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The second in a series of three

**ENVIRONMENTAL PLANNING,
CONSTRUCTION and OPERATIONS
PRIMERS**

Produced by the:

Construction Institute's Environmental Committee

MANAGING ENVIRONMENTAL COMPLIANCE DURING FIELD CONSTRUCTION

A "How To" Guide

***for identifying and managing
environmental and land use issues
commonly encountered at
construction and redevelopment projects
in Connecticut.***

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Table of Contents

CHAPTER 1. INTRODUCTION.....	1
<i>SECTION 1.01 OBJECTIVE</i>	<i>1</i>
<i>SECTION 1.02 STRUCTURE</i>	<i>1</i>
CHAPTER 2. ENVIRONMENTAL PERMIT REVIEW, IMPLEMENTATION & COMPLIANCE	2
<i>SECTION 2.01 PROJECT INITIATION</i>	<i>2</i>
<i>SECTION 2.02 PERMITS/REGISTRATIONS/AUTHORIZATIONS REVIEW.....</i>	<i>2</i>
<i>SECTION 2.03 CONDITIONAL APPROVALS</i>	<i>3</i>
<i>SECTION 2.04 PERMIT REVISION: WHAT'S CHANGED</i>	<i>4</i>
<i>SECTION 2.05 ADDITIONAL PERMITS?</i>	<i>4</i>
<i>SECTION 2.06 STORMWATER</i>	<i>5</i>
<i>SECTION 2.07 SEDIMENTATION AND EROSION CONTROL MAINTENANCE.....</i>	<i>5</i>
<i>SECTION 2.08 POST-CONSTRUCTION STORMWATER.....</i>	<i>6</i>
CHAPTER 3. NON-PERMIT PLANNING	7
<i>SECTION 3.01 HAZARD COMMUNICATION STANDARD.....</i>	<i>7</i>
<i>SECTION 3.02 UST (UNKNOWN) - NOTIFICATION AND RESPONSE PROCEDURES</i>	<i>9</i>
<i>SECTION 3.03 SPILL PREVENTION, CONTROL & COUNTERMEASURE (SPCC) PLANS</i>	<i>11</i>
<i>SECTION 3.04 BEST MANAGEMENT PRACTICES (BMPs)</i>	<i>11</i>
<i>SECTION 3.05 SPILL RESPONSE AND NOTIFICATION PROCEDURES</i>	<i>11</i>
<i>SECTION 3.06 REPORTING OF CERTAIN ENVIRONMENTAL HAZARDS</i>	<i>12</i>
<i>SECTION 3.07 ASBESTOS AND HAZARDOUS MATERIALS</i>	<i>13</i>
CHAPTER 4. THE KICK-OFF MEETING	16
CHAPTER 5. WASTE DISPOSAL	17
<i>SECTION 5.01 WASTE TYPES</i>	<i>17</i>
CHAPTER 6. CONTAMINATED SITES.....	21
CHAPTER 7. CONSTRUCTION ENVIRONMENTAL MONITORING.....	25
<i>SECTION 7.01 PROJECT-SPECIFIC REQUIREMENTS CHECKLIST PREPARED</i>	<i>25</i>
<i>SECTION 7.02 SITE INSPECTIONS BY REGULATORY PERSONNEL.....</i>	<i>25</i>
CHAPTER 8. PROJECT DOCUMENTATION	27
<i>SECTION 8.01 ENVIRONMENTAL HEALTH AND SAFETY MONITORING DATA</i>	<i>27</i>
<i>SECTION 8.02 WASTE MANIFESTS/ BILLS OF LADING/LAND DISPOSAL RESTRICTIONS</i>	<i>27</i>
<i>SECTION 8.03 DISCHARGE MONITORING DATA</i>	<i>28</i>
<i>SECTION 8.04 EQUIPMENT OPERATING DATA</i>	<i>28</i>
<i>SECTION 8.05 TANK REGISTRATION FILED.....</i>	<i>28</i>
<i>SECTION 8.06 PERMITS TO OPERATE FILED</i>	<i>28</i>
CHAPTER 9. PROJECT TRANSITION.....	29

Chapter 1. Introduction

The Construction Institute's Environmental Planning Primer identified a series of common environmental and land use considerations which could apply to any construction or renovation project in Connecticut and information on how to plan for them. These included environmental requirements at "green-field" sites where there have been no pollutants introduced by past activities and "brownfields" where historic contamination has occurred. This Environmental Construction Primer has been prepared to assist you with "Managing Environmental Compliance during Field Construction". As in the Planning Primer, the procedures described include environmental requirements and recommendations applicable to both greenfield and brownfield sites.

Section 1.01 Objective

The objective of this primer is to provide a basic review of how environmental and land use considerations identified during project planning can be effectively communicated to and managed by the project team during field construction. For purposes of this primer, we have adopted the title "Construction Manager" (CM) as the individual responsible for this management. This title is not an absolute. Your project may or may not have an individual who carries this title and, if it does, he or she may not be the one responsible for managing all of the issues discussed in this primer. Each specific project should review its team structure and determine who the responsible individual is or individuals are, regardless of their actual titles.

Section 1.02 Structure

The first portion of this primer will focus on environmental compliance issues that may be applicable to any construction project, whether at a greenfield or brownfield site. This includes contingency planning for unknown contamination. The second portion will review typical requirements for known contaminated sites including sites with the active involvement of the Department of Environmental Protection (DEP) and those being done "voluntarily".

Chapter 2. Environmental Permit Review, Implementation & Compliance

Section 2.01 Project Initiation

The project planning is complete, the golden shovels used and hung on the wall and field construction is about to begin. At this point the project team should have considered each of the items identified in the Environmental Planning Primer, determine if they apply to this project and, if so, how they are going to be addressed and by whom during construction. The question is, has the Construction Manager (CM) been given this information by the people who made these determinations?

Experience tells us that more often than not, all of this information has not been communicated by the planning team or its importance adequately understood by the CM. Experience also tells us that all too often generic references in project specifications which require compliance with “all applicable” environmental laws have come to be considered boiler-plate language that gets passed over by the CM with a shrug. A kick-off meeting to disseminate what the actual environmental requirements applicable to the project are is an approach with a much higher chance of achieving compliance and avoiding delays. While the structure of this meeting can vary widely, we recommend that at a minimum the following issues be addressed in preparation for it.

Section 2.02 Permits/Registrations/Authorizations Review

Based on the project needs and site characteristics, some number of environmental permits, registrations and/or authorizations will likely have been applied for during project planning. For convenience, these will be collectively referred to below as “Permits”. As identified in the Planning Primer, at greenfield sites, these may include:

- Local Planning and Zoning Approvals/Permits;
- Local Aquifer Protection Area Requirements;
- DEP General Permit for Management of Stormwater and Dewatering Wastewaters at Construction Sites;
- Local Inland Wetlands Permit;
- Other State and Federal Wetlands Permits including Federal Army Corps of Engineers;
- Dredge and Fill (402) Permits, DEP Coastal Wetlands Permits, etc.;
- DEP Permit to Operate an Emergency Generator;
- DEP Permit to Operate Rock Crusher/Screeners;
- DEP Water Diversion Permit;
- Local Underground Storage Tanks (UST) Removal Permits;
- Federal/State/Local Waste/Wastewater Disposal Authorizations/Permits;
- Department of Public Health Asbestos Abatement Plan;
- DEP Landfill Disruption Permit; and
- DEP Underground Storage Tank Registrations/Local Building Permit.

As noted, these permits may be imposed by Federal, State, and/or Municipal authorities. However, after local inland wetlands, building and planning and zoning permits, most environmental requirements will be imposed at the State level. The most notable exceptions are

the Section 404 dredge and fill permits and related wetland permits issued at the Federal level. Projects requiring an approval under the National Environmental Policy Act due to their source of funding or other interstate considerations are also potential exceptions, but because these projects have such a focus on environmental issues they are beyond the scope of this primer.

Which of these permits will be applicable will be different for each project. The Construction Manager should question the project planning team about all of them to identify and create a project-specific list and then obtain a copy of each permit. Once the list is thought complete, the CM should read each permit to understand what's required. It is important to recognize that most permits will have a set of general conditions that apply to all permits, as well as a set of specific conditions that are tailored to the individual permit. Frequently, the general conditions are buried in the boiler plate language of the permit or merely incorporated by reference to a statute or regulation and so may not be as obvious as the site-specific requirements. Permits may also reference or be contingent upon plans submitted with the application that impose further requirements. To keep all of this information readily available, it is a good practice for the CM to expand the list to include additional information such as:

- Name of Applicant (whose responsible);
- Date of Application/Permit Expiration;
- Name of the “activity” regulated;
- Type of “Application” and any requirement it contains for prior approval or notification before work can begin;
- General Provisions/Requirements/Conditions;
- Site Specific Provisions/Requirements/Conditions; and
- Names of and Requirements imposed by any “Plans” referenced in the application.

When the construction project begins, the various agencies that have issued the permits must generally be notified that work has begun. Frequently, this notification includes a certification agreeing to comply with the permit conditions signed by the applicant or his agent – our Construction Manager.

A ubiquitous example of this is the General Permit for Management of Stormwater and Dewatering Wastewater from Construction Activities. The general conditions of this permit require development of a Stormwater Pollution Control Plan, certification of this plan by all sub-contractors, and submittal of schedules prior to start of work. While the CM may have had little or nothing to do with the development of the Stormwater Pollution Control Plan, it is likely his or her duty includes verifying sub-contractor certifications and submitting sequencing schedules. Compliance with the general conditions may also have resulted in the creation of a project-specific Erosion and Sedimentation Plan (E&S Plan). The E&S plan in turn may require the construction of a specific control feature (e.g., wheel wash station), regular inspections and recordkeeping, and scheduled maintenance. Simply checking off that the permit was obtained will not alert the CM to these detailed requirements and will not achieve compliance. The CM needs to read and understand all permits and put a system in place to track compliance.

Section 2.03 Conditional Approvals

The Construction Manager should also ask the planning team if there were any operational commitments made to avoid the need to obtain a written permit or approval. These types of commitments are not always documented in the written record. An example may be an

agreement with local inland wetlands not to stockpile materials within a specified distance of a wetland. Typically such conditional approvals are made at the local level and inquiry of the project architect or civil engineer is a logical starting place for these types of questions.

The CM should record any such verbal requirements and restrictions on his annotated list of permits. This list becomes a key topic for discussion at the construction team kick-off meeting described at the end of this section. These discussions should include not only what actions are required but who will be responsible for performing specific actions, including inspections, monitoring and reporting and that any and all approvals required before work begins have been received.

Section 2.04 Permit Revisions: What's Changed?

Site specific permits can require long periods of time to obtain. For this reason, permit applications are frequently submitted as early in the design phase as possible. At the time the permits must be applied for to maintain the construction schedule, most projects are still evolving and it is difficult to predict all of the requirements and details that may become relevant. Design changes with environmental consequences can be made right up to the 100% design level.

Since the plans and drawings submitted with the application become part of the permit itself, it is crucial for the CM to evaluate whether the permitted activities are the same as those in the final design drawings in the contract documents. Any changes to the design or construction sequence which occurred after permit applications were submitted may now require permit modifications, some of which can require resubmission to and review and approval by the responsible regulatory authority. Similarly, any changes implemented during construction to accommodate unexpected conditions can also trigger the need for resubmittals requiring review and approval. In these cases, the proposed revisions should not be constructed until approved, potentially resulting in a delay. These delays may be minimized or avoided if, at the time a change in plans/design is being considered, this consideration includes the impact of the change on the existing environmental approvals. There may be a functionally equivalent or adequate change that avoids the need for permit modification.

Section 2.05 Additional Permits?

Although a project designer will typically be able to provide a list of permits required for a specific built project, the requirement to obtain all the appropriate approvals during construction typically falls to the Construction Manager. A careful review of the project construction needs compared to the permits listed is warranted to evaluate whether all the permitting requirements for the construction activities needed to build the project have been considered. For example, operation of crushers, screeners and generators can require permits, as discussed in the Planning Primer. Chapter 6 also discusses Permits which may only be applicable at brownfields sites.

Section 2.06 Stormwater

By far, the most common environmental permit for a construction project is for the management of stormwater to minimize the erosion of soil and to control sediment deposition. The primary mechanism in Connecticut for regulating stormwater is the [General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities](#) (attached as [Appendix A](#)) and available at www.dep.state.ct.us/pao/download.htm. Projects that create a disturbed area of one or more acres (total), regardless of phasing, must adhere to the permit requirements including developing and implementing a Stormwater Pollution Control Plan. Projects that disturb between five and ten acres must register with the State, and projects that disturb over ten acres must submit a Stormwater Pollution Control Plan for review and approval prior to the start of construction.

A Stormwater Pollution Control Plan details the following:

- Construction Sequencing;
- Source Control Practices (Erosion and Sediment Controls including structures and practice);
- Dewatering Controls;
- Post Construction Stormwater Management; and
- Inspections and Maintenance.

Construction sequencing provides a general list of project stages, specifically identifying when and how control practices to protect stormwater quality will be implemented during the various phases of the project.

The Stormwater General Permit also authorizes discharge of dewatering wastewaters. When it is known or anticipated that dewatering will or may be required, project-specific measures for the management of dewatering wastewater to control turbidity and prevent scour at the point of discharge should be developed in advance of the start of the project and discussed at kick-off. If groundwater beneath the site is “contaminated” or potentially contaminated, additional actions to collect, characterize and dispose of these wastewaters are needed, as discussed in Chapter 6. However, the need for dewatering and the presence of contamination are not always known in advance of construction. If identified during construction the CM should file a new General Permit prior to initiating the discharge.

Section 2.07 Sedimentation and Erosion Control Measures

The General Permit for the Discharge of Stormwater and Dewatering Wastewaters associated with Construction Activities requires by reference “conformity” with the 2002 Connecticut Erosion and Sediment Control Guidelines (2002 E&S Guidelines). This manual can be purchased from DEP going to www.state.ct.us/store/index.htm. The 2002 E&S Guidelines describes in text and schematic drawings 46 control measures and the design criteria for selecting and sizing a specific measure, under what conditions and for what measures a PE certification is required, when written DEP approvals are needed and how often during construction these measures must be inspected. While most require a schedule of inspections on a weekly basis and within 24 hours of each 0.5 inch storm event, many are more frequent.

Ensuring that the construction drawings call out the proper control measures in the first place, and knowing when a changed condition in the field triggers the need to revise the Stormwater Pollution Control Plan through notification to the DEP, are critical to fulfilling that boiler plate specification requirement to comply with all applicable laws.

Section 2.08 Post-Construction Stormwater

As mentioned in Section 2.06, plans for post-construction stormwater management, inspection and implementation of Best Management Practices (BMPs) are also required by the General Permit. These BMPs are to be designed to protect the stormwater quality at the site after construction; for example, covering waste bins, virgin materials and finished products to prevent exposure to stormwater. Another long term measure may be to monitor and maintain stormwater retention basins since, as sediments accumulate in these basins, their storage capacity and functionality decrease. These plans must also identify a team of facility personnel responsible for implementing the Plan and meeting on a routine basis to review and update the Plan. These requirements will be discussed in detail in the third primer of this series on project Operations and Maintenance (O&M). However, we mention this requirement here because the Construction Manager will likely be in the best position to collect/record information concerning the required or recommended maintenance of in-ground, engineered control features which he/she can then pass on to the subsequent Facility Manager.

Chapter 3. Non-Permit Planning

Chapter 2 focused on identifying all applicable written requirements for a project, including permits, approvals and registrations (“Permits”), listing what they require, recognizing changed conditions that require their modification, and establishing who will be responsible. Unfortunately, not all environmental or land use requirements are the result of such written documents. This chapter highlights common “non-permit” requirements.

In particular, this chapter addresses contingency planning. Hopefully, before any greenfield project goes to construction, its planning team has established a contingency plan designating a chain of command and procedures for identifying potential hazards, emergency responses, emergency response contact numbers and locations of hospitals. If not, the CM will need to do this planning in the field.

In addition to contingency planning, the CM should ask if this project is attempting to achieve a Leadership in Environment and Energy Design (LEED) certification and what his role in the certification process will be. Many, in fact most, LEED credits are achieved in the design process, but the CM will be in a good position to help document that proposed design elements are actually implemented. For example, a LEED credit can be achieved by using paints with a low volatile compound concentration or re-using soils on the site. Field modifications which the CM may be asked to approve may seem innocuous enough but cost LEED points. In some cases, the CM also may be in the position of gaining points on his/her own initiative. A decision to grind and re-use old asphalt or cement block as paving sub-base might gain a point the design team missed. Just don’t forget to get your mobile air permit for the crusher/grinder!

The Construction Institute has devoted full day seminars on the LEED and related green-building process. For more information go to our website at www.construction.org or www.ctgbc.org.

The following sections address common non-permit considerations at construction sites.

Section 3.01 Hazard Communication Standard

Hazardous materials are a part of our everyday lives. OSHA established the Hazard Communication (HazComm) Standard, also referred to the Worker Right-to-Know standard, which can be found in the federal regulations at [29 CFR 1910.1200](http://www.cfr.gov). The Hazard Communication standards for the construction industry are found under [29 CFR 1926.59](http://www.cfr.gov). Both are to inform employees of the hazards associated with the chemicals used in the workplace and thereby reduce the number of workplace accidents. In the context of environmental considerations on a construction project, HazComm should help reduce injuries related to chemical hazards brought to the site by the construction team by making Material Safety Data Sheets (MSDSs) for these materials readily available.

Under OSHA compliance is typically the responsibility of each individual employer who is only responsible for his/her employees. However, control of safety issues at a construction site is different than at a typical workplace. The construction process itself will result in hazardous materials such as fuels and paints being brought on to the site by many employers where accidental releases and exposures can occur to workers of other employees. For these reasons, construction sites are different than most workplaces in OSHA’s eyes. OSHA refers to these as “multi-employer workplaces” and requires a procedure for extending the “employers”

responsibilities of sharing information on chemical hazardous to all “employees” at the site. Our CM can help insure this happens.

The following paragraphs outline what each employer must do and what information should therefore be available to the Construction Manager to manage the OSHA hazard communication process and be in a position to make required information available to all employees.

Hazard Determination

The HazComm standard applies to workplaces where employees may be exposed to hazardous chemicals. At a minimum, these chemicals include, but are not limited to, chemicals for which:

- OSHA has established a Permissible Exposure Limit (PEL),
- The American Conference of Industrial Hygienists (ACGIH) has established a Threshold Limit Value (TLV), and
- The National Toxicology Program (NTP) has listed in an Annual Report on Carcinogens.

Examples of chemical hazards found at a construction site include welding fumes, carbon monoxide from combustion sources (gas engines), particulate from diesel exhausts and landscaping, wood or metal dusts from cutting or grinding operations, fuels, oils, paints and sealants. Other categories include physical hazards (noise, compressed gases, flammable liquids, explosives) and health hazards (solvents, cleaning agents). In general, chemical manufacturers and suppliers have determined if their products contain constituents that are in these lists and provide their assessment of a product’s hazards on Material Safety Data Sheets. If an MSDS for a material you or a subcontractor want to use can not be obtained, the best idea may be to find an alternative project (see below).

Written HazComm Program

Under the OSHA standards, employers must prepare a written HazComm program for the chemicals they will use within the workplace. This program must list the hazardous materials known to be present, inform employees of these hazards, identify how the employer will comply with the labeling requirements and identify where MSDSs for these materials will be maintained. It must also include information on employees actually using the chemicals and the training they receive. Informing workers of this information can be done by the CM during an initial health and safety orientation for the project with updates at tool-box meetings as needed.

MSDS Records and Labels

Each employer must have a MSDS for every hazardous material they use and be able to provide copies for all employees during all shifts. The manufacturer or importer of the hazardous material must provide a MSDS with each initial shipment and whenever the MSDS is updated. MSDSs are typically kept in binders in a central location. If left in a pinch, there are several on-line providers such as www.msdonline.com where MSDSs are available. However, as product formulations change frequently, the first choice should be to ask the employer who is using the material to provide the MSDS that corresponds to that particular “batch” of the product.

OSHA also requires that hazardous chemical containers be labeled in English with the contents, appropriate hazard warnings and the manufacturer’s name and address. In specific locations, written procedures may be substituted for labels. Portable containers normally used by the same

worker during a single shift do not have to be labeled, although at a construction site there is always the concern of another sub-contractor coming into contact with that container.

Training

Under the HazComm Standard, employers must provide training to their employees at the time of employment and whenever a new hazard is introduced into the workplace. The training is to inform workers of the OSHA standard, the operations where hazardous chemicals are present, and to identify where the written HazComm program is available and when it is available for review. The training must also include methods of observation used to detect the presence or a release of a hazardous chemical, plus what protective measures can be employed, such as the use of personal protective equipment (PPE).

For multi-employer construction sites this training is typically combined with other safety elements into a comprehensive project contingency plan supplemented with “tool-box” meetings as mentioned above.

HazCom Summary

As you can see, implementing the OSHA provisions for all sub-contractors at a construction site can be a challenge. Who will know when a sub-contractor brings a “new” hazardous material on-site? Who keeps the master set of MSDSs? Who trains whom? Not coincidentally, this primer starts each of these rhetorical questions with the pronoun “who” because compliance with OSHA HazComm at a multi employer construction site works best where a single party is keeping track of the issues. The key is who will be considered by OSHA to be the responsible entity. The usual answer is if not the owner, it will be the CM.

Section 3.02 UST (Unknown) - Notification and Response Procedures

Installation and registration of a new underground storage tank (UST) will be regulated as part of the project building permit, but management of existing tanks may not and management of an unknown tank found during construction certainly will not. This section deals primarily with discovery of unknown tanks. As stated in Section 2.02, if a project will be removing a known UST, some local agencies require permits for the work and, depending on the size and use of the tank, notification to the DEP.

Until the 1970s, or perhaps even the 80s, registration of USTs being brought into service was not consistently done and discovery of an unknown UST is an all too common occurrence on construction sites. In general, it is safe to assume that if a previously unidentified but intact UST is encountered, there are requirements for someone to file information with the DEP. If a release from a previously unknown UST is detected, a release notification form must also be submitted to the CTDEP and follow-up actions taken to prevent the spread of contamination. If proper planning was done, a contingency plan for this occurrence should already be in place.

Discovery

Upon discovery of an unknown UST by any construction personnel, the first response should be to stop work in the area and contact the Construction Manager. If there is no evidence of a release, some time can be taken to:

- Check site history to determine if there is a known or likely use of the tank, e.g., fuel oil storage or something else.
- Check DEP UST registrations to see if the tank is registered but had been overlooked during project planning.
- Determine, if not known, if the local government or fire marshal requires notification of the discovery or notification of its pending removal, or assume that they do and proceed to notify them.
- Determine the tank's contents if its safe to do so or engage an environmental remediation contractor to do so. Proceed to remove the contents and render the tank inert before proceeding with removal. *Remember, USTs frequently contain ignitable materials which can ignite or explode from sparks generated by removing rusty fill caps to see what a tank holds or puncturing the tank with an excavator bucket.*

Almost regardless of the information you can get from these sources, removal of an UST, particularly if it contains any liquid materials, should likely be delegated to an environmental response contractor. These contractors are trained for the unexpected and have specialized construction monitoring and personal protective equipment for added safety. Perhaps just as important, they carry the pollution liability insurance which the CM likely does not which covers situations such as the tank falling apart and releasing residual materials when the tank is lifted from its grave.

Release Reporting

If upon discovery of the tank there is also evidence of a release, typically odor but also possibly visual wetting or staining, then notification to DEP (1-800-424-3338) should be done at once and a spill report filed using the form in Appendix B (see also Section 3.05). DEP may or may not come to the site, take control of the site and direct further operations as they are authorized to do under State statutes. If they do not, then the CM should proceed with engaging the response contractor. In many instances on-site operators/equipment have been used to remove such tanks but there are many risks and liabilities associated with this course of action as mentioned above.

Post-Removal Confirmation

After removal of a tank, whether there is obvious contamination or not, it is wise to collect soil samples to document that the tank grave is "clean". The DEP has published [Sampling and Analytical Methods for Underground Storage Tank Closure](#) guidelines which can be found at www.dep.state.ct.us/wst/ust/ustclose.htm that detail the recommended number of samples, sampling locations, and site analytical parameters to be collected from a regulated UST excavation and the Remediation Standard Regulations (RSRs) define how clean is clean. For fuel oil tanks, the type most often found unexpectedly, the primary test needed is Extractable Total Petroleum Hydrocarbons. If the tank use was not known or was for something other than fuel oils/gasoline, determining a parameter list should be left to trained professionals.

Once the tank and any contaminated soils above applicable RSR standards have been removed, the next step is to determine the status of the tank as regulated or non-regulated. The [CTDEP UST Program Fact Sheet](#) included in Appendix C and found at

www.dep.state.ct.us/pao/pumpfact/ustfact.htm provides a brief summary of the regulatory program. The UST program regulations are [Sections 22a-449\(d\)-1 and 22a-449\(d\)-101 through 113 of the Regulations of Connecticut State Agencies \(RCSA\)](#). Non-residential USTs are regulated by the DEP with some exemptions identified in the regulations. All regulated tanks must be registered, including previously unregistered tanks that are discovered and removed.

Section 3.03 Spill Prevention, Control & Countermeasure (SPCC) Plans

SPCC plans are required for facilities which manage oil above specified quantities where the accidental release of these oils could enter “navigable waters” as defined by the regulations. Under this definition, virtually every site in Connecticut has this potential. However, most construction projects will not result in the storage of oil aboveground above the threshold quantity of 1,320 gallons (total in all containers of 55 gallons or more excluding motor vehicles). Fuel storage is most likely to result in an exceedance of this threshold but would still be an atypical situation. If the threshold is exceeded, a SPCC plan will need to be developed. Preferably, management of oils can be modified so as not to exceed the 1320 gallons capacity.

In addition, if the “facility” at which the construction project is being done is already subject to a SPCC plan and the temporary construction-related additional storage is anticipated to be ongoing for more than 6 months, the facility should revise its Plan to reflect this storage. The CM would likely have to bring this situation to the attention of the owner.

Section 3.04 Best Management Practices (BMPs)

The HazComm Program discussed in Chapter 3 will identify the hazardous materials that are on a site, but does not dictate how they are managed. BMPs for hazardous materials management may or may not be “required” but are always a good idea to guard against the extraordinary costs and delays which can be associated with accidental releases.

Mechanisms through which BMPs can be required are the General Permit for Stormwater Management and, increasingly, local regulations including particularly construction at new or existing facilities located within Aquifer Protection Areas (APAs). APAs occur in about half of the towns in Connecticut and have at least been preliminarily mapped by the Towns (See Project Planning Primer).

What constitutes a BMP depends on what hazardous material is being managed and how. In general, all involve forms of secondary containment and supervision to prevent accidental releases during storage and delivery to and transfer of the hazardous materials from bulk containers. While BMPs generally fall into the category of “common sense”, additional relevant information can be found in the DEP’s APA regulations at www.dep.state.ct.us/wto/aquiferprotection/index.htm.

Section 3.05 Spill Response and Notification Procedures

Releases can be discovered or can occur for a number of reasons in addition to abandoned USTs. Despite adherence to BMPs, accidents involving containerized hazardous materials can still result in releases. In addition, releases with no identifiable source, such as encountering free-phase product in the water table during the course of an excavation can just be “found”. The response to all these events is much the same as described for USTs and again should be part of the project contingency plan.

Reporting a release can start a chain of events that can be difficult to control and have repercussions to the project. Not reporting a release which should have been reported also has significant ramifications for both the project and the “responsible” party. For both these reasons, the reporting responsibilities should be clearly identified, specifically who will report the condition to the [DEP Oil & Chemical Spill Response Division](#). As stated in [Chapter 446K, Section 22a-450 of the Connecticut General Statutes](#), spills must be reported by phone “immediately” to the DEP, Oil and Chemical Response Division at (860) 424-3338, 24 hours/day. Should this number become unavailable for any reason, call (860) 424-3333. Within 24 hours of the spill, a written [Report of Petroleum or Chemical Product Discharge](#) is required to be submitted to DEP using the form provided in Appendix B.

The DEP response will be consistent with the nature of the release and the other incidents which may be going on at the same time. If there is a serious incident and DEP staff come to the site, all immediate construction activities may cease and the DEP On-Scene Coordinator (OSC) will control and direct all activities to mitigate the emergency condition. However, if the report is made in response to a historic release or a minor spill and a responsible party (owner, operator or contractor) is actively addressing the problem, the DEP may not come to the site. If the DEP does not assume control, the question of how clean the release area has to be will generally be answered by the property owner with some degree of reliance on the Remediation Standard Regulations. For real-time spills, major or minor, the owner’s criteria will frequently be “as clean as it was before the spill” with the person who caused the release or the owner of the container from which the material was spilled becoming the financially liable party.

For historic contamination (and some large spills), the contamination may be too widespread to meet the qualitative criteria of “as clean as it was before” and there will be little to no clarity concerning who’s responsibility it is. Ultimately, and in cases where the source is not known, the property owner will be held liable under State statute.

As you can see, responding to these conditions can be complex and waiting to determine who will be responsible for what until after a discovery is made can destroy a project schedule and result in both corporate and personal liability.

Section 3.06 Reporting of Certain Environmental Hazards

Reporting a qualitative release is not the only DEP reporting consideration. Connecticut [Public Act 98-134](#) which became effective October 1, 1998 placed specific notification requirements on “Technical Environmental Professionals” (TEP), their clients and/or property owners, if Significant Environmental Hazards (SEH) are determined to be present.

A TEP is defined as “anyone, including a Licensed Environmental Professional, who collects soil, water, vapor or air samples in order to investigate and remediate pollution to the State's soil or water, and who may be directly employed or retained as a consultant by a public or private employer”. The TEP must notify his/her client and the property owner either immediately within 24 hours or within 7 days from when an environmental hazard condition is determined to be present, depending on the type of hazard present.

Significant environmental hazards include contamination above specified standards of:

- a public or private drinking water well,
- soil within two feet of the (ground) surface,
- ground water under a building,
- ground water discharging to surface water,
- ground water within 500 feet of a drinking water well, or
- vapors in soil or water resulting in an explosion threat.

Environmental hazards are determined, with the exception of explosive hazards, by comparing analytical data to specific criteria set out in the act that are based on the RSRs and Groundwater Quality Criteria and Standards.

Because the reporting obligation falls to a TEP or the owner and usually relies on comparison of analytical data to reporting thresholds, situations where the CM becomes responsible for reporting under this program are limited. However, if the CM collects data to identify what some unanticipated condition (odor or discoloration) may be, arguably he/she has become a TEP and is then responsible for reporting to the owner and DEP. Therefore, before collecting any soil or groundwater samples for laboratory analyses, the CM should be sure he/she knows how to evaluate the data under this statute and, if a SEH is present, how he/she will respond. An environmental fact sheet on this act can be found in Appendix D.

Section 3.07 Asbestos and Hazardous Materials

When demolition or renovation of an existing building is part of the project, an asbestos and hazardous materials (hazmat) survey should have been done as part of project planning. Since the asbestos abatement regulations under the Department of Health have been in place and aggressively enforced for many years, the asbestos portion of the survey probably was. The hazmat portion is less regulated (see hazardous waste below) and cannot be assumed to have been done. If demolition/renovation are a part of the project, the CM should ask for copies of these surveys and, once again, be sure he/she understands who is responsible for managing any materials identified.

In addition, the CM should also understand that, like all environmental concerns, even after a good pre-demolition survey, unexpected conditions can be found when “walls come a-tumbling down”. Knowing what was identified so that unanticipated conditions are recognized is key. The following paragraphs provide a review of standard operating procedures which the CM should see being performed or ask the reason why.

Required Inspection for Asbestos-Containing Materials

Prior to demolition or renovation, all public and commercial properties and housing structures greater than four units must be inspected for asbestos-containing materials (ACMs). The USEPA NESHAP regulations require an inspection prior to the project. This inspection will identify locations and quantities of ACMs located in and on the exterior of the building. The inspection must be thorough and must include destructive sampling in order to discover hidden suspect materials. The work must be performed by a trained and DPH licensed asbestos inspector. The NESHAP regulations require this inspection regardless of the age of the building.

Asbestos containing products are still being sold in the United States and even a new building may have asbestos-containing materials.

Inspection for Other Hazardous Materials

The asbestos inspection may be performed in conjunction with a hazardous materials survey. A hazardous materials survey will identify other materials of concern during a renovation or demolition project. Below is a list of substances that may require special waste consideration during the project:

- Chlorinated flouorocarbons (CFCs), halons and other refrigerants – CFCs are commonly found in refrigeration and air conditioning equipment. Halons are mainly used in fire control equipment.
- Lead – A lead-based paint survey can be used to identify lead-based paint. Lead may also be found in batteries (lighting, exit signs, security systems), pipe solder, flashing molds, roof vents.
- Mercury – Mercury is commonly found in thermostats or any other control used for measurement of vacuum, temperature or flow, and in fluorescent light tubes, metal halide lighting, high pressure sodium lighting and neon lighting.
- Polychlorinated biphenyls (PCBs) – These can be commonly found in transformers, capacitors, light ballasts and more rarely in specialty paints in industrial applications
- Radioactive Tritium – Exit signs that contain this material are so labeled and can be returned to the manufacturer.

Abatement Specifications/Procedures Project Monitoring

After identification of the materials that require remediation, a specification may be developed by a licensed and accredited Project Designer. This specification will address the scope of work as well as work practices and procedures in order to comply with the regulations. The abatement work must be performed by a Connecticut-licensed asbestos abatement contractor. The contractor's work should be monitored by an independent consultant licensed as a project monitor by the State of Connecticut to ensure compliance with State and Federal Regulations.

Upon completion of any abatement project, final visual inspections and final air clearance testing must be performed by a licensed project monitor. In some demolition projects, final air clearances may not be required if the building will not be occupied prior to demolition.

Final air clearance testing requirements are dependent upon the amount of material removed. For non-school buildings, abatement of ACM greater than or equal to 1,500 square feet or 500 linear feet will require TEM (Transmission Electron Microscopy) analysis, which can only be analyzed in a licensed laboratory. Amounts less than those mentioned can be tested by PCM (Phase Contrast Microscopy) analysis that can be performed on-site.

For school buildings, abatement of ACM greater than or equal to 160 square feet or 260 linear feet will require TEM (Transmission Electron Microscopy) analysis which can only be analyzed in a licensed laboratory. Amounts less than those mentioned can be tested by PCM (Phase Contract Microscopy) analysis that can be performed on-site.

Exterior non-friable abatement (such as roofing, window glazing) does not require air sampling for clearances, but only a final visual inspection.

Training/Licensing/Notifications

The Connecticut Department of Public Health (DPH) regulates training accreditation and certification for inspectors, management planners, project designers, project monitors, abatement worker and supervisors. The DPH requires an asbestos abatement notification prior to any abatement project and a demolition notification of any demolition project. More information, lists of licensed consultants and contractors, and forms are available at the DPH's website: http://www.dph.state.ct.us/BRS/Asbestos/asbestos_program.htm.

Disposal

The disposal of asbestos-containing materials must be in accordance with RCRA regulations. The contractor must provide a Waste Shipment Record (WSR) to the building owner within 35 days of the transport of asbestos waste. This record will provide information on the quantity of material, location of disposal and transporter information. This record should be kept with the final close-out documentation.

If toxic levels of lead (1.0 mg/cm^2) in wipe samples are discovered during the survey, the waste must then be tested by Toxicity Characteristic Leachate Procedure (TCLP) to determine if the waste is required to be disposed of as hazardous lead waste (TCLP result of $\geq 5 \text{ mg/l}$) or as general construction debris ($<5 \text{ mg/l}$).

Disposal of other material must be in compliance with the regulations for reclamation or hazardous waste disposal as required.

Recordkeeping

The building owner should retain records of any hazardous materials removal or abatement project. The records should include the inspection report, specifications for abatement, contractor logs including personal air sample results, project monitoring activities and licenses, training records and health-related documentation of all workers involved in the project. Additionally, the final air clearance documentation and disposal records should be included in the final closeout report. These records will provide the building owner with evidence that the project was completed in compliance with the regulations.

Chapter 4. The Kick-off Meeting

All of the preceding discussion has been leading up to this! Armed with the knowledge gained from talking to the project planning team, reviewing permits and approvals they obtained and planning for contingencies, it is now time for the Construction Manager to hold the kick-off meeting. During this meeting, the construction team will discuss what environmental requirements apply to the project, who is responsible for their implementation, how their implementation will be documented and what their responsibility is if they become aware of a changed condition including a change in the anticipated construction procedures or project design. While many parties will have some role to play to insure success, a single party who will have final authority/responsibility for environmental compliance needs to be identified - whether it is the construction manager, the general contractor, a project engineer/architect, an owner's representative or the owner.

In practice, it is unlikely that a single such meeting at the start of a project will satisfy this objective for the life of the project. Certainly, a single meeting cannot respond to changed conditions; those will require additional discussion between a smaller number of parties as they are identified. In addition, talking to the interior finish sub-contractors at the same time as the earthwork sub-contractors likely won't be possible or a good use of everyone's time. However, all parties do need to know what can cause an environmental liability and what their responsibility for compliance is.

It will come as no surprise to most readers that juggling all this is what makes managing a construction project so much "fun", and every manager will go about it somewhat differently. To help the process along, and to provide a one page summary of the primer to this point, Appendix E provides a Kick-Off Meeting Checklist as an outline of the topics to be discussed at a typical greenfield project kick-off meeting. All items will not apply to all projects but they all might, so checking them off a list as "Not Applicable" insures they were considered. Brownfield sites may also rely on this checklist but will likely have an overlying Remedial Action Plan that will take the place of several other permits.

While this Chapter does not have a lot of its own text, this is where the "rubber meets the road", or the "shovel meets the dirt". Bottom line: kick-off meetings, prepare for them and pull your team together!

Chapter 5. Waste Management

As soon as construction begins, wastes, whether they are excess soils, land cleaning or demolition debris, empty material containers or general trash will start to be generated. In Connecticut it is the generator of a waste who is responsible for its legal disposal, but this is another responsibility that gets blurred at a multi-user construction site. At many sites the Construction Manager will have a waste container (roll-off) placed at the site for use by many sub-contractors. Should improper wastes get placed in this container, such as cans of paint, who is or will be held responsible? Likely the person who rented the container, i.e., the Construction Manager.

Waste management during the construction phase also provides the best opportunity for the CM to earn LEED credits by re-using or salvaging materials that would otherwise be disposed.

For both reasons, it is important that the CM understand how wastes are classified in Connecticut and how they must be managed. This section first describes typical waste types generated at construction project and second, from the demolition portion of a project.

Section 5.01 Waste Types

Clean Fill

Clean fill is defined in RCSA 22a-209 as natural soil, rock, brick, ceramics, concrete and asphalt paving fragments that are virtually inert and pose neither a fire threat nor a pollution threat to ground or surface water. Clean fill is exempt from solid waste regulations; that is they are not wastes. Certain types of building demolition (brick) and highway construction (asphalt) waste can also be classified as clean fill.

Polluted Soil

Soils which have constituents present which are not naturally occurring or, if naturally occurring in soil, such as arsenic, are present above background conditions, are polluted soils and are regulated. The RSRs set out procedures and conditions to determine if these soils can be re-used on-site and/or off-site and transported by common carriers. Alternately, they must be tested to determine if they are hazardous waste or Connecticut-Regulated, CR05, chemical waste solids, and managed accordingly. Determining what testing is needed is highly dependent on what and where the re-use or disposal will be. In general, it is best to rely on an environmental consultant (re-use) or the disposal facility to determine this.

Bulky Waste

Bulky waste includes materials usually considered waste from construction projects, including land clearing debris, building demolition waste and highway construction waste. These are solid wastes and are regulated as such. They can be disposed of at appropriately permitted facilities and transported by common carriers.

Construction (and Demolition)

Construction and demolition (C&D) waste is generated during the construction, renovation, repair and demolition of buildings, roads, bridges, etc. C&D waste is made up of wood, steel,

concrete, gypsum, masonry, plaster, metal, asbestos and lead and just about anything else. A formal definition of C & D waste does not exist in Connecticut; these materials are defined in three legal classifications: Bulky Waste, Clean Fill and Municipal Solid Waste. One of the most common confusions with C&D waste is whether or not old wood surfaces painted with lead-based paint (LBP) are hazardous waste due to its lead content. In general, the answer is no because while the paint alone may be hazardous, the waste in question is the painted wood surface of which the paint is such a small weight component that it rarely tests hazardous. If a pre-demolition survey in the planning process identified LBP, the CM should be asking if pre-characterization of the C&D waste was done and if not, who is responsible for getting it done. This same thought process applies to all hazardous materials and is discussed further below.

Solid Wastes

“Solid Wastes” include solids, liquids and gasses. In addition to the solid wastes listed above, which are generated as a direct result of site construction, use of materials during construction also result in wastes. These can fall into 4 major categories in Connecticut:

- Hazardous wastes;
- Connecticut regulated wastes;
- Special wastes; and
- Mixed municipal wastes

The following sections define these waste types in general terms with more detailed information in the appendices.

Hazardous Wastes

Every generator of a solid waste is required by Federal and State statute to determine if that waste is also a hazardous waste. The criteria for a solid waste to be hazardous are presented in great detail in the Federal and State regulations and Appendix F provides a summary which can also be found at <http://dep.state.ct.us/wst/hazardous/hwd.htm>. In general, however, at construction (not demolition sites or contaminated soil/groundwater sites), the most common hazardous wastes will be liquids including:

- Ignitable liquid wastes with a flashpoint below 140°F such as solvent-based paints, fuels, cleaning solvents and mixtures of these with other solids and liquids and containers of the above which have not been fully emptied as defined in the regulation (see below).
- Corrosive liquids as either acid or caustic “cleaners”.
- Universal hazardous wastes consisting of broken fluorescent lights (during construction/installation).

Federal and State regulations set out very precise, albeit convoluted, criteria to determine if a solid waste meets the definition of a hazardous waste. Solid wastes which are hazardous cannot legally be co-disposed of with any solid wastes. Of particular concern are liquid or semi-solid chemical products and their containers such as paints, sealants, caulks, adhesives, lacquers, stains, etc. Many are ignitable, containerized under pressure (aerosols) and/or contain hazardous constituents as carries. Spills of these materials or partially filled containers being discarded are of particular concern. Appendix F provides some guidance but since every product is different, no single reference can be relied on to make hazardous waste determinations simple. It is recommended that the CM make it clear to all subs that they are to manage any and all “wastes” they produce by taking them back to their place of business. If this is not possible the CM should establish some rules or procedures regarding what and who can place wastes in a roll-off placed on the site by the CM.

Depending on the quantity and rate of hazardous waste generation, a host of additional requirements may be triggered. Describing these is beyond the scope of this primer. The key issue is knowing that the Construction Manager must be aware of the hazardous materials that are being used on the site and alert to what may be being “thrown away”, including excess polluted soils which are being removed from the site. Both civil and criminal sanctions are possible outcomes of failing to do so. As a starting point, do not allow any liquids to be disposed of at the site. Even if they are not hazardous, they will surely be Connecticut-Regulated and require separate handling and disposal.

Hazardous wastes must be transported to facilities permitted to treat and/or dispose of the specific wastes being generated and transported only by permitted haulers. All hazardous waste shipments must use the Uniform Hazardous Waste Manifest available from DEP as the shipping paper. Signatures are required by the “generator” which carry significant, long-term liability.

Connecticut-Regulated, Special, and Construction and Demolition Wastes

Non-hazardous wastes may meet one of five definitions of Connecticut-Regulated Wastes including:

- PCBs/PCB items (CR-01)
- Petroleum Oil (liquid) (CR-02)
- Water Soluble Oil (liquid) (CR-03)
- Chemical Liquids (CR-04)
- Chemical Solids (CR-05)

These wastes must be transported and disposed of by haulers/facilities permitted to manage these wastes. That is, they should not be placed in a general trash/dumpster to be sent to either a Resource Recovery Facility or Municipal/Regional Landfill.

Special wastes are non-hazardous solids or sometimes sludges which the generator has requested authorization from both the DEP and the ultimate receiving facility to discard with normal trash. The DEP and the facility will determine the acceptability of placing these wastes with normal trash based on analytical testing results. Without written authorization, these wastes are usually CR05 regulated wastes. Because of the typical need for testing and the administrative time to process the request, unless it is a large volume waste and/or one routinely generated, it is unlikely that it will be worthwhile to obtain a special waste authorization. Since construction

projects are typically “temporary” and non-routine, a special waste authorization would be unusual at construction sites.

As discussed above, construction and demolition (C&D) wastes are a separate category of wastes which can be transported by non-DEP permitted haulers and received by municipal or C&D landfills. It may also be possible to dispose of these wastes at Resource Recovery Facilities (RRF) but they typically contain some large scrap (e.g., they are “bulky” wastes) which RRFs will not accept and metal scrap which by statute should be source separated. “Empty”, (5 gallons or less size) containers are typical components of a C&D waste stream. Land cleaning debris also falls into this category, but increasingly there are outlets to send this material to a “biomass” (wood burning) resource recovery facility where LEED points can be achieved.

Demolition Wastes (Additional Considerations)

While typically referred to as a single waste stream, demolition wastes differ from construction wastes in that they are typically more diverse, .e.g., commingled piping, wire, wallboard, wood, concrete, brick shingles, etc. More importantly, there is a much higher probability that hazardous waste or other regulated items can get mixed in. It is critical that demolition phase asbestos and hazardous building material surveys have been done and, as needed, abatement performed to segregate these from the demolition wastes. Nonetheless, the CM should be alert to items overlooked. Items of concern include but are not limited to fluorescent lights and light ballasts, abandoned containers, electrical equipment, mercury switches, PCB-containing capacitors, asbestos and lead-based paints.

Concerning surfaces coated with lead-based paint, determining if it is hazardous or non-hazardous demolition waste is based on analysis of a core of the material, not simply the paint. Appendix G contains DEP’s guidance on this and other demolition waste issues.

There are a variety of protocols that can be used to reduce the volume of wastes that require disposal at a landfill or other off-site facility. Waste reduction techniques used during construction include re-use of clean fill and contaminated soil both on- and off-site, salvage of C & D waste material for resale, re-use or increasingly, energy recovery and returning unused material to vendors for credit.

The DEP also has a general permit for the [Beneficial Reuse of Solid Waste](#) in those limited situations where a solid waste can be used in a manufacturing process to make a product or as an effective substitute for materials used in a commercial product. Waste reduction, recycling and re-use may provide opportunities for gaining LEED credits for a project.

Chapter 6. Contaminated Sites

Chapter 3 discusses Contingency Planning for situations where contamination is discovered after construction begins. This Chapter discusses construction practices typically followed at known contaminated sites.

As discussed in the Environmental Planning Primer, sites with known contaminated soil and/or groundwater, e.g., “brownfields”, usually result in the site being subject to additional regulatory oversight. Although presented separately in this primer, environmental requirements imposed at a construction site due to known soil or groundwater conditions can effect virtually every at- and below-grade activity including the development and layout of features in the site plan, building locations, asphalt specifications, foundation specifications and so forth. As such, it is critical that these issues are understood by the CM and identified to the project team so the intent of the design, which can at first appear to add unnecessary costs to the construction, is not altered in the field.

Although perhaps counter-intuitive, the more serious the known conditions are, the easier the Construction Manager’s integration job may be since the amount of environmental investigation and planning typically increases in proportion. Depending upon the regulatory status of the site, these requirements may be formalized in a Remedial Action Plan (RAP) that has been submitted to and approved by the DEP or developed with the owner by a Licensed Environmental Professional an environmental consultant. For less complex sites, the DEP may not be involved and the RAP may be unwritten and simply derived from the Remediation Standard Regulations, conditions of local approvals or self-imposed requirements of the project team. Managing construction at any of these sites will complicate the actions discussed in previous chapters and add additional permitting, inspection contingency planning and response requirements.

As stated above, construction at many brownfield sites will be regulated by the DEP and at many of these sites a written RAP will have been prepared. In much the same way that the General Permit for Stormwater Discharges incorporates the 2002 E&S Guidelines by reference, a RAP also frequently becomes a legally enforceable mandate during and after construction on a brownfield site. RAPs may dictate where buildings can go, how thick asphalt paving must be, where, how and if dewatering water can be discharged and a myriad of other less than obvious restrictions as described below.

Construction at other brownfield projects will not be formally regulated by DEP or have a written RAP. For example, new construction at a former gasoline station or renovation construction for the owner of a strip mall which had a dry cleaning tenant at one time may not have had to enter into discussions with DEP. Nonetheless, contamination could be expected or known to exist and special precautions called for during construction.

Remediation Standard Regulations

While primarily written to answer the question “How clean is clean?”, the 1996 Remediation Standard Regulations (RSRs) recognize that the way a site is constructed has a major effect on whether or not site users can be exposed to contamination. As a result, the RSRs can provide information and guidance that is relevant to the construction team. While this primer will not attempt to explain the application of the RSRs in detail, the following paragraphs highlight relevant considerations.

Exposure

Fundamentally contaminated soil or groundwater only poses a risk if humans are exposed to them. As a consequence, leaving contaminated soil and sometimes groundwater on a construction site can be done safely and the RSRs which are written into a RAP provide several options for doing so “legally”. Understanding the basic rationale for these options will make compliance easier to achieve.

Soil

Exposures to soil can be prevented by having the soil be “inaccessible” by virtue of being:

- Greater than 15 feet below the ground surface;
- Greater than 4 feet below the ground surface with the establishment of a legal document to prevent excavation;
- Below a permanent structure;
- Below 2 feet of a qualifying asphalt with a legal document to maintain it; or
- Below an engineered control with the establishment of a legal document to prevent its disruption and on-going monitoring.

Migration of most contaminants out of soil and into groundwater (leaching or mobility) can be prevented by rendering the soil “environmentally isolated” by:

- Being below a permanent structure (except for volatile organic compounds such as gasoline which can move as vapors);
- Being below the water table; or
- Being below an engineered control (low permeability cap) with provision for post-construction monitoring.

Knowing what these basic measures for preventing exposures are, you can see how coordination with the project design concerning such items as where buildings are placed on the site, where and how asphalt surfaces are constructed, and how site grading and drainage is laid out become very important. Add to this the fact that under specified conditions contaminated soils can be moved and re-used on-site, or even brought in from another location, the cost-benefit opportunities for integration of site design and known contamination conditions become even greater.

In contrast, should the project site already have rendered some soils “inaccessible” or “environmentally isolated”, avoiding these soils in the construction process will be equally important.

Construction-Phase Management

The mechanisms above will influence the project design and what gets built. How it gets built and how these contaminated materials get managed in the process is another matter of primary concern to the CM as it effects construction procedures, timing, available lay-down areas and, of course, cost.

If excess soil is to be removed off-site it may be possible to do analytical testing of the soil while it is still “in-place” (in-situ) to perform the required waste determination and obtain a disposal authorization. When done in this manner, excavated soils can be live-loaded onto trucks without stockpiling and double handling.

If in-situ pre-excavation testing cannot be used to obtain the authorizations needed (some receiving facilities do not allow it), excavation and establishment of soil stockpiles will likely be used. Disposal facilities typically require one sample to be tested for each 500 to 1,000 cubic yards to be disposed. Such small stockpiles can cover a lot of ground so coordination on sampling schedules, laboratory turn-around time (how fast the lab gives you the data after they receive the samples), restrictions placed on quantities accepted (loads or tons per day) and at what times of day by the receiving facilities, tracking sample data with soil stockpiles etc., all require additional effort. Control of dust, precipitation infiltration and odor must also be managed by keeping stockpiles covered and trucks clean - tasks easier said than routinely done and which can easily trigger complaints from off-site.

Contaminated Water

Generally, when the construction activity will come into contact with groundwater, the dewatering requirements of the Stormwater and Dewatering General Permit (see Chapter 2) will be in place and dictate how the water will be managed whether contaminated or clean.

Economical management of larger quantities of wastewater will always be via discharge to a sanitary sewer or via a site-specific permit to a surface water. Pre-treatment may be a component of discharges of contaminated wastewaters and is typically done under a DEP permit. Use of one or more “fractionation” tanks for sediment settling is almost always a treatment component for dewatering often with additional filters. These tanks are generally 21,000 gallons and measure 15 by 40 feet. Coupled with associated piping and pumps, they can monopolize significant lay-down area often with little flexibility in their location. In addition, they will also require extra spill control, monitoring and maintenance and may require dedicated and trained operators.

Even if a project is fortunate enough to be able to manage small quantities of dewatering wastewaters in containers, above-ground storage tanks or tank trucks, concerns of container security and integrity, waste characterization and spill control during transfer remain special concerns.

Health & Safety (H&S) Monitoring

While construction of a building over the top of contaminated soil will render that soil inaccessible after construction, the construction worker can be exposed during construction.

The CM’s H&S plan must be expanded beyond normal physical hazard to include what pollutants may be present, what personal protective equipment will be available, when to use it and how to determine and document when its use was and was not necessary. OSHA regulations (29 CFR 1926) provide clear direction on many of these issues for construction laborers, and a qualified consultant should review all available soil and ground water data to determine if an OSHA requirement will be triggered. For example, are lead levels in dust high enough to require blood testing? Are organic vapors anticipated to require use of respirators with intent training, fit testing and medical monitoring? The extent and degree of monitoring documentation

under applicable OSHA requirements is fairly easy to determine but, as a risk management issue for the “employer”, is very subjective.

Construction at a contaminated site also has the potential to result in exposures to site abutters. This concern becomes a risk management issue primarily for the site owner but, since complaints from abutters can also affect construction procedures and cause delays, the CM should be aware of how the owner wants to manage these concerns. This is especially true since, in most cases, the CM will be more visible and accessible to the abutters than the owner. Risk tolerance can go from simply being confident that exposures of concern will not occur and doing no monitoring to running a round-the-clock, electronic monitoring system with alarm levels designed to trigger changes in construction procedures or work stoppages.

Like all Health and Safety plans, the environmental component will be molded by the specific contaminants present, their concentrations and a Job Safety Analyses (JSA). That is, what tasks are going to be performed and how will performing these tasks potentially bring a worker into contact with pollutants (exposure pathways).

Grading and excavation of contaminated soils resulting in inhalation of dust is the most common exposure pathway by inhalation. Disruption of volatile organic compounds such as gasoline residuals also commonly result in an inhalation exposure. Direct contact and inadvertent consumption of soil are also very common but unless particularly toxic or high concentrations of contaminants are present, these pathways are unlikely to be significant. Good site hygiene should always be a Best Management Practice reinforced at tail-gate H&S meetings.

Control of dust and air monitoring for volatile organics to identify exposures before they reach levels of concern are the basis elements of these plans. Rarely would a project task be performed by a “general contractor” where actual exposures would be a concern. Such operations are delegated to specialty construction contractors with HAZWOPER training (29 CFR 1910.1200).

Chapter 7. Construction Environmental Monitoring

The purpose of environmental monitoring is to ensure that environmental commitments made during the project design and regulatory approval process are implemented during construction. Some of these obligations may continue as facility operation issues after the construction project is complete.

Section 7.01 Project-Specific Requirements Checklist Prepared

The development of the project-specific checklist based on the permits and regulatory approvals granted and presented at the kick-off meeting will provide an organized list of all requirements in one location. This checklist should include the following information:

- Permits/regulatory approvals that require monitoring;
- Specific monitoring requirements (sampling frequencies, test parameters, collection procedures, etc.);
- Specific inspection requirements and who is responsible for them;
- Criteria for evaluating site inspection results to determine when corrective actions are necessary;
- Specific corrective actions to be implemented; and
- Notification requirements and communication protocols.

The checklist can be utilized as a worksheet for the inspector to complete, thereby ensuring thoroughness and accuracy. Typically, routine environmental inspection reports are required to be submitted to the regulatory agency with jurisdiction or to be kept on-site for regulatory review if requested. These checklists can also function as these report submissions/records but obviously require care concerning how the information is presented.

Section 7.02 Site Inspections by Regulatory Personnel

Inspections of a construction project by regulatory agency personnel should be expected and planned for. Depending on the site, complexity of the project and the sensitivity of the environmental receptors, multiple agencies may conduct inspections. Their inspections can be independent of each other or conducted in a coordinated, simultaneous manner.

The responsibility for meeting a regulatory inspector, escorting inspectors around the site, requiring that the inspectors comply with site health and safety precautions, and knowing where the project paperwork is kept, should be clearly assigned to or by the CM.

All efforts should be made to allow a regulator access to the site and site documents when he/she arrives, but there are times when other time critical constraints can make this difficult. If this is the case, it is acceptable to ask the inspector to reschedule most inspections, but not those related to spills/releases. Be sure to explain why the present is not a good time and reschedule the inspections as soon as possible. Simply saying no may well result in a search warrant being handed to you and an enforcement-oriented attitude when the inspection does get underway.

During an inspection the inspector should always be accompanied by the CM, facility owner/operator or other assigned knowledgeable individual. Detailed notes of the inspection should be written and if possible, a copy of the inspector's notes obtained at the end. If the

inspector takes environmental samples, you should ask him/her to provide you with duplicate (a.k.a. “split”) samples and what test parameters he/she is going to run so you have the opportunity to have the samples analyzed at your own laboratory for the same parameters. For many parameters, you can hold the sample, usually kept at 4°C for 14 days while you talk to your team and decide if analyzing the split samples is worth the cost. A few parameters, notably volatile organic compounds, have shorter allowable holding times and a decision to have the samples analyzed will need to be made at the time the sample split is handed to you.

Always ask for an “exit” interview and any preliminary findings before the inspector leaves. If you provide documents to the inspector, be sure you know what you provide and have a copy of your own. If you are requested to provide additional information, provide it in writing or by phone with a follow-up letter as soon as possible.

Chapter 8. Project Documentation

A job is never done until the paperwork is complete and environmental work is no exception. Further, when questions arise, they all too often come up years after the project is complete. This section describes project reports that should be kept in a safe place for many years, typically 3 to 5.

Section 8.01 Environmental Health and Safety Monitoring Data

The site-specific Health and Safety Plan (HASP) may include monitoring to document either working conditions or potential releases to the environment or both. The most obvious example would be during an asbestos abatement project. Typically, air monitoring is done during abatement to monitor worker exposure. A third party is then hired to do a post-abatement air sampling event to document that proper abatement and decontamination procedures were followed and that no residual contamination is present that would pose a hazard to the public. Another example of monitoring would be during the remediation of a brownfield project site. Perimeter air monitoring stations would be established to document the magnitude of potential releases as protection against lawsuits by site abutters. The worker, site user or site abutter may not claim damage until years after the asbestos abatement or brownfield construction is complete. To defend against such claims, all project monitoring data and reports describing how, where, when and why the data was collected should be assembled. The reports may or may not provide any data analyses or conclusions.

Section 8.02 Waste Manifests/Bills of Lading/Land Disposal Restrictions

The Federal and State hazardous waste regulations established a “cradle to grave” system of tracking hazardous waste from the point of generation to its final disposal location. To accomplish this, all facilities that generate hazardous wastes must obtain an EPA ID number. This ID number is specific to the site, not the facility owner or operator making the issue of manifest compliance difficult at multi-employer sites. All hazardous waste must be transported under a uniform hazardous waste manifest by a licensed transporter. The disposal facility must also be licensed and must be capable of treating the specific waste being sent from your site. In other words, metal-bearing wastes cannot be sent to a facility that is only permitted to treat solvent wastes. The manifest is signed by all parties (generator, transporter and disposal facility). The generator must receive a manifest signed by the disposal facility within 35 days, or an Exception Report must be filed with the EPA. Copies of the manifest are also submitted to the generation state and destination state. An order form for obtaining manifests is attached as Appendix H.

Connecticut-regulated wastes must also be shipped to receiving facilities in Connecticut under a Connecticut Uniform Hazardous Waste Manifest.

Each manifest requires a signature by the generator concerning the nature of the waste and waste minimization activities. By signing as the generator, the individual is assuming certain corporate and personal liability and should clearly understand what he/she is signing. If the CM is asked to sign as an agent for the generator, an agreement as to what this means legally should be established prior to the start of work.

Section 8.03 Discharge Monitoring Data

Permits issued for a construction project may require periodic monitoring of discharges. These permits are site- AND source-specific. The permits will specify monitoring parameters and frequency and may also dictate when data is reported to the regulatory agency. In addition to these specified reports, a project documentation file containing all monitoring results in chronological order and the when, how and who of these events should also be established. If the monitoring documents exceedances, additional information on why these exceedances occurred, how long they lasted and what corrective actions were taken should also be maintained.

Section 8.04 Equipment Operating Data

Much like discharge monitoring data, air discharges from mobile sources (rock crushers, emergency generators, etc.) are regulated and must either be directly or indirectly monitored. Indirect monitoring includes documenting the time the equipment is operated and/or the amount of fuel used. Direct monitoring includes laboratory testing.

Documentation may also be required for inspections and maintenance activities. All of this information should also be kept in an organized manner and retained.

Section 8.05 Tank Registrations

Non-residential USTs must be registered with the DEP, except for facilities with tanks used to store heating fuel only. However, if the volume of the tank exceeds 2,100 gallons, these facilities must register as well. Registration forms are prescribed by the DEP and information for obtaining them can be found at www.dep.state.ct.us/pao/pumpfact/ustfact.htm.

Section 8.06 Permits to Operate Withdrawn

Once the construction project is complete, permits that were required for specific operations should be formally withdrawn. Typically, this is done by a certified letter since DEP and other agencies are unlikely to issue a final permit revocation.

Chapter 9. Project Transition

At some point in time, hopefully very close to the intended schedule, construction will be complete.

Just like the Project Planning Team may have made environmental commitments to get the project approved that had to be identified to the CM, the CM may make other commitments to get the project built. For example, some existing construction permits, such as the post-construction provisions of the Stormwater General Permit may obligate the facility managers to continue to inspect and maintain sedimentation basins and similar controls. In addition, the manufacturer of certain pollution control structures such as oil/water separators may have recommended maintenance protocols that the CM can give to the new facility manager. A documentation file of all such obligations will be the subject of the next kick-off meeting between the Construction and Facility Operations teams.

Kick-Off Checklist
Environmental Project Construction Requirements

Project Name

Project Owner _____ Contact #s

Construction Manager _____ Contact #s

Project Organization (create flow chart)

Permits/Approvals Held

Name of Approval/Permit _____

Issuing Body _____

Name of Applicant _____

Responsible Party _____

General Requirements List

Specific Requirements List

Prior Approvals Required Yes No

Permit Checklist¹

Construction Stormwater/Dewatering D (EP)

Inland Wetlands (Local)

Coastal Wetlands (DEP)

Dredge/Fill (DEP/ACOE)

Mobil/Emergency Power Generation (DEP)

Material Processing Equipment (DEP)

Landfill Disruption (DEP)

Remedial Action Plan (Brownfield) (DEP/EPA)

Planning/Zoning (DEP, Local)

Setbacks, Buffers, etc.

Aquifer Protection Areas

Required Actions (by permit)

Additional Requirements (non-permit)

Hazardous Materials Management/Asbestos/Hazardous Materials

Abatement/Notification/Characterization & Disposal

Waste Management (DEP/EPA)

SPCC Plan (EPA)

BMPs/Aquifer Protection (DEP, Local)

Contingency Procedures

Chain of Command

Emergency Contact Numbers

Review of design/construction procedure changes/permit compatibility

Hazardous Material Spills

Unanticipated Soil/Water Conditions

¹ Use multiple pages as needed.