the equivalent of three (3) years of full-time relevant experience ; or (iii) have a Baccalaureate or higher degree from an accredited institution of higher education in a discipline of engineering or science and the equivalent of five (5) years of full-time relevant experience; or (iv) have the equivalent of ten (10) years of full-time relevant experience. (3) An EP should remain current in his or her field through participation in continuing education or other activities.

4.4 PETROLEUM REMEDIATION SITE – Any petroleum site in Maine where a risk-based remedial action is currently on-going, in the planning stages of remediation, being evaluated to determine if remedial action is needed, being monitored after remedial actions are complete, or an evaluation has been completed and remediation is warranted based on the CSM. Once a site has been closed it is no longer considered a petroleum remediation site unless it is reopened or a new release occurs.

4.5 PROJECT TEAM - The project team includes DEP staff within BRWM that are simultaneously assigned and actively involved in a petroleum release case that requires remediation of soil, water, or air. The project team may include members of the Division of Response Services, Division of Technical Services, Division of Petroleum Management, and the Division of Remediation. Additionally, the team may include environmental consulting technical staff hired by the MEDEP or a responsible party

4.6 RECEPTOR - An entity or resource that may be at risk of impact from petroleum contamination. Receptors could include humans, ecological systems, and surface water resources.

4.7 RISK BASED REMEDIAL ACTION – A remedial action that is based on the risks to human health and the environment based on site data as evaluated in accordance with the Remedial Action Guidelines Petroleum Addendum. It does not include remedial actions based on site-specific license requirements or statutes that require specific target cleanup levels.

5. GUIDELINES AND PROCEDURES

5.1 INTRODUCTION

For every petroleum remediation project, the project team will need to develop a CSM. The CSM is a dynamic tool that directs the project team's investigation and risk mitigation decisions at the site. The CSM should be developed as early in the assessment process as possible (it does not require site specific hydrogeologic or laboratory data) and updated as new information becomes available. The CSM will be used to focus site investigation work plans on the collection of data needed to support a site-specific, risk-based decision in accordance with the



Remedial Action Guidelines Addendum for Petroleum Remediation. The CSM should be revised as data is obtained to reassess appropriate risk mitigation and site remediation options.

Section 6.3 of the Remedial Action Guidelines (RAGs) provide an explanation of a CSM based on ASTM E1689-95 (2014). Readers should refer to the RAGs for definitions and references.

There are three basic components of a CSM including:

1. The source of the contamination,
2. The receptor(s), and
3. The migration pathway between the source to the receptor.

A CSM must include all three components of the CSM.

5.2 PLANNING

Planning a CSM may be completed without a site visit based on verbal communications and available information on the site setting. However, a site visit is necessary to develop a site-specific CSM. Many petroleum release sites involve a recent discharge of petroleum. Prompt emergency response actions to eliminate the discharge condition and control the released petroleum from migrating to a receptor, into the environment, or soaking further into building materials is the top priority for emergency response action. Development of a CSM must not delay the emergency response action. The information obtained during the emergency response action forms the basis of the initial CSM. Therefore, it is vital for the Project Team to obtain the emergency response information during the planning stage of the CSM.

5.3 PROCEDURE

5.3.1 OVERVIEW

In addition to the information obtained from the emergency response actions, the CSM should incorporate the surficial and subsurface hydrogeology, that could affect the migration of petroleum contamination to a receptor. The CSM should identify the extent of the source, the COC(s), the migration pathways, and the receptors. Historic site uses and uses of neighboring properties should be considered and incorporated into the CSM as appropriate.

5.3.2 PROJECT SPECIFIC CONSIDERATIONS

Considerations specific to a petroleum CSM include, but are not limited to, the following:

1. The product type, volume, duration, and date of the release
2. Site history
3. Remaining impacts to environmental media following emergency remediation



4. Site stratigraphy and geology (surficial and bedrock)
5. Depth to groundwater
6. The location of the release relative to water supplies, ground water resources, and surface water resources
7. Impact or risk of impact to indoor air quality – consider heating, ventilation, and air conditioning (HVAC) system
8. The location of the release relative to structures on the site – inside or outside of the building
9. Impacts to preferential pathways such as sumps, floor drains, perimeter drains, etc.
10. Types and characteristics of at-risk water supplies – casing condition and depth, well depth, etc.
11. Impacted building components - construction of building and foundation type
12. Site topography
13. Groundwater geochemistry changes and non-petroleum vapor impacts caused by the petroleum release

Attachment 1 of this SOP provides a summary of important information used to develop a site-specific CSM. The attachment includes two options for summarizing the information including a field-form with space to hand-write the details and an electronic form utilizing a fill-in form with drop-down options. BRWM staff and/or an environmental professional investigating and monitoring a site, will update the CSM as appropriate to reflect the current understanding of the site. The CSM will include site maps, sample location maps, photographs, and site drawings/sketches to relay important details of the CSM. Any CSM on which remedial actions are based will be documented in the Petroleum Program project files or as a written submittal to the department. For sites with ongoing monitoring, the sample location map will include sample point names used in the Sampling and Analysis Plan (RWM-PP-007).

6. QUALITY ASSURANCE/QUALITY CONTROL

Data quality objectives (DQOs) should be stated in the Sampling and Analysis Plan (RWM-PP-007e). Quality Assurance/Quality Control (QA/QC) samples may be collected if needed to meet DQOs. All analytical data should be reviewed and assessed to determine if DQOs have been met. If review indicates DQOs have not been met, corrective action will be recommended by the reviewer.

To ensure complete and accurate representation of the site, all project team members should review the CSM.

7. REFERENCES

- 7.1 ASTM E1689 - 95 (2014), Standard Guide for Developing Conceptual Site Models for Contaminated Sites
- 7.2 SOP RWM-PP-007 Sampling and Analysis Plan



SOP No. RWM-PP-006-
Effective Date: 9/15/2021
Revision No. 01
Last Revision Date: 12/01/2020

Attachment 1

CSM Forms

Spill #: _____
 Site Name: _____

Conceptual Site Model - Petroleum Discharge

Date: _____
 Prepared By: _____

GENERAL SITE INFO		
Site Address	Property Owner Name/Contact	Other Name/Contact

EVENT		
Narrative (source, cause product, volume)	Source Location	Other Spill Paths
discovery date: _____ duration: _____	<input type="checkbox"/> Outside <input type="checkbox"/> Inside Location: _____	<input type="checkbox"/> Sump <input type="checkbox"/> Drain <input type="checkbox"/> Other Outlet: _____

SITE GEOLOGY				
Overburden Type/Stratigraphy	Depth to Bedrock	Bedrock Type	Groundwater Gradient	Sand & Gravel Aquifer
				<input type="checkbox"/> Yes <input type="checkbox"/> No

IMPACTED AND AT RISK MEDIA/RECEPTORS		
Groundwater	Soil	Surface Water/Other
Describe Impacts/Risk:	Describe Impacts/Risk:	Describe Impacts/Risk:

Air / Vapor		
PID at source: _____	Slab / Floor Condition: _____	Impacted soil/FP under building: _____
PID in living space: _____	Resident's Impression: _____	Sensitive Pop.: _____
PID other: _____	Impacted fixed components: _____	HVAC/SSDS: _____

Wells											
	Well name	Well Type	Depth	Casing Length	Depth to GW	Driller	Yield	Install Date	Filtration	Impacted?	Comments
On Site											
Other											
Other											
Other											

RESULTS OF EMERGENCY RESPONSE ACTION				
Remedial actions taken	Field Screening Results	Lab Sample Results	Impacted Soil Remaining	Recoverable Free Product
	Excav. Bottom: _____ Excav. Walls: _____ Other: _____		<input type="checkbox"/> Yes <input type="checkbox"/> No Location: _____	<input type="checkbox"/> Yes <input type="checkbox"/> No

Maine DEP Petroleum Discharge CSM

Date: Site Address:	Spill Number: Discovery Date: Cause:	Property Owner Name: Property Owner Phone: Property Owner Email: Duration of Release: Volume Released:
Product: Other Source: UST Location: Dirt Floor		
Response/Referral Notes:		
Soil On Site: <input type="checkbox"/> Impacted <input type="checkbox"/> At Risk Soil Off Site: <input type="checkbox"/> <input type="checkbox"/> Groundwater: <input type="checkbox"/> <input type="checkbox"/> Surface Water: <input type="checkbox"/> <input type="checkbox"/> Public Drinking Water Supply: <input type="checkbox"/> <input type="checkbox"/>	Well Name: _____ Well Type: Dug Depth: _____ Casing Length: _____ Depth to GW: _____ Overburden Type and Stratigraphy: _____ Bedrock Type and Depth: _____ Groundwater Gradient: _____ Sand and Gravel Aquifer: <input type="checkbox"/>	PID at Source: PID in Living Space: PID Other: Slab / Floor Condition: Resident's Impression: Impacted Items: Impacted Fixed Components: Impacted soil/FP under building: Sensitive Pop: HVACC/SSDS sys:
Other Notes:		
Sumps: Other Preferential Pathways: Previous Spills at Site:	Drainage System: Previous Spills Near Site:	Utilities:

Maine DEP Petroleum Discharge CSM

Date: Site Address: Product: Other Source: UST Location: Dirt Floor	Spill Number: Discovery Date: Cause:	Property Owner Name: Property Owner Phone: Property Owner Email: Duration of Release: Volume Released:
Response/Referral Notes:		
Soil On Site: <input type="checkbox"/> Impacted <input type="checkbox"/> At Risk Soil Off Site: <input type="checkbox"/> <input type="checkbox"/> Groundwater: <input type="checkbox"/> <input type="checkbox"/> Surface Water: <input type="checkbox"/> <input type="checkbox"/> Public Drinking Water Supply: <input type="checkbox"/> <input type="checkbox"/> Well Name: _____ Well Type: Dug Depth: Casing Length: Depth to GW: Overburden Type and Stratigraphy: Bedrock Type and Depth: Groundwater Gradient: Sand and Gravel Aquifer: <input type="checkbox"/>	PID at Source: PID in Living Space: PID Other: Slab / Floor Condition: Resident's Impression: Impacted Items: Impacted Fixed Components: Impacted soil/FP under building: Sensitive Pop: HVACC/SSDS sys:	Other Notes:
Sumps: Other Preferential Pathways: Previous Spills at Site:	Drainage System: Previous Spills Near Site:	Utilities:

RWM-PP-006_ConceptualSiteModel

Final Audit Report

2021-10-14

Created:	2021-08-26
By:	Lindsay Caron (LINDSAY.ER.CARON@MAINE.GOV)
Status:	Signed
Transaction ID:	CBJCHBCAABAAAtZZocnxTPOk3V8vCwcSs6u5CuaHxkyjw

"RWM-PP-006_ConceptualSiteModel" History

 Document created by Lindsay Caron (LINDSAY.ER.CARON@MAINE.GOV)

2021-08-26 - 3:44:52 PM GMT- IP address: 198.182.163.115

 Document emailed to Molly King (molly.king@maine.gov) for signature

2021-08-26 - 3:46:36 PM GMT

 Email viewed by Molly King (molly.king@maine.gov)

2021-08-26 - 4:10:30 PM GMT- IP address: 104.47.64.254

 Document e-signed by Molly King (molly.king@maine.gov)

Signature Date: 2021-08-26 - 4:11:28 PM GMT - Time Source: server- IP address: 198.182.163.115

 Document emailed to Susanne Miller (susanne.miller@maine.gov) for signature

2021-08-26 - 4:11:30 PM GMT

 Email viewed by Susanne Miller (susanne.miller@maine.gov)

2021-09-01 - 5:51:39 PM GMT- IP address: 104.47.65.254

 Document e-signed by Susanne Miller (susanne.miller@maine.gov)

Signature Date: 2021-09-01 - 5:56:48 PM GMT - Time Source: server- IP address: 184.153.146.117

 Document emailed to Bill Longfellow (william.longfellow@maine.gov) for signature

2021-09-01 - 5:56:50 PM GMT

 Email viewed by Bill Longfellow (william.longfellow@maine.gov)

2021-09-01 - 6:04:44 PM GMT- IP address: 24.198.167.74

 Document e-signed by Bill Longfellow (william.longfellow@maine.gov)

Signature Date: 2021-09-01 - 6:07:24 PM GMT - Time Source: server- IP address: 24.198.167.74

 Document emailed to Melanie Loyzim (melanie.loyzim@maine.gov) for signature

2021-09-01 - 6:07:26 PM GMT

 Email viewed by Melanie Loyzim (melanie.loyzim@maine.gov)

2021-10-14 - 5:42:38 PM GMT- IP address: 104.47.65.254

 Document e-signed by Melanie Loyzim (melanie.loyzim@maine.gov)

Signature Date: 2021-10-14 - 5:42:50 PM GMT - Time Source: server- IP address: 24.198.212.100

 Agreement completed.

2021-10-14 - 5:42:50 PM GMT