

CONSTRUCTION ACTIVITIES IN CONTAMINATED AREAS

***** DRAFT DOCUMENT *****

MASSACHUSETTS DEPARTMENT OF
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1.0 BACKGROUND AND PURPOSE

Construction activities in industrial, urban, or heavily developed areas frequently encounter contaminated soils, contaminated groundwater, and/or buried waste products. Discoveries of this nature can significantly impact construction schedules and project costs. More importantly, failure to adequately address and respond to such situations can endanger construction workers, surrounding populations, and environmental resources.

The purpose of this document is to provide insight, direction, and guidance to the regulated community on the problems and issues germane to construction in contaminated areas, by:

- identifying and describing relevant regulatory jurisdictions and procedures, including important new regulatory provisions and interpretations;
- describing general investigatory and response-action principles and mitigation techniques for construction activities in contaminated areas;
- providing practical technical advice and recommendations; and
- in providing the preceding, articulate the elements and specifics of a recommended Best Response Action Management Approach.

It is hoped that the application of this document will serve to promote mutual interests that exist in this area, namely, the better protection of human health, safety, and the environment, and the establishment of more timely, effective, and cost-effective pollution mitigation plans.

2.0 APPLICABILITY

This policy has been prepared by the Massachusetts Department of Environmental Protection, Bureau of Waste Site Cleanup (DEP/BWSC), under the provisions of MGL Chapter 21E, the "Massachusetts Oil and Hazardous Materials Release Prevention and Response Act", and

regulations promulgated thereunder, codified as 310 CMR 40.0000, the "Massachusetts Contingency Plan" (MCP).

This document contains guidance and recommendations on planning and undertaking construction activities in areas where the soil or groundwater is contaminated by oil and/or hazardous material. The procedures and parameters outlined in this policy are generic in nature, designed for site-specific application by competent professionals, in compliance with all applicable statutory and regulatory requirements, including but not limited to all applicable oversight, licensing, and permitting requirements.

The scope of this policy is specifically limited to the investigation, assessment, and management of contaminated soils and groundwater encountered during a construction project; other construction-related issues, such as worker health and safety, building demolition, and asbestos removal concerns, are not addressed in this document.

This policy is not intended and cannot be relied upon to create rights, substantive or procedural, enforceable by any party in litigation with the Commonwealth. The Department reserves the right to act at variance with these guidelines and change them at any time without public notice.

3.0 REGULATORY JURISDICTIONS, REQUIREMENTS, AND PROCEDURES

A. General

"Construction projects", in and of themselves, are **not** categorically or directly regulated by existing DEP environmental statutes or programs. Rather, jurisdiction is project and site-specific. A number of federal, state and local regulatory programs oversee environmental issues and concerns that may be present at any given construction project or work site. It is the responsibility of the project proponent(s), property owners, and facility operators to identify and conform to all applicable jurisdictions.

At locations where there is no prior knowledge/reason to believe that a release of oil or hazardous materials has occurred, project proponents will generally be under no regulatory obligation to "look" for contamination, or pre-plan contingencies. However, should evidence of contamination **be**

encountered during construction operations, proponents may be required to report such findings to DEP, and to subsequently undertake appropriate response actions.

Moreover, even where there are no visible or obvious signs of contamination, project proponents may be liable for any infractions of environmental regulations that nonetheless occur; for example, the discharging of chemically contaminated dewatering effluent to a surface water body, or the depositing of chemically contaminated soils in an unapproved and inappropriate location.

For the above reasons, prudent industry practice dictates considerations of such elements in the planning and implementation of construction actions in areas where contamination is possible or likely, especially urban, heavily developed, and historically industrialized sites.

B. Chapter 21E and the Massachusetts Contingency Plan

At present, there is no comprehensive set of environmental regulations that specifically govern construction activities in contaminated areas.

In practice, MGL Chapter 21E, the Massachusetts Oil and Hazardous Materials Release Prevention and Response Act, and the DEP regulations promulgated thereunder, codified as 310 CMR 40.0000, the Massachusetts Contingency Plan (MCP), have become a default jurisdictional "umbrella" for construction activities in contaminated areas. Although not written with this application in mind, the broad statutory authority and discretion embodied in MGL c. 21E make it suitable for this purpose.

Extensive revisions have recently been made to the MCP, effective October 1, 1993. These revisions seek to accelerate and streamline the cleanup of contaminated sites by (1) the establishment of clear standards, (2) the consolidation of permitting authorities, and (3) the increased delegation of response-action responsibility to the private sector. The individual and collective impacts of these changes, together with specific new provisions for construction projects in public roadways, have a significant impact on construction activities in contaminated areas, as outlined below:

(1) Notification Requirements

Specific release reporting thresholds have been established in 310 CMR 40.0300. These thresholds provide clear standards for when a contaminated site, including the site of a construction project, is subject to the response action procedures and standards delineated in the MCP (i.e. "in the system").

Reporting thresholds have been established for petroleum products and several thousand hazardous materials, including "Reportable Quantities" for sudden release/spill incidents and "Reportable Concentrations" for soil and groundwater.

A tabulation of Reportable Concentrations for common environmental contaminants is provided in Table 1. Relative to other reporting thresholds, note that sudden releases of 10 or more gallons of petroleum products (i.e. gasoline, diesel, fuel oils) require reporting to the Department, as does the visual observation of 0.5 inches or more of Non Aqueous Phase Liquids (NAPL, including "floating product" on the groundwater). Consult 310 CMR 40.0300 and 40.1500 for complete details on reporting requirements, timeframes, and procedures.

(2) Risk Reduction Measures

The MCP now provides specific opportunities and provisions to address contamination encountered during construction activities through the implementation of Risk Reduction Measures, as outlined in 310 CMR 40.0400.

Limited Removal Actions (LRAs) are voluntary measures that Potentially Responsible Parties (PRPs) or "Other Persons" may take to remediate localized volumes of contaminated soils. "Localized" is defined as less than 100 cubic yards of soils containing petroleum hydrocarbons at levels at or greater than the site-specific Reportable Concentration (RCS-1 or RCS-2), and/or less than 20 cubic yards of soils contaminated by hazardous material at levels equal to or greater than the site-specific Reportable Concentration. PRPs who successfully complete LRAs in conformance to all provisions of 310 CMR 40.0318, and remove all contaminated soils above reporting thresholds, are not

required to report the site/ encountered contamination to DEP.

Release Abatement Measures (RAMs) are voluntary measures that PRPs or Other Persons may undertake to remediate, mitigate, contain, and/or otherwise address more than localized contamination encountered at construction sites (above MCP reporting thresholds). The procedural requirements for conducting RAMs are fully described in 310 CMR 40.0440, and are summarized in Table 2. Note that RAMs require reporting to DEP, oversight by a Licensed Site Professional, the prior submittal of a RAM Plan to DEP, and are subject to a written or 21 day "presumptive approval" process.

Utility Related Abatement Measures (URAMs) are a special and limited class of risk reduction measures specifically developed to address contamination (above MCP reporting thresholds) encountered in public roadways, utility easements, and private or public property during the installation, repair, replacement or decommissioning of:

- sanitary sewerage, water, or drainage systems and related appurtenances (but **excluding** streams and open channel drainage systems without bottoms);
- natural gas pipelines and related appurtenances; and
- above ground or underground electric, telephone, telecommunication cables or other conduits, and related appurtenances.

The purpose and intent of URAMs is to facilitate the timely and protective construction and repair of necessary infrastructure utilities located within contaminated areas. Although such activities must be reported to DEP and must be undertaken under the overall supervision/management of a Licensed Site Professional, no DEP approval is required.

URAMs must be limited, however, to only those response actions necessary to complete the construction project, and cannot involve measures that may impede future

response actions that will be likely needed at the site.

URAMs are also not applicable for the construction and/or repair of buildings, other than those buildings constructed for the sole purpose of housing pumping, metering, switching, and other equipment that may be considered a utility "appurtenance".

The procedural requirements for conducting URAMs are fully described in 310 CMR 40.0460, and are summarized in Table 3.

Note that LRAs, RAMs and URAMs cannot be taken at sites with "serious" contamination problems, as indicated by the presence of release or site conditions that would require reporting to DEP under the "2 hour" or "72 hour" timeframes described in 310 CMR 40.0300, including Imminent Hazard conditions, sudden spills above a Reportable Quantity, and the presence of 0.5 inches or more of NAPL. In such cases, a third class of Risk Reduction Measure, an "Immediate Response Action", must be undertaken under the approval and supervision of DEP.

(4) Liability

Parties involved in construction activities in contaminated areas are advised to be fully cognizant of the liability provisions of MGL c. 21E and other applicable regulatory jurisdictions, and seek legal counsel, if necessary, to understand their responsibilities in this regard.

Although recent amendments to MGL c. 21E provide some agencies and public utilities with conditional defenses (under limited circumstances) against the Commonwealth's cost recovery abilities for remedial response actions undertaken in a right of way [MGL c. 21E, Section 5(j)], project proponents and contractors are advised to carefully consider the provisions of MGL c. 21E, Section 5(a), which can potentially apportion liability to:

"any person who, by contract, agreement, or otherwise, directly or indirectly, arranged for the transport, disposal, storage, or treatment of hazardous material to or in a site or vessel from

or at which there is or has been a release or threat of release of hazardous materials" and

"any person who otherwise caused or is legally responsible for a release or threat of release of oil or hazardous material"

The liability of parties performing construction in or through a contaminated area must be ascertained on a case-by-case basis. Generally, DEP/BWSC refrains from imposing broad site and area-wide response action requirements on public or private utilities or other parties undertaking construction activities through contaminated areas on public ways or easements, pending further investigations to identify the source and extent of encountered contamination.

C. Other Regulatory Jurisdictions

In addition to MGL c. 21E, other jurisdictions may be applicable in certain cases. Relative to construction-related projects, an abridged listing of the most commonly encountered situations and regulatory jurisdictions are summarized in Table 4.

5.0 REMEDIATION WASTES

A. General

The MCP contains new, clearer, and more streamlined provisions for the classification, handling, management, and recycling/reuse/disposal of soils and groundwater contaminated by oils or hazardous materials, as well as other wastes that may be encountered during a construction project. Collectively, these materials have been defined as **"Remediation Wastes"**. Consult 310 CMR 40.0030 for complete details on Remediation Wastes, and DEP Policy #WSC-94-400, "Interim Remediation Waste Management Policy for Petroleum Contaminated Soils" for specific details and guidance on the characterization and management of petroleum contaminated soils.

In summary, Remediation Wastes consist of the following:

1. Contaminated Media

Contaminated Media includes soil and groundwater contaminated with oil or hazardous materials **at levels at or greater than applicable (RCS-1 or RCS-2) Reportable Concentration**. This is the most frequently encountered Remediation Waste at construction sites, and includes "urban fills" which contain elevated concentrations of oils, PAHs, and certain heavy metals.

2. Contaminated Debris

Occasionally, subsurface construction projects will encounter refuse, (building) demolition wastes, and/or other solid wastes, that have been contaminated by a release of oil or hazardous material (generally oils or waste oils). These wastes, as well as sorbents used to contain spills of oils or hazardous materials, are classified as **Contaminated Debris**.

3. Uncontainerized Wastes

Non Aqueous Phase Liquid (NAPL) oil or hazardous material and/or other "pure" discarded, uncontainerized oil or hazardous material products or sludges encountered in the environment are considered **Uncontainerized Wastes**. The most commonly encountered material of this nature at construction sites is immiscible oils (including gasoline) that are "floating" on the groundwater table. A subset of Uncontainerized Wastes is **Uncontainerized Hazardous Wastes**, which consist of uncontainerized hazardous materials (**excluding oil or waste oil**) which meets the definition of a listed or characteristic "hazardous waste".

Note that encountering 0.5 inches or more of NAPL at a construction site would trigger a "2 hour" reporting obligation to DEP, and the initiation of an Immediate Response Action.

A fourth category of waste materials, defined as **Containerized Wastes**, are not included within the definition of Remediation Wastes. Containerized Wastes consist of discarded or abandoned "pure" oil or hazardous material liquids, solids, sludges, or gases that are contained in a drum, tank,

engineered impoundment, or other fabricated container. If encountered during a construction project, these materials would constitute a "Threat of Release", requiring notification to DEP within 2 hours of obtaining knowledge. The management procedures for these materials would then be decided by the agency on a case-by-case basis, as part of its oversight of the Immediate Response Action that would be required to address this discovery.

B. "On Site" Management of Remediation Wastes

In the past, considerable confusion existed over the regulatory requirements associated with the handling of contaminated soils and other Remediation Wastes which met the state or federal definition of a "hazardous waste". The MCP, in 310 CMR 40.0031(3), now contains a codification and articulation of an important concept in this regard: with the exception of Uncontainerized Hazardous Wastes, the "on site" (i.e. within the boundaries of the contaminated area) management of most Remediation Wastes do not require permits, approvals, or licenses from the DEP Division of Hazardous Wastes, even if it involves the handling or treatment of contaminated soils, contaminated groundwaters, and certain wastes (i.e. non-soil matrices) that meet the state definition of "hazardous wastes". (Consult 310 CMR 40.0030 for complete details)

Note that while DEP's "on-site" deferral of Hazardous Waste permitting requirements [pursuant to 310 CMR 30.801(11) and 310 CMR 40.0031(3)] can significantly streamline on-site remedial/construction activities, this deferral is limited to those federal "Hazardous Waste" requirements for which Massachusetts has received formal EPA delegation. Although EPA has formally delegated to the Commonwealth implementation of most federal hazardous waste (RCRA) management requirements, as of the effective date of this policy, Massachusetts has not received authority from EPA to oversee the management of wastes that are considered "characteristic hazardous wastes" due to failure of the Toxicity Characteristic Leaching Procedure (i.e. "TCLP wastes").

EPA is in the process of evaluating and possibly modifying its interpretation and/or implementation of TCLP waste requirements. As of the effective date of this policy, however, EPA Region I has communicated to DEP the following position in this matter:

- TCLP wastes that are excavated, stored, and backfilled within the same "Area of Contamination" are not subject to the permitting or Land Disposal Restriction (LDR or "Land Ban") requirements of RCRA;
- TCLP wastes that are stored outside the Area of Contamination, or that are treated on-site, are subject to permitting and LDR restrictions, except for TCLP that are treated on site "in containers" within 90 days of generation.

This means that TCLP wastes (including contaminated soils failing a TCLP test) that are excavated and stored at a construction site within the general area of contamination, and which are subsequently backfilled at or near their point of original excavation within this area of contamination do not require treatment, permitting, approval, or licensing from EPA (or DEP) under federal and state hazardous waste management regulations. Project proponents are advised to consult with EPA Region I, Waste Management Division, for additional clarification/details in this regard, and requirements for on-site treatment activities.

C. Contaminated Soils

The most important Remediation Waste issue at construction sites generally involves the handling and management of contaminated soils. **There are two critical distinctions in this regard, relative to whether contaminated soils are redeposited "on site", or whether they are removed for off-site reuse, recycling, or disposal:**

1. On-Site Management

Contaminated soils that are re-deposited (backfilled) in or near their point of original excavation are considered Remediation Wastes that are being managed "on-site". As such, they do not constitute a "generated waste" that would otherwise be subject to waste handling and management provisions of the Massachusetts Hazardous Waste Regulations, the "Bill of Lading" provisions of 310 CMR 40.0034, or the permitting and "Land Ban" provisions of the federal RCRA program. Nevertheless,

project proponents are still required to properly handle and manage such materials, in conformance to applicable provisions of 310 CMR 40.0000, and in consideration of the guidance provided in this policy.

2. Off-Site Reuse/Recycling/Disposal

Remediation Wastes that are removed from the site of generation no longer qualify for the "on-site" deferral provisions of 310 CMR 40.0031(3), and become subject to a broader array of state and federal waste management regulations.

With the exception of TCLP wastes, most Remediation Wastes that are removed from the site of generation may be managed by the MCP "Bill of Lading" process outlined in 310 CMR 40.0034. Consult DEP Policy BWSC-94-400 for complete details on the management of petroleum contaminated soils, the most frequently encountered Remediation Waste at construction sites.

D. Soils Contaminated Below Reportable Concentrations

Under the provisions of 310 CMR 40.0006, **Contaminated Media** is defined to include soils contaminated by a release of oil or hazardous material "for which notification is required by 310 CMR 40.0300". Accordingly, contaminated soils which do not trigger a notification threshold are not considered **Remediation Wastes**, and do not require management as such when removed from the site of generation. Thus, unless specifically mandated by DEP pursuant to the provisions of 310 CMR 40.0370(2) or 40.0402, the following do not require management as a Remediation Waste:

- soils containing levels of oil and hazardous materials less than appropriate site-specific Reportable Concentrations (i.e. RCS-1 values for high exposure potential areas, RCS-2 for lower exposure potential areas); and
- soils containing elevated concentrations of lead due to solely to engine emissions or contamination by lead-based paints at the point of original application.

Moreover, in accordance with a recent position adopted by DEP with respect to the "contained-in" provisions of the Massachusetts Hazardous Waste Regulation (310 CMR 30.00), **soils containing concentrations of hazardous materials derived from a listed hazardous waste will no longer be considered a listed hazardous waste if the constituent levels are less than RCS-1 Reportable Concentrations. This does not apply to "characteristic" hazardous waste (including TCLP wastes).**

NOTWITHSTANDING THE ABOVE PROVISIONS, NOTE THAT THESE SOILS ARE NOT "UNREGULATED" WITH RESPECT TO THE MCP. Specifically, the following rules apply to the off-site movement of such soils, as stipulated in 310 CMR 40.0032(3):

- these soils may not be disposed or reused at locations where a site-specific Reportable Concentration will be met or exceeded (i.e. cannot bring soil from RCS-2 areas to RCS-1 areas if it will meet or exceed RCS-1 values); and
- these soils may not be disposed or reused at locations where the indigenous (i.e. "background") concentrations of oil and hazardous materials are significantly lower.

For the purposes of this policy, "significantly lower" should be interpreted as being a one order of magnitude difference.

E. Temporary Off-Site Storage of Remediation Wastes

The provisions of 310 CMR 40.0034(4) allow parties performing construction activities in contaminated areas the ability to temporarily store, stockpile, and/or consolidate contaminated soils at an off-site location owned or operated by the project proponent.

This provision may be particularly useful for public and private utilities, state authorities, and public works departments, who are encouraged to develop standardized Remediation Waste management plans in this regard, with respect to the centralized storage, consolidation, and characterization of small quantities of excavated materials resulting from emergency or routine repairs.

F. Managing Small Quantities of Contaminated Soils via URAMs

In addition to the temporary off-site storage provisions of 310 CMR 40.0034(4), additional mechanisms have been provided in the MCP to facilitate the development and implementation of cost-effective and environmentally protective Remediation Waste management plans by parties undertaking Utility Related Abatement Measures (URAMs).

Specifically, under the provisions of 310 CMR 40.0462(4), the use of a Licensed Site Professional (LSP) is not required to oversee URAMs that are limited to the excavation and off-site removal of less than 100 cubic yards of petroleum contaminated soils, or less than 20 cubic yards of soils contaminated by hazardous materials. The intent of this provision is to allow public and private utilities, state authorities, and public works departments to conduct limited routine or emergency repairs to underground utilities, and temporarily store any resultant small quantities of contaminated soils at a centralized location.

Once at the centralized location, however, all soils must be properly characterized, and soils containing oil or hazardous materials above the Reportable Concentration values applicable to the centralized storage location must be removed for proper reuse, recycling, or disposal, **within 120 days of it's initial excavation at the utility work site.**

G. Management of Contaminated Groundwater

Groundwater containing concentrations of oil or hazardous materials above a site-specific Reportable Concentration (RCGW-1 or RCGW-2) is considered a **Remediation Waste** subject to the management provisions of 310 CMR 40.0030. Generally, such Remediation Wastes are managed at the site of generation, via the pumping, treating, and discharging of contaminated groundwater in accordance with a Risk Reduction Measure undertaken under the MCP.

Although DEP/BWSC is making attempts to streamline the permitting/approval process of the on-site treatment and discharge of contaminated groundwater, as of the effective date of this policy, specific approvals and/or permits may be required by other DEP and/or state, local, or federal jurisdictions, depending on the method of effluent disposal selected.

There are basically 4 options available:

1. pump to a tight tank or "vacuum truck", with subsequent treatment/disposal at an off-site approved facility;
2. discharge to an upgradient portion of the excavated trench;
3. discharge to a sanitary sewer with appropriate permit from local and regional sewerage authorities and DEP;
4. discharge to a storm drain or surface water body with permit or approval from DEP and/or the US EPA;
or
5. discharge to the ground with approval from DEP/Bureau of Resource Protection.

With respect to the site-specific evaluation of the suitability of the above options, the following factors should be considered

- Option (1) would usually only be feasible in situations where excavation beneath the groundwater table is limited and/or where the required dewatering pumping rate is minimal (i.e. impervious formations). In such

cases, the contaminated water would have to be removed from the site as a Remediation Waste, pursuant to the provisions of 310 CMR 40.0030 using a hazardous waste manifest, if it is a listed or characteristic hazardous waste, or a Bill of Lading, if it is not a listed or characteristic hazardous waste.

- Where suitable site conditions are present, option (2) may be the most cost-effective method of handling contaminated dewatering effluent. In such cases, the following conditions must be met:
 - o contaminated groundwater must be discharge back into the open trench, in an area isolated from the working/pumping zone by soil berms or other suitable temporary "dams", in a manner that is protective of human health, safety, public welfare, and the environment;
 - o contaminated groundwater may only be discharged to a point in the open trench that is within the area of contamination, **and in no case more than 100 feet from point of extraction;**
 - o treatment of the dewatering effluent must be provided as needed to protect human and environmental receptors; and
 - o contaminated groundwater discharged in such a manner must not impact and/or infiltrate contiguous or nearby utilities, building foundations, or other subsurface structures.

Unless specifically directed by DEP as part of its review of site response action, temporary dewatering discharges conforming to the above specification will generally not require permitting by DEP.

- Where site conditions preclude the utilization of option (2), options (3) through (5) should be considered at sites where conditions preclude the utilization of options (1) or (2). In such cases, treatment of the dewatering effluent will generally be necessary, generally be the use of a mobile treatment trailer

equipped with one or more granular activated carbon (GAC) canisters.

For short-term operations of this nature, treatment and discharge to a surface water body/storm drain may be a cost-effective and expedient alternative. In such cases, a short term exemption from the permitting provisions of the National Pollutant Discharge Elimination System (NPDES) may be approved by the US EPA, via the Regional Office in Lexington, Massachusetts (tel 617/860-4300).

- Note that many local and regional (sanitary) sewerage authorities will not permit the discharge of groundwater into their sewer systems; it is incumbent upon the project proponents to discuss this with the appropriate sewerage agency or authority.
- Longer-term discharges to surface waters or storm drains, and any discharge to the ground, requires approval and/or issuance of a permit from DEP, Division of Water Pollution Control, under the provision of 314 CMR 3.00 and 5.00, respectively. In such cases, contact: DEP, Division of Water Pollution Control, One Winter Street, Boston, MA 02108. (tel 617/292-5673)

6.0 PERFORMANCE STANDARDS AND PROJECT LIMITATIONS

The focus of MGL c. 21E and 310 CMR 40.0000 is the comprehensive remediation of sites contaminated with oil or hazardous materials.

This is usually not the prime concern nor objective of parties performing a construction project in an area that happens to be contaminated.

In the short term, such a distinction may be acceptable. Specifically, pollution mitigation/remedial response plans addressing contamination encountered at construction sites can be limited to only those actions necessary to complete construction activities, provided the following conditions are met:

- contamination conditions are not exacerbated as a result of construction activities;

- workers, surrounding populations, and environmental interests are sufficiently protected during and following construction activities;
- construction activities do not preclude likely (eventual) comprehensive remedial response alternatives;
- remediation wastes are appropriately managed; and
- appropriate reports are provided to DEP to document site conditions, the nature and extent of encountered contamination, and site response/mitigation measures undertaken.

Notwithstanding the above, depending upon the nature of site conditions and construction activities, DEP/BWSC reserves the right to make determinations, at any point in time, on the scope and extent of necessary remedial response actions, as per the authority and provisions stipulated in MGL c. 21E and 310 CMR 40.0000. This may include a determination by DEP/BWSC that construction activities in contaminated areas may not be commenced or continued prior to the initiation/completion of additional environmental investigations or necessary remedial response measures.

In many cases, additional assessment and/or remedial cleanup actions will (eventually) be necessary at contaminated construction sites. Parties undertaking construction in such areas should evaluate the nature and extent of their liabilities and legal responsibilities for such contamination, and consider the cost-effectiveness of initiating broader remedial response actions during construction operations, as regulated by DEP under 310 CMR 40.0000.

7.0 PRE-CONSTRUCTION CONSIDERATIONS

Prior to the initiation of construction activities in contaminated or potentially contaminated areas, the involved parties should carefully consider the following items:

A. Site Precharacterization

Parties should consider conducting a precharacterization study to determine the quality of the soil to be excavated and groundwater to be dewatered, especially in areas where the site history/land use indicates the possibility of oil or hazardous material releases. Where there is no (existing) evidence of a problem, such a "fishing expedition" is optional, but would be advisable under the following conditions:

- where construction delays cannot be tolerated;
- where construction costs must be estimated to a high degree of certainty; and
- where soil/waste stockpiling and staging areas are limited or restricted.

The probability of encountering unexpected areas of contamination decreases with an increased level of precharacterization. By pre-defining site conditions, parties will be afforded an opportunity and time period to plan response actions, and obtain necessary permits and approvals.

Although cognizant of the disruptive and costly fallout of shutting down operations while awaiting an agency approval or permit, parties should be aware that DEP is not equipped or staffed to provide instantaneous attention and "crisis management" to construction projects that encounter contamination. **Precharacterization, therefore, should be viewed as a "risk of doing business" decision, with attendant costs and benefits.**

B. Project Modifications

Based upon precharacterization studies, and/or encountered contamination, parties should consider whether project modifications are necessary or cost-effective. This is in many cases an economic decision: the benefits of the original design versus the cost to manage the encountered contamination. At some sites, building designs have been modified (i.e. omit lower sub-levels) and utility excavations have been re-routed, or postponed to low-groundwater seasons, as a result of such a decision analysis.

Alternative options, however, may not incumber or preclude eventual, likely remedial response actions.

C. Contingency Planning

Even where some level of precharacterization is performed, a detailed contingency plan should be available for every construction project. Such a plan would detail field observation and monitoring actions, as well as classification, segregation, stockpiling, testing, and other response options should contamination be encountered.

D. Contaminated Soil Management

On many occasions, construction bid documents defer the responsibility of soil removal to an excavation or trucking contractor or subcontractor. Often, these contractors have no training or awareness of contamination issues, and indiscriminately route the contaminated soils to inappropriate and unapproved locations. Conversely, where awareness does exist, the contractor may wait to the last minute to seek appropriate disposal/re-use locations, which can delay the project schedule.

It is strongly recommended that the issue of soil management be specifically addressed, overseen, and monitored by the site owner and/or developer, who ultimately retain liability for wherever the contaminated material is deposited. This liability includes a responsibility to the state under MGL Chapter 21E, as well as potential third-party lawsuits by affected parties.

E. Residential and Commercial Buildings

Buildings in contaminated areas present a number of technical, legal, and "risk communication" concerns. This is especially true for residential dwellings and school/day-care facilities.

In all cases, appropriate steps **must** be taken to insure that any and all future occupants of such buildings are not exposed to site contaminants at levels that would present a significant risk to human health, as defined in 310 CMR 40.0900. Beyond this minimum standard, where feasible, steps should be taken to prevent or minimize **any exposure** to site contaminants:

- A subsurface vapor barrier should be considered at all new buildings constructed in contaminated areas. At sites where significant levels of volatile contaminants are present (light petroleum distillates, chlorinated solvents, etc.), a passive or active sub-building venting/depressurization system should be installed for immediate or potential future activation, in compliance with 310 CMR 40.0040 and applicable DEP/BWSC policies. Similar in design and concept to radon mitigation systems, installations of this nature during building construction or renovation are relatively inexpensive insurance/contingencies against potential problems with subsurface vapor infiltration. **Note that the infiltration of subsurface vapors into residential and school buildings, regardless of the level of risk, constitutes a condition of "Substantial Release Migration", as described in 310 CMR 40.0413(2)(g), requiring the initiation of an Immediate Response Action.**
- Contaminated soils should be covered by an appropriate barrier (i.e. pavement) or by at least 1 foot of clean soil.
- An Activity and Use Limitation, as described in 310 CMR 40.1000, may be advisable or necessary to insure that future owners/occupants of the site do not inadvertently disturb or become exposed to contaminated media.

Contaminated conditions in building area should be brought to the attention of local permitting authorities overseeing construction, including the Building Department and/or Board of Health.

While short term actions are generally effective in addressing immediate exposure concerns, more comprehensive assessment and remedial response actions will most likely be necessary and/or required at many of these sites, pursuant to the phased response process of 310 CMR 40.800.

8.0 SITE PRE-CHARACTERIZATION

A recommended site pre-characterization and Remediation Waste management process is summarized in Figure 1.

The goal of pre-characterization is the in-situ determination of the nature, degree and extent of contamination, including the identification of "hot spots" in both soils and groundwater. The level of pre-characterization efforts should be a function of:

- o site usage/history;**
- o documented and potential pollution problems; and**
- o relative homogeneity of site/soil conditions.**

The pre-characterization program should include sampling/analysis of surficial and subsurface soils and, where appropriate, groundwater (obtained from soil borings/test pits or monitoring wells). Where groundwater is presumed to be relatively shallow (within 15 feet of ground surface), groundwater investigations within the footprint of construction are recommended to:

- establish whether dewatering will be necessary, by determining the potentiometric surface(s) of the groundwater, relative to the proposed depth of excavation;
- determine the chemical quality of the site and local groundwater, to facilitate the selection and/or design of treatment/handling systems, and procurement of any necessary discharge permits, should dewatering be necessary; and

- evaluate soil quality in the area(s) of the monitoring well(s) by using groundwater quality data as a "barometer" of the presence and levels of soluble contaminants in the construction area.

The frequency and location of soil and/or groundwater sampling is dependent upon site conditions. In general, pre-characterization sampling should target known or suspected areas of contamination. In the absence of information on known/suspected contamination, a sampling grid should be considered to identify contaminated areas across the site.

On large construction projects, it may not be cost-effective to attempt a comprehensive in-situ pre-characterization of environmental conditions. As an alternative, parties should consider conducting a more limited investigation, with the objective of identifying the types of contaminants present, and the location of any extensive "hot spots".

If discrete areas of contamination or "hot spots" are identified in the vadose zone by the in-situ testing program, consideration should be given to removing these soils before construction commences.

If contaminated groundwater is identified at the subject location through the in-situ testing program, soils beneath the water table will likely be contaminated. Moreover, groundwater contamination generally implies that such soil contamination is not localized. Parties planning excavations beneath the water table should consider the technical, logistical, and economic consequences of handling (potentially large volumes of) wet, contaminated soils and contaminated dewatering effluent prior to initiation of site activities.

9.0 CONTINGENCY PLANNING

In all cases, generic, area, or project-specific contingency planning is recommended:

A. Monitoring Activities

At the very least, a visual and olfactory observation/documentation plan should be developed and implemented at every construction project in urban, industrial, or heavily developed areas. Preferably, a field organic vapor meter (PID or FID) should be employed to scan soil and groundwater media. Headspace readings above 5 ppm v/v total organic vapors (excluding methane) indicate the potential for environmental contamination, and should trigger a progressive series of more detailed field and/or laboratory analytical tests.

While a recommended and generally effective technique, the limitations of field monitoring activities must be recognized.

B. Contaminated Soils

Contingency plans should be developed to facilitate the characterization, segregation, stockpiling, testing, and disposing of contaminated soils and/or waste products that could be encountered during construction operations.

C. Contaminated Groundwater

Because of permitting issues, the unexpected discovery of contaminated groundwater can greatly delay those construction projects where dewatering is necessary. As a contingency on small jobs, it may be advisable to mobilize a licensed hazardous waste transporter's "vacuum"/tanker truck for on-call or standby duty. Such an option may not be feasible where a high pumping rate is required.

D. Emergency Response Operations

It may be necessary to mobilize a hazardous materials emergency response team if unexpectedly high levels of chemical contamination are encountered. A number of companies within Massachusetts and New England specialize in such response actions. A list of contacts and mobilization procedures should be pre-established.

10.0 WORKING IN CONTAMINATED AREAS

Specialized skills, training, and equipment is required when working in contaminated areas. Parties unfamiliar with such procedures are advised to contract with competent experts in this field. Ultimately, it remains the responsibilities of site owners, developers and/or contractors to insure activities in such areas are conducted appropriately, adhering to the performance standards articulated in Section 4.0. In this regard, the following guidance is given:

A. Worker Protection

Worker protection is primarily addressed through state and federal occupational regulations (i.e. OSHA). DEP/BWSC generally defers to such authorities, and places the onus on project proponents to insure an appropriate level of worker protection.

B. Analytical Monitoring

Some level of workplace and environmental monitoring is generally necessary when working in contaminated areas. The following are recommended:

- Combustible Gas Indicator;
- Oxygen meter;
- colorimetric air-monitoring tubes;
- Photoionization or Flame Ionization Detection organic vapor meters/gas chromatograph.

Where the liberation of contaminated dust is a concern, real-time particulate monitors are recommended for job-site/neighborhood perimeter monitoring (PM₁₀ particulates).

C. Surrounding Populations

Occupational exposure standards are **not** appropriate for application to surrounding populations. What may be deemed an "acceptable" level of (voluntary) exposure to a healthy, trained, adult construction or factory worker is NOT necessarily an appropriate standard to evaluate (non-

voluntary) exposures to surrounding human populations, particularly residential/school/playground areas.

For this reason, the human health risk management standards in 310 CMR 40.0900 should be the basis for determining the "acceptable" level of protection of surrounding human populations, not occupational standards.

The recommended maximum "fence line" concentrations of common volatile organic compounds (VOCs) is provided in Table 5. The chemical-specific recommended values are the lower of:

- the DEP Threshold Effect Exposure Limit (TEL);
- the DEP Ambient Allowable Ambient Air Limit multiplied by a factor of 75 (to account for a one year construction exposure); and
- the 50th percentile odor recognition level.

If necessary, the value selected above was increased to ensure that it was not below typical "background" conditions. Down-wind "fence line" air monitoring should be conducted on a systematic or real-time basis, using instrumentation and methodologies capable of achieving the desired detection limits.

D. Forced Trench Ventilation

Except where explosive conditions are present, DEP does not recommend forced trench ventilation in those contaminated areas surrounded by sensitive receptors (homes, schools, commercial areas). In such cases, vapor concerns should be addressed through proper worker protection (respirators, SCBAs, etc).

Where forced ventilation is necessary, off-gas treatment should be provided (i.e. by activated carbon treatment of a point-source air discharge), as specified in 310 CMR 40.0040.

Additionally, under the provisions of 310 CMR 7.00, an air quality discharge permit may be required for any emission greater than 1 ton/year, or any emission that results in a condition or air pollution.

E. Containing Contamination

Construction activities and installed structures must not result in/exacerbate the subsurface mobilization of site contaminants, nor expose surrounding receptors to levels of oil or hazardous materials that would present a significant risk of harm to human health, safety, public welfare or the environment, as defined in 310 CMR 40.0900.

In furtherance of this performance standard, project proponents should carefully consider whether one or more of the following mitigative actions are necessary at their site:

- o to prevent or minimize the subsurface migration of immiscible, dissolved, or vapor-phase contaminants along the pervious backfill of underground utilities, low-permeability (concrete, clay) "dams" should be periodically constructed along the alignment, perpendicular to/surrounding the underground utility;
- o where soil contamination is of concern, special measures should be instituted and monitored (i.e. wetting) to ensure dust control at the job site. The use of vapor-suppressing foams may be necessary or advisable to control toxic or noxious odors;
- o where appropriate, a truck/equipment decontamination program should be instituted to minimize the spread of contaminated soil outside of the site of generation, particularly if the site is in or near a school, playground, or residential area. The tracking of wet, contaminated soils via entrainment in truck tire treads can be especially problematic.

F. Backfilling contaminated soils

In general, DEP does not object to backfilling contaminated soils on construction jobs, subject to the following restrictions and limitations:

- Chemical waste products, sludges, and overtly contaminated soils should not be backfilled into areas with lower existing/residual contaminant levels. Within this context, "overtly" contaminated soils are defined as soils that contain free (non-aqueous) liquids, or

more than 10,000 ug/g of hazardous materials. Such materials should be appropriately segregated, stockpiled, sampled, and subsequently removed to an appropriate off-site location.

- Contaminated soils containing oil or hazardous materials above a site-specific Reportable Concentration should be backfilled as close as reasonably possible to their point of origin, should not be redistributed among defined strata, and should not be moved from above to below the groundwater table.
- The chemical compatibility of the contaminated soils with surrounding structures should be considered and addressed. For example, it may be prudent to encase vulnerable piping and/or pipe joints in concrete in those areas where high organic contamination may result in deleterious reactions with piping materials and/or joint gaskets. (This is especially true for potable water piping, particularly where such pipes are located below the water table).
- Contaminated backfill containing oil or hazardous materials above a site-specific Reportable Concentration or risk-based cleanup level should be overlain by an impervious containment structure (i.e. pavement) or by at least 1 foot of clean fill.
- Future maintenance needs and resultant worker exposures should be considered and addressed whenever contaminated fills are placed around subsurface utilities and structures.
- The backfilling of contaminated soils above RCS-1 concentration values or site-specific risk-based values on residential properties should be avoided, unless evidence exists to indicate wide-spread exceedences of RCS-1 values are present throughout the property and/or surrounding area.

Unless specifically stated otherwise, DEP/BWSC reserves the right to require additional remedial response actions, if warranted, at any location where contaminated material is backfilled and/or is otherwise present.

11.0 STOCKPILING AND SEGREGATION OF CONTAMINATED SOILS

In most construction projects, a certain amount of excavated soil will have to be removed from the site, for off-site reuse, recycling, or disposal. This could range from only a few cubic yards or less for a small utility or infrastructure repair job, to tens of thousands of cubic yards for a large building foundation. An essential element of managing soils at construction sites is the proper segregation and stockpiling of contaminated materials, **from the point and at the time of excavation**. The range of disposal options, and their associated costs, are a function of contaminant levels. **Mixing contaminated materials into uncontaminated materials will limit treatment/disposal options, and greatly increase costs.**

An environmental professional should be on-site to supervise the excavation and segregation of contaminated materials. At a minimum, the on-site professional should use an Organic Vapor Detector (10.0 +/- eV PID meter or FID meter) to screen and segregate soils. On large jobs, it may be desirable to establish an on-site laboratory to provide rapid analytical turn-around times. Real-time analysis of this sort will facilitate the segregation and stockpiling of soils during excavation activities.

A. Initial Segregation

In the first stage of the segregation process, the excavate should be screened for visible and olfactory evidence of waste materials and/or overtly contaminated soils (i.e. cinders, ash, oil staining, coal tars, unnatural odor or color). Soil in the area of known or suspected contamination should be targeted for additional investigation as part of the screening/segregation process.

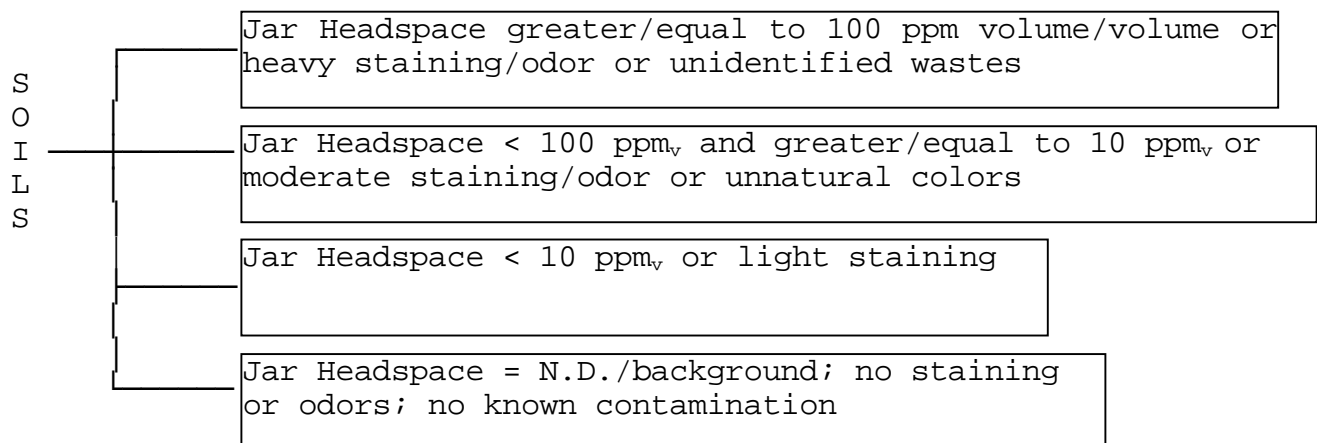
Excavate containing (non-hazardous) waste materials (wood, ash, rubble) should be segregated during the initial screening operations. If removed from the site, these materials will need to be properly disposed or recycled. It may be advisable to mobilize mechanical screening systems to separate bulk waste from soil at some jobs.

Large rocks or other solid debris that appear contaminated with oils or other heavy molecular weight organic fluids should be segregated in a separate area. Subsequently, such materials may be

steam-cleaned and/or crushed and disposed/reused at an appropriate location.

B. Headspace Screening/Segregation During Excavation

During excavation, headspace screening of soils for the presence of volatile organic compounds (VOCs) should be performed using an Organic Vapor Meter. Soils should be segregated into separate stockpiles according to headspace readings and visual/olfactory observations. The following stockpile segregation scheme is recommended:



It is important to recognize and understand the limitations of visual, olfactory, and headspace screening segregation practices. While these are useful and feasible tools, they cannot distinguish many classes of hazardous contaminants, including such ubiquitous "urban" contaminants as lead and PAHs. In such locations, analytical testing would be necessary to make any conclusive judgements on excavate quality.

A recommended jar headspace procedure to screen contaminated soils is provided in Appendix A.

C. Additional Analytical Screening Techniques

Other field analytical screening techniques and methodologies should be considered to aid in the segregation of excavated materials. A number of innovative techniques are now commercially available, including:

- Portable Infrared Spectrometers for TPH analysis;
- Portable UV Fluorescence Spectrometers for TPH/PAH analysis;
- Portable X-Ray Fluorescence Spectrometers for metal analysis;
- Colorimetric methods for BTEX/TPH analysis; and
- Immunoassay test kits for TPH, PAHs, PCBs, and other analytes

All of the above, and other innovative techniques, are in various stages of validation. Most lack the precision and accuracy of conventional laboratory methods, and are subject to various interferences. Nevertheless, the use of such techniques and devices have utility in optimizing segregation operations and reducing the need for laboratory analysis, and thus may be cost-effective for larger projects.

D. Other Segregation Issues

To the extent information or data is available, an attempt should be made to segregate soils contaminated with petroleum products **only** from soils contaminated with other hazardous materials. In general, there are more options available to deal with petroleum-only contaminated soils, as compared to other chemical contaminants, and mixed materials are managed on the basis of the worst/most restrictive constituents.

E. Securing and Stockpiling Contaminated Materials

Appropriate steps must be taken to stockpile contaminated materials, pending analytical testing and/or off-site disposal. Contaminated materials should generally be placed on, and covered with, a minimum 6-mil polyethylene tarp.

Overtly contaminated soils (i.e. percent levels of hazardous materials) and chemical waste materials should be contained by a minimum 20-mil polyethylene tarp, and secured with a perimeter of concrete Jersey barriers, or secured in temporary watertight roll-off containers. **DEP/BWSC should immediately be notified of the discovery of such gross levels of contamination.**

12.0 PRELIMINARY SAMPLING & ANALYSIS OF SOIL STOCKPILES

Segregated stockpiles displaying signs of contamination should be characterized by additional sampling and analysis, prior to removal to an off-site location. An exception would be where a thorough in-situ precharacterization study was undertaken, **and** where observations during excavation are consistent with precharacterization findings.

In many cases, the nature and extent of analytical testing will be dictated by the permit or corporate requirements of the off-site facility or location that will receive the contaminated soils. Note that receiving facilities are free to require whatever level of testing and characterization they deem necessary and appropriate, and many elect to require more than what may be specified or recommended in a DEP issued permit, regulation, or policy. As such, pre-consultation with representatives from one or more proposed receiving facilities would be advisable.

The following guidance is therefore general in nature, and should be viewed as recommended actions for preliminary stockpile characterization, in order to determine (1) if the soil is in fact "contaminated", (2) the nature and approximate level or range of contamination, (3) whether the contamination is subject to the "Remediation Waste" requirements of the MCP, and (4) appropriate management options/requirements, which may or may not require additional characterization due to receiving-facility demands.

A. Sampling Approach

Composite sampling is recommended, where appropriate, to reduce analytical expenses. In such cases, equal portions of a number of (grab) subsamples may be combined into one sample composite, which will then be analyzed for contaminants of concern. In such cases:

- * Dissimilar grab samples should not be composited (based upon visual/olfactory and/or analytical screening).
- * Care must be taken when compositing soil samples for VOC analysis to avoid off-gassing of sample constituents.

- * Except for parameters with limited sample holding times (i.e. VOCs), it may be prudent to temporarily retain and archive individual (grab) subsamples, pending the acquisition and evaluation of analytical data results for the composite sample. In this manner, if the composite sample contains elevated levels of targeted contaminants, it would be possible to re-analyze the individual (grab) subsamples, to see if the contaminant is isolated or concentrated in one part of the sampled area.

Where composite sampling is being accomplished to document compliance to a "maximum level" performance standard (as opposed to a "representative level" performance standard), the number of subsamples should not be in excess of the designated performance standard divided by the method detection limit. For example, if the "maximum level" performance standard is 500 ug/g of TPH, and the method detection limit is 100 ug/g TPH, no more than 5 subsamples should be composited. Under such a scheme, if the 5 sample composite is 100 ug/g or less, none of the individual subsamples could be above the stated action level (500 ug/g).

Samples subjected to destructive analytical screening evaluation (i.e. PID testing of headspace) should never be utilized for additional/laboratory analysis. While a comparison of screening/laboratory data is often useful, such comparisons must be made on the basis of discrete split-samples.

B. Sampling Frequency

The number of samples needed to characterize segregated stockpiles should be evaluated on a case by case basis. In general, soils that are heterogeneous, yield high headspace readings, or exhibit heavy staining/strong odors require more testing than homogenous soils that appear to be less contaminated upon initial screening and segregation. Without exception, unidentified wastes found in soil must be sampled and analyzed by the appropriate analytical methodologies.

At a minimum, segregated soils should generally be analyzed at the following frequency (grab or composite samples):

Initial Screening Results	Minimum Analytical Frequency
Unknown source; jar headspace	

greater/equal to 100 ppm _v heavy staining/odor or unidentified wastes	1 sample/20 yd ³
Unknown source; jar headspace < 100 ppm _v and greater/equal to 10 ppm _v or moderate staining/odor or unnatural colors	1 sample/50 - 100 yd ³
Jar headspace < 10 ppm _v or light staining or known source/contaminant profile	1 sample/100-500 yd ³

C. Analytical Parameters

The analytical program should reflect the site and area history and land use, and the results of the in-situ testing and initial analytical screening. At all sites located in urban/industrialized areas, soil samples should generally be analyzed for total petroleum hydrocarbons (EPA Method 418.1 or GC/FID), volatile organic compounds (EPA Method 8240 or 8260), and selected heavy metals, including lead. A summation of these and additional recommendations is contained in Table 6.

In general, analytical testing of contaminated soils should initially focus on total (bulk) soil concentrations, since such values best characterize potential health and environmental impacts. TCLP testing should be considered whenever Remediation Waste will be removed from the area of contamination, to determine whether it is a "characteristic" hazardous waste. TCLP wastes can only be removed from the site of generation by a licensed hazardous waste transporter, using a hazardous waste manifest.

Generators of wastes are allowed to consider the nature and composition of their wastes in determining if and when TCLP testing is required. For contaminated soils, a minimum (bulk) soil concentration value would be needed to mathematically exceed a TCLP elutriate test level. These minimum concentrations have been tabulated in Table 7.

13.0 APPENDICES

The following appendices contain recommendations on a field headspace screening procedures, as well as lists of acronyms, cited regulations, telephone numbers, and other related materials.