RFCA Stakeholder Focus Group
September 27, 2000
Meeting Minutes

Introduction and Administrative

Reed Hodgin began the meeting explaining that the meeting room would be again be arranged as an open square table to foster better communication among the participants. Those who wished to join the conversation were asked to sit around the table; those who attended the meeting to answer technical questions or to observe were seated behind and around the square.

A participants list for the September 27, 2000 RFCA Stakeholder Focus Group meeting is attached (Appendix A).

Reed reviewed the Focus Group purpose.

Reed reviewed the agenda for this meeting.

The September 13, 2000 RFCA Stakeholder Focus Group meeting minutes were reviewed and approved with the following modification: Leroy More requested at the meeting that a peer review process be established for the Rocky Flats Radioactive Soil Action Level (RSAL) Review.

Leroy submitted to the Focus Group a paper describing the peer review process as recommended (Appendix B).

Reed reminded the Focus Group and the RFCA Agencies that two actions from the Agencies would be due at the next Focus Group meeting:

- The Path Forward for the Focus Group – Key Policy Questions to Be Addressed and the Time Frame for Discussion, and

- Report-back to the Focus Group on How Its Input is Influencing Decision-Making by the Agencies.

ADMIN RECORD

DOE, CDPHE, and EPA agreed to make these reports at the October 11, 2000 Focus Group meeting.

Clean up Alternatives Exercise

Reed Hodgin began the discussion by reviewing the Focus Group process for an initial evaluation of alternatives for the 903 Pad clean up. DOE presented a qualitative evaluation of four bounding alternatives for clean up of the 903 Pad at the last meeting. The members of the Focus Group left the meeting with a homework assignment to individually conduct their own qualitative evaluations of these and other alternatives. The group was to compare and discuss their results at the current meeting.

Reed had placed enlarged versions of the evaluation matrix on the walls around the room. One chart was provided for each of the original four bounding scenarios identified by DOE. He asked the members of the Focus Group to identify additional clean up alternatives and evaluation criteria and write them on blank charts.

Kathy Schnoor had identified two additional scenarios at the September 27, 2000 meeting:

- Soil excavation and removal to RSAL (Tier 1) plus engineered barriers except new pond at Indiana Ave.
- Soil excavation and removal to 10 pCi/g plus engineered barriers except new pond at Indiana Ave.

Leroy More identified two additional scenarios:

- Soil excavation and removal to 10 pCi/g plus engineered barriers plus Nearby or On-site Retrievable Monitored Storage (NORMS),
- Ultimate goal of long-term stewardship – technological development for cleanup to average background level.

Leroy provided a written description of the NORMS concept to the group (Appendix C).

CDPHE identified an additional evaluation criterion for the exercise:

- Secondary benefits.

This criterion was intended to capture spin-off benefits of an alternative, such as creation of wildlife habitats or recreational opportunities.

Leroy More also identified an additional evaluation criterion:

- Technology development.

This criterion was intended to evaluate the potential that an alternative would promote development of new technology for future "final" cleanup of the site.

After this activity was completed, the list of eight alternatives considered in the exercise was:

- Soil excavation and removal to RSALS (Tier 1) only,
- Soil excavation and removal to RSALS (Tier 1) plus engineered barriers,
- Soil excavation and removal to 10 pCi/g only,
- Soil excavation and removal to 10 pCi/g plus engineered barriers,
- Soil excavation and removal to 10 pCi/g plus engineered barriers plus Nearby or On-site Retrievable Monitored Storage (NORMS),
- Ultimate goal of long-term stewardship – technological development for cleanup to average background level,
- Soil excavation and removal to RSAL (Tier 1) plus engineered barriers except new pond at Indiana Ave.,
- Soil excavation and removal to 10 pCi/g plus engineered barriers except new pond at Indiana Ave.

The revised list of evaluation criteria included:

- Threshold Criteria
  - Protect human health and environment
  - Protect local off-site residents
  - Protect future on-site land user
  - Protect site workers
  - Protect transportation worker and public
  - Protect disposal site worker
  - Meet surface water quality standard – onsite
  - Meet surface water quality standard – offsite
  - Protect environment
  - Comply with ARARs (including Endangered Species Act)

- Balancing Criteria
  - Long-term effectiveness
  - Reduction of toxicity, volume, mobility
  - Short-term effectiveness
  - Implementability
  - Capital Cost (Remediation)

- Modifying Criteria
  - State acceptance
  - Community acceptance
  - Stewardship
  - Secondary benefits
  - Technology Development

Reed invited the members of the Focus Group to fill in the blanks in the wall charts, using the results of their individual evaluations. He defined four symbols to be used in the plotting exercise:

- Up arrow represents probable success in meeting the criterion,
- Down arrow represents probable failure in meeting the criterion,
- Horizontal arrow indicates that there is insufficient information to predict success at this point, and
- Question mark indicates a need for significant new information in order to have the discussion.

Before conducting the exercise, the group held a short discussion.

Mary Harlow indicated that there was as yet insufficient information about the alternatives for her to participate in the exercise – her arrows would all be "down" as a result.

Hank Stoval suggested that many criteria should be considered from both a short term and long term perspective. The process was changed to include two arrows in each box of the matrix – one for short term success in meeting the criterion and one for long term success in meeting the criterion.

It was emphasized that engineered barriers will eventually fail.

Leroy More was asked if the NORMS alternative would include storage of just waste generated as a result of remediation or other waste as well. Leroy responded that the alternative would include just remediation waste.

Hank Stoval indicated that he considered Monitored Retrievable Storage to be disposal and that the City of Broomfield would not support this option. Leroy responded that Monitored Retrievable Storage was intended as a temporary remedy only – until permanent action such as treatment could be taken.

Victor Holm indicated that modification of the water standard should be considered by the group. Hank Stoval responded that the City of Broomfield would not support changing the water standard and that the Water Quality Control Commission was the venue in which it should be considered.

Members of the Focus Group expressed concern that their answers would represent commitments and that the answers would be used out of context at later times. The representatives of the RFCA agencies emphasized that the inputs to this exercise would be considered "preliminary for discussion only" and would not be used out of context or construed as commitments from the members. They further stated that the agencies' evaluations were also "preliminary for discussion only" and did not represent commitments.

Members of the Focus Group asked Reed to review the purpose of the exercise. Reed responded that the exercise would help to prioritize the issues for discussion by the group and would identify areas needing more information to allow the discussion.

CDPHE indicated that explanatory comments were available for the agency's matrix evaluation. Those comments are included in Appendix D.

The members of the Focus Group then assembled around the wall charts and began filling in the matrices with their evaluations.

Discussion of Exercise and Path Forward

Following the exercise the group discussed how to proceed. Members of the group asked that the matrices be documented and analyzed. Reed Hodgin accepted the action to transcribe the results of the group evaluation and take a first shot at analyzing the results. He committed to try to have the matrices out via email by the end of the week.

Mary Harlow asked why ground water protection was not included in the evaluation criteria. John Rampe of DOE responded that the discussion to date had focused on plutonium migration and ground water in the vicinity of the 903 Pad was not a

contributor. Ground water will be a significant player when volatile organic compound contamination is discussed.

Victor Holm suggested that a method should be created to determine the level of confidence that a selected alternative will really work as designed.

It was suggested that more information is needed to evaluate worker risk and transportation risk.

Some members of the group indicated that the evaluation criteria did not have enough specificity to allow a good evaluation and asked that the criteria be better defined.

It was suggested that the group begin looking at the most conservative alternative and work from there.

A member of the group suggested that a round-robin discussion be held on each issue as defined by the individual boxes on the matrix.

It was suggested that the group examine the question: will increased excavation produce increased risks to workers?

It was suggested that the group examine the question: What will the status of public health protection be at closure under different alternatives?

Some members of the group stated that a better understanding of the candidate engineered controls is needed in order to continue the discussion.

Reed agreed to propose an agenda for the next Focus Group Meeting based on the Focus Group's comments and his analysis of the matrix results.

Radioactive Soil Action Level Update

Jeremy Karpatkin of DOE announced a RSAL conference call for Wednesday, October 4, 2000 at 3:00 p.m. MDT. He stated that there was not yet a call-in number, but that one would be announced before the call.

Jeremy briefed the group on the current activity to map out the public involvement process for the RSAL review. He stated that a plan and schedule would be available in the next few days.

Actions

The following actions were identified by the Focus Group:

- Definition of "Waters of the State" (Rich Horstmann, CDPHE)
- Briefing on Recovery and Revegetation after the Hanford Fire (Mary Harlow – City of Westminster)
- Briefing on Path Forward for the RFCA Focus Group (RFCA Agencies)
- Briefing on Influence of the RFCA Focus Group on Decision-Making (RFCA Agencies)
- Transcription of Matrix Exercise (Reed Hodgin)
- Analysis of Matrix Exercise (Reed Hodgin)

Adjournment

The meeting was adjourned at 6:35 p.m.

RFCA Stakeholder Focus Group
September 27, 2000
Meeting Minutes

Appendix A
Participants List

ADMIN RECORD

RFCA Stakeholder Focus Group
September 27, 2000
Meeting Minutes

Appendix B
LeRoy Moore Memo: "Peer Review for the Rocky Flats RSALs"

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RFCA Stakeholder Focus Group
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Appendix C
LeRoy Moore Paper "Nearby or On-site Retrievable Monitored Storage (NORMS) for Contaminated Soil Excavated at Rocky Flats"

ADMIN RECORD

RFCA Stakeholder Focus Group
September 27, 2000
Meeting Minutes

Appendix D
CDPHE
Explanatory Comments on CDPHE Evaluation Matrix

RFCA Stakeholder Focus Group
Attachment B

Title:	Meeting Minutes for September 27, 2000 Focus Group Meeting
Date:	October 4, 2000
Author:	C. Reed Hodgin AlphaTRAC, Inc.
Phone Number:	(303) 428-5670
Email Address:	cbennett@alphatrac.com

ADMIN RECORD

September 20, 2000

Dear Stakeholder:

The Rocky Flats Cleanup Agreement (RFCA) Stakeholder Focus Group will meet at the Broomfield Municipal Center at One DesCombes Drive, on September 27, 2000 from 4:30 to 6:30 p.m. A technical discussion meeting will be held in the Bal Swan room at the Broomfield Municipal Center from 3:00 to 4:15 p.m. The Focus Group meeting will be held in the Bal Swan and Zang's Spur rooms. As agreed to at the September 13, 2000 meeting, we will discuss alternatives for remediation of the 903 Pad. The agenda for the September 27 meeting is enclosed (Attachment A).

Members of the Focus Group will individually complete evaluation matrices and bring them to the meeting. The Focus Group will discuss the individual results, looking for areas of agreement and disagreement.

The Focus Group will identify areas where further information is needed to allow discussion as well as areas to prioritize for further discussion.

The meeting minutes from the September 13, 2000 RFCA Stakeholder Focus Group are enclosed (Attachment B). Also enclosed are the following water quality related background materials requested by the Focus Group at the September 13 meeting or identified by the RFCA agencies:

- Remedial action alternative selection (DOE / K-H, Attachment C)
- Information regarding operation of surface water sampling equipment (DOE / K-H, Attachment D)
- Negative Activities and Concentrations (DOE / K-H, Attachment E)

You are encouraged to attend the technical discussion session for these materials that will occur in the Bal Swan room at the Broomfield Municipal Center from 3:00 to 4:15 p.m. on September 27, 2000. We will have subject matter experts available to answer any questions on the packet information.

ADMIN RECORD

(Over)

Also, DOE would like to discuss the status of the Radioactive Soil Action Levels (RSALs) review process at the technical meeting.

Please complete the enclosed alternative template (Attachment F) with modifications to the alternatives presented at the September 13 meeting, or create your own alternatives, such as monitored retrievable storage, and bring it to the September 27, 2000 meeting to discuss. You should include in your analysis:

- Which comparisons of alternatives to evaluation criteria are most important?
- Which comparisons of alternatives to evaluation criteria require a great deal more technical discussion or backup?
- Are there any alternatives beyond excavation and engineered barriers you believe that the agencies and the Focus Group ought to consider?
- What criteria should be added to the matrix?

If you need additional information to prepare you for the Focus Group discussion on September 27, please contact the subject matter experts listed in the packet, or call Christine Bennett of AlphaTRAC, Inc. at 303 428-5670 (cbennett@alphatrac.com). Christine will help to find the appropriate resource for you.

Please visit the RFETS RFCA Stakeholder Focus Group website at www.rfets.gov and click on **Stakeholder Focus Group** to access background information, meeting minutes, etc. electronically. You may call either Christine or me if you have any questions, comments, or suggestions concerning the RFCA Stakeholder Focus Group or the upcoming meeting.

Sincerely,

C. Reed Hodgin, CCM
Facilitator / Process Manager

RFCA Stakeholder Focus Group
Meeting Agenda

When: **September 27, 2000, 4:30 - 6:30 p.m.**

Where: **Broomfield Municipal Hall, Bal Swan and Zang's Spur Rooms**

4:30 Introductions and Agenda Review

4:40 Presentation and Discussion of Evaluation Matrices for 903 Pad Clean-up

6:10 Topics for Upcoming Meetings

6:20 RSAL Update (DOE, EPA, CDPHE)

6:30 Adjourn

ADMIN RECORD

RFCA Stakeholder Focus Group
Attachment C

Title: Remedial Action Alternative Selection

Date: September 20, 2000

Author: Lane Butler
Kaiser-Hill Inc., LLC

Phone Number: (303) 966-5245

Email Address: lane.butler@rfets.gov

ADMIN RECORD

RFCA Stakeholder Focus Group
Attachment C
Remedial Action Alternative Selection

Introduction

At the last Stakeholder Focus Group Meeting, the discussion focused on selection of remedial alternatives that would meet the RSALs and Surface Water Quality Standards balanced against the nine CERCLA criteria. DOE and Kaiser-Hill provided four example remedial alternatives with preliminary, qualitative evaluations against the nine CERCLA criteria to illustrate the alternative identification, relevant relationships and the selection process. Using the same process, the focus group agreed to provide separate qualitative evaluation against the CERCLA criteria for the four example alternatives and for any additional alternatives of interest. The focus group requested additional definition and information about the CERCLA criteria and potential components of remedial alternatives. More specific and quantitative information was requested regarding long-term and short-term risk.

Technical Summary

Template Criteria Discussion

Definitions of the nine CERCLA criteria were provided in the last meeting and are included on the template for completeness. Additional definition is provided below to supplement those definitions.

Protection of Human Health and the Environment: The definition provided in the handout provides little explanation of the various segments of human health that must be protected. Below the human health and environment segments for the 903 Pad are broken out separately to explain how the evaluation template was used.

Protection of Local Off-site Residents: Risk to off-site residents may be considered a long-term risk based on the residual contamination left at the site. This segment is primarily focused on exposure routes via wind and surface water. For example, if a remediation scenario cannot guarantee that the surface water standard will be met, the long-term the risk to an off-site resident would be inappropriate (i.e., result in a downward arrow). This risk should not be confused with the long-term risk to the actual land-user.

Protection of Future On-site Land User: This segment is focused on exposure to the future land user. Currently under RFCA the land use is specified as open space and industrial use, with pending legislation to make the site a wildlife refuge. The primary exposure routes of exposure for the future land user are soil and surface water.

Protection of Site Workers: This segment consists of the workers who will actually perform the remediation at the site. Protection of the workers is of prime importance to DOE and Kaiser-Hill. An integrated safety management system will be implemented with health and safety plans for remediation projects to provide proven methods to protect the workers. However, all industrial activities carry inherent risks and zero risk can only be achieved with zero activity. Risk includes potential exposure to contaminants, but the primary risk is industrial accidents, such as accidents with heavy equipment. Therefore, it is imperative that appropriate risk reduction in other segments adequately offset these imposed risks.

Protection of Transportation Workers and Public Exposed to Transportation Risks: This segment consists of the drivers and public during transportation of waste generated during remediation. Mitigation and risk reduction of this segment is very challenging. While safety programs include proper training, procedures, inspections, and preventive maintenance, DOE and the contractors have no control of the actions of others on the road.

Protection of Disposal Site Workers: This segment consists of the workers who will unload the waste from the transport vehicles and place the waste in the disposal site. An integrated safety management system will be implemented to provide proven methods to protect the workers. However, all industrial activities carry inherent risks and zero risk can only be achieved with zero activity. The primary risk in this segment is industrial accidents.

Meet Surface Water Quality Standard On-site: On-Site Water Quality is closely linked to protection of the health of the future land user and the environment. It is also considered as part of meeting the ARARs since it will be a requirement under RFCA. If a given remediation scenario, such as remediate to Tier 1 only, cannot guarantee the water standard will be met, that scenario may not be deemed effective. Definition of where and how this standard will be measured on-site has not been resolved.

Meet Surface Water Quality Standard Off-site: Similar to the on-site water quality, off-site water quality must meet a standard that is deemed to be protection of the environment and the local off-site resident. It is also considered as a part of meeting the ARARs.

Protection of the Environment: This segment includes protection of other environmental resources such as the tall prairie grasses and habitat of wildlife. Generally, protection of the Prebles Meadow Jumping Mouse would be included. However, for this exercise we have included the Threatened and Endangered Species Act as part of the ARARs as a separate criteria.

Compliance with ARARs is defined in Attachment F.

The balancing criteria are defined in Attachment F. For this exercise, the cost was divided into (1) capital or remediation cost and (2) operation and maintenance or stewardship cost. Capital cost should be considered as the initial cost for implementation of the remedial alternative. Operation and maintenance cost is the long-term stewardship cost to operate and maintain the remedial alternative. This consists of any subsequent actions required including institutional controls.

The modifying criteria are defined in Attachment F.

Stewardship is not a CERCLA criteria, but has been added to this exercise at the request of the focus group. This criteria has reference to long-term stewardship actions that may or may not be required following implementation of a remedial alternative. It is assumed that less follow-up actions required for an alternative are better than more.

Alternative Development Discussion

The four example alternatives presented at the last stakeholder meeting were developed to consider soil excavation for protection of the land user with engineered barriers for protection of surface water. Examples of potential improvements to the alternatives were presented. The following provides additional detail on the potential improvements.

Variable Cleanup Levels Based on Erosion Potential: The example alternatives were presented as "bounding" alternatives and considered removal of source at Tier 1 as a "minimum" excavation case and 10 pCi/g as a "maximum" excavation case. The maximum case assumed removal of all contaminated soil at the 903 Pad above 10 pCi/g regardless of where it was located. This potential improvement would consider cleaning up to some base level, such as Tier 1, and then excavating to a much lower level on the erodable surfaces. In this way, surface water protection is enhanced, while waste generation and the associated handling by the workers and the transportation industry is reduced from the maximum excavation case.

Stabilization Techniques: This concept is based on stabilizing residual plutonium contamination to prevent erosion into surface water. Examples of this may be surface grouting with various agents such as phosphate-based cements, enhanced vegetation, soil fixants, and physical erosion controls such as rip rap.

Precision Excavation Techniques: Generally, industry practices for minimum excavation depth using standard equipment and methods is six inches, due to equipment limitations. In most areas around the 903 Pad, the soil contamination is only in the top inch or two. Identification of innovative excavation methods to minimize the soil removal could significantly reduce waste volumes and the associated handling by the workers and the transportation industry. As a result both long-term risk to land users and short-term risk to workers and public during excavation, transport, and disposal could be substantially reduced.

Soil Screening for Waste Volume Reduction: Surface soil at Rocky Flats consists of sands and clays mixed with significant amount of rock. Plutonium contamination at the 903 Pad has been determined to be bound in the small soil particle fraction rather than the rocks. The small particle fraction is also most susceptible to erosion. Significant waste volume reduction can be achieved by simple screening of the soil to remove the larger rocks from the waste soils. This method could significantly reduce waste volumes and the associated handling by the workers and the transportation industry. As a result both long-term risk to land users and short-term risk to workers and public during excavation, transport, and disposal could be reduced.

Capping and Covering: Capping or covering of residual contamination could be used in conjunction with soil excavation to minimize the waste. Capping is similar to stabilization in that the contaminant residual is not removed, but placed in a more stable configuration to prevent migration off-site.

RFCA Stakeholder Focus Group
Attachment D

Title: Information Regarding Operation Of Surface Water Sampling Equipment

Date: September 20, 2000

Provided by: Bob Nininger
Kaiser-Hill, LLC

Phone Number: (303) 966-4663

Email Address: bob.nininger@rfets.gov

ADMIN RECORD

RFCA Stakeholder Focus Group
Attachment D
Information Regarding Operation Of Surface Water Sampling Equipment

Excerpted from: Surface Water Task Descriptions Document

...Typical equipment for each station will include an ISCO® flow meter controlling an ISCO® portable automated sampler. **Sampler intakes must be positioned such that representative samples are collected at each station.**[1] A Geomation® remote radio telemetry system will be used to transmit data in real-time from certain stations to Site personnel and other potential users of the transmitted data. Certain locations will also be equipped with dedicated multi-parameter water quality probes capable of transmitting and/or logging data. **Water-quality probes must be positioned to ensure that they collect representative data and remain wet at all times.**[2] Certain locations will also be equipped with dedicated precipitation gages. Precipitation gages must be installed such that nearby structures do not interfere with precipitation collection. Power for the instrumentation will be provided by AC line power, where available, with battery backup. Where AC power is unavailable, solar/DC power systems will be used. **Each station will have a primary flow-control structure. The flow-control structures may be existing culverts or concrete stormwater conveyance structures. However, in most cases, flumes or weirs will be purchased and/or fabricated for installation in natural stream channels and ditches, or fastened to existing concrete or metal stormwater conveyance structures.**

The installation task may require minor hand excavation of channel banks and beds for installation of the flow-control structure in ditches or natural channels. All construction and soil disturbance permit requirements will be fulfilled and permits obtained prior to installation. For fastening of flow-control structures to existing structures, a rotary hammer or carbide-tip steel drill may be used to drill holes in the structures for attachment of the flow-control structure by either lag screws or expansion bolts. Alternatively, temporary flow-control structures may be installed by simply using tarps

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[1] Intakes are positioned to collect only water that flowed through the flow-control structure. The intakes must be secured high enough off the streambed so as not to collect non-representative sediment quantities, but low enough to be submerged during near zero flow rates. Consideration is also given such that intake position minimizes the effects of winter freezing conditions.

[2] Probes must be positioned in the flow path, but in a location such that they will not be damaged by high flows. At locations which are dry during some periods, special flow-through sump systems may be constructed such that the probes remain wet between direct runoff periods.

and sandbags to secure a flume in a channel and ensure that all runoff enters the flume. Each location will require a unique application of flow-control structure and means for securing the structure in place. For excavation applications, an areal impact of no more than 15 square feet is expected per site.

After the flow-control structure is installed, it is instrumented with the monitoring equipment. The equipment is then programmed and performance checked to complete the installation.

RFCA Stakeholder Focus Group
Attachment E

Title: Negative Activities and Concentrations

Date: September 20, 2000

Author: Bob Nininger
Kaiser-Hill, LLC

Phone Number: (303) 966-4663

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RFCA Stakeholder Focus Group
Attachment E
Negative Activities and Concentrations

One typically confusing aspect of reporting environmental radioactivity and concentrations of radionuclides is the reporting of negative results. Physically such environmental concentrations are not possible yet they are reported quite frequently in monitoring data reports from not just Rocky Flats Environmental Technology Site but from other databases with similar types of data. DOE guidelines, in fact, recommend the reporting of negative results (see Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance, DOE/EH-0173T, page 7-5, Appendix A).

The reason such data are acceptable, and in fact preferred over other reporting methods, is easy to understand if one understands the origin of the number and the necessity to keep information in the database that can be related to the uncertainty and overall quality of the observations recorded there.

In most reports of environmental data, many of the results may be near the detection limit of the methods employed to analyze the radioactivity in samples. While longer counting times can provide better confidence in the numbers that are recorded in the instruments used for the analysis, there are other limits to the precision of the analysis. For example, no methodology is available to completely remove natural contributions and variability in the materials used in the collection and preparation of the sample, in the instrumental response and in the background in the laboratory. These can be minimized but not eliminated. In this context, since World War II, we must consider actinides resulting from nuclear experiments and weapons detonation as part of the "natural" contribution from these sources.

When these variables are considered together, they result in two contributions to every analytical result: a non-zero result when no environmental sample is present, called a blank, and an analytical uncertainty in that blank result. We compensate for the blank by subtracting an average blank result from the sample analysis result. However, the uncertain contribution due to blank variability cannot be quantified in the individual environmental samples. The number coming out of this arithmetic correction is the "blank-corrected" analytical result for the sample. Most data residing in the RFETs databases (SWD or AIR) are blank corrected. Only groundwater results are not blank corrected, and accordingly, are actually biased high compared to the actual amounts of actinide in the samples.

RFCA Stakeholder Focus Group
Attachment E
Negative Activities and Concentrations

All is well and good with this approach when the sample contains an easily detected amount of radioactivity, however one must remember that the sample, whether blank corrected or not, still carries with it that unquantifiable "uncertainty" due to the natural factors discussed earlier. The ideal sample would have a blank value equal to the average blank used for the "blank correction"; all real-world samples have such a blank component only serendipitously. These real-world samples have a blank component that is either a little more or a little less than the average blank value.

What does this mean to the reported values when the sample being analyzed contains only a small amount of environmental radionuclide? It means the analytical result can be less or more than the average blank value. Of interest to this discussion, the reported radionuclide activity <u>can</u> be negative after blank correction when the sample blank and environmental radionuclide contributions together are less than the average blank. The negative number is completely valid procedurally and has significant physical meaning if appropriately interpreted in the context of the reporting methodology.

The following graphic may assist in understanding the discussion given above:

RFCA Stakeholder Focus Group
Attachment E
Negative Activities and Concentrations

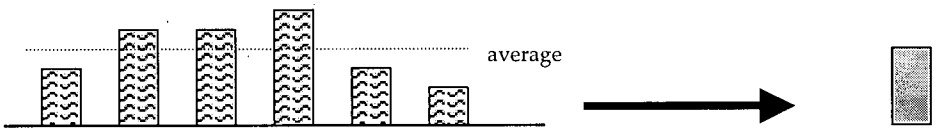
Definitions:

- **Blank** – instrument output or calculated concentration when no actual environmental sample is present; i.e. result is due to filter or other sampling medium, laboratory medium or instrument variability.
- **Environmental Activity** – actual amount of radioactivity contributed by the environment being sampled.
- **Environmental Sample** – the environmental radionuclide plus the blank contribution.

Sample population of **blank** values

Yields

Average blank value

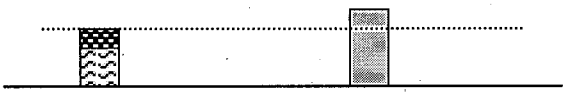


Consider a "real-world" **environmental sample** containing:

1) Single blank from total population of blanks

2) Environmental activity

The environmental sample can only be analyzed in the laboratory as these two components together and is then compared with the average blank:



ENVIRONMENTAL SAMPLE

AVERAGE BLANK

Since the magnitude of the average blank is larger than the environmental sample, subtracting the average blank from the environmental sample result (blank correcting) will yield a negative number.

RFCA Stakeholder Focus Group
Attachment E

Appendix A
Negative Activities and Concentrations

RFCA Stakeholder Focus Group
Attachment F

Title: Remedial Action Alternative Templates

Date: September 20, 2000

Author: Lane Butler
Kaiser-Hill, LLC

Phone Number: (303) 966-5245

Email Address: lane.butler@rfets.gov

ADMIN RECORD

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
Soil Excavation Alternatives for Remediation of the 903 Pad	**Protect HH and Env.**	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**				

CERCLA's 9 Decision Criteria:

1. Overall protection of human health and the environment
2. Compliance with ARARs
3. Long-term effectiveness and permanance
4. Reduction of toxicity, mobility, or volume
5. Short-term effectiveness
6. Implementability
7. Cost
8. State acceptance
9. Community acceptance

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
Soil Excavation Alternatives for Remediation of the 903 Pad	**Protect HH and Env.**	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**				
Soil Excavation and Removal to RSAL only																							
Soil Excavation and Removal to RSAL plus Engineered Barriers - Enhanced SID and potential new structures - Maintain existing dams and ponds - Recontour Site - Revegetate Site - New Dam at Indiana																							
Soil Excavation and Removal to 10 pCi/g only																							
Soil Excavation and Removal to 10 pCi/g plus Engineered Barriers - Enhanced SID and potential new structures - Maintain existing dams and ponds - Recontour Site - Revegetate Site - New Dam at Indiana																							

CERCLA's 9 Decision Criteria:

1. Overall protection of human health and the environment
2. Compliance with ARARs
3. Long-term effectiveness and permanance
4. Reduction of toxicity, mobility, or volume
5. Short-term effectiveness
6. Implementability
7. Cost
8. State acceptance
9. Community acceptance

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9. Community acceptance

Soil Excavation Alternatives for Remediation of the 903 Pad	Threshhold Criteria									Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
	Protect HH and Env.	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	***Secondary Benefits***			
Soil Excavation and Removal to RSAL only	↓ surface water standard will not be met	↑for air - NESHAP met now & RESREAD model includes air path ↓ for water - standard will not be met	↑ RESRAD model indicates dose is ok	→Scenarios modelled in RSAL did not include site workers	→ Not known	→Not known	→	→	→ Rad risk ok, but habitat protection uncertain	→ May not meet ALARA - level not yet defined	↓ surface water standard will not be met	←	←	←	→ All options are expensive	←	→ This analysis is part of the decision making process	→ NA	→ Depends on whether or not free-release levels are attained	→ Needs wildlife & recreational assessment		?	

CDPHE Decision Matrix for September 27, 2000 Stakeholder Focus Group Meeting

Notes:

- Arrows should be read as one reads the text (holding the page in portrait orientation)
- Column for Secondary Benefits added to Non-CERCLA Criteria - for things such as Habitat or Wildlife Observation benefits

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
Soil Excavation Alternatives for Remediation of the 903 Pad	**Protect HH and Env.**	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	***Secondary Benefits***			
Soil Excavation and Removal to RSAL plus Engineered Barriers - Enhanced SID and potential new structures - Maintain existing dams and ponds - Recontour Site - Revegetate Site - New Dam at Indiana	→ uncertain if on-site water standard will be met	↑for air - NESHAP met now & RESREAD model includes air path ↑ for water - standard currently met (ponds)	↑ RESRAD model indicates dose is ok	→Scenarios modeled in RSAL did not include site workers	→ Not known	→Not known	→ don't know effectiveness	↑current ponds effective	→ Rad risk ok, but habitat protection uncertain	→ May not meet ALARA - level not yet defined	→ on-site water standard may not be met	←	←	←	→ All options are expensive	↓ requires more maintenance than just excavation	→ This analysis is part of the decision making process	→ NA	→ Depends on whether or not free-release levels are attained	→ Needs wildlife & recreational assessment			

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Notes:

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- Column for Secondary Benefits added to Non-CERCLA Criteria - for things such as Habitat or Wildlife Observation benefits

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
Soil Excavation Alternatives for Remediation of the 903 Pad	**Protect HH and Env.**	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	***Secondary Benefits***			
Soil Excavation and Removal to 10 pCi/g only	↓ surface water standard will not be met	↑for air - NESHAP met now & RESREAD model includes air path ↓ for water - standard will not be met	↑ RESRAD model indicates dose is ok	→Scenarios modelled in RSAL did not include site workers	→ Not known	→Not known	→	→	→ Rad risk ok, but habitat protection uncertain	→should meet ALARA , but habitat impacts are larger	↓ surface water standard will not be met	←	←	←	→ All options are expensive	←	→ This analysis is part of the decision making process	→ NA	→ Depends on whether or not free-release levels are attained	→ Needs wildlife & recreational assessment			

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- Column for Secondary Benefits added to Non-CERCLA Criteria - for things such as Habitat or Wildlife Observation benefits

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
Soil Excavation Alternatives for Remediation of the 903 Pad	**Protect HH and Env.**	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	***Secondary Benefits***			
Soil Excavation and Removal to 10 pCi/g plus Engineered Barriers - Enhanced SID and potential new structures - Maintain existing dams and ponds - Recontour Site - Revegetate Site - New Dam at Indiana	→ uncertain if on-site water standard will be met	↑for air - NESHAP met now & RESREAD model includes air path ↑ for water - standard currently met (ponds)	↑ RESRAD model indicates dose is ok	→Scenarios modeled in RSAL did not include site workers	→ Not known	→Not known	→ don't know effectiveness	↑current ponds effective	→ Rad risk ok, but habitat protection uncertain	→ should meet ALARA , but habitat impacts are larger	→ on-site water standard may not be met	↑	↑	↑	→ All options are expensive	↓ requires more maintenance than just excavation	→ This analysis is part of the decision making process	→ NA	→ Depends on whether or not free-release levels are attained	→ Needs wildlife & recreational assessment			

CDPHE Decision Matrix for September 27, 2000 Stakeholder Focus Group Meeting

Notes:

- Arrows should be read as one reads the text (holding the page in portrait orientation)
- Column for Secondary Benefits added to Non-CERCLA Criteria - for things such as Habitat or Wildlife Observation benefits

Soil Excavation and Removal to RSAL only

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
	Protect HH and Env.	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	**Secondary benefits**			
DOE		↓	↑	↑	↑	↑				↓	↓	NA	↓	↑	↑	↑							
CDPHE	↓	↑	↑	→	→	→	↓	↓	→	→	↓	↑	↑	↑	→	↑	→		→	→			
EPA																							
Community																							

Soil Excavation and Removal to RSAL plus Engineered Barriers

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
	Protect HH and Env.	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	**Secondary benefits**			
DOE		↑	↑	↑	↑	↑				↑	→	NA	↑	↑	→	→							
CDPHE	→	↑	↑	→	→	→	→	↑	→	→	→	↑	↑	↑	→	↓	→		→	→			
EPA																							
Community																							

Soil Excavation and Removal to 10 pCi/g only

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
	Protect HH and Env.	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	**Secondary benefits**			
DOE		↑	↑	↓	↓	↓				→	→	NA	↓	↑	↓	↓							
CDPHE	↓	↓	↑	→	→	→	↓	↓	→	→	↓	↑	↑	↑	→	↑	→		→	→			
EPA																							
Community																							

Soil Excavation and Removal to 10 pCi/g plus Engineered Barriers

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
	Protect HH and Env.	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	**Secondary benefits**			
DOE		↑	↑	↓	↓	↓				↑	↑	NA	↓	↑	↓	↓							
CDPHE	→	↑	↑	→	→	→	↑	→	→	→	→	↑	↑	↑	→	↓	→		→	→			
EPA																							
Community																							

Alternative:_____

	Threshhold Criteria										Balancing Criteria						Modifying Criteria		Non-CERCLA Criteria				
	Protect HH and Env.	Protect Local off-site Residents	Protect FutureOn-site Land User	Protect Site Workers	Protect Transportation Worker & Public	Protect Disposal Site Worker	Meet Surface Water Quality Standard On-site	Meet Surface Water Quality Standard off-site	Protect Environment	**Comply with ARARs (incl. Endangered Species Act)**	**Longterm Effectiveness**	**Reduction of Tox, Vol., Mob**	**Shortterm Effectiveness**	**Implementability**	**Capital Cost (Remediation)**	**Operation & Maint. Cost (Stewardship)**	**State Acceptance**	**Community Acceptance**	**Stewardship**	**Secondary benefits**			
DOE																							
CDPHE																							
EPA																							
Community																							