

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 groundwater. At any point within groundwater 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 groundwater, 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 groundwater 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;
- (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 on 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 groundwater. At any point within any groundwater 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, groundwater, 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, groundwater, 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 4 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 groundwater at levels which exceed Type 1 or 2 groundwater criteria, whichever is higher, 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.

4. For lead, soil concentrations at the site must not exceed those concentrations that would cause a resident 6 year old child (averaged across preceding 84 months) to have a probability of no greater than 5% of a blood lead level greater than 10 ug/dL as determined by the IEUBK model using site-specific exposure assumptions, including the ingestion of site groundwater as drinking water and the probability of subsurface soils being brought to the land surface. The soil criterion at Item 1 above shall also apply to the Type 2 standard for lead.

(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 groundwater. The groundwater 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:

(i) Concentrations described in Item 1 of Rule 391-3-19-.07(6)(c).

(ii) Concentrations listed in Table 2 of Appendix III.

(iii) For lead, 400 mg/kg.

2. Concentrations in surface soil (soil within 2 feet of the land surface) shall meet the criteria of Item 1 above and, in addition, shall not exceed the lower of the concentrations defined in Items (i) through (iii) below. If none 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.

(iii) For lead, 400 mg/kg.

(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 groundwater. 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, groundwater, 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, groundwater, determined using Equation 1 from RAGS, Part B, and site-specific exposure factors for the non-residential use scenario.

(d) Criteria for soil. Concentrations in soil that has been affected by a release shall not exceed the least of the concentrations in Items 1 and 2 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 in soil at any point above the uppermost groundwater zone which will not cause contamination of groundwater at levels which exceed Type 3 or 4 groundwater concentration criteria, whichever is higher, 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 in surface soil shall meet the criteria of Item 1 above and shall not exceed the lower of the concentrations in Item (i) through (iii) below. The depth of soil considered surface soil may be based upon site-specific exposure factors approved by the Director, or assumed to be the top two feet of soil. In no event shall compliance be achieved by applying clean soil or any other barrier onto surface soil.

(i) 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.

(ii) 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 nonresidential use scenario.

(iii) For lead at nonresidential sites, soil concentrations at the site must not exceed concentrations that are determined by the procedures described in Appendix IV. In cases where children frequent the site, soil concentrations may be determined pursuant to Rule 391-3-19-.07(9)(f). In all instances, the soil criterion at Item 1 above shall also apply to the Type 4 standard for lead.

(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 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. Groundwater. At a minimum, for all Type 5 cases, free product shall be removed to the extent practicable. For groundwater contaminated with regulated substances that the responsible party demonstrates is not appropriate to remove or treat to the Type 1-4 standards, the criteria under Items (i) and (ii) below shall be met.

(i) If all source material and soil is removed, or treated to concentrations that are protective of groundwater as specified in Rule 391-3-19-.07(6)(c)1., (7)(c)1., (8)(d)1.(i), (9)(d)1., whichever are applicable, the responsible party shall implement engineering controls, institutional controls, and monitoring for groundwater, unless the Director determines that they are not needed, to ensure:

(I) Groundwater contaminated with regulated substances in excess of the Type 1 through 4 standards will not migrate beyond the limits of the engineering controls, institutional controls and monitoring;

(II) Regulated substances in groundwater will not increase in concentration or toxicity in excess of Type 1 through 4 standards at the limits of engineering and institutional controls and monitoring; and

(III) Exposure to regulated substances in groundwater in concentrations exceeding the Type 1 through 4 standards will not occur.

(ii) If all source material and soil is not removed or treated to concentrations that are protective of groundwater as specified in Rule 391-3-19-.07(6)(c)1., (7)(c)1., (8)(d)1.(i), or (9)(d)1., whichever are applicable, removal or treatment of groundwater shall be implemented at the hydraulically downgradient limit of the engineering controls used to control source material and soil to prevent or eliminate the horizontal and vertical migration of regulated substances in excess of the Type 1 through 4 standards beyond the hydraulically downgradient limit of such engineering controls. Beyond the engineering controls for source material and soil, the responsible party shall implement engineering controls, institutional controls and monitoring for groundwater, unless the Director determines that they are not needed, to ensure that the criteria specified in Items 4. (i)(I) - (III) above are met.

5. Soil. For soil contaminated with regulated substances at sites where a Type 5 standard is being sought, exposure area averaging using methods recognized by USEPA and approved by the Director may be used to demonstrate compliance with soil criteria derived pursuant to this section, provided the engineering and institutional controls for soil will permanently maintain exposure conditions consistent with those used to calculate such criteria.

(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.

Authority O.C.G.A. Sec. 12-8-90 et seq. **History.** Original Rule entitled "Risk Reduction Standards" adopted. F. July 1, 1994. eff. July 21, 1994. **Amended:** F. Nov. 3, 1999; eff. Nov. 23, 1999. **Amended:** F. July 3, 2003; eff. July 23, 2003.