

## Department of Energy

Washington, DC 20585

DEC 23 2003

### MEMORANDUM FOR DISTRIBUTION

FROM: EUGENE C. SCHMITT *Eugene C Schmitt*  
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ENVIRONMENTAL CLEANUP AND ACCELERATION  
OFFICE OF ENVIRONMENTAL MANAGEMENT

SUBJECT: Risk Based End States Guidance Clarification

The Assistant Secretary for Environmental Management issued guidance on September 22, 2003, for the preparation of Risk Based End State (RBES) Vision documentation as directed by the Department of Energy (DOE) Policy 455.1, *Use of Risk-Based End State*. The deadlines for comment on the draft and final Vision documents were recently extended to February 1, 2004, and March 30, 2004, respectively. To date, many DOE sites have responded to this direction with submittal of the required RBES Vision and, where required, information on the current site state. These submittals are currently under review by Headquarters staff, and the results of these reviews on the preliminary draft documents are being discussed via conference calls with site representatives.

Each site's RBES Vision is intended to enable readers to understand the current state of cleanup progress at the site and to understand one or more alternative end states that is sustainable, protective and accounts for appropriate future land uses. The RBES Vision needs to be stated explicitly and is to define clearly what the differences are between the currently planned and alternative end states. It is not intended to solely describe the current and planned actions, but rather to examine future actions based on alternative scenarios associated with land use plans, hazard information, and risk assessments. The documents reviewed to date do not meet these intentions, and this information is being relayed during the conference calls mentioned above. These comments alone will not be sufficient to align the documents with the guidance nor ensure that the RBES Visions will meet the intended purpose of providing the basis for decisions by the Assistant Secretary for Environmental Management on pursuit of changes to site baseline documents.

Review of more than a dozen RBES Vision documents indicates that portions of the *Guidance for Developing A Site-Specific Risk-Based End State Vision* dated September 11, 2003, have been misinterpreted or misunderstood. Reflecting on the guidance in light of the Vision document reviews also reveals that some areas of guidance could benefit from additional specificity, use of examples, or be further explained. Attachment 1 provides these needed guidance explanations. Note that this material is considered clarification, and not new guidance. Information for submission of revised documents is provided in Attachment 2.



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The RBES Review Team at Headquarters is committed to working with your staff from now through the deadline for submittal of the final Vision documents.

If you have any further questions, please call me at (202) 586-0755 or John Lehr, of my staff, at (301) 903-2011.

**Attachments**

**cc:**

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**December 2003 Clarification Addendum to  
GUIDANCE FOR DEVELOPING A SITE-SPECIFIC  
RISK-BASED END STATE VISION (DATED September 11, 2003)**

**INTRODUCTION**

Based on the review of the Risk-Based End State Vision (RBES) documents received to date, the following clarifications to the *Guidance for developing a Site-Specific Risk-Based End State*, dated September 11, 2003 (hereafter called the Guidance) are being provided.

The fundamental purpose of the RBES vision for a site is to depict a set of site conditions and associated information that will sustainably protect human health and the environment for the planned land use of the site property and its environs. **The RBES is not a decision document.** It provides a basic portrayal of site conditions in relations to which current regulatory and other values can be defined, described, and evaluated. It does not signal shortcuts around any current law or regulation. Once RBES visions are developed, the Department will further evaluate the cleanup activities and strategic approaches to determine if it is appropriate to pursue changes in site baselines. Identification of a different end state(s) as a result of RBES Vision development for a site does not necessarily signal an intent by the Department to change its planned course of action at the site. There are many factors that will contribute to any such decision, significant among them being the benefit that would accrue to the taxpayer, and the value of any improvement in protection of human health and the environment. The risk-based approach used to define RBES that are sustainably protective of human health and the environment will be developed with input from regulators, affected governments, and stakeholders. **If the Department ultimately decides to seek changes to the current compliance agreements, decisions, or statutory/regulatory requirements, those changes will be made in accordance with applicable requirements and procedures.**

**The Department expects that there will be variances between the RBES vision and the current cleanup plans for many of the sites in the complex.** These variances must be described in the RBES Vision. The intent of the RBES Vision document is to:

- Articulate an end state vision for the site that is risk-based, readily sustainable, appropriately protective of human health and the environment, and consistent with the site and surrounding area's planned land use(s).
- Identify the variances between that vision and the current site cleanup baseline end state. If the DOE Site manager believes that the currently planned EM mission end state for the site is risk based in whole or in part, then for those areas the end state must be described so that it is demonstrated to meet the elements shown in the first bullet above.

To assist DOE in comparing and evaluating the risk reductions associated with the current cleanup strategy and with the RBES Vision, sites are requested to document (1) the "current state of the site," (2) the "current cleanup baseline end state," and (3) the RBES Vision. Because the site will include visual depictions and discussions of the site, the surrounding areas, and the site hazards, the differences between the current state, the

current cleanup baseline end state, and the RBES Vision should be clearly documented. The current state is based on site conditions in 2003 rather than some point in the future. Detailed guidance for the format and structure of the current state and RBES Visions is provided in Appendix A, entitled Format for the RBES Vision Document of the Guidance document. Section 4.0 of this Guidance and its Appendix D, entitled Guidance on Variances Reporting, discuss the need to identify and describe any variances between the current cleanup baseline end state and the RBES Vision for the site. Figure 1 of this Addendum provides a conceptual diagram of the relationship between the current state of the site, the current cleanup baseline end state and the RBES vision.

### **Clarification of Terms**

The following are definitions to clarify what is meant by terms such as current state, risk-based end state, etc.

The **current state** is a portrayal of a site, as it exists in 2003. Current state descriptions should effectively communicate the nature of existing hazards including their concentration levels and the potential of these hazards to have an impact on human health and the environment. This impact should be in terms of potential receptors and potential exposure pathways.

The **current cleanup baseline end state** is the end state that the site would achieve upon executing its performance management plan (PMP). This end state is typically based on the requirements in Current Compliance Agreements or existing regulations. The timeframe for this end state is the current EM mission completion date for that site. However, activities that will continue after the EM mission completion date (e.g., pumping and treatment of groundwater) should be identified as such and the expected completion time for these activities should be identified.

The **risk-based end state (RBES)** is the end state that is based on the appropriate planned future land use and is protective of human health and environment for that land use. The end state should be sustainable and should be based on the risk scenarios and assumptions that are consistent with the future land use of both the site and the areas that bound the site. This end state should at a minimum describe any hazards remaining and their projected levels, potential receptors, and potential pathways for exposure and their barriers. The timeframe for attaining this end state is the current EM mission completion date for that site or for an accelerated timeframe expected to be achieved with the RBES.

*In developing the RBES, sites should consider all risks to be experienced among the different potentially affected populations. This "risk balancing" should consider risks to current and future on-site and neighboring off-site populations, workers responsible for achieving the designated remedy, and risks to off-site populations resulting from off-site transportation, treatment and disposal of contaminated materials. In addition, risks to ecological resources resulting either from habitat disruption through implementation steps, the final remedy status, or receptor pathways with respect to residual contamination should be considered. These risks should be described in the document for both the current cleanup baseline end state and the RBES.*

The **variances** between the RBES vision and the current cleanup baseline end state are the differences between the RBES vision and the current cleanup plans and/or regulatory agreements. These variances may be identified through discussions with regulators, the affected governmental organizations, adjacent landowners, and the public. Regardless of the approval status of the sites' current Performance Management Plans or current cleanup baseline, it is possible to identify variances between the current cleanup baseline end state and the RBES Vision. Sites should discuss and document any variances by identifying what changes would have to be made to the current site baseline to align the current baseline with the RBES vision. Appendix D of the Guidance provides details on what information needs to be included in the RBES Vision document. Figure 2 of this Addendum reiterates the summary table provided in Appendix D of the Guidance, which shows the information needed to describe the proposed variances, the potential impacts, the barriers in achieving the RBES, and recommendations on how to resolve the barriers. *At this time, it is not anticipated that sites will have completed new quantitative risk assessments for the RBES or new modeling efforts for the RBES by the time that their Final RBES Vision document is to be submitted (i.e., March 30, 2004). However, in describing the variances, if additional or new modeling or risk assessments are needed, one of the site's recommendations should be that the risk analysis work needs to be completed for the RBES to be fully validated and technically persuasive to regulators and other stakeholders.*

The **twenty year planning timeframe** described in section 1.2 of the Guidance refers only to the planning horizon that most local and state governmental organizations use for evaluating growth changes in the area in terms of population and needs for services such as roads, schools, etc. This provides a documented foundation for land uses, exposure scenarios, and other aspects of risk assessment in the RBES documents. As the RBES visions are developed these local planning documents should be evaluated to determine projected changes in the areas that bound the sites in terms of projected population growth, potential rezoning of areas near the site boundaries, and potential improvements to infrastructures (new or improved roads, new sewage and water lines, new schools, etc.). The document should provide information on any what the local zoning is for the areas bounding the site and then if there are any differences in the future zoning for the site and the projected future land use. For example, if the future zoning of the area is residential and the future land use is industrial this should be documented.

#### **Clarification for the Conceptual Site Models (Appendix C of the Guidance)**

Appendix C of the Guidance provides guidance on the Conceptual Site Maps and the associated narratives. Below are some clarifications to that guidance to improve the use of the documents to document their risk-based end state and to provide sufficient information for stakeholders to determine that the RBES Vision is still protective of human health and the environment.

- The Conceptual site models requested in the document are for the current site conditions in 2003 and for the RBES vision end-site. To use this document as a risk communication tool with regulators and stakeholders, it may be helpful to add a third conceptual site model depicting the current cleanup baseline end state so that it is

easy to understand the changes between the current proposed end state and the RBES end-state and how the RBES end-state remains protective of human health and the environment. It is the intent of the guidance that, at a minimum, the current cleanup baseline end state should be discussed in the narratives and is the basis for determining the variances that describe the change between the current cleanup baseline end state and the RBES.

- The CSM intent is that it describe all of the human health and ecological risks associated with current state and the RBES for each hazard area (and the current cleanup baseline end state if a CSM is completed). The CSM's depiction of each hazard area should present not only the risks associated with the cleanup activities but also the risks associated with the primary steps or processes required to complete the cleanup activities (i.e., the pathway to the end state), e.g., the type of risks to workers (i.e., radiation, chemical, traumatic injury), risks to ecosystems or ecological receptors, e.g., destruction of habitat, and risks to off-site populations, e.g., populations that may be affected during transportation of wastes or at an off-site disposal area.
- Narratives are intended to be consistent with the maps. There may be additional information included in the narratives that is not on the maps or on the maps and not in the narrative, however, the information that is on both must be consistent. Narrative for each of the CSMs should state the major assumptions or uncertainties for the risk analysis completed. (e.g., land use is industrial and the risk scenario is a worker on site for 8 hours a day, 5 days a week, 50 weeks per year, etc.)
- The purpose of the hazard area narrative guidance in sections 2.1 and 3.1.1 is to provide information concerning the technical basis to support the RBES Vision and the CSM, along with their assumptions and uncertainties. The hazard area description narratives are intended to provide sufficient characterization information about the contaminants remaining at the end state to provide a sense of the severity, persistence and availability of the contaminants as they affect risk. It includes discussion of the barriers used to control the hazard (risk reduction) demonstrating how the barriers will be protective in the context of the RBES, and control the availability of contaminants using active barriers and institutional controls. The CSM is not intended to be a discussion of regulatory requirements, but rather to explain the basis in risk for the regulatory or other requirement. If there is no compelling basis in risk for the requirement, the CSM narrative should note this fact and provide information to support a proposed variance as part of an alternative end state. For example: sites should identify the distinction between risk based approaches to establishing points of exposure versus regulatory points of compliance. The information can be presented in narrative form, and when appropriate, augmented with tables and charts. Sites should carefully read section 3.1.1 and ensure the requested information is provided. The following information is sought for each CSM and it can be presented in narrative and/or tabular format:
  - a. List of hazards/contaminants of concern and their concentration levels
  - b. Pathways to the environment

- c. Projected risk levels expected and/or concentrations expected after remediation
  - d. The basis in risk for existing requirements, or for regulatory limits to provide the risk context for the applied limit
- Citations are needed for the risk assessments and/or RI/FS documents that were completed for the site and provide the bases for the RBES vision. Appropriate documents may be referenced in the report with the full citation in an Appendix.
- To use these documents as a risk communication tool, each site should consider the following potential receptors. For those that are applicable, the exposure pathways should be identified and it should be clear if the exposure pathways are actual, potential or blocked:
  - Resident
    - Onsite resident (future resident scenario)
    - Offsite /fence line resident (including downstream, downwind, subsistence hunting and/or fishing, gardening)
  - Worker
    - Onsite indoor office worker
    - Onsite outdoor landscape or environmental worker
    - Onsite indoor/outdoor construction/infrastructure worker/demolition (include D&D)
    - Onsite outdoor remediation worker
  - Visitor
    - Recreational users of current or future on-site lands
    - Intruders and trespassers
  - Ecological
    - Onsite ecological receptors: ecosystem, plants, invertebrates/vertebrates, sediment, aquatic vertebrates, terrestrial vertebrates, threatened/endangered species
    - Offsite ecological receptors: ecosystem integrity, plants, invertebrates/vertebrates, sediment, aquatic vertebrates, terrestrial vertebrates, threatened/endangered species
- It is the intent of the guidance that it be clearly stated if any of the receptors listed above are not applicable for the site or were not evaluated in any risk analysis.
- If available, additional information on the plumes should be provided, i.e., depth of plume, extent of plumes, some measures of rate of movement of plumes offsite only to the extent that it aids the explanation of the risk basis for the end state under discussion.
- As stated in Section 2.1.5 of Appendix C, often more than one barrier or intervention may be needed to assure sustainable protection or safety for the potential future receptors depicted in hazard area of concern. A potential failure analysis for the barriers that block the receptors from the potential exposure pathways or for the

**institutional controls is needed. In addition, information for ongoing maintenance requirements should be provided for sites requiring institutional controls.**

## Refinements to Appendix B Mapping Manual

### **Appendix B, page B-1, 2<sup>nd</sup> paragraph of the Guidance:**

There has been some confusion regarding what should be included or shown on site context and hazard-specific RBES maps. Those sites that are expected to reach closure with the next 3-5 years are not required to prepare a set of current regional context, site context or hazard-specific maps. Many of these same sites, however, have prepared their required RBES maps without adequate consideration of what off-site infrastructure, land use, and population changes might occur over some reasonable period of time after closure, and which therefore could impact the land use and/or cleanup strategy being pursued. Similarly, many of those sites with longer closure horizons have not taken into consideration potential changes in off-site infrastructure, land use, and populations that might occur in this same time frame and possibly affect the land use and/or cleanup strategy they are pursuing. A twenty-year time frame is a reasonable planning horizon for most local and state government organizations, and such information should therefore be readily available to the sites and included on all RBES maps where appropriate.

### **Appendix B, page B-35 – Sections 5.1.1 (Land Use) and 5.1.2 (Land Cover)**

Several western sites have attempted to depict off-site grazing areas on their Regional Context, Site Context and Hazard-Specific maps. The Non-Agricultural Vegetated Land Cover category (RGB Value 144,238,144) should be used to depict such lands on all Regional Context maps. Unfortunately, no Land Use category or related color code is provided for use with Site Context and Hazard-Specific maps. It is recommended that sites use the Open Space/Recreational Land Use descriptor (RGB Value 144,238,144) for government-owned lands and the Agricultural category (RGB Value 34,139,34) for privately owned lands used for this purpose.

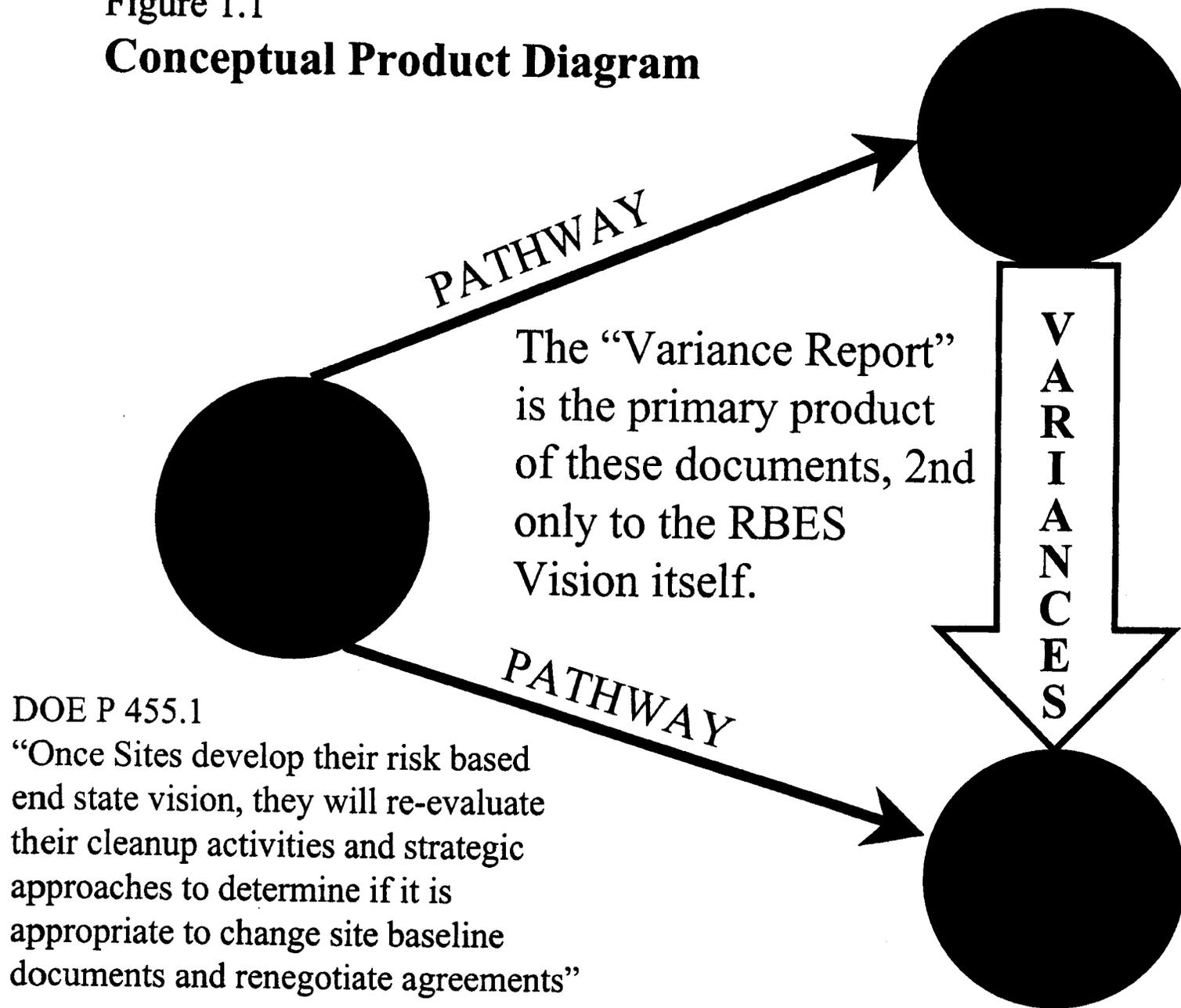
The land use category “Restricted Access” is intended to be used to depict a highly restricted contaminated area, where there are no ongoing activities aside from security and limited manual monitoring. Land use in areas that are restricted, but which have ongoing manufacturing or industrial activities, should be depicted by that land use categorization and color code.

### **Appendix B, page B-36 – Section 5.1.3 (Population Density)**

The colors representing the three lowest population density categories are too similar to one another, making it difficult to identify differences when looking at Site Context Map Set 3.4a and b. Therefore, use the following new RGB values for the population density:

Population Density	RGB Value
Population 10,000 +	160,90,20
Population 5,001-10,000	207,150,37
Population 1,001-5,000	252,190,110
Population 501-1,000	235,232,52
Population 151-500	252,250,180
Population 0-150	250,249,230

Figure 1.1  
**Conceptual Product Diagram**



**FIGURE 2 - EXAMPLE OF VARIANCE REPORT (APPENDIX PAGE D-2)**

Variance Report				
ID No.	Description of Variances	Impacts ( in Terms of Scope, Cost, Schedule and Risk)	Barriers in Achieving RBES	Recommendations
V- 1	The current agreement with state requires cleanup of area x to residential cleanup standard. Based on RBES vision, the area x is to be used as recreational areas. Area x is located in the middle of site and is approximately 30 acres.	<p>Cleaning to residential standard will require additional 10,000 cubic meters of soil to be excavated. Remediation of additional 10,000 cubic meters of soil will cost \$ 50 million dollars (including excavation, treatment and disposal fees).</p> <p>Remediation will take additional 6 months to complete the project.</p> <p>Risk assessment has not been completed for RBES.</p>	<p>State regulators insist cleaning up to residential standard per agreement.</p> <p>Local stakeholders are not fully onboard with RBES process and have not accepted new cleanup strategy for area x.</p>	<p>Requires EM- 1's involvement with state regulators and EPA Region x.</p> <p><b>Action :</b> Site manager will arrange a meeting between state regulator and EPA Region x Administrator.</p>
V- 2	The current baseline assumes D& D and complete removal of buildings xx to xxx. Based on the RBES, the area 2 where the buildings are located will be a restricted area with heavy industrial use to support the future mission by landlord organization ( NE) . Based on this, D& D and complete removal buildings is not RBES. Based on future use of the land, RBES supports entombment of the buildings in place.	<p>D&amp; D and complete removal of buildings xx and xxx will require \$300 million dollars (validated 2002 baseline). Entombment of buildings is expected to cost \$ 150 million dollars (estimated cost).</p> <p>It is expected to generate 20,000 cubic meters of LLW and MLLW. Entombment will greatly reduce the amount, but will require long- term institutional controls ( annual cost of \$100,000).</p> <p>Entombment can be completed by 2005 vs. D&amp; D/ removal schedule of 2008.</p> <p>No risk analysis has been performed to compare the two options.</p>	<p>State regulators insist D&amp; D and complete removal of buildings xx to xxx level per DOE' s previous agreement. However, preliminary discussion with State regulators regarding RBES, they have indicated that they are willing to discuss the issue.</p> <p>Landlord PSO (NE) has indicated that the entombment of buildings are acceptable based on expected future use of the site by NE.</p> <p>Local stakeholders are not fully onboard with RBES process and have not accepted the " entombment" concept.</p>	<p>Requires EM- 1's involvement with state regulators and EPA Region x.</p> <p><b>Action 1 -</b> Site manager will arrange a meeting between state regulator and EPA Region x representative.</p> <p><b>Action 2 - -</b></p> <p><b>Action 3 - -</b></p>
	Continue for each variance.	Continue for each variance.	Continue for each variance.	Continue for each variance.

**Figure 3**

Example of Summary for Hazard and Risk Information (fill-in to the extent that information is available)

**Table XXX. Human Health Risk Assessment Summary for Identified Hazard Areas**

Hazard Area	Land Use <sup>A</sup>	Risk <sup>B</sup>	Risk Scenario <sup>C</sup>	Contaminant Description	Representative Conc	Baseline Risk Level	PRG or Cleanup Goal	Basis for PRG or Cleanup Goal <sup>E</sup>	Actual or Expected Post-cleanup Conc. Or Risk Level
A	Industrial	Y	Residential	Cs-137 in groundwater under Disposal Pit 7	13 pCi/L	5 x 10 <sup>-4</sup>		Regulatory	
		Y		Nitrates in groundwater under Disposal Pit 7	120 mg/L	HI = 3	MCL		
		Y	Recreational	Mercury in Soil at Landfill 9	23 mg/kg	HI = 8.5	5 mg/kg	Risk-based calc. or Negotiated	
B	Recreational								

- <sup>A</sup> Industrial, residential, recreational, mixed use
- <sup>B</sup> Y – yes; N – no; NC – not characterized.
- <sup>C</sup> Residential, Industrial Worker, Recreational, Trespasser
- <sup>D</sup> List top five risk drivers.
- <sup>E</sup> Risk Based, Regulatory, Negotiated

**Table YYY. Ecological Risk Assessment Summary for Identified Hazard Areas**

Hazard Area	Land Use <sup>A</sup>	Habitat Setting <sup>B</sup>	Risk <sup>C</sup>	Contaminant Description <sup>D</sup>	Representative Conc.	Baseline Risk Level	PRG or Cleanup Goal	Basis for PRG or Cleanup Goal <sup>E</sup>	Actual or Expected Post-cleanup Conc. Or Risk Level
A	Recreational	Aquatic	Y	Mercury in sediments	12 ug/L	HI = 14	AWQC	Regulatory	
				Chromium in surface water	28 ug/L	HI = 22	AWQC		Regulatory

- <sup>A</sup> Industrial, residential, recreational, mixed use
- <sup>B</sup> Terrestrial, aquatic
- <sup>C</sup> Y – yes; N – no; NC – not characterized.
- <sup>D</sup> List top five risk drivers.
- <sup>E</sup> Risk Based, Regulatory, Negotiated

**December 2003 Clarification Addendum to  
GUIDANCE FOR DEVELOPING A SITE-SPECIFIC  
RISK-BASED END STATE VISION (DATED September 11, 2003)  
Submission of Revised Documents**

**DOCUMENT FORMATTING & CONTENT**

- Include new submittal date and revision number (v1, v2, etc.)
- To facilitate the fast and accurate review of your site RBES document, identify changes by either:
  - a. Including a separate document with each copy summarizing the changes made and a brief (2-4 paragraphs total) explanation for those changes (if you made drastic changes to the entire document), or
  - b. Indicating paragraphs/sections where significant changes have been made by highlighting, footnoting, or using another marking tool in those areas (if the majority of the document is the same).

**HARDCOPY SUBMITTAL**

- Use color (not black and white) for all maps and graphs in every copy sent out.
- When sending copies, follow previous guidance AND send 10 copies to John Lehr, Office of Core Technical Group.

**ELECTRONIC COPY SUBMITTAL**

- Post the updated draft in the form of a PDF file on the FTP site in the "RBES v2" folder and name your file "Site Name RBES v2" (example: Ashtabula RBES v2). Post the final draft in the form of a PDF file in the folder named "RBES FINAL" and name your file "Site Name RBES Final" (example: Ashtabula RBES Final).
- If the document includes more than one file (e.g. images, maps, etc.), create a sub folder to place all your image files in (example: Ashtabula RBES Images). If the document is in a single file, please post it in the main folder (example: RBES v2) with the other sites.
- If the file cannot be converted to a PDF, post it on the FTP site in any format and Headquarters will convert it to a PDF.

In addition to posting the document(s) on the FTP site, include an electronic copy with the hardcopies you send to John Lehr.