COVER SHEET
STANDARD OPERATING PROCEDURE

Operation Title: **Water Supply Replacement**

Originator: **Kelly Perkins**
Quality Assurance Coordinator
Division of Technical Services
Bureau of Remediation and Waste Management

APPROVALS:

Division of Technical Services Director:

Molly King	Molly King (Oct 26, 2021 10:55 EDT)	Oct 26, 2021
Print name	*Signature*	*Date*

Bureau of Remediation and Waste Management Director:

Susanne Miller		Nov 10, 2021
Print name	*Signature*	*Date*

QMSC Chair:

Kevin Martin		Nov 15, 2021
Print name	*Signature*	*Date*

Department Commissioner:

Melanie Loyzim		Nov 15, 2021
Print name	*Signature*	*Date*

DISTRIBUTION;

( ) Division of Technical Services……..By:_____Date:_____

1.0 APPLICABILITY

This Standard Operating Procedure (SOP) applies to all programs in the Maine Department of Environmental Protection's (MEDEP) Bureau of Remediation and Waste Management (BRWM). It is applicable to all parties that replace water supply wells under the Petroleum Program.

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.

2.0 PURPOSE

The purpose of this document is to describe the MEDEP/BRWM procedure for replacing a private water supply well that is contaminated with petroleum constituents or has been impacted by petroleum constituents and other compounds or elements that pose a risk to human receptors.

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.

3.0 RESPONSIBILITIES

All MEDEP/BRWM Staff must follow this procedure when performing this task. All Managers and Supervisors are responsible for ensuring that their staff are familiar with and adhere to this procedure. MEDEP/BRWM staff reviewing data by outside parties are responsible for assuring that the procedure (or an equivalent) was utilized appropriately.

4.0 DEFINITIONS

4.1 Potability Test - Includes the following parameters: pH, Chloride, e.Coli bacteria, Fluoride, Total Hardness, Nitrate Nitrogen, Coliform Total, Nitrite Nitrogen, Arsenic, Calcium, Copper, Iron, Magnesium, Manganese, Uranium, and Radon. (https://www.maine.gov/dhhs/mecdc/environmental-health/eohp/wells/mewellwater.htm)

5.0 GUIDELINES AND PROCEDURES

5.1 INTRODUCTION

This procedure outlines tasks that need to be completed when:

1) Rehabilitation of an existing water supply well is not possible
2) No other cost-effective alternatives exist for providing potable water to a petroleum contaminated property (i.e. public water supply line connection or extension)
3) The decision has been made by the project team to replace an existing water supply well that is contaminated by the release of petroleum products.

4) The decision to replace the water supply well has been approved by the Director of Technical Services

5.2 PLANNING

A well-developed Conceptual Site Model (CSM) is imperative for effective use of this technique. Prior to installing a replacement well, the hydrogeology of the property on which the well will be placed should be sufficiently understood relative to the contamination to increase the likelihood of a successful well replacement.

5.3 PROCEDURE

There are two categories of well replacements covered by this SOP including replacement by drilling or installation of a replacement water supply and connecting the property to an alternate, existing water source. Within these two categories there are several options that are site specific. The scope of this SOP is not intended to discuss every option available under the two categories, but rather to provide procedures that need to be followed to assure that a proper cost-effective risk-based decision is made based on the site-specific situation to provide potable water to the property.

Connection to an Alternate Water Source

There are certain procedures that are needed when an existing water source (public water, private well, or surface water) is going to be used to supply water to a property. Section 5.3.1 below provides procedures that must be completed prior to connection with the alternate water source. Additionally, MEDEP staff must verify that the alternate source has an adequate supply of water for the contaminated property. Analytical samples will be needed to confirm the water quality of the alternate water supply is free of contamination and meets CDC guidelines for the Standard Water Test (if there are no records available). Agreements, consistent with SOP RWM-PP-018, must be secured before the alternate water is supplied to the contaminated property. Agreements with the property owners must be completed to assure that the property owners will accept the alternate water supply and be willing to decommission and properly abandon the existing water supply. Permits, easements, and agreements must be obtained to allow placement of the water supply line to the contaminated property. This may include right-of-way permits and plumbing permits from local or state governments, and easements for adjoining property owners. Once the above procedures are complete then the alternate water supply can be connected to the property and the contaminated well can be properly abandoned or decommissioned in accordance with RWM-PP-020.

Drilling or Installation of a Replacement Water Supply

Attachment 1 provides a checklist for the three sets of procedures that need to be completed:

- Procedures to be completed prior to drilling or installing the replacement well;

- After the replacement well is complete, but prior to connection, and;
- After the replacement well is connected to the home or business.

All procedures should be consistent with the Technical Services "Do No Harm Protocol" presented in Section 5.3.4 below.

5.3.1 The following tasks to be completed prior to installing a replacement well or connection to an alternate water source is completed.

A) Budget approval must be received from the Director of Technical Services prior well replacement. This process includes a project review for the proposed plan.

B) The water quality of the existing well must be determined including:
   a. Petroleum and related constituent contamination
   b. Water potability testing using the Maine CDC Standard Water Test plus radon in accordance with the MOA between Maine CDC and Maine DEP

C) Verification of ownership of the property targeted for a replacement well. And execution of a written agreement between the DEP and the owner regarding liability, payment, site work, power, plumbing, access, easement, real estate transfer, survey, and recording according to Agreements SOP RWM-PP-018.

D) Property access and easements, for the well and associated waterline between the well and the house.

E) A signed Water Supply Well and Treatment System Transfer of Responsibility Agreement.

F) Proper setbacks according to local codes and well drilling rules (Department of Human Health and Human Services, CMR Chapter 232 – Well Drillers and Pump Installers Rules) and appropriate variances within the rules. (e.g. property boundary setbacks and septic system setbacks).

G) General siting considerations should include overhead lines, access roads, waterline placement, shrubs, utilities, erosion control BMPs

5.3.2 The following tasks to be completed after the replacement well is installed, but before it is connected to the home or business

A) The water quality of the replacement well must be determined including:
   a. Petroleum and related constituent contamination

b. Water potability testing using the Maine CDC Standard Water Test plus radon in accordance with the MOA between Maine CDC and Maine DEP. Determine appropriate treatment and maintenance costs of the treatment system

B) Well purging and recovery test
   a. DHHS CMR Chapter 232 – Well Drillers and Pump Installers Rules, Section 407.0 Recommended Minimum Recovery Rates

C) Discuss results with the Collections, Claims, and Recovery Unit (CCR Unit) Supervisor

D) Establish a sampling plan for the replacement well to demonstrate that it meets the expectations as a replacement water supply

   a. Plan allows for sufficient monitoring prior to abandonment of the original well and for sampling the original well as appropriate for the site-specific conditions

5.3.3 The following tasks to be completed after the replacement well is connected to the home or business

A) Connect the replacement well to the GAC and other appropriate treatment

B) Follow the sampling plan established previously and make a written determination when the treatment for petroleum can be removed

C) After appropriate evaluation period, make a written determination that the replacement well or the existing well is adequate in accordance with Section 5.3.2.
   a. Make a determination about properly abandoning the unused water supply well(s) in accordance with SOP RWM-PP-020.

D) Written notification to CCR Unit when treatment is needed on the property water supply well in accordance with Section 5.3.2.

5.3.4 PROJECT SPECIFIC CONSIDERATIONS

WHEN SHOULD THE MAINE GROUND WATER OIL CLEAN-UP FUND PROVIDE LONG-TERM TREATMENT FOR A DEP REPLACEMENT WELL?

Contaminant	Replacement Well	Original Well	DEP Responsible for Treatment Cost	Home Owner Responsible for Treatment Cost
Inorganics (except As)	>RAG/MCL/HA	< RAG/MCL/HA	Yes	No
	< RAG/MCL/HA	> RAG/MCL/HA	No	Yes
	> RAG/MCL/HA	> RAG/MCL/HA	No	Yes
As	> RAG/MCL/HA	< RAG/MCL/HA	Yes	No
	< RAG/MCL/HA	> RAG/MCL/HA	No	Yes
	> RAG/MCL/HA	> RAG/MCL/HA	See additional considerations below	See additional considerations below
Bacteria	Persistent in well after well disinfection	Not present	Yes	No
	Persistent in well after well disinfection	Present	No	Yes

Radon[1]	> RAG/MCL/HA (4000pCi/l)	< RAG/MCL/HA	Yes	No
	< RAG/MCL/HA	> RAG/MCL/HA	No	Yes
	4,000-10,000 pCi/l	4,000-10,000pCi/l	No	Yes
	≥10,000pCi/l	<10,000pCi/l	Yes	No
	<10,000 pCi/l	≥10,000 pCi/l	No	Yes
	≥25,000pCi/l (aeration)	<25,000pCi/l (aeration)	Yes	No
	≥25,000pCi/l (aeration)	≥25,000pCi/l (aeration)	No	Yes
	> RAG/MCL/HA & <25,000pCi/l (aeration)	≥25,000pCi/l (aeration)	No	Yes

Additional Considerations:

1. The use of this protocol requires the collection and analysis of water samples from both the original homeowner well and the DEP replacement well for standard water test plus radon and DO. Both wells are to be tested for coliform and e-coli bacteria, arsenic, copper, fluoride, iron, lead, magnesium, manganese, nitrate, nitrite, sodium and uranium, as well as radon. In addition, both wells need to be tested for DO if Arsenic is above the MEG in order to evaluate the source of the high Arsenic concentrations (e.g. naturally occurring vs. oil discharge caused ground water chemistry changes).
2. Other circumstances when DEP may provide treatment on replacement well paid by the Maine Ground Water Oil Clean-up Fund:
    a. Need to treat metals, bacteria or other compounds in order to effectively treat VPH or EPH to below RAG/MCL/HA in new well.
    b. When sampling data demonstrates ground water chemistry has been altered by the oil discharge to cause an increased release of Arsenic from bedrock and resulting in concentrations above the RAG/MCL/HA in both the DEP replacement well and the original well.

[1] 25,000 pCi/l is used here as a rule of thumb to decide when aeration is required to treat radon vs. GAC. Generally at 25,000 pCi/l GAC will last just under 3 years before becoming a low level radioactive waste in a typical household, with a gamma radiation field from the filter of approximately 7 feet in diameter.

3. Prior to installation and transfer of ownership of a long-term treatment system to the home owner, a long-term treatment agreement between the Department and the property owner is required in accordance with SOP RWM-PP-18 Agreements.
4. When long-term treatment of a DEP replacement well is under consideration, compare cost against providing long-term treatment of original well. May be more cost effective to provide treatment on original well. Proper abandonment of water supply wells should be delayed, in accordance with Section 5.3.3 (C) until it is known whether use of the original well or the DEP replacement well is more cost effective and a long-term treatment agreement with the well owner has been finalized and signed.

6.0 QUALITY ASSURANCE/QUALITY CONTROL

Data quality objectives should be stated in the SAP. Quality Assurance/Quality Control (QA/QC) samples may be collected if needed to meet DQOs. Typical types of QA/QC samples that may be collected or prepared at the laboratory include replicate MIS samples to allow determination of a UCL for the DU, laboratory control blank spikes, and analysis of reference material containing known concentrations of the target analytes. 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.

7.0 REFERENCES

Maine Department of Health and Human Services, CMR Chapter 232 – Well Drillers and Pump Installers Rules
(https://www.maine.gov/dhhs/mecdc/environmental-health/dwp/professionals/wellDrillers.shtml)

Maine CDC Well Testing Brochure
(https://www.maine.gov/dhhs/mecdc/environmental-health/eohp/wells/mewellwater.htm)

Memorandum or Agreement between Maine CDC and Maine DEP

Technical Services Memorandum RE: Do No Harm Protocol, February 13, 2014

RWM-PP-005 Eligible Cleanup Costs Under the GW-SW Fund Program
RWM-PP-006 Conceptual Site Model for Petroleum Sites
RWM-PP-007 Sampling and Analysis Plan
RWM-PP-010 Groundwater Resource and Drinking Water Protection
RWM-PP-014 Water Sampling
RWM-PP-018 Agreements
RWM-PP-020 Well and Boring Abandonment

Attachment 1
Section 5.3 Checklist

Section 5.3.1 Tasks to be done prior to installing replacement well	Initials	Date Complete
A) Budget approval must be received from the Director of Technical Services prior well replacement. This process includes a project review for the proposed plan.		
B) The water quality of the existing well must be determined including:		
a. Petroleum and related constituent contamination		
b. Water potability testing using the Maine CDC Standard Water Test plus radon in accordance with the MOA between Maine CDC and Maine DEP		
C) Verification of ownership of the property targeted for a replacement well. And execution of a written agreement between the DEP and the owner regarding liability, payment, site work, power, plumbing, access, easement, real estate transfer, survey, and recording.		
D) Property access and easements, for the well and associated waterline between the well and the house.		
E) A signed Water Supply Well and Treatment System Transfer of Responsibility Agreement.		
F) Proper setbacks according to local codes and well drilling rules (Department of Human Health and Human Services, CMR Chapter 232 – Well Drillers and Pump Installers Rules) and appropriate variances within the rules. (e.g. property boundary setbacks and septic system setbacks).		
G) General siting considerations should include overhead lines, access roads, waterline placement, shrubs, utilities, erosion control BMPs		

Section 5.3.2 Tasks to be done after installing replacement well, but before connection	Initials	Date Complete
A) The water quality of the replacement well must be determined including:		
a. Petroleum and related constituent contamination		
b. Water potability testing using the Maine CDC Standard Water Test plus radon in accordance with the MOA between Maine CDC and Maine DEP Determine appropriate treatment and maintenance costs of the treatment system		
B) Well purging and recovery test		
a. Chapter 232, Section 407.0 Recommended Minimum Recovery Rates		
C) Discuss results with the CCR Unit ESIV		
D) Establish a sampling plan for the replacement well to demonstrate that it meets the expectations as a replacement water supply		
a. Plan allows for sufficient monitoring prior to abandonment of the original well and for sampling the original well as appropriate for the site-specific conditions		

5.3.3 The following tasks to be completed after the replacement well is connected to the home or business	Initials	Date Complete
A) Connect the replacement well to the GAC and other appropriate treatment		
B) Follow the sampling plan established previously and make a written determination when the treatment for petroleum can be removed		
C) After appropriate evaluation period, make a written determination that the replacement well or the existing well is adequate in accordance with Section 5.3.2 below		
a. Make a determination about properly abandoning the unused water supply well(s) in accordance with SOP RWM-PP-020.		
b. Written notification to CCR Unit when treatment is needed on the property water supply well in accordance with Section 5.3.2 below		

RWM-PP-016_WaterSupplyReplacement

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