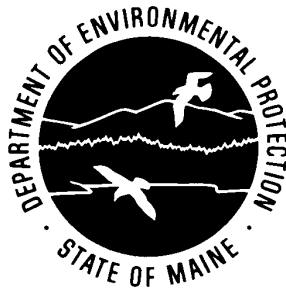


**PROCEDURAL GUIDELINES FOR
ESTABLISHING AND IMPLEMENTING
ACTION LEVELS AND REMEDIATION
GOALS FOR THE REMEDIATION OF OIL
CONTAMINATED SOIL AND GROUND
WATER IN MAINE**



MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

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AND IMPLEMENTING ACTION LEVELS AND
REMEDIATION GOALS FOR THE REMEDIATION
OF OIL CONTAMINATED SOIL AND GROUND
WATER IN MAINE**

**Maine Department of Environmental Protection
Bureau of Remediation & Waste Management**

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APPROVED



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12/5/08
Date

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INTRODUCTION

This guidance document describes site specific human exposure and geologic criteria to establish remediation goals for oil contaminated soil and groundwater. Bureau of Remediation and Waste Management staff, responsible parties, Maine Ground Water Oil Clean-up Fund applicants and others should utilize these revised guidelines in decisions regarding the initiation and termination of remediation at underground storage facilities, other subsurface oil discharges, and above ground storage facilities contaminated by discharges of oil, including gasoline (including ethanol blends of gasoline), methyl tertiary butyl ether (MTBE), kerosene, aviation fuels, #2 heating oil and diesel fuel, or other comparable petroleum hydrocarbons. Stoddard solvent and mineral spirits are also considered oil for the purpose of the guidelines. These guidelines apply to both Maine Department of Environmental Protection funded remediation projects as well as those undertaken by responsible parties or other persons without State funding.¹ Decisions regarding remediation objectives for sites contaminated by waste oil and heavy oils are not governed by this procedure and will continue to be made on a case-by case basis by the Bureau. The same is true for oil discharges resulting from transportation accidents, including ship, truck, rail and pipeline discharges. This guidance does not apply to any site or a portion of a site where hazardous substances contamination is documented or likely to be co-mingled with oil contamination.² .

The objectives of these guidelines are threefold. The guidelines' first objective is to ensure greater consistency in the level of clean up required of responsible parties statewide, while providing sufficient flexibility to accommodate greatly varying site conditions. Secondly, the guidelines are intended to ensure that decisions regarding remediation are based on the risk of public exposure and health risks associated with such exposure. These guidelines emphasize preventing human exposure to oil and petroleum hydrocarbons from contaminated groundwater and to a limited extent, vapors (see the Bureau's separate guidelines for indoor petroleum vapor action levels which apply whenever there is evidence of indoor air contamination).³ The guidelines do not address exposure to oil by way of soil ingestion or dermal contact. Lastly, these procedures are meant to provide guidance to Bureau remediation staff, responsible parties, professional consultants, and others who undertake oil remediation as to the Department's expectations. The final decision on the level of clean-up at a particular site is that of the Department.

These guidelines establish three classes of remediation sites with differing remediation goals. The first and most stringent is for areas of current or likely future groundwater use for drinking water. Areas in close proximity to public and private drinking water supplies or sand and gravel aquifers would fall under these "stringent guidelines". For sites where use of

¹ In cases where a voluntary clean-up is undertaken and no reimbursement of the associated costs is sought from the Maine Ground Water Oil Clean-up Fund, these guidelines do not prohibit remediation to goals lower than those specified in this document.

² Since waste oil is commonly a hazardous waste, clean-up criteria and analyses other than those included in these guidelines often need to be considered. These may include the Department's hazardous waste regulations as well as the Department's hazardous substances soil clean-up guidelines.

³ Guideline for Protecting Residents from Inhalation Exposure to Petroleum Vapors; Maine DEP, June 2000.

groundwater as drinking water is unlikely because of its quality or service by a public water system, "intermediate guidelines" are established to minimize the risk of petroleum vapor problems in buildings and utility conduits. Lastly, "baseline guidelines" are established for all remaining sites, including those located where groundwater has already been contaminated beyond use. Baseline soil contamination guidelines are divided into two sub-categories: one for industrial sites, and one for non-industrial urban areas. At a minimum, all sites will remediate oil saturated soil and free petroleum products.

Where these guidelines reference State mapping or municipal sources of information, the most current version of these secondary information sources should be utilized.

At some sites, the published information may conflict with observed conditions in the field. Actual field conditions should override secondary sources of information (e.g. maps, reports, etc.) A common example is the presence of unmapped transient public drinking water supply wells.

All clean-up decisions must be well documented and included in the Department's case files. In the case of sites managed by the Department's Division of Response Services, how a clean up goal was decided should be included as part of the spill report. At sites investigated or remediated by or under the auspices of the Divisions of Technical Services or Remediation, how a site's clean -up goal was derived is to be well documented in writing in the project's file and recorded in SSTS (Bureau site remediation database). Documentation of the basis of a site's classification and clean up goal is to be available to the public upon request.

Provided at the end of this document is a table summarizing the Guidelines' clean-up goals (Appendix A), and action levels (Appendix B).

This document replaces all earlier editions of Department oil remediation guidelines.

SITE REMEDIATION CLASSIFICATIONS

Oil discharge and contamination sites are broken down into Stringent (ST), Intermediate (IN) and Baseline (BL) site classes which apply to all remediation sites except some home heating oil tank release sites, which are discussed in more detail below. A site's classification is largely determined by the proximity of receptors, the risk of human exposure and to a lesser extent geology.

These guidelines include a separate clean up goal for responses to residential home heating oil discharges. Most of these discharges can be responded to quickly, allowing contaminated soils to be removed prior to becoming an ongoing source of ground water or indoor air quality contamination. That opportunity rarely exists at sites of historical or chronic discharges and contamination.

Home Heating Oil Response Site Guidelines

- 1) Applicability. This remediation guideline only applies to discharges of 300 gallons or less of kerosene, #1 or #2 home heating oil from an above ground oil storage tank system, or associated overfills. It also only applies when responding within 90 days of the approximate date of the discharge.
- 2) Soil clean-up guidelines.
 - a. Remove all oil saturated and pink stained soils.
 - b. Determine areal extent and depth of excavation/soil removal using visual observations and field jar-headspace analyses conducted in strict accordance with Appendix Q of Chapter 691. Periodically collect samples for field analysis from the excavation bottom and sidewalls. Cease removal once beyond limit of stained soil or the field headspace results start to decline significantly.
 - c. Document residual soil contamination left in place. Take a minimum of two (2) soil grab samples at the completion of soil removal for laboratory DRO analysis. The samples should be representative of the range of residual soil contamination being left (or the lack thereof). One sample is to be collected from the location of the highest field reading and one from the lowest. Proceed with backfill upon sample collection.
- 3) Other applicable guidelines. Whenever any one of the following conditions exist, remediation decisions are ALSO governed by the Bureau's other oil remediation guidelines (ST, IN or BL). Under the following circumstances, the site should either be investigated and remediated in collaboration with the Division of Technical Services or is to be referred from the Division of Response Services to the Division of Technical Services for completion. These circumstances include:
 - a. A private or public drinking water supply well has been contaminated;
 - b. The discharge is within 1000' or within the source water protection area of a community or non-community non-transient public drinking water supply well (i.e. all public wells other than transient public wells – restaurants, convenience stores, motels, etc.);
 - c. Contaminated soils extend to bedrock;

- d. A persistent indoor air contamination problem, not resolved by venting or removal of saturated soils; OR,
- e. The discharge is greater than 300 gallons.

Stringent (ST) Ground Water, Drinking Water and Soil Remediation Sites & Guidelines.

If a discharge location meets any ONE of the following criteria, it is categorized as a ST site:

- 1) A private or public drinking water supply well is contaminated that is actively used for human consumption of the water.
- 2) A discharge is located in a source water protection area of a public drinking water supply as mapped by the Maine Drinking Water Program.
- 3) A discharge is located within 1000' of an active community (e.g. town, water district, or mobile home park wells) or non-community non-transient (e.g. school, business with more than 25 year round employees) public drinking water supply well.
- 4) A gasoline discharge is within 1000' of a private well or transient (e.g. restaurant, motel, convenience store, etc.) public drinking water supply well in active use for human consumption
- 5) A discharge of petroleum products other than gasoline is located within 500' of an active private or transient public drinking water supply well used for human consumption
- 6) A discharge is located on a significant sand and gravel aquifer as mapped by the Maine Geological Survey; OR
- 7) Where there is a high probability of future development and use of the ground water for drinking water. This is limited to entire parcels, and portions thereof, within 1000' of a gasoline discharge, or within 500' of another petroleum product discharge; that are currently zoned by the municipality or the Maine Land Use Regulation Commission (unorganized townships) to expressly allow residential development; public drinking water service is not available within 1000' of the discharge location; AND ground water at the property boundary of the parcel with the discharge is contaminated by oil above a State of Maine or federal drinking water standard.

For sites where only 6 or 7 of the above apply, a discharge location which meets the criteria of an urban ground water non-attainment area should not be classified as a ST site. Another site classification should be utilized. These are aquifers or portions of an aquifer that because of current and historical land use and pollution, they are unsuitable for use as a public or private drinking supply source. For the purpose of these guidelines only, urban ground water non-attainment areas are densely developed industrial, commercial or residential areas, including portions of mapped sand and gravel aquifers or other ground water aquifers where any one of the following conditions are documented or found to exist:

- a) The aquifer or ground water beyond the property on which the discharge occurred are polluted with one or more man-made contaminants in concentrations exceeding federal

maximum contaminant levels (MCL) or a State MCL or maximum exposure guideline (MEG) prior to the discharge;

- b) The aquifer's ground water has not been and is not now the subject of a Department supervised or approved remediation effort with the eventual goal of restoring or protecting ground water to ensure it's potability;
- c) Dense commercial or residential development where most lots are ½ acre or less with subsurface waste water disposal, with public drinking water service, and no active, potable water supply wells within 1000';
- d) Where long-term institutional controls or a municipal ordinance prohibits the withdrawal of ground water for human use within 1000' of the discharge location; OR,
- e) Other documentation demonstrating to the Department's satisfaction that the aquifer is unsuitable or unavailable as a future public or private drinking water resource.

Intermediate (IN) Remediation Sites & Guidelines

An IN soil remediation site is one that does not meet any of the ST criteria above. Typically this classification is for developed residential neighborhoods where the ground water is not utilized for drinking water because of the availability of public drinking water. If a discharge site threatens a residence or other building routinely occupied by humans by meeting any ONE of the following conditions, it is to be considered an IN site for the purposes of remediation.

- 1) Persistent indoor air contamination exceeding Department indoor air quality guidelines resulting from the discharge;
- 2) Soil gas samples found at or exceeding Department indoor air quality guidelines and collected as follows:
 - a) Samples collected from the unsaturated zone in accordance with Department soil gas sampling procedures⁴
 - b) Samples taken directly beneath, or at a depth of four (4) or more feet of the ground surface and within 50', of a routinely occupied building with a basement or crawl space; or
- 3) Presence of oil saturated soils beneath the slab or basement floor of a routinely occupied building.

⁴ Standard Operating Procedure for the Collection of Soil Gas Samples Using Summa Canisters, Municipal Brownfields Site Assessments, Maine Department of Environmental Protection, May 2004.

Baseline (BL) Remediation Sites and Guidelines

Baseline sites are locations which do not meet the ST or IN site criteria or conditions, where public drinking water is available and where the ground water is not potable. For the purposes of this guidance they have been broken into two (2) subclasses – BL-1 and BL-2. In addition to the above criteria, the following should be used to distinguish BL-1 and BL-2 sites.

BL-1. This site classification is for discharges at large current or former industrial parcels where contamination is likely restricted to the industry site or surrounding industrial lands.

BL-2. This classification is for oil discharges where:

- 1) Indoor air contamination in a routinely occupied building if documented may pose a nuisance but does not exceed any Department indoor air exposure guideline;
- 2) Air contamination is documented in an utility conduit or other confined work space in which workers are likely to be exposed, and that exceeds Department acute air guidelines due to the subject discharge; OR,
- 3) No other site classification is applicable.

CLEAN-UP ACTION LEVELS and GOALS

The following clean-up action levels and goals should be implemented, except where a variance has been approved by the Department because of unique site specific conditions. See section on Variances from Clean-up Goals for more information.

When a mixture of oil products have been discharged, the lower of the following gasoline range or diesel range organic goals will be used, and at Stringent (ST) sites ground water and drinking water will be analyzed for benzene and MTBE.

For Stringent (ST) Sites

- 1) Ground Water Clean-up Action Levels:
 - a) Dissolved phase ground water contamination at or exceeding 25ppb gasoline range organics (GRO), 50ppb diesel range organics (DRO), 2ppb benzene, or 25ppb MTBE.
 - b) Presence of free product
- 2) Clean-up Goals:
 - a) Removal of free product;
 - b) Removal or remediation of contaminated soil containing greater than 10 ppm DRO and 5 ppm GRO; and,
 - c) Remediation of drinking water and ground water containing greater than 50 ppb GRO or DRO, 35ppb MTBE and 5ppb benzene.

For Intermediate (IN) Sites:

- 1) Removal of free product; and,
- 2) Removal or remediation of contaminated soil containing greater than 10 ppm DRO or 5ppm GRO.

For Baseline (BL) Sites:

- 1) Baseline 1 (BL-1).
 - a) Removal of free product; and
 - b) Remediate oil saturated soils ⁵
- 2) Baseline 2 (BL-2).
 - a) Removal of free product ; and,
 - b) Remediate gasoline contaminated soils to 1,000ppm, and diesel fuel, kerosene, #1 & #2 heating oils to 400 ppm, each as measured utilizing the Department's field jar/ bag headspace technique as specified in Appendix Q of Chapter 691 of the Department regulations.⁶

⁵ See definition and measurement method for oil saturated soil in Explanatory Notes and Glossary of Terms.

⁶ If laboratory analyses are used, the clean-up goal for GRO and DRO should be 100ppm.

VARIANCES FROM CLEAN-UP GOALS

Flexibility is provided in the guidelines to allow alternate site specific remediation goals for oil contaminated soil and groundwater. Such an alternate goal must adequately protect public health, safety and the environment and be well supported by hydrogeological investigation results, or other technical studies or written documentation provided or approved by the Department. Such studies may include risk assessments or contaminant transport studies or modeling. Alternate goals may be either less or more stringent than those indicated by the guidelines' methodology and shall be approved by the Department. If the terms of this paragraph are satisfied, more stringent remediation clean up goals as well as less stringent goals may be utilized.

When an alternate clean-up goal is to be approved and used, it is only the goal or standard that changes, not the site's classification. For example, if a hydrogeological study shows to the Department's satisfaction that a soil clean-up standard at a ST site greater than 10 ppm DRO is appropriate given that receptors are not at risk, an alternate clean-up goal may be used to guide remediation decisions (e.g. 200 vs. 10 ppm), however, the site remains classified as a ST site for this particular discharge.

An alternate clean-up goal may also be based on the ability to cost effectively protect a receptor by alternate means to remediating the soil and ground water contamination to ST goals. Again an example may be helpful. A site is a ST site due to the proximity of an uncontaminated, private household well to a discharge. This is the only criterion that triggers the ST site classification. Because of the availability of public drinking water service nearby, it is more cost effective to connect the nearby home to public water along with a more limited soil clean-up to mitigate the risk of future indoor gasoline vapors (e.g. 1000 ppm by jar headspace analysis). Again the site remains classified as a ST site for the purposes of this particular discharge, only the remediation goal changes.

In accordance with the definition of contamination in Chapter 691 of the Department's regulations⁷, the Department may not require the remediation of a leak or other discharge of oil at an underground oil storage tank (UST) facility to lower concentrations than specified in the "stringent clean up goals" listed in this document. This regulatory restriction only applies to the clean up of oil contamination associated with a UST, in the general environment. It does not affect Department authority to provide for temporary treatment of or the replacement of contaminated drinking water supplies.

⁷ Rules for Underground Oil Storage Facilities, Maine Department of Environmental Protection, April 3, 2007.

SITE CLASSIFICATION CHANGES

Site classifications change with time and changes in surrounding land uses. A common cause is the encroachment of residential development surrounding a UST or AST facility. Similarly, the extension of public drinking water service to the neighborhood of a former ST discharge site, may cause the same facility and site to be classified in the future as IN or BL-2 at the time of the next discharge.

DOCUMENTATION OF RESIDUAL SOIL CONTAMINATION

Residual soil contamination that is being left unremediated with the Department's approval will be documented at all sites governed by these guidelines. Adequate documentation will consist of soil samples for laboratory analysis, representative of the range of oil concentrations remaining following the completion of remediation or at the time of a Department decision not to undertake/require remediation.

The samples should be representative of the range of residual soil contamination being left (or the lack thereof) and the types of petroleum products discharged at that site (GRO and/or DRO). At a minimum a sample is to be collected from the location of the highest field jar/bag headspace reading and one from the lowest. Samples are to be analyzed by a laboratory certified or accredited by the State of Maine or the Northeast Environmental Laboratory Accreditation Program (NELAP) and in accordance with the performance standards in the following section of the guidelines.

In the event saturated soils are being left unremediated with Department approval, documentation of the extent of residual oil saturated soils is adequate and laboratory analyses are not necessary.

APPROVED LABORATORY ANALYTICAL METHODS AND PERFORMANCE STANDARDS FOR ANALYSIS OF OIL AND ITS CONSTITUENTS IN WATER AND SOIL

Decisions regarding remediation governed by these guidelines are to be based on analytical data meeting with the approval of the Department utilizing approved analytical methods and performance standards as specified in Appendices Q and S of Chapter 691 of the Department rules. Laboratory analyses are to be conducted at a laboratory certified or accredited by the State of Maine or the Northeast Environmental Laboratory Accreditation Program (NELAP) to conduct the specific method to be used.⁸ In addition sample collection and analyses (including field headspace analyses) are to meet the standards of the Department's current Leaking Underground Storage Tank (LUST) Quality Assurance Plan.

⁸ Laboratories and laboratory methods are certified by the Maine Department of Health and Human Services.

USE OF GROUND WATER/DRINKING WATER ACTION LEVELS

The purpose of the action levels for ground water or drinking water at Stringent (ST) sites is two-fold. The first is to guide when, and when not to require or fund the monitoring, treatment and remediation of dissolved phase contaminated groundwater, including contaminated drinking water supplies. The second purpose is to provide guidance when contamination sites currently undergoing investigation, monitoring or remediation are to be closed and remediation expenditures to cease. Some level of investigation is necessary for any site where oil contamination is detected in drinking water, even if it appears to be below all action levels, in order to use these Guidelines.

For the purposes of this guidance document, an action level is defined as the prevailing dissolved phase concentration of an oil analyte in groundwater as determined by a Department approved groundwater sampling plan and that equals or exceeds one half of the U.S. Environmental Protection Agency maximum contaminant level (MCL). Where no MCL has been established, the State MCL or maximum exposure guideline (MEG), established by the Maine Center for Disease Control and Prevention in the Department of Health & Human Services. Notwithstanding the above, the action level for benzene is a groundwater concentration equal to or exceeding 2.0 ppb. For diesel range organics the action level is 50 ppb.⁹ The Department action level for MTBE is 25 ppb or greater. As drinking water health standards change, the respective action level will change accordingly for use in future Department decisions.

The term "contamination" has the same meaning as in Chapter 691 Section 3 subsection g. Under that definition any reportable laboratory result above laboratory detection levels and significantly higher than background levels from other sources, constitutes contamination of groundwater.

Investigation and Remediation of Ambient Groundwater:

This guidance should be used in conjunction with Section 12 of Chapter 691. In accordance with Chapter 691, the decision to require an initial hydrogeological investigation is at the Department's discretion. However, this document affects whether to investigate a site further or to pursue groundwater remediation based on the findings of an initial hydrogeological investigation.

⁹ The Department has found over time that the current Maine Modified Dro Method for Determining Diesel Range Organics, Method 4.1.25, does not currently produce reliable results below 50 ppb, making it not feasible to have an action level below the current State drinking water standard.

Investigation beyond an initial hydrogeologic investigation, or remediation of ambient groundwater contamination may be required by the Department when prevailing concentrations of dissolved phase oil contamination over a 12 month period should equal or exceed the action level for gasoline range organics (GRO), diesel range organics (DRO), benzene, MTBE or other relevant oil analytes. Conversely when prevailing concentrations are below applicable action levels for 12 consecutive month's groundwater remediation should be terminated and the project closed after additional 12 months of confirmation monitoring. If concentrations increase above the action levels, further investigation, remediation or monitoring should be considered in accordance with this paragraph.

When drinking water supplies are affected or threatened, the "Remediation and Monitoring of Contaminated and At-Risk Private Wells" section of the guidelines applies.

Remediation and Monitoring of Contaminated and At-Risk Private Wells:

How are the action levels to be applied to the decision to provide interim point of entry treatment and the monitoring of contaminated private residential drinking water supplies? For newly reported oil discharge sites all private water supplies found by the Department to be contaminated or at imminent risk of contamination must be sampled for contamination. Wells verified by two or more sample analyses to be contaminated above an action level are to be provided with point of entry (POE) treatment and placed in the Bureau's quarterly monitoring program. Where contamination is documented but at concentrations below the action levels, the decision whether to provide temporary POE treatment must be based on the site specific judgment of the Department on whether contamination concentrations are expected to increase, remain stable or decrease. If contamination levels are expected to increase (e.g. low levels of MTBE at the leading edge of a suspected gasoline plume; or concentrations of #2 fuel oil below the laboratory's reporting limit (50 ppb), but near a recent heating oil tank failure) or cannot be predicted, temporary point of entry treatment should be provided along with quarterly monitoring until such time as a trend in the influent concentration can be determined. If quarterly monitoring reveals that the concentration remains below the action levels, for 4 sequential quarters, POE treatment should be discontinued. Quarterly monitoring should be continued for at least an additional 12 months after POE treatment is terminated to verify the concentrations are likely to remain stable and below the action levels.

The decision to place an "at risk" well on quarterly monitoring also should be governed by site specific circumstances. If contamination is likely given the site's geology and the circumstances of the discharge, the well should be placed on quarterly monitoring until such time as four quarters has passed without a reportable indication of contamination. If the well becomes contaminated, it is managed in a manner consistent with the preceding paragraph, guided by the concentration levels and trends. Quarterly monitoring may be continued as determined appropriate by the Department based on site specific geology or other unique circumstances, or if additional data is needed as part of the overall site monitoring plan.

Concentration levels should also guide decisions concerning the replacement of contaminated private drinking water supplies or provision of long term treatment for these water supplies. Such long term remediation actions should be provided or required where prevailing contaminant concentrations are at or above the action levels, and are likely to remain so.

Remediation of Contaminated Public Drinking Water Supplies:

The action levels also are to be applied in making decisions in the monitoring, treatment and remediation of the contaminated public drinking water supplies. Transient non-community public water supplies (e.g. motels, restaurants, churches, town meeting halls) should be handled in the same manner as private residential drinking water supply wells as described above. Decisions to treat and monitor non-transient, non-community public water supplies (e.g. schools, larger places of employment, food processing facilities, etc) should be governed by the same criteria, however, the Maine Drinking Water Program is to be notified, and monitoring and treatment shall be in accordance with the Department's Memorandum of Agreement with that agency (Appendix C). Decisions on whether to monitor, treat or remediate community public drinking water supplies contaminated or at imminent risk of contamination by oil should be made jointly with staff in the Maine Drinking Water Program. Drinking Water Program staff shall be contacted when any public drinking water supply (privately or publicly owned) is found to be contaminated or at imminent risk of contamination, including contamination at low levels.

Investigation of Potential Contamination Sources:

When a contaminated private or public water supply well has been documented, the source of the contamination should be investigated (if not known) and preventive measures taken if feasible, as is required under Department regulation and statute and current practice regardless of the concentration of oil (even when below all action levels). Once the source of the contamination is known, a more informed decision can be made on the most cost effective and feasible approach to remediation of contaminated well(s).

Varying from Action Levels:

If unusually sensitive exposed individuals or other unusual health risks may be present, the Department may vary from these action levels. Variances from the use of the action levels may be considered for long-term remediation sites with unusually sensitive exposed individuals, or with unusual site geology or other circumstances where it is deemed: (1) necessary to adequately protect public health; and (2) technically feasible and cost effective in the professional judgment of the Department. Under such circumstances the action levels and the reasons for the variance must be documented in the Department's project file, including how such decisions meet the criteria listed above. In any case, where a party claims they are hypersensitive or have other health related reasons for requiring lower exposure levels than outlined in this guidance, written documentation to that effect from a properly licensed doctor is needed to justify such a variance.

EXPLANATORY NOTES and GLOSSARY OF TERMS

- 1) Action Level. For the purposes of this guidance document, an action level is defined as the prevailing dissolved phase concentration of an oil analyte in groundwater as determined by a Department approved groundwater sampling plan and that equals or exceeds one half of the U.S. Environmental Protection Agency maximum contaminant level (MCL). Where no MCL has been established, the State MCL or maximum exposure guideline (MEG), established by the Maine Center for Disease Control and Prevention in the Department of Health & Human Services. Notwithstanding the above, the action levels for benzene and MTBE are 2.0 ppb and 25ppb, respectively.
- 2) Community public drinking water system or well. This is a well which serves at least 15 year round service connections or regularly serves at least 25 year-round residents. Common examples include town and water district wells, or a communal well serving a mobile home park or other housing development.
- 3) Diesel Range Organics or DRO. DRO refers to that range of hydrocarbons as measured by the State of Maine's Modified Method for Determination of Diesel Range Organics (DRO), Maine Health and Environmental Testing Laboratory (HETL) Method 4.1.25; September 6, 1995.
- 4) Free product. Free product for the purpose of these guidelines has the same meaning as in Chapter 691 of the Department's regulations, nonaqueous phase liquid oil or petroleum.
- 5) Gasoline Range Organics or GRO. GRO refers to that range of hydrocarbons as measured by the State of Maine's Modified Method for Determining Gasoline Range Organics (GRO), Maine Health and Environmental Testing Laboratory (HETL) Method 4.2.17, September 6, 1995.
- 6) Oil saturated soils. Oil saturated soils, or saturated soils, are used in these guidelines to describe soils which contain mobile product. Saturated soils are identified by placing a handful of soil in a clear container and submerging it in clean water. The soil should then be stirred to break up any clumps. If oil product droplets or an oil layer forms on the water, the soil should be considered "saturated". The presence of only a sheen does not indicate saturation. It may be easier to see the product if the water is decanted into a narrow container such as a VOA vial (40 ml). It may also be necessary to let silty or clayey materials to settle for several minutes in order to determine if an oil layer is present.
- 7) Non-transient, Non-community well or water system. This refers to a public drinking water supply which is neither a community nor transient well or system. Such a water system serves the same 25 or more persons for six (6) months or more per year. Examples include schools, day care centers, factories, industrial or office parks or other large places of employment with their own well.
- 8) Private drinking water well. This is defined in statute as a well that is used to supply water for human consumption and is not a public water supply well. Individual household wells are the most prevalent example. A well used exclusively for livestock, animals or plants does not meet this definition.
- 9) Transient public water well or water system. This is also referred as a "transient non-community water system". This is a well or water system which serves at least 25 persons, but not necessarily the same individuals, for at least 60 days per year. Common

examples include restaurants, motels and hotels, campgrounds, golf courses highway rest areas and some convenience stores.¹⁰ A bottled water company well is considered a transient public water supply.

- 10) Urban ground water non-attainment area. These are aquifers or portions of an aquifer that because of current and historical land use and pollution they have little potential for use as a public or private drinking supply source. For the purpose of these guidelines only, these are densely developed industrial, commercial or residential areas, including portions of mapped sand and gravel aquifers or other ground water aquifers where any one of the follow conditions are documented or found to exist:
- a) The aquifer or ground water beyond the property on which the discharge occurred was polluted with one or more man-made contaminants in concentrations exceeding federal maximum contaminant levels (MCL) or a State MCL or maximum exposure guideline (MEG) prior to the discharge;
 - b) The aquifer's ground water has not been and is not now the subject of a Department supervised or approved remediation effort with the eventual goal of restoring or protecting ground water to ensure it's potability;
 - c) Other documentation demonstrating to the Department's satisfaction that the aquifer is unsuitable or unavailable as a future public or private drinking water resource;
 - d) Dense commercial or residential development where most lots are ½ acre or less with subsurface waste water disposal, with public drinking water service, and no active, potable water supply wells within 1000'; OR
 - e) Where institutional controls or a municipal ordinance prohibits the withdrawal of ground water for human use within 1000' of the discharge location.

¹⁰ Whether a convenience store with its own well is a transient public water system depends on a number of factors in addition to if it serves food and beverages to the public according to Maine Drinking Water Program policy. It must also have 10 or more seats for the public, or a public rest room. If not a public water system, the well is a private well.

REFERENCED DOCUMENTS AND PUBLICATIONS

Chapter 691, Rules for Underground Oil Storage Facilities; Maine Department of Environmental Protection; April 3, 2007.

Field Guideline for Protection of Residents from Inhalation Exposure to Petroleum Vapors; Maine Department of Environmental Protection; June 2000.

Modified Method for Determining Diesel Range Organics (DRO), Maine Health and Environmental Testing Laboratory Method 4.1.25, Sept. 6, 1995.

Modified Method for Determining Gasoline Range Organics (GRO), Maine Health and Environmental Testing Laboratory Method 4.2.17, Sept. 6, 1995.

Multiplication Factors for Estimating the Population of Public Water Systems, Maine Department of Human and Health Services, Drinking Water Program, October 7, 2007.

Quality Assurance Plan for Maine Department of Environmental Protections' Leaking Underground Storage Tanks Program; February 24, 2007.

Standard Operating Procedure for the Collection of Soil Gas Samples Using Summa Canisters, Municipal Brownfield's Site Assessments, Maine Department of Environmental Protection, May 2004.

APPENDIX A

**SUMMARY TABLE OF REMEDIATION
GOALS FOR OIL CONTAMINATED SOIL
AND GROUND WATER**

SUMMARY OF REMEDIATION GOALS FOR OIL CONTAMINATED SOIL & GROUND WATER

CLEAN UP GOAL	Free Product Remediation	Saturated Soil	Contaminated Soil				Dissolved Phase				Test Method
			Gasoline	Test Method	Fuel Oils/ Kero. ¹¹	Test Method	Gasoline	MTBE	Benzene	Fuel Oils ¹	
ST	Yes	Yes	5ppm	Lab ¹²	10ppm	Lab ²	50ppb	35ppb	5ppb	50ppb	Lab ¹³
IN	Yes	Yes	5ppm	Lab ²	10ppm	Lab ²	None	None	None	None	NA
BL2	Yes	Yes	1000ppm ¹⁴	Field hd space	400 ppm ⁴	Field hd space	None	None	None	None	NA
BL1	Yes	Yes	None	None	None	NA	None	None	None	None	NA

¹¹ Does not include heavy oils that are heated while being stored. Heavy oil clean-up standards are decided on a case by case basis. Includes #1 and # 2 heating oils, kerosene, diesel fuel, and heating oils other than heavy oils.

¹² Laboratory methods for gasoline and fuel oils in soil are Maine HETL Modified Method for Determining Gasoline Range Organics, 4.2.17; and HETL Modified Method for Determining Diesel Range Organics, 4.1.25, respectively.

¹³ Laboratory methods for testing water are Maine HETL Modified Method for Determining Gasoline Range Organics 4.2.17; US EPA Method 8260 for benzene and MTBE, and HETL Modified Method for Determining Diesel Range Organics 4.1.25 for fuel oils and diesel fuel.

¹⁴ If laboratory analyses are used, the clean up goal is 100ppm for both gasoline and fuel oils.

APPENDIX B
SUMMARY TABLE OF OIL REMEDIATION
ACTION LEVELS

**SUMMARY OF DRINKING WATER STANDARDS & ACTION LEVELS
FOR THE MOST COMMON OIL CONTAMINANTS (in PPB)**

Contaminant	GRO	Benzene	MTBE	DRO
MCL ¹	NA	5	35	NA
MEG	50	5	NA	50
Action Level	25	2.0	25	50

¹ The MCL for benzene is a federal EPA MCL. The MCL for MTBE is one adopted by the State of Maine and is found in state statute.

APPENDIX C

**MDEP AND MDHS BUREAU OF HEALTH
MEMORANDUM OF UNDERTANDING
REGARDING TREATMENT FOR OIL
CONTAMINATED NON-COMMUNITY PUBLIC
WATER SYSTEMS**

MEMORANDUM OF UNDERSTANDING

Between the Departments of

ENVIRONMENTAL PROTECTION,
BUREAU OF REMEDIATION & WASTE MANAGEMENT

And

HUMAN SERVICES, BUREAU OF HEALTH
DRINKING WATER PROGRAM

This Memorandum provides the framework for the working relationship between the Maine Department of Environmental Protection, Bureau of Remediation & Waste Management (BRWM), and the Department of Human Services, Bureau of Health, Division of Health Engineering, Drinking Water Program (DWP), with regard to installation, maintenance, and monitoring of point-of-entry (POE) treatment equipment installed by BRWM on non-community public water supplies regulated by DWP. It also provides for the sharing of water quality data to expedite the investigation and remediation of threats to public drinking water supplies.

BRWM, to protect public health and the environment from contamination by petroleum and hazardous substances, often installs POE treatment equipment on water supplies, some of which are “public water systems” under Chapter 231 of DWP rules. When a water supply is contaminated, it usually is best to restore potability quickly to minimize the exposure and risk to the health of its users. BRWM is required by statute to use the most cost-effective means of protecting public health and the environment from adverse effects of hazardous materials.

DWP ensures that all public water systems are designed and operated in accordance with Maine Rules Relating to Drinking Water (Chapter 231) and the federal Safe Drinking Water Act (SDWA). SDWA regulations (40 CFR Part 141) require that owners of all public water systems receive approval from DWP prior to making any changes in treatment processes. In addition, new treatment equipment may be subject to additional monitoring as necessary to safeguard the health of consumers.

Non-community, non-transient public water systems are defined as systems that serve at least 25 of the same persons for six months or more per year, such as schools and factories or office buildings having 25 or more employees. Non-community, transient public water systems serve at least 25 persons, but not necessarily the same persons, for at least 60 days of the year, and include restaurants, motels, and campgrounds.

In order that both agencies can fulfill their respective responsibilities expeditiously and share information obtained on treatment equipment performance, the agencies agree as follows:

BRWM agrees to:

1. Notify DWP when any public water supply has been confirmed by BRWM to be contaminated above BRWM-established action levels or is considered at imminent risk of becoming contaminated. Action levels are set at one-half the drinking water Maximum Contaminant Level (MCL), when one exists, or at one-half the Maximum Exposure Guideline (MEG) when no MCL has been established, except for MTBE, where the BRWM action level is 25 ppb.
2. Notify DWP before BRWM installs point-of-entry (POE) treatment equipment on any public water system or makes changes in treatment equipment or techniques previously approved by DWP, and submit schematic diagrams of the treatment train promptly after its installation. Treatment technologies used will be approved by USEPA as best available technology (BAT) or other means available for achieving compliance with the applicable MEG or MCL for contaminants listed in 40 CFR 141.61, and in accordance with good engineering practice for contaminants not listed. Equipment will be sized, designed, and installed such that water available to the public for consumption meets all MCLs, where these have been established, and MEGs when no MCL is in effect. The need for pretreatment equipment to ensure effective, reliable operation of treatment equipment will be evaluated based on the water chemistry of individual sites. BRWM will eliminate bypass plumbing in all existing POE equipment in public water systems, and will ensure that its contractors do not install bypasses in the future.
3. Monitor effectiveness of BRWM-installed treatment equipment as needed. Where a water source is contaminated with an organic compound or a petroleum product, BRWM will analyze the finished water at least quarterly using EPA Method 524.2 for that compound or constituents of the petroleum product for which there is a drinking water standard. BRWM will notify DWP promptly when post-treatment water quality does not meet drinking water standards.
4. Provide DWP with a list of regional contacts and FAX numbers in the BRWM's Division of Response Services for notification of possible indications of contamination in accordance with Paragraph 1 below. DEP will investigate public water supplies where laboratory data provided by DWP indicate possible contamination by petroleum or its components or a hazardous substance. The purposes of such investigations shall be to verify the presence of man-induced contamination, and identify the source(s) of the contamination for possible remediation in accordance with BRWM's statutory and regulatory authority.

DWP agrees to:

5. Notify by FAX designated regional BRWM contact persons of laboratory analytical results, indicating newly discovered detections at concentrations above the laboratory reporting level of volatile and semivolatile chemicals or other organic chemicals, including pesticides, for which

a federal Maximum Contaminant Level (MCL) or State of Maine MCL or Maximum Exposure Guideline (MEG) has been established for drinking water. BRWM contacts will also be notified of confirmed detections of inorganics for which there is a primary drinking water standard whenever such detections exceed ½ an existing MCL or MEG for the first time. BRWM will not be notified of contamination if limited to disinfection by-products, copper, lead, nitrates, nitrites, microorganisms or radionuclides. FAXed notifications shall be labeled “Report of Possible Spill.”

6. Consider prior notification by BRWM followed by submittal of schematic diagrams sufficient to satisfy the requirement of Chapter 231 (3)(C) for plan submission, review and approval by DWP of POE treatment equipment.
7. Consider BRWM-installed POE treatment equipment selected, installed, and maintained as described under paragraph 2 above to meet BAT, per 40 CFR 141.61.
8. When a public water supply must be treated with aeration to remove volatile contaminants, increase to monthly the frequency of testing the finished water for microbial contamination. After six months of testing, DWP will re-evaluate with BRWM the testing frequency.
9. Notify BRWM when BRWM-installed POE equipment on a public drinking water source fails to achieve primary drinking water standards.
10. Advise BRWM of any proposed changes in DWP rules, policy, or practice which would affect BRWM in its responsibility to eliminate hazardous substances and petroleum constituents from public drinking water supplies.
11. To continue its efforts to make public water supply monitoring data more readily available to BRWM and the State’s Oracle-based Groundwater Data Base, and to notify BRWM when this data is available on Oracle software.

Other Terms Of This Agreement

12. By June 1, 1999, BRWM and DWP agree to designate contact persons to receive information, inquiries, and assistance requests related to this MOA.
13. BRWM and DEP will determine the need for disinfection on aeration POE treatment systems based on the findings of the bacterial analyses conducted in accordance with this Memorandum of Understanding .
14. This Memorandum of Understanding expires on June 30, 2001.

**Department of Environmental Protection
Services**

Bureau of Remediation & Waste Management

Department of Human

Bureau of Health

Signed _____
David Lennett, Director
Bureau of Remediation & Waste Management

Signed _____
Dora A. Mills, Director
Bureau of Health

Date: _____ **Date:** _____