4.2.1 Office and Electronic Communications Facilities

SC&A maintains its corporate headquarters in 4,200 square feet of prime office space located on Old Dominion Drive in McLean, Virginia. This office has a 15-workstation 10/100 RJ-45 LAN, allowing SC&A employees to work together and communicate effectively with clients and subcontractors. The LAN operates using Windows NT 4.0 and Linux servers, and utilizes Send Mail for electronic mail. Automated tape backup systems safeguard the network. Each workstation has access to full-time, real-time, full-service direct connectivity over the LAN to the Internet via our dedicated DSL line. This ensures reliable access to global Internet resources, as well as providing the capability for communication and file transfer with remote staff, subcontractors, and clients. Physical resources include a conference room complete with audiovisual equipment. The building has a multi-level security system with card reader access entry.

SC&A's Southeastern Environmental Laboratory is located in Montgomery, Alabama and specializes in the analysis of radionuclides in environmental media. It is fully equipped with modern, industry-standard radiochemical and radiometric equipment and is organized according to nationally and internationally accepted radioanalytical and treatment processing principles. A

significant inventory of factory-calibrated field sampling devices and health and safety equipment is maintained at the laboratory. This inventory includes a full complement of radiation survey equipment, including alpha scintillation probes, beta/gamma survey meters, and gamma scintillation probes. The laboratory is pre-qualified with the U.S. Army Industrial Operations Command under the category of "Characterization and Verification." The laboratory holds a radioactive materials license (No. 1150) with the Office of Radiation Control in the Alabama Department of Public Health and is certified in several other states to characterize radioactive waste.

SC&A also operates a regional office in St. Louis, Missouri, which provides quality assurance and auditing services.

4.2.2 Graphic and Reproduction Facilities

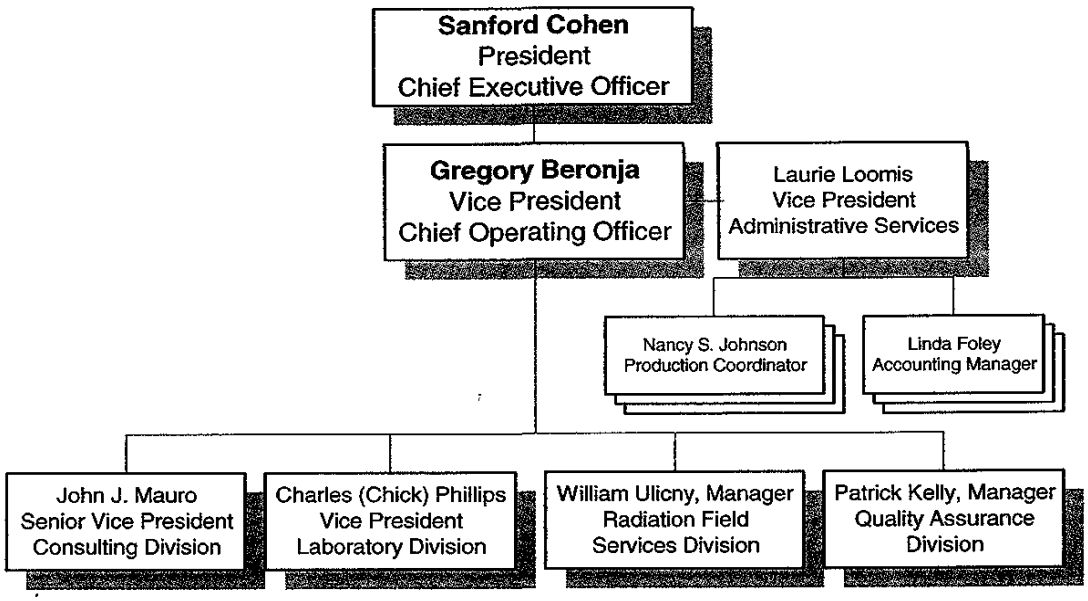
SC&A's production department creates a wide range of documents, presentations, and exhibit materials. Our word processing and graphics capabilities include state-of-the-art desktop publishing software, enabling us to create high-quality documents in a variety of formats. Using graphics software such as Adobe Illustrator, Adobe PhotoShop, Microsoft PowerPoint, Aldus PageMaker, Claris Draw, Corel Draw, and T/Maker ClickArt, SC&A staff are also able to illustrate documents and create effective presentation and exhibit materials.

The McLean office of SC&A is equipped with two Canon ImageRunner 550 reproduction machines, one of which is networked for access from the individual workstations. These high-volume copiers produce high-quality copies at rates of up to 83 copies per minute and are used for reproduction of technical reports, manuals, and handbooks. They are equipped with automatic feed and sorters, and can produce double-sided copies. Both machines are maintained by factory-trained technicians and are serviced regularly. SC&A maintains a full complement of laser and inkjet color and black-and-white printers.

5.0 CORPORATE EXPERIENCE

SC&A currently has approximately 30 employees and approximately 100 associates. More than 75 percent of SC&A's professional staff have advanced degrees. The majority have 15 to 25 years experience solving scientific and technical problems and implementing solutions to radiation and radiation-related issues. SC&A personnel are primarily engineers, health physicists, chemists, and physicists. The engineering staff is composed of nuclear, chemical, and environmental professionals, many with professional registration. About one-fourth of the health physics staff are Certified Health Physicists, and almost all the chemists are radiochemists. Other disciplines include computer science, metallurgy, and hydrology. The following presents SC&A's corporate organizational chart.

SC&A Organizational Chart



Since its founding, SC&A has provided primarily radiological consulting services to Federal agencies under large, task order, cost plus fixed fee contracts. Our principal clients have been and continue to be the CDC, the NRC, the EPA (particularly ORIA/EPA), and the Republic of the Marshall Islands (RMI). We have also held large contracts with the DNFSB and the Congressional Office of Technology Assessment (OTA). The important point is that our primary business is providing the highest quality radiological consulting services to Federal agencies, especially agencies that provide independent regulatory oversight to the DOE and its contractors. From the perspective of being qualified for providing the services required by this contract, and still being free of any real or perceived conflict of interest, SC&A is in a very unique position. The only significant amount of work that we perform for DOE is laboratory services for some DOE contractors, and we do no work for NIOSH.

Our private sector work has been limited primarily to the radiological characterization of contaminated sites and providing heath physics oversight and closeout surveys. We have also assisted many NRC licensees in obtaining and maintaining their NRC licensees. In its more than 20 years of existence, SC&A has performed work on approximately 225 contracts, including more than 1,000 tasks for its clients.

5.1 Radiological Assessment Support to the NRC and the Nuclear Power Industry

SC&A has held 17 contracts with the NRC, either as a prime contractor or subcontractor, since 1981. Six of these contracts were completed or initiated within the past five years. Under these contracts, SC&A fulfilled dozens of task orders, with support requirements spanning the entire spectrum of assistance requested under this solicitation.

SC&A evaluated the impact of NRC-initiated multi-plant actions on worker radiation exposures. A list of multi-plant actions potentially resulting in occupational radiation exposures was compiled from the NRC "orange book" for the period 1979 through 1983. This list was supplemented by the relevant I&E Bulletins over the same time period. The next step was to divide the operating reactors into classes, based on distinguishing parameters, and to select representative plants from each of the classes.

Occupational radiation exposure data were obtained from the Radiation Work Permits at ten representative plants for tasks corresponding to the NRC multi-plant actions. The exposures from these representative plants were used to estimate the total exposures at light water-cooled reactors. The results were presented in a form which illustrates the contribution of dose from NRC-initiated multi-plant actions to total worker dose. The report was published as AIF/NESP-033, Occupational Radiation Exposure Implications of NRC-Initiated Multi-Plant Actions, March 1986.

In the early 1980s, the nuclear energy industry employed an increasing number of non-permanent radiation workers at nuclear power plants, variously referred to as "temporary" or "transient" workers. Little was known about these workers, aside from their radiation exposures, which were alleged to be higher, on the average, than those of permanent station employees. SC&A conducted a study to characterize the non-permanent radiation workers at nuclear power plants. The workforce was subdivided into permanent station employees, non-station utility employees, temporary station utility employees, permanent contractor employees, and temporary contractor employees. For each category of workers, data were collected on numbers of individuals by craft, age, sex, geographical origin, duration of employment, and radiation exposure. Additionally, radiation exposures were evaluated by specific job, including steam generator repair, control rod drive maintenance, decontamination, and waste management. Finally, the training in radiation safety was assessed for both permanent and temporary workers.

In evaluating the job-specific radiation exposures, it was necessary to disaggregate radiation work permits by worker category. Although this task was simplified at some plants through the use of automated databases, tedious reviews were necessary at other plants. In total, one to three years of exposure data were obtained for 15 units at nine stations operated by six utilities. The work was published as a report entitled, "Characterization of the Temporary Radiation Work

Force at U.S. Nuclear Power Plants," AIF/NESP-028, May 1984. This experience has many similarities to the development of worker and site profiles.

SC&A developed for the nuclear power industry methods for predicting worker doses. The objective was to determine how accurate are current state-of-the-art estimates, and to develop a method which improves the accuracy of these estimates. Initially, using data collected from representative nuclear power plants, estimated doses were compared with actual doses in an attempt to explain the reasons for discrepancies. The results of these comparisons were used to guide the development of a method to improve the accuracy of these estimates.

The developed method comprises three building blocks--an overall logic, checklists, and worksheets. A logic diagram guides the estimator through a series of steps, each of which involves the completion of a checklist or worksheet. The checklist systematically solicits the information needed to prepare the estimate, including appropriate adjustment factors. The worksheets are used to organize information and perform calculations needed to construct the dose estimate. The final report described the application of the method to the engineering design process, and presented a sample problem which illustrates its application.

The report was published as AIF/NESP-039, Estimating Doses in Nuclear Facilities with Emphasis on the Design Process, January 1987. The method was also programmed for implementation on a desk-top computer. The program is contained on a floppy disk included with the program description in NUMARC/NESP-001, DOSES: A System for the Personal Computer to Estimate Radiation Exposure at Nuclear Facilities.

Though these investigations were performed on behalf of NRC and its licensees many years ago, the experience and lessons learned have applicability to historical exposures experienced by workers at DOE and AWE facilities at that time.

SC&A is currently supporting NRC's effort to develop the technical basis for a rulemaking establishing residual radioactivity contamination standards for the clearance of materials and equipment from licensed facilities. SC&A is characterizing the quantities and radiological composition of materials and equipment that may be affected by the rule, and supporting the development of cost models for use in determining material dispositions for the collective dose/risk assessment and the cost/benefit analysis portion of the Regulatory Impact Analysis.

As part of the characterization investigations, SC&A was instrumental in the development of a database characterizing the quantities, types, and radionuclide composition of systems, facilities, and equipment for more than 11,000 facilities in a number of industrial and government sectors. SC&A is currently working on two follow-on contracts. The first is to finalize NUREG-1640, entitled "Radiological Assessments for Clearance of Equipment and Materials from Nuclear Facilities," for the Office of Nuclear Regulatory Research. NUREG-1640 contains methods for translation of concentrations of radioactivity in or on certain metals and concrete into radiation doses as a result of decontamination and survey of these materials. SC&A is performing an analysis of individual dose assessments for the clearance of materials and equipment, resolving public comments on NUREG-1640, and preparing the manuscripts and other materials for final publication. Under the second contract, SC&A is providing technical assistance for both

individual and collective dose assessments to determine the radiological impacts of alternatives for the clearance of materials and equipment. Both projects involve the development of Monte Carlo-based multimedia dose assessment models for evaluating individual and collective doses to workers and the public, including formal assessment of uncertainties and variabilities. The models make extensive use of ICRP methodologies for performing internal and external exposures.

5.2 Defense Nuclear Facilities Safety Board Support

SC&A was a technical support contractor to the DNFSB from 1993 through 1997. DNFSB was established by Congress in 1989 as an independent agency to provide advice and recommendations to the Secretary of Energy on public health and safety at DOE defense nuclear facilities. Fourteen tasks were ordered during the four years that SC&A held the contract. (DNFSB eventually brought the work in-house.)

SC&A developed a Standard Review Guide (SRG) on Radiological Training under the DNFSB contract, which was intended to be the first of a series of guides that would comprehensively relate to radiological protection. SC&A also reviewed several implementation guides under the DOE rule on occupational radiation protection, 10 CFR Part 835, and compared them with applicable commercial and government standards, assessing their technical content with the guidance that has been given to commercial utilities. The lessons learned from these programs provide insight into the strengths and limitations of historic DOE radiation protection programs vis-à-vis NRC regulated programs.

It is important to note that all of these investigations that SC&A performed for our Government clients required auditable QA/QC programs performed under fully documented pre-approved Quality Management Plans and Quality Assurance project procedures which implemented those plans for each project. Our documentation had to be complete, transparent, and was audited by our clients on numerous occasions. During your review of our past performance on these projects, you will have an opportunity to judge the responsiveness and quality of our work.

5.3 Dose Reconstruction Support to Centers for Disease Control

In January 1990, the Secretaries of the Departments of Energy (DOE) and Health and Human Services (DHHS) signed a Memorandum of Understanding (MOU) transferring to DHHS responsibility and funding for studies of chemical and radionuclide releases from DOE nuclear facilities, and of potential exposures and health effects to the surrounding population. The primary purpose of this transfer of responsibility was to avoid any perceived or actual conflict of interest associated with DOE performing the historical dose evaluations for facilities for which it has operational responsibility.

Under the authority of the MOU, the Radiation Studies Branch (RSB) of the CDC began its independent investigations into the historical doses at the INEEL in 1992. The first phase of these investigations began with the retrieval of approximately 15,000 boxes of records and the creation of a bibliographic database containing titles and abstracts of reports, records, and documents pertinent to the historical operations, radionuclide emissions, and radiation exposure

of members of the public on and offsite since the commencement of operations in 1949. This bibliographic database was designed to facilitate research into the historical non-occupational exposures at INEEL. Based on this experience, SC&A understands the challenges associated with the retrieval of critical historical records related to dose reconstruction.

On June 21, 2002, CDC authorized SC&A, in cooperation with SENES Oak Ridge, to proceed with a research project that included:

- Calculation of the chronic and episodic airborne radionuclide releases from the Idaho Chemical Processing Plant (ICPP) for the years 1957, 1958, and 1959, from the criticality accident that occurred in October 1959, and from the series of 31 Initial Engine Tests of the Aircraft Nuclear Propulsion Program (ANP).

- Determination of the historical doses to members of the public both on and offsite from these releases.

The project also involves the search for additional records as required for the above research and adding them to the bibliographic database, attending meetings of the INEEL Health Effects Subcommittee (a Federal Advisory Committee), and preparing fact sheets regarding the project and our findings. The results of this research are to be used by CDC to determine the need for follow-up investigations into the potential impact of these radiation doses on public health.

5.4 Dose Reconstruction Support to the Republic of the Marshall Islands

SC&A provided technical support to the Office of the Public Advocate, Central Government, and the Local Government Councils of Enewetak, Bikini, Rongelap, and Utrik Atolls of the Republic of the Marshall Islands in matters relating to the resettlement of the northern atolls and public health and land claims compensation due to radioactive contamination and radiation exposures resulting from nuclear weapons testing in the Central Pacific. These services included the following:

- Evaluate the current and future, and actual and potential, radiation doses and radiological health risks to the critical population groups and the average members of the populations of the northern atolls of the Marshall Islands from radionuclides in the environment due to nuclear weapons testing.

  The evaluations used existing data (supplemented in some cases by confirmatory sampling and analyses) characterizing the radionuclide concentrations in soil, foods, air, and water to develop three-dimensional representations of the contamination profiles on the islands. Radiation doses and health risks were then derived using the methodologies recommended by the EPA and site specific information regarding diets, living habits, and environmental transfer constants on the islands.

- Compare these radiation doses and health risks to the applicable radiation protection standards.

  The standards included the 15 mrem/yr EDE above background standard adopted by the EPA and by the RMI for the cleanup of sites contaminated with radioactive materials. SC&A also evaluated the doses against the 25 mrem/yr and 100 mrem/yr standards set forth in NRC regulations and recommended by the NCRP and ICRP.

- Derive soil cleanup levels.

  This involved determining the combined average concentrations of Cs-137, Sr-90, Pu-239/240, and Am-241 in soil in survey units, considering depth of contamination, that provide a level of assurance that the resettled populations and/or the existing populations on each island will not receive exposures in excess of the EPA cleanup criteria of 15 mrem/yr above background to the reasonable maximally exposed individual for all pathways of exposure.

- Evaluate the costs and effectiveness of a broad range of alternative strategies for the remediation of the islands to the EPA cleanup criteria.

  The remediation strategies include the no action alternative, natural attenuation with monitoring (including whole body counting, urinalysis, and environmental radiological surveillance), food avoidance, island avoidance, soil removal, application of soil additives to suppress the uptake of radionuclides by plants (including the application of potassium and the application of clay-like additives to soil), soil washing, and phytoremediation. Due to the location of the islands and the unique environmental settings, cost analysis for each remediation strategy required unit cost information unique to the Marshall Islands.

- Reconstruction of the historical radiation exposures and associated health risks to the people of the Marshall Islands from fallout from nuclear weapons testing.

  This work involved the review of hundreds of recently declassified documents characterizing bioassay data, film badge readings, radiation survey readings, aerial survey overflight readings, fallout patterns, and the observed clinical effects of fallout on the populations of the northern atolls. The dose reconstructions included derivation of the doses to the average members of the populations and members of the critical population groups each year from 1946 to the present. These dose reconstructions were then compared to the applicable radiation protection standards at the time for the purpose of assessing compensable "loss of use" claims. SC&A also derived the time integrated collective doses to the populations in support of claims compensation for adverse impacts on public health. This involved monetizing the detriment caused by the exposures using a broad range of methods adopted by the EPA, NRC, and other agencies for monetizing health detriment.

This particular task, which lasted two years at a cost of about $500,000, required retrieval and in depth review of hundreds of recently declassified documents, which included data logs, telegraph communications, redacted documents, hand written reports, very old overflight radiological surveys, film badge readings, results of radiological surveys performed using primitive and poorly calibrated instrumentation, and the review of bioassay data that was sparse, used primitive techniques, and was contradictory. We visited remote atolls of the Marshall Islands and spent extensive periods of time (weeks) interviewing these people to elicit their personal experience and recollection of events that took place almost 50 years ago. This experience is invaluable in terms of the lessons learned with regard to what it means to reconstruct historical doses under difficult situations.

As a result of this work, we believe we have uncovered major discrepancies between the whole body, thyroid, and GI tract doses experienced by the Marshallese as compared to the doses reported by the Government at that time and to this day. The people of the Marshall Islands have learned to trust us to objectively report our findings and defend our work before government tribunals and the DOE. We believe that, in providing these services, we have not only earned the respect of the people of the Marshall Islands, but also our counterparts at the DOE and the various independent consultants that have been reviewing our work. The two key individuals that were responsible for this work, Drs. , are key individuals on this proposed project for the Advisory Board.

- Performance of MARSSIM radiological surveys for selected northern atolls for the purpose of determining whether remediation is required or to certify that the islands comply with the cleanup criteria.

  This involved sending a survey team to collect samples of soil, water, and food items on the Island of Ailuk. The samples were analyzed at SC&A's laboratory in Montgomery, Alabama and in the RMI laboratory in Majuro. Before analyzing the samples in the Majuro lab, SC&A refurbished the lab, and installed and calibrated new counting equipment. As part of the project, SC&A trained six Marshallese in field sampling procedures and worked closely with Marshallese laboratory personnel in performing sample analyses at the Majuro lab.

- Evaluation of the northern atolls for PCB contamination.

  Concern was expressed by the people of Enewetak and Bikini that their atolls may have also been contaminated with PCBs resulting from the facilities constructed on Enewetak and the ships that were sunk in the lagoon of Bikini atoll. SC&A collected soil, lagoon sediment, and fish and analyzed the samples for a broad range of PCB congeners and trace heavy metals.

Our scope of work included defending our analyses before the Nuclear Claims Tribunal for claims amounting to over $1 billion. On four separate occasions, SC&A consultants participated

in extensive hearings (each lasting about 2 weeks), where the results of our work were presented and litigated. Our support to the People of the Marshall Islands also included participation in periodic meetings with the DOE and the Department of the Interior. At these meetings, SC&A presented the findings of our investigations, reviewed the work performed by DOE on behalf of the Marshall Islands, suggested new areas of inquiry, and assisted in the drafting of memoranda of understanding between the Republic of the Marshall Islands and the U.S. Government.

Our work involved numerous visits to Majuro, the capital of the Marshall Islands, and the outer islands to obtain information and present our results to the people of the northern atolls, the President and his Cabinet, the Senators representing the atolls, and before the Nitijela (the Parliament).

5.5 Dose Assessment Support to the Environmental Protection Agency

SC&A has supported EPA/ORIA in many of its rulemaking efforts related to the nuclear power industry and related radiation programs, including a multi-task contract. These efforts involved the recycling of radioactive scrap metal (RSM), cleanup criteria for sites contaminated with radioactivity, 40 CFR Part 197 regulations for Yucca Mountain, disposal of low-activity radioactive waste, and drinking water protective action guidelines. SC&A investigated the technical issues associated with the rules and compiled the information into formats required by the regulatory process, including Technical Support Documents (TSDs), Background Information Documents (BIDs), Regulatory Impact Analyses (RIAs), Environmental Impact Statements (EISs) and Regulatory Issues Papers.

SC&A prepared the radiological dose assessment guidance provided in EPA's "Risk Assessment Guidance - Human Health Evaluation Manual," which is EPA's guidance for deriving DCGLs, along with "Guidance for the Development of Derived Concentration Guideline Levels for Radionuclides in Soils: Technical Background Document," prepared for the EPA ORIA, Contract No. 68D20155, Work Assignment 5-23, EPA Work Assignment Manager Michael Boyd, September 30, 1997.

SC&A support included helping establish the framework and overall EPA strategy for rulemaking; evaluating the legal and regulatory framework within which rules would be promulgated; considering the scope and alternative forms of rules; generating factors involved in implementation of rules; and analyzing precedents established by EPA and other Federal and state agencies. Once information on the rules or guidance was published, SC&A supported EPA in managing, evaluating, and responding to comments.

For example, SC&A prepared a comprehensive multi-volume Background Information Document for the Agency's proposed rule regarding the recycling of radioactive scrap metal (RSM) cleared from nuclear facilities. The investigations (1) compiled an inventory of DOE's existing RSM and predicted the quantity of material that would be generated through DOE's decontamination and decommissioning (D&D) program, (2) performed a cost/benefit analysis for all of DOE's recycle options, and (3) assessed the impacts on certain sensitive industries of recycling metals with residual levels of radioactivity.

SC&A was a prime contractor to EPA ORIA over a 15-year period (1986 to 2000). EPA 402-B-02-001 (October 2002) lists over 700 reports published by ORIA. SC&A was a principal contributor to many of those reports dealing with radiological issues. Noteworthy among those reports include:

- Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), 402-R-97-016
- Environmental Characteristics of EPA, NRC, and DOE Sites Contaminated with Radioactive Substances, 402-R-93-011, March 1993
- Computer Models Used to Support Cleanup Decision Making at Hazardous and Radioactive Waste Sites, 402-R-93-005, March 1993
- Risk Assessment Guidance for Superfund (RAGS): Part A (Volume 1 - Human Health Evaluation Manual), 540-1-89-002, December 1989
- Radiation Site Cleanup Regulations: Technical Support Document for the Development of Radionuclide Cleanup Levels for Soil, 402-R-96-011, Volumes A, B, C, D
- Radiation Exposure and Risk Assessment Manual (RERAM), 402-R-96-016
- Background Information Document to Support NESHAPS Rulemaking on Nuclear Power Reactors, 402-R-94-015
- Fact Sheet: Computer Models Used to Support Cleanup Decision Making at Hazardous and Radioactive Waste Sites, 540-F-94-022
- Fact Sheet: Environmental Characteristics of EPA, NRC, and DOE Sites Contaminated with Radioactive Substances, 540-F-94-023
- Fact Sheet: Environmental Pathway Models – Ground-Water Modeling in Support of Remedial Decision Making at Sites Contaminated with Radioactive Material, 540-F-94-024
- Fact Sheet: A Technical Guide to Ground-Water Model Selection at Sites Contaminated with Radioactive Substances, 540-F-94-025
- A Technical Guide to Ground-Water Model Selection at Sites Contaminated with Radioactive Substances, 402-R-94-012 (prepared as a cooperative effort by EPA, the NRC Office of Nuclear Material Safety and Safeguards, and the DOE Office of Environmental Restoration)
- Evaluating Technical Capabilities of Groundwater Models Used to Support the Cleanup of Low-Level Radioactive Waste Sites, 402-R-93-010

- NESHAPS Background Information Document on Rulemaking for NRC and Agreement State Licensees other than Nuclear Power Reactors, 430-R-92-011

- Radiation and Mixed Waste Incineration Background Information Document, 520/1-91-010

5.6 Selected Private Sector Experience

Starting with the most recent, the following presents brief descriptions of SC&A's experience in deriving cleanup standards using a broad range of dosimetric models and designing and implementing facility and site characterization and closeout surveys for the private sector. All field work is performed by SC&A personnel, using SC&A equipment, and all laboratory work is performed by SC&A's radiological laboratory.

New Jersey Industrial Sites

SC&A is currently involved with five New Jersey sites that are contaminated with radioactivity, including U-238, Th-232, Ra-226, and tritium. SC&A's role involves site investigation, waste characterization and disposal, radiation health and safety, field procedures, oversight functions, and assisting in the development and negotiations with NJDEP for site-specific cleanup criteria. The New Jersey sites are located in Teterboro, Hopewell, Lodi, Riverton, and Sayreville. SC&A has derived DCGLs for both commercial/industrial and residential uses of the sites and designed and implemented the MARSSIM site characterization and closeout survey programs.

Curtis Bay FUSRAP Site in Baltimore, MD

SC&A served as consultant and radiological subcontractor to EA Engineering (under a contract with the Army Corps of Engineers) to provide health physics oversight, site characterization services, and the preparation of the baseline risk assessment of Building 23 (a large five-story industrial building) and the Radioactive Waste Disposal Area (a seven-acre site used for waste disposal) contaminated with residual levels of Th-232 and U-238 series radionuclides. The work included the collection and analysis of wipe samples, air particulate samples, measurement of direct gamma exposure rates, radon emanation analyses, and the collection and analysis of soil samples. SC&A also monitored workers for external exposure (TLDs) and inhalation exposures (breathing zone samplers and low volume air samplers). All work was performed by SC&A field technicians and health physics personnel, under the direction of a Certified Health Physicist. All samples were analyzed by SC&A's radiological laboratory. All data were compiled and reviewed under SC&A's data verification procedures and Quality Assurance Project Plan. The data are being used to evaluate compliance with the established radiation protection standards, the ARARs, and to support MARSSIM evaluations.

Regulatory Approval of a Removal Action

SC&A completed a removal action for the U.S. Army Corps of Engineers (Baltimore District under contract with Foster Wheeler Environmental Corp.) for the cleanup of the 26th Street Disposal Site located at the Edgewood Area, Aberdeen Proving Ground, MD (Contract No.

DACA31-94-D-0020). The project included the segregation and removal of 611 cubic yards of waste containing elevated levels of radioactivity (depleted and natural uranium, cobalt-60, strontium-90, cesium-137, radium-226, and thorium-232, among others), UXO, surety agents, and hazardous waste. All waste was characterized, deposited into containers, and shipped to Envirocare for disposal. The work was conducted under a license and oversight of the NRC, Maryland Department of Environmental Conservation, and DOD's Directorate of Safety, Health and Environment. The project was audited by the NRC twice and once by the Maryland Department of the Environment; the agencies did not issue any citations.

Upon completion of all remedial activities, SC&A implemented a final site characterization survey and prepared a closure report to support an application to the NRC for unrestricted release. The NRC conducted an independent radiological survey of the site via ORISE. The survey included *in situ* measurements and soil sampling and analysis. The NRC authorized the release of the site for unrestricted use on June 22, 1998.

5.7 Dose Assessment Experience

Since its incorporation in 1981, SC&A has performed over 500 studies which required the assessment of the radiation doses associated with radionuclides in the workplace and the environment. In the process, SC&A has either used or reviewed virtually every radiological dose assessment model developed and has also developed its own models for specific purposes. The following outlines the range of SC&A's dose assessment experience:

- Dose/Risk Assessments in Support of Site Cleanup

  SC&A studies pertaining to dose/risk assessments in support of site cleanup include:

  - The development of guidelines and regulations pertaining to the cleanup and assessment of sites and facilities contaminated with radioactive and mixed waste.

  - The performance of baseline risk assessments at several sites, including Weldon Springs, Kerr McGee, and Maxey Flats.

  - The evaluation of the costs and benefits of cleanup technologies.

  - The review of the dose/risk assessments and the models and data used to perform the risk assessments at several sites, including waste management units at Savannah River, Oak Ridge, Paducah, Fernald, Mound, and Los Alamos.

  - A comprehensive dose/risk assessment of sites throughout the country containing elevated levels of naturally occurring radionuclides.

- Dose/risk assessments for contaminated soil, aquifers, and buildings at major DOE facilities as part of SC&A's support to EPA in the development of a site cleanup rule.

- Dose/risk assessment of residual radioactivity and cleanup needs for the Republic of the Marshall Islands.

• Mixed Waste Studies

Most of the studies described above involved the evaluation of both radioactive and chemically hazardous waste. However, several SC&A studies were directed specifically at mixed waste and mixed waste risk assessment. One of the more challenging risk assessment projects was the development of a mixed waste Hazard Ranking System (HRS), which was incorporated into the HRS in revised 40 CFR 300.

• Airborne Pathways Risk Assessment and Source Term Characterization

These studies include:

- Radiological dose/risk assessments of airborne emissions from hundreds of facilities throughout the United States, including DOE facilities, in support of the radionuclide NESHAPS rulemaking.

- Inspection of several DOE facilities for compliance with the radionuclide NESHAPS. Although this did not involve the performance of risk assessments, SC&A did gather data pertinent to developing the source term for risk assessments.

- The performance of radiological impact assessments as part of NEPA documentation.

- Phase 1 of the dose reconstruction project of the Idaho National Engineering Laboratory (INEL) for the CDC. The project involved gathering, reviewing, abstracting, and creating a bibliographic database for all reports, records, and data pertinent to the performance of a dose reconstruction at INEL.

- Reconstruction of the airborne emissions and radiation exposures associated with INEL operations.

• Aquatic (Surface Water) Pathways Dose/Risk Assessment

In addition to the assessment of surface water pathways performed in support of RI/FS reviews, SC&A performed several special risk assessments studies specifically for the surface water pathways, including:

- Dose/risk assessments in support of the development of Protective Action Guides and Derived Response Levels for the water pathways.

- Dose/risk assessments of the discharge of produced water (water containing elevated levels of naturally occurring radionuclides) from coastal and offshore oil and gas drilling platforms in the Gulf of Mexico.

- Dose/risk assessments in support of the drinking water standards.

- Assessments of the radiosensitivity of aquatic organisms.

• Review and Development of Multimedia Models and Computer Codes for Use in Risk Assessment

Support in the development of regulations and guidelines for the EPA required extensive model review and development, including:

- The review of 25 multimedia models for possible use in support of the soil cleanup rule. This resulted in the selection and use of RESRAD, PRESTO, and HHEM Part B.

- The verification and validation of AIRDOS-EPA for use in support of the radionuclide NESHAPS.

- The development of guidance on the selection and use of groundwater flow and transport models for use in support of remedial decision making at radioactively contaminated sites.

- Participation in multimedia model evaluation for the DOE Programmatic Environmental Impact Statement (PEIS) for the DOE Environmental Restoration program.

- Development of computer codes to supplement existing codes for assessing the doses and risks to workers and the public from recycling and site cleanup.

• Decontamination/Decommissioning/Recycling Studies

Both the NRC and EPA are engaged in the promulgation of regulations pertaining to the decommissioning of structures and the possible recycling of metal and concrete. SC&A has performed several worker and public health dose/risk assessment studies for both agencies in support of these rulemakings.

- High-Level Waste Studies

  SC&A performed numerous studies for EPA on the risks associated with the management of high-level radioactive waste (HLW). These studies included:

  - Waste characterization.
  - The review of performance assessment models.
  - Uncertainty analysis.
  - The evaluation of release and exposure scenarios, their probabilities, and the associated radionuclide releases to the accessible environment.
  - Waste transportation studies.

- Uranium Mill Tailings

  In addition to the NORM risk assessments, SC&A performed several studies in support of the uranium mill tailings standards. These studies included the modeling of the risks from radon, dust suspension, direct radiation, and the contamination of groundwater.

- Low-level Radioactive Waste (LLW)

  SC&A assisted the EPA in the promulgation of 40 CFR 193. This work involved revising PRESTO to reflect updated waste characteristics, site characteristics, and disposal technologies. SC&A has also performed risk assessments in support of the siting of LLW storage facilities for NRC licensees.

- Radiation Worker Dose/Risk Assessment

  SC&A performed several worker radiation dose studies in support of:

  - The revised 10 CFR 20 for the NRC.
  - Worker training requirements for the NRC.
  - Radiation protection guidelines for EPA workers.
  - Health physics consulting for NRC licensees.
  - ALARA studies for NUMARC and AIF.
  - Dose/risks to workers due to site cleanup at numerous NORM sites.

- Safety Analysis and Emergency Planning

  Except for the HLW studies, the above studies are oriented toward exposures associated with normal, as opposed to transient or accident, conditions. Accidents or severe external events can be the limiting scenario for the risks to workers, the

public, and the environment. SC&A has performed a number of accident analyses, including:

- Special studies of DOE facility safety for DNFSB.
- Nuclear power plant safety analyses for the NRC and the Congressional OTA.
- Accident analyses in support of the development of Protective Action Guides for the EPA.
- Chernobyl studies for EPA.
- Criticality evaluations related to both LLW and HLW management.
- Criticality evaluations of the October 16, 1959 criticality accident at INEL.

• Data Collection, Analysis, and Evaluation

SC&A performed several studies pertaining to the collection of data for use in dose/risk assessment and regulatory compliance. The studies included:

- The development of guidance for data collection for use in risk assessments for EPA.
- Guidance on evaluating the usability of data for risk assessment for EPA.
- The review of data gathered by others at numerous DOE and non-DOE sites.
- The collection of field data from numerous sites for use in dose/risk assessments and site closeout.
- The collection of license termination data from the Nuclear Energy Institute (NEI), EPRI, and ORISE in support of NRC clearance investigations.
- Collection and analysis of environmental samples collected from the Republic of the Marshall Islands.

• Cleanup Technologies

In addition to the review of technologies performed for OTA and EPA, SC&A has developed a soil washing system for EPA for sites containing large volumes of soil contaminated with slightly elevated levels of naturally occurring

radionuclides. The studies included an evaluation of the worker and public health risks associated with the technology.

- Database Management and GIS Systems

  SC&A has developed several large database management systems and GIS systems in support of the performance of dose/risk assessment/management and outreach programs.

- Outreach Programs

  Many of the risk assessment programs performed by SC&A have had large public outreach components, which included the coordination of local and national workshops, the preparation of newsletters, information booklets, and videos. In addition, SC&A interacts with the Federal Advisory Committee for the INEEL dose reconstruction.

- Epidemiologic Studies

  SC&A performed pilot epidemiologic studies for:

  - Workers at commercial nuclear power plants for EPRI.
  - Indoor radon for EPA.

- Dose/Risk Assessments in Support of Policy Decision making

  SC&A performed nationwide screening studies to aid:

  - The EPA Office of Policy, Planning and Evaluation to set national priorities.
  - The NRC to evaluate nuclear power plant license renewal and clearance.
  - The Nuclear Safety Oversight Committee to establish a nationwide approach to safety.
  - The OTA to evaluate nationwide cleanup strategies.
  - The EPA to evaluate radon mitigation strategies.

APPENDIX B

CONFLICT OF INTEREST FORMS

APPENDIX C

DOSE RECONSTRUCTION AUDIT CHECKLISTS

APPENDIX C
DOSE RECONSTRUCTION AUDIT REPORT

Audit Number:	**Claim Number:**	**Date:**
Auditor(s)/Area of Review:		

Audit Record Summary (Describe below what records you examined, person contacted/interviewed, what conclusions were drawn, and how you arrived at your conclusions):		
List the type of records reviewed (e.g., administrative record):		
List of persons contacted/interviewed:		
List of new documents identified: (Attach a copy of all documents not included in the original dose reconstruction to this report.)		
Audit Conclusions: Agree/Disagree (Note: Attach all audit checklists and supporting documents.)	Agree: _____ (Initial) Include any additional comments in 'General Comments' below.	Disagree: _____ (Initial) Additional discussion should be provided in the next section.
Provide a summary discussion of reasons for disagreeing with the dose reconstruction results: (Attach all calculations, notes, reports, etc. used in your conclusions.)		
General Comments:		

Signature of Auditor(s):	Area of Review:	Date:

REVIEW CHECKLIST

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Auditor(s)/Area of Review:

Dose Reconstruction Analysis(s)/Area of Dose Reconstruction (External/Internal):

Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
	A. DATA COLLECTION REVIEW PROCESS			
A.1	**Data Collection: Evaluate whether NIOSH received all requested data for the DOE or AWE site from any relevant data source or repository.** (Note: Follow protocols established in Volume 2, Section 3 of the proposal.)			
A.1.1	Did NIOSH receive all requested data for the DOE or AWE site from any relevant data source (i.e., site/worker profile data from sources such as DOE/AWE, CDC, DNFSB, Congressional Records, etc.)?			
A.2	**Adequacy of Data: Evaluate whether the data used by NIOSH for the case was adequate to make a determination with regard to probability of causation.** (Note: Follow protocols establish in Volume 2, Section 3 of proposal. Determining adequacy of data may require that the entire basic review checklist be completed first.)			
A.2.1	Is there sufficient data (such as individual monitoring, workplace monitoring, workplace characterization, process description, co-worker monitoring) for calculating/ interpolating/extrapolating external doses for all periods of exposure, including monitored, missing, and unmonitored periods?			
A.2.2	Is there sufficient information (such as co-worker comparison data, area monitoring data, instrument calibration, monitoring practice procedures, etc.) to determine if the quality of data used for determining POC is adequate?			

BASIC INDIVIDUAL DOSE RECONSTRUCTION REVIEW CHECKLIST			
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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
B. WORK HISTORY INTERVIEW AND CLAIMANT DOCUMENTATION REVIEW PROCESS				
B.1	**Interview/Claimant Documentation: Evaluate whether NIOSH appropriately addressed all of the reported work history and events represented by the claimant including but not limited to (a) incidents or occurrences, (b) actual monitoring practices, (c) personal protection practices, and (d) work practices.**			
B.1.1	Did NIOSH compare the dates of employment at all applicable facilities provided by the claimant to those reported by DOE/Contractor or AWE site records?			
B.1.2	Did NIOSH compare the locations of employment throughout the work history as declared by the claimant to those reported by DOE/Contractor or AWE site records?			
B.1.3	Did NIOSH review site profile data/facility records to identify radiation incidents (such as contamination or over-exposures) declared by the claimant?			
B.1.4	Did NIOSH compare radiation monitoring practices (such as monitoring frequency, bioassay monitoring programs, etc.) as described by claimant to facility monitoring procedures/records?			
B.1.5	Were facility records associated with personal protection practices (e.g., the use of shielding, glove boxes, respirators, etc.) compared to those described by claimant?			
B.1.6	Did NIOSH compare work practices as described by the claimant to site profile data/facility records?			
B.1.7	Did NIOSH review worker/facility data to identify work-required medical screening x-rays records declared by the claimant?			

BASIC INDIVIDUAL DOSE RECONSTRUCTION REVIEW CHECKLIST			
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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
B.2 Data Consistency: Assure that interview information is consistent with data used for dose estimate.				
B.2.1	Is there consistency between the dates of employment at all applicable facilities provided by the claimant and the DOE/Contractor or AWE site records?			
B.2.2	Is there consistency between the locations of employment throughout the work history as declared by the claimant and the DOE/Contractor or AWE site records?			
B.2.3	Is there consistency between facility records and radiation incidents identified by claimant?			
B.2.4	Is there consistency between radiation monitoring practices described by claimant and site radiological monitoring protocols?			
B.2.5	Is there consistency between personnel protection practices described by claimant and site profile data?			
B.2.6	Is there consistency between claimant's description of work practices and facility procedures/records?			

BASIC INDIVIDUAL DOSE RECONSTRUCTION REVIEW CHECKLIST			
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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C. EXTERNAL DOSE REVIEW PROCESS				
C.1	**External Dose Estimate Assumptions: Evaluate whether all assumptions used in the external dose determination are appropriate for a remedial compensation program and determine whether, if, and to what extent the benefit of the doubt was resolved in favor of the claimant.** (Parenthetical number represents the section within the "External Dose Reconstruction Implementation Guideline" (OCAS-IG-001) that provides detailed methodology for conducting the appropriate portion of the dose reconstruction.)			
C.1.1	Are assumptions used in the initial dose assessment (rough estimate of exposure) for determining whether the case falls into a very low or very high potential exposure category appropriate? (§1.4)			
C.1.2	Are assumptions used in the initial dose assessment conservative (claimant friendly)?			
C.1.3 C.1.3a	Photon Dose Reconstruction Using Monitoring Data: Are assumptions used in the determination of photon dose/photon energies using monitoring data (i.e., dosimeters) appropriate? (§2.1.1)			
C.1.3.b	Are assumptions used in determining dosimeter dose uncertainty associated with photon exposure appropriate? (§2.1.1.3)			
C.1.3.c	Are assumptions used to determine dose for incomplete/missing photon monitoring records appropriate? (§2.1.2)			
C.1.3.d	Are assumptions used in calculating uncertainty associated with incomplete/missed photon monitoring dose appropriate? (§2.1.2.4)			
C.1.3.e	Are assumptions used in the determination of the occupational medical dose component of photon dose/photon energies appropriate? (§2.1.3)			

BASIC INDIVIDUAL DOSE RECONSTRUCTION REVIEW CHECKLIST			
Audit Number:	**Claim Number:**	**Date:**	**Page of**

Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.3.f	Are assumptions used in determining uncertainty associated with the occupational medical dose component of photon dose/photon energies appropriate? (§2.1.3.3)			
C.1.3.g	Are assumptions used in the calculation of the environmental dose component of photon dose appropriate? (§2.1.4)			
C.1.3.h	Are assumptions used in determining uncertainty for the environmental dose component of the photon dose calculation appropriate? (§2.1.4.3)			
C.1.3.i	Are conservative (claimant friendly) assumptions used in the determination of photon dose/photon energies, when monitoring records were available?			
C.1.3.j	Are conservative (claimant friendly) assumptions used to determine uncertainty associated with photon dose, when monitoring records were available?			
C.1.4 C.1.4.a	Photon Dose Reconstruction With NO Monitoring Data: Are assumptions incorporated in the reconstruction of photon dose using co-worker data appropriate? (§3.1.1)			
C.1.4.b	Are assumptions for the uncertainty analysis associated with reconstructing photon dose using co-worker data appropriate? (§2.1.1.3)			

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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.4.c	Are assumptions incorporated in the reconstruction of photon dose using survey data appropriate? (§3.1.2)			
C.1.4.d	Are assumptions for determining uncertainty associated with reconstructing photon dose using survey data appropriate? (§3.1.2.3)			
C.1.4.e	Are assumptions incorporated in the reconstruction of photon dose using source term data appropriate? (§3.1.3)			
C.1.4.f	Are assumptions for the uncertainty analysis associated with reconstructing photon dose using source term data appropriate? (§3.1.3.3)			
C.1.4.g	Are assumptions incorporated in the reconstruction of photon dose using control limits appropriate? (§3.1.4)			
C.1.4.h	Are assumptions for determining uncertainty associated with reconstruction photon dose using control limits appropriate? (§3.1.4.3)			
C.1.4.i	Are conservative (claimant friendly) assumptions used for reconstruction of photon dose, when no monitoring data were available?			
C.1.4.j	Are conservative (claimant friendly) assumptions used in the determination of certainty associated with the reconstruction photon dose, when no monitoring data were available?			

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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.5 C.1.5.a	Photon Dose Conversion to Organ Dose: Are assumptions used to convert monitored photon dose to organ dose appropriate? (§4.1.1)			
C.1.5.b	Are assumptions used to covert survey/source term data associated with photon dose to organ dose appropriate? (§4.1.2)			
C.1.5.c	Are assumptions used in the energy simplification of ICRP 74 dose conversion factors for input into NIOSH-IREP appropriate? (§4.1.3)			
C.1.5.d	Are assumptions regarding uncertainty associated with the energy simplification process appropriate? (§4.5.1)			
C.1.5.e	Are conservative (claimant friendly) assumptions used in the conversion of photon dose to organ dose?			
C.1.5.f	Are conservative (claimant friendly) assumptions used in determining the uncertainty resulting from the energy simplification process?			
C.1.6 C.1.6.a	Neutron Dose Reconstruction Using Monitoring Data: Are assumptions used in the determination of neutron dose/neutron energy using personal monitoring data (dosimeters) appropriate? (§2.2.1)			
C.1.6.b	Are assumptions used in the determination of uncertainty associated with neutron personal monitoring data appropriate? (§2.2.1.3)			

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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.6.c	Are assumptions used to determine dose associated with incomplete/missing neutron monitoring data and associated neutron energies appropriate? (§2.2.2)			
C.1.6.d	Are assumptions used in determining uncertainty associated with incomplete/missed neutron monitoring dose appropriate? (§2.2.2.4)			
C.1.6.e	Are conservative (claimant friendly) assumptions used in the calculation of neutron dose/neutron energies using monitoring data?			
C.1.6.f	Are conservative (claimant friendly) assumptions used in determining uncertainty associated with neutron monitoring dose?			
C.1.7 C.1.7.a	Neutron Dose Reconstruction With **NO** Monitoring Data: Are assumptions incorporated in the reconstruction of neutron dose using co-worker data appropriate? (§3.2.1)			
C.1.7.b	Are assumptions for the uncertainty analysis associated with reconstructing neutron dose using co-worker data appropriate? (§2.2.1.3)			
C.1.7.c	Are assumptions incorporated in the reconstruction of neutron dose using survey data appropriate? (§3.2.2)			

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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.7.d	Are assumptions for determining uncertainty associated with reconstructing neutron dose using survey data appropriate (§3.2.2.3)			
C.1.7.e	Are assumptions incorporated in the reconstruction of neutron dose using source term data appropriate? (§3.2.3)			
C.1.7.f	Are assumptions for the uncertainty analysis associated with reconstructing neutron dose using source term data appropriate? (§3.2.3.3)			
C.1.7.g	Are conservative (claimant friendly) assumptions used for reconstruction of neutron dose, when no monitoring data were available?			
C.1.7.h	Are conservative (claimant friendly) assumptions used in the determination of certainty associated with the reconstruction neutron dose, when no monitoring data were available?			
C.1.8 C.1.8.a	Neutron Dose Conversion to Organ Dose: Are assumptions used to convert area monitoring data associated with neutron dose to organ dose appropriate? (§4.2.1)			
C.1.8.b	Are assumptions used to convert personal monitoring data associated with neutron dose to organ dose appropriate? (§4.2.2)			
C.1.8.c	Are conservative (claimant friendly) assumptions used to convert neutron dose to organ dose?			

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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.9.a	Electron Dose Reconstruction Using Monitoring Data: Are assumptions used in the calculation of electron dose using dosimeters appropriate? (§2.3.1)			
C.1.9.b	Are assumptions used in the uncertainty analysis for the beta dosimetry results appropriate? (§2.3.1.3)			
C.1.9.c	Are assumptions used to calculate dose for incomplete/missing electron monitoring records appropriate? (§2.3.2)			
C.1.9.d	Are assumptions used in determining the uncertainty associated with incomplete/missed electron monitoring dose appropriate? (§2.3.2.3)			
C.1.9.e	Are assumptions used in the dose calculation from skin contamination appropriate? (§2.3.3.2.2)			
C.1.9.f	Are assumptions used in determining uncertainty associated with the calculation of dose from skin contamination appropriate? (§2.3.3.3)			
C.1.9.g	Are assumptions used in calculating dose from electron exposure and associated uncertainty conservative (claimant friendly)?			
C.1.10 C.1.10.a	Electron Dose Reconstruction With **NO** Monitoring Data: Are assumptions incorporated in the reconstruction of electron dose using co-worker data appropriate? (§3.3.1)			

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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.10.b	Are assumptions for the uncertainty analysis associated with reconstructing electron dose using co-worker data appropriate? (§2.2.1.3)			
C.1.10.c	Are assumptions incorporated in the reconstruction of electron dose using survey data appropriate? (§3.3.2)			
C.1.10.d	Are assumptions for determining uncertainty associated with reconstructing electron dose using survey data appropriate (§3.3.2.3)			
C.1.10.e	Are assumptions incorporated in the reconstruction of electron dose using source term data appropriate? (§3.3.3)			
C.1.10.f	Are assumptions for the uncertainty analysis associated with reconstructing electron dose using source term data appropriate? (§3.3.3.3)			
C.1.10.g	Are assumptions incorporated in the reconstruction of electron dose to non-routine radiological workers using radiological control limits appropriate? (§3.3.4)			
C.1.10.h	Are assumptions for the uncertainty associated with reconstructing electron dose using radiological control limits appropriate?			
C.1.10.i	Are conservative (claimant friendly) assumptions used for reconstruction of electron dose, when no monitoring data were available?			

BASIC INDIVIDUAL DOSE RECONSTRUCTION REVIEW CHECKLIST			
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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.10.j	Are conservative (claimant friendly) assumptions used in the determination of certainty associated with the reconstruction electron dose, when no monitoring data were available?			
C.1.11 C.1.11.a	Electron Dose Conversion to Organ Dose: Are assumptions used to convert electron dose to organ dose appropriate? (§4.3)			
C.1.11.b	Are assumptions used to convert electron dose to organ dose conservative (claimant friendly)?			
C.1.11.c	Dose Conversion Factors Based on Exposure Geometry: Are assumptions used to determine the most credible geometries for dosimeter and missed dose appropriate? (§4.4.1)			
C.1.11.d	Do assumptions used in determining geometries associated with dosimetry and missed dose give the benefit of doubt to the claimant?			
C.1.11.e	Are assumptions used to determine exposure geometry uncertainty associated with specific job functions appropriate? (§4.5.2)			
C.1.11.f	Do assumptions used in determining uncertainty associated with exposure geometries for specific tasks give the benefit of doubt to the claimant?			
C.1.11.g	Are assumptions used to determine the most credible geometry for occupational medical exposure appropriate? (§4.4.2)			

BASIC INDIVIDUAL DOSE RECONSTRUCTION REVIEW CHECKLIST			
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Area of Review	Description of Technical Elements of Review	Yes/No/ NA	Comments	Initials
C.1.11.h	Do assumptions used in determining occupational medical exposure geometry give the benefit of doubt to the claimant?			
C.1.11.i	Are assumptions used to determine the most credible geometry for environmental exposure appropriate? (§4.4.3)			
C.1.11.j	Do assumptions used in determining environmental exposure geometry give the benefit of doubt to the claimant?			
C.2	**External Dose Calculations: Verify external dose calculations are appropriate for purposes of determination of POC using NIOSH-IREP.** (Parenthetical number represents the section within the "External Dose Reconstruction Implementation Guideline" (OCAS-IG-001) that provides detailed methodology for conducting the appropriate portion of the dose reconstruction.)			
C.2.1	Are calculations in the initial dose assessment (i.e., rough estimate of exposure) for determining whether the case falls into a very low or very high potential exposure category appropriate and correct? (§1.4)			
C.2.2 C.2.2.a	Photon Dose Reconstruction Using Monitoring Data: Are calculations of photon dose using monitoring data (i.e., dosimeters) appropriate and correct? (§2.1.1)			
C.2.2.b	Are calculations of dosimeter dose uncertainty associated with photon exposure appropriate and correct? (§2.1.1.3)			
C.2.2.c	Are calculations of dose for incomplete/ missing photon monitoring records appropriate and correct? (§2.1.2)			