

**PROPOSED RULES OF
GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION**

Chapter 391-3-19: Hazardous Site Response

SUMMARY. Comments are solicited from the public on a proposed rules amendment that would add to the existing Rules for Hazardous Site Response, Chapter 391-3-19. The proposed rules amendment ("the amendment") would address requirements in the Hazardous Site Response Act, O.C.G.A., § 12-8-93(b), for promulgation of rules governing:

- Investigations, cleanups, and other corrective actions at sites where hazardous wastes, hazardous constituents, and hazardous substances have been disposed of or otherwise released;
- Procedures and criteria for making a determination whether property requires corrective action;
- Procedures for removal of sites from the Hazardous Site Inventory; and
- Procedures for the filing in the deed records of the superior courts of additional affidavits concerning property for which an initial affidavit has been filed pursuant to O.C.G.A. § 12-8-97(c).

The amendment only addresses corrective action at sites or properties that are already listed on the Hazardous Site Inventory (HSI). Rules governing procedures for listing a site on the HSI became effective on February 20, 1994 and are found at Rule 391-3-19-.04 and .05. The amendment is wholly in addition to, and has no effect on, any existing rules.

Specifically, the amendment proposes to do the following:

- Modify existing Rule 391-3-19-.02 "Conventions" by adding four new abbreviations to Subrule (1) and four new definitions to Subrule (2);
- Modify existing Rule 391-3-19-.05 "Reporting ... and Listing of Sites on the HSI" by adding Subrule (4), "Removal of sites from the Hazardous Site Inventory";

- Add Rule 391-3-19-.06 "Corrective Action" to provide the administrative procedures for moving a site that is on the HSI through the corrective action process;
- Add Rule 391-3-19-.07 "Risk Reduction Standards" to provide the technical standards that must be met for a corrective action to be complete;
- Add Rule 391-3-19-.08 "Property Notices" to specify the procedures for carrying out the Act's requirement for notices to private and public property records for sites that are designated as needing corrective action; and
- Add Appendix III "Media Target Concentrations and Standard Exposure Assumptions," which consists of Tables 1-3 and which supplements the risk reduction standards.

The amendment to Chapter 391-3-19 is described on the following pages. For economy and convenience sake, long sections of existing final rules in the Chapter are not repeated; thus, Rule .03 (fees), Rule .04 (release notification), Appendix I (regulated substances and soil concentrations), and Appendix II (reportable quantities screening method) are not shown. The amendment's proposed additions are underlined; no deletions of or within any final rule are proposed. Definitions shall be renumbered upon promulgation. Any text provided herein solely to assist the reader is identified by large boldface italics and shall be deleted upon promulgation.

It is important to emphasize that the amendment relates only to sites listed on the HSI. If a release should occur in the future, the property owner may remediate the release within the timeframe provided for in existing Rules 391-3-19-.04 and -.05 and avoid listing on the HSI.

Nothing in this amendment prohibits a site owner or other responsible party from immediately undertaking a voluntary cleanup either prior to or after listing on the HSI. In fact, the amendment provides substantial incentives for voluntary cleanups after site listing. If the cleanup reaches certain tangible endpoints within the timeframe allowed by the proposed rules, the site may be removed from the HSI and, in certain instances, notices to property records (such as deeds) would not be required.

**RULES OF
GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION**

**Chapter 391-3-19
HAZARDOUS SITE RESPONSE**

391-3-19-.01 General Provisions

(1) **Purpose.** The purpose of these Rules is to establish policies, procedures, requirements, and standards to implement the Georgia Hazardous Site Response Act, Official Code of Georgia Annotated (O.C.G.A.) §12-8-90 et seq. (1992), as amended. These Rules are promulgated to protect and enhance the quality of Georgia's environment and to protect the public health, safety, and well-being of its citizens.

(2) **Authority.** These Rules are issued under the authority of the Georgia Hazardous Site Response Act (HSRA), O.C.G.A. §12-8-90 et seq.

O.C.G.A. Sec. 12-8-90 et seq.

391-3-19-.02 Conventions

(1) **Abbreviations**

CERCLA--Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended

CFR--Code of Federal Regulations

HEAST--USEPA's Health Effects Assessment Summary Tables

HSRA--Georgia Hazardous Site Response Act, O.C.G.A. §12-8-90 et seq.

IRIS--USEPA's Integrated Risk Information System

NCP--The National Oil and Hazardous Substances Pollution Contingency Plan,
40 CFR Part 300

O.C.G.A.--Official Code of Georgia, Annotated

RAGS, Part A--"Risk Assessment Guidance for Superfund: Volume 1 - Human Health
Evaluation Manual (Part A)," USEPA document EPA/540/1-89/002, December 1989

RAGS, Part B--"Risk Assessment Guidance for Superfund: Volume 1 - Human Health
Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals),"
USEPA document EPA/540/R-92/003, December 1991

SW-846--"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,"
USEPA Publication SW-846

USEPA--United States Environmental Protection Agency

(2) **Definitions.** Unless otherwise defined in this chapter, the definition of all terms included in the HSRA, O.C.G.A. 12-8-90 et seq, as amended, the Georgia Hazardous Waste Management Act (HWMA) O.C.G.A. §12-8-60 et seq., as amended, and in the Rules for Hazardous Waste Management, Section 391-3-11-.02, shall have the same meaning in this chapter. When used in this chapter, the following terms shall have the meaning given below:

(a) *Approved analytical test method* means SW-846 test methods that have been promulgated, recommended, or otherwise approved by USEPA, or methods approved for use by the Division;

(b) *Conditionally exempt small quantity generator* means a hazardous waste generator who generates 220 pounds or less of hazardous waste in one month;

(c) *Defined release* means any release which is an event which has a known duration of less than 30 consecutive days, which has a known source, and which involves quantities that are known or can be estimated;

(d) *Detection limit* means the practical quantitation limit (PQL), defined as the lowest concentration, for an approved analytical test method and for a given sample matrix, at which the quantity of a regulated substance can be measured with a stated degree of confidence under routine laboratory operating conditions;

(e) *Final receiving facility* means a receiving facility that receives a hazardous waste and from which that hazardous waste will not be reshipped for further off-site management;

(a') *Free product* means any non-aqueous phase liquid that contains a regulated substance and that has accumulated at a groundwater surface, has pooled above a low permeability boundary in an aquifer, or can move freely in the aquifer;

(f) *Ground water* means any subsurface water that is in a zone of saturation;

(g) *Large quantity generator* means a hazardous waste generator who generates 2.2 pounds or more of acute hazardous waste or 2200 pounds or more of hazardous waste in one month;

(b') *Non-residential property* means any real property or portion of a property not currently being used for human habitation or for other purposes with a similar potential for human exposure, at which activities have been or are being conducted that can be categorized in one of the 1987 Standard Industrial Classification (SIC) major groups 01-97 inclusive (except the four-digit codes 4941, 8051, 8059, 8062-3, 8069, 8211, 8221-2, 8351, 8661, and 9223). Non-residential property includes all of the contiguous block(s) and lot(s) controlled by the same owner or operator that are vacant land, or that are used in conjunction with such business. For leased properties, non-residential property includes the

leasehold and any external tank, surface impoundment, septic system, or any other structure, vessel, contrivance, or unit that provides, or is utilized for the management of regulated substances to or from the leasehold;

(h) *Off-site management* means the movement of hazardous waste beyond the property boundary of the facility where it was generated for disposal, incineration, treatment, storage, recycling and/or reuse at a receiving facility;

(i) *On-site management* means the disposal, incineration, treatment, storage, recycling and/or reuse of self-generated hazardous waste by any large quantity generator before it is shipped for off-site management or discharged from an outfall regulated under the Georgia Water Quality Control Act;

(j) *Out-of-state generator* means any generator outside the State of Georgia that ships hazardous waste to a receiving facility located within the State of Georgia;

(k) *Receiving facility* means a facility that receives hazardous waste for disposal, incineration, treatment, storage, recycling and/or reuse;

(l) *Regulated substance* means any substance defined in the Hazardous Waste Management Act, O.C.G.A. §12-8-62, by the terms "hazardous waste" or "hazardous constituent," or any substance defined in the Hazardous Site Response Act, O.C.G.A. §12-8-92, as "hazardous substance" (all such regulated substances are listed in Appendix I of this Chapter);

(m) *Release* means any intentional or unintentional act or omission resulting in the spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment, including without limitation the abandonment or discarding of barrels, containers, and other closed receptacles, of any hazardous waste, hazardous constituent, or hazardous substance; provided however, that such term shall not include any release which results in exposure to persons solely within a workplace, with respect to a claim which such persons may assert against the employer of such persons; emissions from the engine exhaust of any motor vehicle, rolling stock, aircraft, vessel, or pipeline pumping station; or the normal application of fertilizer;

(n) *Reportable quantity* means the amount of any released regulated substance which causes a site to meet the criteria for listing on the Hazardous Site Inventory pursuant to the screening method provided in Appendix II of this Chapter;

(o) *Reshipped for further off-site management* means when a receiving facility has received hazardous waste and where such hazardous waste has undergone disposal, incineration, treatment, storage, recycling and/or reuse at that receiving facility and the receiving facility subsequently signs

the manifest accompanying such hazardous waste to send it to another receiving facility where it will undergo further disposal, incineration, treatment, storage, recycling and/or reuse;

(c') Residential property means any property that does not exclusively meet the definition of non-residential property. In addition to recognized residential use, it also includes property used for establishments classified by those SIC codes that are excepted from the definition herein of "non-residential". Also, a portion of non-residential property that is used in part for residential activities, such as a day care center, is defined as residential;

(d') Responsible party means any person who has contributed or who is contributing to a release, as defined at O.C.G.A. 12-8-92(9);

(p) *Self-generated hazardous waste* means hazardous waste generated by a large quantity generator or a small quantity generator;

(q) *Shipped for off-site management* means when a generator signs the manifest accompanying a hazardous waste shipment bound for a receiving facility where it will undergo disposal, incineration, treatment, storage, recycling and/or reuse at that facility;

(r) *Site* means that portion of the owner's contiguous property and any other owner's property affected by a release exceeding a reportable quantity.

(s) *Small quantity generator* means a hazardous waste generator who generates greater than 220 pounds but less than 2200 pounds of hazardous waste in one month;

(t) *Soil* means any unconsolidated earth material, together with any unconsolidated plant or animal matter or foreign material that has become incorporated into it, that either consists of, remains within, or comes to be deposited on, native soil or regolith;

(u) *Ton of hazardous waste* means a standard short ton (2000 pounds) including any fraction thereof;

(v) *Wastewater* means any self-generated hazardous waste that undergoes on-site management in a wastewater treatment facility prior to its discharge from an outfall that is regulated under the Georgia Water Quality Control Act.

(3) **Number and gender.** As used in this chapter, words in the singular also include the plural and words in the masculine gender also include the feminine and vice versa, as the case may require.

Authority O.C.G.A. Sec. 12-8-90 et seq.

Sections 391-3-19-.03 and .04 are unaffected by the proposed amendment, so, for reasons of economy, have not been repeated here.

391-3-19-.05 Reporting of Releases Exceeding Reportable Quantities and Listing of Sites on the Hazardous Site Inventory

(1) **Listing on the Hazardous Site Inventory.** The Director shall list a site on the Hazardous Site Inventory if the Director determines that a release exceeding a reportable quantity has occurred or that a release poses a danger to human health and the environment. A determination that a release exceeding a reportable quantity has occurred shall be made in accordance with the method in Appendix II.

(2) **Release reporting.** If the Director determines that a release exceeding a reportable quantity has occurred, he shall notify the property owner in writing of his finding. If the Director determines that a release exceeding a reportable quantity has not occurred, he shall likewise issue such determination in writing. Within 45 days of the receipt of the Director's written determination that a release exceeding a reportable quantity has occurred, the property owner shall submit the following information unless such information has already been submitted pursuant to Rule 391-3-19-.04(4):

(a) Name, mailing address, and telephone number of the site's property owner, lessee, tenant, or facility owner or operator; and

(b) Street address of the site or, if a numbered street address is not available, a location descriptor; and

(c) An original of the most current topographic map of scale 1:24,000 produced by the United States Geological Survey, with the geographic center of the site identified; and

(d) A description of the property boundaries in the vicinity of the site, by legal description, survey plat, tax map, or other means; and

(e) A chemical name, taken from Appendix I, of each regulated substance released at the site which independently meets the notification criteria in Rule 391-3-19-.04(3); and

(f) A general description of the nature of the release and the location of areas affected by the release or by its subsequent migration, both within and beyond the original site's property boundaries; and

(g) If known, the source, quantity, and date of the regulated substance released; and

(h) Suspected or known date and quantity of each release at the site; and

(i) Suspected or known source of each release at the site and the known or estimated extent of the area contaminated by said release or by its subsequent migration, both within and beyond the site's property boundaries; and

(j) A summary of actions taken to investigate, clean up, or otherwise remediate the site; and

(k) A statement which identifies the criteria of Rule 391-3-19-.04(3) by which the property owner determined that a release which requires notification has occurred.

(3) **Notifications under CERCLA 103(c).** A property owner that has previously notified USEPA under Section 103(c) of CERCLA may satisfy the requirements of Rule 391-3-19-.05(2) by submitting a copy of the 103(c) notice together with the topographic map referenced in Rule 391-3-19-.05(2)(c).

(4) Removal of sites from the Hazardous Site Inventory. The Director shall remove a site or an individual property at a site from the Hazardous Site Inventory if any of the following apply:

(a) The Director determines that it had not had a release which either exceeded a reportable quantity or posed a danger to human health or the environment at the time of listing the site on the Hazardous Site Inventory.

(b) The Director determines, that the site or individual property meets Type 1, Type 2, Type 3, or Type 4 risk reduction standards of Rule 391-3-19-.07, and, when required, the property owner has complied with Rule 391-3-19-.08(4).

391-3-19-.06 Corrective Action

(1) Applicability. The requirements of Rule 391-3-19-.06 apply to any person who is a responsible party at a site listed on the Hazardous Site Inventory except as otherwise provided for in Rule 391-3-19-.06(7).

(2) Classification of sites on the Hazardous Site Inventory. Upon listing a site on the Hazardous Site Inventory, the Director shall designate the site or any individual property at the site as Class II unless or until he determines that it should be designated as Class I, Class III, or Class IV pursuant to Rule 391-3-19-.06(2)(a) through (c):

(a) Class I applies to any site or any individual property at a site which:

1. Includes the source of a release to a groundwater drinking water supply that has caused, or is likely to cause, human exposure through drinking water to concentrations of a regulated substance that exceed any of the Type 1 groundwater criteria described in Rule 391-3-19-.07(6)(b);

2. Has had a release which continues to add contaminants to soil, water, or air, or that continues to expand in area or volume;

3. Has had a release of a regulated substance that results in or is likely to result in any of the following:

(i) Bioaccumulation of a regulated substance in flora or fauna that causes adverse toxicological effects or that results in the need to recommend that human consumption be limited;

(ii) Adverse acute or chronic effects to domestic animals, fish, shellfish, or wildlife;

4. Includes an abandoned facility where the potential for exposure to a regulated substance is not controlled through on-site management;

5. Has been classified as Class I pursuant to Rule 391-3-19-.06(6)(b)(4) or (c); or

6. Does not meet any other criteria of Rule 391-3-19-.06(2)(a) but the Director has determined that it nevertheless poses a danger to human health or the environment.

(b) Class III applies to any site or individual property at a site which has been listed on the Hazardous Site Inventory (but not classified as Class IV pursuant to Rule 391-3-19-.06(2)(c)) and which and has been determined by the Director to be in compliance with the Type 3, Type 4 or Type 5 risk reduction standards of Rule 391-3-19-.07.

(c) Class IV applies to any site or individual property at a site which has been listed on the Hazardous Site Inventory and at which corrective action as described in Rule 391-3-19-.06(7)(a) is being conducted or has been completed.

(3) Compliance status report.

(a) Any person who is a responsible party for a site on the Hazardous Site Inventory shall submit to the Director a compliance status report that documents the current status of the site with regard to the risk reduction standards of Rule 391-3-19-.07 for all regulated substances associated with each release at the site. The Director shall in writing request the submittal of said report and specify a deadline for submittal based on a priority for submittal to be determined by the Director.

(b) The report required by Rule 391-3-19-.06(3)(a) shall, at a minimum, include the items enumerated below for all regulated substances associated with each release at the site, unless otherwise stated in writing by the Director. This report should be compiled on the basis of site conditions which exist after the completion of any voluntary corrective action taken by the responsible party prior to the submittal of the report. Reports on previous investigations or remedial activities required under other laws or regulations or undertaken voluntarily should be incorporated into the compliance status report when possible.

1. A description of each known source which has contributed or is contributing to a release including:

(i) Source name, number or other descriptor;

(ii) Location of source on a map of scale of 1 inch = 200 feet or less;

(iii) Name of each regulated substance released from each source;

(iv) Chronology of each source of a release; and

(v) If a source is an engineered structure or a waste management unit, a description of the function, design, dimensions, capacity and operation of the source, including as-built construction drawings where available.

2. If a release involves soil contamination, a complete definition of the horizontal and vertical extent of such soil contamination. Satisfactory evidence of a complete definition of the horizontal and vertical extent of soil contamination shall consist of an appropriate number of data points at sufficient locations with concentrations at background concentrations. An acceptable determination of background concentrations shall be made from samples that are representative of soil conditions not affected by a release of a regulated substance. In support of the definition of the extent of soil contamination the compliance report shall describe the following:

(i) General approach used;

(ii) Analytical parameters selected and rationale for selection;

(iii) Location of all sampling points by sample identification number on a map with scale of 1 inch = 200 feet or less and, where applicable, on vertical cross-sections of appropriate number and scale;

(iv) Sampling and analysis procedures including but not limited to:

(I) Sampling equipment and collection techniques;

(II) Field analytical or measurement techniques including make and model of equipment and calibration schedule and type;

(III) Sample handling and preservation techniques;

(IV) Equipment decontamination procedures;

(V) Chain-of-custody procedures; and

(VI) Laboratory analytical techniques, including references to the analytical methods used, if standard, or in cases where standard analytical techniques do not exist, descriptions of the analytical methods used, including quality assurance and quality control procedures utilized;

(v) A description of any statistical procedures used to evaluate data;

(vi) Procedures used to establish background soil concentrations; and

(vii) Narrative and tabular summary of all pertinent field data and the results of all final laboratory analyses that are supported by sufficient quality assurance/quality control data to validate the results.

3. If a release involves groundwater contamination, a complete definition of the horizontal and vertical extent of groundwater contamination. Satisfactory definition of the horizontal and vertical extent of groundwater contamination shall consist of an appropriate number of data points at sufficient locations with concentrations at background concentrations. An acceptable determination of background concentrations shall be made from samples that are representative of groundwater conditions not affected by a release of a regulated substance. The compliance status report shall, at a minimum, describe the following:

(i) Analytical parameters selected and rationale for selection;

(ii) A description of the methods used to characterize subsurface geology;

(iii) A description of the methods used to characterize horizontal and vertical groundwater gradients, flow rates, and flow directions;

(iv) A description of the methods used to determine hydraulic conductivities and other pertinent hydrogeological characteristics, including a description of any slug and/or aquifer pumping tests;

(v) A description of groundwater monitoring well locations, and their installation and construction methods, including:

(I) A map with scale of 1 inch = 200 feet or less depicting all existing well locations including a survey of each well's surface reference point and the elevation of its top-of-casing;

(II) Type of well casing material;

(III) Description of well-intake design including screen slot size and length, filter pack materials and length, and method of filter pack emplacement;

(IV) Method used to seal the well from the surface and any other features designed to prevent or minimize downward migration of contaminants along the well annulus; and

(V) Description of the methods and procedures used to develop the wells;

(vi) Description of all sampling and analysis procedures used, including at a minimum:

(I) Procedures and timing for measuring groundwater elevations for each sampling event;

(II) Well evacuation procedures including volume evacuated prior to sampling;

(III) Sample withdrawal techniques, sampling equipment and materials (tubing, rope, pump, etc.);

(IV) Sample handling and preservation techniques;

(V) Procedures for decontaminating sampling equipment between samples and sampling events;

(VI) Chain-of-custody procedures for all phases of sample management; and

(VII) Laboratory analytical techniques, including references to the analytical methods used, if standard, or in cases where standard analytical techniques do not exist.

descriptions of the analytical methods used, including quality assurance and quality control procedures utilized;

(vii) A description of procedures used to determine background groundwater quality which is representative of ground water not affected by a release;

(viii) A map with scale of 1 inch = 200 feet or less depicting the horizontal extent of contamination;

(ix) A map with scale of 1 inch = 200 feet or less depicting the potentiometric surface of ground water;

(x) Maps and vertical cross-sections of appropriate scale depicting concentrations for all contaminants superimposed upon site stratigraphic features and monitoring wells; and

(xi) Narrative and tabular summary of all pertinent field data and the results of all final laboratory analyses that are supported by sufficient quality assurance/quality control data to validate the results.

4. A description of any human or environmental receptors who may have been or could be potentially exposed to a release at the site.

5. A description of all properties which are part of the site including the address and location of such property, its legal description, and the property owner's name, address and telephone number.

6. The name, address and telephone number of any other person who may be a responsible party for the site and a description of the type and amount of regulated substances such party may have contributed to a release.

7. A summary of any previous actions taken to eliminate, control, or minimize any potential risk at the site, including actions taken to comply with the risk reduction standards of Rule 391-3-19-.07.

8. If the responsible party certifies pursuant to Rule 391-3-19-.06(4)(c) that the site is not in compliance with any of the risk reduction standards of Rule 391-3-19-.07, the compliance status report may include a proposed corrective action plan that describes the corrective action that the responsible party has determined is necessary to achieve compliance with the applicable risk reduction standards of Rule 391-3-19-.07.

9. If the responsible party certifies pursuant to Rule 391-3-19-.06(4)(c) that the site is in compliance with the Type 3, Type 4 or Type 5 risk reduction standards of Rule 391-3-19-.07, the compliance status report may include a proposed corrective action plan that describes the continuing

actions that the responsible party has determined are necessary to achieve or maintain compliance with the Type 3, Type 4 or Type 5 risk reduction standards.

10. Attached to the front of the compliance status report, a concise statement of the findings of the report presented in plain language, immediately followed by the certification required pursuant to Rule 391-3-19-.06(4)(a).

(4) Certification of compliance with risk reduction standards.

(a) The compliance status report required by Rule 391-3-19-.06(3) shall include a compliance status certification regarding the responsible party's own determination as to the status of a site or any individual property at a site with regard to the applicable risk reduction standards of Rule 391-3-19-.07 for all regulated substances evaluated by the compliance status report.

(b) The compliance status certification shall be signed by the applicable person described in Items 1 through 4 of Rule 391-3-19-.03(5)(c). Where the compliance status report is submitted for two or more cooperating responsible parties, the certification may be signed by a duly authorized representative of said responsible parties, "duly authorized" having the same meaning as in Item 4 of Rule 391-3-19-.03(5)(c).

(c) Any person signing the certification of compliance required under Rule 391-3-19-.06(4) shall make the following certification:

I certify under penalty of law that this report and all attachments were prepared under my direction in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Based on my review of the findings of this report with respect to the risk reduction standards of the Rules for Hazardous Site Response, Rule 391-3-19-.07, I have determined that [(choose either of the following statements): 1) This site/property is in compliance with Type 1, Type 2, Type 3, Type 4, or Type 5 risk reduction standards (specify lowest numbered Type that applies, or all applicable types if more than one Type is applicable) or 2) This site/property is not in compliance with any Type risk reduction standards.].

(5) Public participation.

(a) Within 7 days after submitting to the Director the compliance status report required pursuant to Rule 391-3-19-.06(3), the responsible party who submits the report shall publish a notice in both a major local newspaper of general circulation and the legal organ of the local governments in whose jurisdiction the site is located, announcing that such report is available for inspection by the general public. The public notice must include:

1. The name, address and location of the site as it appears on the Hazardous Site Inventory, and, if the plan applies to less than the full site, the street address and owner's name for applicable properties;

2. The following statement: "The Georgia Environmental Protection Division, Department of Natural Resources, State of Georgia (EPD) has placed this site on the Hazardous Site Inventory pursuant to its authority under the Hazardous Site Response Act and Rules promulgated thereunder. As required by the Rules for Hazardous Site Response, the responsible party for this site was required to investigate the site and submit a compliance status report to EPD summarizing the results of that investigation. EPD is currently reviewing the compliance status report to determine if corrective action is needed for regulated substances that have been released at this site. Before EPD decides whether corrective action is needed, the public has the opportunity to review the compliance status report and provide comments to EPD about the report.";

3. Announcement of a 30-day public comment period beginning on the date of the published notice, and the name, address and telephone number of an EPD contact person to whom written or oral comments can be made;

4. Name, address and telephone number of the responsible party or its designated contact person;
and

5. Location where the report may be viewed and copied.

(b) Within 7 days after submitting to the Director a proposed corrective action plan, or any subsequent revisions thereof, the responsible party who submits the plan shall publish a notice in both a major local newspaper of general circulation and the legal organ of the local governments in whose jurisdiction the site is located, announcing that such plan is available for inspection by the general public. The public notice must include:

1. The name, address and location of the site as it appears on the Hazardous Site Inventory, and, if the plan applies to less than the full site, the street address and owner's name for applicable properties;

2. The following statement: "The Georgia Environmental Protection Division, Department of Natural Resources, State of Georgia (EPD) has placed this site on the Hazardous Site Inventory

pursuant to its authority under the Hazardous Site Response Act and Rules promulgated thereunder. The Director of EPD has determined that this site needs corrective action and has required the responsible party for this site to submit to EPD a proposed corrective action plan that describes the corrective action the responsible party has determined is necessary to comply with the risk reduction standards of EPD's Rules for Hazardous Site Response. Before EPD decides whether to approve this proposed corrective action plan, the public has the opportunity to review the proposed corrective action and provide comments to EPD about the plan.";

3. Announcement of a 30-day public comment period beginning on the date of the published notice, and the name, address and telephone number of an EPD contact person to whom written or oral comments can be made;

4. Name, address and telephone number of the responsible party or its designated contact person; and

5. Location where the plan may be viewed and copied.

(c) Where a proposed corrective action plan is submitted at the same time as the compliance status report required under Rule 391-3-19-.06(3), the same procedures as described under Items (a) and (b) above shall be followed, but with the substitution of the following statement for that given in Item (2):

"The Georgia Environmental Protection Division, Department of Natural Resources, State of Georgia (EPD) has placed this site on the Hazardous Site Inventory pursuant to its authority under the Hazardous Site Response Act and Rules promulgated thereunder. As required by the Rules for Hazardous Site Response, the responsible party for the site was required to investigate the site and submit a compliance status report to EPD summarizing the results of that investigation. The responsible party has submitted to EPD, along with the compliance status report, a proposed corrective action plan that describes the corrective action the responsible party has determined is necessary to comply with the risk reduction standards of EPD's Rules for Hazardous Site Response. Before EPD decides whether to approve the proposed corrective action plan, the public has the opportunity to review the compliance status report and proposed corrective action and provide comments to EPD about the report and plan."

(d) Within 15 days after publishing the public notice required by Rule 391-3-19-.06(5)(a), (b), or (c), the responsible party shall provide the Director with an exact copy of the public notice as it appeared in the paper.

(e) Within 7 days after submitting to the Director either the compliance status report required pursuant to Rule 391-3-19-.06(3), or a proposed corrective action plan, the responsible party shall provide to the county government in the county in which the site is located and to the government of

any city in whose jurisdictions the site is located a written notice providing the same information required in Rule 391-3-19-.06(5)(a), (b), or (c) as applicable.

(f) Upon making a determination pursuant to Rule 391-3-19-.06(6) or upon determining that a proposed corrective action plan should be approved, the Director shall publish notice of such determination in both a major local newspaper of general circulation and the legal organ of the local governments in whose jurisdiction the site is located.

(6) Determination of the need for corrective action. Rule 391-3-19-.06(6) applies to any site or individual property at a site listed on the Hazardous Site Inventory.

(a) Any site or individual property at a site that is classified on the Hazardous Site Inventory as Class I, Class III or Class IV pursuant to Rule 391-3-19-.06(2) shall also be designated by the Director as having a known release needing corrective action.

(b) For any site or individual property at a site listed on the Hazardous Site Inventory, the Director shall review the compliance status certification required by Rule 391-3-19-.06(4) and do the following:

1. If the responsible party certifies that the site or an individual property at the site is in compliance with the Type 1 or Type 2 risk reduction standards of Rule 391-3-19-.07, and the Director concurs with that certification, the Director shall designate the site or property as not needing further action and shall remove the site or property from the Hazardous Site Inventory in accordance with Rule 391-3-19-.05(4).

2. If the responsible party certifies that the site or an individual property at the site is in compliance with the Type 3 or Type 4 risk reduction standards of Rule 391-3-19-.07, and the Director concurs with that certification, the Director shall designate the site or property on the Hazardous Site Inventory as having a known release needing corrective action, reclassify it as Class III, and state on the Inventory that corrective action shall presently consist of those activities needed to maintain compliance with the Type 3 or Type 4 risk reduction standards, including the property notices of Rule 391-3-19-.08(1) and (2). Upon compliance with Rule 391-3-19-.08(4), the Director shall remove the site or property from the Hazardous Site Inventory in accordance with Rule 391-3-19-.05(4).

3. If the responsible party certifies that the site or an individual property at the site is in compliance with the Type 5 risk reduction standards of Rule 391-3-19-.07, and the Director concurs with that certification, the Director shall designate the site or property on the Hazardous Site Inventory as having a known release needing corrective action, reclassify it as Class III, and state on the Inventory that corrective action shall presently consist of those activities needed to maintain compliance with the Type 5 risk reduction standards, including the property notices of Rule 391-3-19-.08(1), (2), and (7).

4. If the responsible party certifies that the site or an individual property at the site is not in compliance with any of the risk reduction standards of Rule 391-3-19-.07, the Director shall reclassify the site as a Class I site and designate the site on the Hazardous Site Inventory as having a known release needing corrective action, whereupon the owner of any property at the site which is not independently in compliance with Type 1 or Type 2 risk reduction standards shall make the property notices required by Rule 391-3-19-.08(1) and (2).

(c) The Director may reclassify a site or an individual property at a site listed on the Hazardous Site Inventory from Class II to Class I, and designate the site or property as having a known release needing corrective action, if:

1. The responsible party fails to submit or fails to agree to submit the compliance status report within the time specified in Rule 391-3-19-.06(3)(a); or

2. The compliance status report is deficient with respect to the requirements of Rule 391-3-19-.06(3)(b) and the Director has notified the responsible party in writing of such deficiencies and the responsible party has failed to correct such deficiencies by a deadline to be specified by the Director in writing; or

3. The responsible party certifies pursuant to Rule 391-3-19-.06(4) that the site or an individual property at the site is not in compliance with any of the applicable risk reduction standards of Rule 391-3-19-.07; or

4. The Director does not concur with the responsible party's certification made pursuant to Rule 391-3-19-.06(4) that the site or an individual property at the site is in compliance with the applicable risk reduction standards of Rule 391-3-19-.07.

(d) Upon making a determination pursuant to Rule 391-3-19-.06(6)(a)-(c) that a site has a known release needing corrective action, the Director shall provide the responsible party, and the owner of each property at the site which continues not to comply with either Type 1 or Type 2 risk reduction standards of Rule 391-3-19-.07, with written notice of such determination, including a statement concerning the requirements of Rule 391-3-19-.08.

(e) If the Director determines pursuant to Rule 391-3-19-.06(6)(b) that a site or an individual property at a site listed as Class I on the Hazardous Site Inventory subsequently comes into compliance with the risk reduction standards of Rule 391-3-19-.07, the Director shall reclassify such site or property in accordance with the provisions of Items 1 through 3 of Rule 391-3-19-.06(6)(b), except that the deed notice provisions of Rule 391-3-19-.08(1) and (2) need not be repeated.

(f) Notwithstanding a previous determination of the Director made pursuant to Rule 391-3-19-.06(6)(a) through (e), the Director may reclassify a site or an individual property at a site listed on the Hazardous Site Inventory as necessary to protect human health and the environment.

(7) Other corrective actions.

(a) The requirements of Rule 391-3-19-.06(3) through (5) do not apply to any person who is a responsible party for any of the following at a site or individual property listed on the Hazardous Site Inventory unless Rule 391-3-19-.06(7)(b) applies:

1. Corrective action required by an order of the Director executed before the effective date of these Rules pursuant to O.C.G.A. § 12-8-71(b) of the Hazardous Waste Management Act;

2. Corrective action required by an order of the Director executed before the effective date of these Rules pursuant to O.C.G.A. § 12-8-96(a) of HSRA;

3. Remedial actions conducted in accordance with a Record of Decision (ROD) under the NCP (referenced at 40 CFR 300.430(f)(5));

4. Remedial actions where compliance is demonstrated with applicable cleanup standards promulgated under the federal Toxic Substances Control Act; or

5. Corrective action required by a hazardous waste management facility permit issued by the Director which contains conditions requiring corrective action in accordance with O.C.G.A. §12-8-66(e) of the Hazardous Waste Management Act.

(b) Any site or individual property at which corrective action as described in Rule 391-3-19-.06(7)(a) is being conducted or has been completed shall be presumed to be in compliance with Type 5 of the risk reduction standards of Rule 391-3-19-.07(10) upon its listing on the Hazardous Site Inventory, and the requirements of Rule 391-3-19-.06(3) through (5) do not apply to any person who is a responsible party at such site unless:

1. The responsible party elects to certify compliance with other than Type 5 risk reduction standards of Rule 391-3-19-.07, in which case the site or property shall remain on the Hazardous Site Inventory as Class IV until the Director reclassifies it in accordance with 391-3-19-.06(6);

2. The Director determines that such corrective action fails to protect human health and the environment and that additional corrective action is necessary to comply with the risk reduction standards of Rule 391-3-19-.07, in which case the Director may reclassify the site or property in accordance with Rule 391-3-19-.06(6)(f); or

3. The Director determines that such corrective action fails to meet the Type 5 risk reduction standards of Rule 391-3-19-.07(10), in which case the Director may reclassify the site or property pursuant to 391-3-19-.06(6)(f).

(c) For any site described in Rule 391-3-19-.06(7)(a)(5) that is not also described by Item 1, 2, or 3 of Rule 391-3-19-.06(7)(b), the property notice requirements of Rule 391-3-19-.08(1) and (2) shall not apply until the Director makes a determination that corrective action is needed pursuant to the Rules for Hazardous Waste Management, Chapter 391-3-11.

391-3-19-.07 Risk Reduction Standards

(1) Purpose and Scope. Rule 391-3-19-.07 specifies the information and procedures necessary to demonstrate compliance with requirements under HSRA for corrective action for all regulated substance releases at a site or individual property at a site listed on the Hazardous Site Inventory. Compliance with these requirements does not preclude the requirement to comply with any stricter standards that may be applicable under other state or federal laws or regulations. These risk reduction standards may be applicable, relevant, or appropriate requirements for remedial actions under the NCP.

(2) [reserved]

(3) Completion of corrective action. A required corrective action shall be considered complete when it is demonstrated that the site or individual property at a site meets any or a combination of the applicable risk reduction standards described in Rule 391-3-19-.07. All risk reduction standards will, when adequately carried out, assure adequate protection of human health and the environment from potential exposure to land-based releases of regulated substances.

(4) Essential features of acceptable corrective actions. For corrective action to be in compliance with these standards, the following common elements are required:

(a) The corrective action shall, at a minimum, provide for the removal of free product to the extent practicable.

(b) No soil remaining in place under Type 1, 2, 3, or 4 risk reduction standards shall exhibit the hazardous waste characteristics of ignitability, corrosivity, or reactivity as defined in 40 CFR 261 Subpart C, and the sum of regulated substance concentrations in air-filled soil pore space shall not exceed 1000 parts per million (by weight or volume) as determined using methods approved by the Director.

(c) The corrective action shall not allow exposure to concentrations which would cause food chain contamination, damage to soils or to biota in the soils which could impair the use of soils for

agricultural or silvicultural purposes, adverse effects on vegetation or wildlife, or the accumulation of vapors in buildings or other structures which pose a threat to human health or the environment.

(d) The corrective action shall protect waters of the State from releases that would cause surface water to experience concentrations of regulated substances in excess of any general criterion specified in the Georgia Rules and Regulations for Water Quality Control at 391-3-6-.03(5) or, if concentration values are not provided in said Rules, concentrations at levels that exhibit acute toxicity to aquatic life as demonstrated pursuant to protocols established by the Director.

(e) If the detection limit and/or the background concentration for a regulated substance is greater than the concentration specified in any risk reduction standard, the greater of the detection limit or background shall be used for determining compliance with the applicable risk reduction standard. "Detection limit" in this context implies the non-fraudulent use of an approved analytical test method that is appropriate for the particular application. Background shall be determined from samples taken from media that are unaffected by a release. For radionuclides, background means background radioactivity.

(5) Multiple property sites. For sites consisting of more than one property, the Type risk reduction standard that shall apply to each individual property at that site shall be based upon the applicable use scenario for each individual property, i.e., residential or non-residential.

(6) Criteria for Type 1 standards.

(a) Type 1 standards provide for regulated substance concentrations that pose no significant risk on the basis of standardized exposure assumptions and defined risk levels for residential properties. To comply with these standards, all source materials must be removed or decontaminated to Type 1 media criteria.

(b) Criteria for ground water. At any point within ground water that has been affected by a release, concentrations of regulated substances in groundwater samples shall not exceed concentrations given in Table 1 of Appendix III or, for those substances not listed, the background or detection limit concentration. If two or more regulated organic compounds are present in ground water, their sum in a single sample shall not exceed 10 mg/L if the Table 1 value for each compound is less than 5 mg/L, or, where at least one compound has a Table 1 value greater than or equal to 5 mg/L, the sum of the concentrations shall not exceed the maximum Table 1 value for a detected compound plus 10 mg/L.

(c) Criteria for soil. Concentrations at any point above the uppermost groundwater zone in soil that has been affected by a release shall not exceed the concentrations given in Table 2 of Appendix III or, for those substances not listed, the least of the concentrations from Items 1 through 3 below:

1. Concentrations which will not cause contamination of ground water at levels which exceed Type 1 groundwater criteria, determined as the highest of the soil concentrations in Items (i)-(iii) below:

(i) Soil concentrations in Appendix I, excluding any values given in square brackets;

(ii) Multiplication of the Type 1 groundwater concentration criteria by a factor of 100;

Does not make sense { (iii) Demonstration through use of the Toxicity Characteristic Leaching Procedure, SW-846 Method 1311, or other method approved by the Director that a concentration in soil will not generate leachate concentrations that exceed Type 1 groundwater concentration criteria.

[Note: For substances excluded under Item (i) above and not listed in Table 1 of Appendix III, the concentration under Rule 391-3-19-.07(6)(c)(1) shall be considered non-calculable.]

2. Concentrations which are unlikely to result in any noncancer toxic effects on human health via soil ingestion along with inhalation of volatiles and particulates, determined using Equation 7 of RAGS, Part B, and standard residential exposure assumptions in Table 3 of Appendix III.

3. Concentrations for which the upper bound on the estimated excess cancer risk is less than or equal to 10^{-5} (10^{-4} for Class C carcinogens) via soil ingestion along with inhalation of volatiles and particulates, determined using Equation 6 of RAGS, Part B, and standard residential exposure assumptions in Table 3 of Appendix III.

[Note: Where concentrations are non-calculable under Items 1-3 above, the soil criterion shall be the higher of the background or detection limit concentrations.]

(7) Criteria for Type 2 standards.

(a) Type 2 standards provide for regulated substance concentrations that pose no significant risk on the basis of a site-specific risk assessment for residential properties. To comply with these standards, all source materials must be removed or decontaminated to Type 2 media criteria.

(b) Criteria for ground water. At any point within any ground water that has been affected by a release, concentrations of regulated substances in groundwater samples must not exceed the lesser of the values from Items 1 and 2 below or, for those substances for which neither calculation can be made, the higher of concentrations in Table 1 of Appendix III, background concentrations, or detection limit concentrations.

1. Concentrations which are unlikely to result in any noncancer toxic effects on human health via ingestion of, or inhalation of volatiles from, ground water, determined using Equation 2 from RAGS, Part B, and site-specific exposure factors for the residential use scenario.

2. Concentrations for which the upper bound on the estimated excess cancer risk is less than 10^{-5} via ingestion of, and inhalation of volatiles from, ground water, determined using Equation 1 from RAGS, Part B, and site-specific exposure factors for the residential use scenario.

(c) Criteria for soil. Concentrations at any point above the uppermost groundwater zone in soil that has been affected by a release shall not exceed the least of the concentrations in Items 1 through 3 below, or, for those substances for which the calculations cannot be made, the highest of the concentrations in Table 2 of Appendix III, background concentrations, or detection limit concentrations:

1. Concentrations which will not cause contamination of ground water at levels which exceed Type 2 groundwater criteria, as determined by any laboratory test and/or fate-and-transport model recognized by USEPA and approved by the Director, at a point of exposure defined as any point at which a drinking water well could be installed.

2. Concentrations which are unlikely to result in any noncancer toxic effects on human health via soil ingestion along with inhalation of volatiles and particulates, determined using Equation 7 from RAGS, Part B, and site-specific exposure factors for the residential use scenario.

3. Concentrations for which the upper bound on the estimated excess cancer risk is less than 10^{-5} via soil ingestion along with inhalation of volatiles and particulates, determined using Equation 6 from RAGS, Part B, and site-specific exposure factors for the residential use scenario.

(d) The exposure assessments under Items 2 and 3 of Rule 391-3-19-.07(7)(c) above shall be conducted in a manner consistent with USEPA's "Guidelines for Exposure Assessment" (57 FR 104:22888-22938; May 29, 1992).

(e) More stringent criteria may be established for a site than are specified under Rule 391-3-19-.07(7)(b) and (c) if the Director or the responsible party determines that it is necessary to protect human health or the environment.

(8) Criteria for Type 3 standards.

(a) Type 3 standards provide for regulated substance concentrations that pose no significant risk on the basis of standardized exposure assumptions and defined risk levels for the non-residential use scenario. To comply with Type 3 standards, all source materials must be removed or decontaminated to Type 3 media criteria.

(b) Type 3 standards are not applicable to residential properties. Type 3 standards are applicable where the responsible party documents that the activities being conducted on the property satisfy the definition for non-residential property at Rule 391-3-19-.02(2).

(c) Criteria for ground water. The ground water criteria for Type 3 are the same as for Type 1.

(d) Criteria for soils.

1. Concentrations at any point above the uppermost groundwater zone in soil that has been affected by a release shall not exceed the higher of concentrations described in Item 1 of Rule 391-3-19-.07(6)(c) or those listed in Table 2 of Appendix III.

2. Concentrations in surface soil (soil within 2 feet of the land surface) shall not exceed the lower of the concentrations defined in Items (i) and (ii) below. If neither of the calculations implied below can be made, the surface soil criterion shall be equal to the criterion of Item 1 above. In no event shall compliance with the surface soil criteria be achieved by applying two feet of clean soil onto the original land surface.

(i) Concentrations which are unlikely to result in any noncancer toxic effects on human health due to ingestion of soil and inhalation of particulates and volatiles, determined using Equation 7 of RAGS, Part B, and standard nonresidential exposure assumptions in Table 3 of Appendix III.

(ii) Concentrations for which the upper bound on the estimated excess cancer risk is less than or equal to 10^{-5} (10^{-4} for Class C carcinogens) for human ingestion of soil and inhalation of particulates and volatiles, determined using Equation 6, RAGS, Part B, and standard nonresidential exposure assumptions in Table 3 of Appendix III.

(9) Criteria for Type 4 standards.

(a) Type 4 standards provide for regulated substance concentrations that pose no significant risk on the basis of a site-specific risk assessment for the non-residential use scenario. To comply with Type 4 standards, all source materials must be removed or decontaminated to Type 4 media criteria.

(b) Type 4 standards are not applicable to residential properties. Type 4 standards are applicable where the responsible party documents that the activities being conducted on the property satisfy the definition for non-residential property at Rule 391-3-19-.02(2) and documents that a monitoring program will assure continued compliance with the Type 4 standards.

(c) Criteria for ground water. Concentrations of regulated substances in groundwater samples must not exceed, at any point within the property boundaries, the lesser of the values from Items 1 and 2

below or, for those substances for which neither calculation can be made, the higher of concentrations in Table 1 of Appendix III, background concentrations, or detection limit concentrations.

1. Concentrations which are unlikely to result in any noncancer toxic effects on human health via ingestion of, or inhalation of volatiles from, ground water, determined using Equation 2 from RAGS, Part B, and site-specific exposure factors for the non-residential use scenario.

2. Concentrations for which the upper bound on the estimated excess cancer risk is less than 10^{-5} via ingestion of, and inhalation of volatiles from, ground water, determined using Equation 1 from RAGS, Part B, and site-specific exposure factors for the non-residential use scenario.

(d) Criteria for soil. Concentrations at any point above the uppermost groundwater zone in soil that has been affected by a release shall not exceed the least of the concentrations in Items 1-3 below, or, for those substances for which said concentrations cannot be calculated, the highest of concentrations in Table 2 of Appendix III, background concentrations, or detection limit concentrations:

1. Concentrations which will not cause contamination of ground water at levels which exceed Type 4 groundwater concentration criteria, as determined by any laboratory test and/or fate-and-transport model recognized by USEPA and approved by the Director, at a point of exposure defined as any point at which a drinking water well could be installed.

2. Concentrations which are unlikely to result in any noncancer toxic effects on human health via soil ingestion along with inhalation of volatiles and particulates, determined using Equation 7 from RAGS, Part B, and site-specific exposure factors for the non-residential use scenario.

3. Concentrations for which the upper bound on the estimated excess cancer risk is less than 10^{-5} via soil ingestion along with inhalation of volatiles and particulates, determined using Equation 6 from RAGS, Part B, and site-specific exposure factors for the non-residential use scenario.

(e) The exposure assessments under Rule 391-3-19-.07(9)(c) and (d) above shall be conducted in a manner consistent with USEPA's "Guidelines for Exposure Assessment" (57 FR 104:22888-22938; May 29, 1992).

(f) More stringent criteria may be established for a site than are specified under Rule 391-3-19-.07(9)(c) and (d) if the Director or the responsible party determines that it is necessary to protect human health or the environment.

(10) Criteria for Type 5 Standards

(a) Type 5 standards allow, in those instances where application of Type 1-4 standards is not appropriate under present circumstances, the use of measures to control the regulated substances or the

property where the regulated substances are located. Such measures may consist of engineering controls such as construction of a fence, placement of a cap, installation of a slurry wall, or stabilization/solidification/fixation of the waste or waste residues. Under Type 5 standards, removal, decontamination, or treatment are used where appropriate to remove the principal threats at a site. The responsible party has the burden of being able to demonstrate to the satisfaction of the Director that the particular mix of removal, decontamination, treatment and/or control measures is appropriate to eliminate or abate present and future threats to human health and the environment. Institutional controls should not be substituted for active remedial measures unless such active measures are determined not to be practicable.

(b) Compliance with Type 5 standards requires long-term monitoring and maintenance, as appropriate for all implemented remedial measures, plus a restrictive covenant provided in accordance with Rule 391-3-19-.08(7).

(c) Compliance with Type 5 standards requires that Type 1, 2, 3, or 4 risk reduction standards, as applicable, be met beyond the boundary of the area for which compliance with Type 5 standards are sought whenever implementation of remedial measures is complete.

(d) Remedial measures designed to achieve compliance with Type 5 standards shall be consistent with the general requirements of Rule 391-3-19-.07(10)(a) and meet all the following performance criteria:

1. Carcinogens. For carcinogens, the measures shall be expected to permanently prevent exposures which exceed the upper bound on an estimated excess cancer risk of 10^{-5} (10^{-4} for Class C carcinogens) for individual carcinogenic substances and individual exposure pathways. The cumulative excess cancer risk for multiple carcinogenic substances and exposure pathways shall not be greater than 10^{-5} .

2. Systemic toxicants. For systemic toxicants, the measures shall be expected to permanently prevent exposures which exceed the dose to which the human population (including sensitive subgroups) could be exposed on a daily basis without appreciable risk of deleterious effect during a lifetime. Exposures shall not exceed a hazard quotient of one or a hazard index of one. The hazard quotient is the ratio of a single systemic toxicant exposure level for a specified time period to a reference dose for that systemic toxicant derived from the same time period. The hazard index is the sum of the hazard quotients for a single or multiple systemic toxicants which affect the same target organ, or which act by the same method of toxicity through single or multiple media exposure pathways.

3. Air. The measures shall be expected to permanently assure that any emission from the contamination being addressed under these rules does not cause ambient atmospheric concentrations to exceed the lowest of the following concentrations:

(i) NESHAP and NAAQ Standards, and other applicable federal and state standards and guidelines of the USEPA and EPD.

(ii) For residential exposure conditions, concentrations that satisfy Items 1 and 2 of Rule 391-3-19-.07(10)(d) above at exposure points located both at the property boundary and within the contaminated area.

(iii) For non-residential exposure conditions, either OSHA permissible exposure limits, threshold limit values or other criteria applicable to an industrial exposure setting within the property boundary, and concentrations that satisfy Items 1 and 2 of Rule 391-3-19-.07(10)(d) at the property boundary.

4. Ground Water. The measures shall be expected to permanently assure that groundwater concentrations shall not exceed Type 1-4 criteria, as applicable. The applicable groundwater criterion shall be achieved throughout the entire plume of contaminated ground water, except where the remedial measure provides for soil being left in place with concentrations in excess of applicable soil criteria under Types 1-4, in which case the Director may exclude from this requirement that portion of the plume that lies directly under the contaminated soil, as long as continuing releases to ground water from the soil and continued vertical migration of the release within ground water are eliminated by approved control measures. At a minimum, for all Type 5 cases, free product shall be removed to the extent practicable.

5. Soil. The measures shall not leave, beyond the effective control of engineering control measures, concentrations of regulated substances in soil that exceed the soil criteria for Type 1-4 standards, as applicable.

(e) More stringent criteria may be established for a site than are specified under 391-3-19-.07(10)(d) if the Director or the responsible party determines that it is necessary to protect human health or the environment.

391-3-19-.08 Property Notices

(1) Notices to private property instruments. This Rule applies to the owner of any property that is included in a site which is listed on the Hazardous Site Inventory and which has been designated as needing corrective action pursuant to Rule 391-3-19-.06(6). The requirements of this paragraph do not apply to the owner of any property at the site where the Director concurs with a demonstration that the property complies, independently of other properties at the site, with either Type 1 or Type 2 risk reduction standards.

(a) From and after the date any owner receives written notice from the Director under Rule 391-3-19-.06(6)(d) that property of such owner that is listed on the Hazardous Site Inventory has been

designated as needing corrective action, the owner of any such property shall include the following notice in any warranty deed, mortgage, security deed, lease, rental agreement, or other instrument that is thereafter given or caused to be given by the property owner which creates an interest in or grants a use of the property:

"This property has been listed on the state's hazardous site inventory and has been designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. Contact the property owner or the Georgia Environmental Protection Division for further information concerning this property. This notice is provided in compliance with the Georgia Hazardous Site Response Act."

[Note: The term "instrument that is thereafter given or caused to be given by the property owner which creates an interest in or grants a use of the property" does not include options or contracts to purchase real property.]

(b) Rule 391-3-19-.08(1)(a) shall not apply after filing of the affidavit referred to in Rule 391-3-19-.08(6).

(2) Affidavit in county deed records. No later than forty five (45) days from the date the Director issues the written notice pursuant to Rule 391-3-19-.06(6)(d) that a property or part thereof listed on the Hazardous Site Inventory has been designated as needing corrective action, the owner of any such property shall cause to be prepared an affidavit of such fact in recordable form as set forth in O.C.G.A. § 44-2-20 and shall file such affidavit with the clerk of the superior court of each county in which the real property or any part thereof lies. Such affidavit shall be recorded in the clerk's deed records pursuant to O.C.G.A. § 44-2-20. Such affidavit shall include the statement provided in Rule 391-3-19-.08(1). The requirements of this paragraph do not apply to the owner of any property where the Director concurs with a demonstration that the property complies, independently of other properties at the site, with either Type 1 or Type 2 risk reduction standards.

(3) Petitions for hearing. The notices required by Rule 391-3-19-.08(1) and (2) shall be stayed if the property owner files a petition for a hearing in accordance with O.C.G.A. 12-8-73 within thirty (30) days of the date the Director issues the written notice pursuant to Rule 391-3-19-.06(6)(d) that the site upon which the property is located needs corrective action.

(4) Documentation of property notices. Within thirty (30) days after the recorded affidavit required by Rule 391-3-19-.08(2) is returned by the county clerk to the property owner, the property owner shall submit a copy of such recorded affidavit to EPD.

(5) Director's affidavit in county deed records. Where ownership or control of any real property at a site subject to Rule 391-3-19-.08(1) and (2) is involuntarily acquired by a unit of state or local government through bankruptcy, tax delinquency, abandonment, or other circumstances in which the

government involuntarily acquires title by virtue of its function as sovereign, the Director shall give thirty (30) days notice to any person who owned, operated, or otherwise controlled activities at the property immediately beforehand that the property is subject to the requirements of Rule 391-3-19-.08 and that, barring said person's contest under Rule 391-3-19-.08(3), the Director shall prepare and file the notice referenced in Rule 391-3-19-.08(2).

(6) Subsequent affidavits. If, subsequent to the filing of the initial affidavit referenced in Rule 391-13-19-.08(2), the Director determines that no further action is needed, and the property is removed from the Hazardous Site Inventory pursuant to Rule 391-3-19-.05(4), the Director shall notify the property owner in writing of such determination whereupon the property owner may file an additional affidavit with the clerk of superior court attaching a copy of such determination, which shall be restricted to the following declaration:

"This property was listed on the state's hazardous site inventory and was designated as needing corrective action due to the presence of hazardous wastes, hazardous constituents, or hazardous substances regulated under state law. However, this property has since been designated as needing no further action and has been removed from the state's hazardous site inventory. A copy of that determination is attached hereto. The notice requirements of O.C.G.A. § 12-8-97 no longer apply to this property and prior notices given under this code section are no longer in effect. The property owner or the Georgia Environmental Protection Division may be contacted for further information concerning this property. This notice is provided in compliance with the Georgia Hazardous Site Response Act."

(7) Restrictive covenants. The owner of any property at which the Type 5 risk reduction standards of Rule 391-3-19-.07(10) are being used shall, upon the request of the Director, execute a restrictive covenant for such property. The covenant shall be recorded with the clerk of superior court for the county in which the property is located, and a copy shall be provided to any zoning or land use planning authority that has jurisdiction over the property. Such restrictions shall run with the land and be binding on the owner's successors and assigns. If the Director determines subsequent to the execution and recording of the restrictive covenant that the property is in compliance with Type 1, 2, 3, or 4 risk reduction standards and removes the property from the Hazardous Site Inventory, the Director shall so notify the property owner whereupon the restrictive covenant may be amended or revoked. The restrictive covenant shall be prepared by the Director and may include, but not necessarily be limited to, provisions to accomplish the following:

(a) Prohibit activities on the property that may substantially interfere with a remedial action, operation and maintenance, long-term monitoring, or other measures necessary to ensure the integrity of the remedial action.

(b) Prohibit activities that may result in human exposures above those specified for residential scenarios in Rule 391-3-19-.07(6) and (7) or for non-residential scenarios at Rule 391-3-19-.07(8) and

(9), whichever scenario is applicable, and activities that would result in the release of a regulated substance which has been remedied in accordance with Rule 391-3-19-.07(10).

(c) Allow the Director to enforce the restrictions set forth in the covenant by legal action in a court of appropriate jurisdiction.

(d) Require the installation and maintenance of a permanent marker on each side of the site which delineates the restricted area.

(e) Describe uses of the property that are prohibited.

Appendix I and II are unchanged by the proposed amendment so, for reasons of economy, have not been repeated here. Underlining is not used hereafter, although all remaining sections are part of the proposed amendment.

APPENDIX III

MEDIA TARGET CONCENTRATIONS AND STANDARD EXPOSURE ASSUMPTIONS

Table 1. Groundwater Criteria

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|-------------------------------------|----------------------|
| 83329 | Acenaphthene | 2 |
| 67641 | Acetone | 4 |
| 75058 | Acetonitrile | 0.2 |
| 98862 | Acetophenone | 4 |
| 107028 | Acrolein | 0.7 |
| 79061 | Acrylamide | 0.0001 (a) |
| 107131 | Acrylonitrile | 0.0006 (a) |
| 116063 | Aldicarb | 0.007 |
| 309002 | Aldrin | 0.00002 (a) |
| 7664417 | Ammonia | 30 |
| 62533 | Aniline | 0.006 (a) |
| 7440360 | Antimony | 0.006 (a) |
| 140578 | Aramite | 0.001 (a) |
| 7440382 | Arsenic | 0.05 |
| 1332214 | Asbestos [fibers longer than 10 µm] | 7 million/liter |
| 7440393 | Barium | 2 |
| 56553 | Benz(a)anthracene | 0.0001 |
| 71432 | Benzene | 0.005 |

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|-----------------------------|----------------------|
| 92875 | Benzidine | 0.0000002 (a) |
| 50328 | Benzo(a)pyrene | 0.0002 |
| 205992 | Benzo(b)fluoranthene | 0.0002 |
| 100447 | Benzyl chloride | 0.0002 (a) |
| 7440417 | Beryllium | 0.004 |
| 111444 | Bis(2-chloroethyl) ether | 0.00003 (a) |
| 75252 | Bromoform | see Trihalomethanes |
| 85687 | Butyl benzyl phthalate | 0.1 |
| 7440439 | Cadmium | 0.005 |
| 63252 | Carbaryl | 0.7 |
| 1563662 | Carbofuran | 0.04 |
| 75150 | Carbon disulfide | 4 |
| 56235 | Carbon tetrachloride | 0.005 |
| 57749 | Chlordane | 0.002 |
| 126998 | Chloro-1,3-butadiene, 2- | 0.7 |
| 106478 | Chloroaniline, p- | 0.1 |
| 108907 | Chlorobenzene | 0.1 |
| 510156 | Chlorobenzilate | 0.7 |
| 124481 | Chlorodibromomethane | see Trihalomethanes |
| 67663 | Chloroform | see Trihalomethanes |
| 95578 | Chlorophenol, 2- | 0.04 |
| 107051 | Chloropropene, 3- | 0.002 |
| 2921882 | Chlorpyrifos | 0.02 |
| 7440473 | Chromium | 0.1 |
| 218019 | Chrysene | 0.0002 (a) |
| 7440508 | Copper | 1.3 |
| 57125 | Cyanide | 0.2 |
| 72548 | DDD | 0.0001 |

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|----------------------------------|----------------------|
| 72559 | DDE | 0.0001 |
| 50293 | DDT | 0.0001 |
| 75990 | Dalapon | 0.2 |
| 117840 | Di-n-octyl phthalate | 0.7 |
| 2303164 | Diallate | 0.0006 (a) |
| 333415 | Diazinon | 0.0006 |
| 53703 | Dibenz(a,h)anthracene | 0.0003 |
| 96128 | Dibromochloropropane | 0.0002 |
| 84742 | Dibutyl phthalate | 4 |
| 1918009 | Dicamba | 0.2 |
| 541731 | Dichlorobenzene, m- | 0.6 |
| 95501 | Dichlorobenzene, o- | 0.6 |
| 106467 | Dichlorobenzene, p- | 0.075 |
| 91941 | Dichlorobenzidine, 3,3'- | 0.00008 (a) |
| 75274 | Dichlorobromomethane | see Trihalomethanes |
| 75718 | Dichlorodifluoromethane | 1 |
| 75343 | Dichloroethane, 1,1- | 4 |
| 107062 | Dichloroethane, 1,2- | 0.005 |
| 75354 | Dichloroethylene, 1,1- | 0.007 |
| 156605 | Dichloroethylene, trans-1,2- | 0.1 |
| 108601 | Dichloroisopropyl ether | 0.3 |
| 120832 | Dichlorophenol, 2,4- | 0.02 |
| 94757 | Dichlorophenoxyacetic acid, 2,4- | 0.07 |
| 78875 | Dichloropropane, 1,2- | 0.005 |
| 542756 | Dichloropropene, 1,3- | 0.002 |
| 60571 | Dieldrin | 0.00002 (a) |
| 84662 | Diethyl phthalate | 5 |
| 123911 | Diethylene dioxide, 1,4- | 0.07 (a) |

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|----------------------------------|----------------------|
| 117817 | Diethylhexyl phthalate | 0.006 |
| 60515 | Dimethoate | 0.007 |
| 119904 | Dimethoxybenzidine, 3,3'- | 0.003 (a) |
| 131113 | Dimethyl phthalate | 400 |
| 57976 | Dimethylbenz(a)anthracene, 7,12- | 0.000001 (a) |
| 119937 | Dimethylbenzidine, 3,3'- | 0.000004 (a) |
| 105679 | Dimethylphenol, 2,4- | 0.7 |
| 99650 | Dinitrobenzene, m- | 0.001 (a) |
| 51285 | Dinitrophenol, 2,4- | 0.07 |
| 121142 | Dinitrotoluene, 2,4- | 0.00005 (a) |
| 88857 | Dinoseb | 0.007 |
| 122394 | Diphenylamine | 0.2 |
| 122667 | Diphenylhydrazine, 1,2- | 0.00004 (a) |
| 2764729 | Diquat [di-cationic form] | 0.02 |
| 85007 | Diquat dibromide | 0.02 |
| 298044 | Disulfoton | 0.0003 |
| 115297 | Endosulfan (mixed isomers) | 0.002 |
| 145733 | Endothall | 0.1 |
| 72208 | Endrin | 0.002 |
| 106898 | Epichlorohydrin | 0.04 |
| 110805 | Ethoxyethanol, 2- | 10 |
| 60297 | Ethyl ether | 7 |
| 97632 | Ethyl methacrylate | 3 |
| 62500 | Ethyl methanesulfonate | 0.000001 (a) |
| 100414 | Ethylbenzene | 0.7 |
| 106934 | Ethylene dibromide | 0.00005 |
| 52857 | Famphur | 0.001 |
| 22224926 | Fenamiphos | 0.002 |

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|-------------------------------|----------------------|
| 206440 | Fluoranthene | 1 |
| 86737 | Fluorene | 1 |
| 16984488 | Fluoride | 4 |
| 944229 | Fonofos | 0.01 |
| 50000 | Formaldehyde | 1 |
| 64186 | Formic acid | 70 |
| 76448 | Heptachlor | 0.0004 |
| 1024573 | Heptachlor epoxide | 0.0002 |
| 118741 | Hexachlorobenzene | 0.001 |
| 87683 | Hexachlorobutadiene | 0.001 (a) |
| 319846 | Hexachlorocyclohexane (alpha) | 0.000006 (a) |
| 319857 | Hexachlorocyclohexane (beta) | 0.00002 (a) |
| 77474 | Hexachlorocyclopentadiene | 0.05 |
| 67721 | Hexachloroethane | 0.001 (a) |
| 70304 | Hexachlorophene | 0.01 |
| 193395 | Indeno(1,2,3-cd)pyrene | 0.0004 |
| 78831 | Isobutyl alcohol | 10 |
| 78591 | Isophorone | 0.1 |
| 143500 | Kepon | 0.000002 (a) |
| 7439921 | Lead | 0.015 |
| 58899 | Lindane | 0.0002 |
| 121755 | Malathion | 0.2 |
| 7439976 | Mercury (inorganic) | 0.002 |
| 126987 | Methacrylonitrile | 0.004 (a) |
| 67561 | Methanol | 20 (a) |
| 16752775 | Methomyl | 0.2 |
| 72435 | Methoxychlor | 0.04 |
| 74839 | Methyl bromide | 0.01 |

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|-----------------------------|----------------------|
| 74873 | Methyl chloride | 0.003 |
| 78933 | Methyl ethyl ketone | 2 |
| 80626 | Methyl methacrylate | 3 |
| 298000 | Methyl parathion | 0.002 |
| 74953 | Methylene bromide | 0.4 |
| 75092 | Methylene chloride | 0.005 |
| 108101 | Methylisobutylketone | 2 |
| 924163 | N-Nitrosodi-n-butylamine | 0.000006 (a) |
| 621647 | N-Nitrosodi-n-propylamine | 0.000005 (a) |
| 55185 | N-Nitrosodiethylamine | 0.0000002 (a) |
| 62759 | N-Nitrosodimethylamine | 0.0000007 (a) |
| 10595956 | N-Nitrosomethylethylamine | 0.000002 (a) |
| 100754 | N-Nitrosopiperidine | 0.000008 (a) |
| 930552 | N-Nitrosopyrrolidine | 0.00002 (a) |
| 91203 | Naphthalene | 0.02 |
| 91598 | Naphthylamine, 2- | 0.00004 (a) |
| 7440020 | Nickel | 0.1 |
| 98953 | Nitrobenzene | 0.02 |
| 100027 | Nitrophenol, p- | 0.06 |
| 1336363 | PCBs | 0.0005 |
| 1910425 | Paraquat | 0.03 |
| 56382 | Parathion | 0.2 |
| 608935 | Pentachlorobenzene | 0.03 |
| 82688 | Pentachloronitrobenzene | 0.0001 |
| 87865 | Pentachlorophenol | 0.001 |
| 108952 | Phenol | 4 |
| 298022 | Phorate | 0.007 |
| 7723140 | Phosphorus, elemental | 0.0001 |

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|---|---------------------------|
| 23950585 | Pronamide | 0.05 |
| 129000 | Pyrene | 1 |
| 110861 | Pyridine | 0.04 |
| 94597 | Safrole | 0.0001 (a) |
| 7782492 | Selenium | 0.05 |
| 7440224 | Silver | 0.1 |
| 93721 | Silvex | 0.05 |
| 100425 | Styrene | 0.1 |
| 1746016 | TCDD, 2,3,7,8- [Dioxin] | 3×10^{-8} (a)(b) |
| 13071799 | Terbufos | 0.0009 |
| 95943 | Tetrachlorobenzene, 1,2,4,5- | 0.01 |
| 630206 | Tetrachloroethane, 1,1,1,2- | 0.07 |
| 79345 | Tetrachloroethane, 1,1,2,2- | 0.0002 (a) |
| 127184 | Tetrachloroethylene | 0.005 |
| 58902 | Tetrachlorophenol, 2,3,4,6- | 1 |
| 3689245 | Tetraethyldithiopyrophosphate | 0.02 |
| 7440280 | Thallium | 0.002 (a) |
| 108883 | Toluene | 1 |
| 95534 | Toluidine, o- | 0.0001 (a) |
| 106490 | Toluidine, p- | 0.0002 (a) |
| 8001352 | Toxaphene | 0.003 |
| 76131 | Trichloro-1,2,2-trifluoroethane, 1,1,2- | 1000 |
| 120821 | Trichlorobenzene, 1,2,4- | 0.07 |
| 71556 | Trichloroethane, 1,1,1- | 0.2 |
| 79005 | Trichloroethane, 1,1,2- | 0.005 |
| 79016 | Trichloroethylene | 0.005 |
| 75694 | Trichlorofluoromethane | 2 |
| 95954 | Trichlorophenol, 2,4,5- | 4 |

| CAS Number | Regulated Substance/Analyte | Concentration (mg/L) |
|------------|-------------------------------------|----------------------|
| 88062 | Trichlorophenol, 2,4,6- | 0.03 |
| 93765 | Trichlorophenoxyacetic acid, 2,4,5- | 0.07 |
| 96184 | Trichloropropane, 1,2,3- | 0.04 |
| | Trihalomethanes, total | 0.1 |
| 99354 | Trinitrobenzene, 1,3,5- | 0.002 (a) |
| 126727 | Tris(2,3-dibromopropyl)phosphate | 0.00003 (a) |
| 7440622 | Vanadium | 0.2 |
| 75014 | Vinyl chloride | 0.002 |
| 1330207 | Xylenes (total) | 10 |
| 7440666 | Zinc | 2 |

- (a) The health-based drinking water criterion for this substance/analyte is lower than the lowest currently achievable and available detection limit. According to Rule 391-3-19-.07(4)(e), the detection limit or background will be the Type 1 groundwater concentration criterion for this substance/analyte.
- (b) For the purposes of Rule 391-3-19-.07, all polychlorinated dibenzodioxins and dibenzofurans are collectively considered as one substance, expressed as an equivalent concentration of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), based on the Toxicity Equivalency Factor approach described in "Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Dioxins and Dibenzofurans," U.S. Environmental Protection Agency, March 1989. Where concentrations only of homologous groups are known (isomer-specific data are not available), the Director must be consulted to determine an appropriate method for determining 2,3,7,8-TCDD equivalents.

Table 2. Type 1 Soil Criteria

| Regulated Substance/Analyte | Concentration (mg/kg) | NC mg/kg |
|-----------------------------|-----------------------|----------|
| Antimony | 4 | |
| Arsenic | 20 | 41 |
| Barium | 1000 | |
| Beryllium | 2 | |
| Cadmium | 2 | |
| Chromium | 100 | 1200 |
| Cobalt | 20 | |
| Copper | 100 | 1500 |
| Lead | 75 | |
| Mercury | 0.5 | |
| Nickel | 50 | |
| Selenium | 2 | |
| Silver | 2 | |
| Thallium | 2 | |
| Vanadium | 100 | |
| Zinc | 100 | |

Table 3: Parameters, Definitions and Standard Assumptions*, to be used in Equations 1, 2, 6, and 7 in RAGS, Part B

| Parameters | Definitions (Units) | Values |
|---------------------|---|--|
| C | Concentration in soil (mg/kg) or water (mg/L) | chemical-specific |
| TR | Target excess individual lifetime cancer risk (unitless) | 10 ⁻⁵ for Class A and B carcinogens; 10 ⁻⁴ for Class C carcinogens |
| THI | Target hazard index (unitless) | 1 |
| SF _o ** | Oral cancer slope factor ((mg/kg-day) ⁻¹) | chemical-specific |
| SF _i ** | Inhalation cancer slope factor ((mg/kg-day) ⁻¹) | chemical-specific |
| RfD _o ** | Oral chronic reference dose (mg/kg-day) | chemical-specific |
| RfD _i ** | Inhalation chronic reference dose (mg/kg-day) | chemical-specific |
| BW | Adult body weight (kg) | 70 kg |
| AT | Averaging time (yr) | 70 yr carcinogens (Equals ED for systemic toxicants) |
| EF | Exposure frequency (days/yr) | 350 days/yr residential 250 days/yr non-residential |
| ED | Exposure duration (yr) | 30 yr residential 25 yr non-residential |
| IR _w | Daily water ingestion rate (liter/day) | 2 L/day residential 1 L/day non-residential |
| IR _{soil} | Soil ingestion rate (mg/day) | 114 mg/day residential 50 mg/day non-residential |
| IR _a | Daily inhalation rate (m ³ /day) | 15 m ³ /day residential 20 m ³ /day non-residential |
| PEF | Particulate emission factor (m ³ /kg) | 4.63 X 10 ⁹ m ³ /kg |
| VF | Soil-to-air volatilization factor (m ³ /kg) | see derivation below |
| K | Water-to-air volatilization factor (L/m ³) | 0.5 L/m ³ |

} may be subject to change

*Standard assumptions are required for Type 1 and Type 3 risk reduction standards.

**Values are to be taken from the current version of IRIS or, if not listed in IRIS, from the current version of HEAST. Where data are not available from IRIS or HEAST and appropriate, peer-reviewed data are otherwise available, values may be derived using the procedures described in RAGS, Part A and in consultation with the Director. If a value for only one of the two variables in a variable pair (RfD_o/RfD_i or SF_o/SF_i) is not available for a particular chemical, the term containing that variable in an equation can be ignored or equated to zero. If neither value is available for a variable pair, a concentration cannot be calculated with the equation.

[Continuation of Table 3]

Derivation of VF values (Soil-to-Air Volatilization Factor)

$$VF(m^3/kg) = \frac{(LS \times V \times DH)}{A} \times \frac{(\pi \times \alpha \times T)^{1/2}}{(2 \times D_{ei} \times E \times K_{oc} \times 10^{-3} \text{ kg/g})}$$

WHERE:

| | | |
|-----------------|---|--|
| LS | length of side of contaminated area (m) | = 45 |
| V | wind speed in mixing zone (m/s) | = 2.25 |
| DH | diffusion height (m) | = 2 |
| A | area of contamination (cm ²) | = 2.03 x 10 ⁷ (= 0.5 acre) |
| π | pi | = 3.14 |
| α | (cm ² /s) | = $\frac{(D_{ei} \times E)}{E + (\rho_s)(1-E)/K_{oc}}$ |
| T | exposure interval (s) | = 7.9 x 10 ⁸ (= 25 yr) |
| ρ _s | density of soil solids (g/cm ³) | = 2.65 |
| OC | soil organic carbon content fraction (unitless) | = 0.02 |
| D _{ei} | effective diffusivity (cm ² /s) | = D _i × E ^{0.33} |
| D _i | molecular diffusivity (cm ² /s) | (chemical-specific) |
| E | total soil porosity (unitless) | = 0.35 |
| K _{oc} | soil/air partition coefficient (g soil/cm ³ air) | = (H/K _d) × 41 |
| H | Henry's law constant (atm-m ³ /mol) | (chemical specific) |
| K _d | soil-water partition coefficient (cm ³ /g) | = K _{oc} × OC (or chemical specific) |
| K _{oc} | organic carbon partition coefficient (cm ³ /g) | (chemical specific) |

if Heavy $> 10^{-5}$

mol. weight < 100

most metals not volatile