

APPENDIX K

Response to Comments

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*Industrial Area and Buffer Zone Sampling and Analysis Plan
 Response to Regulatory Agency Comments on Industrial Area Sampling and Analysis Plan and Buffer Zone Sampling and Analysis
 Plan Modification 1 – Appendix K*

CDPHE Comments on the Draft Industrial Area Sampling and Analysis Plan		
	Comments from March 7, 2001	Response
1	<p>1. Decision rules 2, and 3, mix the determination of PCOCs with the determination of AOCs. It would be clearer if the two concepts were separated as in the following:</p> <p>2. If all Analytical results are nondetections or are all below the background mean plus two standard deviations, a PCOC will be disqualified from further consideration; otherwise, the PCOC will be retained. Some inorganic and radionuclide concentrations may be below background levels but above Tier II ALs.</p> <p>3. AOCs will be determined based on the areal distribution of PCOC concentrations that are above detection limits and above background.</p>	<p>Decision rules 2 and 3 are distinct because Decision rule 2 refers to organic constituents and decision rule 3 refers to inorganic constituents. The determination of the AOC is explained in the Inputs to the Decision section of the DQOs and illustrated on Figure 15.</p>
1	<p>2. Response to DOE/KH's response to CDPHE comment 22.</p> <p>Example calculation showing the inequality of the EMC and the unity rule equation.</p> <p>In Section 5.3 Elevated Measurement Comparison, (equation 5.3) DOE/KH equated the EMC (elevated measurement concentration) with the unity rule equation, as follows:</p> $\frac{\text{EMC}}{\text{AL}} = \frac{\sum [95\% \text{UCL}_{\text{ipu}}] + \sum [(\text{Sample Result}_{\text{hs}} - 95\% \text{UCL}_{\text{ipu}})]}{(\text{AL} \times \text{Area}_{\text{ipu}})} \geq 1 \text{ (Indicates Remedy or Action)}$	<p>Equation 5.3 was written as a condition of taking an action that is consistent with the overall objective of the IASAP and RFCA. The condition of expression explicitly states that a remedy or action will be taken when the left-hand portion of the equation is greater than or equal to 1. The expression also implies that all values less than or equal to one require no remedy or action.</p> <p>The text was changed to indicate that if the EMC is greater than 1, action is indicated.</p>

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Action)	Area _{hs}
<p>As stated in our previous comment, it is incorrect to equate the EMC to the right hand side of this equation. Too many steps have been combined. We have no objections to the right hand side of the equation per se. It is simply the unity rule. If the sum of the ratio of the average concentration in an AOC to the action level plus the ratio of the average hotspot concentration to the action level for that size hotspot is greater than 1, then the 25 mrem dose standard will be exceeded, and an action should be triggered. However the EMC does not equal the right hand side of the equation.</p> <p>In order to be consistent with MARSSIM, for radionuclides, the $EMC = DCGL_{EA} = AL \times (DCGL_{hs}/DCGL_w) = AL \times \text{Area Factor}$.</p> <p>The easiest way to prove our point is by substituting numbers into the equation, as an example. Therefore let: $AL = 100 \text{ pCi/g}$, $95\% \text{ UCL}_{ipu} = 10 \text{ pCi/g}$, $\text{Sample result}_{hs} = 50 \text{ pCi/g}$, $\text{Area}_{ipu} = 20 \text{ m}^2$, $\text{Area}_{hs} = 5 \text{ m}^2$.</p> <p>If these values are substituted into the unity rule equation, (the right hand side of equation 5.3), one gets: $\frac{10}{100} + \frac{(50 - 10)}{(100 \times \frac{20}{5})} = 0.1 + 0.1 = 0.2$.</p> <p>This value, (0.2) is less than 1, therefore such a site would</p>	

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	<p>not exceed the 25 mrem standard, and an action would not be triggered.</p> <p>However, the elevated measurement concentration (EMC) should not be equal to 0.2 if the action level, (AL) is equal to 100 pCi/g, since a higher concentration should be allowable if someone were to be exposed to only a small hotspot area.</p> <p>Rather, the $EMC = AL \times \frac{Area_{ipu}}{Area_{hs}} = 100 \times \frac{20}{5} = 400$ pCi/g.</p> <p>Thus, it appears that DOE/KH's equation 5.3 has incorrectly combined the part of the equation which indicates that the standard is likely to be exceeded with the EMC. DOE/KH must correct this error.</p>	
<p>3</p>	<p>Comment 7.B.</p> <p>The response addresses sampling for radionuclides, but not non-radionuclides for which there is no scanning coverage method available. Part A of EPA's Data Usability for Risk Assessments (1992) specifies a minimum 90% confidence limit for non-radionuclides. Guidance in Part B of that document suggests 95% confidence limits for radionuclides. At the comment resolution meeting, it was suggested that there is a trade-off between greater data quality and increasing the probability of detecting a hotspot using HPGe scanning. Both could be achieved by decreasing the sample spacing and increasing the number of samples.</p>	<p>Biased, statistical, and geostatistical methods are currently described in the IASAP as methods to locate and characterize hot spot presence and extent. The statistical sampling grid is the only method that specifies an 11-meter grid consistent with a 90% confidence of finding a 10-meter hot spot (in accordance with MARSSIM). The IASAP methodology of a triangular grid and a hot spot of 10 meters will result in approximately 3,500 sample locations over 77 acres in IHSSs, PACs, and UBC Sites.</p> <p>The IASAP also incorporates biased sampling to target hot spots where process knowledge or existing analytical data indicate that small spills may have occurred. Biased sampling will be used as</p>

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		<p>necessary in IHSSs, PACs, and UBC Sites and will also be used to supplement the 11-meter grid sampling. The IASAP also incorporates geostatistical techniques that will be used as appropriate to determine sampling locations. The geostatistical technique is not tied to hot spot size, but to probability.</p> <p>The IASAP provides for grid coverages with a 90% confidence of finding a radionuclide hot spot, as well as provides statistical confidences for other constituents consistent with IASAP DQOs, i.e., at error rates of 10% to 20% (alpha and beta, respectively, and for both radionuclides and nonradionuclides). Further, in-situ gamma spectroscopy coverages would provide a measurement base (not a statistical base) of ~80% of the surface soil area, which is deterministic not probabilistic. The probabilistic uncertainties cited for DQOs are different than the de facto gamma spectroscopy areal scan coverages. IASAP confidences are consistently 90 to 95% (for alpha error) and consistent with specifications given in EPA, 1992. (The numbers cited from EPA, 1992 are derived differently than the IASAP DQOs, particularly in their relation to CVs and MDRAs. The IASAP DQOs are based on action levels, not background values [background values are related to the MDRAs as used in EPA, 1992]).</p>
4	<p>4. Comment 7.C. In the response to this comment, the exponent of the factor mentioned in the quote out of DOE Order 5400.5 is missing. The factor should be $(100/A)^{0.5}$. This Order also establishes an upper limit of 30 times the "appropriate limit for soil" on radionuclide concentrations. This limit should be included in the hotspot methodology. A limit is</p>	<p>The paragraph IV 4. In DOE Order 5400.5 is specific to radium and thorium hot spots. The Order further states that "guidelines for residual concentrations of other radionuclides shall be derived from the basic dose limits by means of an environmental pathway analysis using specific property data where available." The EMC calculation in the IASAP is consistent with DQOs and provides a</p>

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	<p>also appropriate for those non-radionuclides that have potential for acute toxicity. The action levels are based on chronic exposures over time and it is appropriate to average concentrations within a certain exposure area. Short duration (acute) exposures, however, may expose an individual to a portion of the entire exposure area, which may have elevated concentrations (a hotspot). If the contaminant of concern has a potential for acute toxicity, then an upper limit must also be applied to that contaminant. See the discussion on comment 22.E. below.</p>	<p>consistent and conservative approach to defining hot spots. Operationally, it is easier to have a consistent and conservative approach for all hot spots when many IHSSs are being characterized and remediated than an assortment of methods.</p> <p>In regards to acute toxicity, please see response to comment 5.</p>
<p>5</p>	<p>Comment 22.E. DOE's response to our original comment was insufficient. In the August 3, 2000 IASAP working group meeting, the State asked that the potential for acute toxicity be factored in to the evaluation of whether a hot spot should remain or not. DOE's toxicologist at the time, Win Chromec, agreed that this was important to do from a toxicity standpoint, and agreed to do so. However, DOE's proposal in the comment response to use an arbitrary number equal to 3 times the chronic action level has no toxicological basis. The basis for using 3 times the action level should be explained and a toxicologist should review this proposal.</p> <p>Furthermore, DOE's statement that "It would certainly be inappropriate to assess acute effects for sample results that just exceed the (chronic) action level" also has no toxicological basis. For example, ATSDR's acute duration MRL (minimal risk level) for DDT to produce</p>	<p>According to our meeting notes, DOE did not commit to using toxicity values or to review the toxicity values, but committed to consider the issue. Upon consideration of the issue DOE decided to use a 3 x the AL as the upper limit of hot spots. This decision was made because IA remediation and the sampling to support remediation is based on RFCA ALs, not risk assessment. The text has been clarified to state that "...when the concentration of a contaminant at a hot spot is three times the Tier I AL an action is indicated."</p> <p>As stated in the IASAP (Section 4.3.3) the decision whether a hot spot requires remediation is not part of the IA characterization or post-remedial sampling effort. The EMC is presented in the IASAP because the EMC is consistent with IASAP DQOs for data aggregation and evaluation. Potential cleanup issues, such as acute toxicity are not part of the IASAP scope. Interim cleanup goals for RFETS are the RFCA ALs or as defined in a decision</p>

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<p>noncancer effects via the oral route is 5 E-4 mg/kg/d, based on effects on perinatal development of the nervous system in neonatal mice, with behavioral neurotoxicity manifested in adult animals. The intermediate duration oral MRL (applicable to exposures ranging from 2 weeks to 1 year duration) for DDT is also equal to 5 E-4 mg/kg/d, based on liver lesions in rats. EPA calculated its chronic RfD based on that same study, to be equal to 5 E-4 mg/kg/d. Thus, for this chemical, the chronic RfD, the intermediate duration MRL, and the acute MRL are all equal. In other words, one could expect acute toxic effects to occur at the same dose as chronic effects. For this chemical, the 3 times value clearly does not apply.</p>	<p>document.</p> <p>The comparison to the ATSDR's acute duration MRL is not a valid comparison. The MRL is a measure of the "pure contaminant" and not a measure of the contaminant in soil. The MRL would need to be put in context of soil ingestion/inhalation so that a meaningful comparison can be made to RFCA ALs. The task of evaluating acute, intermediate, or chronic values and whether they should be incorporated into RFETS remediation goals will be conducted as part of the 2001 review of Action Levels and Standards Framework for Surface Water, Ground Water, and Soils (ALF).</p>
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CDPHE Comments on the Draft Industrial Area Sampling and Analysis Plan		
	Comment	Response
1	Page 2, Section 1.1 – This section and this document need to be more specific about how this SAP fits into the integration of functions (characterization, remediation, and closure) that occur in an accelerated action.	A diagram (Figure 2) has been added to illustrate how the IASAP and other IA Strategy elements correlate with the accelerated action process.
2	<p>Page 3, Section 1.3 –</p> <p>A) Any addenda to this SAP must be reviewed and approved by the regulatory agencies. We recognize due to the cyclical nature of the DQO's that multiple rounds of sampling may be conducted under a SAP Addendum. Once an addendum is approved it may be appropriate to work on a concurrence basis for the follow-up rounds of sampling. It is not clear how data will be reported to the agencies. The State and the site should discuss details of how real-time data used for decision making will be provided to the regulators.</p> <p>B) RFETS submitted revised language on this section, our comments on that revision are:</p> <ol style="list-style-type: none"> 1. Add bullets for the Elements of the IASAP which are applied and the Rationale for the use of the sampling methodology. 2. The methodologies (biased, Smartsampling, and statistical gridding) are not adequately included in this document. 3. There is no language in RFCAs to define what "non- 	<p>A) The Addenda approval process is currently being discussed with the agencies and Sections 1.2 and 1.3 of the IASAP have been revised to reflect these discussions.</p> <p>A data management system that will couple database and GIS capabilities is being developed. This system will allow the regulatory agencies and RFETS to view the same data at the same time so that proposed sampling locations can be discussed. A new section has been added to Section 6 to describe this system.</p> <p>B)</p> <ol style="list-style-type: none"> 1. A bullet stating that the "Sampling methodology for each IHSS, PAC, or UBC Site" was added to Section 1.3. 2. The IASAP Addenda will note what methodology was used to identify proposed sampling locations. The methodologies are described in the IASAP and are not re-described in the Addenda. 3. The phrases "non-concurrence" and "non-approval" do not

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	<p>concurrency” of the LRA means, however, “non-approval” is defined by a process in RFCA.</p> <p>4. We think 15 working days from the receipt of an addendum document is an attainable turnaround for approval.</p>	<p>appear in the Draft IASAP or in the revised text.</p> <p>4. As agreed with the regulatory agencies, there will be a 14-calendar day approval period.</p>
3	<p>Section 2.3.2 OU9 – Original Process Waste Lines - The test references Figure 4, which shows only the outside tanks. The process waste lines are shown in Figures 22 through Figure 25D, which should also be referenced.</p>	<p>This section provides an overview of the former OU 9 and is not intended to provide complete information on the OPWL. An additional figure, that shows the location of the OPWL, has been added.</p>
4	<p>Section 3.1.1 –</p> <p>A) This section has been reviewed with the understanding that some of the previous assumptions regarding Tier I and Tier II levels may change based the choice of restricted or unrestricted use action levels. Currently there is little or no difference between the Tiers for surface soils and subsurface soils. Based on the RSALs process and the Project Coordinator’s agreements the concentration values could be changed based on priorities set by those groups.</p> <p>B) How well are the MDL’s in Appendix D. known before the contract for each field method is completed?</p> <p>C) Inputs to the Decisions (pages 21 and 26) The following replacement text is suggested for items 4.f) and 6.f) in these sections respectively:</p>	<p>A) The IASAP DQOs will be reevaluated if RFCA Tier I and Tier II action levels change.</p> <p>B) Instrument MDLs proposed in Appendix D are currently being evaluated. If MDLs for proposed instruments cannot be met, other instrumentation with MDLs below RFCA Tier II values will be evaluated.</p> <p>C) The text has been revised to the suggested text, with the underlined changes:</p>

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For sites with soil data values exceeding Tier I and/or Tier II ALs, the spatial extent of the AOC will be established by delineating detectable contamination; i.e., PCOC values above the background mean plus two standard deviations for inorganics and radionuclides, and PCOC values above detection limits for organics. Additionally, PCOC values above Tier I ALs and PCOC values above Tier II Als will be delineated.

There is no lower limit on the size of an AOC; however, no single AOC will exceed (TBD; equal to the size of the smallest exposure unit used in the CRA) acres. Data will be aggregated over the AOC according to the decision rules. The 95% upper confidence limit (UCL) of the mean for each PCOC will be compared to the Tier I and Tier II ALs in order to make appropriate remedial decisions. When evaluation of a Tier I exceedance indicates an area of very limited extent (i.e., a hot spot), data aggregation may not be appropriate. The methodology for determining potential hot spots is described in Section 4.3.

For sites with soil data values exceeding Tier II ALs, the spatial extent of the AOC will be established by delineating PCOC values above the background mean plus two standard deviations for inorganics and radionuclides, and PCOC values above detection limits for organics. PCOC values above Tier I ALs and PCOC values above Tier II Als will be delineated.

There is no lower limit on the size of an AOC; however, no single AOC will exceed 10 acres or an approved EU. The process for determining the AOC is shown in Figure 15 and described below:

- Compare data for inorganics and radionuclides to the background mean plus two standard deviations, compare data for organics to detection limits;
- Establish AOCs based on the spatial distribution of data;
- aggregate data over the AOC according to the decision rules;
- Compare the 95% upper confidence limit (UCL) of the mean for each PCOC to the Tier I and Tier II ALs
- When evaluation of a Tier I exceedance indicates an area of very limited extent (i.e., a hot spot), data aggregation may not be appropriate. The methodology for determining potential hot spots is described in Section 4.3.

The 10-acre size for the AOC is as stated in the RFCA Appendix 3, Section 3.7.2.

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<p>D) Page 20 - Analyzing for a complete PCOC list is compatible with the site's desire to accomplish as much sampling as possible in one phase and would eliminate data gaps in the analyte by analyte evaluation for the CRA.</p> <p>E) Page 23 - The Decision Rules for characterization sampling could be simplified by assuming that action levels account for background levels; i.e., if a background level for an organic or radionuclide is higher than its Tier II AL, the background level becomes the de facto soil AL. This procedure is similar to the protocol for groundwater ALs (RFCA Attachment 5, 3.3.C.3). Comparisons to background or detection levels would then be superfluous to comparisons to ALs.</p> <p>F) Page 23 - In Decision Rule #5, it is unclear which PCOC in a sum of ratios that exceeds 1 becomes a</p>	<p>The determination of the AOC language is taken from the IGD.</p> <p>D) Soil in IA Groups will be analyzed for specific PCOCs when process knowledge or existing analytical data indicated that there is a restricted list of PCOCs for the group. In areas where process knowledge or existing analytical data do not indicate a restricted PCOC list, or there is no process knowledge or existing analytical data to constrain the list, analytes listed in the RFCA ALF will be included on the PCOC list.</p> <p>E) The DQOs, including decision rules, were developed with the regulatory agencies. The comparison to background and detection limits is specified for determining the AOC.</p> <p>F) The decision rules have been modified and a new figure (Figure 18) has been added to clarify when a PCOC becomes a COC (see attached figure and text). Decision rule #5 does not lead to an action, it leads to Decision Rules #7, 8, and 9 which incorporate the actions.</p>
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<p>COC. These DQOs do not incorporate our comment that the text should say, "some action has to be taken". Data evaluation and aggregation are not the only possible actions that should come out of this step.</p> <p>G) It is unclear what kind of data will be acceptable for the CRA, and what will not. Some sections differ from conclusions reached during meetings with the regulators.</p> <p>H)</p> <ol style="list-style-type: none"> 1. Section 3.1.3 Final Characterization of the Industrial Area for the Comprehensive Risk Assessment - Inputs to the Decisions (page 31) It is not clear exactly what kind of data from pre-demolition survey reports, or pre-remediation data collected for AL comparisons will be used for the CRA. More detail needs to be provided here. 2. Section 4.1 In-Process Sampling (page 35) This section seems to indicate that field data could be used for the CRA. This would only be acceptable if the field data has been demonstrated to be of similar quality and to attain similar detection limits as more standard laboratory procedures. This needs to be stated here. 	<p>G) Existing data that has passed through the Data Quality Filter and is consistent with risk assessment needs and new characterization and confirmation sampling data collected according to IASAP DQOs and passing the Data Quality Filter may be used in the risk assessment. The Draft CRA Methodology includes DQOs that specify data requirements.</p> <p>H)</p> <ol style="list-style-type: none"> 1. Existing data that has passed through the Data Quality Filter and is consistent with risk assessment needs and new characterization and confirmation sampling data collected according to IASAP DQOs and passing the Data Quality Filter may be used in the risk assessment. The Draft CRA Methodology includes DQOs that specify data requirements. 2. The statement "Field analytical instrument data will be used for the CRA if appropriate data quality can be demonstrated." has been added.
<p>5 Page 32 Section 3.1.3 – Which modeling studies are/will be approvable?</p>	<p>Text has been changed to "Data used for CRA modeling must meet Actinide Migration Evaluation (AME) modeling criteria" to</p>

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		be consistent with the Draft CRA Methodology.
6	The IA Data Quality filter needs to be included in this document.	The IA Data Quality Filter has been added after the first reference to the filter (Section 3.1.1).
7	<p>Section 4.3 Hot Spot Methodology (page 39) Three sections, 4.3, 5.2.2, and 5.3 deal directly with hot spots. It seems more appropriate and efficient to have all this guidance and protocol together in one section, then reference that section as necessary.</p> <p>A) This section states that separate hot spot methodologies will be discussed for each of the three area designations, but only one methodology is needed. Elevated Measurement Comparisons (EMCs) should only be necessary in Class 1 areas. Any direct measurement or sample that is $>DCGL_{EMC}$ (or the EMC for non-radionuclides) in Class 1 areas should be flagged for further investigation. If the elevated measurement is real, then any concentration greater than the $DCGL_{EMC}$ would be included in the calculation of the average hot spot concentration. "...[A]reas of elevated activity should not exist in Class 2 or Class 3 areas." (MARSSIM Rev. 1, p. 8-23) and "Measurements exceeding $DCGL_w$ in Class 2 or Class 3 areas may indicate survey unit misclassification." (MARSSIM Rev. 1, p. 8-22) Rather than applying a hot spot methodology to areas not expected to have action level exceedances, the IASAP should focus on clarifying and better defining the</p>	<p>Section 4.3 introduces the hot spot methodology and concepts. Section 5.2.2 is a description of the Tier I and Tier II comparison and is frequently referred to as a hot measurement test. This is not the Hot Spot Methodology. Section 5.2.3 describes the equations used in determining the hot spot. The equations were included in a Data Evaluation section so the reader would not get lost in equations before understanding the sampling and analysis process.</p> <p>A) This section discusses the hot spot methodology for the 2 designations within the IA. The third designation is the outer BZ and is discussed in the BZSAP.</p> <p>Three hot spot methodologies – one for the IA, inner buffer zone, and outer buffer zone were developed at the request of the regulatory agencies. RFETS staff agree that there should not be any hot spots in Class 2 or 3 areas. However, methodology was developed to assure the regulatory agencies that RFETS would not try to overlook potential hot spots in areas outside IHSSs, PACs, and UBC Sites.</p> <p>MARSSIM has been referenced and used as guidance where MARSSIM concepts are useful to the IASAP approach. Modifications to MARSSIM approaches were made because of the additional COCs (metals, VOCs, SVOCs) at the Site.</p>

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	<p>classifications and how areas can be re-classified. Action level exceedances in a Class 2 area should lead to further investigation. The result may be reclassifying the area of elevated measurements as Class 1 and increasing the sampling density.</p> <p>B) The IASAP appears to rely only on statistically placed grids or SmartSampling to determine where hot spots occur. Additional scanning, as recommended in MARSSIM is not included. Therefore, the level of confidence that hot spots not caught by the gridded sampling will not be as great for this methodology as it is for the MARSSIM methodology.</p> <p>C) DOE Order 5400.5 specifically puts a lower limit on the size of a hot spot, namely 25 square meters, so that there is an upper limit to the allowable concentration of a contaminant in a hot spot that can be left on-site. DOE Orders are "To-Be-Considered" during cleanups, apparently this criterion was not considered for the IASAP. What is the justification for not following this criterion? Incidentally, RAC recommended and Weldon Springs placed lower limits on the size (and therefore upper concentration limits) on hot spots.</p>	<p>B) The IASAP is consistent with MARSSIM requirements. The scanning coverage proposed in the IASAP for HPGe provides a 90% probability of detecting a hot spot. This scanning coverage is consistent with the 903 Pad characterization and is close to the MARSSIM required scan coverage of 100% for Class 1 areas. Additionally, this coverage is consistent with the IASAP DQOs.</p> <p>C) The requirements in DOE Order 5400.5 were reviewed and are incorporated in the IASAP. DOE Order 5400.5 does not actually put a lower limit on the size of a hot spot. It states that a hot spot methodology must be developed if areas of contamination can be less than 25 square meters. DOE Order 5400.5 Section IV.4.a.(1):</p> <p style="padding-left: 40px;">If the average concentration in any surface or below-surface area less than or equal to 25 square meters exceeds the limit or guideline by a factor of (100/A), [Where A is the area (in square meters) of the region in which concentrations are elevated], limits for "hot-spots" shall also be developed and applied."</p>
8	Page 41 Section 4.3.2 – The SmartSampling variogram range should be determined for each area and contaminant. What is the basis for the statement that it	The text has been change to the following: " The hot spot size of 10,000 m ² will provide appropriate sampling frequency and spatial information for SmartSampling analysis of the white

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	provides good correlation with the 10,000 m ² hot spot?	space and inner BZ.
9	Page 42 Section 4.4.1 – It would be helpful to summarize the procedures in this SOP as not everyone reviewing this document has easy access to the SOP documents. Will SOP's be developed for the field instruments? Since it is possible that bedrock materials could be contaminated as well, sampling methods for consolidated materials should be included here.	The text references Section 4.10, which includes sampling procedures. Procedures will be developed for field instruments. The use of hollow-stem augers is described in Section 4.10.2.
10	Table 4 – This table does not appear to be complete. Why are no samples listed for the Solar Evaporation Ponds IHSS when the table indicates sampling is complete? We would like to see an aggregation of this data with SmartSampling that demonstrates no additional sampling is needed. Other areas for which we believe there is sampling data do not indicate that it exists.	Table 4 has been updated. The Solar Evaporation Ponds have been extensively characterized through 2 RFI/RIs as documented in the IM/IRA. The Solar Evaporation Ponds' data will be used in an IA-wide SmartSampling analysis.
11	Page 53 Section 4.5.1 – The MDL and associated lab error must be below the Tier II action levels for confirmation samples to be taken with field instrumentation. For example the MDL of the field method for beryllium would not allow sufficient confidence for confirmation samples.	Field analytical instrument data will be used for confirmation samples if appropriate MDLs can be achieved and appropriate data quality can be demonstrated. MDLs include statistical error and are appropriate for comparison with RFCA ALs.
12	Section 4.5.2 Sampling Locations In the August 3, 2000 IASAP working group meeting, the State stated that a percentage of HPGE sampling needed to be supplemented with alpha spectrometry so that site-specific correlations could be determined. This comment was not incorporated into the IASAP document.	As stated in 4.5.2, correlation between field and laboratory instruments, including HPGe, will need to be demonstrated.
13	Page 59 Section 4.8.5 – We are concerned about the lack	Biased sampling at OPWL, NPWL, sanitary sewers, and storm

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	of detail in this section. We don't believe enough is known about the process waste lines to be able to characterize leaks with biased sampling. Not characterizing the interiors of the lines and leaving them in place may allow contaminants well above Tier I levels to remain in the subsurface environment. There is a high probability of failure for those structures before any radioactive contamination would decay to safe levels, therefore they should be characterized and treated as other subsurface contamination that has escaped containment.	drains provides a place to start the sampling process. As stated in Section 4.8.5, "This in-process approach will allow tracking of contamination along a pipeline...". Contamination found at, for example, a known leak, would be tracked in both directions from the leak. More detail on characterization of the OPWL, NPWL, sanitary sewers, and storm drains will be included in the appropriate addenda. Additionally, RFETS staff expects that there will be continuing dialog with the regulatory agencies about this issue prior to characterization. Remediation of the OPWL, NPWL, sanitary sewers, and storm drains will be addressed in the ER RSOP.
14	Page 62 Sections 4.9.1 to 4.9.3 – The information referenced here is not yet included in Appendix G.	The information will be included in the final draft.
15	Page 64 Section 4.10.2 – Surface vegetation may be removed but subsurface organic matter should be included in the soil samples	The text has been revised to indicate that surface vegetation will be removed.
16	Page 64 Section 4.10.3 – What provision will be made to keep contamination from migrating down a borehole and causing lower samples to appear contaminated?	As stated in Section 4.10.3, the exterior surfaces of soil samples will be "peeled" to remove material that is in direct contact with the sampler/corer. This will remove material that may have "migrated" down the borehole. Additionally, sampling equipment will be decontaminated between sample intervals.
17	Page 66 Section 4.10.4 – We are interested in the results and evaluation of the HDD and EMWD projects.	The HDD/EMWD fieldwork was completed in December. A report on the results will be completed when laboratory data becomes available.
18	Page 70 Section 5.1.2 – Level III and Level IV measurements are not defined for this calculation.	Level III data is field analytical data. Level IV data is laboratory analytical data. The text has been modified to clarify what kind

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		of measurements are included in the calculation.
19	Page 70 section 5.1.4 – How will the number of verification samples be determined when field or onsite analytical methods are not of adequate quality?	Quantity and comparability of verification samples will only be related to other samples that have had appropriate verification and validation. Rejected samples or results, i.e., samples or results of inadequate quality will not be used in evaluation of verification data.
20	Page 71 Section 5.2 – Although decision errors were previously mentioned it would be appropriate to restate them in this section and discuss their implication. It would also be useful to illustrate the discussion with probability diagrams for contaminants of interest such as beryllium and vinyl chloride showing the overlap of the analytical gray area (plus or minus 20% or 30% according to acceptable data guidelines) with the alpha and beta errors around the action level. Other diagrams such as cadmium, uranium, or plutonium can also be presented to illustrate how safe it is to make decisions based on the field instruments.	Probability diagrams, as well as other useful graphics, will be used as appropriate to illustrate gray regions and concentrations compared with action levels. These diagrams are graphical supplements. Statistical and/or numerical formulae will be used to calculate the numbers actually used in decisions and not the referenced graphs themselves.
21	Page 72 Section 5.2.1 – What level of geologic logging will be done for the many shallow boreholes that will be drilled?	Detailed geologic logging will not be performed. Soil color (GSA Munsell Soil Color System), type, contacts, changes, and other unique features will be described in the project logbook and archived in the data management system.
22	Section 5.3 Elevated Measurement Comparison - A) The elevated measurement concentration (EMC) is not equal to the equation listed on page 75. It appears that too many steps have been combined into one equation. The sum of the ratio of the average concentration in an AOC to the action level plus the ratio of the average	A) The process outlined in this section is consistent with the “Elevated Measurement Comparison” methodology in MARSSIM. The only differences are that the Tier I and Tier II ALs are being used as the DCGL _w and the contaminant-specific AL is being area weighted instead of area weighting

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hotspot concentration to the action level for that size hotspot does not equal the EMC. This sum should be less than 1 in order to make sure that the 25 mrem dose standard or any other action level will not be exceeded. However, it is incorrect to equate this sum to the EMC. The EMC, or $DCGL_{EMC}$ was defined by MARSSIM as the radionuclide-specific activity concentration within a survey unit corresponding to the release criterion. In other words, it is the concentration of a particular radionuclide in a particular sized hotspot that would result in a 25 mrem/y dose (or any other risk-based limit). MARSSIM calculates the $DCGL_{EMC}$ by multiplying $DCGL_w$ by the appropriate Area Factor for the hot spot size.

In order to be consistent with MARSSIM's definition, for radionuclides,

$$EMC = DCGL_{EA} = AL \times (DCGL_{hotspot} / DCGL_w) = AL \times \text{Area Factor}$$

For non-radionuclides,

$$EMC = AL \times (\text{Area}_{AOC} / \text{Area}_{hotspot}) = AL \times \text{Area Factor}.$$

The elevated measurement comparison should be done by directly comparing each measurement to the above appropriate EMCs. Equations 5-3 and 5-4 are used to indicate whether a remedy occurs or not; however they should not be equated to the EMC.

the $DCGL_w$ to obtain the $DCGL_{EMC}$.

B) A flowchart has been prepared (Figure 32) that outlines the

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<p>B) This section needs to clearly delineate the sequence of events that should happen during the elevated measurement comparison. This may be done best in a flow chart, should include the following steps:</p> <ul style="list-style-type: none">• Calculate an EMC ($DCGL_{EMC}$) based on the size of the grid area.• Do a point by point comparison to the appropriate EMC.• If a point is greater than the EMC, it should be investigated further, i.e.,• Is the hot spot real, or merely an anomalous analytical result?• If the hot spot is real, how big is it? (nature and extent of the hot spot)• If the hot spot is confirmed, recalculate the EMC for the specific area of the hot spot, A'.• Is the average concentration in the hot spot greater than the hot spot-specific EMC? (Using the area factor $F_{A'}$ for the area A', the average concentration in the area, A' (95% UCL on the mean) should not exceed the product ($F_{A'} \times DCGL_W$) in order for the survey unit to meet the release criterion. <p>C) Equations 5-3 and 5-4 use the terms $95\%UCL_{ipu}$ and $Area_{ipu}$. As stated in the second paragraph of this section, the applicable area is the AOC, not the generally drawn IHSS, PAC or UBC areas. The terms, therefore, should be the $95\%UCL_{AOC}$ and $Area_{AOC}$.</p>	<p>elevated measurement comparison process.</p> <p>C) The term ipu will be changed to AOC.</p>
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<p>D) Please provide a more complete rationale, such as written up in MARSSIM (Aug.2000) page D-22 & 23 for internal radionuclides that justifies the validity of simply comparing areas of the AOC and of the hot spot as a surrogate for the Area Factor for non-radionuclides.</p> <p>E) In the August 3, 2000 IASAP working group meeting, the State had asked that the potential for acute toxicity be factored in to the evaluation of whether a hot spot should remain or not. This document uses a value of three times the AL as an upper limit for re-evaluation, and states that this is consistent with RESRAD's release criteria. What is the basis for considering "three times" a chronic action level as safe from an acute standpoint across the board? It appears more toxicologically justifiable to evaluate the potential for individual PCOCs to produce acute effects.</p> <p>F) What are the standard units for the parameters in this equation?</p>	<p>D) For non-radionuclides, it is well established within the CERCLA risk assessment paradigm that an individual is exposed to contaminants across an exposure area. This is the basis for allowing the use of the 95% UCL of the mean concentration as the exposure point concentration for an individual in a CERCLA risk assessment. Therefore, using area weighting is an appropriate technique for non-radionuclides in an AOC. An AOC is a surrogate for the exposure area.</p> <p>E) The EPA endorses the use of an average concentration for the exposure point concentration in a number of guidance documents. As a matter of fact, risk assessments routinely use an average concentration for the exposure point concentration. Using an average for the exposure point concentrations is appropriate because an individual will randomly contact contaminants over a large area given a long exposure period. It seems to be a reasonable assumption that the upper end of contaminant concentrations could be 3 times the average concentration with no deleterious acute effects even if the average concentration equals the action level. It would certainly be inappropriate to assess acute effects for sample results that just exceed the action level. Toxicity will be evaluated in the CRA.</p> <p>F) The units for the analyte concentration and the action level need to be consistent so they cancel each other in the equation. The units for the area of the hot spot and the AOC need to be consistent so they cancel each other in the equation as well. Units will be added to the equation to</p>
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		illustrate this concept.
23	Page 77 Section 6.0 – The geologic data management system is not mentioned here or in Table 9.	The geologic data management system will not be used. A new data management system that integrates analytical data with GIS will be used.
24	Page 80 Section 6.1.7 – It is not clear here and elsewhere in this document what data or reports will be submitted for regulatory approval. Please include discussion of how and when evaluations of field data that lead to a decision to stop or continue sampling and remediation will be provided to the regulators.	A data management system is being developed that will allow the regulatory agencies and RFETS staff to view analytical data on maps. Final data summaries for each IHSS Group will be included in the Closeout report. Remediation decisions are describe in the ER RSOP.
25	Page 82 Section 6.1.9 - What classification system will be used for soil horizons?	The Unified Soil Classification System will be used.
26	Page 83 Table 10 – Is the GPS system able to provide accurate locations for closely spaced sampling grids?	Current, commercially available GPS systems are accurate to approximately 0.10 ft. K-H will require the characterization contractor to meet standard land surveying units.
27	Page 84 Section 6.1.11 - What is the current and/or anticipated future laboratory capability for radiological samples above the DOT criteria?	Appropriate laboratory capability will be assured. Samples above the DOT 2,000 pCi/g total radioactivity threshold will be shipped in accordance with hazardous materials transportation shipping regulations to offsite analytical laboratories.
28	Page 87 Section 9.0 - The State is especially concerned with H&S requirements for Beryllium.	DOE is concerned about H&S requirements for beryllium and has special H&S requirements for beryllium projects.
29	Figure 13 – The decision to disqualify a PCOC from further consideration should not be made before the nature and extent question is answered.	See response 4F.
	Figures 14 - It is also unclear how the last decision box in this flow diagram leads to “Remedial Decision” if the decision is “No.”	An additional decision diamond has been added to address analytical results greater than RFCA Tier I ALs.
30	Figure 15 - It isn't clear why the initial input (blue box) is	The initial input box has been changed to include existing

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	limited to "characterization sample analytical results". Won't confirmation sampling, plus any characterization sampling for areas where no remediation was necessary be the inputs here? Most of the characterization sampling will no longer represent the area where remediation has occurred since the locations will no longer exist.	analytical data as well as confirmation data.
31	<p>Figure 17- What are the inputs to this decision? In evaluating the remedial locations the cost to remediate to an ALARA level should be included in the decision.</p> <p>A) The NFA circles at the top of this flow diagram should be revised so they are consistent with the first two corresponding steps of Figure 18.</p> <p>B) The criteria for how the decision is made that "the data indicate a hot spot" needs to be specifically listed, e.g., spatial distribution, concentration > DCGL_{EMC}.</p> <p>C) References to the text would make all of the flow diagrams most useful.</p>	<p>An input box has been added to this diagram. Remedial costs are included in the ER RSOP as is the decision of when and how much to remediate.</p> <p>A) Figure 17 has been changed to be consistent with Figure 18.</p> <p>B) Figure 17 is for SmartSampling. The hot spot decision diamond is used to flow potential hot spot data into the EMC as SmartSampling is not necessarily used for hot spot evaluation.</p> <p>C) In the final draft, the figures will follow the text and will not be at the end of the document.</p>
32	Figure 18 - uses PCOC and COC inconsistently.	The inconsistency was fixed.
Comments on Appendix A, Draft Industrial Area Sampling and Analysis Plan Addendum Industrial Area Group 700-4		
1	Page 1 Section 2.0 - The locations within Buildings 771 and 774 should be located on the reference map.	Appendix A is included as an example of what an IASAP Addendum will look like. The IASAP Addendum for this IHSS Group will be based on building specific and existing data. An addendum for sampling within Building 771 is currently being developed.

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		<p>Figures 3 and 4 show where samples will be taken. Additional information on rooms within the buildings is UCNI classified.</p>
2	<p>Page 11 Section 2.0 – The nitric acid dumpster is not identified on any maps, there is one biased sample just to the north of a gray rectangle in the area described in the text, does the rectangle represent this dumpster?</p>	<p>The nitric acid dumpster is considered part of Building 771.</p>
3	<p>Map 2k-0404 is difficult to read and interpret. It is not labeled with a figure number although the text seems to reference it as Figure 2. The IHSS layer covers the building boundaries so interior and exterior IHSS's are hard to distinguish. Sometimes the IHSS is labeled with an IHSS number and sometimes with a tank number, this inconsistency makes it difficult to match the description to the location. Neither IHSS 124.1, 124.2, 124.3 or the associated tank numbers could be located on this map. It would be helpful to include the PCOC list for a tank or IHSS. The surface soil data posted seems to show several common soil parameters above the background plus two standard deviations and very few PCOC's. Perhaps there is another way to screen the data for this posting that eliminates the clutter caused by highly variable background parameters.</p>	<p>The figure number (2) has been added.</p> <p>The following changes have been made to the figure:</p> <ul style="list-style-type: none"> • The color of the UBC Sites has been changed; • IHSSs and PACs have been labeled. <p>The data was screened according the IASAP DQOs (Section 3.0 of the IASAP).</p>
4	<p>Page 18 Table 1- IHSS 124.1, 124.2, 124.3, and 125 - Why is only surface soil being sampled for these IHSS? Uranium and nitrate in solution are able to infiltrate to subsurface depths. All descriptions indicate there were liquid spills.</p>	<p>The IASAP Addendum for this IHSS Group will be based on building specific and existing data. An addendum for sampling within Building 771 is currently being developed.</p>
5	<p>Figures 3 & 4 – It appears that some gridded sample locations are the same as some biased sample locations,</p>	<p>Biased sample locations are based on the location of known leaks and OPWL. These locations will be revised as more is</p>

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	<p>what is the difference between the two types of samples? What do the irregular blue crosshatched areas represent? If these are lakes and ponds as indicated on the larger map have the sediments been sampled? If not, these areas should be included in the second round of gridded sampling.</p>	<p>learned about potential contamination through D&D characterization in the buildings. The gridded sample locations represent the standard statistical approach described previously in Section 4.2.2. As stated earlier, Appendix A is included as an example.</p> <p>The water features are part of different IHSS groups and will be evaluated as part of those groups.</p> <p>Areas outside of IHSS groups will be sampled as part of White Space sampling.</p>
6	<p>IHSS 150.1 - A biased sampling location is listed in the table but there is no sample location posted on the map. The existing data posted on the map does not include radionuclides. Why is this IHSS not included in the second round of grid sampling when the numerous contamination events are not specifically located within the area?</p>	<p>IHSS 150.1 has 8 sample locations biased to collect surface soil data and subsurface soil data about the OPWL beneath the IHSS. There are 10 existing samples locations with acceptable analytical data.</p>
7	<p>Section 3.0 - In general the sampling rationale has not been well developed in this document. Sampling methods should be specified in the addendum. The posted existing data does not provide any information on the PCOCs. The sample locations are generally located with no information as to where a biased sample will be collected. Information on why biased samples were located or how they will be chosen should be included. It would be helpful to number the samples and include a table with the rationale for each biased sample. Does biased sampling</p>	<p>The IASAP Addendum for this IHSS' Group will be based on building specific and existing data. An addendum for sampling within Building 771 is currently being developed.</p> <p>The sample rationale for each IHSS, PAC, or UBC Site was listed in Table 1. Each method is described in Section 4.2 of the IASAP.</p> <p>Existing analytical data greater than background plus 2 standard deviations for radionuclides as well as metals and detection</p>

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	<p>mean a single sample, a composite sample, or multiple locations based on professional judgment in the field? Will samples be removed from the borehole for analysis? How will they be collected? What sample size is needed? What analysis method will be used? What other analytes are included in the field sampling analysis besides the PCOC's?</p>	<p>limits for organics has been posted.</p> <p>Table 1 has been revised to include additional information.</p> <p>The figures show sample locations only. Sample numbering will be in accordance with established ASD procedures as described in Section 6.1.12 of the IASAP. Sample numbers are generated several weeks before the sampling event.</p> <p>A biased sample is a single sample, unless it is a borehole where samples will be collected every two feet as stated in Section 4.10.3 of the IASAP.</p> <p>Yes, samples will be removed from the borehole for analysis.</p> <p>Samples will be collected as described in Section 4.10.3 of the IASAP.</p> <p>Sample size is dependent on the analytes of interest.</p> <p>Analytical method is dependent on the analytes of interest. Please refer to Appendix D.</p> <p>PCOCs will be identified from process knowledge and existing analytical data. Data will be evaluated based on the DQOs to determine specific COCs for each IHSS, PAC, and UBC Site.</p>
8	<p>Section 6.0 - The initial characterization phase should include general screening sampling and not focus on a narrow PCOC list developed from process information, at this stage of sampling there are too many unknowns. Is a six-inch sample depth from below a building really</p>	<p>The initial beneath-building characterization will be targeted to identifying health and safety concerns.</p>

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	adequate to characterize what will be exposed when the building is removed?	
9	Appendix G Page 9 Section 3.1 – It is not appropriate to assume uranium contamination will have an equilibrium activity ratio. Depleted uranium is a common COC at the site and U234 could be found at concentrations greater than a 1:1 ratio with U238 would indicate.	All ratios used will assume the most conservative scenarios relative to decay (activity) ranges. Derivations of the ratio have been added to Appendix H text.

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CDPHE Comments on the Draft Industrial Area Sampling and Analysis Plan	
Comments from May 25, 2001	Response
<p>1</p> <p><u>Response to Comment 1</u> OK. It still seems simpler and more straightforward to write these two decision rules in a logical, stepwise progression: first determine PCOCs, then determine AOCs based on those PCOCs.</p>	<p>The determination of PCOCs is in decision rules 2 and 3 and at the end of each of the decision rule is the statement "AOCs will be determined based on PCOC concentrations detected above background." This indicates that the PCOCs are determined before the AOC is defined.</p> <p>Perhaps the confusion results from the AOC description in the <i>Inputs to the Decision</i> section that, according to DQO guidance, is before the decision rules.</p>
<p>2</p> <p><u>Response to Comment 22</u> OK. However, if there is more than one hotspot in an AOC, "a separate term should be included in the calculation for each area of elevated activity [or concentration]." (MARSSIM, Section 2.5.1.1)</p>	<p>In the Elevated Measure Comparison (EMC) the "j" term (which is summed) is the number of hot spots for a given COC. If there are 5 plutonium hot spots in an AOC they are summed in the EMC.</p>
<p>3</p> <p><u>Response to Comment 7.B</u> OK. The explanation provided in this response should form the basis of additional text.</p>	<p>Section 4.2.2, paragraph 4 has been rewritten as follows:</p> <p>A systematic sampling scheme will be used to identify and delineate hot spots within the areas of interest following procedures outlined in Gilbert (1987). Sampling locations will be positioned into equilateral grids, such as triangular grids, following the methods presented in Gilbert (1987), Gilbert and Simpson (1992), and Section 4.3. Triangular grid sampling provides uniform coverage of a sampling area and increases the chances of identifying an elliptical or circular hot spot (Gilbert 1987). The following assumptions apply to the proposed</p>

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		<p>sampling design:</p> <ol style="list-style-type: none"> 1. Samples will be collected on a statistical grid. 2. The sampled area is much smaller than the grid spacing. 3. Hot spots are circular or elliptical. 4. Hot spots will be defined. <p>After the grid interval is calculated for the specified area, a random-start grid overlay will be superimposed on a map of the IHSS, PAC, or UBC Site. In some cases, biased sampling will supplement the grid interval. This methodology provides grid coverage with a 90% confidence of finding a radionuclide hot spot, as well as provides statistical confidence for other constituents consistent with DQO error rates of 10% (alpha) and 20% (beta) for both radionuclides and nonradionuclides. Confidence levels are also consistent with EPA specifications (EPA 1992).</p> <p>Soil samples will be collected at the intersection of each grid according to the sample collection methods described in Section 4.10. Additional samples will be collected, as needed, to determine the size of the AOC. Sampling methods for each IHSS, PAC, and UBC Site will be specified in the appropriate IASAP Addendum.</p>
4	<p><u>Response to Comment 7.C</u> OK</p>	OK

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5 Response to Comment 22.E
 OK. The commitment to evaluate acute, intermediate, or chronic effects as part of an annual ALF review sufficiently addresses this concern. However, for any action levels that are adjusted in the future to account for acute toxicity, it would be inappropriate to apply a multiplier of 3 to determine an upper limit for a hotspot. The hotspot upper limit of 3x the Action Level could be illustrated in the examples in Appendix G.

The following text has been added to Section 4.3.3 and 5.3:
 The “three times the AL” concept will not apply to ALs that are based on acute toxicity.

The examples are only illustrations of how the equation works. A new paragraph has been added after the first paragraph of Appendix G.

Because the EMC includes an area-weighting component, results for very small hot spots may indicate action is not necessary for very high contaminant concentrations. To reduce this effect, when the concentration of the contaminant at a hot spot is three times the Tier I AL, action is indicated.

An additional example that illustrates the “three times the AL” concept has been added as Example 3 and the other examples have been renumbered.

$$\sum_{i=1}^n \left[\frac{1393.9}{4770.0} \right]_i + \sum_{j=1}^n \left[\frac{(15000_{hs} - 1393.9_{AOC})}{\left(\frac{4770 * 16}{1} \right)} \right]_j = .47$$

Additionally, the following text has been added:

The EMC calculation indicates that action is not required for this hot spot, however, as stated in Section 5.3 that action will be taken at three times the AL, action is indicated at this hot spot (4770 [AL] x 3 = 14310).

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6	<p><u>Response to Comment 7.A (January 12, 2001 comments)</u> MARSSIM establishes guidelines for setting sampling densities in Class 2 and Class 3 areas, and assumes that "...areas of elevated activity should not be present in Class 2 or Class 3 survey units" (MARSSIM, Section 2.5.1.1). MARSSIM avoids calling contamination in Class 2 and Class 3 areas "hotspots" and states that areas where contamination is found should be reclassified. That approach seems more straightforward than describing two different methods of designating hotspots in the two IA areas. The Class 2 Designations (Section 4.3.2) are based on a hotspot size 100 times the hotspot size in Class 1 areas (Section 4.3.1). The term "hotspot" is also used differently in Section 4.3 than in Section 5.3. The hotspots (Elevated Measurement Comparisons) described in Section 5.3 and Appendix G are areas of elevated activity/concentration within an identified AOC. Sections 4.3.1 and 4.3.2 describe the search for points of contamination, which may lead to establishing an AOC.</p>	<p>The hot spot methodology described in Sections 4.3.1 and 4.3.2 is used to determine the size of the sampling grid in IHSSs, PACs, UBC Sites, and White Space Areas. As Comment 6 correctly states, these sections describe the search for points of contamination and the Elevated Measurement Comparison in Section 5.3 describes areas of elevated activity/concentration within an AOC.</p> <p>Section 4.3 has been rewritten as follows:</p> <p>Hot spot size drives the grid density and number of samples for a given area of interest. To determine grid density for IA and CRA sampling, the Site has been divided into three areas based on the following criteria:</p> <ol style="list-style-type: none"> 1. IHSSs, PACs, and UBC Sites are areas of known contamination or have a potential for contamination (based on process knowledge or analytical data). 2. White Space Areas in the IA and inner BZ are considered areas that have a potential for contamination but the contamination is not expected to exceed RFCA ALs. 3. The outer BZ is considered a nonimpacted area not expected to contain contamination. <p>Sampling location methodologies for potentially contaminated areas and areas not expected to exceed ALs are described below;</p>
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sampling location methodology for nonimpacted areas is described in the Draft BZSAP (DOE 2001a).

Section 4.3.2

Areas in the IA White Space and inner BZ are not expected to have contamination above ALs and will be sampled to support CRA analyses. Surface soil in the IA White Space and the inner BZ will be sampled at grid points located based on Gilbert's methods and the probability of finding an area of elevated contamination. The area of the IA White Space and inner BZ is approximately 1,027 acres and a grid size of 2.5 acres has been chosen for the following reasons:

1. There is very little precedence in existing literature for determining grid size at DOE Superfund sites. However, MARSSIM provides guidance on the evaluation of land areas at radionuclide sites. MARSSIM defines land areas that have a potential for contamination as not greater than 10,000 m² in size. The IA White Space Areas and inner BZ are considerably larger (approximately 1,027 acres, 45 million ft², or 4 million m²) than a MARSSIM area of 10,000 m² (2.5 acres or 107,639 ft²). A grid size of 2.5 acres in the IA White Space and inner BZ would be approximately 0.2 percent of the area and provides a conservative method for determining contaminant distribution.
2. The grid design based on the 2.5 acre grid will augment geostatistical analysis by filling in data gaps between IHSSs, PACs, and UBC Sites.

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		<p>3. The grid size of 2.5 acres will provide appropriate sampling frequency and information for geostatistical analysis of White Space and the inner BZ.</p> <p>Areas with concentrations above RFCA Tier I and Tier II ALs will be evaluated, according to IASAP DQOs and methods described in Section 5.0, to determine whether contamination is present. Figure 26 illustrates the extent of the IA White Space and inner BZ Areas at RFETS.</p>
<p>7</p>	<p><u>Appendix E</u> For those analytes with MDLs greater than action levels, the site must propose an alternate detection method or propose a practical quantitation limit. The justification for the “disqualification” of each analyte must be reviewed and approved.</p>	<p>Where MDLs are greater than the AL, the MDL for the specific analytes listed in Tables E1 and E2 will be used to determine the extent of the AOC for those specific analytes. Additionally, the determination of an acceptable practical quantitation level (PQL) will be considered during the annual review of the ALF. RFETS staff will continue to research emerging analytical methods so that more sensitive analyses can be incorporated into the analytical instrument suite.</p> <p>As stated in Appendix E, PCOCs will be re-evaluated on an IHSS and AOC basis. The text has been modified as follows:</p> <p>Potential contaminants of concern (PCOCs) will be re-evaluated on an IHSS, PAC, or UBC Site basis during the IASAP Addendum development process to ensure that potential contaminants are not overlooked during sampling and analysis.</p>

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EPA comments on the Draft Buffer Zone Sampling and Analysis Plan	
COMMENT	RESPONSE
GENERAL COMMENTS	
1	<p>While EPA recognizes the statistical validity of the planned sampling strategy that is presented in this document, there is an additional need for independent verification sampling that will add greater validity to the entire site characterization and confirmation of remedial actions efforts. Therefore, EPA is proposing that it sample various locations throughout the project and that the samples obtained be sent offsite for analysis, at EPA expense, to labs of its choosing. EPA is in the process of developing its own sampling and analysis plan that would be coordinated with the Buffer Zone and Industrial Area Sampling and Analysis Plans developed by DOE's contractors.</p>
2	<p>We concur with the comment, and advocate independent verification sampling that is consistent with the regulators' oversight responsibilities. In our common endeavor to add greater validity to the entire site characterization, we also suggest that EPA's sampling and analysis techniques be comparable to those suggested in the BZSAP. For example, grab samples should be compared with grabs; composites with composites; random samples with random (vs. biased), etc. Consistency in sampling and analysis will allow more meaningful quantitative comparisons when parameters such as precision are calculated</p>
2	<p>This document does not include the 280 acre Wind Site southeast of the Highways 128 and 93 intersection on any of the maps or schedules presented, and therefore, apparently no further sampling of this area is contemplated by DOE. EPA believes that this area must be assessed in the same manner as other areas in the outer buffer zone, as per the methodology presented in this document. Previous sampling has been conducted in this area, and as a starting point, the data derived from this sampling should be assessed in the same manner as data that has been previously collected in other portions of the buffer zone. After this has been accomplished, further sampling will also be necessary to characterize the area for eventual inclusion in the Comprehensive Risk Assessment and with the rest of the site.</p>
	<p>The Wind Site is not considered part of RFETS (DOE et.al. 1996, Attachment 2), however, in the event contamination is found adjacent to this area within the boundary of the RFETS, the Wind Site may require additional characterization according to the BZSAP characterization methodology.</p>

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<p>3 This document proposes giving the regulatory agencies only 14 calendar days to review and approve the annual Buffer Zone Addenda that will specify sampling locations, methodology, PCOCs, etc, for each buffer zone group that will be addressed in the coming fiscal year. EPA believes that a 30 day period for review and approval is more reasonable and appropriate for this activity given the fact that these Addenda are likely to arrive at the end of a fiscal year when many other items are also due and given the annual addenda could in some cases be a large submission covering many areas of the site.</p>	<p>DOE will develop BZSAP addenda in consultation with the EPA and CDPHE and resolve issues with the draft addenda prior to submittal for agency approval. Therefore, DOE believes that a 14-day approval period (consistent with IASAP addenda approval period) is appropriate. However, the following sentence was deleted: "No response from the regulatory agencies during the 14-day period implies approval."</p>
SPECIFIC COMMENTS	
<p>1 Section 3.1.1, Characterization of IHSSs and PACs:</p> <p>In general, this section and its related flowcharts must be better written and coordinated. For example, in Figure 4, answering yes to decision rule #5 results in redefining PCOCs as COCs. However Figure 5 confuses this transition and needs to be revised. These decision rules are used on multiple occasions throughout this document, and therefore, spending the time to rewrite these rules would greatly improve the document. One way to improve the flowcharts would be to numerically correlate each decision diamond with its decision rule as shown in the text, so that the reader can more easily relate the two.</p>	<p>Section 3.1.1, Section 3.1.2, and Section 3.1.3 were discussed extensively and agreed upon by EPA and CDPHE as part of the development of preliminary DQOs (DOE 2000), the Draft Comprehensive Risk Assessment (CRA) Methodology (DOE 2000), and the IASAP (DOE 2001). DOE prefers to retain the agreed-upon language.</p> <p>Flow charts and decision rule text were revised to better correlate to one another. Decision rule numbers were added to the flow charts.</p>
<p>2 Inputs to the Decisions, Page 11:</p> <p>One of the comparison criteria listed here define Tier I or Tier II exceedances as the "<u>sum of the ratios</u> for either nonradionuclides or radionuclides is >1." Explain in detail how the <u>sum of the</u></p>	<p>The use of the SOR methods for data aggregation and comparison is based on the IGD, Appendix 3 to RFCA. Section 3.7 of the IGD specifies the use of the SOR for radionuclides</p>

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<p>ratios for nonradionuclides is calculated and give the rationale for using this method rather than merely comparing each soil data value with its action level. Use of the sum of ratios complicates nearly all of the decision rules that follow and the concept and the calculation needs to be clearly defined up front.</p>	<p>and nonradionuclides.</p> $SOR_{\text{rads}} = x_{\text{Am-241}}/y_{\text{Am-241}} + x_{\text{Pu-239/240}}/y_{\text{Pu-239/240}} + x_{\text{U-233/234}}/y_{\text{U-233/234}} + x_{\text{U-235}}/y_{\text{U-235}} + x_{\text{U-238}}/y_{\text{U-238}}$ <p>The SOR is calculated for radionuclides detected above background activities.</p> <p>Where x = concentration in soils and y = action level.</p> $SOR_{\text{nonrads}} = \sum (x_{i+1}/y_{i+1})_{\text{metals}} + \sum (x_{i+1}/y_{i+1})_{\text{VOCs}} + \sum (x_{i+1}/y_{i+1})_{\text{PCBs}} + \sum (x_{i+1}/y_{i+1})_{\text{SVOCs}}$ <p>Where x_{i+1} = concentration of constituent x_i in soils and y_{i+1} = action level of constituent y. The SOR is calculated for metals above background concentrations and organics above the method detection limit.</p>
<p>3 Study Boundaries, Page 13:</p> <p>Study Boundary item 3 states that “Soil will be considered from the land surface to the top of the saturated zone or the top of bedrock, as appropriate.” This definition must be further clarified, so that the reader understands what is meant by “as appropriate.” Perhaps this could be revised by replacing “as appropriate” with “whichever is shallower.”</p>	<p>Concur. The text “as appropriate” was revised to “whichever is shallower.”</p>

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<p>4 Decision Rules, pages 13 & 14:</p> <p>Rule 1 of the Decision Rules needs to be rewritten for better clarification because it is not clear what exactly is meant by “adequately documented” or how it is determined that a PCOC is “adequately documented.”</p> <p>Rule 3 needs to be more specific: this rule can only apply to inorganics and rads, since data is being compared to background, but this is not stated in the first sentence. Then, in the later sentences, background or background levels are mentioned, but it is not clear whether this refers to the mean or mean plus two standard deviations. This rule also refers to analytes which have background values that are greater than Tier II AL values. These analytes should be listed in a table showing their respective background values and Tier II AL.</p>	<p>Decision Rules were restructured and renumbered to represent actual data flow.</p> <p>Decision Rule 1 has been renumbered to Decision Rule 3. A PCOC is adequately documented if sufficient analytical data is available to determine whether and where remediation is necessary. Because IHSS and PAC sizes range from a 1-gallon spill to the 903 Lip Area, the data adequacy determination is made on a case-by-case basis and documented in the appropriate BZSAP addendum.</p> <p>Decision Rule 2 was renumbered to Decision Rule 1 and revised to: “ If all analytical results for organic compounds are nondetections, the compounds will be disqualified from further consideration, otherwise, the compounds will be retained as PCOCs. AOCs will be determined based on organic compounds having concentrations above detection limits.”</p> <p>Decision Rule 3 was renumbered to Decisions Rule 2 and revised to: “ If all data values for metals and radionuclides are below the background mean plus two standard deviations, the metal or radionuclide will be disqualified from further consideration. Otherwise, the metal or radionuclide will be retained as a PCOC.”</p> <p>These analytes that have background values greater than Tier II AL values are footnoted as “D” in Appendix E Table E-4. Background values are defined as the mean concentration plus two standard deviations.</p>

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<p>Rule 4 is confusing and needs to be rewritten. How about: If all data is less than Tier II AL (and lesser sum of ratios levels), no further action is required.</p> <p>Rule 5 could be rewritten as: If any data is greater or equal to Tier II AL, (or the sum of ratios levels) aggregate and evaluate data as per rules 7, 8, and 9. This rule is actually just making the same comparison and decision as rule 4.</p> <p>Rules 7, 8, and 9 are supposed to aggregate (evaluate) data for the purpose of determining whether remedial action is required or not. Presumably this is done to give a statistical basis and increase the validity of the sampling instead of simply determining whether any data exceed action levels, but this is not discussed. Therefore, somewhere in this document, discussion of the basis for these rules should be further explained, so that the reader can gain a better understanding of how the data is being evaluated.</p>	<p>Decision Rule 4 was revised to read: "If the sum of the ratios for either nonradionuclides or radionuclides considered separately is less than 1, calculated using the maximum concentrations for each PCOC across the AOC and Tier II ALs, no further evaluation is necessary in accordance with RFCA requirements. Otherwise aggregation and evaluation as described in decision rules 6, and 7 are necessary."</p> <p>The revised Decision Rule 4 combines Decision Rules 4 and 5; therefore, Decision Rule 5 has been deleted.</p> <p>Concur. The following text was included in Section 3.1.1, Characterization, Inputs to the Decision, 4 (f): Aggregate data over an AOC by first excluding data outside the boundary of the AOC from the data set. The resulting data set data will be aggregated using methodology presented in Section 5.2.1. The results for PCOCs will be used to calculate the 95% UCL of the mean of constituents for each depth interval. The 95% UCL will be used to calculate the ratios based on Tier I and Tier II ALs prior to summing ratios for radionuclides and nonradionuclides for evaluation in decision rules.</p>
<p>5 Section 3.1.2, Inputs to the Decisions, Page 16:</p> <p>Item 2 cites post remediation sampling locations based on RFCA and CRA requirements. The document needs to be more specific in regards to the requirements upon which this sampling would be</p>	<p>The method for determining post-remediation sampling locations is described in Section 4.5, Post-Remediation Confirmation Sampling. This methodology is in accordance with</p>

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based.	RFCA. CRA requirements are described in Section 3.1.3, Final Characterization of the BZ for the CRA in the BZSAP and the Draft CRA Methodology.
6 Study Boundaries, Page 17: Item 1 cites the IGD as the basis for determining the boundary of the AOC. This process needs to be completely explained in this document instead of merely citing another document.	The process for determining the AOC in accordance with the IGD is described in Section 3.1.1 of the BZSAP; <i>Inputs to the Decision</i> , Section 4 paragraph f and is illustrated on Figure 2.
7 Section 3.1.3, Final Characterization of the BZ for the CRA Study Boundaries, Page 22: Item 3 discusses grid spacing for ecological characterization. This subject needs to be verified and agreed upon as part of the ecological risk assessment discussions that are presently being scheduled. Therefore, it <u>may</u> be adequate, but it is also subject to revision at a later date and must be so noted in the text.	The following text was added to item 3: “The grid spacing for habitats other than the PMJM will be documented in a CRA Work Plan.”
8 Section 4.3.1, Potentially Contaminated Areas Items 2 a) and 2 b), Pages 29 and 30: In 2 a) the proposed grid spacing is stated as being 11 m or 36 ft., but in section 2 b) the proposed grid size is listed as being 10 m or 33 ft. It is assumed that 10 m is the correct grid size since this correlates to the field of view for the HPGe, but the example problem shown in Appendix J uses a 36 ft. grid size. This must be corrected so that the document is consistent throughout.	As stated in Section 4.3.2, Item 2 a) the grid size is 11 meters (36 ft); Item 2 b) the HPGe field of view is 10 meters (33 ft) The text in Section 4.3.1 2b was revised to reflect the correct grid size of 11 meters.

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<p>In addition, section 2 b) proposes that for IHSSs and PACs which are less than 10 m across, a minimum of 5 samples will be collected. The 5 sample minimum is a good idea but should also apply to larger IHSSs or PACs, since 5 samples would not be generated from a random start triangular grid size of 10 m for areas that are less than 25 meters in both directions.</p>	<p>The text was revised to reflect that a minimum of five samples will be collected for each IHSS/PAC/UBC at either biased or random sampling locations to ensure the site is adequately characterized.</p>
<p>9 Section 4.3.2 Areas Not Expected to Exceed Action Levels:</p> <p>The proposal to sample the White Space of the IA and Inner Buffer Zone using a 2.5 acre grid needs further explanation and illustration. Will one random start grid be laid over this entire area or will it be done in separate pieces? Will this sampling be performed during characterization of the IHSSs and PACs or afterwards? Providing a figure or figures that shows this area with samples located using the proposed 2.5 acre size grid spacing would allow a better understanding of the proposal.</p> <p>The last paragraph of this section states that AOCs (with concentrations > RFCA Action Levels) will be evaluated to determine whether <u>contamination</u> is present. Presumably, the word <u>contamination</u> in this sentence was meant to be <u>hot spot</u>, since by definition, anything exceeding action levels would be</p>	<p>The following text was added to Section 4.3.2 following the first sentence in first paragraph: "White Space Area sampling will be performed following characterization and remediation of IHSSs and PACs. IHSSs and PACs characterized under the BZSAP will be excluded from White Space Area sampling. Because the Inner BZ White Space Areas may change based on characterization and remediation, a map of proposed sampling locations has not been included. The map of proposed sampling locations will be provided in the BZSAP Addenda."</p> <p>The following text was added to section 4.3.2 following the first sentence in the second paragraph: The initial sampling node of the grid will be randomly selected and the grid will be laid over the entire White Space area.</p> <p>The word "contamination" was changed to "hot spot".</p>

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contamination.	
<p>10 Section 4.3.3 Elevated Measurement Comparison, Page 31:</p> <p>The concept presented here, that a hot spot may not need to be remediated due to the fact that it is small in areal extent, even though it's concentrations could exceed Tier I levels by as much as 2.9 times, does not make sense. It is understood that there is a need to evaluate hot spots in terms of <u>extent</u> for remediation and to provide a statistically valid method of doing so. To state that an equation will be used to determine if a hot spot will need remediation when concentrations are > Tier I action levels but < 3X Tier I action levels, introduces an obscure complexity to the situation that is intuitively unacceptable. The rationale for the EMC needs to be presented here in order to support its use. It is also stated that the decision as to whether a hot spot requires remediation is not part of the BZ characterization or post-remedial sampling effort. If is not part of this plan, then where is it to take place and why is it presented here?</p>	<p>The hot spot methodology was developed at the request of the regulatory agencies to assure that RFETS would not try to overlook potential hot spots in areas outside IHSSs, PACs, and UBC Sites.</p> <p>The hot spot may not need to be remediated because the risk from the hot spot is a function of the contaminant levels and exposure to a receptor. Therefore, small hot spots that will have a limited exposure area can have higher contaminant concentrations because the receptor passes through the area quickly. Larger hot spots must have lower contaminant concentrations because the receptor will take a longer time to pass through a larger area and be exposed for a longer period of time.</p> <p>The limit of 3 times the action level was proposed because CDPHE considered the "unlimited" values nonprotective if contaminants with acute toxicities were present. The 3 times the AL is consistent with the Residual Radioactivity Computer Code (RESRAD). The upper end of contaminant concentrations could be 3 times the average concentration with no deleterious chronic or acute effects even if the average concentration equals the action level.</p> <p>The EMC is presented in the BZSAP because the EMC is</p>

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	consistent with BZSAP DQOs for data aggregation and evaluation. While the data analyses are defined in the BZSAP, all remediation decisions are made under the ER RSOP or other appropriate remediation decision document.
<p>11 Section 4.4.1, Surface and Subsurface Soil Sampling, Page 32:</p> <p>It is stated here that subsurface soils will only be sampled where historical information and analytical data suggest contamination may be present below a depth of 6 inches. Without further clarification, this criteria for subsurface sampling could result in very few samples being taken below 6 inches depth. A characterization effort such as this needs to be more oriented to investigate, and assume that in almost all occasions when a spill or release occurred, it may have migrated more than 6 inches in depth. The basis for subsurface sampling needs to be rewritten and/or explained in more detail, so that we can be assured that adequate sampling for characterization is performed.</p>	<p>Unlike the IA, there is little evidence from either analytical data or historical information that subsurface contamination exists in the BZ. The BZSAP Addenda will contain sampling locations based on current site knowledge and will include subsurface sampling where contamination is suspected. If surface soil results indicate contamination to a depth of 6 inches, additional samples will be taken to characterize the extent of contamination. Additionally, if during remediation, stained soil, debris, or other evidence of additional contamination is found, it will be investigated.</p>
<p>12 Section 4.6 Characterization Sampling Strategy for Surface Soil in the Outer Buffer Zone White Space Areas, Page 41;</p> <p>It is stated in this section that the sampling grid spacing will be on the EU (exposure units) in the CRA methodology. More detail is needed here, i.e. how many samples will be required in each EU and what will be the size of the EU (CRA Methodology is planned to be in Appendix D, but not yet available).</p>	<p>The size of the EU is being discussed with the regulatory agencies. The number of samples required in each EU will be described in the CRA Work Plan.</p>
<p>13 Section 4.8, Sample Collection, Page 43;</p>	

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<p>The second sentence states that sampling activities may be modified or replaced if conditions are unsafe or cause the technique to be inappropriate. While EPA understands the need for this statement, it is also necessary for DOE to notify EPA and CDPHE of such conditions and receive approval for proposed changes to sampling activities.</p>	<p>DOE expects that EPA will be onsite and participating in the sampling effort on a real-time basis. Changes to the sampling approach will be made through the RFCA consultative process.</p>
<p>14 Section 4.8.5, Surveying, Page 47: What is the minimum acceptable resolution of the GPS instruments that will be used to locate surface soil sampling locations and boreholes? This should be stated here and in Appendix H, Quality Assurance Project Plan.</p>	<p>The minimum acceptable resolution for the GPS instrumentation is ± 0.5 feet for the northing and easting and ± 3 feet for the elevation. The Quality Assurance Project Plan was revised to include these specifications.</p>
<p>15 Appendix I, Linear Regression Analysis; The regression analysis of the in situ HPGe method results and the laboratory alpha spectrometry results from the 903 Pad Characterization demonstrates a strong correlation. While the methods do seem to strongly agree, caution must be taken when applying equations I-1 and I-2, shown on page 9 of this appendix. The correlation (i.e. equation) is based on upon 1) soil profile (66/33), 2) fifteen grab samples and 3) a weighted average from the grab samples. As a starting point, the calibration parameters derived from the regression analysis will be adequate, however, quality control samples must be collected as work progresses, to ensure and check the assumptions regarding soil profile and that the weights applied to grab samples are within instrument specifications.</p>	<p>The Site concurs that quality control samples be collected to ensure and check assumptions and weights applied to grab samples are within instrument specifications. Quality control samples for in-situ HPGe include source checks, duplicate in-situ measurements, and the collection of duplicate surface soil samples. Surface soil samples will be collected at a frequency of 1 surface soil sample for each 20 in-situ HPGe measurements. The quality control (surface soil) samples, which will be analyzed using alpha spectroscopy at an offsite laboratory, will be compared with the predicted values. These comparisons will establish overall precision, which addresses both random and systematic errors.</p> <p>There are many factors that influence the final reported values of</p>

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<p>Equations I-1 and I-2 should be modified to include 1) 95% UCL error term and 2) add a 20 % RPD, (see below). The equations show a strong correlation but there still are significant y intercepts and slope terms, thus the inclusion of UCL. Table I2 shows the RPD among several HPGe measurements taken at the same locations over time. These differences should be thought of as instrument uncertainty and included in Equations I-1 and I-2. Therefore, the modified equations would be:</p> $^{239/240}\text{Pu}_{\text{alpha spec}} = 3.24 + 8.08(xi) + e(95\%UCL) + 20\%RPD \text{ (for I-1)}$ $^{241}\text{Am}_{\text{alpha spec}} = 4.43 + 1.25(xi) + e(95\%UCL) + 20\%RPD \text{ (for I-2)}$ <p>$xi = ^{241}\text{Am}$ activity measured by the HPGe instrumentation</p>	<p>radiological contaminant concentration (pCi/g), including those parameters cited; however, all sources of error, both random and systematic, are captured within the linear regression, which, by definition, minimizes the total error within the sample set relative to the linear model.</p> <p>The purpose of field duplicates and resulting RPD values is to evaluate control of the sampling and analysis process within an acceptable range of tolerance ($\pm 35\%$); this tolerance is considered an acceptable DQO based on a typical target of 30% RPD for intralaboratory precision in soils; the field DQO of 35% must be more robust because it includes analytical (lab) error, field sampling error, and inherent heterogeneity between soil samples. Those samples failing the precision criterion will be rejected if project decisions are impacted (e.g., conclusion of contamination vs. noncontamination) or qualified if not (e.g., RPD exceeds 35%, but both results are well below associated action levels). The RPD (error) will be evaluated to determine its randomness over the project lifecycle; any systematic negative bias will result in associated qualification of the data.</p> <p>Given the general linear model established for the 903 Pad work and its high correlation coefficient, and coupled with systematic QC sampling that establishes repeatability, modification of the general linear model, as suggested in the comment, compromises accuracy of the model in an overly conservative fashion.</p> <p>The equations proposed in the BZSAP are acceptable for characterization and preliminary verification purposes. The 903</p>

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	<p>Pad data was evaluated using direct HPGe measurements, the best-fit line, and the 95% UCL of the best-fit line to estimate ^{241}Am and $^{239/240}\text{Pu}$ (as prepared for and measured by alpha spec). This evaluation is provided in Section 2 of the Characterization Report for the 903 Drum Storage Area, 903 Lip Area and Americium Zone Report. The conclusion: "Based on the representativeness of the $^{239/240}\text{Pu}$ to ^{241}Am ratio and the agreement with the historical alpha spectroscopy data, the best-fit regression line is the chosen model to standardize the HPGe results. The 95% UCL regression model would be inappropriate for accurately delineating the extent of radiological contamination within the Americium Zone."</p>
<p>16 Appendix E, Table E12; Table E12, Disqualified Analytes, needs better explanation. What is its purpose and why do some of the main COCs at Rocky Flats appear in this table, i.e. plutonium, uranium, tritium, etc.</p>	<p>Table E12, Disqualified Analytes, was prepared to eliminate analysis of compounds not identified as contaminants of concern or that do not have RFCA Soil ALs.</p> <p>The contaminants in question – "plutonium, uranium, tritium" are actually Pu-239, total uranium, and tritium. These radionuclides, or in the case of uranium - groups of radionuclides are now discussed as examples in Section 2.2 of Appendix E. The discussion presents rational why these radionuclides were disqualified from further consideration consistent with the five criteria listed in Section 2.1, Appendix E and presented below:</p>

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	<p>Pu-239 – Eighteen plutonium-239 (Pu-239 or Plutonium-239) results were identified with incorrect CAS Numbers. Site laboratories report Plutonium 239 and Plutonium-239/240 as CAS# 10-12-8.</p> <p>Total Uranium – appears in Table E12 because there is no RFCA AL associated with the grouped radionuclides. It does not exclude the analysis of uranium-233/234, uranium-235, or uranium 238 from future analyses.</p> <p>Tritium – appears in Table E12 because there is no RFCA action level associated with the radionuclide.</p>

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<p>Page 7, Section 2.2.1</p> <p>This section should also include a discussion of the faulting on site and the potential for faults to transmit water horizontally.</p>	<p>The BZSAP was prepared to collect surface and subsurface soil samples to compare to ALs. Groundwater flow and transport of contaminants are outside the scope of this document.</p>
<p>Page 13, Decision Rule 4</p> <p>This rule essentially makes Tier II levels a free release standard. All Tier II levels should be evaluated to ensure this is appropriate.</p>	<p>The decision states that if contaminants contained in soil are below Tier II ALs no evaluation, management or remediation of the AOC is necessary in accordance with RFCA requirements. However, this does not imply free release. The Tier II AL is not a free release standard because RFCA ALs are considered interim cleanup levels. Additional actions may be taken based on results of the CRA.</p>
<p>Page 14</p> <p>Refers to the Waterstone shared access data and mapping system. When will this be demonstrated to us?</p>	<p>RADMS is scheduled to be implemented during the first quarter of FY02. RADMS was demonstrated to the regulatory agencies on November 5, 2001.</p>

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<p>Table 1</p> <p>Trenches T-4 and T-12 are missing from this table.</p>	<p>Table 1 was revised to present IHSS/PACs that have either; not been accepted as an NFA, not proposed as an NFA, or require additional data (status based on the 2001 HRR Update) and may require characterization.</p> <p>Trench 4 is not included with the BZSAP because it has been accepted as an NFA.</p> <p>Trench 12 (PAC NE-1412) is included in Table 1 under IHSS Group NE/NW.</p>
<p>Table 4</p> <p>It appears the 'number of existing sample location' information is incomplete, for instance Trench T-1 should have more than one sampling location.</p>	<p>Trench 1 has been proposed as a NFA and therefore, references to Trench 1 in Tables 1 and 4 were removed.</p>
<p>Section 3.1.1 Characterization of IHSSs and PACs</p> <p>Decision rules 2 and 3 (page 13) mix the determination of PCOCs with the determination of AOCs. It would be clearer if the two concepts were separated as in the following:</p> <ol style="list-style-type: none"> 1. If all analytical results are nondetections and are all below the background mean plus two standard deviations, a PCOC will be disqualified from further consideration; otherwise, the PCOC will be retained. Some inorganic and radionuclide concentrations may be below background levels, but above Tier II ALS. 	<p>Decision Rules were restructured and renumbered to represent actual data flow.</p> <p>Decision Rule 1 has been renumbered to Decision Rule 3. A PCOC is adequately documented if sufficient analytical data is available to determine whether and where remediation is necessary. Because IHSS and PAC sizes range from a 1-gallon spill to the 903 Lip Area, the data adequacy determination is made on a case-by-case basis and documented in the appropriate BZSAP addendum.</p> <p>Decision Rule 2 was renumbered to Decision Rule 1 and revised to: "If all analytical results for organic compounds are</p>

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<p>2. AOCs will be determined based on the areal distribution of PCOC concentrations that are above detection limits and above background.</p>	<p>nondetections, the compounds will be disqualified from further consideration, otherwise, the compounds will be retained as PCOCs. AOCs will be determined based on organic compounds having concentrations above detection limits.”</p> <p>Decision Rule 3 was renumbered to Decisions Rule 2 and revised to: “ If all data values for metals and radionuclides are below the background mean plus two standard deviations, the metal or radionuclide will be disqualified from further consideration. Otherwise, the metal or radionuclide will be retained as a PCOC.”</p> <p>Analytes that have background values greater than Tier II AL values are footnoted as "D" in Appendix E Table E-4. Background values are defined as the mean concentration plus two standard deviations.</p> <p>Decision Rule 4 was revised to read: “If the sum of the ratios for either nonradionuclides or radionuclides considered separately is less than 1, calculated using the maximum concentrations for each PCOC across the AOC and Tier II ALs, no further evaluation is necessary in accordance with RFCA requirements. Otherwise aggregation and evaluation as described in decision rules 6, and 7 are necessary.”</p> <p>The revised Decision Rule 4 combines Decision Rules 4 and 5; therefore, Decision Rule 5 has been deleted.</p>
<p>Elements of the data quality objectives listed in Section 5.1.4 of the Draft ER RSOP for Routine Soil Remediation (September</p>	<p>The DQOs in Section 5.1.4 of the Draft ER RSOP are consistent with the DQOs in Section 3.1.2 of the BZSAP. Because the</p>

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2001), including the hotspot criteria, could be added to these decision rules.	BZSAP is the decision document for sampling and analysis the rules for remedial decisions are deferred to the ER RSOP or other appropriate decision document.
<p>Page 47, Section 4.9.1</p> <p>Discuss the hand off of groundwater contamination from BZ IHSS and PACs in more detail. What is the decision being made with this groundwater sampling? There are many more monitoring wells that are inactive, sampling those wells would be useful in determining contaminant trends in an AOC. A list of COCs should be developed for this sampling activity. The data should be compared to historic results. This planning needs to be coordinated with the Well Abandonment and Replacement Program (WARP) in Water Programs. Many wells are scheduled to be abandoned, if groundwater samples are needed to provide information to the remediation decision the BZ SAP schedule must be coordinated with the WARP schedule.</p>	<p>Groundwater sampling is outside the scope of the BZSAP because the BZSAP only addresses soil sampling. As stated in Section 3.1.1 of the BZSAP, <i>Study Boundaries</i>, "Soil will be sampled from the land surface to the top of the saturated zone...". Additionally, Section, 4.9.1 states "When active groundwater wells are located in IHSSs, PACs, UBC Sites, or areas being characterized, compliance staff may direct or perform groundwater sampling." The decision to sample groundwater wells and the relevant COCs in or near IHSSs, PACs, and UBC Sites will be made on a case-by-case basis. Wells needed for groundwater sampling to support remediation decisions or post-closure performance monitoring will not be abandoned.</p> <p>The text will be revised to "When active groundwater wells are located in IHSSs, PACs, or being characterized, ER or compliance staff may request further groundwater sampling through the IMP Program".</p>
<p>Page 53, Section 5.2.3</p> <p>How are the remediation goals referenced here selected?</p>	<p>Remediation goals are determined through the RFCA ALF and may be modified by other considerations such as surface water protection, ecological receptors, stewardship, and ALARA.</p>

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<p>Figure 14</p> <p>The data evaluation flow chart points to NFA but what if Institutional Controls are needed?</p>	<p>Institutional Controls are evaluated in remedial action decision documents and the Site's CAD/ROD.</p>
<p>Appendix C</p> <p>Page C-11 Trench T-11 does not have an IHSS or PAC number referenced and therefore can't be located on Plate 1.</p> <p>Page C-12 – This appears to be a place holding comment that was not completed, what does "(as appropriate)" mean</p>	<p>The IHSS identification number 111.8 will be included in the appendix.</p> <p>The "as appropriate" references will be removed.</p>
<p>Appendix E</p> <p>For those analytes with MDLs greater than action levels, the site must propose an alternate detection method or propose a practical quantitation limit. The justification for the "disqualification" of each analyte must be reviewed and approved.</p> <p>Table E-12 – Why are chromium, nitrate, cesium, Tl-208, plutonium isotopes, uranium and quite a few organics with detectable results in this list of disqualified analytes?</p>	<p>Where MDLs are greater than the AL, the MDL for the specific analytes listed in Tables E1 and E2 will be used to determine the extent of the AOC for those specific analytes. Additionally, the determination of an acceptable practical quantitation level (PQL) will be considered during the annual review of the ALF. RFETS staff will continue to research emerging analytical methods so that more sensitive analyses can be incorporated into the analytical instrument suite.</p> <p>Table E12, Disqualified Analytes, was prepared to eliminate analysis of compounds not identified as contaminants of concern or that do not have RFCA Soil ALs.</p> <p>The contaminants in question – "chromium, nitrate, cesium, Tl-208,</p>

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	<p>plutonium isotopes, uranium, and quite a few organics ” are discussed below:</p> <p>Chromium – Total Chromium results were disqualified in Table E12 because RFCA has action levels for only Chromium III and Chromium IV.</p> <p>Nitrate – Some nitrate results are disqualified because of incorrect CAS numbers.</p> <p>Cesium – Cesium results are disqualified because there is no RFCA action level for cesium in soils.</p> <p>Tl-208 – Thallium is disqualified because there is no RFCA action level associated with it in soils.</p> <p><u>Plutonium Isotopes</u></p> <p>Pu-238 – Plutonium-238 was disqualified because there is no RFCA action level for Pu-238 in soils.</p> <p>Pu-239 – Eighteen plutonium-239 (Pu-239 or Plutonium-239) results were identified with incorrect CAS Numbers. Site laboratories report Plutonium-239 and Plutonium-239/240 as CAS# 10-12-8.</p> <p>Uranium – Total Uranium appears in Table E12 because there is no RFCA AL associated with the grouped radionuclides. It does not</p>

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	<p>exclude the analysis of uranium-233/234, uranium-235, or uranium-238 from future analyses.</p> <p>Organics – Organic compounds appear in Table E12 because there is no RFCA action level associated with these compounds.</p> <p>Some of the contaminants in question will be discussed as examples in Appendix E, Section 2.2, Comparison with RFCA Action Levels. The discussion will present rational why plutonium (plutonium-238), uranium (total uranium) and tritium were disqualified from further consideration consistent with the five criteria listed in Section 2.1, Appendix E.</p>