C Unit 10 C{PRIVATE }

Site Assessment

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Site Assessment

In 1970, there were less than 1,000 pages of environmental regulations in the Code of Federal Regulations (CFR). By 1993, environmental regulations increased to over 11, 000 pages. This proliferation of regulations has impacted all aspects of the environment. One of the areas of greatest concern is liability, or identifying who is responsible for remediation once the environment has been contaminated. Liability associated with environmental contamination is viewed as one of the most stringent in the United States and is changing the way business is conducted in this country.

10.1.1 Purpose

The above-mentioned environmental liability has created the need to investigate properties for chemical hazards. Such investigations help establish financial liability, collect basic information that can be used to define the nature and extent of the environmental contamination, and set the stage for cleanup operations.

This manual presents information and techniques for the investigative phases that defect environmental contamination. This process may be called a site inspection, site assessment, site investigation, environmental site assessment, preacquisition site assessment, preliminary facility assessment, initial site assessment, property transaction site assessment, or preliminary assessment depending on the person or government agency conducting the investigation. Regardless of the name, this process involves a systematic examination of records and a property inspection to detect existing and potential environmental contamination.

Often, “environmental audit” is used to mean site assessment. However, the two terms refer to different processes and are not interchangeable[1]. The purpose of an environmental audit is to assess compliance at an existing facility. Such audits typically consist of waste stream identification, treatment processes, pollution control, permits, recordkeeping, emergency response plans, insurance, etc.

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[1] This unit is reprinted by permission of McGraw-Hill, Woodinville, WA

10.1.2 When to Conduct a Site Assessment

A site assessment should be conducted prior to property transfer. When a property is transferred, the new owner assumes responsibility for any environmental hazards on or associated with the property. This liability, discussed in detail in Unit 3, is rapidly making a site assessment a routine part of the transfer process, just as a title search and an appraisal are now part of the property transfer process.

A site assessment is also undertaken when expansion, demolition, or other activities will disturb existing structures or the land. Regulations now require that a building be inspected for

asbestos prior to demolition. If asbestos is found, control techniques must be used to prevent unprotected persons from coming in contact with that asbestos. Site assessments are increasingly used in industrialized areas prior to excavations. Underground chemical hazards can be deadly to construction workers, and a site assessment is the best means to identify potential human risks.

Finally, a site assessment may be triggered by the Agency of Toxic Substance and Disease Registry (ATSDR). This agency can issue a public health advisory for sites that pose a high level of concern for pubic health. Such sites must meet the following criteria before the health advisory is issued.

- hazardous materials are present on the site and are known to be toxic to human health:
- an established exposure pathway exists between the contamination and adjacent human populations;
- humans are exposed or could be exposed to hazardous concentrations of hazardous substances; and
- no remediation or removal is planned.

Such public health advisories have been responsible for adding sites to the National Priorities List (NPL) and for increasing the remediation priority for sites already on the NPL.

10.1.3. Definition of a Hazardous Substance

A hazardous substance has several definitions. RCRA does not define this term, but instead uses the term hazardous waste. Section 1004 (5) of RCRA defines hazardous waste that may:

(1) "cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness, or"
(2) "pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed.

The definition does not provide a regulatory framework to identify hazardous waste. Therefore, Subtitle C of RCRA (40 CFR Part 261) classifies a waste as hazardous if it meets any of the following conditions:

(1) it has been named and listed as a hazardous waste by RCRA;
(2) it has not been excluded as a hazardous waste be RCRA
(3) it is a mixture containing a listed hazardous waste and a non-hazardous waste, or
(4) it exhibits, on analysis, any characteristic of a hazardous waste. These characteristics include ignitability, corrosivity, or reactivity, or the waste meets the detection limits for substances determined by the toxicity characteristic leaching procedure. CERCLA does not use the term hazardous waste, but uses the broader term of hazardous substance. In essence, this term is defined as "any substance designated as hazardous under any existing federal regulations". Therefore, Circle's hazardous substance includes the hazardous waste designation by RCRA, designated substances under the Clean Water Air Act, and hazardous pollutants listed in the Clean Air Act, and hazardous chemicals pursuant to the Toxic Substances Control Act.

However, the CERCLA hazardous substance term does not include all environmental hazards of concern during a site assessment. Asbestos (in-place), naturally occurring radioactive materials such as radon, lead-based paint, lead in drinking water, and some petroleum products are not defined under CERCLA as a hazardous substance, yet identification of these materials is important during a site assessment. Therefore, site assessments should identify any material or condition that can (or has) damaged the environment or threatened human health.

10.2 SITE ASSESSMENT METHODS

Although methods of site assessment are similar regardless of the situation, details of the investigative procedure change depending on why the assessment is being conducted, who is requesting the assessment (the client), and any applicable regulations. Therefore, while the case studies presented in this manual are similar in scope, the details change in accordance with the above mentioned factors.

This unit presents the generic preacquistion site assessment process for property transfer. Most of the material presented in this unit concerns the initial investigative phases that focus on identifying probable or actual environmental liabilities. Subsequent activities, such as detailed sampling programs, long-term monitoring, risk assessment, site remediation, and other related activities are site specific and are not discussed in detail.

10.2.1 BASIC PROCEDURES FOR CONDUCTING PROPERTY TRANSFER SITE ASSESSMENTS

Phase I site assessment standards for property transfer are gradually emerging from a variety of professional groups including the American Society for Testing and Materials (ASTM), the Federal National Mortgage Association (Fannie Mae), the National Resolution Trust Corporation (NRTC), and the Federal Deposit Insurance Corporation (FDIC). A summary of the current ASTM are presented in the appendix. Other groups are also involved in site assessment standards include the Association of Engineering Firms Practicing in the Geosciences, Association of Ground Water Scientists and Engineers, National Ground Water Association, Multiple Family Housing Council, Hazardous Waste Action Coalition, and various real estate organizations and lending institutions.

All phase I standards are similar in scope and all strive to provide the necessary level of effort to quality for liability relief under CERCLA if contamination is discovered following property transfer. However, this development of site assessment standards is a slow and fragmented process, and none of the standards prepared to date have been subjected to extensive legal challenge or scrutiny by the federal government.

Phase I site assessment methods for property transfer presented in this manual focus on the features common to all site assessments procedures. Assessments are typically divided into three sequential phases as follows:

(1) Phase I – This phase consists of a preliminary evaluation of the property and includes records review and interviews that provides information to evaluate present and past activities, inspection of the property, evaluation of adjacent property, and a report. The cost for Phase I usually ranges from $1,500.00 to $5,000.00, depending on the level of detail required. Most firms conducting Phase I site assessments require approximately 15 working days to complete the work.

(2) Phase II – If the Phase I assessment concludes that a reasonable probability of environmental liabilities exist, a detailed investigation is conducted to confirm or deny the presense of environmental liabilities. Samples are collected and analyzed to define the type, extent, and significance of environmental hazards. Phase II assessments typically require four or more weeks to complete and initial costs can range from $1,000.00 for tank testing to $20,000 for ground water sampling.

(3) Phase III – Assuming that environmental liabilities were documented in Phase II, this phase II, this phase involves a more detailed hazardous substance evaluation (such as intensive sampling, monitoring programs, and risk analysis), design of remedial action,

regulatory approval, and implementation of the cleanup. Costs are difficult to predict. For example, site remediation for leaking underground storage tank where contamination for a leaking underground storage tank where contamination has not spread to adjacent properties averages $40,000 per tank. When contamination has moved off-site, remediation costs typically increase to $250,000. Minimum time requirements for Phase III commonly range from four to eight months.

While these phases are presented as distinct activities, the boundary lines between the phases are often blurred. This is especially true between Phase I and Phase II. When there is a high probability of environmental liability (such as with certain industrial operations) or when complaints have been received, preliminary sampling is often included with Phase I. In cases where there is a known release of hazardous substances, Phases I and II are often combined.

The ASTM has proposed a "Transaction Screen" when a full Phase I may not be justified, such as when there is little risk of environmental contamination (relatively undisturbed land or a new multi-family building, for example). This process consists of a limited records review and a brief property inspection. If any suspicion of contamination is identified during this process, a full Phase I assessment is conducted. The Transaction Screen is summarized in the appendix.

10.2.1.1 PHASE I SITE ASSESSMENT FOR PROPERTY TRANSFER

This initial assessment phase is generally separated into three parts: records review, site inspection, and report preparation. Following is a brief discussion of these three parts; detailed information can be found in subsequent units.

10.2.1.1.1 RECORDS REVIEW

The first step in a site assessment is to gather all available records concerning the site. The purpose of records review is to examine past activities to determine the probability of hazardous substance release, to provide direction to site examination that follows, and to alert the investigator about possible health hazards that could be encountered during an inspection. Records review may be referred to as a documents search, data acquisition, historical review, agency records review, etc.

Ownership or title records are available at county offices. Examination of such records will supply names of previous owners. These names are useful only in their relation to past uses of the property. For example, a listing of John Thompson as an owner gives no information about the potential environmental liabilities, but a listing of the American Gold Smelting Company as on owner immediately suggest land use activities that may have left environmental contamination. Ownership records should be traced back as far as possible. It is almost impossible to establish a time line that pre-dates pollution.

Some clients require that ownership and other records be searched for the previous 50 years. While this requirement helps establish the scope of work and controls costs, it greatly increases the probability that important records giving evidence of pollution will be missed. For example, a consultant was hired to conduct a Phase I assessment for the Robinson Brick and Title Company in Denver, Colorado. Their records search that went back 70 years found that the site was once occupied by the National Radium Institute. This Institute processed 1600 tons of uranium ore to extract radium. Based on this information and subsequent sampling, the site was placed on the Superfund list and cleanup of low-level radioactive material was initiated. During excavation in the deeper pits, a white crystalline substance formed on the walls. Analysis showed this material to contain high levels of zinc, lead, cadmium, and arsenic. The Phase I assessment was reopened and the records searched from 1913 back. These records showed that the site was occupied by the Bailey Smelter in 1889 and by the Colorado Zinc Company around 1900. Cleanup costs dramatically increased due to the underlying

contamination. This example points out two data acquisition hazards: stopping the records investigation once an obvious hazard has been found and terminating the records search prior to exhaustion of all sources of information relating to past land usage.

Aerial photographs should be examined. These documents have excellent information about prior land use such as the location of roads and buildings, the presence of tanks and lagoons, and the condition of the land.

While maps do not provide as much information as aerial photographs, they go back well into the last century for most locations. Planning maps, insurance maps, real estate maps, etc. often indicate the type of facility, adjacent land use, and other information that can be important in assessing environmental liabilities.

A variety of lists are available that will assist in assessing environmental liabilities.

A variety of lists are available that will assist in assessing environmental liabilities. The State RCRA Hazardous Waste Notifiers List gives basic information about all facilities that generate hazardous waste. CERCLIS (CERCLA information System) is a listing of suspected hazardous waste sites and the status of the investigation. The National Priorties List (NPL) presents basic information about Superfund sites. States may have lists of underground water wells, chemical spills, landfills, water discharge permits under the National Pollutant Discharge Elimination System (NPDES), etc. Such lists give quick access to potential hazards on the site under investigation as well as adjacent sites.

Basic environmental information is often collected during the records review phase. Soil and geologic information can be valuable in determining migration pathways of pollutants. For example, if the soil is sandy and underlain by fractured rock, there is a much higher probability that chemical releases will quickly reach ground water that if the soil is high in clay and underlain with nonfractured rock. Weather information provides a preliminary assessment of the potential movement of chemical releases into soil, surface and ground water, and the air.

Interviews with facility owners, employees, and neighbors are additional sources of important data that may reveal information about chemical releases. Interviews must be carefully conducted, and in many cases the information must be confirmed by independent analysis.

Miscellaneous sources of information include newspapers, historical societies, company records (if available), emergency response units, planning boards, and so on.

10.2.1.1.2 SITE INSPECTION

Personal safety is the first concern when conducting a site inspection. Hazards likely to be encountered during a site inspection include confined spaces, toxic liquids and vapors, and physical hazards such as pits, sharp objects, slippery surfaces, uneven terrain, falling objects, etc. Because of these potential hazards, a perimeter reconnaissance should precede actual site entry. Here the property boundaries are walked to identify potential safety hazards with the site. The site is then entered wearing appropriate safety equipment and carrying appropriate air monitoring instruments.

Although a client may have hired you to conduct the site assessment, permission from the property owner is required prior to entry. The property owner may request the investigation be conducted at night or on the weekend to prevent interfering with work schedules.

Armed with the information collected during the records review, the site is meticulously examined for possible environmental liabilities. Some of the more obvious outside items to look for include:

- discolored soil or pavement;
- stressed vegetation
- drums and aboveground tanks;
- pumps vents, and other evidence of underground storage tanks;
- evidence of buried waste;
- poor housekeeping
- transformers; and
- surface water that has a sheen or other evidence of contaminants.

Note that is this phase the investigator is simply describing possible environmental hazards; sampling or otherwise verifying that hazards actually exist is generally not part of a Phase I assessment. In some cases, limited sampling (such as radon, lead based paint, asbestos, etc.) may be within the scope of a Phase I assessment.

Adjacent areas are also examined during the site inspection. Adjacent property can release hazardous substances that subsequently contaminate the clients property. Some experts recommend that land use within 250 feet of the subject site be examined as a potential source of contamination. Others recommend an other limit of 1,000 feet or more, especially when high risk neighbors are present. High risk neighbors are those that use hazardous substances, such as fuels an solvents, or generate hazardous wastes.

If a building is included in the site assessment, obvious items to look for include:

- Wrapped pipes, acoustical tiles, and insulation that might contain asbestos;
- chemical storage areas;
- areas where chemicals are used;
- manufacturing or processing areas.

In an addition to observation, employees encountered during the inspection may supply valuable information that will assist in determining environmental hazards.

Locked rooms, inaccessible areas, and confined spaces are commonly encountered during a building inspection. Such areas should be inspected at a later date when access can be provided and when appropriate safety precautions can be observed.

To facilitate the site inspection, checklists are often developed prior to the inspection and used to ensure that all important facets are covered. Lending institutions often use checklists; in addition, the ASTM has prepared a detailed checklist for Phase I site assessments.

10.2.1.1.3 THE REPORT

The only product recreated during a Phase I site assessment is a report detailing the results. Therefore, this document must be well organized, well written, and comprehensive in scope.

Report format will vary depending on the client, the type of property investigated, anticipated use, and preference of the author. However, all reports should present the scope and purpose of the assessment, the methods used, a description of the site, results form the records review, results of the property inspection, summary and recommendation, and a disclaimer.

The report should refrain from making any definitive statements regarding potential environmental liability other that stating the findings as determined by the site assessment. The property cannot be certified free of contamination or liability, and any statements suggesting this condition must be avoided. In addition, the report should not recommend for or against purchase of the property. The risk of purchase and all financial decisions belongs to the client. The risk of purchase and all financial decisions belongs to the client. However, the report should provide the basis for the client to make an informed decision as to whether to proceed of cancel the proposed transaction, and to decide if a Phase II assessment is warranted.

10.2.1.2. PHASE II SITE ASSESSMENT FOR PROPERTY TRANSFER

If the Phase I site assessment concludes that a significant potential for environmental liability exists on the property under investigation, a Phase II is to verify and characterize the suspected contamination through sampling and analysis.

A well-defined scope of work is essential for Phase II. Sampling and analysis is expensive and costs can readily exceed the budget if the scope of work is not defined. The type and number of samples, sampling methods, sample packaging and shipping, and laboratory analysis must be defined prior to conducting the field work. A sampling plan that specifies every detail of the field program is highly recommended. Quality assurance, quality control, chain of custody, and other details must be stated to ensure that data of the appropriate quality is collected and that all procedures and records meet legal standards should litigation develop.

Obviously, Phase II assessments are site specific. Some of the activities that might be included in this phase are:

- soil sampling;
- air sampling;
- soil gas survey;
- surface and/or ground water sampling
- metal detection surveys to locate buried drums and tanks;
- tank testing;
- drum sampling;
- asbestos inspection;
- radon detection; and
- more intensive data acquisition.

Specialized training and state certification are usually necessary for some types of sampling such as asbestos, tank testing, and radon detection. In addition, the analytical laboratory that analyzes the samples may need certification.

10.2.1.3 PHASE III SITE ASSESSMENT FOR PROPERTY TRANSFER

If the Phase III site assessment documents the existence of environmental liabilities, the investigation moves into a third phase. This phase may involve additional sampling to determine the exact nature and extent of the pollution, a remediation plan, and implementation of the plan (the cleanup). Phase III can range from simply removing a leaking tank plus contaminated soil to long and costly ground water remediation projects.

In most cases, property transfer does not involve Phase III. The current owner usually cleans up the property prior to transfer to a new owner. However, a growing number of investor are purchasing contaminated property, cleaning the property, and selling the remediated property. Obviously, contaminated property can be bought very inexpensively, and if clean up costs are not too high, a substantial profit can be realized for investors willing to take a risk. Unfortunately, the question of "How clean is clean?" has yet to be answered, so there is no guarantee that the remediated property is free of future environmental liabilities.

10.3 ENVIRONMENTAL LIABILITY

A man who paid $380 for a piece of land may end up having to spend $1 million to clean up toxic waste at Kansas City, Kansas, site K.C. Groves bought the land in January at a delinquent tax sale. He said the Environmental Protection Agency has notified him that the land was contaminated with toxic chemicals and must be cleaned up immediately at an estimated cost of $600,000 to $1 million.

Rocky Mountain New, February 1991

The excerpt is just one example of the range of transactions that can create environmental liability. The courts have ruled that a wide range of individuals or organizations are liable for waste cleanup, regardless of their role in causing or allowing the environmental degradation. This unit is a brief review of the environmental liability issues associated with property transfer. However, these issues are complex and often litigated, and appropriate legal assistance should be obtained for anything other than generalized information.

10.3.1 CERCLA and Environmental Liability

CERCLA (1980) and its reauthorization (Superfund Amendments and Reauthorization Act of 1986, or SARA) provide that certain parties are liable for cleanup of hazardous substance releases into the environment. The purpose of financial liability under these acts is to facilitate cleanup of hazardous substances, not to fairly assess costs to those responsible. Therefore, it is imperative to know to avoid becoming ensnarled in the liability net as a potentially responsible party (PRP).

10.3.1.1 POTENTIALLY RESPONSIBLE PARTIES

Under Superfund, the EPA imposes financial liability on any individual or organization it considers potentially responsible for the hazardous substance release. The potentially responsible parties may include:

- Those who generate hazardous substances;

- current owner(s) and/or operator(s) of a facility or property, regardless of their role in the generation of the hazardous substance,

- owner(s) and/or operators(s) of a facility or property at the time the hazardous substance was disposed of

- any person who arranged for the treatment or disposal, or arranged for the transport for treatment or disposal of the hazardous substances; and

- any person who accepts or accepted hazardous substances for transport to a facility they selected.

CERCLA liability is far reaching and all encompassing. A waste generator can be held financially responsible for a hazardous substance release even if its actions at the time were legal. For example, many major corporations disposed of their hazardous waste at the Lowry Industrial Landfill in Colorado during the active live of their facility. Their actions were legal at the time. Unfortunately, the disposed hazardous waste leached into ground water and necessitated a costly restoration program. The companies that sent their hazardous waste to Lowry are now paying most of the cleanup costs. The liability is applicable even if you did not own the facility of the time the hazardous substances were shipped off-site for disposal.

Other companies are bearing financial costs for hazardous substance releases caused by companies they merges with or acquired. Paramount recently paid approximately $26 million to settle liability at the Eagle Mine Superfund Site, even though it did not remove a single pound of ore from the mine and did not own the mine at the time of the initial release.

Recent actions by the courts have ruled that individuals can be personally liable for cleanup costs, especially if they were directly involved in the management of hazardous substances. Officers, directors, shareholders, and employees can likewise be directly liable for releases of hazardous substances if their level of involvement falls within the broad definition of a PRP. For example, a major shareholder of a corporation was held individually in the manufacturing of chemicals and the actual improper placement of hazardous substances.

The CERCLA liability net has also sent tremors through the banking and lending industry. Lenders can be considered “owners or operators” when they participate in day to day activities of the facility to take title to contaminated property through foreclosure. Landlords can be held responsible for activities of their tenants that contaminate property. The lessor of property is liable for cleanup of contamination caused by the activities of the lessee, even when the lessor had no knowledge of such activities.

In short, the overriding purpose of environmental laws regarding the release of hazardous substances into environmental is to cleanup the hazardous waste. Traditional fault based notions of “fairness” are subordinate to the goal of assuring that waste sites are adequately remediated.

10.3.1.2. EXTENT OF LIABILITY

Those judged to be persons that have PRP status are liable for the following costs:

- all costs associated with the removal or remediation of a hazardous substance site incurred by the federal government, a state government, or their contractors;

- any other necessary cost of response incurred by any other person (usually other PRPs) consistent with the National Contingency Plan:

- damages for injury to, destruction of, or loss of material resources, including the cost of assessing the costs of these damages; and

- the costs of any required health assessment or health effects study.

In addition, these costs can include governmental administrative costs, attorney’s fees, and interest on costs and fees. The EPA estimates the average cost for cleanup at a Superfund site is approximately $33 million where little or no ground water remediation is necessary.

10.3.1.2 TYPES OF LIABILITY

CERCLA recognized two types of liability; strict liability and joint and several liability.

Strict liability means that the government need not prove any intent; negligence, or wrong doing associated with the release of hazardous substances. Thus, you may be held liable for a hazardous substance release even if you used licensed contractors and state-of-the-art equipment, and followed all applicable regulations at the time of disposal.

Joint and several liability means that each and every PRP at a given site could be held liable individually for the entire cost of site cleanup. For example, the Ames Company sent its hazardous waste off-site for disposal. The liner in the disposal site leaked and hazardous waste leached into the ground water. Although the Ames Company contributed only 5 percent of the waste, the company could be held liable for the entire cleanup costs. Typically, the government sues some, but no all, PRPs that contributed to a hazardous waste release. The government sues those with the highest ability to pay, or the "deep pockets". It is up to the defendants in the suit to identify and subsequently sue other PRPs in a "contribution action" for their share of the cleanup costs.

10.3.1.3 STATE LAWS AFFECTING ENVIRONMENTAL LIABILITY

Many states have enacted their own hazardous waste statutes that generally parallel federal laws. It is beyond the scope of this manual to discuss all these laws, but some are worthy of mention. Some states have created a "superlien". This allows states to impose a lien against a company (to cover the cost of hazardous waste cleanup) that applies not only the subject site, but other property owned by the company. In addition, superliens are often superior to prior creditors' liens. Thus, superliens take priority over earlier liens on the property, including bank mortgages. As of 1992, seven states had superlien provisions, and more states are likely to adopt such provisions.

Some states have laws requiring a site assessment prior to the transfer of industrial property. New Jersey passed the first such law in 1883. This law requires that prior to transfer of an industrial facility, the seller must submit to the state a certificate stating there has been no discharge of hazardous substances or waste on or from the site, or that any discharge on or from the site has been remediated. If the seller cannot make that certification, the seller must submit a state-approved cleanup plan, secured by a bond or other financial security. An increasing number of states are adopting legislation requiring some type of site assessment prior to property transfer. Nine states have such legislation and 21 other states are considering the issue.

Other laws that impact environmental liability deal with negligence, trespass, and nuisance. Negligence imposes environmental liability based on failure to meet the standard of care that society demands of its citizens. Trespass involves the physical invasion of the property by a person or a chemical substance that interferes with the use of the property. Nuisance is defined as unreasonable interference with another's use of property, and can include introducing hazardous substances into air, ground, or water.

Another area in which state laws can significantly influence environmental liability is through "toxic torts". This refers to the handling of hazardous substances in a manner that causes human exposure and results in personal injury. The persons injured can recover damages from the party causing the exposure. Such claims often involve injury to a large group of people, thus imposing significant liability. For example, the U.S. Department of Justice recently settled a toxic tort lawsuit over the operation of its Fernald, Ohio Nuclear Weapons Plant for approximately $60 million. This form of liability may not surface for many years because exposure to hazardous substances often takes a long period of time to manifest itself. Employees are usually unable to sue their employers for toxic torts, and are restricted to recover workers' compensation benefits.

10.3.2. ENVIRONMENTAL LIABILITY SPECIFIC TO PROPERTY TRANSFER

The environmental liabilities discussed above. Apply to property transfer. The specter of unlimited CERCLA liability has caused the greatest concern to the industrial, real estate, and financial communities.

The prospective buyer is most concerned with becoming a PRP through the "owner or operator' provision in CERCLA liability. For example, in the case involving the State of New York v. Shore Realty, the defendant purchased property that had been significantly contaminated by past activities. The new owner, Shore Realty, was held liable for the cleanup costs, even though they did not own the property at the time of the contamination and they had nothing to do with the activities that resulted in the contamination. Thus, strict liability, as well and joint and several liability, extends to a new property owner.

A new owner of contaminated property may have recourse through the "innocent landowner defense" or a *de minimis* settlement with the EPA.

10.3.2.1 INNOCENT LANDOWNER DEFENSE

The scope of the statutory third party defense was expanded in SARA to provide for an "innocent landowner" defense. This can shield a purchaser from liability inadvertently acquired during property transfer. To qualify for this defense, the purchaser must have exercised "due diligence" in investigating the property for the presence of hazardous substances prior to the purchase of the property. In essence, this due diligence under SARA requires a site assessment involving the following.

- appropriate investigation into the previous ownership and uses of the property; and in most cases,

- a site visit to detect "obvious" contamination.

Once due diligence has been established, the purchaser may qualify for the innocent landowner defense if he or she can establish a least one of the following:

- the property was acquired without knowing and without having any reason to suspect that hazardous substances were present;

- the property was acquired by a governmental entity through involuntary transfer or through eminent domain authority (usually tax sale or condemnation);
- the property was acquired through inheritance or bequest;

- the purchaser was the victim of acts of unrelated third parties, such as midnight dumpers;

- owners of property adjacent to hazardous waste disposal sites, where contaminants have migrated onto the landowner's property despite the exercise of due care by the landowner.

This defense does not apply if the purchaser contributed to the contamination, such as through the contamination of a process that released hazardous substances.

Released hazardous substances.

The innocent landowner defense is applied on a case-by-case basis that, to date, has demonstrated that this defense is very difficult to qualify for and is narrowly applied.

10.3.2.2 *DE MINIMIS* SETTLEMENT

The *de minimis* settlement is another means of settling claims against property owners that had no direct involvement in the release of a hazardous substance. The EPA is directed to reach a prompt settlement if the settlement involves only a minor portion of the cleanup costs at the facility concerned.

While simple in concept, this idea has proven difficult to implement. To quality for a *de minimis* settlement, one of the following apply:

- the volume and toxicity of the substances contributed by the current owner are minimal in comparison to other substances at the facility; for example, a small quantity of solvents were sent to a land disposal facility that now leaks and is contaminating the ground water; or

- the owner did not permit or contribute to the activities causing the contamination and purchased the property without knowledge of the presence of hazardous substances; for example, a person buys a property in an industrial park that is found to be contaminated.

The *de minimis* settlement is used to resolve environmental liability prior to or in the early stages of litigation. Although the exact terms of the settlement vary, the typical *de minimis* settlement will require that the landowner make a cash "contribution" to the EPA for cleanup efforts and that the owner file a notice in the local land records office stating that hazardous substances were disposed of on the site.

The cash contribution to the EPA is based on the owners volumetric share of the total expected cleanup costs at the site. To date, premiums have ranged from 60% to 150% of the owners volumetric share of the hazardous substance.

The potential benefits of a *de minimis* settlement are numerous. Environmental liens against the property can be withdrawn. Lengthy and costly litigation is avoided. The owner pays only for his or her share of the waste, not the entire amount that can be assessed under joint and several liability. The most important benefit of *de minimis* settlements may be their shield from contributor claims. A party that enters a settlement agreement with the EPA is shielded from lawsuits brought by other PRPs claiming that the settler should pay additional cleanup costs.

However, the EPA retains the right to seek further payments or liabilities under a number of conditions. Some of these conditions include additional hazardous waste disposal on the site after settlement, failure of the landowner to exercise due care in handling and disposing of hazardous substances, and the landowner's failure to cooperate with the EPA.

10.3.3 ENVIRONMENTAL LIABILITY REDUCTION

The far-reaching liability net established by CERCLA, and reinforced by court decisions, has the potential to entangle the seller, buyer, real estate agent, lending institutions, and the site investigator in expensive and protracted litigations. There are, however, precautions that can minimize this potential liability.

10.3.3.1 LIABILITY PROTECTION FOR THE BUYER

The best liability protection for the buyer is to contract a competent firm to conduct a Phase I site assessment. The buyer customarily pays for the assessment as part of the closing costs.

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However, a site assessment is no guarantee that the property is free of contamination. For example, BCW Associates purchased property from the Occidental Chemical Corporation. The buyer had two separate site assessments conducted prior to acquisition with both assessments concluding that the property was free of contamination. Following purchase, the new owner found lead contamination and was obligated to pay for cleanup costs. Thus, the purchaser cannot hide behind a defective site assessment if there is no reason to believe that contamination might exist.

The federal environmental liability laws, provide no exception for any type of property owner. Therefore, even homeowners could be held liable for clean up actions under CERCLA. Examples of this potential homeowner liability include areas where hazardous mine tailings have been used a backfill around foundations, contaminated ground water originating from off-site areas, and housed built on contaminated soil. In response to this concern, the EPA issued a policy statement on July 3, 1991 addressing owners of residential property where hazardous substances have been found. Under this policy the EPA "will not take enforcement actions against any owner of residential property to require such owner to undertake response actions or pay response costs" provided that certain requirements are met such as cooperating with the EPA and not contributing to the release of hazardous substances. However, this policy "does not provide an exemption from potential CERCLA liability for any party; it is a statement of the Agency's enforcement discretion." In other words, at the present time it is not the intent of the EPA to collect cleanup costs from owners or single family residences.

10.3.3.2 LIABILITY PROTECTION FOR THE SELLER

In most cases, the seller is not particularly interested in environmental hazards and may purposely remain ignorant of such issues to avoid the obligation of divulging known hazards. Yet ignorance has its risks. If a contaminated site is transferred without benefit of a site assessment, the new owner can sue the previous owner. Now the issue focuses on who contaminated the land – the previous owner or the present owner? The previous owner may have no viable defense if he or she has not conducted a site assessment to document environmental hazards. Therefore, it is in the best interests of both the buyer and the seller to conduct a site assessment.

10.3.3.3 LIABILITY PROTECTION FOR THE BROKER

Brokers (or real estate agents) are not identified as PRPs under CERCLA and they normally have no direct liability under existing environmental laws. However, brokers can be exposed to liability through professional negligence. If environmental matters are not properly handled during real estate transactions, broker liability could result. For example, a California court held that a real estate broker was liable for selling a home that was built on an improperly engineered and compacted landfill. The court stated that the agent failed to disclose

“reasonably discovered facts” that affected the value of the property. This was followed by legislation requiring brokers to conduct a “reasonably diligent and competent inspection” of a property to document any obvious conditions that might affect the property value.

It is common for brokers to obtain disclosure information from the seller that documents the seller’s knowledge of the environmental condition of the property. This information is then made available to the potential buyer. Obviously, the broker cannot solely rely on what the seller discloses; the broker must inspect the property and disclose conditions consistent with his or her professional responsibilities

- inform parties to the transaction of the existence of environmental laws and concerns;
- discuss owner liability under these laws;
- recommend steps that can be taken to assess the risk through a professional site assessment;
- refer the client to legal or environmental assistance when questions arise;
- inspect the property consistent with professional broker practices; and
- provide the client with the seller’s disclosure and other pertinent information demonstrating that environmental concerns have been addressed.

It is important that the broker realize that he or she is not an environmental expert and should refrain from making statements that imply expertise that does not exist.

Assessors are involved in the real estate transactions and could be held liable if environmental problems are discovered following completion of the transaction. Therefore, appraisers must have a basic knowledge of what constitutes an environmental liability and how this liability affects market value.

Causes of market-value loss of contaminated property include costs of cleanup, liability for damage to public health, and the “contaminated” stigma that may attach to the property after cleanup. Significant contamination can obviously cause market-value loss, but even property where contamination is only suspected has restricted marketability. Marketability of contaminated property is limited by cleanup costs, availability of an indemnity, higher equity yield demands to compensate for risk, and generally higher financing costs because few lenders will consider such property. Appraisals of properties that may contain hazardous substances should include a statement addressing this concern. In addition, it is often necessary to add specific statements to the limiting conditions of the appraisal if there is reason to believe that hazardous substances might be present on the property.

10.3.3.4. LIABILITY PROTECTION FOR THE LENDING INSTITUTION

As previously mentioned, a lending institution can become a PRP through foreclosure or through participation in the borrower’s business. The best liability protection precedes these activities and starts during the loan negotiation process.

The lending institution should require that the borrower determine whether the site is contaminated prior to loan closure. In addition, the lender should set inspection standards (commonly through a checklist) and should approve the company that conducts the inspection. A thorough, high quality site assessment is needed and the lender has an important role in ensuring that such an inspection is conducted. Once the site assessment has been completed, an environmental risk analyst or similar officer must review the report and make the appropriate financial risk assessment. Improper interpretation of a site assessment can lead the lender into

environmental liabilities that could have been avoided.

Once a loan is granted for a property, environmental liability still exists. Activities by the borrower can release hazardous substances. When practicable, the lender should prohibit the handling of hazardous substances by the borrower. When hazardous substances must be handled, the lender should require periodic environmental audits (by an approved consultant). Such audits will document the borrower's compliance with all applicable federal and state environmental regulations. In addition, the lender may require the borrower to obtain specialized property insurance such as environmental impairment liability insurance. Such insurance is experiencing explosive growth in most states. Policies typically cost between $10,000 and $15,000 for 3 years of coverage; the limit of coverage is usually $2 million. Some banks are now requiring environmental protection insurance on all new and renewing commercial real estate loans of $1 million or more. Finally, the lender may require additional collateral or other financial assurances if the borrower uses hazardous substances and/or generates hazardous wastes.

The lender should avoid participation in the borrower's business. The lender may be named a PRP if it becomes involved in the day-to-day operation of a business. Simply participating in financial management, to a degree that influences the handling of hazardous substances, is sufficient to become a PRP. For example, in 1991, the Supreme Court ruled that a secured creditor that enjoyed the "capacity to influence" hazardous waste management at a facility on which it foreclosed, and therefore, the creditor must pay the costs for remediating the property under CERCLA.

Finally, the lender should conduct a site assessment before foreclosure. At foreclosure, the lender owns both the assets of the facility and the liabilities. If a property is contaminated, the lender is left with the difficult choice of either allowing the borrower to walk away from a defaulted loan, or become the owner of a contaminated site. The environmental liabilities can easily exceed the value of the property, a lender's nightmare.

In an effort to clarify the liability of lenders and others holding security interests in contaminated property, the EPA issued a rule on April 24, 1992. The purpose of this rule is to protect a lender from being exposed to CERCLA liability for engaging in their "normal" course of business. The EPA rule allows the lender to engage in the following activities without incurring CERCLA liability:

- undertaking or requiring a site assessment or environmental audit of the property;

- requiring the prospective borrower to clean up a facility;

- provide specific or general financial advice to a borrower with contaminated property; and

- foreclose on a contaminated property if done for the primary purpose of protecting the lender's investment, provided that the lender endeavors to sell the property in a reasonably expeditious manner.

However, six months after this ruling, the real estate market experienced few positive impacts. Lending institutions had hoped that the U.S. Congress would pass a more definitive lender liability law. Analysts feel that Congressional action is unlikely because many members of Congress are nervous at the thought of lending institutions, with federal blessing, being somehow immune form environmental responsibilities. In addition, the new ruling is confusing and still poses a significant potential that lenders will become PRPs.

Some contend that lender liability laws are not needed. Due diligence, speciialized property insurance, and a healthy appreciation for the "buyer beware" policy should allow lenders to

avoid CERCLA liability.

In summary, environmental liability has changed the lending practices of banks and other real estate financiers. A site assessment and environmental risk analysis are becoming as much a part of the loan process, as a credit check, collateral, title search and appraisal.

10.3.3.5 LIABILITY REDUCTION FOR THE SITE INSPECTORS

The site inspector who is hired to provide expertise regarding environmental contamination has potential liability if significant environmental hazards are overlooked, or if an environmental hazard, after further investigation, is shown to be innocuous. Overlooking a hazard could means that the client purchases contaminated property and incurs cleanup costs. Litigation against the inspector is almost guaranteed. In contrast, if a site inspector concludes that a site is contaminated and this turns out not to be the case, the prospective seller could sue for misrepresenting the property and consequently reducing its value.

Sweeping statements, subjective judgments, and other information that could be misinterpreted must be avoided when writing the report. State what was observed and found; elaboration adds little substance to the report and often leads to trouble.

Professional liability insurance is usually purchased by environmental professionals engaged in site assessments. However, some of the opinion that such insurance only increases the likelihood of being sued.

Disclaimer statements can also help reduce the site investigator's liability. Key items in any disclaimer statement are as follows:

- It is impossible to prove that a site is not contaminated; proving the negative is impossible.

- The definition of contamination or environmental liability changes as regulations change. Therefore, what is considered not contaminated today may be considered contaminated tomorrow if regulations change.

- All information will be held confidential and will be released only to the client or as required by law. However, some disclosure, such as property address, during the site assessment is necessary to obtain the required information.

- The scope of the investigation is determined b the client and the consultant is not responsible for conditions outside the scope of the investigation.

When appropriate, disclaimers should list what is not included in the investigation. Public health issues, such as contaminated drinking water and sick building syndrome, are usually part of a Phase I site assessment.

The site investigator should not make purchase recommendations. The job of the investigator is to document environmental hazards, no to become involved in the financial and risk aspects of property transfer. The investigator does not have access to financial and business information necessary to make purchase recommendations.

Additionally, do not guarantee or certify that a property is "clean". Such statements or implications cannot be proven and only serve to increase the investigator's liability if contamination is found at a later date.

10.3.4 ETHICAL ISSUES

Ethical issues can cause problems for consultants conducting site assessments. The most common problem is disclosure of “imminent danger’ situations. The consultant may feel a professional or personal obligation to report situations considered to pose an imminent danger to public health and safety. However, there is no legal obligation for such disclosure, and if the consultant judged the situation incorrectly, he or she sued by the client for violating confidentially. Yet ignoring the situation could cause problems. When the new owner finds the contamination, the owner could sue the consultant for conspiracy to commit fraud.

The disclosure of imminent danger is probably the most difficult ethical issue for the consultant. One possible solution would be to warn the client that regulations require that imminent danger situations be reported within a certain length of time. Cite any professional codes or licensing stipulations that require consultants to disclose violations not reported by clients. Hopefully, this will convince the client to comply with regulations.

State regulations may eventually solve the disclosure dilemma. Some states are considering regulations that force consultants to disclose contamination to state officials. However, this could be counterproductive if owners start hiding contamination during a site assessment.

Other ethical issues may involve omitting certain data or changing the facts. If the client is insistent, the consultant may have to withdraw from the project rather than compromising professional values by changing facts or omitting important material.

10.4 RECORDS REVIEW

The records review is the first step in a Phase I site assessment for property transfer. It is essential to complete a thorough records review within the preliminary stages of any site assessment investigation. This process involves a systematic examination of all records that provide information on land use in general and chemical use, storage, and disposal in particular. These records often reveal potential environmental liabilities not evident during the physical inspection. In addition, records will assist the investigator in determining what site hazards may be present and what protective equipment and monitoring instruments, if any, should be used during initial entry.

10.4.1 SEARCH DISTANCE

Minimum search distance must be established prior to beginning the records review. Some records, such as hazardous waste manifests and ownerships information, pertain to the site only and it is not necessary to include adjacent areas. Other records, such as lists of landfills and leaking underground storage tanks, require that the evaluation extend beyond the property boundaries. Table I presents suggested minimum search distances commonly used for site assessments. The search distance is measured from the property boundary outward. This is used in lieu of radius to include irregularly shaped properties.

The search distance can be decreased for a particular record at the discretion of the investigator. Two cases where such a reduction may be justified are as follows:

- the density of the setting in which the property is located is high, such as in an urban setting; or

- the distance that chemicals are likely to migrate is low, as based on local hydrogeologic conditions.

As previously mentioned, the time line for the records is another important decision that should be made prior to the records search.

With respect to private land and the innocent landowner defense, CERCLA requires that the records review constitutes "all appropriate inquiry…consistent with good commercial or customary practice". Therefore, the time line decision is left to the investigator who must determine the point where the cost of information obtained or the time required to gather it outweighs the usefulness of the information and delays the timely completion of the report. The ASTM site assessment standard requires that at least one historical source prior to 1940 must be used.

In some cases, the investigator cannot examine pertinent records and must request that agency personnel examine the records. According to ASTM, if the requested information cannot be provided by the agency within 20 days after the request, the investigator is not obligated to include those records in the site assessment.

The records described below are considered to be standard sources for site assessments. The investigator has an obligation to use additional sources if site specific conditions warrant an extended records search. Additionally, while the investigator is not obligated to identify errors in the information, the investigator should make a reasonable effort to identify and compensate for errors and missing information. The report should document each source of information examined, even if the source reveals no pertinent information.

RECORD SOURCE	SUGGESTED MINIMUM SEARCH DISTANCE ON MILES
FEDERAL, STATE, AND	LOCAL SOURCES
USGS Topographic Map	0.5
Ground Water Maps	0.5
Bedrock Geology Maps	0.5
Surficial Geology Maps	0.25
Soil Maps	0.25
NPL Sites	1.0
CERCLIS	1.0
RCRA TSD Facilities List	1.0
RCRA Generators List	1.0
ERNS List	Site Only
Landfill Sites	1.0
Leaking UST Lists	0.5
Registered UST Lists	0.25
Well Lists	1.0
HISTORICAL	RECORDS
Tax Asessment Files	Site Only
Fire Insurance Maps	Site Only
Other Historic Maps	0.25
City Street Directories	Site Only
Aerial Photos	0.25
Recorded Deeds & related Records	Site Only
Chain-of-Title	Site Only
Building Permits	Site Only
Zoning Maps	0.25

Table 1 Suggested minimum search distances

10.4.2 PHYSICAL SETTLING RECORDS

The “physical settling” records include topographic maps and records pertaining to soil, geology, water and meteorology. Although such information rarely identifies environmental liabilities, it is useful in determining the probability of contamination once chemical releases have been identified or suspected.

For these and other records, both the address of the site under investigation and its legal description are needed. For sites where the legal description is obtained from the rectangular survey system. An example of the division of a section is shown in Figure 1

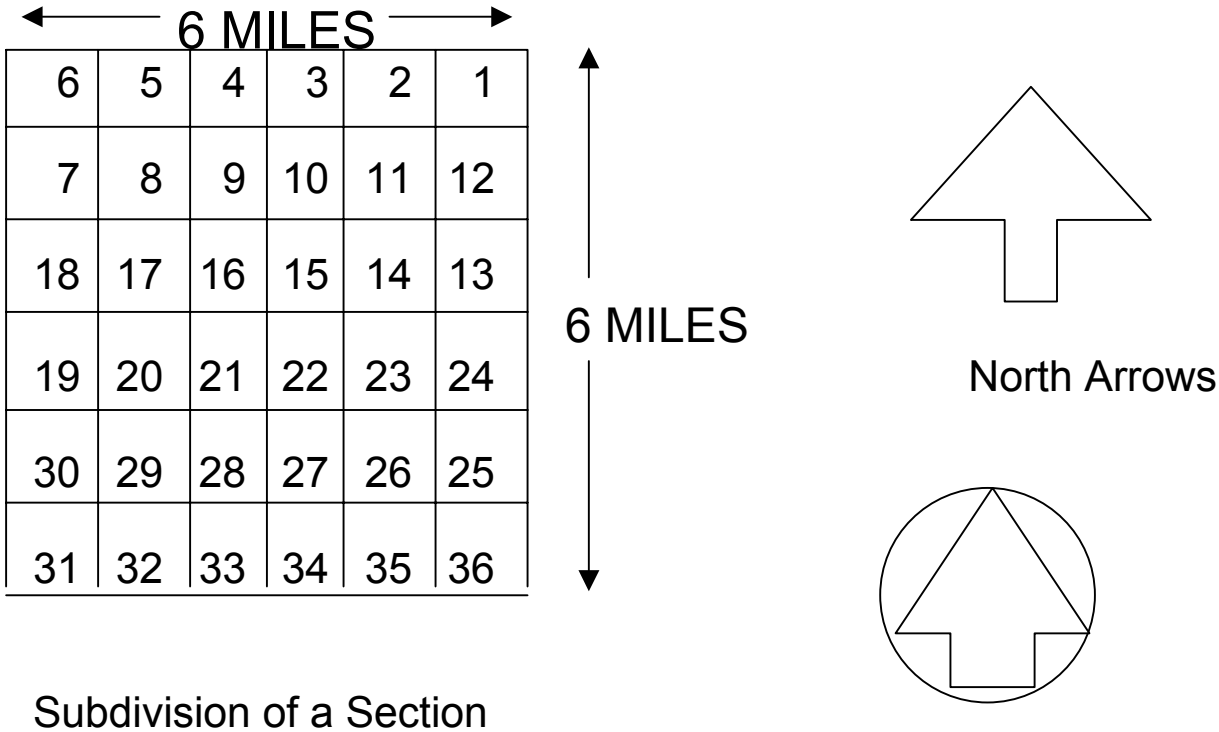
10.4.2.1 TOPOGRAPHIC MAPS

Topographic maps are issued by the United States Geologic Survey (USGS) and available at USGS outlets or from private vendors. A variety of maps are available from the USGS; the 7.5 minute quadrangle series published at a scale of 1:24,000 is the most useful for the records review (Figure 2).

The distinguished feature of a topographic map is contour lines. These are imaginary lines that follow the land surface at a constant elevation above sea level. The contour interval is the elevation difference between adjacent contour lines. This interval is chosen on the basis of map scale and on local relief. A small contour interval is used for flat areas while larger intervals are used for mountainous terrain.

Examination of a USGS topographic map is a routine part of a site assessment. These maps will show important natural features such as elevation, location and type of aquatic features, slope (rise or fall of the surface), aspect (compass direction of the slope), vegetation, etc. Artificial features such as survey boundaries, buildings, homes, roads, railroads, waste piles (if large and topographically important), subsidence, etc. are also important to note during examination of topographic maps.

SUBDIVISION OF A TOWNSHIP- FIGURE 1 DIVISION OF A SECTION



Subdivision of a Section

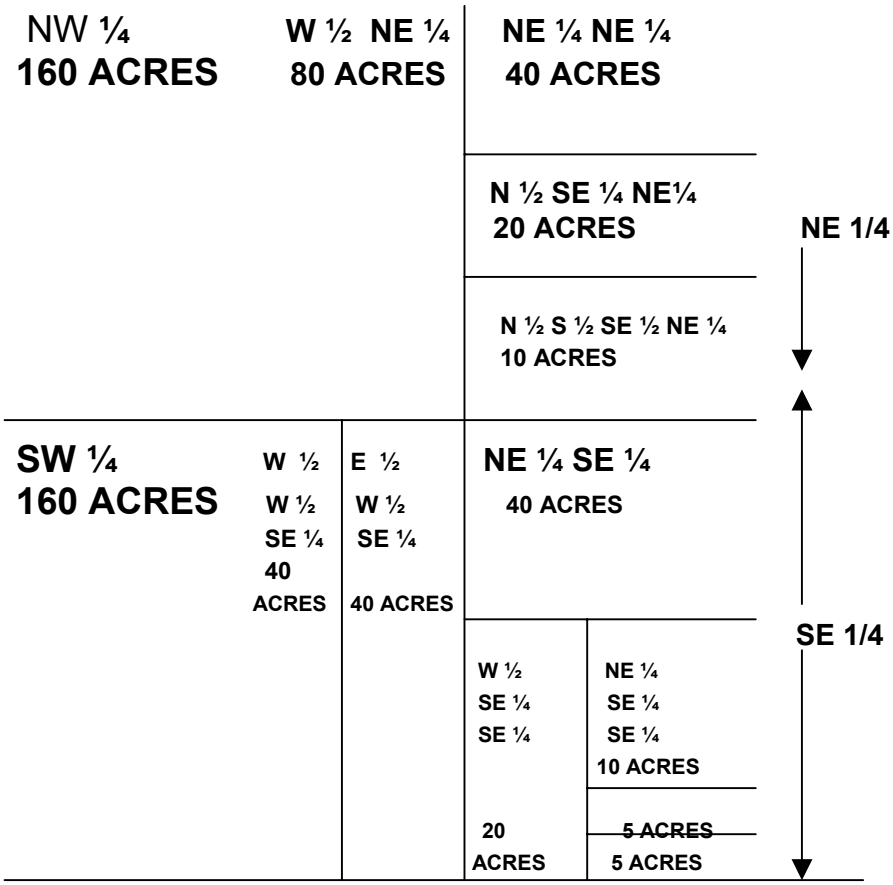


FIGURE 2 - EXAMPLE OF AN USGS 7.5 MINUTE QUADRANGLE MAP

- NOT INCLUDED -

Topographic maps produced by sources other than the USGS may also be available for certain areas of the United States. Such maps are not indexed and are hard to find; building departments and planning offices should be contacted for these maps.

10.3.2.2 SOIL

The U.S. Department of Agriculture, Soil Conservation Service, publishes soil surveys for counties with significant agricultural potential. Each survey is in a paper bound book and includes a general discussion of the soils in the county, a detailed description of each soil type (or series), soil use information, and aerial photographs on which soil type boundaries are superimposed. There is usually a minimum acreage that a particular soil type must occupy before it is mapped (often 5 acres), so the actual soil at a given site may not be the soil listed on the map.

Soil information that is typically included in a site assessment includes soil texture (relative proportions of sand, silt, and clay), depth, color, dominant vegetation, and land use. Such information is useful in identifying stained soil and disturbed areas during the land investigation, predicting movement of chemical releases, and assisting in understanding land use.

10.4.2.2 GEOLOGY

Geologic maps are available from the USGS or from state geologic survey departments. The USGS maps often cover the same area as the topographic maps and are of the same scale. Smaller scale maps are also available for most areas and are useful on a regional basis.

Geologic units are denoted by color and a brief description of each unit is included on the map. Information pertinent to a records review includes geologic unit name, rock color, rock type, and selected physical and chemical characteristics. This information can be used to determine disturbances, assist in identifying the origin or fill, and identify probable routes of chemical dispersal.

10.4.2.3 SURFACE WATER

The National Water Data Exchange (NAWDEX) is operated by the USGS and is located at 421 National Center, Reston, VA 22092 (phone 703-648-5677). This system has a database called STORET which can be searched for water data in specific geographic area. The area can be specified by political unit down to county or by a polygon based on latitude and longitude. Information includes detailed chemical analysis (approximately 30 parameters) for each monitoring location. However, the site under investigation may not be near a monitoring location, or the data may be too old for use.

Local sources such as water departments, water user groups and environmental departments may have information of the quality and flow of surface water.

10.4.2.4 GROUND WATER

The USGS has ground water maps showing depth to groundwater, water quality, and water yield information for most portions of the U.S. Although the information is general in nature, it is readily available a forms a basis for interpreting locally available information on ground water.

During the 1950's and 1960's, most states required permitting of new and existing ground water wells. These records are available from state officers and usually include, at a minimum, location of the well, owner, well depth, static water level, yield, water use, and the geologic formation yielding water (Figure 3). When monitoring wells are drilled, states often have the option of requesting the monitoring records from the owner.

Local water boards, irrigation districts, and other water user groups may retain ground water records, especially in terms of pumping rates and yields.

10.4.2.5 METEOROLOGY

Climatic information for a specific location can be ordered from the National Climatic Data Center, Federal Building, Ashville, NC 28801-2696 (phone 704-259-0682). However, there reports may also be available from local libraries. Precipitation, temperature, wind speed, and wind direction data constitute the most useful information for site assessments. Monthly summaries of long-term averages and extreme events (such as the 24-hour maximum precipitation) are of particular interest and are commonly included in site assessment reports.

Other reports are available from the above source from the National Oceanic and

Atmospheric Administration, Environmental Research Laboratories, 325 Broadway, Boulder CO 80303 (phone 303-497-6286). Reports detailing air drainage patterns, pollution and circulation patterns are useful when emissions from on-site or off-site are of concern.

-- FIGURE 3 - NOT INCLUDED --
TYPE OF INFORMATION THAT CAN BE EXTRACTED FROM STATE GROUND WATER WELL RECORDS

10.4.2.6 MISCELLANEOUS PHYSICAL SETTING RECORDS

In some parts of the country mining information is important. Basic mining information can be obtained from the Minerals Information Office, 845 North Park Avenue, Tucson, AZ 85719 (phone 602-882-4795). This federal office maintains a database of all known mines in the U.S. The investigator may request information by legal description or latitude and longitude coordinates. Information supplied by the database includes name of the mine, date of mining, depth, and minerals removed.

In mining areas, subsidence (or the settling of land due to underground mining) is often a concern. State agencies usually address subsidence; narrative information including geologic details, date of mining, mining methods, etc. and both aerial photographs and surface maps delineating subsidence-prone areas are often available.

In pristine or relatively undisturbed areas, wildlife information may be included in the scope of a records review. Information can be obtained from state and local wildlife agencies or from the nearest office of the U.S. Fish and Wildlife Service. The potential or actual presence of threatened and endangered species, or habitat to support such species, can impose restrictions on land use.

If the property under investigation includes a drainage, wetlands and floodplain issues should be addressed in the records search. Maps of wetlands may be available from state sources or from the U.S. Soil Conservation Service. Floodplain information can be obtained from the Federal Emergency Management Agency (FEMA) which has offices throughout the country. The FEMA Flood Insurance Rate Maps for a specific area can be obtained by calling FEMA Map Distribution Center at 800-358-9619. Minimum charge is $5.

A records search of archeological and historical resources may be part of the site assessment. Such records can be obtained from state and local historical agencies. Major sites may have federal records.

10.4.2.7 HISTORICAL RECORDS

10.4.2.8 OWNERSHIP AND TAX RECORDS

Recorded land titles are records of ownership, leases, land contracts, easements, liens, and other property encumbrances. Such records are kept by municipal or county clerks and may be obtained from these offices. As previously discussed, ownership records by themselves are not particularly useful, unless the name of the owner reflects probable land use.

County (or local) property tax files found at the county courthouse (or other agency having jurisdiction) form a standard record source for site assessments. For example, tax assessments records often include notes on land use, structures, condition of structures, improvements etc. (Figure 4). Information that can be obtained from such records include the following;

- land use at the time of assessment;
- structures and their use;
- construction materials; such as asbestos siding or roofing;
- type of heating which can indicate an UST; and
- presence of a well and utilities

USTs may or may not be identified on the tax assessment record; some states or counties consider underground storage tanks as personal property and not subject to local taxes. Tax records are commonly files on microfilm or microfiche; maps, aerial photos, or other indices provide access to the files.

The National Archives can provide limited ownership information if the land was once owned by the federal government. For example, the date that land was homesteaded can be obtained from the National Archives (phone 703-756-6700) located in Washington, DC.

If ownership or other historical documentation suddenly ceases when searching records indexed by address, the lack of documents may be caused by a change in the street name. Changes in street names were common around the turn of the century; historical societies and historical collections at public libraries often have a file on street name changes.

-- FIGURE 4 -- NOT INCLUDED

A PORTION OF A REAL ESTATE APPRAISAL RECORD AVAILABLE FROM THE COUNTY ASSESSOR

10.4.2.9 HISTORICAL MAPS

A variety of historical maps are available for almost any area of the United States. These maps include the USGS topographic maps previously discussed and other maps showing streets, major buildings, streetcar routes, railroads, farm ownership, sewer lines, and any other features of interest to the map maker. These maps are often found in historical collections within libraries or held by historical societies.

Probably the most comprehensive historical map is the Sanborn Fire Insurance Map (Figure 5). Originally created to determine fire risk, these maps can be used to determine land use, building name (if large commercial facility), use of building, construction materials, locations of tanks, impoundments, roads, and railroads, and other features previously useful in fire insurance and now useful in site assessments. Almost one million different maps were produced covering 12,000 cities during the

period of 1867 to the present. These maps are available from the Sanborn Map Company, 629 Fifth Avenue, Pelham, NY 10803 (914-738-1649) for a basic cost of $50 per map ($30 search fee and $20 map fee). In addition, these copyrighted maps can be found in most city libraries; however, maps were updated by pasting the new map on top of the old one, so a complete series of maps not be available.

Historical maps are also available from several government sources. The Earth Science Information Center (ESIC) of the U.S. Geological Survey has out-of-print maps on microfilm. Most of the maps are of the topographic type, and maps dating back to 1879 are available as either photocopies or photographic reproductions. These documents can be ordered through the USGS in Reston, Virginia (703-860-6045) of from a local USGS office. In addition, the National Archives (703-756-6700) and the Library of Congress (202-707-6277) have a wide variety of historic maps that may be useful during a site assessment.

10.4.2.10 AERIAL PHOTOGRAPHS

-- FIGURE 5 -- NOT INCLUDED

EXAMPLE OF THE INFORMATION CONTAINED ON SANBORN FIRE INSURANCE MAPS

The term “aerial photograph” refers to photographs taken from an airplane or helicopter at an altitude low enough to allow identification of surface features relating to land use. Such photographs are a basic land management tool of federal, state and local agencies. Land management aerial photographs date back to the mid 1930’s and continue into the present.

Numerous sources of aerial photographs exist because land management agencies at all levels use these photographs. This does not necessarily mean that such photographs are readily obtainable. Management agencies are commonly not organized to allow private individuals to search their photographic records. Some federal agencies will order a photograph for a nominal fee (about $5), but the delivery time is about six weeks.

Private groups are addressing the growing demand for aerial photographs for site assessment purposes. Many of these firms will pull the requested photographs from their collections and let the investigator review them for a small fee (usually $5 per photograph). Copies can be ordered, but the cost is relatively high (often $40).

Historical aerial photographs date back to the 1880’s when photographers attached cameras to balloons and kites. Most aerial photographs taken for Federal agencies before 1941 are found in the Cartographic and Architectural Branch (phone 703-756-6700) of the National Archives. These photos date from the mid-1930’s and cover approximately 80 percent of the land area of the conterminous 48 States. In addition, the Still Picture Branch (phone 202-523-3236) of the National Archives has a large collection of photographs taken from the air, particularly oblique photographs of cities.

Once obtained, the aerial photograph will show all surface features visible at the time of the photograph. Land use, structures, roads, drainages, ponds, fence lines, type of vegetation, and even small features such as drums and aboveground tanks are visible

on the photographs. Magnification may be necessary to detect small features. If stereographic coverage is required, adjacent "stereo pairs" must be ordered and subsequently examined using a stereoscope.

10.4.2.11 DIRECTORIES

"Houehold" directories may give ownership information on the basis of the street address (Figure 6). For example, the addresses along Main Street will be listed in numerical order. Adjacent to each address is the owner (or use) of the property. Household directories were published around the turn of the century by private (or sometimes government) sources and are usually available from libraries and historical societies.

Business and city directories may also be useful (Figure 7). These directories list business in alphabetical order, similar to the business directory and yellow pages in a telephone book. Business directories may provide useful information on land use and company location.

10.4.2.12 BUILDING RECORDS

Building records refer to those records of a local government granting the right to construct, alter, or demolish property. Current and recent records can be found in the Building Department of a municipality or county, older records are often placed in a historical collection available from a library.

Building records (Figure 8) can yield useful site assessment information that includes building materials, insulation, tanks, utilities, property use, date of demolition, and permits issued (such as electrical, plumbing, underground storage tank, and special use such as a paint booth.

10.4.2.13 AGENCY RECORDS

Agency records refer to information that is available from federal, state and local agencies. While many agencies, especially federal agencies, are organized to provide the public with ready access to records, other agencies, especially at the state and local level, lack the time and resources to meet public demand for their records. In such cases, a written request must be made, or the investigator must be prepared for delays and frustration when endeavoring to review such records.

When requesting information from agencies, be a specific as possible. Requests for any information within 1 mile of a particular site will likely be returned as not being specific enough. Therefore, specify the area you want based on how the records are organized. Records can be organized on how the records are organized. Records can be organized by street address, legal description, county, zip code, alphabetically by facility name, etc. Additionally, a particular site may be known by one name and listed with the EPA under another name; therefore, list all name combinations known when requesting information about a particular facility.

-- FIGURE 7 – NOT INCLUDED

A PAGE FROM A 1926 BUSINESS DIRECTORY

-- FIGURE 8 – NOT INCLUDED

EXAMPLE OF A BUILDING RECORD

10.4.2.14 AGENCY LISTS

Most agencies keep lists of the sites under their jurisdiction, and such lists are generally available in hard copy and sometimes in computer disk form. Searching by zip code is the most common method to quickly cover the search distance. In some cases, index maps are available to locate particular sites; once the site name is known, an alphabetic listing is consulted.

Following are the agency lists commonly used during a records review.

10.4.4.1.1 NPL SITES

Those sites that scored 28.5 and higher using the HRS are placed on the National Priorities List. The NPL lists the name of each site and its city, state, EPA region, NPL rank, response category, and cleanup status. If additional information is needed about a particular site, a PA and SI should be available. The NPL can be obtained through the Freedom of Information Act (FOIA) Officer at the nearest EPA office.

10.4.4.1.2 CERCLIS

CERCLIS is a database for suspected and actual hazardous waste sites on file with the EPA. The list of most interest is “List 8” which lists every “event” in the specified area. An “event” is usually some type of regulatory action such as a complaint about a given site or placing a site on the NPL. The CERCLIS database presents entries either by zip code or alphabetically. For each site the EPA number, address, event type, start date, completion date, and event lead (state or EPA) are listed (Figure 9). Preliminary assessments and other information should be available for each site listed.

CERCLIS is available from the EPA and is currently available only in paper. The master CERCLIS can be sorted by city, state, county, name, zip code, and latitude and longitude. Searching is conducted by zip code, facility name, or by using an index map to first locate facilities of interest. This list is available from the EPA through the FOIA Officer.

-- FIGURE 9 -- NOT INCLUDED

EXAMPLES OF CERCLIS ENTRIES

10.4.4.1.3 RCRA LISTS (GENERATOR AND TSD)

All entities that are involved in the generation, transportation, or treatment, storage and/or disposal (TSD) of hazardous wastes must notify the EPA. This information is publicly available in the “RCRA Notifiers List”. This list gives the name and address of the facility, name of the owner, county, the EPA number, and type of waste (Figure 10).

-- FIGURE 10 – NOT INCLUDED

RCRA NOTIFIERS LIST

This information is available from the EPA or from the state agency that implements the RCRA program. When requesting this information from the EPA, specify which list(s). are needed (TSD, generator, or transporter). Then request the sort selection-the EPA system can sort on name, city, state, county, or zip code. Requests should be made through the FOIA Officer.

10.4.4.1.4 ERNS LIST

The Emergency Response Notification System (ERNS) was established under CERCLA and requires that the National Response Center be notified of any chemical releases exceeding a specified quantity. This information is compiled on a list and is available from the EPA. The list contains the location of the release, date, spiller, material spilled, and quantity (if known) (Figure 11). This information can be obtained through the FOIA Officer at the EPA. ERNS information can be sorted by name (spiller), state, city, or zip code.

-- FIGURE 11 -- NOT INCLUDED

ERNS LIST

10.4.4.1.5 UST LISTS

State and county regulatory agencies maintain lists of underground storage tanks. At a minimum, the UST list will contain the facility name and address of the tank. Most lists contain additional information including owner, type of facility, status of tank (in use, temporarily out of use, etc.), date of tank installation, age of tank, capacity, type of material used to construct the tank, and name of facility manager (Figure 12). Unfortunately, many UST records do not record the contents of the tank. UST records are available through the appropriate state or county agencies. USTs that have been reported as leaking are usually recorded on a separate list. These “leaker” lists usually contain the facility name and location, and date the tank was reported leaking. Additional information should be available from the regulatory agency because detailed documentation of containment and remediation of leaking underground storage tanks is required under RCRA (Subtitle 1.

-- FIGURE 12 -- NOT INCLUDED

UNDERGROUND STORAGE TANK INFORMATION AVAILABLE FROM SOME STATE OFFICES.

UST lists should not be regarded as complete. Permitting of these tanks and notification of releases has been taking place only recently (usually within the last ten years). Therefore, many out-of-service or abandoned tanks will not be listed. In addition, many registered tanks that are leaking have not been reported, generally due to the owner not being aware that the tank is leaking or choosing not to report a leak.

The UST regulations under RCRA provide exemption for a variety of USTs that are of

concern during a site assessment. Septic tanks and fuel storage tanks for household use and having a capacity of less than 1,000 gallons are exempt from the federal regulations and are generally not listed with the state. The fuel tanks are of particular interest during the site assessment, especially if there has been a leak. A site inspection is generally necessary to detect these unregulated tanks.

10.4.4.1.6 LANDFILL LISTS

Landfill lists and/or maps are available from state or county agencies. Landfill location, years in operation, and type (domestic or construction) are presented on the maps or lists. In addition, many states have conducted methane gas studies for domestic landfills. These studies contain information on the location of the landfill, quantity of methane found, type of methane survey conducted (perimeter, on-site, within buildings, etc.), buildings and other structures potentially affected, monitoring well location, and control systems.

Landfill lists are generally incomplete and only list the disposal sites currently known. Smaller sites and those sites closed for 50 years and longer may not be listed.

10.4.4.1.7 OTHER LISTS

Under the Clean Water Act, NPDES information can be obtained through the EPA or state agencies. The EPA files can sort permit holders by state, county or specific permit. The discharge category of interest must be specified as either a “major’ facility discharge of more than one million gallons per day or a “minor” facility discharge of less than this amount. The NPDES list usually includes only the name, location, and permit number of the facility. However, supporting documentation should be available and can include pretreatment procedures, permit limits, discharge limits, monitoring data, enforcement actions, etc. In some cases rationale documents are available that justify the issuance of the permit. These documents often give a history of the site and other information of interest during a records review. Other lists available under the Clean Water Act include storm water discharge permits and publicly owned treatment works (POTW) pretreatment discharge permits. These permits specify how a waste stream must be treated prior to discharge into a sewer.

FIFRA, TSCA, and EPCRA (Emergency Planning and Community-Right-to-Know Act) lists are also available from the EPA. These files consist primarily of enforcement actions. Files can be sorted by state, county, city or zip code.

Books are available that list chemicals commonly used with particular commercial operations. Such books are available through normal publishing channels or through chemical distributors. These books can be very useful when trying to determine what chemicals may be associated with a particular commercial operation. A related resource material is the EPA Treatability Manual (EPA-600/2-82-001b) dated January 1983 and is available at some libraries. This manual lists the concentration of toxic pollutants in raw waste water from particular commercial operations. This information can assist in identifying what chemical residues might remain on a particular commercial site.

Additionally, the EPA publishes a “List of Lists”. This document specifies chemicals and waste products that have been identified in regulations as toxic, hazardous waste,

hazardous substance, etc. The Department of Transportation lists chemicals considered to be hazardous materials. Such lists are useful reference materials when conducting site assessments.

10.4.4.2 OTHER AGENCY RECORDS

It is impossible to list all the pertinent records that may be available form public agencies. However, some of the more commonly used records in site assessments are briefly discussed below.

10.4.4.2.1 HEALTH DEPARTMENTS

The previous information has identified numerous records that may be available form a state health department. In addition to these records, some states will conduct an "environmental audit" for a specified property (Figure 13). This audit may include information about CERCLIS sites, RCRA sites, landfills, underground storage tanks, and other property hazards associated with a particular state, such a subsidence or mining wastes. However, such "audits" are generally of limited use during a site assessment. State audits use public information that is readily available to the investigator, the audit may take 4 to 6 weeks to complete, and there may be inadequate quality control during a state audit.

-- FIGURE 13 – NOT INCLUDED

EXAMPLE OF AN ENVIRONMENTAL AUDIT FORM FROM A STATE HEALTH DEPARTMENT

Health departments typically conduct epidemiology and other public health studies. Such information may be of interest during as site assessment. For example, if the property under investigation is downwind from a tailing impoundment, the air, soil, and/or groundwater may be contaminated and may have been studied as a public health issue by the health department.

Local health departments typically issue septic tank permits, investigate leaking septic tanks, and may test public and private drinking water wells. Such information may be pertinent to the records review.

10.4.4.2.2 FIRE DEPARTMENTS

The type of records available at fire departments vary widely according to the regulations of the particular fire district. All districts maintain some type of alarm log where alarms are entered at the time received. Such logs are generally not useful in a site assessment because they are arranged sequentially throughout the year and every entry must be scanned.

Many fire districts are not set up to supply the public with information. Many districts do not want the public visiting their facilities and require that all requests must be in writing. However, even written requests may not be honored or the waiting period may be excessive.

10.4.4.2.3 EMERGENCY PLANNING UNITS

Under SARA Title III, emergency planning units are to be established in each state, usually on a county basis. Commercial operations that store or use hazardous materials are required to submit an annual inventory that usually includes the types of chemicals, hazards associated with the chemicals, inventory amounts (maximum and average), and location of each chemical within the building. This information is then used to plan appropriate responses to emergencies.

Although this is useful public information for site assessments, most planning units (commonly assigned to the fire district) lack funding to properly index their records and respond to public requests for information. In addition, compliance with the reporting is low, often only 10 percent and the information base is incomplete.

10.4.4.2.4 HIGHWAY DEPARTMENTS

If the property under investigation is adjacent to a federal or state highway, detailed site maps may be available from the state highway department. These preconstruction maps include utility locations, structures, USTs, ASTs, buildings, and numerous other details.

In addition, most highway departments conduct a site assessment before condemning property that will be affected by highway construction. Although the condemned property may now be part of the highway, the site assessment may assist in the historical evaluation of areas adjacent to the property under investigation.

10.4.4.2.5 WATER TREATMENT FACILITIES

During some site assessments, the public supply of drinking water is of interest. Water treatment facilities retain detailed records of incoming and outgoing water quality, water treatment at the facility, and comparisons of water quality to the federal and state water quality requirements. Lead, pesticides, and radionuclides in drinking water are often of concern, and the treatment facilities should be able to supply some of this information depending on their testing and monitoring programs.

Waste water treatment plants often contain information of interest during site assessments. Pretreatment permits, discharge violations, spills that affect the sewer system, and investigation records maybe available from the treatment plant. Surface water monitoring is required for drainages receiving treated water. If water is applied to land, then soil and ground water monitoring is required. Such monitoring information may be useful if the site under investigation is near (usually within one mile) or adjacent to a waste water treatment facility.

10.4.4.2.5 RAILROADS

If a railroad is located within or adjacent to the site under investigation, the railroad may have records of spills. All railroads now have hazardous material specialists that may be able to provide information on chemical releases on lands owned by their respective railroads. For abandoned railroads, historical societies may have some information, although is would be unusual to find information on chemical spills.

10.4.4.2.6 PUBLIC UTILITES

All public utilities retain records of the location of their utility lines, both aboveground and below ground. Underground utilities are of particular interest because they are often backfilled with coarse materials, and such utilities can provide a conduit for the rapid movement of contamination.

Records can be obtained by contacting the pertinent utility office. These records are often on microfiche and can be reviewed at the utility office. Another option is to request the utility to field locate their lines; such requests are often filled within 24 hours and without change. Accuracy is generally plus or minus about 2 feet. Some metropolitan areas have a central clearing house for utility locations. When they receive a located request, they forward the request to all member utilities that service the location. Each individual utility then comes to the site and locates their lines.

The power utility supplying electricity to a site often owns the transformers. When transformers are found within a site, their PCB content must be documented. Utilities will provide this information, usually following a written request that includes the location of the transformer, why the information is needed, and the transformer identification number. For privately owned transformers, the manufacturer must be contacted or a sample of the cooling fluid obtained and analyzed.

10.4.4.8 ZONING RECORDS

Zoning regulations can place substantial restrictions on the use of property, and such information is commonly included in a site assessment. This information is obtained at the city or county planning office. Zoning information may be on the maps or aerial photographs.

10.4.5 SITE RECORDS

If the site is currently used for commercial purposes, on-site records should be examined. Following is a summary of the more pertinent records that are typically stored on-site.

10.4.5.1 BLUEPRINTS

If blueprints can be located, an examination of the plumbing blueprints is recommended. These blueprints will show the locations of USTs, ASTs, utility lines, sump pumps, pretreatment facilities, and other features pertinent to waste treatment. Whenever possible, examine the “as built” blueprints.

Blueprints showing grading and other designed changes in physical features are also useful in that such prints show original contour lines and site features such as drainages, ponds, and structures.

10.4.5.2 MANIFESTS

A generator of hazardous waste must complete a hazardous waste manifest prior to shipping the waste off site for treatment or disposal (Figure 14). The manifest contains

information about the generator, transporter, and receiving facility, the name and identification numbers of the hazardous waste being shipped, the quantity, container type, date shipped, and signatures. The generator must retain a copy of the manifest for at least 3 years following shipment.

Such documents are very useful in reconstructing the site history in terms of hazardous wastes generated, their disposal, and the possibility that residual hazardous waste may still be present at the site.

For small and large quantity generators of hazardous waste, biennial reporting is required that summarizes the information contained in the manifests. If manifests are not available at the facility, the RCRA regulatory agency will have biennial reports.

FIGURE 14 – EXAMPLE OF A HAZARDOUS WASTE MANIFEST – NOT INCLUDED

10.4.5.2 INVENTORY RECORDS

Some facilities maintain an inventory of all hazardous materials that are received. Such records, if available, are useful in tracking hazardous substances and in assessing what products may remain on the site.

10.4.6 INTERVIEWS

10.4.6.1 FACILITY PERSONNEL

Interviews form an important part of a site assessment. In most cases, the facility manager is the most knowledgeable person concerning the facility and possible environmental hazards. Depending on the circumstances, maintenance personnel, process employees, compliance personnel, and even neighbors should be interviewed. However, before interviewing such individuals, the consultant must be advised as to how much information concerning the investigation can be divulged. Premature disclosure of pending financial transactions or environmental investigations under CERCLA or RCRA must be avoided.

Prior to the interview, written questions should be prepared. This will ensure that all important areas are addressed and that each person interviewed is asked the same questions. Questions should be appropriately phrased to avoid antagonizing the person being interviewed is asked the same questions. Questions should be approximately phrased to avoid antagonizing the person being interviewed and to the obtain as much information as possible. Asking direct questions about hazardous waste and contamination may not be the best approach. Questions concerning use of the facility, manufacturing processes, environmental permits, types of chemicals used, etc. may elicit more information than questions targeting hazardous waste and contamination.

Interviews can be conducted in person, by telephone, or by letter. In person interviews are usually the most successful.

While the person conducting the interview has an obligation to ask questions, the person being interviewed is under no obligation to answer the questions. When no answers or incomplete answers are given during an interview, the interview can be considered complete as long as the investigator has made a reasonable effort to obtain

information and all information obtained has been recorded in writing.

Information collected during interviews may not be accurate for a variety of reasons. Therefore, interview information should be substantiated by an independent source, such as the previous mentioned records or during the site visit.

10.4.6.2 GOVERNMENT OFFICIALS

When written records are incomplete or unavailable, it may be necessary to interview local government officials. Interviews with local fire department officials, the local health agency, and the local agency involved in hazardous waste issues and related environmental matters may be appropriate. The procedures an limitations mentioned above should be followed when conducting these interviews.

10.5 ON-SITE INSPECTION

An essential part of the site assessment process is a careful and thorough examination of the land and any buildings to identify potential environmental liabilities. Appropriate personal protective equipment (PPE) must be worn, and appropriate air monitoring instruments should accompany the investigators. In addition, permission from the land owner may be necessary prior to entry. The person responsible for arranging site access must be clearly identified and permissible entry verified before arriving at the site.

Prior to entry, the records search should be completed. The records will give the investigators valuable knowledge about what type of hazards may be present on the side, specific conditions to look for, past releases, and other information that will focus the investigation and minimize the potential of missing important conditions.

10.5.1 PROTOCOL

One way to gain attention is to don protective equipment and start a site inspection of an active facility. This can be a serious dilemma if the investigator feels that protective equipment is necessary, yet realizes the consequences when employees see the investigator poking around a site that they frequently use without protective equipment.

Therefore, measures must be taken to prevent upsetting employees working at a facility under investigation and any neighbors. One technique is to conduct the investigation after normal working hours. For the few people remaining, the investigator can explain the purpose of the inspection and resolve any problems. The disadvantage to the after hours inspection is the likelihood of poor lighting. Such lighting greatly increases the risk that important site features will be over looked. Conducting the inspection during the weekend will eliminate the employee and poor lighting problems.

If the inspection must take place during normal working hours and protective equipment must be worn, try to disguise the protective clothing. In wet climates, a rain suit is an effective disguise.

10.5.2 PHOTOGRAPHS

Photographs of key areas are generally taken by the site investigator and presented as

an appendix in the report. Photographs of potential environmental liabilities often speak louder than words. Colored photographs are preferable, especially when color assists in identifying key components.

10.5.3. LAND INSPECTION

The inspection should be methodical to ensure that all areas are carefully examined. In most cases, it is advisable to start with a perimeter reconnaissance (see Unit 7), and then work form the perimeter inward. This method allows the investigator to identify may site hazards before encountering them.

Whenever possible, the inspection should be carried out in daylight hours and when the ground is free of snow cover. However, this is not always possible, and when conducting an inspection under either of the above conditions, the client should be informed of the limitations imposed by poor light or a snow cover.

10.5.3.1 FIELD NOTEBOOK

All observations made during the land inspection should be recorded in a bound field notebook. Not only will the observations in your field book form the basis of the report, the field book may be entered as evidence should litigation ensue. The following guidelines will help insure proper documentation of the field investigation.

- Use a bound notebook that has consecutively numbered pages. Retain the first two pages for the table of contents.

- Write with water-soluble ink. If an error is made, draw a single line through the error, initial the error, and write in the correct entry.

- Title the entry and record date, time, weather, name of all crew members, and a brief description of the purpose of the investigation. A rough map of the area is often useful.

- Record all observations that you make. The need to record observations of suspected contamination is obvious; however, recording a lack of visible contamination is just as important.

- If instruments are used during the investigation, background values followed by site values are recorded. Also record any calibrations and a description of the instrument (make, model, etc.).

- Sign your name at the bottom of each page.

- If a page is left blank, write “Page intentionally left blank” across the page and draw a line through the page.

- Write legibly; someone other than yourself may have to read your entries.

- Retain the field notebook as a permanent record. It is wise to make backup copies.

10.5.3.2 SEARCH DISTANCE

As with the records review, adjacent areas can have a significant impact on the site under investigation, and such areas must be included in the site inspection. Current land use, visual signs of contamination, and the presence of tanks and other features that could provide a source of contamination to the clients property should be included in the investigation. Generally, land within 250 feet of the property boundary is included in site assessment. This limit is arbitrary and is intended to represent a reasonable extension of the investigation beyond the subject site. This distance should be extended to a least 1,000 feet if adjacent areas deal with hazard substances or engage in other activities that could adversely affect the subject property. In most cases the investigator should not attempt to enter adjacent properties, especially if the property is privately owned. Examine adjacent areas from the clients property or from a public thoroughfare.

Sensitive environments that could receive any contamination released from the subject property should be included in the assessment. Sensitive receptors can include ground water supplies, wildlife habitat, bodies of surface water, and sensitive land use such as schools, hospitals, and day care centers. Often, a 1,000 foot border is used for sensitive receptors, but this distance can be extended to several miles in some cases.

10.5.3.3 UNDERGROUND STORAGE TANKS

Environmental hazards posed by leaking underground storage tanks (USTs) include soil contamination, ground water pollution, and migration of leaked products into utility conduits or basements of nearby structures. Human risks include exposure to toxic fumes, contaminated drinking water, and the risk of fire or explosion.

UST's containing petroleum products or other hazardous substances are regulated under RCRA. By definition, a UST is a tank including associated piping, that is more than 10 percent below the ground surface. Regulations specifically exclude some tanks including farm and residential tanks with a capacity of less than 1100 gallons that contain motor fuel for noncommercial use, tanks containing heating oil used on the premises, septic tanks and systems, flow-through process tanks, and emergency spill or over tanks. However, all UST's are a potential environmental liability, regardless of the presence or absence of regulations. UST regulations under RCRA include specifications for notifying the EPA or an authorized state agency of the presence of a UST, installing new UST's, upgrading old UST's, testing for leaking UST's and closing inactive UST's.

Physical evidence of a UST may include the following;

- depressions;
- manholes (other than utility manholes that are labeled as such);
- fill pipes (similar to a water meter manhole or to a fire hydrant mounted on an exterior wall);
- vent pipes (typically a 2-inch diameter pipe extending 3 to 6 feet above ground);

- dark staining of the ground that suggests spilled fuel associated with fuel transfer; and/or

- a fuel pump.

During the Phase I assessment, all suspected or confirmed UST's must be documented. All UST's should be leak tested by a licensed tester prior to property transfer. If tests show that the tank leaks, subsurface investigations (soil sampling and/or ground water sampling) are recommended to document the release and define the extent. Limited soil and/or ground water testing is also recommended when tests show that the tank is tight. The tank may have been recently repaired or the present tank may have replaced tank that leaked.

10.5.3.4 ABOVEGROUND STORAGE TANKS

Storage tanks not classified as USTs may meet the definition for aboveground storage tanks (ASTs). Some agencies have defined AST as any container designed to continuously hold more than 55 gallons of a solid, liquid, or gas. Such tanks may store a variety of chemical products that could pose a threat to human health and the environment should an uncontrolled release occur. These risks include human chemical exposure, fire or explosion hazards, contamination of soil and surface waters, and ground water contamination if a large leak or spill is not promptly detected and remediated.

ASTs containing hazardous substances can be divided into two categories: petroleum products and other hazardous substances. Tanks containing petroleum products are regulated by the EPA under the Clean Water Act. Regulations require certain facilities with ASTs to establish emergency response procedures that will aid in response to an uncontrolled release and containment systems that consist of curbs, berms, or dikes to contain any spilled or leaked product. ASTs used to store hazardous waste are regulated under RCRA. Regulations under RCRA include an emergency response plan, a containment system and permitting, closure, and tank integrity requirements.

ASTs are generally spherical or cylindrical objects that may stand vertically or horizontally, or may be mounted on legs. On-ground ASTs are typically large and prone to leaking due to contact with the ground. Off-ground tanks are generally small and less prone to bottom corrosion than on-ground tanks. The construction of the tank can give clues as to its contents. Steel tanks with flat ends are used for a variety of products, with the exception of corrosives and pressurized gases. Plastic tanks suggest the storage of a corrosive material. Upright tanks with rounded ends are usually used for cryogenic (cold) products. Small (less than 1000 gallons) oval tanks usually contain fuel oil.

In addition to documentation of the tank itself, the investigator must observe the fill pipe area for spills. The fill pipe may be 200 feet of more form the tank. For ASTs located in basements, the fill pipe is typically mounted on an exterior wall and looks similar to a wall-mounted fire hydrant or stand pipe.

10.5.3.5 DISPOSAL SITES

Land disposal of hazardous substances may occur in open dumps, surface

impoundments, and landfills. These terms are generally defined as follows.

- Dumps are defined as sites where wastes have been indiscriminately discarded by means not in accordance with federal, state, or local requirements.

- Surface impoundments typically consist of a manmade basin to hold liquids and solids. The solids are allowed to separate from the liquids. The liquids may be treated to remove hazardous substances and then discharged into surface water, or sprayed on adjacent land, or simply allowed to evaporate in a holding pond. Solids are periodically dredged from the impoundment, treated in some manner, and disposed of in a dump or landfill.

- A landfill is defined as a waste disposal system in which the waste is buried and compacted between layers of earth.

Some of the more obvious hazards associated with disposal sites include ground water pollution, surface water pollution, soil contamination, methane gas generation, migration of methane into basements, excavations, and utility conduits, and subsidence.

Numerous federal and state regulations govern waste disposal. The two most important regulatory mechanisms are RCRA and CWA. RCRA regulates the disposal of both hazardous wastes and non-hazardous wastes. Land disposal of hazardous wastes is only allowed at permitted treatment, storage, and disposal facilities (TSDF). Disposal of non-hazardous waste is being regulated through land bans, construction criteria for landfills, and strict monitoring requirements.

The CWA prohibits discharge of hazardous substances into navigable waterways such as rivers and lakes. However, many states have extended this prohibition to any body of surface water and to ground water. As a result, many facilities must treat their waste prior to discharge. This requires a permit under the National Point Pollutant Discharge Elimination System (NPDES).

The probability of buried waste varies according to the type of the type of commercial operation. Operations such as smelting and other types of ore processing, oil refining, and pesticide, chemical, and steel production often generate high volumes of waste that might be buried on site. When investigating such sites, a thorough search for disposal locations should be made.

Recently disturbed areas, mounds, unnatural topographic features, or pits may signal a disposal site. Such surface features should be noted and appropriate recommendations made for the client. Stained soil, seeps emitting discolored water, and dead or stressed vegetation are other indications of buried waste. In some cases; protruding debris at the surface will signal buried waste. In some cases; protruding debris at the surface will signal buried waste. In other cases, an entrenched stream will cut through a dump and debris will be visible along the cut bank. All vehicle access routes should be thoroughly examined for evidence of disposal sites. Soil cracks oriented in circles or straight lines generally indicate buried waste.

Any fill areas on the property may contain hazardous materials. Excavations are a good place to bury discarded material. For example, a research facility 8in Golden, Colorado had a pile of uranium ore that was no longer needed in their test program. This material

was used as a base for a parking lot. In another case, a transformer storage yard was paved for a parking lot. Subsurface investigations found that the soil underlaying the asphalt was contaminated with PCBs. Fill brought in from off-site may contain hazards. For example, radioactive uranium mill tailing was extensively used in Grand Junction, Colorado, for filling around structures. In Denver, Colorado, waste from radium processing was used as backfill throughout the city, and in Durango, Colorado it is estimated that sixty percent of the structures were backfilled with uranium tailings. Therefore, all fill areas should be examined, especially if prior use suggests the potential for buried waste or if off-site fill of unknown origin was used.

Farms and ranches usually have a disposal area. Such dumps may contain creosote, pesticide containers, solvents, and veterinary waste. Cleanup costs often exceed $400,000.

All manmade impoundments should be suspected of containing hazardous substances, regardless of visual appearances. Chemicals can reside in sediments for decades with little degradation and no visual evidence of their presence.

10.5.3.5 RADIOLOGICAL HAZARDS

A substance is radioactive when the nuclei of the atoms break apart to form other elements. During this process, the nuclei give off energy in the form of particles (such as alpha and beta particles) and electromagnetic waves (such as gamma rays). This radioactive energy can cause changes in cell structure of plants and animals. Such changes can result in the cell dying or becoming cancerous.

A variety of agencies regulate radioactive hazards. The Nuclear Regulatory Commission (NRC) regulates the licensing of nuclear power plants. The EPA regulates radioactive materials that might be released into the environment, the management and disposal of spent nuclear wastes, and uranium mill tailings under a variety of programs, but not RCRA or CERCLA. Other federal agencies, such as the Department of Energy (DOE) and the Department of Defense (DOD), have input into the management and disposal of radioactive wastes. The records search portion of the site assessment should identify land uses or conditions that may create a radiological hazard.

Naturally Occurring Radioactive Materials (NORMs) are often present and can include coal, soil, rocks, water, plants, air, petroleum products, bricks, coal ash, and other materials. For example, propane contains minute amounts of radionuclides that precipitate along the interior of propane tanks. With time, significant amounts of radioactivity can be measured inside such tanks. Radioactive scale also forms on the inside of oil well pipes and processing equipment. As general rule, any method that extracts raw materials and processes them to remove impurities can concentrate NORMs

If radiological hazards are suspected, the site inspector should use appropriate radiological survey instruments for hazard identification and preliminary measurements.

10.5.3.7 VEGETATION

Many chemicals are toxic to vegetation, therefore, stressed vegetation can indicate a chemical release. However, vegetation is stressed by conditions other than chemicals,

so stressed vegetation in itself is not conclusive of a chemical release.

Stressed vegetation refers to plants that are dead, dying, or stunted. This includes chlorotic plants (plants that are light green in color rather than the normal dark green) and areas where plants should be growing but are not present. Examples where stressed vegetation may be found are as follows.

- If hazardous substances have been spilled, vegetation may not grow or may be stressed within the dump or spill boundary. If this is the case, there is usually a clear line between the stressed vegetation and healthy vegetation that identifies the boundary.

- Vegetation may be stressed along a surface water or storm water pathway. This may occur when rain water flows over and away from a dump or spill. The hazardous substances carried with the rain water may then kill the vegetation it contacts along the way.

Vegetation stressed by natural factors (early frosts, drought, inundation, lack of nutrients, etc.) usually occurs in a random manner or in a wide area. In contrast, when vegetation is stressed from released chemicals, the damage is often localized and usually occurs in some type of pattern as indicated above. Distinct lines between healthy and stressed vegetation suggest a chemical release. Clumps of stressed vegetation down-gradient from a tank or other potential point suggest that chemicals may be responsible for the mortality.

Whenever dead or stressed vegetation indicates a chemical release, the investigator should look for the source. It should be possible to track the dead or stressed vegetation to an up-gradient tank, a drum, or a solid waste disposal site.

Vegetation may reflect a recent disturbance. The vegetation (and soil) may have been disturbed during burial of hazardous wastes change or spills. Vegetation typically found in newly disturbed areas are of the “weedy” type and may include thistle, tumble weed, bind weed, dock, and clover. A dense cover of weedy species suggests a disturbance that should be investigated during a Phase II site assessment.

In summary, whenever stressed or weedy vegetation is found, the investigator should look for evidence that links the vegetation with a release of hazardous chemicals. Unfortunately, vegetation is only a good indicator of chemical release during the growing season (May through September in most locations). In addition, “healthy” vegetation does not necessarily include an absence of chemical releases because not all chemicals affect vegetation.

10.5.3.8 EVIDENCE OF SPILLS

Soil color is the best indicator of a spill. Residue from the spill may be retained at the surface. Therefore, the investigator should be aware of natural soil colors; this will allow the investigator to recognize foreign colors that often indicate a spill.

As mentioned above, stressed vegetation can indicate a spill, especially if the stressed vegetation can be traced back to a structure that may have released chemicals.

Severely rusted drums and ASTs in poor condition suggest chemical releases and the need to test the soil for chemicals involved in the suspected release. Punctured drums, bulging drums, and drums lying on their sides suggest a chemical release. The presence of used absorbent booms and other chemical absorbents suggest that a spill may have occurred.

Areas used for transport, such as railroads, or for loading or unloading, such as a rural air strip, should be examined for spills. Chemicals are often spilled in storage areas and staging sites. Any areas used to retain trash and other waste products prior to off-site disposal must be thoroughly examined for spills.

The general attitude for maintenance and housekeeping often reflects the owners concerns for environmental matters and the likelihood that spills have occurred. Sloppy housekeeping (especially in terms of storage areas, loading and unloading areas, and waste handling) and poor exterior maintenance suggests a cavalier attitude for the environment and an increase likelihood of chemical releases.

10.5.3.9 SURFACE WATER

Hazardous substances can enter the surface water by means of runoff, direct dumping into water, or by seepage into ground water that eventually discharges into a surface aquatic system. Although laboratory analysis of water samples is the best method to prove contamination, visual observations are valuable in demonstrating that water analysis is needed and in directing the types of analysis to be done.

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Visual observations of possible water contamination are a part of a Phase I site assessment. Water that displays a sheen (commonly seen as a floating rainbow) may be contaminated by some type of liquid waste that has a specific gravity of less than 1.0. Polluted water may have an odd color, such as light red, yellow, blue, or green. For example, in the early 1900s several cars of copper ore overturned and dumped their contents into a small stream. The water down gradient of this point is blue in color.

A lack of aquatic vegetation within the stream bed and/or a lack of vegetation adjacent to the stream indicates water borne contamination that may be toxic to plant life. In addition, aquatic animals (vertebrates and invertebrates) are very sensitive to pollution and can serve as good indicators of water quality. However, quantification of the aquatic community requires special sampling equipment and expertise in aquatic biology.

Stains on stream bed rocks are another indication of pollution. For example, dissolved iron from mines will precipitate on rocks and give them a distinct yellow-brown color Water high in salts will leave a white residue on exposed rocks and shoreline soil.

Dead animals adjacent to a stream are not conclusive evidence of contaminated water. Animals commonly seek water when they are sick, so the cause of animal death is often located a substantial distance from the stream

Stream bed sediment is usually brownish in color. Distinct colors such as yellows, reds, and blues in the sediment suggest chemical contamination.

Proliferating vegetation, especially algae, suggests aquatic pollutants that stimulate plant growth. Phosphates and nitrates are common pollutants that serve as plant nutrients, thus increasing plant growth at the expense of other aquatic organisms.

All conduits that discharge water or liquid wastes must be evaluated during the investigation. Roof drains, surface drains, pipes that daylight (exposed at the ground surface), drainage pies, overflow pipes, outfalls (point at which a waste stream discharges into a ditch, stream, or river), irrigation ditches, and catch basins (as area where a waste stream collects prior to discharge) must be examined for signs of contamination and destination of the waste streams. Destination of the waste can include a municipal sewer, dry well (a well drilled into the ground for the sole purpose of discharging waste water), retention pond, stream, river, or simply the ground. Contamination can be identified by soil straining, stressed vegetation, sheens and other abnormal features as previously discussed.

10.5.3.10 GROUND WATER WELLS

Ground water monitoring wells on the property or on adjacent properties indicate a concern about water quality. Monitoring wells are usually readily identifiable by the steel standpipe used to protect the casing or by a labeled metal cover that is installed at ground level. If such wells are present, monitoring data should be obtained from the owner or from state agencies.

Producing wells (drinking water, process water, irrigation water, etc.) can be identified from piping, pumps, electrical lines, and other surface features. Water quality records may be available for such wells.

Abandoned wells may be present. A stand pipe with no electrical lines or auxiliary piping may be an abandoned well. Abandoned wells that are plunged often appear as a circular cement area about 10 inches in diameter surrounded by pieces of grout, well casing, and sand that is often removed during well closure.

The potential for ground water contamination should be evaluated while examining the site. Liquid wastes that discharge into sandy soil, gravel, fractured bedrock, or retention areas, leaks from underground tanks and buried process lines, and improperly used and/or functioning septic tanks have a significant potential of contaminating ground water.

10.5.3.11 DRUMS

The 55 gallon steel or plastic drum is the common shipping container for chemicals. However, chemicals also come in smaller drums. Once empty, containers are commonly stored outdoors until they can be returned for credit or used for storage.

All drums should be examined during a Phase I site assessment. Readily visible labels and other markings on drums should be noted. Although the labels and markings rarely reflect what is currently in the drum, they give important clues as to the chemicals used

at the facility and the type of waste products to expect. Markings on the drum often have a code that can be used to trace the manufacture and the exact nature of the original product.

The drum itself can give clues as to its contents. Steel drums with a bung and vent hole are used for liquids, usually noncorrosive liquids. Plastic drums with a bung and vent hole are typically used for corrosives. Stainless steel drums are commonly used for radioactive materials or pharmaceutical. Fiber drums are often used for dry solid wastes, such as asbestos and medical wastes. Drums with removable tops are used for solids.

Drum condition should also be noted. Severely rusted drums that still contain a waste protect may leak now or when attempts are made to move the drum. A bulging drum indicates possible internal pressure, and such drums should be avoided.

10.5.3.12 PESTICIDES

Pesticides are chemical products developed to eradicate a target species in a localized area; these chemicals include insecticides, herbicides, rodenticides, and fungicides. Such substances are regulated (particularly in terms of labeling and application) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Because of their persistence and toxicity, FIFRA has banned the manufacture and use of some pesticides including:

Aldrin
Alpha BHC
Beta BHC
Chlordane
DDT, DDE, DDD
Delta BHC
Dieldrin
Endosulphan I &II
Endrin
Heptachlor
Kepone
Lindane
Methoxychlor
Toxaphene

Although banned, residue of these pesticides are still found in the environment, especially in soil and sediment. In some cases, these pesticides are still contaminating food crops. For example, onions grown in a former cornfield were found to be contaminated with Lindane that had been applied to the field twelve years earlier.

Proper use of most modern pesticides should leave no potential environmental liability. However, overuse, spills, and improper disposal can result in chemical residues that contaminate soil, water and sediments. This is most likely to occur at facilites that manufacture pesticides and in agricultural areas. In addition, the inspector should look for flat areas that may have been used to load pesticides for aerial application.

Testing (soil, sediment, water, food crops, and forage) is usually recommended for sites that may contain pesticide residue. In addition, inspectors should ask the farmer if he or

she is a certified pesticide applicator. If not, and if pesticides are being applied by the farmer, misuse and resulting contamination may be a problem.

FIFRA does little to enforce its application, record keeping and disposal regulations, other than to recommend that all applicators follow the directions on the label. New regulations require that pesticide applicators keep detailed records as to products used and when. The inspector should request a copy of these records.

10.5.3.13 OTHER CONDITIONS THAT MAY IMPOSE RESTRICTIONS OR LIABLITIY

Although the site assessment focuses on potential liability imposed through releases of chemicals, other forms of liability or land use restrictions may be present. A variety of natural or historical conditions can significantly impact the value of land and are often included in a site assessment. Following is a brief review of some federal regulations that may impose environmental liability. Most of the federal regulations are implemented on a state level.

10.5.3.13.1 WETLANDS AND FLOODPLAINS

Wetlands are areas that are temporarily or permanently inundated by surface or ground water and support vegetation adapted for like saturated soil. Such areas are defined by characteristic hydrology, vegetation, and soils. Typically envisioned as wetlands are marshy, swampy, or tidal areas; however, wetlands can occur in any environment and are often found along small streams irrigation ditches, mudflats, and springs.

The value of wetlands for wildlife habitat, flood control, shoreline stabilization, water purification and such areas are protected under the Clean Water Act. The U.S. Army Corps of Engineers is responsible for controlling and permitting any activities that disturb wetlands. A “404” dredge and fill permit from the Corps of Engineers is required prior to disturbing a wetland. If the wetland area to be disturbed is less than 1 acre, notification of the Corps of Engineers is usually the only requirement. If areas up to 10 acres are to be disturbed, a permit is required but documentation is not extensive. If more that 10 acres of wetlands are to be disturbed, extensive documentation is usually required.

The EPA defines a wetland as “those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds”. The EPA has elaborated on this definition by stating that wetlands must be saturated with water at least 7 to 10 days per year within the 12 to 16-inch root zone beneath the surface. States also have definitions or wetlands. For example, Massachusetts defines a wetland by the vegetation it supports while Connecticut defines wetland by soil classification.

If the site under investigation has surface water in any form, designation of the land surrounding the water as wetlands is a possibility. Should further investigation indentify such areas as wetlands, use of the area may be precluded or regulated under a federal permit. Permitting stipulations commonly require that any disturbed wetland be replaced in another location.

Floodplain regulations are present in most states and severely restrict or preclude developments in areas that are prone to floods. Such areas may or may not be wetlands and are usually mapped by the Federal Emergency Management Agency (FEMA). Maps are drawn on the basis of a 100 year flood event and updated as development affects the flood plain.

10.5.3.13.2 THREATENED AND ENDANGERED SPECIES

A threatened and endangered species is a mammal, fish, bird, plant, insect, mushroom, or reptile that is extremely uncommon. Such species and their related acts that are implemented by a variety of federal agencies, particularly the U.S. Fish and Wildlife Service. Restrictions under the acts that are implemented by a variety of federal agencies, particularly the U.S. Fish and Wildlife Service. Restrictions under the act apply to federal projects and to private projects that require federal or state agencies approval or permits. Thus, almost any development project will be required to comply with this act.

Threatened and endangered species are most likely to occur in conjunction with wetlands, pristine areas, or some type of unique habitat (such as virgin forests, virgin grasslands, or unusual topographic features). The records and on-site observations should provide the needed information to assess the potential for threatened an endangered species. In the Front range area, habitat that may support bald eagles, peregrine falcons, black-footed ferrets and other species may trigger an endangered species assessment. For example, prairie dog colonies provide critical habitat for black-footed ferrets and food for bald eagles. Removal of a colony may first require an endangered species assessment. Even if no ferret signs are found, animal rights groups and other organizations may require the prairie dogs to be relocated.

10.5.3.13.3 COASTAL DUNES AND BEACHES

Coastal dunes and beaches are low-lying strips of land that may be found along the oceans and Great Lakes. Dunes are composed of sand and other sediments moved and deposited by winds, waves, tides, and currents. They are valued for their beauty, recreational opportunities, shorelines protection functions, and wildlife habitat. Such areas are protected under the Coastal Zone Management Act, Rivers and Harbors Act, and the Clean Water Act.

If the property under investigation is located within 1000 feet of a shoreline, it may be within a coastal area protected under local, state, or federal regulations. Further investigations should be recommended to define the status of the land and any use restrictions.

10.5.3.13.4 ARCHEOLOGICAL RESOURCES

Federal sites that contain evidence of past plant and animal life, human settlement, or human activity may be protected under the Antiquities Act or the National Historic Preservation Act. The value of such resources can be greatly diminished or destroyed of they are not handled correctly since much of the information that can be gathered from

artifacts-depends on their relative location in the soil and to each other. For this reason, these resources must be identified and protected before land is significantly altered by human activity.

In the context of a site assessment, archeological resources are commonly evaluated by the following methods that focus on the likelihood of resource occurrence.

- presence of archeological resources in nearby areas; or
- land characteristics that are similar to land that commonly contains archaeological resources

Obviously, as the degree of development increases, the likelihood of locating archaeological resources decreases. Therefore, the probability of finding such resources is greatest for undisturbed land. Because some states have regulations protecting archaeological resources on private land, such resources may be included in a site assessment. Even when state regulations are lacking, uncovering archaeological resources during excavation often delays a project and may present a public relations problem to the owner.

10.5.3.13.5 HISTORIC SITES

Historical buildings, structures, and sites can be irreplaceable repositories of important cultural information. Such sites are protected by the Antiquities Act, Historic Sites Act, and the National Historic Preservation Act. Protection is often implemented on a state basis by a state historical preservation officer.

With respect to historic to historic sites, the investigator needs to ask the following questions during a site assessment.

- Does the property contain a plaque, marker, or other indication that designates it as a historic landmark?
- Have any significant events (in terms of history, architecture, archaeology, engineering, or cultural) occurred on this property?
- Could the property be considered part of the historical district?

If the answer to any of these questions is yes, the deed and perhaps other documents should be examined. Sites with official historic significance usually have development restrictions recorded as past of the deed.

10.5.4 BUILDING INSPECTION

A building inspection should be systematic and comprehensive. All assessable areas of the building should be inspected. If locked doors or confined spaces preclude entry, the investigator must state this fact in the report and recommend that all inaccessible areas be inspected prior to property transfer.

If possible, someone knowledgeable about the building should accompany the inspectors. The facility manager is probably the most knowledgeable person with respect to the building and its contents. Maintenance and janitorial personnel are also familiar with the building.

As notes, including sketches of the floor plan, must be entered in a bound book and the notes must follow the same rules previously presented for the land inspection. Persons interviewed or contacted during the building inspection should also be included in the notes.

Intended use of the building after transfer is important in assessing potential hazards. For example, if partially used drums of solvent are in the building use will not change after transfer, the solvent has potential value to the new owner. However, if building use changes, then the solvent may become a waste product requiring proper disposal.

Finally, public health issues, such as indoor air quality an drinking water quality, are usually not included in a Phase I assessment. Such issues often involve sampling and data collection that are beyond the scope of a Phase I investigation.

10.5.4.1 ASBESTOS

The EPA estimates that almost one million buildings contain asbestos products of some type (Table I). Existing environmental regulations do not mandate the removal of asbestos containing material (ACM) under most conditions, with the exception of building demolition. Therefore, the hazards associated with ACM and the degree of liability depends on the condition of the ACM, current use of the building, and potential future use of the building.

TABLE I
ASBESTOS - Asbestos products available in the 1950's

Raw Asbestos: yarn, thread, felt, rope packing wick packing, plain and corrugated paper, roll-board, millboard, insulating wire, 85% magnesia pipe covering, blocks, high temperature insulation, compressed sheet packing, molded composition for electrical and other purposes, molded brake lining and brake blocks, etc, filler in plastics, flooring, pottery, asbestos cement, shingles, siding and tile, asbestos cement wall tile, flat sheets, corrugated roofing, roof sheathing, panels, insulating board, floor tile backing, pipes, boiler insulation, roofing cement, furnace, cement, plaster and stucco, paints, varnishes and fillers, acoustical sprayed asbestos, insulation of walls, floors, mattresses, conduits, in foundations to resist shock, filter fibers and filter pads, sewer pipe, asphalt or vinyl floor tile (commonly found in 9 x 9 inch sized tiles), and automobile body undercoating.

Asbestos yarn: cloth, tape, brake linings, clutch facings, packing gas mask filters, gaskets, tubing wicks, rope, twine, sewing thread, wire covering, cable covering, steam hoses, and fire retardant hoses.

Asbestos cloth: sheet packing, brake lining, clutch facing, gaskets, mattresses, clothing, gloves, mittens, aprons, leggings, draperies, hangings, blankets, mail bags, awnings, rugs, theater curtains, theater scenery and floor lining in theaters, motion

picture screens, acoustical treatment, filters, lining, padding medical equipment, fire shields, sand bags, conveyor belts, airplane fittings, and ironing board covers.

Asbestos felt: acoustical work, noise insulation, and piano padding.

Asbestos tape: wicks, belts, insulation, winding coils, underground cables, and glass manufacture.

Asbestos paper: air cell and other pipe coverings, boiler jackets, asbestos felt roofing, gaskets, wicks, tubes, wire wrapping, hot air pipe wrapping stove lining of various other equipment, filters used for chemical analysis, automobile exhausts, baking sheets, table pads and mats and air ducts.

Asbestos mill board: stove lining, heaters, safes, garages, motion picture booths, dry-cleaning machines, garbage incinerators, ovens, fire-proof wallboard, ceiling, gaskets, fire doors, tablemats, and stove mats.

Asbestos cement flat sheets an wall board: interior sheathing, partitions, exterior sheathing, siding, various building uses, laboratory table tops, switchboards, cabinets, panel boxes, motor castings and electrical apparatus.

Asbestos cement pipes: water, sewage, gas and special liquid pipes, conduits for electric light wires.

Asbestos composition material: insulation, heating, cord insulation, electric wire insulation, lamp sockets, switch parts, resistant mounting and other electrical uses, as well as underground insulation, flooring, and various plastic uses.
The EPA has identified three categories of ACM used in the buildings.

- Surface Materials. This category includes ACM sprayed or troweled on surfaces (such as walls, ceilings, structural members) for acoustical, decorative, or fireproofing purposes.

- Thermal System Insulation. This includes insulation used to inhibit heat transfer or to prevent condensation on pipes, boilers, tanks, ducts and other components of water systems, heating units, ventilation ducts, and air conditioning systems.

- Miscellaneous Materials. This category includes material such as floor tile, ceiling tile, roofing felt, concrete pipe, outdoor siding, and fabrics.

Materials in the first two categories are of particular concern because they tend to be friable (readily reduced to a powder when handled). Thus, friable asbestos is more likely to release fibers when disturbed than nonfriable asbestos. Nonfriable asbestos becomes a hazard when it is sanded, cut, broken or otherwise manipulated.

Both the EPA and OSHA have promulgated regulations to reduce asbestos exposure. The first regulations were issued in 1973 under the National Emission Standards for Hazardous Air Pollutants (NESHAP's). This regulation partially banned spray-applied ACM in new buildings and established procedures on handling ACM during demolition. The regulations were revised in 1975 and 1978; these regulations essentially banned the use of ACM in new buildings as of 1970. However, the wide ranging EPA ban on the

manufacture, importation, and use of asbestos is being challenges in court. This ban, scheduled to take full effect in 1996, was struck down by a federal appeals court which stated, in part, that the ban would save few lives and hurt the economics of foreign countries that export asbestos to the United States. One of the key exported products is transite, a mixture of non-friable asbestos and cement. Transite is commonly used in water pipes in this country. Other asbestos products affected by this court action include brake linings, roof coatings, shingles, and paper.

Whenever asbestos is suspected, the building should be inspected for ACM by a certified inspector, such certification is now required for all buildings. In May 1993, the EPA promulgated a rule stating that anyone "performing an environmental assessment of a school or public or commercial building for insurance purposes or as part of a real estate transaction" have accredited training that consists of a tree day course.

Asbestos must be addressed during the building inspection portion of a site assessment. When assessing the potential for ACM to be present, first determine when the building was constructed. If the construction date was later than 1979, the potential for ACM is low. For buildings constructed during or prior to 1979, the acoustical material, fireproofing insulation and cement-like siding or roofing (Table 2). Note that asbestos containing products can be difficult to detect. Asbestos was commonly used for these purposes, and the older the building the greater the potential of finding ACM. However, asbestos cannot be identified by visual inspection; rather, polarized light microscopy is the only approved method of asbestos identification. Therefore, the role of the non-certified-asbestos investigator is to advise the client concerning the need to conduct an asbestos inspection.

Once asbestos has been removed from a structure, an asbestos hazard may still be present. Improper fiber control during removal usually results in an increased asbestos hazard after removal than existed prior to removal.

TABLE 2 – Building material likely to contain asbestos

- Asbestos cement insulating panels
- Cement asbestos wallboard
- Asbestos insulating panels
- Roofing
  - asbestos saturated felt
  - reinforced asbestos flashing sheet
  - asbestos base felt
  - flashing
  - paint
- Sheet metal work
  - plastic cement
- Waterproofing
  - asbestos base felt
  - asbestos finishing felt
  - flashing
- Putty
- Door insulation
- Fire Dampers
- Flooring

    - asphalt tile
    - vinyl asbestos tile
    - vinyl sheet flooring
    - backing
    - adhesive
- Plaster
- Ceiling Tile
- Insulation
    - thermal sprayed on
    - fireproofing
- Paints
- Textured coating
- Taping compounds
    - elevator, brake shoes
- Insulated HVAC systems
    - piping insulation
    - boiler block
    - breeching insulation
    - gaskets
    - ductwork taping
    - flexing fabric joints
    - flue seam taping
- Cooling tower baffles and fill
- Valve packing and rope
- Laboratories
    - hoods
    - oven gaskets
    - gloves
    - bench tops

10.5.4.2 RADON

Radon is a natural occurring gas that has no smell, taste, or visual properties. It is a decay product of uranium and is found in soils and rocks containing uranium, and in granite, shale, phosphate, and pitchblende. Radon can enter and accumulate to dangerous levels in buildings. It enters through cracks in the floor and walls having contact with soil or rock, gaps in drain or sump systems, through tap water, via tiny cracks or pores in hollow-brick walls, and through slab joints. Radon can also be release from many building materials, but these sources rarely contribute significantly to elevated levels of indoor radon. Household water represents another source of indoor radon. Radon concentrations released by water can be high, but is not a significant source of radon in most situations. One study estimated that water borne sources of radon account for 1 to 7 percent of the average radon exposure.

Radon and its daughter products are known carcinogens that affect the lungs. In general, risk increases as the length of exposure and level of radon increase. However, studies have yet to link high levels of radon with outbreaks of lung cancer. For example, Colorado has higher levels of radon that most states, but is also has the third lowest death-by –caner rate in the country, and the rate of lung cancer is below the national norm. Recent studies in Florida and Washington state concluded that residential exposure to radon does not pose a significant long-term risk for the development of lung

cancer.

Regardless of the unproven radon-cancer link, the building inspection should address radon and the need to measure this potential hazard. Unfortunately, radon levels vary greatly form place to place, from room to room, and from day to day. An adjacent building could contain high levels of radon while the building under inspection might contain very little radon. Thus, radon levels cannot be predicted; testing is the only means of determining the radon risk.

Radon is detected by using one of the methods listed below.

- Grab samples – air pumps collect particles on a filter and the radioactivity of the filter is determined. This is an on-the spot test and may not be accurate, especially for long-term projections.

- Short-term tests – typically, canisters collect radon over a 3 to 7 day period. The canisters are then removed and placed in a counting device to determine radon levels. These are commonly used in schools and businesses.

- Long-term tests – a alpha-track detector or similar devise measures radon over a 3-12 month period. The etchings left by alpha particles are counted and converted to radon concentrations. These detectors are commonly used in homes.

Tests are usually conducted in the basement (or lowest level of living space) where radon concentrations are often highest. Levels above 4pCi/L indicate the need for corrective measures, such as sealing entry points or venting the structure. However, radon is usually not a concern in commercial buildings due to their semi-open nature, good air movement, and non-residential status.

Other forms of radioactivity may also be present in buildings. If radioactive materials were a component of bricks, mortar, concrete, or back fill around the foundation, occupants of the building could be subjected to high levels of radioactivity.

10.5.4.3 POLYCHLORINATED BIPHENYLS (PCBS)

Polychlorinated biphenyls belong to a large family of organic chlorinated hydrocarbons. PCBs have been primarily used in electrical equipment as a dielectric cooling agent because of its high heat transfer ability, high heat capacity, low flammability, and low electrical conductivity. In addition, hydraulic and lubricating fluids can contain PCBs, especially in older machines. This chemical causes chloracne (a disfiguring skin illness) and is carcinogenic and teratogenic in test animals. In addition, once PCBs are released into the environment, they are persistent.

PCBs are regulated under the Toxic Substance Control Act and implemented by the EPA. In the 1970s, domestic production of PCBs was voluntarily halted. In 1978, the EPA developed labeling rules and disposal regulations. In 1979, the EPA implemented rules governing the manufacture, use and disposal of PCBs. Use of PCB-containing equipment will be phased out by 1993. However, from 1929 to 1977, more than one billion pounds of PCBs were produced, so this persistent chemical is commonly found today.

10.5.4.3.1. PCBS IN TRANSFORMERS

Current transformer regulations can be summarized as follows:

- Transformers can legally contain 500 ppm PCBs or more and still be used; these are classified as “PCB transformers” by the EPA. The transformer must be labeled, totally encased, cannot leak, and if it fails it cannot be repaired. When the transformer is removed, the fluid must be incinerated and the carcass buried.

- Tranformers containing from 50 – 5—ppm PCBs can be repaired and reused; these transformers are classified as “PCB-contaminated” by the EPA. There are no rules governing the disposal of the carcass, but the PCB fluid must be incinerated.

- Transformers containing from 2 – 50 ppm PCBs can be repaired and reused; they are classified as “non-PCB”. The PCB fluid can be disposed of in any manner except placing it in an area that could contaminate food, feed, or water. Incineration of the PCB fluid is the recommended disposal method.

- Transformers containing less than 2 ppm PCBs are not regulated.

The site inspector must examine all transformers and report their current status. If the transformers have been flushed, the owner should have a statement that tells the date of flushing, the residual PCB level (flushing cannot remove all of the PCB), and final disposition of the waste. If PCB disposal was not properly conducted, the new owner could be liable for cleanup costs at the disposal site. In addition, the site inspector must examine the area in the vicinity of the transformers for oil stains that indicate a leaking transformer and contaminated material.

If label information is available, “PCB fluid” may be missing and a trade name given instead. Trade names for PCB fluids include:

Abestol
Aroclor
Askarel
Chlophen
Chorextol
Clorinol
DK
EEC-18
Fenclor
Inerteen
Kennechlor
No-Flamol
Phenoclor
Pyralene
Pyranol
Safe-T-Kuhl

Salvol

The most common trade name is Askarel; this product contains 40 to 80 percent PCB.

Transformers located inside a building are more likely to contain PCBs than those located outside. Transformers within a building are usually privately owned and relatively old; both conditions increase the probability that the transformer contains PCBs.

10.5.4.3.2 PCB ARTICLES

Prior to 1979, PCBs were used in the capacitors found within a fluorescent light ballast. Generally, these capacitors contained about 10ml of PCB based fluid. Such capacitors (termed a PCB article) by the EPA) can be legally thrown in the trash. However, when large quantities of such capacitors are discarded from a single location (such as a large office building being remodeled) or from a single entity (such as a school district), the capacitors are generally handled as a hazardous waste because of the possibility of future liability if the capacitors were landfilled.

10.5.4.3.3 PCBs IN ELECTRICAL VAULTS

The EPA is also concerned with PCBs that have contaminated electrical vaults or other structures. This chemical can be found on the floor, walls and ceiling of such structures, depending on the integrity of the transformers and events such as overheating and fires. If a release is suspected or confirmed, wipe tests may be necessary regardless of the current PCB content of the transformer. If the wipe tests show more than 10 micrograms per 100 cm^2, the contaminated concrete (or other material) must be removed or remediated.

10.5.4.4 EVIDENCE OF SPILLS

Stains on the floor and walls, and severely rusted drains suggest chemical spills. The inspector should try to determine what was spilled, the quantity, and the date of the spill. If a spill is properly cleaned up, there should be no remaining residue that would be of concern to a new owner. However, some hazardous substances are very difficult to clean up thus creating a residual hazard. For example, in the 1910's a building was used for radium experimentation. Prior to remodeling in the 1930's, the entire building was cleaned. During a radiological survey in the early 1980's high levels of radiation were found in several rooms that had been previously used for the radium experiments. An expensive cleanup followed where minute quantities of radium dust were removed

10.5.4.5 CHEMICAL STORAGE AREAS

Chemical storage areas must be carefully examined and the quantity of each hazardous substance, container type, container condition, and other details recorded. The floor and walls should be examined for evidence of spills and residue. Presumably, the chemicals will be removed before property transfer, thus, the investigation should focus on what hazards will likely remain once the chemicals have been removed.

Storage of hazardous chemicals is regulated by various governmental agencies. These

regulations include proper labeling, separate storage areas for incompatible chemicals, containment structures, etc. In addition, chemical reporting regulations are included in the SARA legislation. If a facility is not in compliance with these regulations, the investigator should closely scrutinize the building for other signs of improper chemical handling procedures.

10.5.4.6 CHEMICAL USE AREAS

Areas in the building where chemicals are used must be thoroughly examined for spills and residue. Discoloration, readings on air monitoring instruments, and rust are indicative of chemical residue. In addition, return duct for heating and cooling, and ducts leading away from 100 pounds of radioactive plutonium were found in the ducts at a processing facility within the Rocky Flats Weapons complex northwest of Denver, Colorado.

A new twist to chemical use areas is illegal drug manufacture. Over 1,000 such facilities are discovered each year, and the number is increasing dramatically. Chemical contamination can be extensive and cleanup is carried out the owner's expense. Often the structure is demolished and buried rather than cleaned. Some chemicals used to manufacture illicit methamphetamine includes sodium cyanide, thionyl choride, acetaldehyde, mercuric chloride, ephedrine, phenylacetic acid, benzyl chloride, methylamine, acetone, benzene, and hexane. Unfortunately, it is not uncommon during a site assessment to encounter an illegal drug lab.

10.5.4.7 LEAD

10.5.4.7.1 LEAD IN PAINT

Lead-based paint is one of the most significant sources of lead in humans. The EPA recently estimated that one out of nine children under the age of six has elevated levels of blood lead that could cause health problems, especially with the central nervous system. This hazard was recognized in 1933, but it was not until 1977 that the use of lead carbonate in most paint was banned.

Children are particularly susceptible to lead poisoning from paint. Young children exhibit a high level of hand to mouth behavior that can introduce lead-based paint chips into the digestive system. Once in the body, children retain a large portion of the ingested lead, storing this lead in bones and soft tissues. Lead-based paint has a sweet taste that makes it attractive to children. Finally, such paint may satisfy mineral craving for malnourished children.

Although people can become exposed to lead at home and at work, the former exposure path is of greatest concern. Three million tons of lead line the walls of American homes. Lead-based paint may be found on any interior or exterior surface in an older home, particularly on woodwork, radiators, doors, windows, and exterior walls, Heavily-leaded paint was used in about two-thirds of homes built before 1940, one-half of homes built from 1940 to 1060, and some homes built after 1960. The government has estimated that 75 percent of the homes built before 1980 have some lead paint. In April 1990, the Department of Housing and Urban Development (HUD) issued preliminary guidelines for the identification and abatement of lead-based paint in homes. Following testing of the guidelines, HUD will likely develop regulations concerning sampling, abatement, and

maintenance of homes containing lead-based paint.

HUD recognizes two techniques to identify lead paint. The first method is X-ray fluorescence (XRF). This portable instrument gives immediate results without disturbing the test site. The second method is laboratory testing. Paint samples are scraped off the walls and sent to a laboratory for analysis using atomic absorption spectrometry. However, this method scars the collection site and substantial quantities must be collected to ensure that a representative sample is collected. Regardless of the analytical method, sampling should concentrate on areas within the reach of children and in areas where paint is peeling.

Concerns about lead-based paint extend beyond the home. Workers that weld, cut or blast steel coated with lead-based paint are at risk of lead poisoning.

The site investigator should assess the potential for lead paint (usually based on the age of the building) and make appropriate recommendations to the client.

10.5.4.7.2 LEAD IN WATER

It is estimated by the EPA that one in six people or 40 million Americans drink water with excessive amounts of lead. Sources of this lead include water service lines, solder used in plumbing, brass fixtures that contain lead, and lead-lined water coolers. Elevated levels of lead in drinking water can be found in almost any situation. For example, areas using “soft” (low mineral contents) water often have elevated lead levels because soft water is very efficient at corroding pipes. New homes often have lead to problems because plumbing in such homes sheds lead more readily than old pipes; however, lead-free solder was introduced in the late 1980’s and is now in extensive use.

Liability associated with lead in drinking water is unclear at this time. The site investigator should be aware of potential lead problems in drinking water and make appropriate recommendations to the client.

Lead also occurs in other products such as batteries, semiconductors, ammunition, gasoline, some plastics, glass, pesticides, matches, lubricants, and mining wastes. Lead from these sources is significant only in special situations, such as property located downwind from mining wastes containing high levels of lead or land adjacent to major highways where lead from engine exhaust has contaminated the roadside.

10.5.4.8 UREA FORMALDEHYDE FOAM INSULATION

Formaldehyde has been used extensively in building materials including fiberboard, hardwood plywood paneling, particleboard, and Urea-formaldehyde foam insulation. Of these products, the insulation is of most concern because of its widespread use as a retrofitted insulation.

Health effects from formaldehyde exposure include irritant effects (eye, upper respiratory and skin)), sensitization that causes allergy-like symptoms, and carcinogenicity in laboratory animals. Because of these and other concerns, the manufacture of this material has been voluntary restricted since the mid 1980’s. However, a type a urea formaldehyde insulation is experiencing a small resurgence as an insulating material for concrete blocks and panels.

Urea formaldehyde insulation is a non-fibrous material consisting of small particles and is free of bubbles. It is soft and brittle, and readily crumbles to a fine dust. Colors range from white to light yellow and gray.

The most common method of detection is to examine the building exterior for plugs that were installed following application of the insulation. If plugs are found, further examination and sample collection is conducted, usually by removing electrical outlet plates or by sampling unfinished walls. If exterior plugs are not found, interior examination may still be advisable, depending on the age of the building.

If urea formaldehyde insulation is suspected, laboratory analysis is required for positive identification. Air sampling may be conducted if formaldehyde insulation is found, but such tests are not highly accurate and only measures conditions at one point in time.

10.5.4.9 MISCELLANEOUS

Many buildings contain above ground and below ground storage tanks. Such tanks can store virgin products or wastes, that are regulated under RCRA as discussed in the previous unit. Aboveground tanks should be examined for their contents, evidence of leaks, and the presence or absence of containment structures. For underground tanks, a leak test should be conducted to property transfer.

Electric and magnetic fields (EMFs) have been studied since the1960s. Most studies found no health effects associated with these fields. However, some recent studies found no health effects associated with these fields. However, some resent studies found a slightly higher incidence of leukemia among children living near high-current (60 Hz) power lines. While no direct cause and effect relationship has been established, a recent EPA report concluded that electric and magnetic fields from power lines and perhaps and perhaps other sources of EMFs are possible, but not proven, cause of cancer in humans. The courts seem to agree that there is no proven link between EMFs and health problems. In May 1993 a jury ruled that higher voltage power lines stretching over a couple's home did no cause their young daughter's rare kidney tumors. Despite that lack of a proven health hazard, if high-current power lines are on or near the property under investigation, the client may want additional information about possible health effects from EMFs.

10.6 THE REPORT

The report is the only tangible product that results form a site assessment. If reflects the expertise and competency of the writer; it is a professional report card. Therefore the report deserves as much care and attention as all other phases of the investigative process.

The site assessment report must meet two constraints. First, it must inform the readers as efficiently as possible. Efficiency does not mean the report with the shortest length but the report that takes the reader the shortest time to understand. Second, the report must be honest. All pertinent facts must be presented regardless of the implications to the client.

Before beginning to write, the reader (usually the client) of the report must be identified.

The report must be prepared in a manner that will allow the reader to easily understand the material. In addition, the reader may require that a certain report format be used.

The format and content of the site assessment report will vary depending on the requirements of the client and any regulatory requirements. The ASTM recommends a report format that is similar to that required under other site assessment procedures. The following material represents the organization and content of most site assessment reports.

10.6.1 COVER LETTER

While not technically part of the report, the business letter that accompanies the report is necessary and must be well prepared. Important points in preparing such a letter are as follows:

- state what is enclosed and basic information such as location of the property inspected, date of the inspection, report title, contract number (if any), etc;
- summarize the more important aspects of the report; and
- summarize the recommendations.

The cover letter should be short and to the point. Its primary purpose is to reiterate key aspects of the report. The report will present and expound on the details of your investigation; the cover letter is only a brief summary of this information.

10.6.2 COVER PAGE

Most reports start with a cover page that presents the title of the report, the name of the client and address, date, and name and address of the company preparing the report. The table of contents follows on a separate page.

10.6.3 SUMMARY

This section reiterates key points presented in the report. The summary must be brief (about one page) and to the point. The client should be able to read the summary and understand the essence of y our work without having first read other sections of the report. Therefore, the summary must stand alone. Write and rewrite the summary until it is perfect. More people will read the only portion of the report they will read. The summary is so important that it is often found at the beginning of a report rather than the end.

When writing the summary, professional liability must be considered. Therefore, the professional should consider all aspects of the investigation, and then focus on the following items:

- strength of the evidence;
- quality of the information collected;

- type and extent of contamination potentially present;

- environmental risks due to potential contamination; and

- applicable regulations.

10.6.4 INTRODUCTION

The purpose of the introduction is to ease the reader into the report. It is a mistake to assume that everyone reading your report knows why the report was written. Thus, the introduction educates that reader as to what follows.

An introduction often starts with statements naming the project, the client, the contract type(verbal agreement, a signed contract, etc.) date of the contract, and purpose should be stated in specific terms, but be careful not to overstate the purpose and mislead the client.

The introduction may contain special terms that are used in the report. For example, hazardous substance, due diligence, innocent landowner defense, may require a definition. Common words that are given a specific meaning in some site assessment reports, such as obvious, user, site visit, key site manager, contamination, and actual knowledge, should be explained.

Limitations and exceptions are often specified in the introduction. They serve to put the report in perspective and limit potential liability; they are similar to a disclaimer, but not as legalistic in nature. Although limitations and exceptions are site specific, some commonly specified limitations include the following;

- All services were performed in accordance with our agreements and with current professional standards.

- The scope of the investigation was limited to visual observations, interviews, and review of reports, and other documents

- Information obtained from interviews has been assumed to be correct and complete; we do not assume any liability for misrepresentation of information

- Information from the records may not be correct and/or complete.

- The investigation does not include naturally occurring toxics, biological pathogens, subsurface contamination, contaminants that violate any present regulatory standards.

- There is no investigation which is thorough which is thorough enough to preclude the presence of materials which presently, or in the future, may be considered hazardous.

- This report is intended as a limited assessment of the environment conditions

associated with the referenced property and is prepared in accordance with generally accepted environmental practices within the constraints of the clients directive. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report is intended for the exclusive use of the client.

10.6.5 SITE DESCRIPTION

This section gives the street address and legal description of the property, general site and vicinity characteristics, a description of roads, structures, and improvements (including source of potable water, sewer disposal, etc.) and past and present uses of the subject property and adjacent properties.

Often this information is not presented as a separate section. Street address, legal description, and site and vicinity characteristics are often included in the introduction. The remainder of the material is often included in the records review.

10.6.6.1 RECORDS REVIEW

The records review is a summary of important information pursuant to a site assessment and derived from a variety of sources. A short, concise summary of all records reviewed, even those that contained no useful information, should be prepared. The records review is often subdivided into sections as follows.

10.6.6.1 PHYSICAL SETTING RECORDS

This section includes descriptions of topographic maps, soils, geology, surface water, ground water, meteorology, wetlands, and other information including mines, floodplains, plants, and animals when pertinent information exists.

10.6.6.2 HISTORICAL RECORDS

This section contains ownership and tax records, a description of important features on historical maps, and descriptions of aerial photographs. Other historical information may be included if pertinent material is found.

10.6.6.3 AGENCY RECORDS

Records obtained from local, state, and federal agencies presented in this section. Material commonly summarized includes CERCLIS, RCRA, Notifiers List, emergency response information, UST information, landfill locations, information form health departments, and land use planning information.

10.6.6.4 SITE RECORDS

Information derived from records obtained on-site including blueprints, hazardous substance manifests, and any type of environmental investigations (such as asbestos, radon, indoor air quality, and PCBs) is presented in this section.

10.6.7 INTERVIEWS

Many site assessment reports present interview information in a separate section.

Pertinent information is summarized, including the person interviewed, his or her affiliation, and the date interviewed. In other reports, interview information is included in the records review and site inspection sections.

10.6.8 SITE INSPECTION

Also called site reconnaissance, this section presents a detailed discussion of items found during the site visit that are or may be of environmental concern. Generally, exterior and interior observations are presented as distinct sections. The information should be presented in some type of logical order, such as from the front of the property to the back, or floor by floor for a building.

10.6.9 FINDINGS AND CONCLUSIONS

Findings and Conclusions, also called Recommendations, must relate to the client's needs and the purpose of the assessment. Most clients will want assessment concerning the need for further study (Phase II)

Due to the potential for misunderstanding and misinterpreting the report's conclusions, the ASTM recommends specific language for the Findings and Conclusions section for site assessments addressing property transfer. These legalistic statements are as follows:

> "We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard Practice E.50.02.2 of (insert address or legal description), the Property. Any exceptions to, or deletions from, the Standard Practice are described in section ( ) of this report. This Assessment has revealed no evidence of Recognized Environmental Conditions in connection with the Property."

Or

> "We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard Practice E.50.02.2 of (insert address or legal description), the Property. Any exceptions to, or deletions from, the Standard Practice are described in section ( ) of this report. This Assessment has revealed no evidence of Recognized Environmental Conditions in connection with the Property except for the following (list).

In essence, the first statement concludes that the site assessment failed to find any conditions that were recognized as a potential environmental liability. The second statement concludes that potential environmental liabilities may exist and identifies those liabilities. This conclusion strongly implies that the investigation should continue into a Phase II, but does not specifically state this.

10.6.10 REFERENCES

A list of the records reviewed during the site assessment must be included in the report. The reference can be cited as soon as the particular record is mentioned or the citation can be placed in a reference list.

Sufficient detail should be given in the citation to allow another person to easily find the information. Examples of the format used for citations are as follows.

- City of Montrose Wastewater Questionnaire. Questionnaire completed by Larry E. Eilts, District Manager, U.S. Department of Energy, Western Area Power Administration. Montrose Power Operations Center, Montrose, Colorado. 30 May 1989.

- U.S. Environmental Protection Agency. 40 CFR Part 300-Hazard Ranking System (HRS) for Uncontrolled Hazardous Substance Releases; Appendix A of the National Oil and hazardous Substances Contingency Plan; Proposed Rule. Federal Register. V 53, pp 51962-52081. 23 December 1988.

- Royce, Bill. Superintendent; Wastewater Treatment/Industrial Pretreatment, City of Montrose, Colorado. Letter to Jack Ward, Property/Facility Manager, U.S. Department of Energy, Western Area Power Administration. Montrose Power Operations Center, Montrose, Colorado. 4 May 1989.

- Erickson, Dennis L. Superintendent of Parks, City of Montrose, Colorado. Personal communication with Linda Rock, JFSTSS. 1989.

- Manifest records and check receipts for removal of waste oil by Approved Drain Oil Service, Inc., Adams City, Colorado. 1982, 1983, 1984, 1985, 1986-90.

10.6.11 APPENDIX

Information documenting key statements made in the body of the report should be placed in the Appendix. Maps, tax assessor statements, interview documentation, employee statements, documentation of tanks, and other important material should form the Appendix.

Every document placed in the Appendix must be referenced in the text. For example, when the report discusses tanks, refer the reader to the Appendix for a listing of property tanks that have been recorded with the State.

If maps are part of the Appendix, each map must have a scale, north arrow, and the investigated property highlighted in some manner. This also applies to aerial photos.

Mounted photographs are often included in the Appendix of a site assessment. Each photograph should be labeled and the photo direction noted. Arrows, scale, boundary lines, and other marks can be made directly on the photograph. Some consultants take a photo showing themselves, their partner, or their vehicle at the site. This provides documentation that the site was actually visited.

Finally, the Appendix must be well organized and pages numbered. It should be

restricted to important documents; it is not a collection of odd papers and notes that the writer does not know how to handle.

10.6.12. REPORT MECHANICS

Headings and subheadings are the key to an organized report. These notations serve as signposts to keep the reader on the right road. In addition, such notations allow the reader to quickly find a particular section in the report.

The most common method of organizing a site assessment report is by the numbering system. Each main heading has a particular number, and each subheading adds one more digit to that number. This manual is organized in the numbering format.

If a report becomes too "organized" confusion results. Numerous tiers to subheadings will only lose the reader. Writers should endeavor to keep their organization to four tiers, such as 6.4.2.1. Use the fifth tier sparingly, and avoid any tiers beyond the fifth.

10.6.12.1 PARAGRAPHING

Whenever the subject of your discussion changes, start a new paragraph. However, even with this basic rule, paragraphing is an imprecise art. When in doubt about a subject, keep the following rules of thumb in mind.

- Avoid one sentence paragraphs. Short paragraphs make your writing choppy and unprofessional. However, an occasional short paragraph is an excellent way to emphasize an important point.

- Avoid long paragraphs. Paragraphs should not exceed approximately fifteen lines. Excessively long paragraphs will bog the reader down and make reading tedious.

10.6.12.2 PASSIVE OR ACTIVE VOICE

Should your report state "I observed evidence of a fuel spill.." or "Evidence of a fuel spill was found," the first is in the active voice, and the second is in the passive voice. The passive voice commonly used in technical writing. It does not mention the actor, or who observed the spill. This may serve a useful purpose. It may no be in the best interest of the company to state that Linda Smith observed the spill; the spill is more important that who observed it. In addition, was it really Linda that observed the spill or was it her partner Jack? Does it really matter? Using the active voice stresses the actor more than the subject, and this may not be appropriate for a site assessment.

However, some professional writers encourage the use of the active voice in writing. Attempting to achieve objectively by using the passive can lead to problems. The passive voice can become awkward, weak and tedious to read.

The debate between active and passive voice in technical writing is likely to continue for a long time. The passive voice is "safe", traditional, and may reduce potential liability; the active voice is interesting and new. The choice is up to you.

10.6.13 COMMON ERRORS

Following is a discussion of the errors commonly found in technical reports.

10.6.13.1 USE OF CONTRACTIONS

Do not use contractions in a technical report. These abbreviated words, such as don't, it's, and can't are informal and have no place in technical writing.

10.6.13.2 WORDINESS

Wordiness, or using too many words to express a simple though, is a common error in technical writing. For example, the statement "the pond look like it does not contain any water" is wordy and should be replaced with "the pond appears dry."

Keep work clutter out of reports by avoiding such phrase as:

Wordy	Replace with
Bright green in color	bright green
By means of	by, with
Due to the fact that	because
During the time that	while
In all cases	always
In order to	to
In the event that	if

On the basis of	from, by
Subsequent to	after
Serves the function of	is
Goes under the name of	is called
With reference to	about
As a general rule	usually
At the present time	now
By the use of	by
Few in number	few
Minimize as far as possible	minimize
Is found to be	is
Are known to be	are
Made the examination of	examined
Are of the opinion that	believe
Take into consideration	consider
In the vicinity of	near
Has the ability to	can
Owing to the fact that	because
Make measurements of	measure

These are only a few of the hundreds of wordy expressions that creep into technical reports. Edit such clutter from your report. It will be easier to read.

10.6.13.3 QUALIFIERS

Qualifying statements (or hedging) made in the report are necessary to convey the appropriate degree of uncertainty to the client. The Phase I site assessment identifies potential environmental liabilities, and the report must emphasize this potential and not imply actual liability. Following sampling and analysis in Phase II, more definitive statements can be made.

Some qualifying words are as follows:

Suggests
Appears
High probability
Likely
Seems
May

Statements like “Drums to the west of the building are not leaking” are not appropriate because you have no evidence to back up this statement. Rather, use a statement such as “Drums to the west of the building appear not to be leaking.” The latter statement conveys a degree of uncertainty, and at this point in the site inspection you are uncertain.

Overuse of qualifiers must be avoided. If every statement is qualified, the inspector will lose credibility with the client and will appear indecisive, timid, and self-protective. The client needs information from which to make a decision, and overloading the report with qualifiers may suggest that the investigation was a waste of time. Statements such as “The investigation suggests what appears to be probable leak “say nothing and should

be replaced with “The tank may be leaking’ or a similar statements.

10.6.13.4 PRECISE WRITING

One method to avoid qualifiers is to provide details that state facts. For example, the statement “Numerous drums were found in the vicinity of the building” lacks precision. Words such as “numerous” and vicinity” have vague meanings that convey different things to different readers. Rephrase the statement to read “Thirty-seven 55-gallon steel drums were found in a drum yard adjacent to the west wall of the building.” This statement tells exactly what was found and where. Words such as significant, note worthy, meaningful, important, considerable, many, some, a few, large, and small are not precise and should be avoided.

10.6.13.5 FALSE ELEGANCE

Technical writers often become pretentious. They replace a common word with a less common one or a phrase. Fancy language simply makes communication difficult; replace it with brevity and simplicity. Following are examples of false elegance and a suggested improvement:

False Elegance	Improvement
Activate	start
Afford an opportunity	allow
After this is accomplished	then
A majority of	most
Assuming that	if
Endeavor	try
Compensation	pay
Encounter	meet
For the reason that	because
In close proximity	near
In lieu of	instead of
In the course of	during
In the vicinity of	near
In terms of	in
In light of the fact that	because
In the not-too-distant future	soon
In the proximity of	near
Terminate	end
To be cognizant of	to know
Necessitate	require
Remuneration	pay
Component	part
Facilitate	cause
Subsequently	then

10.6.13.6 POINTLESS PHRASES

Many phrases commonly used in technical writing say nothing and simply serve as filler. Such fillers irritate readers that do not have the time to grope through the word fog to find

the important details. Following are examples of phrases that say nothing and should be eliminated:

Needless to say
You may no doubt recall
It may be said that
It should be noted that
In this connection
It might be stated that
With respect to
In the case when
It stands to reason that
We beg to differ
To the fullest possible extent

10.6.13.7 INTENSIFIERS

Certain modifiers intensify a word, such as very hot, extremely cold, etc. This leaves the reader wondering just how hot is very hot, or how cold is extremely cold. Use intensifies sparingly because their meaning is unclear.

Absolutes do not need and intensifier. Phrases such as most unique, perfectly correct, very essential, and extremely rare, are illogical.

10.6.13.8 JARGON AND ACRONYMS

Jargon is vocabulary particular to a profession and not well understood outside of that profession. Words like remediation, de minimis, migration potential, monitoring, radon, toxic tort, quality standards, etc, are well understood by the layperson who is likely to read the site assessment report. Avoid the use of jargon whenever possible and define the word when it must be used.

Worse than jargon are acronyms. They seem to appear everywhere – NPL, SI, RI/FS, EPA, LUST, CERCLA, RCRA, PA, PPE, QA/QC, FIT, and so on. They almost become a second language to others. If you must use them, define the acronym the first time it is used, they just use the acronym. The best advise is to avoid acronyms in reports that may be read and used by the layperson.

10.6.13.9 COMMANDMENT

Several decades ago, Elmer W. Shaw wrote the ten commandments for technical writers. His advice is probably more pertinent today than at any time in the past. The rules are as follows:

(1) Thou shall remember thy readers all the days of thy life, for without readers thy words are as naught.
(2) Thou shall not forsake the time-honored virtue of simplicity.
(3) Thou shall not abuse the passive voice
(4) Thou shall not dangle thy participles; neither shall thou misplace thy modifiers
(5) Thou shall not commit monotony.

(6) Thou shall not cloud thy message with technical jargon
(7) Thou shall not hide the fruits of thy investigation beneath excess verbiage; neither shall thou obscure thy conclusions with vague generalities
(8) Thou shall not resent helpful advise from thy instructor, boss, and client
(9) Thou shall consider the views of the layperson, for this person has insight often unknown to technocrats
(10) Thou shall write and rewrite without tiring, for such is the key to improvement

- APPENDIX -

ASTM STANDARDS FOR ENVIRONMENTAL ASSESSMENTS OF COMMERCIAL REAL ESTATE

The purpose of this voluntary national standard, released in 1993, is to define accepted practice for conducting an Environmental Site Assessment for commercial properties with respect to the range of contaminants within the scope of CERCLA and petroleum products. Throughout both standards the term "recognizable environmental conditions" is used. This term is defined as the presence of any hazardous substance (as defined under CERCLA) or petroleum products on the property under conditions that indicate an existing release, a past release, or a material threat of a release into ground, groundwater, or surface water. The purpose of both standards is to satisfy practices that constitute "all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice." Such an inquiry is one of the requirements to qualify for the Innocent Landowner Defense under CERCLA.

Following is a summary of the standard for a Phase I Environmental Site Assessment and for the Transaction Screen Process. A complete copy of these standards can be obtained from ASTM Customer Service, 1916 Race Street, Philadelphia, PA 19109. Request either "Environmental Site Assessments; Phase I Environmental Site Assessments: Phase I Environmental Site Assessment Process (E1527) or "Environmental Site Assessments: Transaction Screen Process" (E1528).

A10.1 PHASE I ENVIRONEMENTAL SITE ASSESSEMTN (ASTM STANDARD E.50.02.2)

The purpose of this assessment is to identify recognizable environmental conditions in conjunction with the property under investigation. The standards require that the site assessment be conducted by an environmental professional. This term is defined as a person possessing sufficient training and experience necessary to conduct a site reconnaissance, interviews, and other activities in accordance with that standard and having the ability to develop conclusions regarding recognized environmental conditions in connection with the property under investigation. An assessment completed under this standard is considered to be valid for 180 days.

The Phase I Environmental Site Assessment includes a comprehensive records review, conducting a site reconnaissance, interviewing the site manager, occupants, and local government officials, evaluating the information, and writing a report.

A10.1.1 RECORDS REVIEW

The records review required under this standard is similar to that previously presented in Unit 4 in terms of search distance and appropriate records. Specifics are as follows.

A10.1.1.1 STANDARD ENVIRONMENTAL SOURCES

Review of the following sources of environmental information is required under this standard.

- Federal NPL

- Federal CERCLIS
- Federal RCRA TSD Facilities List
- Federal RCRA Generators List
- Federal ERNS List
- State Lists of Hazardous Waste Sites
- State Landfill and/or Solid Waste Disposal Sites
- State Leaking UST Lists
- State Registered UST Lists

A10.1.1.2 ADDITIONAL ENVIRONMENTAL SOURCES

The following state and local records may be reviewed, in the discretion of the environmental professional, to enhance and supplement the records identified above.

- Local Records

  -Lists of Landfills/Solid Waste Disposal Sites
  -Lists of Hazardous Wastes/Contaminated Sites
  -Lists of Registered UST
  -Records of Emergency Release Reports under SARA
  -Records of Contaminated Public Wells

- Local Sources
  -Department of Health/Environmental Division
  -Fire Departments
  -Planning Departments
  -Building Permit/Inspection Department
  -Local Pollution Control Agency
  -Local Water Quality Agency
  -Local Utility Companies

A10.1.1.3 PHYSICAL SETTING SOURCE

A current USGS 7.5 Minute Topographic Map shall be reviewed. In additional, discretional sources, such as ground water maps, bedrock geology maps, surficial geology maps, soil maps, and other sources should be reviewed when chemical releases are suspected.

A10.1.1.4 HISTORICAL USE INFORMATION

The standard requires an intensive prior-use investigation from the present time to 1940 and a less intensive investigation from 1940 to a time when the property was undeveloped. Documenting land use at 5 year intervals is recommended, although longer intervals are appropriate when there has been little change in land use. Standard historical sources are as follows:

- Aerial Photographs
- Fire Insurance Maps
- Property Tax Files
- Recorded Land Title Records
- Topographic Maps

- Local Street Directories
- Building Department Records
- Zoning/Land Use Records

A10.1.2 SITE RECONNAISSANCE

During the site reconnaissance, the exterior survey shall include the periphery of the property and structures on the property, and adjacent properties form public thoroughfares. The interior investigation shall include all structures, all areas expected to be used by the occupants or the public, maintenance and repair areas, and a representative sample of occupied spaces. It is not necessary to look under floors, above ceilings, or behind walls.

The four components of the site reconnaissance are summarized below.

A10.1.2.1 GENERAL SITE SETTING

Components of the general site setting are listed as follows:

- current use(s) of the property
- past use(s) of the property
- current uses of adjoining properties
- past uses of adjoining properties
- current of past uses in the surrounding area
- geologic, hydrogeologic, hydrologic, and topographic conditions
- general description of structures
- roads
- potable water supply
- sewage disposal system

A10.1.2.2 INTERIOR AND EXTERIOR OBSERVATIONS

Issues of concern that affect the interior and exterior are as follows:

- current use(s) of the property
- past use(s) of the property
- hazardous substances and petroleum products in connection with identified uses (identify quantity, container type, and storage conditions)
- storage tanks (above ground and below ground)
- strong, pungent, or noxious odors
- pools of liquid (including surface water)
- drums (from 5 gallon capacity up)
- unidentified substance containers (identify quantity, container type, and storage conditions
- PCBs (in electrical and hydraulic equipment)

A10.1.2.3 INTERIOR OBSERVATIONS

Only a few items are of concern specific to the interior. These items are as follows.

- Heating/Cooling (including fuel source)
- stains or corrosion (on floors, walls, or ceiling, except for water staining)

A10.1.2.4 EXTERIOR OBSERVATIONS

Items specific to the exterior are listed as follows:

- pits, ponds, or lagoons (particularly in conjunction with waste treatment or disposal)
- stained soil or pavement
- stressed vegetation (from something other than insufficient water)
- solid waste (mounds, depressions, and fill areas)

A10.1.3 INTERVIEWS

The purpose of the interviews is to obtain information indicating recognized environmental conditions in connection with the property under examination. The interview may be conducted in person, by telephone, or in writing. Such information can be collected before, during, or after the site visit.

A10.1.3.1 SITE MANAGER AND OCCUPANTS

Prior to the site visit, the owner should be asked to identify a person with good knowledge of the uses and physical characteristics of the property. This person is termed the “key site manger.” This person may be the property manager, the chief physical plant supervisor, or head maintenance person. The standards recommend that the key site manager be interviewed when conducting the site visit.

A reasonable attempt should be made to interview occupants of the property, such as when multi-family properties are being investigated. A reasonable attempt shall be made to interview a representative number of the occupants, especially those occupants whose operations are likely to indicate recognized environmental conditions in connection with the property. In addition, the major occupant(s) should be interviewed; a major occupant is defined as a person or entity that uses at least 40 percent of the leasable area of the property.

If those being interviewed do not answer the interviewer’s questions or the answers are incomplete, the interview shall be considered complete provided: (1) the questions have been asked in person or by telephone; (2) written records have been kept of the person to whom the questions were addressed; (3) the responses, or the questions, have been asked in writing; and (4) at least one reasonable follow-up (such as a telephone call) was made to obtain a response.

Key questions to ask during the interview process include (1) if there is or has been any pending, threatened, or past litigation or administrative procedures relevant to hazardous substances on or from the property, (2) if there are or have been any notices from governmental entities regarding possible violations of environmental regulations.

A10.1.3.21 LOCAL GOVERNMENT OFFICIALS

A reasonable attempt shall be made to interview at least one staff member of any one of

the following local government agencies:

- local fire department
- local health agency
- local agency having jurisdiction over hazardous waste disposal

The interview questions should be directed toward identifying recognized environmental conditions, and the person interviewed should be asked to be as specific as possible in answering the questions. The interview should be conducted as described in the previous section.

A10.1.4. OTHER ISSUES

There are a variety of environmental conditions not included in the ASTM standard that can have a significant impact on commercial property. Under strict application of "due diligence" and "appropriate inquiry" as defined by the CERCLA legislation, the following conditions do not create liability under CERCLA:

- asbestos-containing materials
- radon
- lead-based paint
- lead in drinking water
- wetlands

The user may request that these and other conditions be evaluated in the Phase I Site Assessment.

A10.1.5 EVALUATION AND REPORT PREPARATION

All information gathered during the Phase I Environmental Site Assessment shall be compiled into a report. The report should include all documentation to support any opinions and conclusions presented. All sources of information, including those that revealed no findings, should be sufficiently documented to facilitate reconstruction of the research data at a later date.

Recommended format of the report is as follows:

- Summary
- Introduction
  - Purpose
  -Special terms and conditions
  -Limitations and exceptions
- Site Description
  -Location and legal description
  -Site and vicinity characteristics
  -Descriptions of structures and other improvements
  -Information on environmental liens
  -Current uses of the property
  -Past uses of the property
  -Current and past uses of adjoining properties
  -Site map

- Records Review
  - -Standard environmental record sources
  - -Physical setting sources
  - -Historical use information
- Site Reconnaissance and Interviews
  - -Hazardous substances in connection with identified uses
  - -Hazardous substance containers and unidentified containers
  - -Storage tanks
  - -Indications of PCBs
  - -Indications of solid waste disposal
  - -Physical setting analysis
- Findings and Conclusions
- Signatures and Qualifications of Environmental Professionals
- Appendices (Optional)
  - -Other maps, figures, and photographs
  - -Ownership and historical information
  - -Regulatory documents
  - -Interview documents
  - -Contract

In the "Findings and Conclusions" section of the report, the environmental professional's opinion of recognized environmental conditions shall be presented in one of the two statements given below.

> "We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard Practice E.50.02.2 of (insert address or legal description), the Property. Any exceptions to, or deletions from, the Standard Practice are described in section ( ) of this report This Assessment has revealed no evidence of Recognized Environmental Conditions in connection with the Property."

or

> "We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Standard Practice E.50.02.2 (insert address or legal description), the Property. Any exceptions to, or deletions form, the Standard Practice are described in section ( ) of this report. This Assessment has revealed no evidence of Recognized Environmental Conditions in connection with the Property except for the following: (list)."

A10.2 TRANSACTIONS SCREEN PROCESS (ASTM STANDARD E.50.02.1)

The purpose of the Transaction Screen Process (TSP) is the same as the Phase I Environmental Site Assessment. However, the TSP is limited in its scope and appears to apply to sites where contamination is unlikely (such as a new building or relatively undisturbed vacant land) or when the risk tolerance is high. The TSP can be conducted by an employee of the user (the user is defined as the client, current owner, lender, etc, that requested the evaluation) or an environmental professional. However, the process does not require the judgment of an environmental professional. Any inquiry beyond the scope of the TSP should proceed to a full Phase I Environmental Site Assessment. An

assessment conducted under this standard is considered to be valid for 180 days.

The TSP consists of asking questions of owner and occupants of the property, observing site conditions, and conducting a limited records review.

A10.2.1 TRANSACTION SCREEN QUESTIONAIRE

Table 1 presents the questions that should be asked of the owner and any major occupants of the property or, if the property does not have any major occupants, at least 10 percent of the property occupants. In addition, any occupant using, treating, generating, storing, or disposing of hazardous substances or petroleum products on or from the property should be interviewed. The complete ASTM guidelines provide explanatory material for each question.

A10.2.2 SITE VISIT

The Transaction Screen Questionnaire (Table 1) serves as a guide to the site visit. During this visit, the site and adjacent areas should be examined for current or past industrial use, especially industrial uses that involve the processing, storage, manufacture, or transportation of hazardous substances or petroleum products. In addition, the site and adjacent areas should be examined for current or past use as a gas station, vehicle repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility.

Site specific issues to be addressed are as follows:

- chemical storage
- fill dirt either contaminated or of unknown origin
- pits, ponds, or lagoons associated with waste treatment
- stained soil
- storage tanks or evidence of such tanks
- flooring, drains, or walls stained by chemicals
- ground water wells
- environmental liens, violations, or lawsuits
- discharge of waste water
- presence of buried materials
- records indicating PCBs in electrical or hydraulic equipment

A10.2.3 GOVERNMENT RECORDS AND HISTORICAL SOURCES INQUIRY

Federal records, including NPL, CERCLIS, and RCRA lists, and state and local lists including UST lists, LUST lists, and lists of waste disposal or remediation sites should be examined using the specified search distances. In addition, fire insurance maps should be reviewed to determine past uses of the property that may have generated contamination. Table 2 presents a guideline for obtaining this information.

A10.2.4 NON-SCOPE ISSUES

Although evaluation of conditions outside the scope of the ASTM transaction screen process is not necessary to meet strict “due diligence” and “appropriate inquiry”

requirements under CERCLA, evaluation of the following conditions may be appropriate under certain circumstances.

- asbestos-containing materials
- radon
- lead-based paint
- lead in drinking water
- wetlands

A10.2.5 REPORT

The ASTM standard does not mention the preparation of a report for the TSP. All of the above mentioned information could be recorded using questionnaires and checklists.

TABLE 1 – TRANSACTION SCREEN QUESTIONNAIRE

QUESTION	OWNER			OCCUPANTS (If Applicable)			OBSERVED DURING SITE VISIT		
1. Is the Property or any Adjoining Property for an industrial use?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
2. To the best of your knowledge, has the Property or any Adjoining Property been used for an industrial use in the past?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
3. Is the Property or any Adjoining Property used as a gasoline station, motor repair facility, commercial printing facility, dry cleaners, photo developing laboratory, junkyard or landfill, or processing, or recycling facility?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
4. To the best of your knowledge, has the Property or any Adjoining Property been used as a gasoline station, motor repair facility, commercial printing facility, dry cleaner, photo developing laboratory, junkyard or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
5. Are there currently, or to the best of your	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
6. Are there currently, or to the best of your knowledge have there been previously, any industrial drums (typically 55 gallon) or sacks of chemicals located on the Property or at the facility?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
7. Has fill dirt been brought onto the Property which originated from a contaminated site or which is of an unknown origin?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
8. Are there currently, or to the best of your knowledge have there been previously, any pits, ponds, or lagoon located on the Property in connection with waste treatment or waste disposal?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
9. Is there currently, or to the best of your knowledge have there been previously, any stained soil on the Property?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
10. Are there currently, or to the best of your knowledge have there been previously, any registered or unregistered storage tanks (above or underground) located on the Property?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
11. Are there currently, or to the best of your knowledge have there been previously, any vent pipes, fill pipes or access ways indicating a fill pipe protruding from the ground on the Property or adjacent to any structure located on the Property?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk
12. Are there currently, or the best of your knowledge have there been previously, any flooring, drains, or walls located within the facility that are stained by substances other than water or are emitting foul odors?	Yes	No	Unk	Yes	No	Unk	Yes	No	Unk