



SRS Citizens Advisory Board

Old Radioactive Waste Burial Ground Focus Group

Meeting Summary

August 2, 2000
Hampton Inn
Aiken, SC

The Citizens Advisory Board (CAB) Old Radioactive Waste Burial Ground (ORWBG) Focus Group met on Wednesday, August 2, at the Hampton Inn, Aiken, SC. The purpose of the meeting was to discuss the Independent Scientific Peer Review (ISPR) draft report, intruder analysis in the Performance Assessment, difference in the intruder analysis in the Performance Assessment versus the Corrective Measures Study/Feasibility Study (CMS/FS), intruder concepts of the National Academy of Science, National Regulatory Commission and the Environmental Protection Agency, determine the approach for intruder analysis in the Focus Group work and review the path forward. Those in attendance were:

CAB Members

Bill Willoughby

Stakeholders

Lee Poe

Ratib Karam

Bill McDonell

Jerry Devitt

DOE/Contractors

George Mishra, DOE

Ed McNamee, BSRI

Don Toddings, BSRI

Elmer Wilhite, WSRC

Jim Cook, WSRC

Jim Moore, WSRC

Lee Poe, Technical Lead, welcomed those in attendance and stated that Jimmy Mackey, Administrative Lead, was unable to attend the meeting and sent his regards. He mentioned that Mr. Mackey requested that there be an executive summary included in the draft ISPR report that was easy for the non-technical person to understand.

ISPR Response to Comments:

- Dr. Ratib Karam, ISPR Team Lead, stated that the contributions to the U.S. average individual dose of radiation is 400 mrem /year. The standards for radiation exposure for members of the public from all sources other than natural background, medical, and consumer products from all pathways is 100 mrem/year per the Nuclear Regulatory Commission and the Environmental Protection Agency (EPA). The standard for air is 10 mrem/year and for drinking water, 4 mrem/year (for man-made beta, gamma emitters). The drinking water standard of 4 mrem/year does not translate to the 20,000 pCi/L/year maximum contaminate level for tritium. One (1) mrem/year equals 20,000 pCi/L/year. Therefore, in reality, the EPA standard for drinking water ought to be 80,000 pCi/L/year versus the 20,000 pCi/L/year.

Dr. Karam reviewed the estimated risk from various activities and exposures. Some were as follows:

<u>Activity or Exposure Per Year:</u>	<u>Risk of Fatality:</u>
1 mrem/year	5×10^{-7}
Driving in a passenger car 30 miles	2×10^{-6}
Eating 90 lbs. of charcoal-broiled steak	1×10^{-6}
Home accidents	1×10^{-4}
Natural background	1.5×10^{-4}
Smoking 1 pack of cigarettes/day	3.6×10^{-3}

Dr. Karam stated that the standards should be set with a rational basis commensurate with what we do in everyday life. He felt the National Academy of Sciences should determine the standards applied.

Dr. Karam reviewed the tritium assumptions used in the three cases in the draft report. The tritium respectively in the three cases were 3 million curies, 1 million curies and 475 thousand curies. The 475,000 case was used because it enabled the model selected to best match the measured releases in the stream. Dr. Karam indicated that there was no technical reason from the evaluation of the source term to select the 475,000 Ci release. These levels were used to calculate tritium at the seepage line, Fourmile Branch and the Savannah River. It was also assumed that no tritium was lost by the time it traveled to the 301 bridge, the tritium was only diluted. The K_d was assumed to be zero (0). With $K_d = 0$, the peak level of tritium from the burial ground occurred in 1989. It was felt that $K_d = 0$ was the best estimate.

In the report, Dr. Karam stated that the concentration of tritium in the seep decreases to the EPA standard of 20,000 pCi/L in the year 2007 with an uncertainty range of between the year 2005 and 2010.

Since the Focus Group had commented on radionuclide accumulation in fish and other pathways to man, the ISPR had evaluated that issue and found it inconsequential. Based on previous total SRS releases to the river, the committed dose to the maximally exposed individual from liquid releases is about equal for fish and water. The percent of total dose is 50.3 and 49.6 percent respectively for fish and water. The dose from the consumption of 42 pounds of prescribed fish from the mouth of Fourmile Branch is about 90 percent cesium and about 9 percent strontium. Neither of these items comes from the burial ground.

Other Constituents of Interest (COI) could not be compared to the model because there was no actual data to check against. For instance, Carbon-14 was not calculated because there was no data to extrapolate.

Concentrations of Volatile Organic Compounds (VOC's), lead and mercury were below the EPA limit.

Mr. Poe stated that he addressed the questions by Julie Corkran, EPA, related to the Focus Group. He asked everyone to look them over and make sure they are appropriate since these may be used in the Focus Group report.

Dr. Karam stated that the final report is a consensus report and should be available to the Focus Group within one or two weeks.

Intruder Analysis in the Performance Assessment:

Mr. Poe asked Elmer Wilhite to review the intruder analysis used in the Performance Assessment, noting that there were three long lived COI's in the ORWBG (mercury, carbon-14, and plutonium).

Mr. Wilhite reviewed the performance objectives, assessment requirements and points of compliance as noted in DOE Order 435.1. He pointed out that the Performance Assessments were performed for new waste disposal facilities at the site. He noted for the hypothetical inadvertent intruder, the performance measure is ≤ 100 mrem/yr from chronic exposure and ≤ 500 mrem from a single event. In these Performance Assessments, institutional controls were assumed to be effective in deterring intrusion for at least 100 years following closure of the waste unit.

Mr. Wilhite stated that for the intruder scenarios, reasonable activities are considered consistent with regional social customs and well drilling, excavation, and construction practices, and regional environmental conditions projected for the time that intrusion is assumed to occur. There is random contact with waste. The intruder will take reasonable actions upon discovery of unusual materials. At a minimum, the analysis should consider acute construction, acute well drilling, and chronic agriculture scenarios. Mr. Wilhite reviewed the scenarios used and the analysis methodology.

The scenarios considered were:

- Excavation Scenario
- Drilling Scenario
- Post-Drilling Scenario
- Agriculture Scenario
- Resident Scenario

In reviewing the results for plutonium 239 for the E-area Low Level Waste facilities, the results in the following table give the allowed Pu in the waste (expressed in nCi/g) to prevent groundwater users from exceeding 25 mrem/year all pathway limits* or the intruder exceeding the 100 mrem/year chronic exposure limit:

<u>Disposal Unit:</u>	<u>Groundwater:</u>	<u>Intruder Agriculture:</u>
Low Activity Waste Vault	3.5×10^6	2.2
Intermediate Low Level Waste Vault	1.8×10^9	NA**
Slit Trench	0.05	3.4

*Drinking water standards of 15 pCi of alpha/liter equates to about 50 mrem/year for Pu239.

** Intrusion not credible within 10,000 years

Discussion ensued on the significance of the values in the table. The following conclusions can be reached.

- For the LAW vault, the intruder analysis limits the waste that can be put in the vault
- For the ILW vault, intruder scenario is prevented by the vault structure (engineered barriers)
- For slit trenches, the water limit is controlling
- The engineered barriers used in the analysis determine the groundwater limits
- There is essentially no difference in the intruder analysis between the LAW vault and the slit trenches.

Mr. Wilhite stated that the site starts with the designated standards and then works backwards in its computations so that the resulting concentrations do not exceed that standard.

Difference in the Intruder Analysis in the Performance Assessment versus the Corrective Measures Study/Feasibility Study (CMS/FS):

Ed McNamee stated that in the CMS/FS there were 21 special 100-year hot spots. There were nine (9) 500-year hot spots. In the CMS/FS intruder analysis there were several differences between the intruder analysis in the Performance Assessment (PA). Those differences are as follows:

- CMS/FS – All scenarios used 500 mrem

PA – Scenarios used 100 mrem and 500 mrem.

- CMS/FS – Drill scenario – When the intruder hit the concrete barrier, they changed to a diamond bit and drilled through the concrete.

PA – Intruder stopped when they hit the concrete.

- Excavation of basement was the same in both analyses.
- CMS/FS – In the agriculture scenario, the intruder got 100% of his food from the land.

PA – The intruder got 50% of his food from the land.

- CMS/FS – Biased towards the hot spots

PA – Averaged over the hot spots.

The results of the CMS/FS intruder analysis were as follows:

- Drill scenario – Did not exceed 500 mrem/year. Maximum was on the order of 400 mrem/year.
- Excavation scenario – Two (2) 500-year hot spots exceed 500 mrem/year with a maximum of around 550 mrem/year.
- Agriculture scenario – Five (5) 500-year hot spots exceed 500 mrem/year with a maximum of around 1,000 mrem/year.

For the CMS/FS, the actions considered to resolve the intruder analysis concerns were bio-barriers and intruder barriers. The other option is to remove the inventory, but the cost would be high. All agreed that the deed restrictions were not strong enough to keep an intruder out.

Intruder Concepts of the National Academy of Science (NAS), National Regulatory Commission (NRC) and the Environmental Protection Agency (EPA):

Mr. Poe stated that there is a difference of opinion between the regulators and the technical community. Mr. Poe stated that the NAS proposed not looking at the consequence to the intruder breaking the law, but the consequence of intrusion damage to the barrier on the functional intent of the facility. The NAS proposed EPA change their standard for geological repositories.

Determine the Approach for Intruder Analysis in the Focus Group Work:

Mr. Poe stated an earlier Focus Group analysis assumed the period of site closure to be the completion of vitrification of the waste plus 100 years, or 2140. At that point, the site is transformed to passive institutional control, deed restrictions, markers and monitoring. Mr. Poe commented the Focus Group should look again at this scenario.

In looking at precedents set at SRS on closure, the High-Level Waste (HLW) tanks would be the

example. The tanks were emptied, filled with grout and left with only monitoring.

Mr. Wilhite stated that there is a new mind set in the Environmental, Safety and Health Department, a site can't relinquish control of the land until it won't expose the public to more than 15 mrem/year.

Mr. McNamee stated that according to the Atomic Energy Act, 11.E(2), DOE would be responsible for the site as long as there is atomic material on site that resulted from weapons production. In addition, if DOE were to leave the site, a new Record of Decision (ROD) would have to be written. Mr. Poe stated that in addition the Land Use Control Assurance Plan (LUCAP) required that DOE review the plan for any changes every five years.

Mr. McNamee indicated that the South Carolina Department of Health and Environmental Control (SCDHEC) as well as EPA prefer the intruder barrier approach.

Mr. Wilhite stated that under DOE Order 5400.5, DOE can't relinquish control of certain lands like the Old Burial Ground because of the inventory and therefore it may be under perpetual control.

Mr. Poe stated that there are other sites such as West Valley Burial Ground that belongs to New York and Barnwell, S.C. that have the same problem as SRS. SRS is not unique. Mr. Poe stated that Rod Rimando, DOE, is to review with the Focus Group what other sites are doing in institutional control. Mr. Poe said he was to have a dry run with Mr. Rimando on August 15.

Other items:

Mr. Poe suggested that everyone review the DOE-HQ Stewardship Report and send in their comments. Elmer Wilhite and Bill Willoughby requested copies of the report.

The next ORWBG Focus Group meeting is slated for August 30, 5:00 p.m., at the Hampton Inn, Aiken.

With no other comments, the meeting was adjourned.

Meeting handouts may be obtained by calling 1-800-249-8155.