

SECTION II. ACT 2 REMEDIATION PROCESS

A. Applying Land Recycling to Your Property

1. Classifying your Site and Considering Options for Remediation

In order to select a standard for your site, a site assessment is needed to determine site conditions which may require remediation of a release. Characterization of a release includes the identification of specific contaminant concentrations throughout soil and groundwater media, discharges to surface water and air, and any other conditions which may pose a risk to human health and the environment associated with the release. The site characterization may reveal that the remediator needs to interface with other environmental laws and/or Act 2. Under Act 2, the appropriate standard or combination of standards (*i.e.*, background, Statewide health or site-specific) must be determined. The Department will accept NIRs for properties on which a release of regulated substances can be documented, or for properties affected by off-property releases of regulated substances for which the remediator is not responsible. The background, Statewide health and site-specific standards may be used at any site. Only certain sites qualify as special industrial areas.

A person with a property with multiple distinct areas of contamination may submit a Notice of Intent to Remediate (NIR) for a single area, or for multiple individual areas. A distinct area of contamination includes the volume of all media affected by the release causing the contamination. For example, if soils were contaminated and that contamination migrated to groundwater, both the contaminated soil and groundwater would be part of the distinct area of contamination associated with the release. In some cases, the Department may agree that characterizing all contaminated media as a distinct area is not practical and may approve a site characterization limited to a single medium. One example of this situation is when a remediator completes a soil media cleanup and an associated groundwater cleanup will take a period of years before attainment can be demonstrated. In this case, the remediator could receive approval of a final report for soils alone (and the associated liability relief), and later when the groundwater is remediated to a point where attainment can be demonstrated, the remediator could submit a separate final report for the groundwater. A second example is the case where a remediator may be approaching multiple areas of concern (AOCs) on the property over a period of years such as multiple ~~soil areas of concern~~ AOCs of soil, and a groundwater unit which is a combination of the effects of the various soil ~~areas of concern~~ (AOCs). Here the remediator could submit NIRs/final reports for individual soil areas of concern and at some time in the future when the source areas (all the soil AOCs) have been remediated, submit an NIR for the groundwater unit. The liability protection afforded under Chapter 5 of Act 2 is for contamination identified in the approved final report. Therefore, *the more extensive and thorough site characterization is, the more extensive the liability protection.* This is true in terms of both size of area included as the site, and in the listing of regulated substances

which are a part of the site. By example, the lower the censoring level chosen in the site characterization, the larger the area and more regulated substances would likely be included in the site. (see [Section I.D.7.c](#) for an example of applying site characterization to a site).

The Department will specify details of the site, in the final report approval letter and attachments, which describe the extent of the liability protection provided under Act 2.

a) Background

A person cleaning up a site to the background standard must document that the concentration of any regulated substances remaining are at a level not related to any release of regulated substances at the site. Samples are required both in the area shown to be contaminated by onsite releases (*i.e.*, the site) and in an appropriate background reference area to demonstrate attainment of the background standard. This standard is useful in cases of releases migrating from off-property, and for widespread or naturally occurring contamination.

b) Statewide Health

The regulations, Chapter 250, establish Statewide health standards for regulated substances in each environmental medium. These standards are referred to as medium specific concentrations (MSCs) that must be achieved in order to demonstrate attainment of the Statewide health standard. In addition to demonstrating that a site ~~is protective of~~ has attained MSCs based on human health, an ecological screen to demonstrate protection of ecological receptors and a vapor intrusion analysis are ~~is~~ part of the Statewide health standard ~~to provide protection of ecological receptors.~~

c) Site-specific

Cleanup levels may be developed which pertain specifically to the unique exposure pathways at a site. This is a more detailed process, both technically and administratively. The human and ecological receptors at the site need to be addressed either through the elimination of the exposure pathways or a risk assessment. A site-specific cleanup also provides an opportunity for public participation.

d) Combination of Standards

A cleanup may be performed by using any combination of the three standards. The remediator may select any one or a combination of standards by regulated substance, by medium of concern, or by distinct area of contamination (see [Section I.D.4](#)). Combinations must satisfy all of the requirements of each standard used. For example, in using any combination of standards which includes the site-specific standard, the risk assessment should include only those regulated substances for which site-specific numeric standards are being developed, and for these substances, the cumulative risk requirements of Section 304 of Act 2 must be met. Attainment of these site-specific numeric standards must be demonstrated in the final report. In addition, all of the requirements of

the site-specific standard, including the reporting requirements, apply. All of the regulated substances, media, or distinct areas of contamination meeting another standard (e.g., the Statewide health standard) must meet the requirements of that standard. Therefore, in addition to a combination of numerical standards there will be combinations of requirements for reporting, attainment tests, and points of compliance.

e) Special Industrial Areas

~~A common misconception by users of the Land Recycling Program is that there is a separate special industrial area (SIA) standard. This is not the case. The special industrial area designation was created by Act 2 to provide special remediation requirements for a distinct set of sites which were used for industrial activity. Under this designation, any contamination that is being addressed must be remediated to meet Attainment of one of the three available standards (background, Statewide health or site-specific) can be demonstrated for properties being remediated as SIA sites. However, the focus of the SIA requirements is on characterizing the contamination within the property boundary and addressing immediate, direct or imminent treats to human health and the environment.~~

~~The special industrial area designation was created by Act 2 to provide special remediation requirements for a distinct set of properties that were used for industrial activity. These sites~~Special industrial areas are properties where there is no financially viable responsible party, or where the property is located within an enterprise zone. Enterprise zones ~~are were a certain type of distressed property~~ designated by the Department of Community and Economic Development (DCED). ~~Since the DCED programs of that department change over time, other property designations may also qualify a property to be a special industrial area, and +~~ Remediators are encouraged to consult with ~~the Department of Community and Economic Development~~DCED to verify that a ~~specific property qualifies to use the special industrial area designation.~~

The remediator and the reuser afforded these special requirements must demonstrate that he/she did not cause or contribute to releases of regulated substances at the property. In order to make use of the special industrial area designation, the remediator must enter into a consent order and agreement with the Department.

2. Immediate Response

If an immediate hazard exists or is discovered at a site, prompt action is necessary to abate the hazardous condition and prevent future or further release of regulated substances. Leaking tanks or drums, conditions presenting a fire or explosion threat, or a situation involving a threat to human health or the environment warrant a prompt response. Act 2 does not prevent or impede an immediate response to such emergencies. Section 307 of Act 2 provides that the provisions under Chapter 3 of the statute, relating to remediation standards and the review procedures including special industrial area cleanups, shall not prevent or impede applicable emergency or interim responses. Final remediation shall

comply with that chapter, which will not be prejudiced by the mitigation measures (emergency or interim response) undertaken to that point [See Act 2 Section 307(a) and (b)]. It is the responsibility of the appropriate person to act in a timely manner to abate immediate threats. The remediator still needs to follow the notification requirements of the Clean Streams Law or Solid Waste Management Act. However, if the final report demonstrating attainment of a standard is submitted within 90 days of the release, the Notice of Intent to Remediate is not required to be filed, and no public notice is required.

3. Regulated Storage Tank Release Sites

Storage tank cleanups conducted pursuant to the Storage Tank and Spill Prevention Act (Act 32 of 1989, as amended) which meet one or more of the standards under Act 2 are Act 2 cleanups. Section 904(c) of Act 2 preserved the corrective action process for the remediation of releases from storage tanks regulated by Act 32. Regulated storage tanks include a wide range of underground and aboveground tanks containing petroleum products and hazardous substances.

The corrective action process applies to releases from regulated tanks for which remediation (anything beyond notification) was initiated on or after August 5, 1989, the effective date of Act 32. Persons who take corrective action under Act 32, and can demonstrate attainment of one or more of the standards under Act 2, will qualify for liability protection. Where Act 32 applies, persons cleaning up these releases are not subject to the notice, fee and Department approval provisions contained in Act 2. Likewise, the mandatory Department review times and the "deemed approved" provisions of Act 2 are not applicable for cleanups involving these releases; instead, the review times and deemed approval provisions of Chapter 245 apply.

Those persons who initiated cleanup prior to their tanks becoming deregulated by Act 16 of 1995 (which amended Act 32) should continue to implement the corrective action process, along with use of the Act 2 remediation standards, to receive liability protection.

Where the tank is not governed by Act 32, adherence to the Act 2 administrative process and cleanup standards will be required in order to receive liability protection. When releases of petroleum products occur at sites with both Act 2 and Act 32 storage tanks, the remediator may elect to address the tanks together, or to address them separately on a dual track of the Act 2 and Act 32 processes. If the person elects to address the tanks together, combined reports and notices that satisfy the requirements of each statute, as they apply to the particular tanks, may be submitted. Department reviews will also be conducted to satisfy the requirements of both statutes.

For example, a person may submit a combined site characterization/remedial investigation report that contains the information required under the corrective action process and under Act 2, and it will serve a dual function under both Act 2 and Act 32. It should be submitted on a time frame that meets both statutes; thus if there is no specified time required to submit the remedial investigation report

under Act 2, but a site characterization report under Act 32 is required within 180 days of reporting the release, the site characterization/remedial investigation report should be submitted within 180 days. Compliance with Act 2 notice and public participation requirements will be necessary for liability protection for tanks governed by Act 2.

4. Short List of Petroleum Products

Table IV-9 contains an abbreviated list of regulated substances for specified products (e.g. gasoline). This short list may be used under any standard as long as the following conditions are met:

- Use of the short list is limited to remediations resulting from releases of the listed petroleum products that are uncontaminated from other sources.
- For soil media attainment, there must be no free liquids left in the soil based on visual inspection, and the soil should not create any odor nuisance.
- For groundwater media attainment, there must be no measurable free floating product (0.01 ft [EPA]) at the point of compliance. (usually the property line).

The rationale for the last two conditions is that, presuming the remediator chose to analyze for all regulated substances in the mixture (e.g. several hundred) for the Statewide health standard which is capped at saturation and solubility limits, then the result would be soil with no visible product and groundwater with no measurable product.

What is the difference in using the short list, say for gasoline (which lists 8 substances) as opposed to the remediator choosing a list of 24 substances to represent the gasoline release?

If a remediator does not utilize the short list but rather chooses a subset of 24 substances in the gasoline (which actually has over 400), the relief from liability is relevant to those 24 substances where the soil was contaminated by the gasoline spill.

If all eight substances from the short list were included, and all three conditions of the short list were documented, then beyond the Act 2 liability coverage, the remediator will have satisfied Department's concern with the spill of the gasoline product as a whole.

If the conditions of the short list are not met, then only the Act 2 liability relief covering the 24 substances applies.

If the remediator chooses to utilize the short list directly, and meets all the conditions, then the final report approval will stipulate that Act 2 liability coverage is for the 8 substances, and the DEP will require no further remediation for the spill of gasoline product documented in the final report.

5. Solid Waste Facilities

If your site includes a solid waste facility see Section III.A of this manual.

6. HSCA/CERCLA Sites

The Hazardous Sites Cleanup Act (HSCA) is the state cleanup law that provides for the remediation of sites contaminated with hazardous substances. Certain sites are designated by the Department as HSCA sites. This is a limited set of sites that has been officially designated by the Department as meeting the criteria for response action under HSCA. Before any site is designated as a HSCA site, the site undergoes a review and approval process that officially documents senior management approval of the HSCA designation. The Department notifies all known responsible parties associated with a site prior to listing it on the Pennsylvania Priority List (PPL). To determine if the site under Act 2 consideration has been designated by the Department as a HSCA site, contact the Environmental Cleanup Program Manager in the Department's regional office where the site is located. Additional information about the relationship between Act 2 and HSCA is included in Section III.E.1 of this manual.

The Comprehensive Environmental Response Compensation and Liability Act (CERCLA) is the federal Superfund law. Sites may come under the jurisdiction of the EPA CERCLA program, in which case the Department's approval of a final report demonstrating attainment of an Act 2 standard cannot provide automatic relief from CERCLA liability. To determine if the site under consideration is a CERCLA site, contact the EPA regional office in Philadelphia, Office of Superfund Programs, at 215-566-3120. Additional information about the relationship between Act 2 and CERCLA is included in this document in Section III.

Comment [MSM1]: Moved to new Section V, Relationship to Other Environmental Statutes.

7.3. Notice Requirements and Procedures

a) Notice of Intent to Remediate

Performance of a site remediation under the provisions of Act 2 requires municipal, public, and Department notification. The intent of notification is to make the municipality, public, and Department aware that a person intends to remediate a site. The formal process for conducting remediation under Act 2 is initiated with submission of the Notice of Intent to Remediate (NIR) to the Department. The NIR and instructions are available online at the Land Recycling web page under "Forms and Lists." Submission of the NIR will initiate the notification procedures.

The Act provides that any person, firm, corporation, or other entity ~~who~~that proposes, or is required, to respond to the release of a regulated substance at a site, shall comply with public notification requirements ~~in order to qualify for liability protection under Act 2. All remediation activities are conducted to attain compliance with one or more of the three remediation standards or special industrial area criteria~~except for certain situations defined in the Act.

The NIR provides basic information on the applicant and the site. The NIR shall include a brief description of the site, ownership information, a listing of the contaminants involved and media affected, proposed remediation (if applicable), and the proposed future use of the site. The NIR may address all of the affected

property or may only address those distinct areas of contamination which the remediator chooses to address, which then become sites. In order to obtain sufficient site information to determine the scope of any site contamination and the remediation standard selection, some site characterization is recommended prior to submission of an NIR. Communication with ~~the Department staff in the region where the site is located to discuss~~ regional office staff regarding procedures, assessment and ~~aspects of~~ remediation ~~aspects~~ is encouraged. The following are the procedures for a Notice of Intent to Remediate:

- Before the NIR is submitted to the Department, provide proof of notice of submission of the NIR to the municipality and to the public. Municipal notice is accomplished by:
 - Sending a copy of the NIR with an accompanying cover letter to the municipality, or municipalities, where the site is located. Submit a copy of the NIR to the municipality with an accompanying cover letter.
 - Publish or arrange for the publication of a summary of the NIR in a newspaper of general circulation in the area of the site. This summary should be a legal notice and developed following the model format on the Land Recycling web page under "Forms & Lists."
- Provide the Department with reasonable proof of the public and municipal notification of the NIR. An example of reasonable proof of municipal notification is by submitting a copy of the newspaper proof of publication document (or a photocopy of the published notification showing the publication date) and a copy of a copy of the letter mailed to the both the municipality with the certified mail receipt card and cover letter. A copy of the proposed text of the newspaper notice and expected publication date is an example of proof of public notification. ~~These are~~ Proof of notification is required to be submitted ~~with~~ at the same time the NIR, plan, and reports required for remediation is submitted to the Department. Provide the Department proof of the public and municipal notification of the NIR by submitting a copy of the newspaper proof of publication document (or a photocopy of the published notification showing the publication date) and a copy of both the municipality certified mail receipt card and cover letter. ~~These are required to be submitted with the plan and reports required for remediation.~~
- Complete the NIR and submit it in duplicate to the Department's Regional Environmental Cleanup Program~~Environmental Cleanup and Brownfields Program~~ (ECPECB) office in the region where the site is located. Submission of site characterization reports with the NIR is encouraged. Provide the name and address of a contact person to ~~which whom~~ correspondence or communication can be addressed. Include the newspaper name and anticipated date that the NIR submission notice will appear Include proof of publication of the NIR in the newspaper. Provide a copy of the NIR to the owner of the property if the NIR is being prepared and/or submitted by

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someone other than the property owner. Liability protection is provided to owners of a property. If the area of contamination includes more than one property, all owners of the properties affected should be included.

- ~~• At the same time the NIR is submitted to the Department, provide notice of submission of the NIR to the municipality and to the public. Municipal notice is accomplished by:
 - ~~— Sending a copy of the NIR to the municipality, or municipalities, where the site is located. Submit a copy of the NIR to the municipality with an accompanying cover letter.~~
 - ~~— Publish a summary of the NIR in a newspaper of general circulation in the area of the site. This summary should be a legal notice and developed following the model format in this manual on the Land Recycling web page under “Forms & Lists.”~~~~
- Provide the Department proof of the public and municipal notification of the NIR by submitting a copy of the newspaper proof of publication document (or a photocopy of the published notification showing the publication date) and a copy of both the municipality certified mail receipt card and cover letter. These are required to be submitted with the plan and reports required for remediation.
- If remediation is pursued by use of a site-specific standard or at a special industrial area, a 30-day period following submission of the NIR is required during which the municipality can request to be involved in the development of remediation and reuse plans for the site [Act 2, Section 304(n) and 305(c)]. The applicant shall inform the municipality of the 30-day comment period when submitting the NIR above. Also inform the municipality of the provision of Act 2 for requesting a public involvement plan. If the municipality requests involvement in the remediation, the person seeking remediation must implement a public involvement plan. The newspaper notice shall also provide a statement about the 30-day comment period and the right of a municipality to request involvement in the development of the remediation and reuse plan for the site. The municipality will have received notice prior to publication. The publication date of the NIR notice in the newspaper starts the 30-day comment period. If the model format previously mentioned is used, it will ensure the 30-day comment period and public involvement plan information has been provided. The DEP will not accept reports until after the 30-day comment period. Comments received from the public or a public involvement plan, along with the remediator’s responses to the comments must be submitted with the appropriate final report. A public involvement plan is described below in [Section I.D.9.c](#).
- If an NIR is submitted for a combination of standards, the municipal and public notification requirements of each standard used apply.

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- Persons submitting an NIR for background, Statewide health, or a combination of these standards, who later decide to pursue cleanup to a site-specific standard or as a special industrial area, must re-notice the cleanup according to the appropriate notice provisions.
- The Department Regional EC&BP office may acknowledge receipt of the NIR and will publish acknowledgment of receipt of the NIR in the *Pennsylvania Bulletin*.

The Department may comment on an NIR if the form is incomplete. An incomplete NIR may not have sufficient information to initiate the Act 2 process. The Department does have enforcement authority to require assessment and remediation on sites for which a person does not voluntarily initiate a cleanup under Act 2.

Public notification of submission of the NIR to the Department, the municipality, and the public via the newspaper notice, and publication in the *Pennsylvania Bulletin* are not required for background or Statewide health standard remediations if the final report demonstrating attainment of the standard is submitted within 90 days of the release.

b) Notice of Proposal for Nonuse Aquifer Determination

Any time a person is proposing to the Department that a site be eligible for a nonuse aquifer determination, notice must be given to the associated municipalities and local water suppliers servicing that area. The notice is similar to that of an NIR in that it is a letter format and identifies “who” and “where” the proposal is associated with. In addition a copy of the actual proposal being sent to the Department for approval should be attached to these notice letters. Under general conditions, the municipalities and community water suppliers will have 45 days to review this material and if desired provide the Department with any information relative to the nonuse aquifer determination requirements specified in [Section 250.303\(c\)](#). These conditions will be those upon which the Department will base ~~its~~ approval decision. In the specific case where a municipality has in place an ordinance meeting the performance criteria of TGM [Section II C.9](#) (relating to institutional controls), the 45 day review period is waived.

c) Public Involvement Plan

Persons selecting to use the site-specific standard or the provision of special industrial areas, must provide an NIR to the Department, municipality and to the public (through notice in a newspaper serving the general area of the site). A 30-day comment period is to be included as part of the initial notice to solicit comments on whether the municipality wishes to be involved in the development of the cleanup and reuse plans for the site. If the municipality requests involvement during the comment period, the person performing the remediation of the property shall prepare a public involvement plan which meets the provisions of Section 304(o) of Act 2. All persons doing cleanups are encouraged to develop programs with a proactive approach to involving

communities in their plans. This plan shall propose measures to involve the public in the development and review of the remedial investigation report, risk assessment report, cleanup plan, and final report for site-specific standard remediations; and the baseline remedial investigation for special industrial areas. Public involvement measures may include:

- Development of a proactive community information and consultation program that includes door step notice of relevant activities.
- Public meetings located within the county where the site is located.
- Roundtable discussions.
- Public access for document review and discussion, and designation of a single contact person to address questions from the community. Such access should be at locations adjacent to primary highways for the convenience of the public wishing to review the material.
- Formation of a community based group to solicit suggestions and comments.
- Where needed, retention of a qualified independent third party to facilitate meetings and discussions and to perform mediation services.

The person can use these or other appropriate methods to ensure the community has ample notice of intended remedial/reuse actions and the appropriate public concerns are properly addressed. The reports and plans submitted to the Department must include the comments received from the public and the municipality, as well as responses to those comments. The Department will consider the comments as part of its review of the plans and reports .

d) Remediation Report Notification Requirements

i) Background and Statewide health standards

Under the background and Statewide health standards, when a final report is submitted, the remediator should provide two copies of the final report to the Department's ~~Environmental Cleanup Program~~Environmental Cleanup and Brownfields Program regional office where the site is located. A complete submission consists of the report, a Transmittal Sheet, a printout of the online final report summary, the checklist (optional) and the appropriate fee. The Transmittal Sheet and checklist are available on the Land Recycling web site under "Forms and Lists." The name and address of a contact person to ~~which~~ whom correspondence or communication can be addressed shall be provided. The Department will acknowledge receipt of the final report. When the final report is submitted to the Department, the remediator shall provide municipal and public notification that a final report has been submitted. This notification is accomplished by:

- Sending a notice to the municipality that a final report has been submitted to the Department. (A model format for this notification is available on the Land Recycling web site under "Forms and Lists.")

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- Providing a notice of submission of the final report to a newspaper of general circulation in the area of the site. This notice shall be a legal notice and developed following the model format (available on the web site) or other appropriate format provided by the newspaper which will provide the required information.
- Providing the Department proof of the public and municipal notification by submitting a copy of the newspaper proof of publication document (or a photocopy of the published notification showing the publication date), and proof of municipal notification of submission of the final report by submitting a copy of the certified mail receipt card and cover letter of the municipal notice to the Department.

The Department has a 60-day review period for the final report and shall notify the remediator of deficiencies. It is the intent of the Department to notify the remediator of both approvals and deficiencies of the final report. Should the Department not respond within 60 days, the final report shall be deemed approved.

The Department Regional [ECP-EC&B](#) office will publish acknowledgment of receipt of the final report in the *Pennsylvania Bulletin*.

Public notification of submission of the final report to the Department, the municipality, the public via the newspaper notice, and publication in the *Pennsylvania Bulletin* is not required for background or Statewide health standard remediations if the final report demonstrating attainment of the standard is submitted within 90 days of the release.

ii) **Site-specific standard**

Under the site-specific standard, when a remedial investigation report, risk assessment report, cleanup plan, or a final report is submitted, the remediator should provide two copies of the document to the Department's [Environmental Cleanup Program](#) [Environmental Cleanup and Brownfields Program](#) regional office where the site is located. A complete submission consists of the document, a Transmittal Sheet, the checklist (optional) and the appropriate fee(s). The Transmittal Sheet and checklist are available on the Land Recycling web site under "Forms and Lists." In addition, the submission of a final report must include a printout of the online final report summary. The name and address of a contact person to ~~which~~ whom correspondence or communication can be addressed shall be provided. The Department will acknowledge receipt of the submission. When the plan and/or reports are submitted to the Department, the remediator shall provide municipal and public notification of the submission. This notification is accomplished by:

- Sending a notice by certified mail to the municipality that a specific plan and/or report has been submitted to the Department. (A model format for this notification is available on the Land Recycling web site under "Forms and Lists.")

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- Providing a notice summarizing the findings and recommendations of the plan or report, along with the comments and responses, to a newspaper of general circulation in the area of the site. This notice shall be a legal notice or other appropriate format provided by the newspaper which will provide the required information.
- Provide the Department with proof of the public and municipal notification by submitting a copy of the newspaper proof of publication (or a photocopy of the published notification showing the publication date), and proof of municipal notification of submission of the plan and/or report by submitting a copy of the certified mail receipt card and cover letter of the municipal notice to the Department.

Remedial investigation reports, cleanup plans, and risk assessment reports may be submitted together or separately.

The Department has a 90-day review period for the plan and/or report and shall notify the remediator of deficiencies. It is the intent of the Department to notify the remediator of both approvals and deficiencies of the final report. Should the Department not respond within 90 days, the plan and/or report shall be deemed approved.

iii) Special industrial areas

Municipal and public notification is required for submission of an NIR to the Department, but is not required for submission of a baseline environmental report.

e) Fees

The Department is required to collect fees to cover some of the costs of the Land Recycling Program. Section 703 of Act 2 specifies the appropriate fees involved for submission of plans and reports. [Section 250.7](#) of the regulations provides further specification on fees.

A fee of \$250 is required for the review of final reports for the background and Statewide health standards; and \$250 for each remedial investigation, risk assessment report, and cleanup plan for the site-specific standard. A fee of \$500 is required at the time of submission of the final report for site-specific standard remediations. No fee is required for submission of the work plan or baseline environmental report required for special industrial area remediation.

Resubmission of any of the above required plans and reports will require payment of the above fee upon resubmission. The Department will disapprove a plan or report that does not have the appropriate fee.

Checks are to be made payable to the **Commonwealth of Pennsylvania**.

A Transmittal Sheet for Plan/Report Submission (2500-FM-LRWM0023) is available for submission of the appropriate fee with the submittal and should be used with all plan/report submissions to the Department. This form may be obtained from the Land Recycling Program web site under "Forms and Lists", or

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a copy may be requested from the Department's Regional office where the site is located or from the Department's Central office.

8.4. Site Characterization

a) Importance of Site Characterization Step

Site characterization under Act 2 is a description of contaminated media, including geometry, and chemical and physical characteristics, that affect movement of regulated substances in environmental media. Site characterization is the process for determining the site under Act 2; i.e., the volume of contaminated media resulting from an environmental release of regulated substances within which attainment of one or a combination of standards will be demonstrated. The site is, in turn, the basis for the Act 2 Chapter 5 liability protection when the final report is approved. In brief, the liability protection is only as good as the site characterization. This can be illustrated by the example at the end of this section.

The site characterization activities conducted must result in a thorough investigation which meets the requirements of [Section 250.204](#) and which provides information in sufficient detail to support decisions in remediation and documenting attainment ~~using of~~ the selected Act 2 standard. **A complete and accurate site characterization, including fate and transport analysis, and its documentation in the final report is very important, as it is the basis for making remediation decisions and is used later in identifying the appropriate area for demonstrating attainment. Except for sites involving the excavation option for petroleum-contaminated soil [See Section 250.707(b)(1)(iii)], without a proper site characterization, attainment requirements cannot be met and the final report will be disapproved by the Department.**

A remediator must keep in mind the definition of a site in the Land Recycling Program. As defined in Act 2, a site is "[t]he extent of contamination originating within the property boundaries and all areas in close proximity to the contamination necessary for the implementation of remediation activities to be conducted under the act." Thus, a site often does not coincide with a property...a site may occupy several properties, and conversely, a property may contain more than one site. In this manual, whenever the term "site" is used in connection with the Land Recycling Program, it is used strictly in the sense as defined in the Act.

DEP Regional Office staff are a valuable resource and want to assist as needed in evaluating your site characterization information. Although not required, working with the Department in many cases can help to facilitate approval of the submitted reports. Always feel free to contact the Department's Regional ~~Environmental Cleanup Program~~[Environmental Cleanup and Brownfields Program](#) staff when you have a question about the requirements of site characterization of a property for the Land Recycling Program.

b) Scope of Characterization

The scope of the site characterization should be designed to help the person conducting the cleanup select an appropriate remedy that will meet the

attainment requirements of the selected Act 2 standard. The requirements that a full site characterization must meet are described in the regulations at [Section 250.204](#). During this phase of the application of Act 2, the remediator should evaluate other applicable regulatory requirements (See [Section III](#) of this manual), since information required by other programs may best be collected during the site characterization phase. The reporting requirements for the standard selected (background, Statewide health or site-specific in Act 2 and Chapter 250 of the regulations) must be met by the person conducting the cleanup. Section II of this Guidance describes in detail the reporting requirements for each of the standards available under Act 2. The procedures documents, and required fees for each standard are included in [Section I.D.9](#). (Notice Requirements and Procedures).

Characterization of sites which may require remediation begins with an evaluation of any existing historical information about the release that identifies specific regulated substances. [The data objectives of the site characterization will differ somewhat depending on whether soil or groundwater is being investigated.](#)

i) Soils

In soils, the characterization must be at least to a concentration sufficiently below the selected numeric standard, or to where it can be demonstrated that the pathway elimination measure is adequate to protect public health and the environment, to insure that all areas containing regulated substances at or above the selected numeric standard have been adequately characterized, and that is sufficient to support a fate and transport analysis which shows where the contamination is currently located and those areas to which it is moving. The remediator determines the concentration level for characterization ~~below~~[beyond](#) the minimal level stated above. The remediator must state what factors were used in determining the level used to define the site boundaries.

[The usefulness of historic soil data \(i.e. data more than two years old\) for site characterization depends on whether or not site conditions have changed since the historic samples were collected. Remediators may use historic data for site characterization at sites that are not reasonably expected to have had new releases. However, in these situations limited additional current data \(i.e. data less than two years old\) should be used to confirm that there have been no new releases. The number of samples and sample locations depend on site specific conditions and should be based on the collective professional judgment of the remediator and the Department. Sites where new releases are expected or have been identified should use post-release data to characterize the site under current conditions.](#)

[The Act 2 regulations allow the remediator to use the 95% upper confidence limit \(UCL\) of arithmetic mean to demonstrate attainment of the Statewide health standard in soils. Statistical methodology for calculating UCLs is based on the assumption of random sampling at all locations with no introduction of biased sampling. Avoid using UCL values for site characterization which is based on](#)

biased sampling. Using UCLs for analyzing data across multiple areas of distinct contamination can be useful during characterization to determine which Act 2 standard to use for each contaminant. However, this approach (utilizing data from multiple areas of distinct contamination) may not be used for attainment demonstration because each distinct area of contamination must be individually evaluated when using statistical tests.

ii) Groundwater

If groundwater is impacted by a release based on knowledge of the site or as a result of soil sampling, a similar process as used for soils to determine the extent of the release into groundwater may be employed based on knowledge of the site, groundwater monitoring, and fate and transport analysis. A common mistake is to take a limited set of groundwater measurements from a single sampling event and conclude that since the concentrations are below the Statewide health standard that no further work is needed to obtain Act 2 liability relief. This is not true. Proper characterization requires more than one round of sampling (250.204 (e)). In addition, attainment sampling and demonstration are required even if characterization samples are below the Statewide health standard (250.704(a)). For further guidance, see Section IV.B.

The usefulness of historic groundwater data can be determined in a similar manner as with soils. Historic groundwater monitoring data can be useful for establishing trends. However, be careful not to use groundwater data collected prior to remediation for attainment purposes.

iii) Conceptual site model including soil and groundwater

When complete, the A complete and comprehensive site characterization should will enable the development of a conceptual site model (CSM). The ~~conceptual site model~~ CSM is a ~~written and graphical~~ representation of the site environmental system and the processes that control the transport and movement of regulated substances through the environmental media and how they interact. The CSM assists in organizing the site investigation by identifying uncertainties and data gaps and focusing data collection efforts. Information from the CSM ~~will~~ can also be used in the development of a vapor intrusion analysis or a risk assessment.

The CSM can be depicted in different ways such as written text, a graphic illustration or as a flow chart (see Figures - - and -). Depending on the size and complexity of the site, †The investigation portion of the site characterization typically is an iterative process which expands and builds as information is gathered (see Fig I-1). Consequentially, the CSM is a dynamic tool to be updated as new information becomes available during site characterization.

The level of complexity of the CSM and the level of detail needed is directly related to the level of complexity of the site, the selected remediation standard and the applicable media of concern. Simpler, less complex sites need only a basic CSM to illustrate contaminant migration pathways, exposure mechanisms and potential receptors. More complicated sites will most likely need a CSM

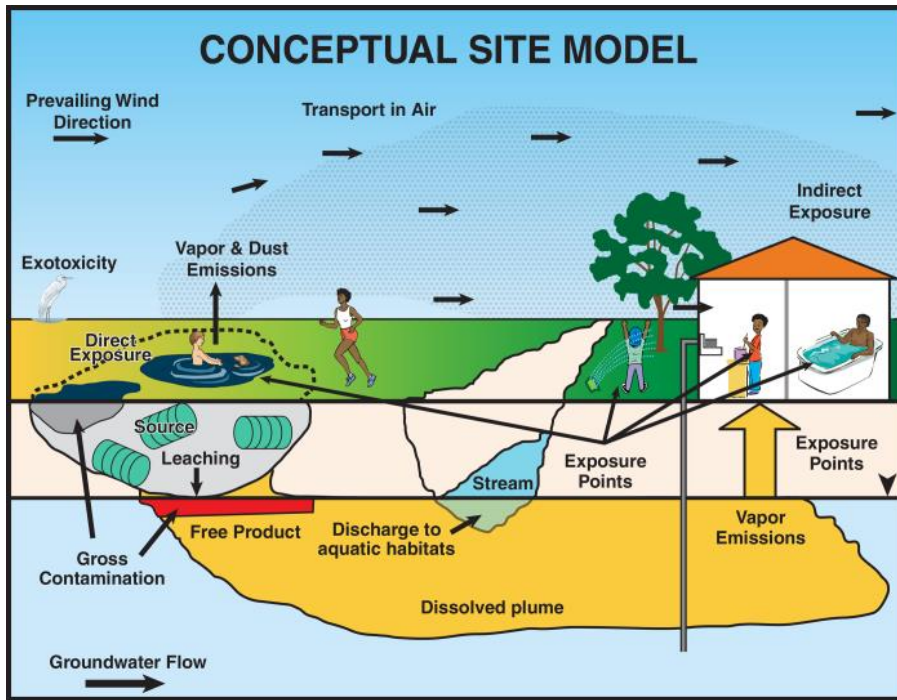
with a higher level of detail to describe all of the different routes of exposure through multiple environmental media to various potential receptors.

EPA, ~~or~~ ASTM and ITRC all provide additional guidance appropriate for the site that may be used as a source for general guidance when conducting the site characterization investigation and developing the CSM.

The DEP Groundwater Monitoring Guidance Manual is also an appropriate ~~appropriate~~ ~~good~~ source of information. Figures - and - below provide examples of CSMs presented graphically and in a tabular format.

When complete, the site characterization should enable the development of a conceptual site model. The conceptual site model is a written and graphical representation of the site environmental system and the processes that control the transport and movement of regulated substances through the environmental media and how they interact. Depending on the size and complexity of the site, the investigation portion of the site characterization typically is an iterative process which expands and builds as the information is gathered (see Fig I-1). EPA guidance or American Society for Testing Materials (ASTM) guidance appropriate for the site may be used as a source for general

[Figure -](#)

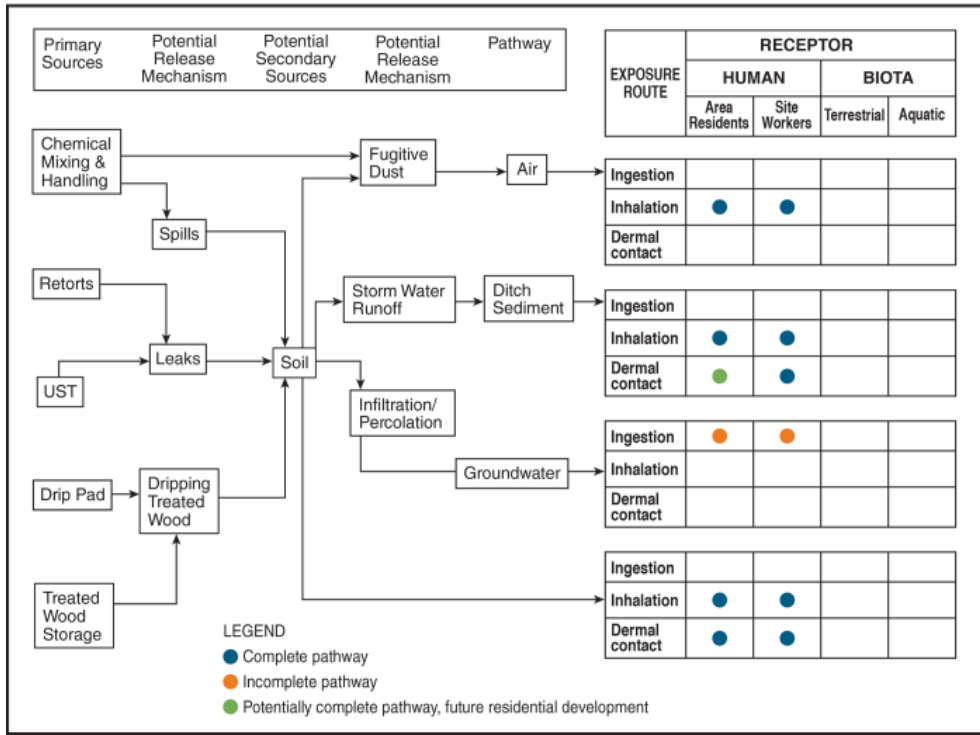


[Graphical depiction of CSM](#)

[Source: ITRC, 2015](#)

Figure -

Example for Pathway-Exposure CSM



Flow Chart / Tabular Depiction of CSM

Source: ITRC, 2015

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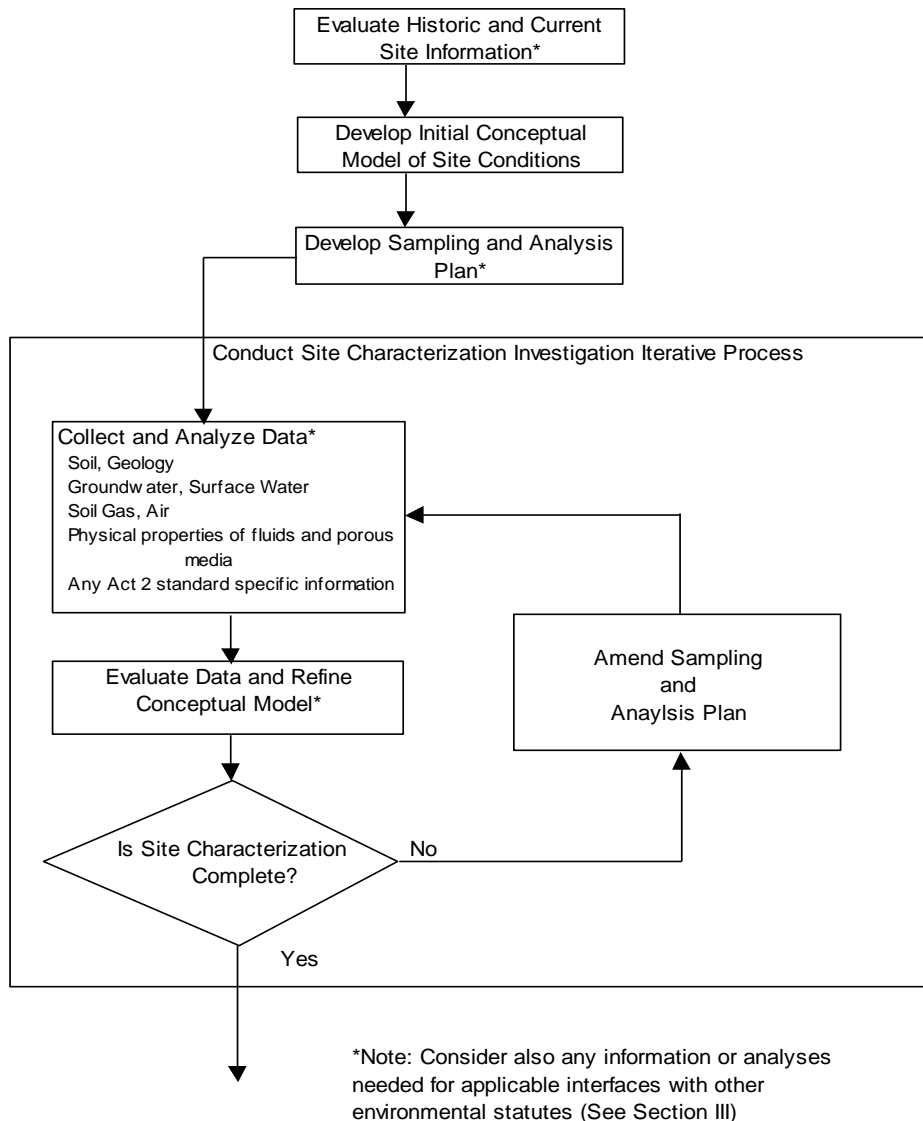
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iv) Conceptual Site Model Example

In the spring of 1999 at a regional airport, there was a release of 1,100 gallons of jet fuel to the ground surface as the result of an overflow of an above ground storage tank. An area 50 feet by 70 feet was excavated, and samples were collected from the excavated area. Nine groundwater sampling events were performed between 1999 and 2014, and indicated that groundwater concentrations of SPL were decreasing. Soil samples contained concentrations of benzene, ethylbenzene, cumene, naphthalene, toluene, total xylenes, and lead. All of these components except for ethylbenzene met the Statewide Health standard MSC. A human health risk assessment was performed. The contamination detected in soil was more than 100 feet from any building, so no vapor intrusion analysis was performed. The hazard quotient for inhalation and ingestion of soil did not exceed the target hazard quotient of 1.0. The hazard quotient for inhalation was 6.05×10^{-3} ; the hazard quotient for ingestion was 6.09×10^{-4} . A hazard index of 6.66×10^{-3} was calculated by adding these two hazard quotients. The hazard index is well below one so it was concluded that the risk to human health was acceptable.

The CSM was inadequate in this scenario because all potential receptors were not identified. Hazard quotients for one generic receptor were calculated but this did not capture all of the potential exposure scenarios. Had the remediator performed a full receptor evaluation in their CSM they would have identified airport workers, construction workers, utility workers, and travelers all as individual receptors with different exposure parameters. Since risks must be calculated for each receptor individually the risk calculations were incorrect.

**Figure I-1
Site Characterization Flow Chart**



~~guidance when conducting the site characterization investigation. The DEP Groundwater Monitoring Guidance Manual is also appropriate.~~

~~The data objectives of the site characterization will differ somewhat depending on whether soil or groundwater is being investigated.~~

A good site characterization where the soil is a medium of concern should be able to provide the following information derived from field investigations:

- The types of regulated substances that are present, their concentrations and the spatial variation in concentration of the regulated substances both horizontally and vertically.
- The physical characteristics of the soil in which the regulated substances are present and through which they may be moving. These include the soil type (texture), dry bulk density, permeability, organic carbon content, porosity, and ~~possibly~~ moisture content. Documentation of these properties and any significant variability over the site may be very important later in developing a fate and transport analysis.

Where groundwater is a medium of concern, the following information at a minimum should be provided by a good site characterization:

- The direction of groundwater flow,
- The hydraulic gradient,
- The permeability of the aquifer material(s) through which the groundwater moves,
- The porosity of the aquifer, and
- The types of regulated substances present, their concentrations and the spatial variation in concentration of the regulated substances both horizontally and vertically.

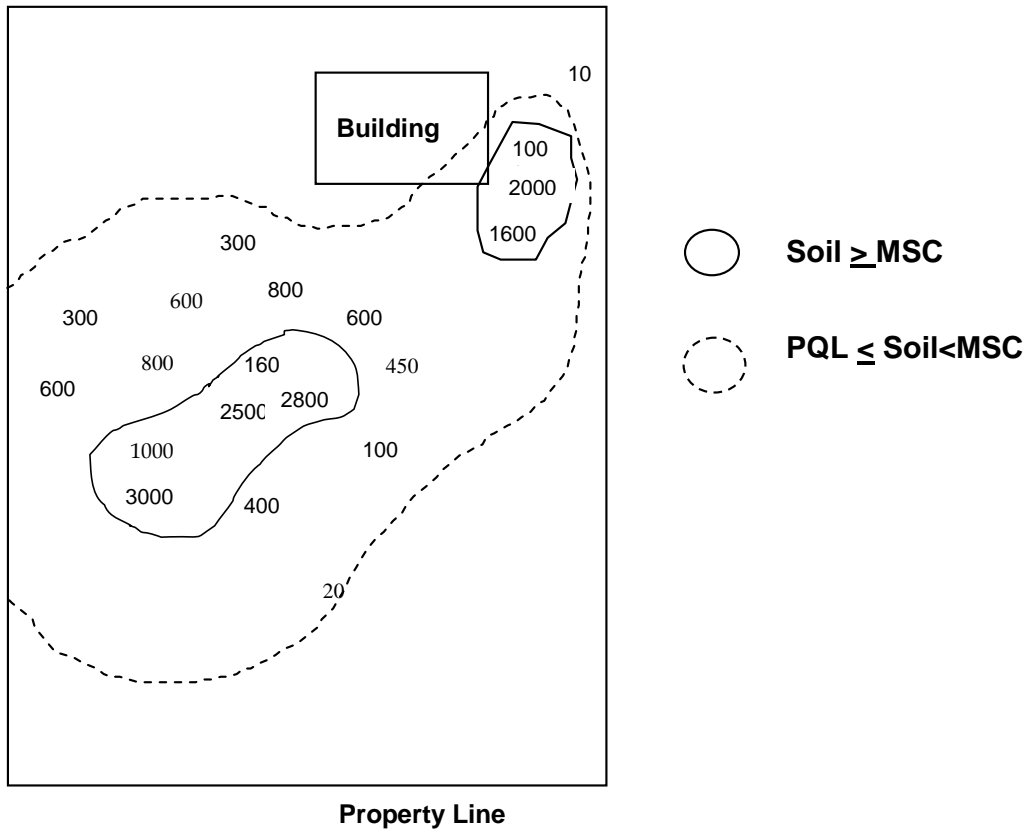
This information is not only necessary to describe and evaluate conditions at the site, but also is often vital to fate and transport analysis, especially when it requires a quantitative approach.

Fate and transport analysis is part of site characterization as well as demonstration of attainment and is required under all three Act 2 standards. Failure to have a fate and transport analysis in any final report is reason for disapproval based on this deficiency. See Section IV.A for guidance for conducting fate and transport analyses.

c) Applying Site Characterization to an Act 2 NIR – Example

The true characterization of soil contamination is shown in Figure I-2. This example considers a large property with several smaller environmental releases. There are two general areas where environmental releases occurred. The remediator has initial results which suggest these two areas of concern for further study. Furthermore, the remediator of this property wished to obtain Act 2 liability relief for this release so that the property can be more easily

**Figure I-2
Site Characterization**



sold. With this objective in mind, ~~he~~ the remediator plans a site characterization and weighs ~~his~~ options. The following are considerations that must be made.

In addition to factors that will help to characterize the hot spots, the remediator must consider, first in designing further investigations and later in finalizing the site characterization, what is the concentration of regulated substance(s) in soil that will represent the boundary of the site. It is technically more difficult and more expensive to define the extent of the contamination to lower concentrations than it would be to define hot spots. However, the Act 2 liability protection only applies to the site, and if the extent of the site is very limited, so is the liability protection.

In order to apply attainment in soils, the remediator must at a minimum define the volume which exceeds the selected standard [Section 250.703(b)]. Sampling beyond the initial phase indicates that two areas exceed the Statewide health standard MSCs. The remediator reasons that, by choosing the boundary of the site to be concentrations much lower than the standard, the area of the liability protection is increased. ~~He~~ The remediator considers 25% of the standard, 10% of the standard and the Practical Quantitation Limit (PQL) of the substance(s) as resolution ~~objectives~~ options. ~~He finally decides that the~~ The extra cost of characterization ~~is in his interest so he~~ allows the remediator to can maximize the site area (and consequently the liability protection) by choosing the PQL and applying it across the entire property. Within this site area, ~~he~~ the remediator also characterizes factors of the media and regulated substance(s) which affect movement (See [Section IV.A, Fate and Transport Analysis](#)). Another remediator may have made a different choice and ended up with several smaller ~~areas~~ of sites with liability protection.

In considering the definition of the site in groundwater (i.e., the plume), some phase of the assessment must determine if the contamination extends beyond the property boundary at levels exceeding the selected standard [Section 250.704]. If the determination is that levels off the property do not exceed the standard, then the remediator determines all areas that equal or exceed the concentration found at the Point of Compliance (POC). ~~He may choose to define the plume to lower levels for purposes of liability protection.~~ Figure I-3 ~~Figure -~~ illustrates this situation.

If the contamination extends beyond the property boundary at levels exceeding the selected standard, then the boundary of the site in groundwater must include the contamination exceeding the appropriately selected standard off the property. [Figure I-4](#) illustrates this situation. A remediator must remember that if the plume exists on both residential and nonresidential properties, different numeric standards would apply at those properties in most cases. In cases of organics and many inorganics, this generally means defining the plume to the PQL of the substance(s). Background values may also be determined [[Section 250.707\(a\)\(2\)](#)].

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Once the extent of contamination in groundwater is established utilizing properly constructed monitoring wells [\[Section 250.204\(e\)\]](#), then two or more rounds of sampling and analysis must be performed [\[Section 250.204\(e\)\]](#).

Figure I-3
Groundwater Characterization
No off-property Levels > MSC

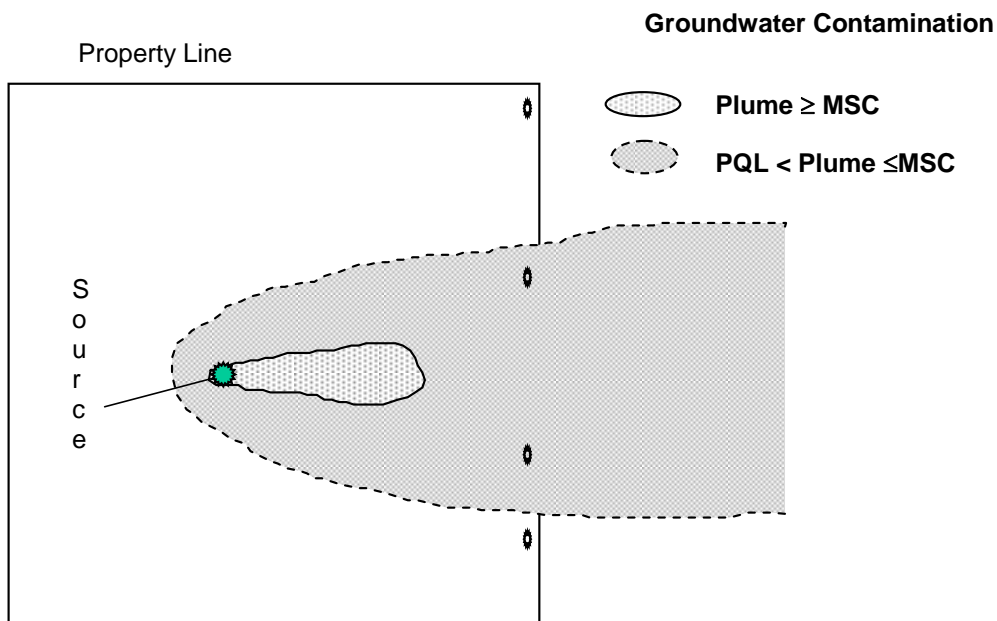
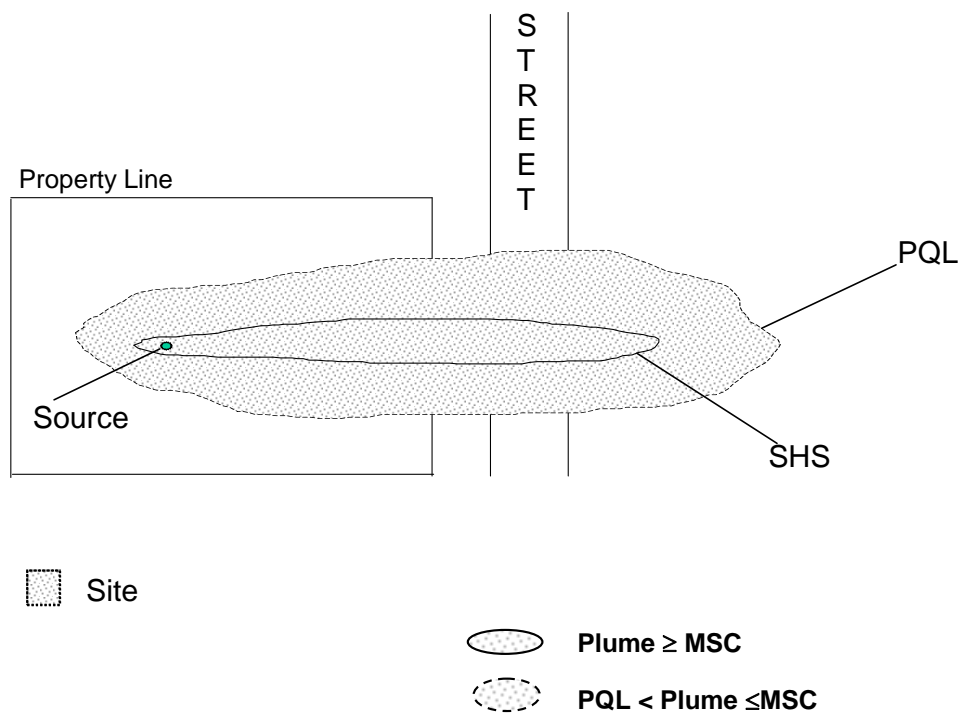


Figure I-4
Groundwater Contamination



If no groundwater remediation is needed (e.g., both rounds of sampling are below the selected standard), the remediator may use the site characterization sampling as part of the required attainment demonstration. With justification under Section 250.704(d), the Department may approve a reduction in the number of quarters of sampling needed to demonstrate attainment ~~from eight quarters to four quarters, or less.~~

9. ~~Management of Separate Phase Liquid (SPL) under Act 32 (The Storage Tank and Spill Prevention Act of 1989) and Act 2~~

~~The presence of Separate Phase Liquids (SPL) at contaminated sites does affect the responsibility of the remediator and limit the standards under which he may remediate.~~

~~When a pure liquid such as gasoline is released to the environment at a sufficiently high rate, accumulations of the liquid as a separate phase may occur within soil or bedrock. Depending on the density of the liquid relative to water, the liquid will migrate under gravity through the unsaturated soil and/or bedrock column and either float on the water table or sink through the water column and accumulate on impermeable surfaces lower in the aquifer. Substances that are less dense than water, like most petroleum products, tend to float on the water table and are called Light Non-Aqueous Phase Liquids or LNAPLs. Substances such as chlorinated solvents which sink through the groundwater column are called Dense Non-Aqueous Phase Liquids or DNAPLs. SPL is encountered primarily where concentrated sources of the regulated substance are released into the environment such as at leaking tank sites.~~

~~The presence of SPL in soil, on or within the aquifer, on surface water, or in sediments, if not removed, is a serious long-term management concern at sites undergoing remediation. SPL, if not removed, constitutes a continuing source of contamination, may result in explosive, toxic or irritating vapors, will greatly increase the time and cost for post-closure care monitoring, and introduces complex fate and transport issues and uncertainties regarding the future impact and migration of contamination at a site.~~

a) ~~Interim Remedial Actions under Chapter 245, Subchapter D (relating to releases from storage tanks regulated by Act 32 of 1989) and Interim Response under Chapter 250~~

~~Section 245.306(a)(3)(ii) requires that SPL recovery resulting from releases from regulated storage tanks be initiated immediately upon its discovery. Section 245.306(b)(1) requires that SPL removal be conducted in a manner that prevents the spread of contamination into uncontaminated areas. These requirements apply to releases from regulated storage tanks where SPL is present regardless of whether the Statewide health or site-specific standard is selected for remediation of the site. SPL should be recovered to the maximum extent practicable with the minimum objective of preventing its migration into uncontaminated parts of the site, and eliminating threats to human health, safety, and the environment.~~

While Act 2 and Chapter 250 do not specifically mandate SPL recovery within the property, the Department encourages removal of SPL within the property to the maximum extent practicable for many reasons as an immediate or interim response under Act 2. In cases relying on natural attenuation, removal of SPL will simplify and shorten requirements for postremediation care monitoring, fate and transport analyses will be simplified, and therefore, the time to attain a standard and eliminate postremediation care is likely to be greatly shortened at many sites. A suggested reference for dealing with SPL at tank sites is the EPA Guidance (web link <http://www.epa.gov/OUST/cat/freeprod.htm>).

b) — Maximum Extent Practicable

Generally, for Act 2 remediations using the Statewide health standard, the Department urges removal of SPL throughout the plume to the maximum extent practicable. For sites being remediated under Chapter 245, the Department will require the removal of SPL throughout the SPL plume to the maximum extent practical. The Department recognizes that the amount of SPL that can be removed will depend on the hydrogeologic framework of the site, the type of product, the remediation technology employed and the effort put into it. Following EPA, the Department has not quantified the term “maximum extent practicable.” For sites being remediated under Act 32, remediators are referred to the publication EPA 510-R-96-001, “How to Effectively Recover SPL at Leaking Underground Storage Tank Sites”. This publication provides general criteria for terminating recovery operations. The Department will recognize these guidelines in determining compliance with the SPL removal requirements under Chapter 245.

For sites being remediated under Act 2, the Department considers the extent of SPL removal to be a determination of the responsible party in accordance with the standard the remediator wishes to attain and demonstrate, after immediate threats to human health and safety and the environment have been mitigated by SPL removal as an interim remedial response.

c) — Relationship of Separate Phase Liquid to Compliance with Act 2 Standards

i) — Background standard

The background standard is available at sites where SPL is migrating onto the property from an off-site source. Responsible parties will be required to demonstrate through the use of monitoring and fate and transport analysis that they have removed an amount of SPL equivalent to the mass contributed by the release from their site.

ii) — Statewide health standard

• — Groundwater

The Department has determined by policy that the Statewide health standard is not available where SPL, as LNAPL or DNAPL, is present in property line compliance wells at sites being remediated under Act 2 or Act 32. The reason

for this policy decision is that the rationale behind development of the saturation and solubility caps under the promulgated Statewide health MSCs was that no SPL should be present at the point of compliance at attainment. Given that assumption, the DEP feels it is more forthright to have a policy prohibiting the presence of SPL at the POC rather than provide the means for a person to analyze a sample, which DEP already presumes will fail the attainment test.

At sites where SPL remains within the interior of the property, remediators should document that presence in the deed to the property voluntarily (although not required by law under a residential Statewide health standard cleanup). This will provide notice to future landowners.

• ~~Soil~~

~~In addition, within the property, the lesser of the direct contact number to a depth of fifteen feet for chemicals of concern and the soil to groundwater pathway number throughout the entire soil column must be attained in soil that is saturated with the SPL. This soil requirement applies to all sites including both those where the SPL has been removed and those where some amount remains.~~

~~At sites where applicable soil standards have been attained, and the responsible person has determined that unrecoverable SPL remains, the responsible person will need to establish through monitoring and fate and transport modeling that any remaining SPL will not migrate to compliance points before a release of liability under the Statewide health standard will be conveyed. Where light phase SPL is present, monitoring will be required as part of the postremediation care program until the SPL has either dissipated or the Department concurs that monitoring and fate and transport analysis have established that any remaining SPL is stationary and diminishing.~~

iii) — Site-specific standard

The site specific standard is an important option when the remediator has determined that, for technical or economic reasons, attainment of either the Statewide health standard or the background standard is not feasible because of the presence of SPL. Attainment under the site specific standard when SPL is present at the POC is permissible as long as there is no discharge to surface water and there is no unacceptable exposure (based on risk) to the contamination.

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