ENVIRONMENTAL ENGINEERING PHILOSOPHY

PREPARED FOR THE STATE OF CONNECTICUT
DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT

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OVERVIEW

The State of Connecticut Department of Economic and Community Development faces significant risk in dealing with potentially contaminated properties. This risk includes responsibility for cleanup, a crippling financial roadblock to development, as well as the expense of monitoring and removing underground tanks which may present exposure risk for tenants. Addressing these issues begins with the careful selection of a qualified engineer to perform a comprehensive environmental investigation of the development site.

The initial objective of the engineer is to address existing or suspected concerns based on historic site use. Next, specific issues such as lead. paint, asbestos, and leaking underground tanks are identified and proper action is integrated into the development programs With the help of a qualified engineer, ongoing maintenance programs can be developed to monitor any potentially hazardous site specific conditions. These might include aging underground tanks, asbestos in floor tiles or PCB laden transformers.

Environmental site assessment insurance then covers any contaminants that were missed in the engineering evaluation. This policy protects the developer from the consequences of a surprise discovery of hazardous material on the property.

By understanding the site history and the application of a systematic investigative protocol such as that recommended by the American Society for Testing and Materials, the State of Connecticut Department of Economic and Community Development and the developer can minimize the financial and health risks to the development and its residents. This outline will serve as a framework for the selection of a qualified assessment firm and the application process for the insurance coverage.

I. PURPOSE

Introduction

The State of Connecticut Department of Economic and Community Development has a unique responsibility concerning environmental issues. The Department's responsibility to the State includes avoiding clean-up costs and custodial care of contaminated real estate while assuring that residents are not exposed to hazardous environmental conditions. To manage this risk effectively a comprehensive environmental investigation of each projects environmental condition is essential.

The Engineer's Role

Due to the technical nature of a comprehensive environmental investigation, which could include chemistry, geology, and hydrology issues, it is important that qualified, experienced personnel conduct the investigation. In the event a site has unique characteristics or a history of high risk usage, particular care should be taken to match engineering skills with the problems that may arise during the investigation. The scope and price of the investigation are important since the State must act wisely as custodian of its scarce funds. The State also has a responsibility, as does a citizen or private company, to act in a reasonable and prudent manner to protect residents from exposure to hazardous substance conditions. A balance must be achieved between these two often-polar responsibilities.

To assure an efficient and effective deployment of resources, the thrust of the environmental inquiry must be clearly defined. The investigation centers on the known and probable contamination of a particular location and its surrounding neighborhood. Since many contaminants have long, if not permanent, lives, the investigation must include the entire history of the site as a developed property. A focus only on the most recent property use will not yield a complete picture of the environmental risks, as uses tend to change with time.

Timing

Unattended environmental issues tend to become worse over time. Disposal costs escalate and contaminants continue to spread, resulting in a larger impacted area. Contamination issues raised in the investigative reports must be addressed promptly to minimize remediation costs. Timing of the preliminary investigation report is critical in relationship to State funding. The investigation timing should be linked to both the project closing and significant State funding. A gap of more than 60 days from the last record search and site walk-through should require an update. The update should be documented as an addendum to the base report. If Site Assessment Insurance is to cover environmental factors not disclosed in the engineering report, the Insurance Company's requirements regarding the use of engineering firms and the dating of the engineering reports should be determined in advance.

In many cases a preliminary report will disclose issues that require ongoing monitoring programs, such as for underground tanks or non-friable asbestos. In other cases it will disclose issues that require prompt remediation action. If Environmental Site Assessment Insurance is to be obtained for the project, it may be wiser to complete the remediation program under the supervision of the qualified environmental engineering firm. With this fully documented the developer can then submit the application for insurance. By completing remediation of any on-site contaminants and providing proper documentation of the clean-up, Site Assessment Insurance can be obtained with more comprehensive coverage.

II. Investigation Methodology

Many terms have been used to describe different stages of environmental investigation, such as Preliminary Site Assessment; Transfer Act Assessment;, Transaction Screening Review; Phase 1, 11 and 111, etc. In the absence of a universal standard, the expected scope of work must be clearly laid out for the engineering firm. A request using inappropriate terminology VVIII generally result in an unsatisfactory assessment and unnecessary spending, To minimize the waste of time and money, areas of concern based on historic site use should be clearly identified before contacting the environmental engineering firm.

The focal point of a site investigation is the identification of both known contamination and potential contamination to the site, Immediate neighborhood influences must be reviewed for potential or real impact to the environmental condition of the property being developed, Since no two properties are identical, no blanket rules for comprehensive, site-specific investigations can be easily developed. To determine this information the following general procedures are employed:

Step I - Records Review

The first step in the investigative process is a formal review of the environmental records of the development site and its immediate neighborhood. The Federal EPA, the State DEP and the Local Health, Fire Marshal and Building Departments maintain these records. The records review identifies known problems with the site and begins to assemble a record of the historic property use. Prior ownership of the property is not of particular interest unless it provides information on the prior use of the property. Historic use is a significant element in understanding 'potential and real risks of a specific location. Unfortunately, most of the records on environmental issues are recent, dating from the late 1970's and early 1980's. This creates a need for further investigation.

Step 11 - Historic Research

Additional background information must be developed to understand better the site history. This frequently involves a review of historic manufacturing indexes and old telephone and street

directories. Sandborne Fire Insurance maps prove useful when reviewed by a skilled investigator. In conjunction with other public records, Sandborne maps yield property use information dating back to the late 1800's. The investigator must have a knowledge of the historic manufacturing processes disclosed in the investigation of a particular location. Combining this knowledge with the historic records review facilitates the identification of potential contaminants of the site.

Aerial photographic records are also often employed to determine site-specific uses. These records are available from the mid 1930's to the present. A review of the records can yield information on the level of development, the placement of structures and areas of suspected contamination, such as stressed vegetation or where on-site dumping may have occurred.

Step III - The Site Walk - Through

The third component of the investigative process is the site walk-through. Trained environmental specialists look for evidence of current use and past abuse of the property. They review housekeeping practices, hazardous inventory stored on the site, and generally keep their eyes and noses open for any telltale signs of contamination. Depending on the specific property conditions, they may also take limited samples for laboratory analysis if included in their work authorization. This typically occurs in the areas of Asbestos, Lead Paint, Radon, PCB's, Stained Soils or potentially Contaminated Flooring Material.

The site walk-through also notes the status of utilities. The presence of PCB materials in transformers, capacitor banks and hydraulic equipment associated with elevators is of particular interest, Compliance with notification, labeling and security requirements are reviewed. If there are any doubts or questions on the potential presence of PCB materials, these are brought out and appropriate laboratory testing conducted. The potential PCB contamination in fluorescent, mercury and high pressure sodium light ballasts are also the subject of further investigation and review.

Of particular interest in the site walk-through is the development of information on any current or former underground storage tanks, These could have been used for heating oil or, in a limited number of cases, for diesel or gasoline refueling purposes. Information such as the size, age and construction of the underground tanks and the related supply lines is collected. Their testing status would be reviewed to determine when, if ever, the tank had undergone an integrity test. The age of the tank is correlated with the building age and the age of the boiler and burner to assure that any earlier tanks were identified, This information is also matched against the State DEP and Local Fire Marshal records to assure that all underground tanks were accounted for. If it appears that earlier tanks were present, another avenue of investigation might be pursued.

Step IV - Report Preparation

Following the investigative process, a formal report would be generated providing information on the types and levels of contamination suspected or found on the particular parcel. The report would describe in detail the steps taken to affirm the site conditions and would report on both the usual and the unusual in a single, free-standing document.

It is not unusual for the initial report to suggest further investigation of open issues that were disclosed. These follow-up issues should be resolved prior to closure on project approval or development it benefits the developer and the State Department of Economic and Community Development to document that environmental issues raised in the initial report have been addressed, since this will allow any Environmental Site Assessment Insurance to be written in a manner maximizing coverage.

Step V - Specific Issues

As mentioned earlier, it is difficult, if not impossible, to develop a set of universal site assessment rules. The following areas may be of interest to the environmental firm and the State of Connecticut as the conditions at a particular site warrant.

Asbestos

Asbestos appeared in a wide variety of building products through the late 1970's, at which time its manufacture was banned and its use authorized only through 1980. For this reason any structures dating from 1980 or earlier are surveyed for materials containing asbestos. If found, the materials are identified and their quantity,, location and condition noted in the environmental report, This information proves useful in applying for proper State removal and disposal permits in the event remodeling programs dictate. Often, if the asbestos-containing materials are found in good -condition, their removal may not be warranted. In these cases the State and the property developer would want to have an Asbestos Management Program in place and may wish to begin building a reserve to cover ultimate removal costs. If this is the case, the State should monitor the Asbestos Management Program to assure that it provides a comprehensive review and that it is carried out. The State may provide periodic audits of the maintenance and monitoring activities within such a program. Assistance in developing such a plan can often be obtained from the environmental engineering firm conducting the initial investigation.

Lead Paint

The issue of lead in a residential environment is one that has generated a lot of interest in recent years, particularly regarding pregnant women, the very young and the elderly. The State of Connecticut Department of Economic and Community Development should be careful to assure that any identified lead from paint or water supply sources is appropriately dealt with by eliminating exposures to persons occupying the property, Similar to the asbestos issue, this may have implications as to costs of renovation if lead paint is found. Steps should be required to control the creation of lead dust and to provide proper disposal of building materials contaminated by lead paint in the event of a renovation or remediation program, Lead water supply lines should require replacement or, at the very least, the initiation of a program for water

quality monitoring to assure that the supply lines do not become a source for human lead exposure.

While it is most common to, focus lead investigations on the interior of the structure, the exterior and surrounding soils should not be overlooked. If construction materials use suggests lead contamination, it should be tested. In the event it is found through any number of relatively simple screening techniques, additional testing of surrounding soils should be undertaken so as to determine the impact of lead paint chalking and peeling. If found, the costs to remediate should be included in any development proposal.

A further consideration with lead paint is a somewhat confusing set of rules on maximum permissible exposures. While the State of Connecticut has not yet adopted a uniform standard, individual health departments often have local exposure regulations promulgated for the community. If the project received a federal subsidy, standards developed by the Department of Economic and Community Development and Urban Development may apply. A quick check with the State Department of Economic and Community Development, outside counsel and the engineering firm should be made to indicate clearly which standards of investigation must be Implemented and what the expected minimum threshold levels of concern are.

Urea Formaldehyde Insulation

The concern here is the off gassing of formaldehyde which can cause severe respiratory and dermatologic problems. This problem is manifested as an air quality issue and can be a particularly expensive issue to deal with if found to be active within a particular structure. Products containing Urea Formaldehyde have generally been eliminated from new building construction. In older construction the problem tends to diminish over time, as the formaldehyde is released and dissipated in the surrounding air. It does require identification and possibly further study, based on the condition and age of the material. An experienced environmental engineer's advice should be sought if this is suspected on any site.

Radon Gas

This problem is associated with the decay of radioactive materials. It presents a modest health-threat if prolonged exposures are incurred. Below grade locations are more likely to experience the problem, which is usually easily addressed through proper sealing of foundation cracks and foundation venting. Because it is an airborne contaminant, subject to seasonal variation, its measurement on a consistently repeatable basis may be difficult, Because of this, projects with the Department of Economic and Community Development involving pre-existing structures should have initial testing performed, followed by a program to monitor conditions through periodic, ongoing testing and inspection. Unfortunately, this is a naturally occurring condition not normally covered by insurance, The appearance of Radon on a site proposed for development can be addressed by utilizing low technology, relatively inexpensive solutions.

Underground Storage Tanks

This represents potentially the most significant risk to any Department of Economic and Community Development project. Leaking tanks are difficult to detect visually and, as a result, can go unnoticed for years before product shortages become significant enough to draw attention to the problem. In the interim the spread of the product no longer contained in the tank can result in a large contaminated area which may require expensive and long-term treatment. It is necessary to determine the site specific tank history by reconciling on-site observations of fill pipes and vent pipes with public records maintained by the Fire Marshal's Office and the State DEP Underground Storage Tank Unit. The current tank's age will need to be reconciled with the age of the heating plant and the history of utility hookups to determine if any other tanks were utilized. If identified, additional investigation using ground penetrating radar or magnetometers will be necessary to determine if the tank is in place as an abandoned unit or if it has been successfully removed along with any associated contaminated soil. It may be appropriate to install monitoring wells and perform limited soil sampling to assure no lingering contamination at the project location.

The State Department of Economic and Community Development should also be cautious of new tank installations. Each new tank and its associated supply lines should be pressure tested in accordance with the manufacturer's guidelines before being loaded with any product. A subsequent leak test should be performed after the first year of use to - detect any new leaks that develop as a result of the settling of fill material and the effects of frost movements in the ground surrounding the tank. In most cases concern will diminish until such time as the tank and the supply lines approach the end of their engineered life span. At that point a regular testing program and removal of a tank on, or before, the expiration of its designed life span should be considered. If the property is acquired with poor tanks identified proper initial inspection, registration and the implementation of a monitoring and removal program should be considered early in the development program. These steps should be periodically audited to assure that they are followed once the project is released for development.

Polychlorinated Biphenois (PCB's)

While not a particularly prevalent contaminant in the projects sponsored by the Department of Economic and Community Development, PCB contamination can be an expensive one to manage and control. PCB's, because of their heat transfer and electrical insulating characteristics, find their way into projects in the form of transformer dielectric, capacitor insulation, hydraulic fluids used in lifts and elevators and in the capacitor units ' of fluorescent, mercury and sodium light ballasts. If identified as PCB contaminated, most of these can be simply removed and replaced with non-contaminated units. Caution should be used when PCB's are discovered in transformers, While the removal of the contaminated dielectric from the transformer, its cleaning, and replacement with clean dielectric may provide a technical clean-up, there may be an additional cost for total replacement as the new power rating of the transformer may have diminished below that required for the specific application. If this is the case, a more expensive replacement would have to be factored Into the project development plan.. In the event contaminated units are discovered, proper marking, reporting and isolation are required or the owner would be subjected to significant fines and penalties from the EPA and State DEP.

An often overlooked area for PCB contamination comes from wood floors of old manufacturing facilities that may be looked to as suitable conversion properties. In these cases, care should be taken to identify the components of any floor staining, especially of wood flooring, as a significant concentration of PCB material may be found. This could require removal of the flooring as a hazardous material. This can yield substantial financial impact that would delay a development or even destroy the economic viability of a given project. Failure to correct the exposures could result in significant long-term health risks.

If any PCB contaminated materials are allowed to remain on-site, the State Department of Economic and Community Development should take special care that all Federal and State rules are abided by and periodic inspections are conducted to catch any changed conditions. Public utilities may own and be responsible for transformers at a particular site. At times they need to be reminded of their responsibilities for labeling and control under both State and Federal regulations. The utilities, periodic inspection process should not be substituted for that of the project manager. Only through removal, or careful monitoring, will the project manager and developer minimize the potential for general site contamination from PCB sources.

On-Site Disposal Areas

A thorough work up of the site history and a review of aerial photographic records may disclose on site disposal areas that will require further chemical and physical investigation. Properties formerly used as industrial or sanitary landfill sites, whether licensed or not, may present insurmountable risks. A more subtle risk might be in the form of a farm dump that received used appliances, surplus insecticides and old automobiles. These will need to be carefully evaluated before committing to its use as a housing development.

111. Unknown Risks - The Transfer of Liability

A properly prepared environmental site assessment report will provide identification of known levels of contamination and a list of probable contaminants that may be present. With these well defined, the Department of Economic and Community Development and independent developer are in a better position to weigh the risks and make appropriate adjustments in the development program to reflect immediate remediation of the problem. Ongoing monitoring, long-term stabilization, and future remediation of the problem can also be addressed before the development commitment is finalized.

What remains is the risk of the unknown. Previously this cloud over all real property could not be mitigated in favor of the property owner. Recently, new insurance products have been developed that link high quality environmental engineering investigations with an insurance policy. In addition to providing a reviewed, high-quality environmental engineering report, the insurance policy transfers the risk of the unknown to a third party. This relieves the property owner of the onus that comes with suddenly discovered hazardous substance conditions. When linked to quality engineering, the insurance package provides a comprehensive program to protect the Department of Economic and Community Development's and the developers resources by identifying known environmental clean-up issues and mitigating the financial impact of undiscovered environmental contamination. Unfortunately, insurance for the future

occurrence of airborne contaminants, such as Radon and the naturally occurring biological agents that contributes to sick building syndrome, have not yet been developed. In these cases of airborne contamination, a solidly based foundation of periodic review and monitoring of the on-site conditions may be the only available form of assurance.

IV. Standards of Investigations

Over the years there has been a number of attempts to develop standards for environmental investigations. Many of these have been in reaction to specific state regulations such as the State of Connecticut Transfer Act and Massachusetts General Statute 21e. To date, none of the local standards has achieved universal acceptance because none has taken a regional or focused approach to the issue and hence has not factored in the unique nature of each site to be investigated. It is the uniqueness of each property, which requires a thoughtful approach to each historic environmental investigation. Specific property history may dictate limited laboratory sampling, especially in the areas of known old Underground Tanks, Asbestos and Lead Paint, while in other cases, such as undeveloped land, the interest may focus on Pesticide Residuals or location and condition of localized Farm Dumps. Because of this it is very important that the agencies supervising the environmental investigation activities develop the scope of work for the investigation in concert with a qualified environmental engineering firm. Specific concerns of the agency, such as lead paint and tank integrity, need to be addressed up-front. In addition, a common expectation of the results and format of any environmental investigation must be agreed on. In this process, effective communication is critical. It is not uncommon for issues to be disclosed during the investigation that will require follow-up, These should be factored into the decision to drop or continue with the project development. If development progresses, the follow-up issues must be addressed under the appropriate supervision of an environmental firm and a follow-up report issued as an assurance that issues were completely addressed. If this process is followed, the conclusion will culminate in a usable environmental report, which fully supports the environmental conditions of a particular development.

Engineering firms should be referred to the Standard for Phase I Environmental Investigations developed by the American Society for Testing and Materials. This standard represents a comprehensive approach based on nationwide input to the issue of "standard" investigative protocols. While this standard rank among the best, the unique features of Connecticut's industrial development and the needs of the State Department of Economic and Community Development would mandate the following expansion:

a. The site history should be carried back beyond the 40 years as recommended by the standard. New England has a significantly longer history of development that needs to be explored on a site-specific basis. The site history and use investigation should date to when the site was undeveloped.

b. The site assessment should provide a detailed inventory of the quantities of hazardous materials found at the location, as well as comments on current and historic storage and disposal practices. This will provide useful information for estimating disposal costs that

may be required in predevelopment of the site. Failure to provide funds for off-site disposal invites unlicensed on-site disposal, which can present serious problems at a later date.

c. An inventory of transformer and related electrical equipment, including model and serial numbers, is necessary, in addition to confirming the PCB content of each. Fluorescent, mercury and sodium light ballasts also need to be inventoried and PCB contamination determined. If found, the development budget must be increased to reflect the disposal of the contaminated equipment and its replacement with non-contaminated units. If allowed to remain on-site, steps should be taken to provide for proper marking, security and registration, including appropriate transfer of registration as the development progresses. Failure to comply can result in significant EPA sanctions.

VI. Bidding Suggestions

The requirements and format of a bid package is largely a legal issue and should be undertaken only upon advice of counsel and within the requirements of the law. Before the bids are let, it is advisable to talk with environmental engineering firms to clarify any site specific issues. This will be required for inclusion in the bid specifications before the official publication. Some of the factors to consider are the following:

a. A reference to a standard such as the American Society for Testing and Materials Phase I Due Diligence Standard or its equivalent is appropriate. This establishes a rough investigation and reporting framework within which the environmental firm must operate.

b. An Asbestos Survey for buildings constructed before 1981 should be conducted, even if the property is ultimately going to be demolished. The survey supports the removal of identified asbestos before demolition commences and will support the licensing required for this to take place. It will also serve to verify the asbestos removal portion of the budget. If the property is not going to be demolished and asbestos in good condition will remain in place, the survey establishes a base point for the development of a comprehensive Asbestos Management Plan and will serve as a starting point for reserving against ultimate removal expenses.

c. Lead paint should be investigated. If the property is to be demolished, the presence of lead paint may significantly impact disposal options and costs. If the structure is to remain intact, a deleading program may be required if the use is to be residential housing for the pregnant women, very young, or the elderly. As with asbestos, if the lead paint remains in place, a monitoring program may be appropriate. While the State of Connecticut has no standard as of this date, caution should be exercised to assure the investigation is in accordance with Local Health Department Regulations and Department of Housing and Urban Development Regulations if they apply.

d. Urea formaldehyde use on the site should be reviewed. If found, the necessary air quality testing should be undertaken to verify that no offgassing of formaldehyde is occurring in the residential environment. If offgassing is found, an appropriate removal program may

be required.

e. Radon gas testing may be required depending upon the status of the development site. Base levels of Radon should be established and steps should be taken to reduce potential exposures. This should include an ongoing monitoring program at the site once the development has been completed. It may also require specific initial design changes to anticipate the problem.

f. Underground Tank Testing and associated soils sampling may be require if there are underground tanks historically located on the site. Removal, with appropriate soils testing and disposal, may be required on tanks and supply lines beyond their anticipated life span. On "'good" underground tanks, appropriate ongoing monitoring programs should be reviewed. Assurances should be obtained that the tanks will be periodically monitored and removed as they approach the end of their engineered life span.

g. Potability and metal content of drinking water should be tested. If lead supply lines are located in existing structures, allowance should be made for their removal, proper disposal and replacement by non-contaminating plumbing. If lead supply lines are provided in the mains feeding the subject site, periodic water testing for metals should be considered to detect any problems with elevated levels of lead.

h. The contractor should be required to provide insurance at levels appropriate to the assignment. The bid specifications should require general liability, automobile, worker's compensation insurance, and errors and omissions insurance. If destructive testing is required as part of the assignment, contractors and engineer's pollution liability insurance may also be appropriate.