

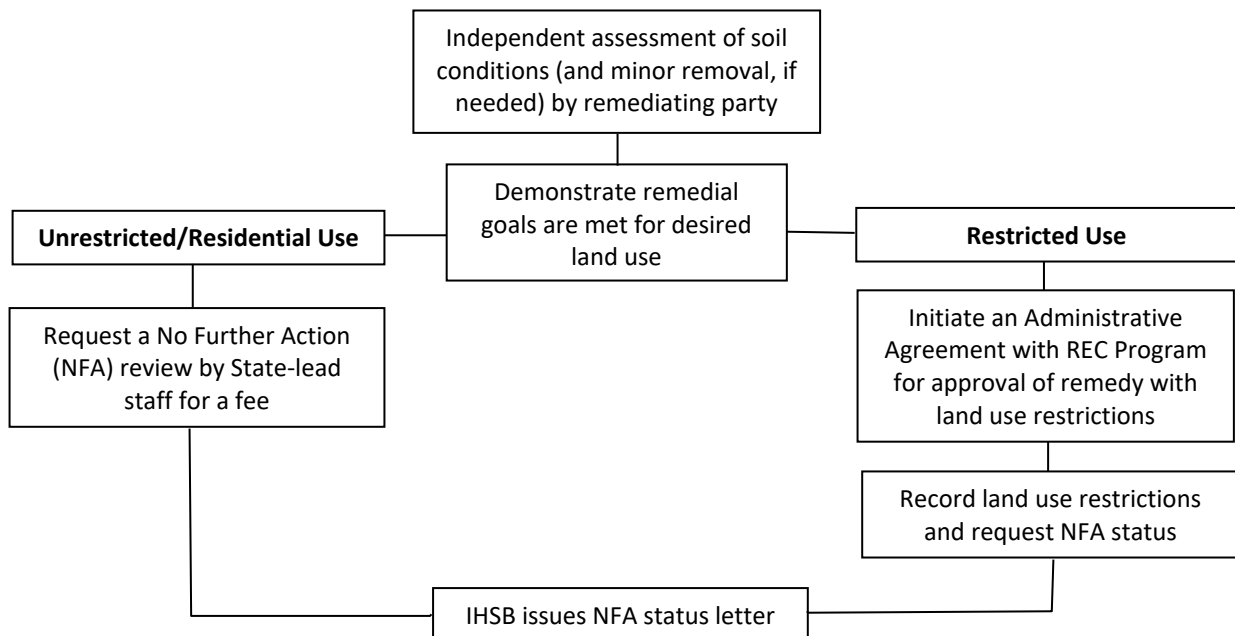
## Methods to Quickly Close Soil-Only Sites

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The purpose of this document to provide guidance on methods for expedited closure of mildly contaminated properties under the Inactive Hazardous Sites Response Act (IHSRA). Mildly contaminated properties for purposes of this document are those with soil contamination that is limited in extent and/or contaminant levels, groundwater and surface water contamination meet established state standards or naturally occurring background levels (or the source of contamination is demonstrated to be from upgradient), and there is no unacceptable risk to ecological receptors (no sensitive environments are present or affected). If groundwater contamination is present and cannot be attributed to background conditions by applying the methods in Section III of this document, this guidance does not apply. Sites with actual or potential groundwater contamination will need to be addressed through the Risk-Based Remediation process or otherwise restored to the 15A NCAC 02L standards. For more information on the risk-based remediation process for contaminated groundwater, follow the guidance found on NC DEQ's risk-based remediation website at <http://deq.nc.gov/permits-regulations/risk-based-remediation>.

There are two pathways for soil-only site closure based on the intended use of the property. If assessment and remedial action are completed and the soil-only site meets residential/unrestricted use, the remediating party can request a No Further Action (NFA) review by the Inactive Hazardous Sites Branch (IHSB). If restricted property use is part of a soil remedy (e.g., industrial/commercial, open space, etc.), Branch approval will be needed which requires an administrative agreement (AA) for voluntary assessment and cleanup in the IHSB's privatized oversight program, known as the Registered Environmental Consultant (REC) Program.

The general process for achieving no further action status for soil-only sites is shown in the graphic below.



This document contains the following sections that describe methodologies to demonstrate that site-specific remedial goals have been achieved:

- I. General Procedures**
- II. Initial Screen Against Soil PSRGs**
- III. Comparison to Background Concentrations**
- IV. Averaging Soil Contaminant Levels**
- V. Calculating Cumulative Risk of Soil Contamination**
- VI. Calculating Health-Based Soil Remediation Goals if Remediation is Warranted**
- VII. Unrestricted-Use Closure**
- VIII. Restricted-Use Closure**

## **I. General Procedures**

The remediating party must complete an assessment delineating the extent of contamination in all media in each area of known or suspected hazardous substance release according to the IHSB *Guidelines for Assessment and Cleanup of Contaminated Sites* available here [Inactive Hazardous Sites Guidance Documents | NC DEQ](#). The assessment activities to support the evaluations described in this document can be conducted independently by the remediating party. All contamination should be delineated to unrestricted use levels. Laboratory quantitation limits should not be elevated more than 10x the method detection limit and generally be best achievable limits. Elevated quantitation limits may mask otherwise detectable contaminants. If a minor amount of soil contamination is found, a party may elect to remove and properly dispose of that material independently without state review and approval. Any request for closure must be accompanied by documentation demonstrating that assessment of contamination in all media is complete.

Soil cleanup levels for sites in IHSB have three components:

- "health-based" level or concentration acceptable for direct contact for both the residential and industrial/commercial (restricted) property use scenarios.
- "protection of groundwater" or leachability levels/criteria, and
- ecological risk (if applicable).

As described in this document, several methods can be used to demonstrate that remedial goals have been met: (1) comparing site concentrations or a representative average concentration with IHSB's Preliminary Soil Remediation Goals (PSRGs), (2) demonstrating that site concentrations are within background concentrations, or (3) calculating cleanup levels based on cumulative risk of all contaminants using the DEQ Risk Calculator. If an ecological risk evaluation is determined to be necessary (refer to the program guidance), the results may alter the approach to remedial action or may alter the cleanup goals. This guidance is intended to assist in cases where no sensitive environments are affected, and contamination is primarily limited to soils. The following strategies are offered to demonstrate that cleanup levels are met for site closure.

## **II. Initial Screen Against Soil PSRGs**

Compare the highest concentrations of each contaminant detected in soil to the respective PSRGs available on the IHSB website ([Inactive Hazardous Sites Guidance Documents | NC DEQ](#)).

These screening levels are provided for both residential (unrestricted) property use and industrial/commercial (restricted) property use. Soil-only sites that meet the levels in both (a) the **Residential Health Based PSRG** column and (b) the **Protection of Groundwater PSRG** column, and no other media are contaminated, are eligible for a NFA review by the Branch. If the Health-Based PSRGs are exceeded for either land-use scenario, then further data evaluation can be conducted according to the information provided in Sections II through V. If the Protection of Groundwater PSRGs are exceeded, additional data analysis can be conducted as described below. All calculations and data must be provided in any NFA review request.

**Protection of Groundwater PSRG Options:** If there is not a value for a contaminant in the Protection of Groundwater PSRG column or if the concentration at the site exceeds the number on the table, the following additional methods may be used to show the leaching criterium has been met.

- A. If groundwater data in the area of concern have been collected and the contaminants do not exceed (1) the final and interim 15A NCAC 02L standards or are below quantitation limits for those contaminants without numeric standards and (2) the release occurred fifteen or more years ago, protection of groundwater PSRGs are considered to have been met. Note that quantitation limits may not exceed the standards or otherwise must be best achievable limits.
- B. For each contaminant, compare the total concentration (not leachable concentration) in soil to twenty times the final or interim 15A NCAC 02L standards. If the concentrations exceed the calculated values or if there is no final or interim 15A NCAC 02L standard for the contaminant, consider using another procedure in this section.
- C. Use site-specific data for porosity, bulk density, and organic carbon content to refine a value in the PSRG Table using the equation provided at the end of the table. Only the parameters noted should be modified and only site-specific data should be used.
- D. Determine the site soil's leachability by requesting the laboratory to conduct the Synthetic Precipitation Leaching Procedure (SPLP) or Toxicity Characterization Leaching Procedure (TCLP) on multiple site soil samples in the area of concern. If leachate concentrations are less than the 15A NCAC 02L standards, then the leaching criteria has been met.
- E. Protection of groundwater soil remediation goals can be determined using a combination of total and SPLP/TCLP sample results from the site. Several soil samples must be collected from various locations within the area of concern representing areas of higher and lower concentrations. Each of the soil samples should be analyzed for (1) total soil concentrations (in mg/kg) and (2) leachate concentrations (in ug/L) using the SPLP or TCLP analysis, for each contaminant of concern. Each total contaminant concentration should be plotted against its companion leachate concentration to determine their linear correlation. The target protection of groundwater soil cleanup concentration then becomes the value

corresponding to a leachate concentration at or below the 15A NCAC 02L standard for that contaminant. Where there is no interim or final 2L standard, groundwater testing will be required to determine if the contaminant is present.

### **III. Comparison to Background Concentrations**

Four types of background contamination can be evaluated: natural, anthropogenic (certain contaminants), normal application of agricultural chemicals and upgradient groundwater and surface water sources. Cleanup below these background levels is not required. Thus, establishing background concentrations can potentially reduce the amount of remediation required.

- A. **Natural Background:** Metals occur naturally in soils, groundwater, sediment, and surface water. Site-specific natural background concentrations should be established through sampling in the immediate area of the site in locations free from contaminant sources. Samples should be located away from roadways, railways, parking areas and other potential sources of contamination. Enough samples should be collected to establish the range of concentrations present. Apparent outlier concentrations cannot be included for background consideration and may need remediation.
- B. **Anthropogenic Background:** PAHs, dioxins and PCBs are commonly found in soils as a result of deposition from airborne fallout from industrial and non-industrial combustion sources and/or power grid/transformer discharges. Area-wide concentrations can be established through sampling for these chemicals. This should include samples on and off property to reflect the larger general area. A range of concentrations should be established, and apparent outlier concentrations must be excluded. Additionally, vehicular exhaust around roadways, including adjoining drainage ditches, can be an anthropogenic source of PAHs and lead. Roadway areas are localized and do not represent area-wide anthropogenic background. If a contaminant area is separated in concentration and extent from the roadway area, concentrations in the roadway area cannot be used to assign remediation standards for soils. If a roadway adjoins the source area, then roadway anthropogenic background should be established by collecting samples away from the area of concern on a nearby stretch of the same roadway.
- C. **Normal Application of Agricultural Chemicals:** Arsenic and 1,2-dichloropropane are sometimes found in groundwater due to normal application of pesticides. Other pesticides, if applied properly, are not as commonly found in groundwater due to their lower solubility. Many former agricultural properties, however, will have levels of pesticides or nitrates remaining in soils. Federal and state laws generally exempt concentrations associated with normal application of agricultural chemicals. Overuse and improper use do not qualify for that exemption. If the presence of agricultural chemicals can be shown to be due to normal application, their remediation is not required by the IHSRA and by most state and federal remediation law.
- D. **Upgradient Groundwater and Surface Water Sources:** If it can be demonstrated that groundwater contamination is migrating onto the property from other source properties, the responsibility of remediation of that contamination resides with the responsible party for the other source. Property line wells demonstrating

significantly higher concentrations of the contaminant or detections of non-site related contaminants could support such a contention. Whenever surface water samples are needed to determine if contaminated soils from the site have entered surface water, an upstream sample should also be collected. This sample must be collected immediately upstream and not be influenced by site groundwater discharges in any way. If there are obstructions preventing a property line sample in the stream, the sample can be taken further upstream, but not further than fifty feet and in any case as close to the facility boundary as possible.

#### **IV. Averaging Soil Contaminant Levels**

For properties where contaminant concentrations are generally within about one order of magnitude of the health-based soil remediation goals, averaging may demonstrate achievement of standards. Averaging only applies to health-based PSRGs and not to protection of groundwater PSRGs. However, both health-based and protection of groundwater PSRGs must still be met for site closure. This averaging procedure may be used for the intended property use: unrestricted or restricted. Where unrestricted cleanup levels cannot be achieved by averaging, land use restrictions would be required as part of the site remedy. All of the following criteria must be met when averaging soil concentration data:

- A. Only sample points within one-quarter-acre sectors may be averaged when comparing to unrestricted use remediation goals. Restricted industrial use (with land use restrictions approved as part of the remedial action plan) may allow for averaging over larger areas if the access and use across the area is consistent and no residential use is involved.
- B. The quarter-acre zone may be circle or a square or triangle of generally equal sides. One dimension of the zone's perimeter may not be disproportionately longer than another. For existing residential lots, averaging cannot exceed individual property boundaries.
- C. Samples must be generally evenly spaced over the zone of averaging (not forming a single line or skewed to one side).
- D. Visibly distinct areas of contaminant release and areas where the discharge is bounded by natural or engineered features controlling the perimeter of contamination should be evaluated as one zone. Concentrations may be averaged within that delineable zone. Areas outside the zone should not be included in the averaging.
- E. Only samples of the same vertical soil horizon may be averaged (0-6 inches for surface samples and no more than a 5-foot vertical spread for subsurface samples). Only actual sample data may be used for all points included in the average and not published averages for background concentrations. Quantitation limits should be used for samples in the area of averaging where a contaminant present at the site was below quantitation limits.
- F. No single sample point may exceed ten times the preliminary health-based soil remediation goal for all contaminants except lead. For lead, no single sample point used in an average may exceed 1000 ppm for unrestricted use and no more than

three times the site-specific cleanup level for restricted use.

- G. Composite sample results may be included in an average but must be weighted proportionally to the area they represent. For example, if one composite sample in an area represents  $\frac{1}{2}$  of the area and 5 others represent  $\frac{1}{10}$  of the area each, then the concentration of the first composite should be multiplied by 5, added to the sum of the other concentrations and then divided by 10 to compute the average concentration. Similarly, if a composite sample was collected over one half the area and 4 individual grabs covered the other half, multiply the composite covering one half the area by 4, add to the sum of the 4 grab sample concentrations and divide by 8.

For characterizing soil contaminant concentrations over an area where there are not visible signs of extent, establish a sampling grid with a 50-foot grid node spacing for grab or composite sampling. For large areas that can be demonstrated to have had consistent use and a uniform release of contaminants (such as a large spray field), sampling grids can be set up with a grid node spacing larger than 50 feet. However, in such cases, the concentrations may not be averaged in quarter-acre zones. The upper end of the individual grid node concentrations is presumed to represent the entire area. If the upper end concentration exceeds unrestricted use cleanup levels, the entire area would require land use restrictions, active remediation or more detailed sampling across the entire area.

An alternative for larger areas where the nature of the contaminant discharge is again generally uniform across the area, is to consider one or more zones within the overall area that represent the range of environmental conditions present (various geologic and geographic conditions such as slope vs valley, wetter vs drier) as representing the overall area. Grids with 50-foot node spacing should be established across these representative areas. These areas can then be averaged if all the other criteria for averaging described in the above bullets is met. If the average contaminant concentrations in all such areas meet the established remedial goals for the intended property use, then no active remediation would be required.

## **V. Calculating Cumulative Risk of Soil Contamination**

If individual and average contaminant concentrations exceed their respective screening levels for the intended property use, cumulative site-specific risk can be calculated using the DEQ Risk Calculator according to the companion *DEQ Risk Calculator User Guide*, both available on the Risk Evaluation Resources page of the Risk-Based Remediation website here: <https://deq.nc.gov/permits-rules/risk-based-remediation/risk-evaluation-resources>. This method typically yields higher cleanup levels.

## **VI. Calculating Health-Based Soil Remediation Goals if Remediation is Warranted**

The DEQ Risk Calculator can be used to calculate target soil cleanup levels if remedial action is needed, especially if only a few contaminants comprise the site. Using the risk calculator results from the evaluation of maximum contaminant concentration, each contaminant's contribution to the total risk identified in the output will indicate which contaminants are driving the risk. Iterations with a series of scaled down contaminant concentrations will eventually provide the contaminant concentrations that will yield acceptable risk. These resulting input concentrations

that do not exceed the allowed risk can be used as site-specific health-based remediation goals for soils. Protection of groundwater levels will still need to be evaluated to ensure soils are not leaching contaminants to groundwater. This can also be done using the risk calculator. Refer to the *DEQ Risk Calculator User Guide*.

## **VII. Unrestricted-Use Closure**

If the soil-only site meets residential/unrestricted use, the remediating party can request a NFA Review by the IHSB for a fee. The fee is \$1,000 for soil-only sites where soil contamination achieved remediation standards passively, or where they were met by removing less than or equal to 5 drums or 1 cubic yard (whichever is greater) of soils or waste with no other media affected. Independent actions not meeting the above criteria will have a review fee of \$6,500.

## **VIII. Restricted-Use Closure**

Where contaminant levels exceed unrestricted health-based cleanup levels using any of the methods described above, institutional controls can serve as a protective remedy by limiting the property use. In these soil-only cases, the leaching criterium must be met. In other words, it must be demonstrated that soil conditions do not have the potential to leach contaminants to groundwater above the 15A NCAC 02L Standards. Restricted use scenarios require approval by DEQ. In addition, the property owner must record a Declaration of Perpetual Land Use Restrictions (DPLURs) on the property deed describing the property's land-use restrictions and the property owner's annual inspection requirement. Examples of restrictions might include non-residential property use only, non-child occupied uses only; no subsurface disturbance without an approved plan; and maintenance of a barrier such as an asphaltic cap.

Sites with only soil contamination that are cleaned up to restricted use cleanup levels and require DPLURs are most often lower-risk cases. These lower-risk cases are handled in IHSB's REC Program: [Registered Environmental Consultant Program | NC DEQ](#). The REC Program has a streamlined process for this type of site. To expedite closure of these mildly contaminated properties, the "soil-only" AA is brief and stipulates that site closure is expected to be completed within six (6) months. The steps for the soil-only AA are described below. If interested in this option, contact the REC Program staff for a copy of the soil-only AA.

The steps for this process are as follows.

- A. The Remediating Party notifies the REC Program of their interest and a draft agreement is prepared.
- B. Notification of the AA is mailed to the property owner, any leasers and adjoining property owners for a 30-day public notification.
- C. The Remediating Party, their REC and the NC Superfund Section sign the agreement and pay the \$3,000 application fee.
- D. The agreement includes certification pages for the REC to attest that the remedial investigation has been completed and complies with specific provisions of the REC rules. If an assessment report has already been prepared and some items required by the rules were not included, the REC can prepare an informational supplement to

provide those items.

- E. Once the REC certifies the assessment is complete, they should discuss potential restricted uses of the property with IHSB REC Program staff.
- F. The REC Program provides the Remediating Party and the REC a draft land use restriction document to review.
- G. The REC prepares and submits a brief remedial action plan (RAP) describing the land use restrictions that will be applied and includes as appendices the agreed upon, but unsigned DPLUR and a draft notice survey plat of the contaminated area/property.
- H. Once the REC Program concurs with the remedy, the REC shall provide a second 30-day public notice of the RAP for public review and comment. During this time, the institutional control documents can be finalized for IHSB review.
- I. Once any comments are addressed, the REC can certify the RAP and record the land use restrictions and the notice survey plat at the county Register of Deeds office, thus completing the remedy.
- J. For site closure, a letter should be sent to IHSB with (1) a statement that remedial goals have been achieved, (2) proof that the institutional controls are recorded, and (3) a request for NFA status.
- K. IHSB will issue a NFA letter and remove the site from the inventory.