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FOR DISCUSSION PURPOSES ONLY**

**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
CONTAMINATED SOILS FORUM -- POLICY GROUP
WASTE CLEANUP FOCUS GROUP**

**Issues Paper -- "Universal" Applicability of Risk-
Based Corrective Action at Florida Waste Cleanup Sites**

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**"Universal" Applicability of Risk-
Based Corrective Action at Florida Waste Cleanup Sites**

The concept of risk-based corrective action (RBCA) (pronounced "Rebecca") has been the focal point of discussion and debate in various federal and state waste cleanup programs, including Florida's waste cleanup programs. The following paper will give a brief outline of the concept of RBCA and its use in Florida, including a discussion of whether RBCA principles should be applied to all of Florida's waste cleanup programs administered by the Florida Department of Environmental Protection (FDEP). The paper will also list important implementation issues that will need to be discussed by the FDEP Contaminated Soils Forum in "universal" use of Florida RBCA principles at all Florida waste cleanup sites; specifically, those issues related to an expanded FDEP "authority" to establish and apply soil cleanup target levels. The paper will likely raise more questions than it answers but will hopefully structure debate on the expanded use of the RBCA cleanup process in Florida.

1. What is RBCA?

RBCA is a decision-making process for assessment and response to chemical releases, based on the protection of human health and the environment. Chemical release sites vary greatly in terms of complexity, physical and chemical characteristics, and in the risk that they may pose to human health and the environment. The RBCA process recognizes such diversity by using a "tiered" approach that couples site assessment and response actions with human health and environmental risk assessment to determine the need for remedial action and to tailor corrective action activities to site-specific conditions and risks.

The formal RBCA process first appeared in or around 1994 when the American Society of Testing and Materials (ASTM) issued its technical guidance entitled "Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites", ES38-94 (July, 1994). ASTM's RBCA technical guidance for petroleum release sites "Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites," E1739-95, (November, 1995) contemplates three tiers whereby the decision to move from one tier to the next is the result of a decision that the lower tier cleanup target levels or goals are inappropriate. The evaluation and methods used begin with simple analyses in Tier 1 and move to increasingly complex evaluations in Tiers 2 and 3. The process of gathering and evaluating data is conducted in a scaled fashion such that only site information which is necessary for that particular tier's decision-making is collected at each tier. For parties responsible for the assessment and remediation of chemical release sites, decisions must be made by comparing the cost of meeting the lower tier remediation goals with the expense of assessment and establishing site-

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specific remediation goals for the next higher tier in determining whether the next higher tier's site-specific cleanup goals will result in a more cost-effective cleanup.

The U.S. Environmental Protection Agency (EPA) has incorporated RBCA principles in various of its cleanup programs, including those for underground storage tanks¹ and Resource Conservation and Recovery Act hazardous waste corrective action sites². Currently, ASTM is developing a standardized guide for use of RBCA principles at any site contaminated by a chemical release, in addition to those sites contaminated by petroleum releases. That standardized guide is expected to be completed in November 1998.

2. Use of RBCA in Florida.

The RBCA cleanup process was initially introduced in Florida as part of the 1995 legislative debate that occurred concerning the Florida Department of Environmental Protection (FDEP)'s petroleum contamination cleanup program. Before the 1995 Florida legislative session, the former Florida Petroleum Efficiency Task Force included a recommendation in its report that Florida improve the cost-effectiveness of its petroleum contamination cleanup program by using RBCA principles for cleanup of petroleum contamination sites. This recommendation was the genesis of the heated debate that occurred during the 1995 and 1996 Florida legislative sessions regarding overhaul of FDEP's petroleum contamination cleanup program and the place of RBCA in that program. That debate ultimately resulted in the passage of Florida's first clear statutory pronouncement of RBCA principles which were set forth in Chapter 96-277, Laws of Florida, and which can now be found at Section 376.3071(5)(b), Florida Statutes (F.S.).

In 1997 and then again in 1998, the Florida Legislature reiterated those statutory RBCA principles (which were further "fined tuned") and incorporated them into the authorizing statutes for the Brownfield site and drycleaning solvent contamination cleanup programs. See, Chapters 97-277 and 98-189, Laws of Florida; Sections 376.81 and 376.3078, F.S.

The RBCA concepts set forth in Chapters 96-277 and 97-277 for FDEP's petroleum contamination cleanup and Brownfield site cleanup programs have been implemented in FDEP rules found at Chapters 62-770 and 62-785, Florida Administrative Code (F.A.C.), respectively. FDEP is currently in the midst of rulemaking that will include RBCA concepts for what will become Chapter

¹. Use of Risk-Based Decision-Making In UST Corrective Action Programs, OSWER Directive 9610-7 (March 1, 1995).

². Corrective Action for Solid Waste Management Units (SWMUs) at Hazardous Waste Management Facilities, EPA Proposed Rule, 55 Federal Register 307998 (July 27, 1990).

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62-782, F.A.C., the rule that will contain cleanup processes and criteria for drycleaning solvent contamination sites.

The Florida RBCA process includes three basic elements to address site cleanup. These are the establishment of a one in one million cancer risk factor for carcinogenic constituents and a hazard index of one for non-carcinogenic constituents in development of cleanup target levels for groundwater, surface water, and soil; an ability to move the point of compliance away from the "hot spot" or "source area" of contamination to the edge of the plume, to the property boundary, or in some instances further than the property boundary to allow natural attenuation processes to occur; and the use of institutional and engineering controls to eliminate or minimize human exposure to the contamination site.

The most recent iteration of statutory Florida RBCA principles is found in Chapter 98-189, Laws of Florida at Section 376.3078, F.S., as follows:

(4) REHABILITATION CRITERIA.--It is the intent of the Legislature to protect the health of all people under actual circumstances of exposure. By July 1, 1999, the secretary of the department shall establish criteria by rule for the purpose of determining, on a site-specific basis, the rehabilitation program tasks that comprise a site rehabilitation program, including a voluntary site rehabilitation program, and the level at which a rehabilitation program task and a site rehabilitation program may be deemed completed. In establishing the rule, the department shall incorporate, to the maximum extent feasible, risk-based corrective action principles to achieve protection of human health and safety and the environment in a cost-effective manner as provided in this subsection. The rule shall also include protocols for the use of natural attenuation and the issuance of "no further action" letters. The criteria for determining what constitutes a rehabilitation program task or completion of a site rehabilitation program task or site rehabilitation program, including a voluntary site rehabilitation program, must:

(a) Consider the current exposure and potential risk of exposure to humans and the environment, including multiple pathways of exposure. The physical, chemical, and biological characteristics of each contaminant must be considered in order to determine the feasibility of risk-based corrective action assessment.

(b) Establish the point of compliance at the source of the contamination. However, the department is authorized to temporarily move the point of compliance to the boundary of the property, or to the edge of the plume when the plume is within the property boundary, while cleanup, including cleanup through natural attenuation processes in conjunction with appropriate monitoring, is proceeding. The department also is authorized, pursuant to criteria provided for in this section, to temporarily extend the point of compliance beyond the property boundary with appropriate monitoring, if such extension is needed to facilitate natural attenuation or to address the current conditions of the plume, provided human health, public

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safety, and the environment are protected. When temporarily extending the point of compliance beyond the property boundary, it cannot be extended further than the lateral extent of the plume at the time of execution of the voluntary cleanup agreement, if known, or the lateral extent of the plume as defined at the time of site assessment. Temporary extension of the point of compliance beyond the property boundary, as provided in this paragraph, must include actual notice by the person responsible for site rehabilitation to local governments and the owners of any property into which the point of compliance is allowed to extend and constructive notice to residents and business tenants of the property into which the point of compliance is allowed to extend. Persons receiving notice pursuant to this paragraph shall have the opportunity to comment within 30 days of receipt of the notice.

(c) Ensure that the site-specific cleanup goal is that all sites contaminated with drycleaning solvents ultimately achieve the applicable cleanup target levels provided in this section. In the circumstances provided below, and after constructive notice and opportunity to comment within 30 days from receipt of the notice to local government, to owners of any property into which the point of compliance is allowed to extend, and to residents on any property into which the point of compliance is allowed to extend, the department may allow concentrations of contaminants to temporarily exceed the applicable cleanup target levels while cleanup, including cleanup through natural attenuation processes in conjunction with appropriate monitoring, is proceeding, if human health, public safety, and the environment are protected.

(d) Allow the use of institutional or engineering controls at sites contaminated with drycleaning solvents, where appropriate, to eliminate or control the potential exposure to contaminants of humans or the environment. The use of controls must be preapproved by the department and only after constructive notice and opportunity to comment within 30 days from receipt of notice is provided to local governments, to owners of any property into which the point of compliance is allowed to extend, and to residents on any property into which the point of compliance is allowed to extend. When institutional or engineering controls are implemented to control exposure, the removal of the controls must have prior department approval and must be accompanied by the resumption of active cleanup, or other approved controls, unless cleanup target levels under this section have been achieved.

(e) Consider the additive effects of contaminants. The synergistic and antagonistic effects shall also be considered when the scientific data become available.

(f) Take into consideration individual site characteristics, which shall include, but not be limited to, the current and projected use of the affected groundwater and surface water in the vicinity of the site, current and projected land uses of the area affected by the contamination, the exposed population, the degree and extent of contamination, the rate of contaminant

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migration, the apparent or potential rate of contaminant degradation through natural attenuation processes, the location of the plume, and the potential for further migration in relation to site property boundaries.

(g) Apply state water quality standards as follows:

1. Cleanup target levels for each contaminant found in groundwater shall be the applicable state water quality standards. Where such standards do not exist, the cleanup target levels for groundwater shall be based on the minimum criteria specified in department rule. The department shall consider the following, as appropriate, in establishing the applicable minimum criteria: calculations using a lifetime cancer risk level of $1.0E-6$; a hazard index of 1 or less; the best achievable detection limit; the naturally occurring background concentration; or nuisance, organoleptic, and aesthetic considerations.

2. Where surface waters are exposed to contaminated groundwater, the cleanup target levels for the contaminants shall be based on the lower of the groundwater or surface water standards as established by department rule. The point of measuring compliance with the surface water standards shall be in the groundwater immediately adjacent to the surface water body.

3. The department may set alternative cleanup target levels based upon the person responsible for site rehabilitation demonstrating, using site-specific modeling and risk assessment studies, that human health, public safety, and the environment are protected to the same degree as provided in subparagraphs 1. and 2. Where a state water quality standard is applicable, a deviation may not result in the application of cleanup target levels more stringent than the standard. In determining whether it is appropriate to establish alternative cleanup target levels at a site, the department must consider the effectiveness of source removal that has been completed at the site and the practical likelihood of the use of low yield or poor quality groundwater, the use of groundwater near marine surface water bodies, the current and projected use of the affected groundwater in the vicinity of the site, or the use of groundwater in the immediate vicinity of the contaminated area, where it has been demonstrated that the groundwater contamination is not migrating away from such localized source, provided human health, public safety, and the environment are protected.

(h) Provide for the department to issue a "no further action order," with conditions where appropriate, when alternative cleanup target levels established pursuant to subparagraph (g)3. have been achieved, or when the person responsible for site rehabilitation can demonstrate that the cleanup target level is unachievable within available technologies. Prior to issuing such an order, the department shall consider the feasibility of an alternative site rehabilitation technology in the area.

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(i) Establish appropriate cleanup target levels for soils.

1. In establishing soil cleanup target levels for human exposure to each contaminant found in soils from the land surface to 2 feet below land surface, the department shall consider the following, as appropriate: calculations using a lifetime cancer risk level of 1.0E-6; a hazard index of 1 or less; the best achievable detection limit; or the naturally occurring background concentration. Institutional controls or other methods shall be used to prevent human exposure to contaminated soils more than 2 feet below the land surface. Any removal of such institutional controls shall require such contaminated soils to be remediated.

2. Leachability-based soil target levels shall be based on protection of the groundwater cleanup target levels or the alternate cleanup target levels for groundwater established pursuant to this paragraph, as appropriate. Source removal and other cost-effective alternatives that are technologically feasible shall be considered in achieving the leachability soil target levels established by the department. The leachability goals shall not be applicable if the department determines, based upon individual site characteristics, that contaminants will not leach into the groundwater at levels which pose a threat to human health, public safety, and the environment.

3. The department may set alternative cleanup target levels based upon the person responsible for site rehabilitation using site-specific modeling and risk assessment studies, that human health, public safety, and the environment are protected.

The department shall require source removal, if warranted and cost-effective. Once source removal at a site is complete, the department shall reevaluate the site to determine the degree of active cleanup needed to continue. Further, the department shall determine if the reevaluated site qualifies for monitoring only or if no further action is required to rehabilitate the site. If additional site rehabilitation is necessary to reach "no further action" status, the department is encouraged to utilize natural attenuation and monitoring where site conditions warrant.

The statutory RBCA principles in Florida include express authority for FDEP to establish and apply soil cleanup target levels (SCTL's) for contaminants found in soil based on human exposure and leachability to groundwater. This authority is found only in the authorizing statutes for the petroleum contamination cleanup, Brownfield site, and drycleaning solvent contamination cleanup programs. No other similar express statutory authority for development and application of SCTL's is found in Chapters 376 and 403, F.S.³

³. The issue of whether FDEP has statutory authority to establish and apply SCTL's to waste cleanup sites other than those in the petroleum contamination cleanup, Brownfield site, or drycleaning

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3. *What are RBCA's Advantages?*

The RBCA process recognizes the obvious fact that not all waste cleanup sites are alike. Before the advent of RBCA principles in Florida, waste cleanup sites were required to achieve conservative cleanup target levels which assumed direct human exposure and potable use of groundwater, or even background and detection limits in some cases. While responsible parties were able to utilize risk assessment processes to justify deviations from the established conservative target levels before the advent of RBCA in Florida, the responsible party incurred significant costs in developing alternative site cleanup target levels. Additionally, there were not clear scientific principles or regulatory criteria enunciated that would provide the responsible party with an idea that any alternative site cleanup target levels proposed would be accepted by FDEP, even though responsible parties were provided with the opportunity to make such a demonstration. Advantages of RBCA processes include:

- ! Use of different cleanup "tiers" with associated different cleanup target levels which correspond to site conditions.
- ! Added flexibility in cleanup by allowing responsible parties to achieve cleanup through compliance with applicable cleanup target levels or to control or reduce exposure by using institutional controls or engineered containment methods.
- ! Allowing a responsible party to utilize the most cost-effective cleanup strategy that is suitable for the site, while protective of human health and the environment, with or without specific institutional or engineering controls.

4. *ASTM RBCA v. Florida RBCA and Other Considerations.*

While the RBCA concept in Florida has been used since 1996 at specific types of waste cleanup sites in Florida, there are still remaining differences between ASTM's RBCA concept and what has been put in place in Florida. One significant difference is Florida's lack of a clearly defined Tier 3 process other than continued use of the previously existing risk assessment option for development of alternative site cleanup target levels. The risk assessment option has been used with varying degrees

solvent contamination cleanup programs is being specifically addressed in other outlines prepared by the waste cleanup focus group. For purposes of further discussion in this paper, it is assumed that FDEP does not have the requisite statutory authority to establish or apply SCTL's to "non-program" sites.

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of success by FDEP over the years and is subject to criticisms of extreme expense and time delay to responsible parties utilizing that process.

Another difference is that the draft ASTM RBCA guidance for all chemical release sites contemplates inclusion of impacts to ecological receptors in determining appropriate site cleanup target levels. These considerations are not included in Florida's RBCA concept. This is because the statutes authorizing implementation of RBCA principles in Florida do not include consideration of ecological impacts from contamination sites in determining appropriate assessment and remediation strategies. See, Sections 376.3071(5)(b); 376.3078(4); 376.81, F.S.

Finally, while not an actual difference between ASTM and Florida RBCA processes, the Florida RBCA process contemplates only one cancer risk level (that being 1×10^{-6}) or one in one million additional cancer case in a given population in establishment of site cleanup target levels for carcinogenic constituents. EPA's use of RBCA type-principles in various of its programs, including RCRA corrective action, establishes a range of 10^{-4} to 10^{-6} cancer risk in establishing site cleanup target levels for these types of constituents. While this outline will not discuss specifically that policy issue, this is a noted difference in Florida's implementation of RBCA principles and implementation of similar concepts by the EPA at waste cleanup sites under EPA's regulatory jurisdiction. In any wholesale adoption of RBCA principles by Florida, these and additional issues will need to be addressed.

5. *Applicability of RBCA to remaining FDEP Waste Cleanup Programs.*

Currently, there is some debate as to whether FDEP can apply RBCA principles provided for in the petroleum contamination cleanup, Brownfield site, and drycleaning solvent contamination cleanup programs to waste cleanup sites being cleaned up pursuant to FDEP's general authority under Chapters 376 and 403, F.S. There is no known technical or scientific rationale for excluding the use of RBCA principles at these other sites. The application and use of RBCA principles, however, to these "nonprogram" sites still raise the issues regarding the Florida RBCA process that are noted above, specifically:

- ! Whether the cancer risk level of 10^{-6} is still appropriate or a risk range of 10^{-4} to 10^{-6} can still be protective of human health and the environment and should be considered?
- ! Whether ecological impact considerations should be included?
- ! Whether a RBCA process that is more closely tuned to the ASTM RBCA process, which includes a detailed Tier 3 analysis, is appropriate?

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A final issue that needs to be addressed when evaluating the RBCA process in Florida is whether Florida should adhere to a "probabilistic" approach or a "deterministic" approach in establishing site cleanup levels. This issue should be addressed jointly by the FDEP Contaminated Soils Policy and Scientific Groups.

Some form of RBCA usage in all waste cleanup sites is appropriate to effectively use limited financial resources in the cleanup of chemical release sites based on the risk of that site's contamination to human health and the environment. Only through use of RBCA and similar principles will progress be made in remediating cleanup sites so as to provide a better environment for future generations of Floridians.

6. An Expanded FDEP Regulatory Authority Over Soil.

The RBCA process set forth in statute for the petroleum contamination cleanup, Brownfield site, and drycleaning solvent contamination cleanup programs gives authority to the FDEP to develop appropriate SCTL's which are protective of human health from the standpoint of direct human exposure and leachability to groundwater resources. FDEP has developed conservative default SCTLs for application at petroleum contamination sites, drycleaning solvent contamination sites, and Brownfield sites. What is unclear is FDEP's statutory authority to require the cleanup of contaminated soil absent possible impact to groundwater outside of the three above-referenced programs. As provided in footnote 3, this paper will not undertake that specific legal analysis. For purposes of noting some of the issues that must be discussed by the FDEP Contaminated Soils Forum on this point, it will be assumed that there is general agreement that FDEP lacks clear statutory authority to require cleanup of soil at "nonprogram" sites where no identifiable threat or impact to groundwater exists from that contaminated soil.

This very issue was the subject of debate between industry and FDEP during recent negotiations concerning possible delegation to FDEP of the EPA RCRA corrective action program. Disagreement on this issue ultimately led to that proposed legislation being withdrawn by interested stakeholders and FDEP. Listed below are some additional important issues that will need to be addressed if RBCA principles are to be applied at all waste cleanup sites in Florida. These additional issues relate specifically to FDEP authority to establish and apply SCTL's for all Florida waste cleanup sites. These include but are not limited to:

- ! What specific discharges, sites, properties, or situations would be subject to application of FDEP's uniform soil cleanup values?

- ! How would FDEP's new "soil" authority apply to spills, leaks, and/or discharges occurring prior to creation of the agency's expanded authority?

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- ! De minimis thresholds. Many, if not most, industrial, commercial, and agricultural areas likely have de minimis concentrations of various chemicals from past and present activities which likely pose no threat to human health and the environment. How would this de minimis concept be recognized and implemented by the agency.

- ! What consideration will be given to background soil concentrations and how will such background levels be determined uniformly recognizing varying geology and soil types in the state?

- ! How will FDEP utilize its already limited staff resources in implementing a new authority over the cleanup of soil, where no surface water or groundwater pollution from such contaminated soil is occurring?

- ! In the development of leachability-based SCTL's for some constituents, FDEP groundwater guidance concentrations are utilized. Are such SCTL's defensible from a scientific and legal standpoint?