

**DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
National Center for Environmental Health/
Agency for Toxic Substances and Disease Registry**



**Savannah River Site Health Effects Subcommittee
September 15, 2005
*Augusta, Georgia***

Record of the Proceedings

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EXECUTIVE SUMMARY

The Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) National Center for Environmental Health/Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) convened a meeting of the Savannah River Site Health Effects Subcommittee (SRSHEs) on September 15, 2005 in Augusta, Georgia.

The January 25, 2005 SRSHEs Meeting Minutes were unanimously approved with changes noted for the record and a status report was provided on action items raised during the previous meeting.

CDC distributed a draft of the independent peer review of the Advanced Technology Laboratory (ATL) International report on the SRS dose reconstruction study to SRSHEs. The findings were also presented during the meeting. The peer review concluded that ATL's models and approaches are standard, appropriate and have generated reasonable figures with no apparent gross errors. The doses appear to be reasonable compared to background doses over a 39-year period. Implementation of different approaches will not change the 95% confidence interval of doses reported in ATL's uncertainty analysis. The peer review also determined that ATL should address deficiencies in the report. Point estimates, medians and means for the uncertainty analyses should be clarified and more strongly emphasized. Missing data should be provided to reproduce ATL's figures.

Several actions were taken during the meeting to identify next steps in finalizing the ATL report. CDC described key findings from its dose reconstructions conducted at other U.S. Department of Energy (DOE) sites and summarized comments submitted to date on the ATL report. SRSHEs provided guidance on the nine recommendations in the ATL report. SRSHEs formulated and unanimously approved a recommendation on specific actions CDC should take before the ATL report is finalized and released to the public. SRSHEs agreed to follow up the consensus recommendation with a letter to CDC. CDC agreed to provide SRSHEs with a written response to the letter.

ATSDR provided a status report of its current activities on the SRS public health assessment (PHA). The review of SRS's history since 1993 and current status of the site has been completed. The identification and review of potential contaminants of concern, completed and potentially completed exposure pathways and other potential hazards unique to SRS are underway. ATSDR's goal is to release the SRS PHA report in FY'06, but recognizes that drastic budget cuts for health-related research at DOE facilities may affect this timeline.

The National Institute for Occupational Safety and Health (NIOSH) provided a status report on its completed and ongoing studies, research projects and other activities at SRS and other DOE sites. SRSHEs was invited to submit comments on NIOSH's agenda and budget of public health activities at DOE sites from FY'05-FY'10 that are now available on the NIOSH web site. SRSHEs was also encouraged to attend the

public meeting on October 27, 2005 in Washington, DC that will be held to inform workers and other stakeholders about NIOSH programs and current research activities.

The Acting Chair opened the floor for public comments at all times as noted on the published meeting agenda. The two action items raised over the course of the meeting were reviewed. Next steps in the SRS advisory committee process were identified because the current proceedings serve as SRSHEs's final face-to-face meeting. CDC will distribute the September 15, 2005 draft minutes to SRSHEs for review and comment. CDC will address outstanding issues at SRS by convening an SRSHEs conference call that will be published in the *Federal Register* and open to the public.

CDC thanked the former and current SRSHEs members for their support, commitment, diligent efforts and valuable input to CDC over the years. CDC expressed its honor in being allowed to serve the SRS community.

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CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL CENTER FOR ENVIRONMENTAL HEALTH/
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY**

**SAVANNAH RIVER SITE HEALTH EFFECTS SUBCOMMITTEE
September 15, 2005
*Augusta, Georgia***

Draft Minutes of the Meeting

The Department of Health and Human Services (HHS) and the Centers for Disease Control and Prevention (CDC) National Center for Environmental Health/Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) convened a meeting of the Savannah River Site Health Effects Subcommittee (SRSHES). The proceedings were held on September 15, 2005 at the Partridge Inn in Augusta, Georgia.

Opening Session

Mr. Joseph Ortaldo, the SRSHES Acting Chair, called the meeting to order at 8:55 a.m. He welcomed the attendees to the proceedings and opened the floor for introductions. The list of participants is appended to the minutes as Attachment 1.

Current SRSHES Business

Review of Previous Meeting Minutes. Mr. Ortaldo entertained a motion to approve the previous meeting minutes. The members noted the following changes for the record.

- Change "Mr. Ali" to "Ms. Ali" on page 1.
- Change "(SC DHEQ)" to "(SC DHEC)" on page 1.
- Change "Rod Scmerr" to "Rod Scherr" on pages 1 and 10.
- Change the sentence on page 5 to "Exposure at a low-dose rate of a total dose of 100 rem increases the chance of developing cancer by 5%."

A motion was properly made and seconded by Mr. French and Mr. Stringer, respectively, to approve the previous meeting minutes as amended. With no further discussion or additional changes, the January 25, 2005 SRSHEs Meeting Minutes were unanimously approved with changes noted for the record.

Review of Current Action Items. Mr. Phillip Green, the SRSHEs Executive Secretary, and Mr. Charles Wood, the CDC Project Officer of the SRS dose reconstruction study, provided a status report of action items that were raised at the previous meeting.

- CDC published the September 15, 2005 draft meeting agenda in the *Federal Register* and also mailed a copy to each SRSHEs member.
- CDC provided the Advanced Technology Laboratory (ATL) International report on the SRS dose reconstruction study to all persons who have requested the document to date.
- Mr. Wood will provide information during the meeting about the table he was asked to develop comparing SRS doses to other U.S. Department of Energy (DOE) facilities.
- CDC provided SRSHEs with a draft document dated September 13, 2005 on findings of the independent review of the ATL report. The results will also be presented during the meeting.
- CDC will instruct ATL to prepare the final report after the meeting to reflect key findings of the independent review and comments that were submitted by SRSHEs, the public and other sources. CDC compiled all white papers written for the ATL report into a new "Appendix T."

Independent Review of the ATL Report

Dr. Nolan Hertel is a Professor at the Georgia Institute of Technology and served as the independent reviewer of the ATL report. CDC charged him with answering three questions to evaluate the document. First, was the methodology appropriate? Second, can an independent reviewer reproduce the results? Third, does the report contain significant errors or omissions that can significantly alter the final calculations? Dr. Hertel's findings from his independent review of the ATL report are outlined as follows.

General Comments. ATL's quality assurance program is solid and quite capable of tracking activities. The scenarios are reasonable based on the published literature and adequately represent the lifestyles of SRS populations. Innovations that were added for standard equations, codes and modeling approaches used in the industry are appropriate. However, repetitious text, the need to constantly switch between the report

and appendices, and the absence of a table of contents and list of figures make the document difficult to read and follow.

Air Releases. Models used for air and liquid releases are appropriate and reflect standard approaches. ATL's recommendation to analyze the air deposition of radionuclides onto ponds, reservoirs and surface runoff as a scoping calculation will not change the bounds based on the uncertainty analysis. ATL's rationale for the fractional activity should not be used because the conservative approach of assuming plutonium to be plutonium 239 is a better reason. However, the end result is correct.

Pathways. The pathways scenario is standard. Unimportant pathways are eliminated from ATL's analyses. Soil ingestion from the beef pathway is not analyzed, but data from the U.S. Environmental Protection Agency show that this pathway can cause exposures on the order of a fraction of a kilogram to >1 kilogram per day. The soil ingestion pathway for humans is incidental, but certain populations may be at increased risk. For example, a farmer who smokes may have more hand-to-mouth contact. The liquid pathway from swimming or accidentally ingesting water is included in ATL's analyses, but is not fully described.

Figures selected for swimming are reasonable based on the point estimate, but whole numbers rather than decimals should be used. The method of partitioning radionuclides into separate isotopes is conservative based on the dose conversion terms. The resulting Phase III source term is reasonable. The 15 major sources of air emissions from the SRS are mapped into four virtual sources. This approach is efficient and significantly reduced the amount of data ATL had to analyze.

Meteorological Data. Four five-year averages for wind data resulted in nearly average behavior. However, a determination could not be made on whether the average of four five-year averages was actually a 20-year average. Joint frequency distribution data could not be located on the CD-ROM provided to Dr. Hertel to reproduce and identify the stack that served as the source of the release. Other parameters are embedded in the text rather than in tables and are also difficult to locate.

Liquid Exposures. A reasonable technique is used to group radionuclides other than cesium, strontium and tritium that were expected to be released in liquid effluent. The Phase II analysis was reviewed and approved by the National Academy of Sciences (NAS) and is used to group radionuclides by the distribution of coefficients and estimate concentrations from other isotopes that were released into the Savannah River. Adjustments that were made to measure the frequency of cesium, strontium and tritium exposures to Lower Three Runs Creek are reasonable, but similar analyses should be performed to obtain concentrations of other isotopes in this location. However, the new

analyses will not cause major changes due to the uncertainty analysis and the inclusion of the most important isotopes from actual measurements.

The analysis for liquid source terms is confusing. ATL determined that the simple model could not be used and therefore made adjustments with Phase II transport adjusted factors to create release terms for other radionuclides with no Savannah River data. The description of the simple model should be moved from the text to an appendix and revised to clearly state that the simple model could not be used. The liquid source terms are reasonable overall. The discussion on the adjustment factors is also confusing and should be clarified. For example, a determination cannot be made on whether "facility" refers to the "site."

ATL missed the peak in terms of concentrations that were measured, calculated and used in the dose reconstruction study. ATL's recommendation to perform additional modeling of acute releases to determine the impact of these concentrations will most likely resolve this disagreement. However, higher figures than those used in the actual data should be incorporated into new models. Data should be analyzed for the short time period of the release. Overall, the source term adequately predicts the total release over this time period. A sum of all the releases and measures will essentially provide the same result. Results of the cesium 137 concentrations in Savannah River water are appropriate.

Soil Exposures. The code ATL selected to analyze soil distribution is somewhat confusing and could not be used during the independent review to model concentrations over 39 years. The code ATL selected to analyze direct exposures solely focuses on deposition and radioactive decay and does not account for leaching. The code is limited to analyzing the buildup of concentrations in the soil for only one year because ATL's atmospheric dispersion model only accepts constant emission rates.

Dr. Hertel's analysis during the independent review showed that examining the buildup of soil concentrations for more than one year makes a difference. The exclusion of leaching yields a conservative result for the one-year period. The agricultural exposure includes leaching, but ignores harvesting. The result is conservative and does not account for residual from previous years. These data do not correlate with Appendix D. ATL's position is that root uptake is not a significant contributor to dose from the ingestion of plants.

Food Chain Transport Analysis. A standard modeling approach is used. Parameter values reflect a combination of both site data and default GENII code data. These values are representative of the literature and will not drastically change results.

Dose and Risk Calculations. ATL acknowledges an error rate of <30% in external dose conversion coefficients for adults of all age groups. The 30% uncertainty range of the point estimate does not significantly change results.

Pond Data. Dr. Hertel modeled a pond with a turnover rate of one-third of the pond volume per year during the independent review, but could not locate deposition rates in the report for isotopes in closer locations to assess his equation. The turnover rate is slow and may not be realistic for private lakes or ponds.

Appendix A. The strategy of mapping 15 major release points into four virtual sources is reasonable and well within the uncertainty of other parameters. The comparison between multiple and virtual sources in all four locations is based on equal releases from the real sources and equivalent amounts from the virtual sources. The resulting uncertainty may be different, but is still well within other parameters. Problems with the GENII calculations related to concentrations and large discontinuities were corrected by slightly moving the location of sources to some towns.

ATL Results. The point estimate results are appropriate, but some tables are mislabeled. The uncertainty and sensitivity analyses were performed with methodical and solid approaches. The standard Latin hypercube sampling tool was used to conduct studies, identify parameters in the models to which results were most sensitive, and select those that would result in the highest impact. The probability distributions are based on standard assumptions for environmental parameters. A sensitivity analysis was not performed to determine differences in the amount of human consumption. Discussions of the results are solid, but somewhat lengthy.

ATL Recommendations. ATL's recommendation to "examine the buildup of long-lived radionuclides in soil to determine if terrestrial doses significantly change" will be addressed in Dr. Hertel's final report to CDC. ATL's recommendation to "compare modeled concentrations in foodstuffs to monitoring data for model validation" is an extremely expensive undertaking and will most likely not change the final analysis. ATL's recommendation to "publish papers on the study methods and results in peer-reviewed journals to obtain technical peer reviews" will add validity to the ATL report and should be considered if funding allows. ATL should perform additional modeling to determine whether surface runoff and airborne depositions into reservoirs and ponds cause significant doses. However, these results will probably not be higher than liquid effluent discharges in the Savannah River from fish concentrations.

Dr. Hertel's overall conclusions from his independent review of the ATL report are outlined as follows. On the one hand, the report is relatively solid at this point. For the most part, the models and approaches are standard, appropriate and have generated

reasonable figures with no apparent gross errors. The doses appear to be reasonable compared to background doses over a 39-year period. Implementation of different approaches will not change the 95% confidence interval of doses reported in ATL's uncertainty analysis.

On the other hand, ATL's outcome of generating point estimate results for the uncertainty analysis that are below median values is disappointing and will be surprising to non-statisticians. The executive summary should be revised to clarify and more strongly emphasize the point estimates, medians and means for the uncertainty analyses. However, the conclusions explain the point estimate results and the uncertainty analysis captures all possible values. The distribution is skewed to the high end of twice the radiation dose to average persons in United States from natural background sources.

Some items are difficult to locate in the report or entirely excluded, such as the pre-processor, post-processor and data to calculate the point estimate for some scenarios. An automatic setup of the subdirectories did not occur with the version of GENII provided to Dr. Hertel. The final peer review report to CDC will address the question of whether an independent reviewer can reproduce results in the ATL report and will also include a small pond model to calculate air deposition.

Dr. Lee noted that the scenarios in the ATL report represent the highest dose to an infant and beef ingestion as the highest pathway. She asked Dr. Hertel to analyze these data and include comments in his final report on whether ATL's approach is sound. She also pointed out a significant gap. The ATL report does not contain sufficient data on the pre-processor to identify specific figures and uncertainty ranges from the Phase II report that served as the basis to calculate doses in the Phase III report. Persons with expertise in dose reconstruction are not able to easily run ATL's codes and reproduce the figures.

Mr. Wood summarized comments on the ATL report in response to SRSHEs's previous action item. Many comments reiterated Dr. Lee's concerns that ATL's approach to calculate doses is unclear and data are missing from the report to reproduce tables. Requests were made to calculate downstream river doses. Concerns were expressed that doses were not calculated for specific populations in certain areas, such as water doses to Jasper, South Carolina residents. For the final report, CDC will instruct ATL to clarify and emphasize its methodology of selecting representative scenarios to ensure the public understands that doses were not calculated for each SRS community.

Mr. Wood added that several comments asked CDC to conduct more studies in the future to address ATL's conclusions and recommendations outlined in Chapter 13.

CDC's response to these requests is that DOE will only allocate \$2.7 million in FY'06 for health-related research at its facilities. This funding will be shared by NCEH/ATSDR and NIOSH and will cover all DOE sites. As a result, CDC will be extremely reluctant to support additional calculations, computer models or data collection unless the outcomes are reasonably expected to demonstrate significant health exposures or larger doses to persons. DOE's FY'06 funding for health-related research at its facilities will not be sufficient for CDC to merely improve the ATL report.

Mr. Wood reported that with the exception of Dr. Hertel's draft independent review, comments from the public and all other sources submitted to CDC to date were compiled and provided to ATL. ATL was also given SRS HES's editorial and technical comments presented during the previous meeting.

Public Comment Period

In response to a question by Mr. Ken Crase of the Westinghouse Savannah River Company (WSRC), Dr. Hertel replied that he did not determine the appropriateness of ATL's approach of applying a canned dose to risk conversion for an individual.

Mr. Peter Atherton is a nuclear safety consultant and expressed concerns about the ATL report. Regulating agencies do not require periodic testing of detectors to ensure accurate calibration or proper function of these instruments. The ATL report does not include safety margins to account for erroneous readings and inefficient detectors. Mr. Atherton questioned whether the models ATL used are appropriate for SRS scenarios and actually reflect problems at the site.

Mr. Wood explained that the calculation of source terms and identification of priority areas to study were completed in Phase II of the SRS dose reconstruction project. During Phase II, earlier measurements of releases from SRS were found to be incorrect due to inaccurate estimates of deposition and sample types. Based on revised calculations and an NAS review, the Phase II source terms were adjusted and published. A thorough examination of instruments was also included in this analysis. Mr. Wood added that the ATL report is not a regulatory document and is not designed to be conservative or generate safety margins. The overarching objective was to provide the best estimates of actual doses to actual persons during the time period of the study.

To Mr. Atherton's second comment, Dr. Hertel and Mr. Wood conveyed that ATL's equations and models were based on well-established theories and then adjusted with certain environmental parameters to develop specific models for SRS. CDC contracted ATL to calculate doses based on sources that were previously estimated in Phase II.

Mr. Wood indicated that the Phase II report can address Mr. Atherton's concerns, particularly the extensive sections on instrumentation errors and the calculation of sources.

Mr. Kenneth Webb was stationed at SRS in 1955 during his military service. He questioned whether the dose reconstruction study accounted for radiation exposure to military personnel who continuously resided on or near the site 24 hours per day for over a year. As a soldier, Mr. Webb was not provided with personal protective equipment, traveled throughout the site in open vehicles and has since suffered from cancer. He learned that DOE and other federal agencies submitted letters to the Veterans Health Administration (VHA) denying the release of any radiation at SRS.

Mr. Wood pointed out that the dose reconstruction study does not contain a specific scenario for soldiers because CDC was commissioned to only examine exposures to the offsite public. However, Mr. Webb could review the scenarios to select a delivery person, migrant worker or another human receptor who spent a significant amount of time onsite as a starting point in estimating his dose. He could also review VHA data on atomic radiation exposures to veterans and worker studies conducted by the National Institute for Occupational Safety and Health (NIOSH). Mr. Webb was encouraged to contact Mr. Wood at 404/498-1826 or cmw6@cdc.gov for additional information or sources.

SRSHEs Open Discussion

SRSHEs asked CDC to take action in three areas during the process of finalizing the ATL report. First, CDC should incorporate SRSHEs's previous recommendations on the ATL report and new recommendations that will be formulated on Dr. Hertel's independent review. Second, CDC should provide SRSHEs with a list of Dr. Hertel's "open-ended" questions or "follow-up" issues. The members will be able to use this document as a checklist while reviewing the final ATL report to ensure these items were addressed. Third, CDC should ask Dr. Hertel to state his position in the final peer review report on whether ATL appropriately used the model to answer questions specifically related to SRS.

Mr. Green and Mr. Wood noted several factors in the overall dose reconstruction process. A manual published by the National Research Council served as the guiding principle for conducting dose reconstructions at SRS and all other DOE facilities, but the guidance was modified to account for characteristics that were specific to each site. CDC implemented a competitive contracting process to select ATL and other contractors to conduct health-related research at SRS and all other DOE facilities.

Awarded contractors were charged with completing specific tasks as defined by the government. In terms of SRS, CDC continues to welcome formal recommendations and other input from SRS HES on the ATL report or additional areas Dr. Hertel should examine in preparation of the final peer review report.

Dr. Lee provided additional details based on her long tenure as an SRS HES member and expertise in the field. The statement of work for Phase III of the SRS dose reconstruction study allowed the contractor to use its best judgment in selecting a model. However, the scope of work changed after the contract was developed due to budget constraints. Most notably, activities for Phases III, IV and V were combined into Phase III. Several different approaches could have been selected to successfully conduct the Phase III activities, but the model chosen by ATL is widely used in the industry and is equally as solid and reasonable as others.

Mr. Wood summarized key findings from CDC's dose reconstructions conducted at other DOE facilities in response to a previous action item. The most significant dose at the Fernald, Ohio site was from a uranium silo that resulted in radon to the lungs. Radon doses to persons could have been as high as 100 rads. The most significant dose at the Idaho National Laboratory (INL) was ~6 rads of an effective dose of iodine 131 from multiple isotopes. No epidemiological studies were conducted at INL.

The most significant dose at the Hanford, Washington site was airborne iodine 131 from the milk pathway with a median dose of ~200 rads to the thyroid of an infant. The upper uncertainty bound was found to be as high as nearly 600 rads. River doses, hot particles and plutonium emissions were found to be considerably smaller than the iodine 131 doses. Two epidemiological studies conducted at Hanford found no correlation between dose and thyroid disease in the affected population and also did not show an increase in the incidence of thyroid cancer, hypothyroidism, hyperthyroidism or Graves' disease. The most significant doses at SRS were from multiple isotopes and pathways with an effective dose of 1 rem.

CDC is currently retrieving documents from the Los Alamos, New Mexico site. Findings from these efforts to date can be reviewed on the CDC web site. Los Alamos is the only DOE site where CDC is still conducting activities. The states of Tennessee and Colorado conducted dose reconstructions at the Oak Ridge, Tennessee and Rocky Flats, Colorado sites, respectively. Each state has posted a dose calculator on its respective web site for persons to enter specific parameters and calculate individual doses.

Mr. Wood provided additional details to further guide SRS HES's discussion on next steps. The Health Physics Society (HPS) position statement does not recommend an

epidemiological study in an area with exposures <10 rem. HPS acknowledges that health effects can be caused by exposures <10 rem, but results at this low rate cannot be statistically detected or measured. The National Council on Radiation Protection and Measurements concurs with HPS's position. CDC is reluctant to conduct an epidemiological study at SRS because similar research performed at other DOE sites with higher doses did not show significant health effects to persons. The SRS doses will still not be as high as those at other DOE sites even if gross errors are detected in previous SRS analyses or new data are located.

Ms. Carol Connell of NCEH/ATSDR clarified that in addition to radon, CDC also examined uranium in drinking water at the Fernald site due to significant public health concerns about an offsite plume. An extensive epidemiological study was launched and is still ongoing because of a lawsuit. Anticipated increases in lung cancer were not seen in Fernald residents, but a slight increase in urinary tract cancer and disease was detected. Overall, doses used in dose reconstruction studies are extremely conservative or cannot be identified by epidemiological studies. Ms. Connell added that the University of South Carolina conducted a five-year cancer incidence study for SRS in Georgia and South Carolina.

Ms. Jane Perry is the SRS/HES liaison to the Georgia Division of Public Health. She conveyed that ATSDR's public health assessment (PHA) will continue to formally address epidemiological issues at SRS and other sites outside of the advisory committee process.

Mr. Ortaldo opened the floor for SRS/HES to provide CDC with guidance on the nine recommendations in the ATL report. The ATL recommendations and SRS/HES responses are outlined below.

- "Examine large acute releases to determine if the pattern of doses will significantly change." SRS/HES recommends that a determination be made on whether acute releases as a total amount released in a year were incorporated into the source term calculation. Dr. Hertel should review existing data on SRS onsite acute releases and dose calculations to make a qualitative statement on whether this information will affect the doses in terms of a significant increase or decrease. CDC should review previous SRS/HES meeting minutes and include SRS/HES's previous position on acute releases in the final ATL report.
- "Examine the buildup of long-lived radionuclides in soil to determine if terrestrial doses will significantly change." SRS/HES agrees with Dr. Hertel's plan to address this issue in the final peer review report.

- “Model contaminants in reservoirs to determine if significant doses occur.” SRSHES recommends that the word “reservoir” not be used because the independent review focuses on significant doses from fish consumption.
- “Compare modeled concentrations in foodstuffs with monitoring data for model validation.” SRSHES recommends that CDC conduct this activity by compiling and reviewing sampling data previously collected for SRS.
- “Perform an auxiliary analysis to determine if breast-feeding of infants substantially changes doses.” SRSHES does not recommend that any actions be taken to address this issue.
- “Perform an auxiliary analysis to determine how *in utero* doses change total dose and cancer risk.” SRSHES does not recommend that any actions be taken to address this issue.
- “Model consumption of venison more carefully to determine if the result changes.” SRSHES recommends that Dr. Hertel review ATL’s white paper on this issue in preparing the final peer review report.
- “Model doses from the consumption of drinking water taken from the Savannah River for municipal water supplies some distance downstream from the SRS.” SRSHES recommends that CDC review existing data to locate the highest level of each isotope measured in any part of the Savannah River. The data should then be calculated to determine the amount of water an individual would need to ingest to obtain a dose of 1 rem.
- “Obtain technical peer reviews by publishing papers on the study methods and results in peer-reviewed journals.” SRSHES does not recommend that any actions be taken to address this issue.

SRSHES turned the discussion to the current status of the ATL report. Mr. Christensen believed the report should be finalized and released to the public at this time, but Dr. Lee pointed out that several deficiencies must first be resolved. Most notably, data are missing from the current version of the report to run ATL’s calculations and confirm the accuracy of figures. The report has not been revised to capture technical and scientific comments from SRSHES, Dr. Hertel, the public or other sources. Mislabeled tables, duplicate text and other typographical or editorial errors have not been corrected. Additional flaws may be detected in the report while Dr. Hertel completes his independent review. Dr. Lee added that the final ATL report should reflect a high-quality and accurate product to honor the tremendous amount of funding, extensive efforts and long period of time of the SRS dose reconstruction project.

Ms. Ali Simpkins of WSRC agreed with Dr. Lee’s comments. The current version of the ATL report cannot be used to run the calculations and easily reproduce doses. Data are entirely missing or are extremely difficult to locate in the text or appendices. An

individual with Ms. Simpkins' experience of over ten years in the dose reconstruction field should be able to easily replicate ATL's figures in one day. However, Ms. Simpkins needed one month to complete this task using the current version of the report. WSRC submitted comments to CDC to document these technical issues.

Based on these comments, SRSHES placed a formal motion on the floor to recommend that CDC take the following actions to finalize and release the ATL report to the public. Additional data should be provided to easily reproduce ATL's calculations and confirm the accuracy of the figures. SRSHES's editorial and technical comments noted in the January 25, 2005 meeting minutes should be addressed. Dr. Hertel should complete the independent peer review and comments from his assessment should be addressed. Technical and scientific comments submitted to CDC from WSRC, the public and other sources should be addressed. The motion was properly moved and seconded by Mr. French and Mr. Stringer, respectively, and **unanimously approved**.

In addition to the formal motion recorded in the minutes, SRSHES also reached agreement for Dr. Lee to draft a letter to CDC. SRSHES's letter will provide more explicit details on specific areas that should be addressed before the ATL report is finalized and released to the public, such as editorial and technical comments submitted by SRSHES, WSRC, the public and all other sources; ATL's nine recommendations listed in the report; and comments from Dr. Hertel's final peer review report. Dr. Lee will forward the letter to Mr. Ortaldo for an initial review and the revised document will be distributed to SRSHES for review and comment. The members will be given two weeks to submit comments to Dr. Lee and the letter will then be finalized and sent to CDC.

Mr. Green and Mr. Wood described CDC's next steps to respond to SRSHES's consensus recommendation. CDC will meet with ATL shortly after the meeting to discuss actions that should be taken to address comments from SRSHES, Dr. Hertel and all other sources in finalizing and releasing the report to the public. SRSHES and the public are welcome to submit additional comments to CDC before the ATL report is finalized. CDC will provide Dr. Hertel with comments submitted by SRSHES and WSRC to assist in his preparation of the final peer review report. CDC will also distribute WSRC's comments to all SRSHES members. CDC will provide a written response to SRSHES's letter on its formal motion.

Public Comment Period

Mr. Atherton made several comments in response to SRSHES's open discussion. A CDC contractor noted at a previous SRSHES meeting that the potential immunity of persons from ingesting adequate quantities of non-radioactive iodine was not

considered in calculating the Hanford dose of 200 rads of iodine 131 to the thyroid. A European study conducted in 2003 demonstrated that low doses of radiation can cause significantly harmful health effects. The *BIER 7 report that was released in 2005 conservatively reduced the safe radiation level to a lower dose. These recent findings dispute the HPS position statement that was published in the 1990s on the lack of statistically significant effects with exposures <10 rem.

Mr. Atherton also questioned the rationale for excluding certain data from the dose reconstruction study, such as high-level radiation leaks from waste storage tanks during the 1950s and a worst-case scenario to account for low doses to the public. Mr. Wood responded to Mr. Atherton's comments as follows. Groundwater was eliminated from the SRS dose reconstruction study as a pathway for historical exposures to the offsite public. The study includes reasonable upper and lower uncertainty bounds, but was designed to estimate actual doses to actual persons rather than a worst-case scenario. The SRS Phase II report fully documents these issues and is available to the public on the CDC web site.

ATSDR's Current SRS Activities

Ms. Connell reported that the 1986 Superfund Amendments and Reauthorization Act to the Comprehensive Environmental Response, Compensation and Liability Act of 1980 directed ATSDR to perform specific public health activities associated with actual or potential exposures to radiological and chemical hazardous substances released to the environment. ATSDR is mandated to perform PHAs for each facility listed on or proposed for the National Priorities List (NPL). ATSDR may also conduct PHAs for a particular facility or release in response to a petition by an individual or group.

ATSDR follows a clearly defined and step-wise process to conduct PHAs. The history, current status and potential contaminants of concern (COCs) at a site are reviewed by conducting site visits; implementing a needs assessment or attending public meetings to document community health concerns; compiling demographic information; analyzing land use and natural resources in the vicinity; and examining results from a dose reconstruction study if available.

Several approaches are used to identify potential COCs at a site. Sampling data published in ATSDR's toxicological profiles on chemicals and radionuclides are collected and evaluated. Environmental concentrations are compared to ATSDR's health-based comparison values. Completed and potentially completed exposure pathways are identified and evaluated for potentially maximally exposed persons.

Screened contaminants are assessed using site-specific scenarios for completed and potentially completed pathways to identify COCs.

Other data sources and tools are applied, such as toxic chemical release inventories, environmental fate and transport models, facility use records and research or journal articles. A weight-of-evidence approach based on applicable animal or human studies and other relevant research with health-based comparison values is used to determine potential public health implications and identify COCs. Conclusions are formulated and public health recommendations are made.

ATSDR launched an evaluation of potential adverse health effects to the public from SRS exposures because the site is on the NPL. NCEH's SRS dose reconstruction focused on historical exposures ending in 1992, while ATSDR's PHA focuses on current and future exposures from 1993 and thereafter. The current status of the SRS PHA is outlined as follows. DOE, Georgia and South Carolina environmental sampling data were gathered for radiological or chemical hazardous substances. Data from research, journal articles and special project reports were compiled. SRS represents the largest data set of any DOE site. To date, SRS has provided ATSDR with >7 million electronic data points for various media, chemicals and radionuclides from 1993 and thereafter.

ATSDR has completed its review of SRS's history since 1993 and current status of the site. The identification and review of potential COCs, completed and potentially completed exposure pathways and other potential hazards unique to SRS are underway. ATSDR expects that the major differences in its PHA versus NCEH's dose reconstruction will be findings from chemical exposures; earthquakes, tornadoes, hurricanes or other disasters with a potential impact on onsite operations and offsite releases; and site activities, such as hunting, tree cutting and burning.

ATSDR's goal is to release the SRS PHA report in FY'06, but recognizes that drastic budget cuts for health-related research at DOE facilities may affect this timeline. However, ATSDR will immediately inform the public if significant health concerns are detected during the PHA process regardless of when the report is completed and released.

Ms. Perry suggested that public education resources be produced for SRS to compliment the PHA, such as the videotape for the Oak Ridge site. Ms. Yolonda Freeman of ATSDR confirmed that funding is available to develop a public education videotape or DVD for SRS. However, SRS/HES must provide ATSDR with input on items that should be included in this tool. Suggestions can be submitted to Ms. Freeman at yvf0@cdc.gov or 404/498-0317.

NIOSH's Current SRS Activities

Dr. Steven Ahrenholz of NIOSH noted that the findings and conclusions in his presentation were not formally disseminated by NIOSH and should not be construed to represent any NIOSH determination or policy. NIOSH's completed activities that are of relevance to SRS are outlined as follows. Three projects were completed in January 2005, including the reconstruction of doses among Chernobyl liquidators; studies on measurement error methods for underground uranium miners; and research on correcting measurement errors in radiation exposures. An update on the Hanford mortality study was completed in June 2005 to focus on age at exposure to ionizing radiation.

A mortality update for the Pantex Weapons Facility was completed in March 2005. An epidemiologic study of mortality and radiation-related cancer risk among 63,561 civilian INL workers is expected to be completed in October 2005. A cohort mortality study and leukemia case-control study at the Portsmouth Naval Shipyard (PNS) were completed in June 2005. A cooperative agreement was undertaken with the International Agency for Research on Cancer to complete a multi-national study in June 2005 on cancer risk following low doses of ionizing radiation covering 15 countries and 407,391 workers.

NIOSH expects to complete several priority research projects in the near future. Follow-up analyses, a systematic literature review and evaluations of potential associations between chronic lymphocytic leukemia and ionizing radiation are expected to be completed in 2005. A multi-site case-control study on leukemia and ionizing radiation and a chemical laboratory worker mortality study are expected to be completed in FY'06 and will include a cohort of SRS workers. A PNS lung cancer nested case-control study, a multiple myeloma case-control study at the K-25 Plant and the Fernald cohort mortality update study are expected to be completed in FY'06.

A study on susceptibility and occupational radiation risks will be continued with ~24,000 SRS workers followed during the 50-year period of 1953-2002. A study on stochastic models for radiation carcinogenesis will be continued with radiation workers to focus on temporal factors and dose-rate effects. A worker mortality study at the Gaseous Diffusion Plant in Louisville, Kentucky will also be continued. NIOSH's agenda and budget for public health activities at DOE sites from FY'05-FY'10 are now available on the NIOSH web site for review. Public comments must be submitted to sahrenholz@cdc.gov by November 1, 2005.

NIOSH will convene a public meeting on October 27, 2005 in Washington, DC to inform workers and other stakeholders about its programs and current research activities. A

notice of the meeting will be published in the *Federal Register* and the public will be invited to provide comments. More information about all of NIOSH's completed and ongoing worker studies at DOE sites can be obtained from the web site at www.cdc.gov/niosh or the toll-free telephone number at 800/356-4674.

Public Comment Period

Mr. Donald Orth is a former SRSHES member. He was pleased to note that the current membership has continued to make diligent efforts and tremendous progress in addressing environmental health concerns within the SRS community.

New SRSHES Business

Mr. Green and Mr. Wood described next steps in the advisory committee process for SRS because the current proceedings serve as SRSHES's final face-to-face meeting. CDC will distribute the September 15, 2005 draft minutes to each member for review and comment. SRSHES can submit changes to Mr. Green at 404/498-1717 or prg1@cdc.gov. CDC will revise the minutes based on SRSHES's comments and circulate the final version to all members.

CDC will convene an SRSHES conference call to address all outstanding issues. The conference call will serve as a public meeting because SRSHES has not been formally discharged at this time and continues to operate and function as an advisory committee chartered under the Federal Advisory Committee Act. A notice of the SRSHES conference call, agenda and toll-free number for the public will be published in the *Federal Register*. A quorum of members will participate and minutes will be taken. CDC will schedule the conference call in the very near future because the 180-day extension for SRSHES members whose terms expired in June 2005 will terminate in December 2005. SRSHES members will be polled to determine the best available date for the conference call. CDC will provide SRSHES with electronic copies of pertinent materials in advance of the conference call.

The two **action items** raised over the course of the meeting were for Mr. Wood to search DVDs of SRS documents to locate deposition rates and for CDC to e-mail Dr. Hertel's slide presentation to SRSHES.

Closing Session

Mr. Green regrettably announced that the SRSHES certificates of appreciation were not completed prior to the meeting for formal presentation to the members. However, he and Mr. Wood thanked the former and current SRSHES members for their support, commitment, diligent efforts and valuable input to CDC over the years. They emphasized that CDC was honored to serve the SRS community.

With no further discussion or business brought before SRSHES, Mr. Ortaldo adjourned the meeting at 3:30 p.m.

I hereby certify that to the best of my knowledge, the foregoing Minutes of the proceedings are accurate and complete.

Date

Joseph F. Ortaldo, Acting Chair
Savannah River Site Health Effects
Advisory Committee

ATTACHMENT 1

List of Participants

SRSHES Members

Mr. Joseph Ortaldo, Acting Chair
Mr. David Christensen
Dr. Deborah Crawford
Mr. Michael French
Mr. Warren Hills, Sr.
Dr. Patricia Lee
Mr. Martin Stringer

Mr. Kwabena Jones
(Citizens for Environmental Justice)
Mr. Ranowul Jzac
(Citizens for Environmental Justice)
Mr. Donald Orth (Public)
Mr. Donald Padgett (WSRC)
Mr. Murray Riley (Public)
Ms. Ali Simpkins (WSRC)
Mr. and Mrs. Kenneth Webb (Public)
Ms. Gail Whitney (DOE)

SRSHES Liaison Representatives

Ms. Jane Perry (Georgia DHR)
Mr. Thomas Rolka (SC DHEC)

Designated Federal Official

Mr. Phillip Green, Executive Secretary

CDC Representatives

Dr. Steven Ahrenholz
Ms. Carol Connell
Ms. Iris Dixon
Ms. Yolonda Freeman
Ms. Judy James
Mr. Charles Wood

Presenters and Members of the Public

Mr. Peter Atherton (Public)
Mr. Cyril Banick (Public)
Ms. Rosemary Caron (CDC Contractor)
Ms. Becky Craft (Public)
Mr. Ken Crase (WSRC)
Mr. Pete Fledderman (WSRC)
Dr. Nolan Hertel
(Georgia Institute of Technology)
Ms. Karen Hooker (DOE)
Mr. Tim Jannik (WSRC)