



*Providing the highest quality consulting and field services  
since 1981*

## **Corporate Capabilities and Experience**

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June 2020

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# Corporate Overview

## Introduction

Since its founding in 1981, SC&A, Inc. has gained nationwide recognition for its expertise in radiological sciences as well as its capabilities in environmental planning, air quality, emergency management, and remediation. SC&A has a headquarters office in Arlington, VA, and offices in Chapel Hill, NC, and Germantown, MD, plus additional employees and associates located throughout the United States—more than 200 employees and associates total. SC&A is a certified small business under various NAICS codes.

SC&A emphasizes quality in project, contract, financial, and office management. Our insistence on careful management ensures that cost objectives are monitored and achieved, product quality is consistently high, contracting functions meet accepted standards, quality assurance and quality control requirements are met, and clients can readily obtain information on work progress. The company maintains DCAA-approved accounting systems.

## SC&A's Professional Capabilities and Staffing Resources

SC&A's employees and associates hold advanced degrees and applicable registered and certified professional credentials, including:

- ✓ Approximately 40 PhDs
- ✓ Over 100 Master's degrees
- ✓ More than 70 applicable professional registrations and certificates

SC&A also draws upon a large pool of subject-matter experts, developed over the years, who can provide specialized analytical services when required by a project. SC&A's professional staff have obtained degrees in the fields shown in the table on the next page. SC&A's air quality capabilities were significantly strengthened by the acquisitions of expertise from two highly-respected small businesses that provided air quality, climate change, and related services to government agencies for over two decades. In 2012, SC&A purchased contracts formerly held by E.H. Pechan and Associates and hired key Pechan employees. In 2015, SC&A acquired EC/R Incorporated. Projects conducted by former E.H. Pechan and EC/R employees prior to these dates are shown as SC&A (Pechan) and SC&A (EC/R).



- ✓ Employee-Owned Small Business Headquartered in Arlington, VA
- ✓ 35+ Years Successfully Delivering Professional Services
- ✓ Expertise Provided to All Levels of Government, the Private Sector, and International Community
- ✓ Nationally Recognized Expertise in Scientific, Environmental, Technical, and Managerial Fields
- ✓ Corporate Culture Driven by Quality and Commitment to Clients' Missions and Performance Goals

# Corporate Overview

## Degrees Held by SC&A Employees and Associates

Accounting	Geology
Agriculture	Health Physics
Anthropology	History
Applied Mathematics	Hydrology
Applied Physics	International Public Affairs
Atmospheric Science	Occupational and Environmental Health
Biology	Law
Biophysics	Management
Biosecurity	Mathematics
Business	Mechanical Engineering
Chemistry	Medicine
Chemical Engineering	National Security
City/Regional Planning	Natural Resource Management
Civil Engineering	Natural Resources
Communications	Nuclear Engineering
Computer Science	Nuclear Medicine (MD)
Criminal Justice	Nuclear Physics
Electrical Engineering	Nursing
Emergency Management	Physical Science
Energy and Environmental Policy	Physics
Environmental Engineering	Political Science
Environmental Management	Public Administration
Environmental Planning and Management	Radiation Biology
Environmental Science	Radiological Science/Radioecology
English	Statistics
Forest Biology	Sociology
Geochemistry	Zoology

### *Clearance Capabilities*

SC&A currently supports several contracts with Top Secret/Sensitive Compartmented Information (TS/SCI) clearances. Approximately 25% of current employees have clearances ranging from U.S. Department of Defense Secret/TS to U.S. Department of Energy Q.

# Corporate Overview

## Delivering High-Quality Scientific, Management, and Analytical Services

SC&A has held more than 600 contracts with over 250 clients, for an aggregate value of more than \$400 million. We have provided services to both the public and private sector. The table below lists a representative sample of clients SC&A has served.

Representative Examples of SC&A Clientele		
Federal	State, Local, and International	Private Sector and Related Institutions
Centers for Disease Control and Prevention (CDC) Defense Advanced Research Projects Agency (DARPA) Defense Nuclear Facilities Safety Board (DNFSB) Defense Threat Reduction Agency (DTRA) Department of Energy (DOE) Department of Homeland Security (DHS) Department of the Interior (DOI) Department of Justice (DoJ) Domestic Nuclear Detection Office (DNDO) Environmental Protection Agency (EPA) Federal Aviation Administration (FAA) Federal Emergency Management Agency (FEMA) Federal Highway Administration (FHWA) National Cooperative Highway Research Program (NCHRP) National Institute for Occupational Safety and Health (NIOSH) Nuclear Regulatory Commission (NRC) Occupational Safety and Health Administration (OSHA) Overseas Private Investment Corporation (OPIC) Small Business Administration (SBA) U.S. Agency for International Development (USAID) U.S. Air Force U.S. Army U.S. Army Corps of Engineers U.S. Coast Guard U.S. Navy	Alaska Department of Environmental Conservation Allegheny County Health Department Arizona Department of Environmental Quality California Air Resources Board City of Sacramento Colorado Regional Air Quality Council Dallas/Ft. Worth International Airport Houston Advanced Research Center Lake Michigan Air Directors Consortium Metropolitan Washington Council of Governments Mid-America Regional Council Montana Department of Transportation New York State Energy Research and Development Authority North Jersey Transportation Planning Authority Pennsylvania Department of Environmental Protection Pennsylvania Department of Transportation Port Authority of New York and New Jersey San Diego International Airport Santa Cruz County Public Health Southeastern States Air Resource Managers, Inc. Tennessee Department of Transportation Texas Commission on Environmental Quality The Republic of the Marshall Islands Utah Department of Environmental Quality Virginia Department of Emergency Management Virginia Department of Transportation	Arizona Public Service Electric Co. Boeing Company Booz Allen Hamilton Center for Climate Strategies CH2M HILL CHWMEG Duke Engineering EA Engineering Eastman Kodak Electric Power Research Institute General Electric Lockheed Martin Michael Baker Jr. Mosaic Parsons Pennsylvania Power & Light Raytheon Redding Electric Rockwell International Sacramento Municipal Utility District SAIC (Leidos) Sierra Pacific Power Company S.M. Stoller Tetra Tech The Energy Cooperative Union Tank Car Company University of California, Los Angeles URS (AECOM) Weston Solutions

# Corporate Overview

## SC&A's Core Service Offerings

SC&A combines the best attributes of consulting – the nimbleness of a small business with the technical depth of a much larger firm. We focus our capabilities to deliver in the following key service areas (short project descriptions follow for each area):



- ✓ [Air Quality Analyses](#)
- ✓ [Climate Change](#)
- ✓ [Compliance Support](#)
- ✓ [Environmental Management and Audit Services](#)
- ✓ [Information, Communication, and Editing Services](#)
- ✓ [Licensing and Performance Assessments of Nuclear Facilities](#)
- ✓ [NEPA Services](#)
- ✓ [Nuclear Safety and Radiological Sciences](#)
- ✓ [Occupational Health and Safety](#)
- ✓ [Regulation Development and Litigation Support](#)
- ✓ [Remediation Services](#)
- ✓ [Resiliency and Emergency Management Services](#)
- ✓ [Risk Assessment and Management](#)

# Air Quality Analyses

## Overview of Capability



SC&A provides a full range of air quality analyses. Our staff are recognized for their in-depth knowledge of air pollution technical and policy issues and for their experience in criteria air pollutant and hazardous air pollutant inventory development and improvement, complex economic and policy models, control strategy evaluation, mitigation support, cost evaluations, stakeholder support, and database development. SC&A also performs risk-related air quality analyses and other analyses associated with regulation development and litigation.

## Capabilities

- ✓ Air Emission Inventories and Projections
- ✓ Control Strategies Evaluation and Costing
- ✓ Technical, Policy, and Regulatory Analysis
- ✓ Information Technology and Data Analytics Support
- ✓ Modeling
- ✓ Economic Assessment
- ✓ Vulnerabilities Assessments and Adaptation Planning

### Selected Examples of Clients Served

- ✓ Arizona Department of Environmental Quality
- ✓ Colorado Regional Air Quality Council
- ✓ Federal Highway Administration
- ✓ Metropolitan Washington Council of Governments
- ✓ Montana Department of Transportation
- ✓ U.S. Coast Guard
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ Virginia Department of Transportation

# Air Quality Analyses

## Examples of SC&A Projects and Corporate Experience

- ✓ **Development of Project-Level Air Quality Studies and Related Services (VDOT):** As part of a consultant team, SC&A supported the Virginia Department of Transportation (VDOT) in preparing air quality hot spot analyses needed to fulfill National Environmental Policy Act and Clean Air Act conformity requirements for several major corridors in the Washington, DC, metropolitan area. SC&A performed the carbon monoxide screening hot spot analyses for two projects and the quantitative Mobile Source Air Toxics (MSAT) air quality analyses for five major road projects to date. SC&A used the latest version of the U.S. Environmental Protection Agency's (EPA's) MOVES model to develop emission rates for all criteria air pollutants following EPA and Federal Highway Administration guidance. We also performed dispersion modeling for some of the projects. For one of these projects, SC&A also developed the affected roadway network to be included in the MSAT analysis.
- ✓ **Evaluate Approaches for Quantifying Maritime Air Emissions (USCG):** SC&A developed prototype models for estimating maritime air emissions (both criteria air pollutants and greenhouse gases) that could produce reasonable, defensible national-level estimates of vessel-related air emissions using commercially available data. This work is to assist the U.S. Coast Guard (USCG) in complying with several regulations. As the first step in this process, SC&A conducted an extensive literature review to identify the latest key scientific literature documenting the state-of-art for estimating maritime air emissions. To capture vessel activity, SC&A used a bottom-up inventory approach to process and evaluate automatic identification system (AIS) tracking data that capture individual vessel movements at 10-minute intervals for two sample ports: the Ports of Los Angeles and Long Beach and the Port of Philadelphia. Using AIS data for 2014 for these two port areas, along with data on vessel parameters from a USCG database, SC&A developed prototype models for calculating emission inventories at a fine spatial and temporal resolution for these two sample ports from all vessel types in the port areas, out to 200 nautical miles from the coast. SC&A also evaluated several scenarios selected by the USCG using the prototype models to determine the effects of potential new statutory/regulatory requirements, such as establishing low-speed zones, requiring shorepower, or reducing berthing times. Under a follow-on contract, SC&A is now developing the model for USCG use and is currently processing AIS and vessel data for a large geographic area in the Gulf of Mexico, which includes substantial vessel activity.
- ✓ **Yuma, Arizona, Nonattainment Area Emission Inventory (ADEQ):** SC&A developed a PM<sub>10</sub> emission inventory for the Yuma PM<sub>10</sub> Nonattainment Area. This project, sponsored by the Arizona Department of Environmental Quality (ADEQ), was initiated to analyze air quality in the Yuma Nonattainment Area from 2006 to the present and develop future State Implementation Plans (SIPs). SC&A's analysis of air quality and meteorological data indicated that emissions from windblown dust and fugitive dust were significant contributors to elevated PM<sub>10</sub> monitor readings. Because of the importance of windblown dust, SC&A developed improved inventory methods for calculating these emissions—particularly windblown dust emissions from agricultural activity. SC&A also improved on the methods or emission factors for estimating emissions from paved and unpaved fugitive dust.
- ✓ **Reevaluation of Montana's Air Quality Program (MDT):** SC&A helped the Montana Department of Transportation (MDT) refine its methods for determining projects to participate in its Montana Air Quality and Congestion Initiative (MACI), developed recommendations to improve and implement the MACI, and helped orient the program toward high-value investments for Montana communities. SC&A performed a risk assessment to (1) identify which Montana communities have the greatest risk of health effects associated with current criteria pollutant exposure and (2) identify Montana areas prone to future transportation-related issues. This analysis focused on the

# Air Quality Analyses

communities at risk from transportation-related pollutants. SC&A prepared a report and supporting worksheets that allow MDT staff and Montana Metropolitan Planning Organizations to estimate the emission reductions, costs, and cost effectiveness of planned Congestion Mitigation and Air Quality Improvement Program projects. Priority measures considered in the analysis included congestion relief and traffic flow improvement projects, vehicle-miles traveled (VMT) reductions, diesel engine retrofits, and road paving.

- ✓ **EPA National Emission Inventory (NEI) Development:** SC&A staff led efforts to develop the EPA's NEI. They provided technical support for developing and applying new methods for estimating emissions for the mobile sources and nonpoint source emission inventories. The nonpoint support addressed fugitive dust emissions for paved and unpaved roads, residential wood combustion, ammonia emissions, and emissions for selected solvent emission categories. Onroad support included, most recently, the development of county-level VMT, preparation of county databases for use with the EPA MOVES model, review of state and local agency submittals for the onroad and nonroad sectors, and running the National Mobile Inventory Model and NONROAD model with state and local inputs to obtain nonroad emission estimates.
- ✓ **Nonroad and Area Source Base-Year and Future-Year Emissions Inventories for the Southeastern States (Southeastern States Air Resource Managers, Inc.):** SC&A developed a comprehensive base-year annual emissions inventory for stationary area and nonroad mobile sources for the Southeast to support modeling and assessment of the emissions and atmospheric processes that result in fine particles, ozone, and regional haze. We developed emissions by source category for each county in the 10 Southeast states. SC&A also developed emissions growth and control factors through 2025. These factors provided state and local agencies in the Southeastern States Air Resource Managers, Inc. region with the ability to model future-year emissions as part of ozone National Ambient Air Quality Standard (NAAQS) maintenance plans. In addition, SC&A developed stationary area source and nonroad mobile source emission inventories for three key projection years to support the modeling of future-year fine particles, ozone, and regional haze. The methods used to develop the inventories were documented in technical reports to support SIPs for fine particles, ozone, and regional haze.
- ✓ **Low-VOC Consumer Products and AIM Market Survey (CO RAQC):** SC&A helped the Colorado Regional Air Quality Council (CO RAQC) identify product categories and primary manufacturers for consumer products and Architectural and Industrial Maintenance (AIM) coatings. SC&A supported CO RAQC in the development of a survey of AIM coating manufacturers in Colorado to assess the volume of AIM coatings sold in Colorado, the volatile organic compound (VOC) content of those coatings, the ability of manufacturers to produce low-VOC AIM coatings, and the ability of manufacturers to supply those coatings within Colorado. SC&A prepared and submitted a document that presented the results of the survey and how the surveyed coating VOC contents compared to existing AIM coating VOC limits in other states (July 2017). There are more than 150 consumer product categories. This phase of the project focused on obtaining and reporting on consumer product VOC content, regulatory data, and information from regulatory authorities that have already undertaken VOC regulations for consumer products.
- ✓ **Control Techniques Guidelines (CTG) for the Oil and Natural Gas Industry (EPA):** SC&A staff helped the EPA develop the *Control Techniques Guidelines for the Oil and Natural Gas Industry*. The CTG provides recommendations to inform state, local, and Tribal air agencies of what constitutes reasonably available control technology (RACT) for selected oil and natural gas industry emission sources. Air agencies can use the recommendations included in the CTG to inform their own determination of what constitutes RACT for VOC for the CTG emission sources in their ozone nonattainment area. The VOC RACT recommendations in the CTG were based on the review of available VOC emission control technologies, their use, and the costs that would be associated with requiring their use. This was

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considered Significant Guidance and was subject to Office of Management and Budget (OMB) review. SC&A's support included (1) providing technical information for use in intra-agency and OMB briefings and presentations and (2) providing technical support in responding to intra-agency and OMB comments on the CTG. After the EPA solicited and received public comments on the proposed CTG, SC&A helped the EPA develop the comment-and-response document and make changes to the proposed CTG as a result of public comments. See <https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry/2016-control-techniques-guidelines-oil-and>.

- ✓ **Nonpoint Emissions Estimation (EPA):** SC&A is currently working on a nonpoint emissions estimation project for the EPA to support the NEI. Specifically, this project focuses on estimating emissions from publicly owned treatment works, livestock, fertilizer usage, and dust from animal hooves. This work includes developing VOC emission factors from literature reviews, acquiring activity data, and documenting the process.
- ✓ **Review of Utah Draft PM<sub>2.5</sub> SIP Provisions (EPA Region 8):** SC&A (Pechan) reviewed draft SIP provisions for control of VOC emissions from surface coating operations. SC&A compared the Utah draft rules to EPA databases of potential control measures and contemporary SIP provisions in other states. We prepared a summary of each draft rule, findings relative to other contemporary rules, and recommendations for follow-up.
- ✓ **Source Classification Code (SCC) Revision Project (EPA):** SC&A supported the EPA in updating and improving point source SCCs. As technologies have changed over the years, the EPA has recognized the need to remove outdated SCCs and add SCCs for new emission processes. The EPA uses SCCs to classify distinct types of anthropogenic emission activities. Each SCC represents a unique process or function that emits an air pollutant. SCCs are used as a primary identifying data element in the EPA's WebFIRE, Electronic Reporting Tool (ERT), NEI, and other EPA databases. The SCCs are also used by many regional, state, local, and Tribal agency data systems.
- ✓ **Emission Surveys (EPA):** SC&A (EC/R) has a long history of performing research related to developing regulations, policies, and programs to reduce emissions. The typical initial steps include the collection of emissions data and control information through literature searches, meetings with industry trade organizations, contacts with state and local agencies, and surveys distributed to the industry or to vendors. For example, for the aerospace National Emission Standards for Hazardous Air Pollutants (NESHAP), we compiled a list of all identified aerospace manufacturing and rework facilities in the United States, which included more than 1,200 distinct facilities. We sent a survey in the form of a Microsoft Excel spreadsheet to each facility requesting information on the location of emission sources, detailed coating and solvent usage, VOC and hazardous air pollutant content data, and emission control measures. SC&A personnel supervised the development of a website to allow automatic upload of completed surveys, as well as related software to extract the data from the uploaded files and build a comprehensive database.

# Climate Change

## Overview of Capability



SC&A supports national, state, and local actors with a range of capabilities to plan for climate change effects. SC&A staff are recognized for their in-depth knowledge of greenhouse gas (GHG) technical and policy issues, complex economic and policy models, mitigation support, cost evaluations, and database development. SC&A works with government agencies to increase institutional and community resiliency by implementing steps for climate risk management, disaster preparedness, and recovery actions.

SC&A is now a CDP Cities Accredited Service Provider. CDP is a nonprofit organization that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts. Through this partnership, SC&A supports CDP cities in disclosing their environmental activities, understanding their impact, and taking action to achieve enhanced sustainability and resilience.

## Capabilities

- ✓ Policy and Strategy Design, Evaluation, and Costing
- ✓ Multi-Modal Transportation Modeling
- ✓ Greenhouse Gas Assessments and Verification
- ✓ Vulnerabilities Assessments and Adaptation Planning
- ✓ Climate Resiliency Planning

### Selected Examples of Clients Served

- ✓ Center for Climate Strategies
- ✓ Port Authority of New York and New Jersey
- ✓ State of Minnesota
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Overseas Private Investment Corporation
- ✓ Virginia Department of Aviation
- ✓ Center for Climate Strategies
- ✓ Ontario Climate Change Secretariat

# Climate Change

## Examples of SC&A Projects and Corporate Experience

- ✓ **GHG Mitigation Planning for Minnesota’s Transportation and Land Use Sector (CCS):** SC&A analyzed the costs and GHG reductions of potential transportation and land use strategies in Minnesota as a subcontractor for the Center for Climate Strategies (CCS). This included the development of GHG mitigation policies over time to reflect Minnesota’s changing transportation needs. For example, the electric vehicle policy estimated the impact of increased electric vehicle subsidies for both direct (tailpipe) and indirect (power plant) GHG emissions, as well as costs to consumers and the government. One policy involved (1) encouraging compact development in the Minneapolis-St. Paul metropolitan area, including the necessary policy incentives to encourage denser development, and (2) modeling the vehicle-miles traveled (VMT) impacts of these demographic changes and expected changes in home energy consumption resulting from this policy. For another policy, we used the Federal Highway Administration’s SmartGAP modeling tool to evaluate the costs, VMT changes, and GHG impacts of doubling transit ridership in Minnesota, plus how such a policy would interact with the denser development initiative. We also analyzed vehicle pricing initiatives, which demonstrated the costs and GHG impacts of changing the per-mile cost of driving in Minnesota. We evaluated these four policies using Minnesota-specific local and state data wherever possible, to help policymakers determine the best mitigation policies for the state.
- ✓ **Stakeholder-Driven Community-Wide Climate Action Plan and GHG Inventory (City of Memphis):** SC&A was selected by the City of Memphis and Shelby County to lead a stakeholder-driven climate action process. SC&A will be developing the community-wide GHG inventory and forecast scenarios compliant with the requirements of the Global Covenant of Mayors for Climate & Energy. Additionally, SC&A will facilitate a climate action process with input from community, government, and private sector actors, culminating in the selection of priority climate actions that achieve greater energy efficiency, lower GHG emissions, and generate local economic opportunities. Selected priority actions will reinforce the City’s broader goals of connectivity, livability, opportunity, and sustainability.
- ✓ **Performance of Expert Professional Inventorizing and Reduction Programs for Transportation Agency (Port Authority of New York and New Jersey):** SC&A supports the Port Authority’s implementation of a program to reduce its GHG emissions by 80% by the year 2050. SC&A developed the 2006 GHG and criteria pollutant baseline covering Port Authority facilities and operations, including the emissions of its tenants (such as airlines and shippers) and patrons (such as airport passengers and PATH riders). SC&A conducts multi-modal transportation modeling of aircraft, marine vessel, road, and nonroad sources. We modeled the most recent aircraft, auxiliary power units, and ground support equipment emission inventories using the Federal Aviation Administration’s AEDT model. Using the U.S. Environmental Protection Agency MOVES model, SC&A also performs ground access vehicle emission inventories that include activities such as passenger access, cargo movement by heavy-duty diesel trucks, and employee commuting. In addition, SC&A develops monitoring and reporting systems that enable agency participation in many sustainability initiatives, most notably, CDP (formerly the Climate Disclosure Project), the Airports Council International – Airport Carbon Accreditation (ACI-ACA), and The Climate Registry. SC&A annually produces agencywide GHG and criteria pollutant inventories for the Port Authority, designed to evaluate the performance of internal GHG reduction goals and targets.
- ✓ **Greenhouse Gas Assessments (OPIC):** SC&A performs an independent assessment of GHG emissions from projects supported by the Overseas Private Investment Corporation (OPIC). SC&A screens a pool of about 700 projects across four continents and identifies the subset of projects that are likely to meet OPIC’s carbon disclosure policy. For this subset, SC&A collects and analyzes operational data

# Climate Change

submitted by funding recipients and develops estimates of direct GHG emissions associated with sponsored projects. Typical industries include oil and gas producers, power plants, chemical plants, food processing, and manufacturing plants.

- ✓ **Airport Carbon Accreditation Verification Services:** SC&A helps airports participating in the ACI-ACA program achieve their carbon management goals. SC&A provides verification services for commercial and general aviation airports, including the Hartsfield-Jackson Atlanta International Airport, Los Angeles World Airports, the San Francisco International Airport, the San Diego International Airport, and the Austin-Bergstrom International Airport. The scope of work is commensurate with the airport's commitment to carbon reduction and generally includes verifying the airport's footprint (scope 1, scope 2, and scope 3 sources), assessing the conformance of the airport's present and future carbon mitigation actions, and evaluating the airport's effectiveness in engaging partners such as airlines and tenants in environmental and energy conservation initiatives.
- ✓ **Airport Sustainability Management Plan (SMP) Support (DOAV):** SC&A supports the Virginia Department of Aviation (DOAV) in developing an SMP to serve all the Commonwealth's 66 public-use airports. The goal of the SMP is to help Virginia airports of various types and sizes better manage their environmental footprint, leverage opportunities with community members, utilize their scarce resources, and promote economic development in the Commonwealth. The SMP is to help DOAV meet its goals, objectives, and performance measures as established in the Virginia Air Transportation System Plan update for each airport classification. SC&A contributes to the team with technical experts on climate change, air quality, waste management, and National Environmental Policy Act compliance.
- ✓ **International and State Climate Action Planning (CCS):** SC&A was a team member with the Center for Climate Strategies for a capacity-building and technical assistance project in Baja California and Coahuila, Mexico. The objective of the project was to help stakeholders and local experts identify priority mitigation actions and formulate transportation GHG mitigation policies, followed by micro- and macroeconomic analyses for integration into each state's climate action plan. SC&A helped stakeholders design each policy, including such elements as goal setting, coverage, barriers to implementation, funding, and implementation mechanisms. SC&A identified policy actions related to transportation with optimal GHG reduction potential—including assessments of emission reductions against a business-as-usual scenario—and analyzed the associated costs of implementation. Some of the transportation policies analyzed included early retirement of old and inefficient heavy-duty diesel trucks, installation of particulate matter control technology, and commercialization of biofuels. The outcome of the project was the formulation of an economy-wide GHG marginal abatement cost curve of proposed actions and pathways for implementation.
- ✓ **Validation of GHG Forecasts and Policy Action Reductions (Ontario Climate Change Secretariat, Cabinet Office):** SC&A provided services to the Ontario Climate Change Secretariat, Cabinet Office to validate its projected GHG emission reductions associated with 14 initiatives of the Province's Climate Change Action Plan. We validated the reductions estimated for the 2014 (interim) and 2020 target years covering the following initiatives: Afforestation, Biogas Financial Assistance Program, Building Codes, Coal Phase Out and Related Energy Policies, Conversion to Electric Buses, Energy Efficiency Act and Other Efficiency Policies, Fuel Efficiency Standard, Green Commercial Vehicle Program/Auxiliary Power Units, Heavy Truck Speed Limiters, Home Energy Savings Program, Landfill Methane Capture, Ontario Bus Replacement Program, Places to Grow Act, and The Big Move (the last two are transportation and land use sector mitigation programs). The results of this validation analysis were that the combined effects of the initiatives would bring Ontario within about 35 million metric tons of carbon dioxide equivalent emissions of its target in 2020 (15% below 1990 levels).

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- ✓ **Risk-Based Adaptation Strategies Development Support (CTA):** The Chicago Transit Authority (CTA) is one of seven pilot entities that the Federal Transit Administration is funding to conduct assessments of climate change adaptation. The CTA pilot project was focused on assessing the vulnerability of transit agency assets and services to climate change hazards, such as extreme heat and flooding. SC&A staff analyzed the effects of high heat, extreme cold, rain, and snow on ridership and overall CTA revenues and used this information to develop risk-based adaptation strategies to reduce system vulnerability.
- ✓ **Verification Services under California’s Mandatory GHG Reporting Program:** SC&A assessed compliance of reporters’ procedures, operations, and records with the requirements of Title 17 of the California Code of Regulations, Sections 95100–95158, which incorporate by reference the federal GHG mandatory reporting rule (40 CFR Part 98). SC&A was responsible for coordinating verification team activities, conducting risk analyses, formulating sampling and verification plans, testing data management systems, and evaluating quality assurance/quality control processes to attest with reasonable assurance whether GHG assertions are free of material misstatements and in conformance with applicable regulations. Clients have included the Los Angeles Department of Water and Power, Redding Electric Utility, Turlock Irrigation District, Kingsburg Cogeneration, and the University of California–Los Angeles.

# Compliance Support

## Overview of Capability



SC&A staff have wide expertise and experience providing regulatory compliance support to regulated entities. This support includes development of compliance and implementation documents and tools to be used by regulated entities. SC&A's work enables regulated entities to remain compliant or achieve compliance with environmental and community expectations. We help them to be more effective and efficient in their operations and enhance their ability to maximize the use of limited resources by making better strategic, tactical, and operational decisions.

## Capabilities

- ✓ Air Permits
- ✓ Implementation Tools/Document Development
- ✓ Compliance/Guidance Development
- ✓ Data Collection and Analysis
- ✓ Efficiency Studies
- ✓ Strategic Planning
- ✓ Cost/Benefit Analyses

### Selected Examples of Clients Served

- ✓ Allegheny County Health Department
- ✓ Chicago Transit Authority
- ✓ Ohio Environmental Protection Agency
- ✓ The Energy Cooperative
- ✓ The Medical Center Company
- ✓ Union Tank Car Company
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Agency for International Development

# Compliance Support

## Examples of SC&A Projects and Corporate Experience

- ✓ **Air Permitting Support (TEC):** For The Energy Cooperative (TEC), a rural energy cooperative that provides electricity, natural gas, and propane to its members in rural areas of Central Ohio, SC&A conducted an extensive review of U.S. Environmental Protection Agency (EPA) literature to calculate volatile organic compound (VOC) emissions from the dehydrator exhaust. SC&A estimated natural gas loss from the glycol dehydrator using a methodology that allowed for daily computations of the actual VOC and hazardous air pollutant emissions. SC&A conducted an extensive review of state and federal air regulations to demonstrate compliance with or exemptions from the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Natural Gas Transmission and Storage Facilities, the Oil and Gas Production Facilities NESHAP, and the New Source Performance Standards (NSPS) for air emission inventories for onshore natural gas processing plants.
- ✓ **Air Permit Modification Assistance (Medical Center Company):** SC&A has reviewed major source permit modifications and prepared permit-to-install and Title V permit applications for the Medical Center Company. In addition, SC&A prepared a request for an emergency permit exemption from the Director of the Ohio Environmental Protection Agency to allow the use of a portable oil-fired boiler in the event of a problem with coal-fired boilers during a natural gas outage. SC&A researched decades of Director's exemptions, provider dual-fuel requirements, and state and federal air regulations to draft the exemption request. In addition, SC&A prepared a permit modification for the use of a predictive emissions monitoring system (PEMS). SC&A also analyzed the applicable regulations to determine whether the EPA or the state air agency had the regulatory authority to allow the use of a PEMS as an alternative monitoring requirement.
- ✓ **Title V Permit Application Assistance (UTLX):** The Union Tank Car Company (UTLX) manufactures, repairs, and provides railroad tank cars throughout North America for the transport of liquids via railcar. SC&A has developed air permit applications and provided support in developing compliance monitoring programs for UTLX facilities in Ohio, Pennsylvania, and Arkansas. This work included developing a detailed air emissions inventory, a process flow diagram, and an emissions egress and control parameter profile for each emissions unit at each facility. SC&A prepared permit-to-install applications modifying throughput limitations, operating restrictions, and control device monitoring parameters that were no longer applicable.
- ✓ **Air Compliance Planning (DOE):** At the request of the U.S. Department of Energy (DOE) Office of Sustainable Environmental Stewardship, SC&A developed air compliance plans for DOE and National Nuclear Security Agency sites. SC&A drafted compliance manuals for Stationary Reciprocating Internal Combustion Engines (RICE) and the disposition and reclamation of ozone-depleting substances. The DOE RICE Technical Assistance Tool summarized the operational and control requirements of the compression ignition RICE NSPS, spark ignition RICE NSPS, RICE NESHAP, and the Engine Test Cells/Stands NESHAP. The RICE Tool (1) included the general federal air requirements applicable to all RICE, (2) provided information on applicability, modifications, and reconstruction for each regulation, and (3) summarized into 157 separate categories the specific requirements for each RICE by engine type, construction date, location, horsepower, and power cycle.

# Compliance Support

- ✓ **Small Entity Compliance Guide for Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources – 40 CFR Part 60, Subpart OOOOa (EPA):** SC&A staff supported the EPA’s development of the *Small Entity Compliance Guide for Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources*. The EPA published this document for small entities subject to 40 CFR Part 60, Subpart OOOOa, “Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification, or Reconstruction Commenced after September 18, 2015,” as required by the Small Business Regulatory Enforcement Fairness Act (SBREFA). See <https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-air/industry/implementation-oil-and-natural-gas-air>
- ✓ **Small Entity Compliance Guide for Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces (EPA):** SC&A staff supported the EPA’s development of the *Small Entity Compliance Guide for “Standards of Performance for New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces.”* The EPA published this document for small entities subject to these Standards, as required by SBREFA. See <https://www.epa.gov/residential-wood-heaters/small-entity-compliance-guide-residential-wood-heaters>
- ✓ **Synthetic Organic Chemical Manufacturing Industry (SOCMI) Regulation Implementation Tools/Document (EPA):** SC&A staff supported the EPA in the development of implementation tools to help regulated entities comply with the wastewater provisions of the SOCMI NSPS. The implementation tools included a glossary of terms, a summary of applicability, applicability flow charts, an implementation timeline, a question-and-answer section, and a summary of the rule requirements. The EPA used this implementation tool as an illustrative compliance case study.
- ✓ **Environmental Permitting Program for the Kingdom of Jordan (USAID):** SC&A personnel served as consultants for the U.S. Agency for International Development (USAID) economic development program in Jordan. They twice traveled to Jordan to assess the current environmental licensing institutional organization, procedures, and legal framework; developed recommendations for a process to transition to a modern environmental permitting program in Jordan; and developed standard operating procedures for reviewing projects during the first stage in that transition.
- ✓ **Air Quality Analysis and Reporting (EPA):** Under a work assignment for the EPA’s Community and Tribal Programs Group, SC&A provided air permit assessments of adjacent industrial facilities for the Kalispel Tribe of Indians in Washington and the Pyramid Lake Paiute Tribe of Nevada. Each air permit review focused on Title V and prevention of significant deterioration (PSD) major sources adjacent to each Tribe’s lands. Each air permit review included an analysis of the construction and operation permits, permit actions, and compliance evaluations. The final report detailed the history of air permitting actions and compliance, air emissions, and modeling results for each identified industrial facility.

## Compliance Support

- ✓ **Compliance and Emissions Data Reporting Rule (EPA):** SC&A staff supported the EPA's development of the proposed Electronic Reporting and Recordkeeping Requirements for NSPS ([80 FR 15100](#); March 20, 2015). Support included the preparation of a proposal preamble and amendments to 40 CFR Part 60, "General Provisions," Subpart A and other subparts. SC&A staff also helped the EPA develop a supporting document that specified the rationale for each of the proposed amendments. The proposed amendments expanded electronic reporting requirements for specific air emissions data reports. The reports covered by the proposal included summary reports, excess emissions reports, performance test reports, performance evaluation reports, and other similar reports required by specific rules.
- ✓ **Compliance Monitoring Sufficiency Reviews (EPA):** SC&A staff supported the EPA's assessment of several existing 40 CFR Part 63 coating rules to (1) identify potential deficiencies in emissions compliance monitoring and testing and (2) suggest remedies for identified deficiencies. SC&A conducted compliance monitoring sufficiency reviews as needed and requested by the EPA. SC&A staff are tasked to assess the sufficiency of existing regulation compliance monitoring for, but not limited to, NSPS, 40 CFR Part 61 NESHAP and Part 63 NESHAP, and Clean Air Act Section 111d/129 regulations.
- ✓ **Multimedia Training on Greenhouse Gas Emissions Reporting (Ohio Environmental Protection Agency):** As part of Ohio Environmental Protection Agency grant EPA 01-0000002458, SC&A developed a multimedia training program explaining the applicability and requirements of the federal mandatory Greenhouse Gas Reporting Rule. We presented this training program to regulated facilities across Ohio in both classroom and webinar formats. SC&A also developed guidance documents that were distributed during the presentation and to the Ohio Office of Compliance Assurance and Pollution Prevention. SC&A gave presentations to the Ohio Oil and Gas Association; the Ohio University Consortium for Energy, Economics & the Environment; the West Virginia Independent Oil and Gas Association; and the Southwest Ohio Chapter of the Air & Waste Management Association. Attendees rated the project very highly for its quality and content. The Ohio Environmental Education Fund awarded the presentation an Honorable Mention in 2012.

# Environmental Management and Audit Services

## Overview of Capability



SC&A provides a broad range of services related to the environmental and human health impacts of energy technologies, industrial processes, and waste management. SC&A also provides training in environmental compliance programs and support for integrating policies and procedures with environmental laws, regulations, and standards.

For example, SC&A has been under contract to the U.S. Environmental Protection Agency (EPA) almost continuously since 1987. The company has held more than 55 prime and subcontracts and has delivered more than \$210M in services to the Agency. SC&A currently supports the Agency as a prime or subcontractor. Likewise, SC&A has provided environmental management and related services as prime or subcontractor under more than 50 contracts with the U.S. Department of Energy (DOE) and has supported contracts of comparable scope and focus for more than 30 federal, state, local, and international clients.

## Capabilities

- ✓ Environmental Compliance Auditing and Support
- ✓ Environmental Assessment of Management Systems/ISO 14001 Compliance
- ✓ Quality Control and Assurance Systems Support
- ✓ Liability Reviews and Due Diligence Support
- ✓ Developing Environmentally Preferable Purchasing Programs
- ✓ Environmental Requirement Integration
- ✓ Technical and Impact Analysis for Federal and State Rulemaking
- ✓ Control Technology Studies
- ✓ Environmental Permit Application Support
- ✓ Site Design and Reduced Reporting Burden Support
- ✓ Environmental Risk Assessment and Reporting

### Selected Examples of Clients Served

- ✓ Arizona Public Service Electric Company
- ✓ CHWMEG
- ✓ The Energy Cooperative
- ✓ U.S. Defense Logistics Agency
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency

# Environmental Management and Audit Services

## Examples of SC&A Projects and Corporate Experience

- ✓ **Chemical Accident Prevention/Risk Management Planning Support (TEC):** SC&A conducted applicability audits for the Chemical Accident Prevention Provisions (40 CFR Part 68) and Occupational Safety and Health Administration Process Safety Management (PSM) requirements at three natural gas processing plants of The Energy Cooperative (TEC). All three plants required risk management plans (RMPs), and one plant also required a PSM. SC&A developed site-specific RMPs for two of the plants and created a unique process hazards analysis for each plant. SC&A conducted detailed compliance audits of the three RMPs, including interviews with employees and site investigations. SC&A's report included recommendations to improve the RMPs for each site. SC&A revised the combined risk management/PSM plan to reflect changes to the operating procedures, responsible individuals, preventative maintenance, and emergency response programs. SC&A also developed hazardous and universal waste plans for TEC sites.
- ✓ **Solid Waste Composting Cost and Program Analysis (Hull, Inc.):** SC&A helped Hull, Inc. analyze the in-vessel composting operations of pre- and post-consumer waste from Ohio University dining facilities. The University had requested a cost analysis and assistance to address problems with compostable serviceware. SC&A and Hull conducted onsite investigations of the University composting operations and waste generation sites (campus dining facilities). SC&A assisted Hull by analyzing commercial and institutional composting operations in Ohio and Oregon to better understand methods for processing compost and compostable serviceware. SC&A provided a final report that reviewed other institutional composting programs; end-use, sale price, and market demand for compost; and issues encountered processing compostable serviceware.
- ✓ **Facility Environmental Reviews (CHWMEG):** Since 2003, SC&A has supported CHWMEG, Inc., a nonprofit trade association of industrial companies interested in efficiently managing the waste management aspects of their environmental stewardship programs. SC&A's primary support to CHWMEG has included conducting comprehensive, independent reviews of commercial facilities that treat, store, dispose, recycle, or transport waste. To date, SC&A has performed more than 230 reviews in the United States, Canada, Guatemala, Italy, Poland, Russia, Turkey, and the Ukraine. These reviews include the completion of an audit questionnaire, interviews of regulatory agency personnel, a site visit, interviews of site personnel, and the preparation of a summary report, which includes an executive summary, questionnaire, risk assessment, and site photographs. These audits address facility design and operations, site geology and groundwater, health and safety, environmental contamination, financial information, insurance, regulatory compliance, quality assurance and quality control, community and public relations, site security, personnel training, and management systems, including, where applicable, International Organization for Standardization (ISO) 9000 and 14000 conformance.
- ✓ **DOE Environmental Management System (EMS) Review:** Under the auspices of Executive Order 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, DOE tasked SC&A to review and comment on the EMS plan and program implemented by DOE Headquarters. SC&A reviewed the EMS and prepared a report that addressed how the plan and program met EMS requirements and identified some areas for improvement.

# Environmental Management and Audit Services

- ✓ **DOE Environmentally Preferred Purchasing (EPP) Program:** SC&A supported DOE's EPP programs by establishing standards and guidelines that promote embedding EPP in site environmental management systems, helping the field implement robust programs, promoting the exchange of successes to rapidly disseminate best practices, and coordinating with DOE's other preferred product programs. SC&A assisted sites with the development and implementation of systematic integration of EPP into site procurement models, design and operating specifications, and purchasing systems.
- ✓ **Field Investigations of a Facility in Fukushima, Japan:** After the accident at the Fukushima Dai-ichi nuclear power plant, SC&A performed an onsite radiological assessment of a medical technology company located about 70 kilometers northwest of the plant to identify whether any low levels of radioactive contamination had been introduced to the facility. SC&A staff collected regional data to develop a radiation survey strategy and then visited the site for a 10-day assessment of the facility. SC&A assessed potential contamination levels on/in medical devices and products and the potential for external and internal radiation exposure to the end users (e.g., health care practitioners, patients). We found that the facility's environmental controls had been effective in preventing contamination, and we trained facility personnel on radiation detection equipment to continue their own studies.
- ✓ **Decommissioning Plan for EPA Laboratories at the University of Nevada, Las Vegas (UNLV):** SC&A helped the EPA plan for the decommissioning of its laboratory facilities at UNLV. This included developing an historical site assessment and decommissioning plan addressing the radiological conditions of the site for the first part of the decommissioning project. Our work included site characterization information, a remediation plan, and a site-specific cost estimate for decommissioning.
- ✓ **Alternative Use of Phosphogypsum Review (EPA):** SC&A helped the EPA review an application from a university for approval of an alternative use for radium-contaminated phosphate waste (phosphogypsum). Under the alternative, the waste would be mixed with other materials to create "briquettes" for erosion mitigation and as a fill material for coastal protection devices. SC&A reviewed the application for completeness and then analyzed the petitioner's procedures and methods to determine whether they were in accordance with accepted risk assessment practices. SC&A reviewed the input values, whether they were appropriate and realistic, and if the assessment was a valid representation of the risks. We reviewed the radiological and hazardous chemical behavior of these materials in a seawater environment, as well as the long-term stability of the processed phosphogypsum and its use as a core material. Our assessment of the petition compared these risks with those that would have been incurred if the phosphogypsum was not used in this way. SC&A then prepared a comprehensive report to document the review, including those areas of the petition that did not meet the requirements. SC&A reviewed several iterations of the application, which had significant deficiencies when first submitted.
- ✓ **ISO 9001 Support (SENES Oak Ridge):** SC&A was selected by SENES Oak Ridge to provide ISO 9001 consulting assistance to the Defense Threat Reduction Agency's (DTRA's) Nuclear Test Personnel Review (NTPR) program. SC&A provided senior consulting services to Titan Corporation, the prime contractor for DTRA in the NTPR program. The specific services included performing a program audit and gap analysis of Titan's quality management program, assisting in the development of the Quality Management Manual, leading the effort to select the independent registrar for the ISO 9001 certification, performing an organizational assessment, and reviewing the quality management program documents and procedures developed by Titan to address ISO 9001.
- ✓ **Needs Assessment Review (Utah Department of Environmental Quality):** SC&A reviewed a Needs Assessment Report and a Needs Assessment Report Addendum that was prepared by Promontory Point Resources, LLC (PPR) to demonstrate the need for a Class V industrial waste landfill near Salt Lake City, Utah. The evaluation focused on the following seven points: (1) the analysis meets the

# Environmental Management and Audit Services

statutory requirements in completeness; (2) the analysis supports PPR's conclusions; (3) data and information provided in the analysis are valid and accurate; (4) data gaps in PPR's economic market analysis exist; (5) the analysis identified existing landfill capacity in the State of Utah; (6) there is a need for additional capacity of nonhazardous solid waste; and (7) the analysis complies with the requirements of the act (Utah Solid and Hazardous Waste Act). SC&A provided an evaluation of the reports, including data validation and professional opinion.

- ✓ **Defense Logistics Agency Audits (EA Engineering):** SC&A helped EA Engineering conduct audits at Defense Logistics Agency distribution depots across the country. SC&A audited depots to determine compliance with U.S. Nuclear Regulatory Commission license requirements. Audits involved 1- or 2-day visits to the depot by SC&A inspectors. The auditors inspected site records involving material inventory and shipping, written safety programs, summaries of personnel exposure, results of previous audits and inspections, previously identified problems and corrective actions, written procedures for the handling of radioactive materials, the condition of and records related to detection and laboratory instruments, records pertaining to dose and contamination, leak tests, personnel monitoring program records, inventory records, posting of required signs, proper labeling of containers, and records pertaining to hazardous waste. SC&A submitted detailed checklists, reports of findings, and recommendations within a few days of each audit.
- ✓ **Audit of Radioactive Waste Shipment Packages from the Palo Verde Nuclear Generating Station (EA Engineering):** SC&A audited five radioactive waste shipments from the Arizona Public Service Electric Company's Palo Verde Nuclear Generating Station. The audit included an independent evaluation of the characterizations of five shipment packages, including liquid waste filters, contaminated laundry, dewatered bead resin, surface-contaminated objects, and radioactive trash. SC&A examined verification and validation of the waste stream analyses, scaling factors, and methodology used to classify waste and determine U.S. Department of Transportation subtypes.
- ✓ **Integration of Environmental Performance Data (DOE):** SC&A assisted DOE's integration of environmental performance data collected through various sources, including the EMS, Occurrence Reporting and Processing System, Pollution Prevention Tracking & Reporting System, Radiation Exposure Monitoring Systems, and other sources (such as the EPA). This integration enables efficient analysis of disparate data and allows DOE to develop performance parameters and indicators to effect continuous improvement in the policies, requirements, and implementation supporting the Department's posture in managing environmental issues.
- ✓ **Management Support in the Acquisition of a Laboratory Operation (DOE):** DOE's Office of River Protection contracted SC&A to perform a program audit of the 222-S Laboratory located at DOE's Hanford Site. This audit was necessary because the 222-S Laboratory was transferred from DOE's Richland Office to the Office of River Protection. The purpose of the audit was to evaluate the management, organizational, business, and technical aspects of the laboratory operation. SC&A staffed this assignment with a management consultant, financial and contractual specialists, and technical experts. Specific activities included a general organizational assessment, a review of performance measures and indicators, and an evaluation of the laboratory's business and action planning processes. These activities were directed at determining whether the laboratory had the right staff mix and size, sufficient policies and procedures to satisfy its customers, and the contractual and financial infrastructure to properly run the operation. SC&A provided daily briefings to management and prepared a written report summarizing the findings.

# Information, Communication, and Editing Services

## Overview of Capability



SC&A's subject-matter experts and information specialists support complex projects with a wide range of communication services. These include data collection, ranging from literature searches and database extraction to survey and reporting, and information management to support project data collection, analysis, and decision-making. Our project-specific solutions include database development and management, electronic tools, websites, surveys, complex modeling for environmental analysis, and Global Positioning System (GPS)-enabled geographic information systems for field work.

SC&A also combines out technical and scientific subject-matter expertise with communications and event planning experience to help clients convey their messages to the public in many media, such as websites and social media; exhibits and booths; special events; brochures, fact sheets, and other public information pieces; awards programs; and information hotlines. SC&A brings together logistics experience, communications professionals, and subject-matter expertise to support webinars, public meetings, workshops, and conferences of all sizes, from 1-hour sessions to multi-day events.

## Capabilities

- ✓ Data Collection and Analysis
- ✓ Information/Database Management
- ✓ Stakeholder and Community Engagement
- ✓ Technical and Scientific Editing
- ✓ Web Content Development and Implementation
- ✓ Meeting and Conference Support
- ✓ Peer Review Coordination and Assistance
- ✓ Training

### Selected Examples of Clients Served

- ✓ Santa Cruz County Public Health Services Agency
- ✓ U.S. Defense Threat Reduction Agency
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Federal Emergency Management Agency

# Information, Communication, and Editing Services

## Examples of SC&A Projects and Corporate Experience

- ✓ **Technical Editing Services (NRC):** SC&A has provided technical editing services for all U.S. Nuclear Regulatory Commission (NRC) organizational elements under contracts with the NRC Office of Administrative Services, Publications Branch, for more than 10 years. SC&A edits documents for clarity; correct grammar, punctuation, and spelling; and adherence to the U.S. Government Publishing Office Style Guide and NRC-specific style guides. Under this contract, SC&A has edited the full range of NRC documents, including safety evaluation reports, NRC staff reports, regulatory guides, and public information pieces. Documents range from less than 10 pages to more than 1,500. SC&A editors bring extensive experience in technical editing as well as a background in the sciences and the nuclear industry, enabling SC&A to effectively edit and rewrite the NRC's complex technical documents.
- ✓ **Mobile Sources Technical Review Subcommittee (EPA):** SC&A has provided logistical and technical support for the Mobile Sources Technical Review Subcommittee and its work groups since 2007. Each work group addressed specific economic, environmental, technical, scientific, or enforcement issues. Our support included planning, administrative, and logistical meeting support and the preparation of draft and final documents summarizing meeting proceedings, recommendations, and technical advice provided by committee members to the U.S. Environmental Protection Agency (EPA). Key administrative and logistical support included contract negotiations and close-out, budget management and the arrangement of audiovisual equipment, site visits to ensure the adequacy of the event space, and managing onsite registrations.
- ✓ **Radiological Operations Support Specialist (ROSS) Outreach Assistance (FEMA):** SC&A assists the Federal Emergency Management Agency (FEMA) Chemical, Biological, Radiological, and Nuclear (CBRN) Office with establishing and building the Radiological Operations Support Cadre. We assist in communicating program components to both ROSS personnel and stakeholders. This work includes developing the ROSS program communications strategy, developing ROSS outreach documents (brochures, fact sheets, presentations), supporting ROSS outreach at association and other conferences, drafting Web content, and providing communication program management, such as maintaining records, tracking the distribution and impact of messaging, and other related efforts.
- ✓ **Technical Support, Risk and Technology Review for Aerospace National Emission Standard for Hazardous Air Pollutants (NESHAP) (EPA):** SC&A (EC/R) provided technical assistance under the EPA's Risk and Technology Review (RTR) program for the Aerospace NESHAP to address deficiencies in the Maximum Achievable Control Technology (MACT) standard (such as significant emission sources not addressed in the original MACT standard). Our staff developed a website to allow for the upload of completed information collection request surveys, which were sent to approximately 1,200 facilities. We also developed a software system to extract the data from the uploaded files, populate a comprehensive database, and format the data into National Emissions Inventory format.
- ✓ **Programming and Database Design of HEM-3 (EPA):** SC&A (EC/R) participated in the programming and database design of HEM-3, which is a model for assessing air pollution concentrations, population exposures, cancer and non-cancer risks, and population exposures from hazardous air pollutant emissions. HEM-3 incorporates EPA's state-of-the-science atmospheric dispersion model, AERMOD, and upgrades to AERMOD can readily be substituted in to HEM-3. SC&A (EC/R) programming support for HEM-3 included the development of (1) a procedure to output Google Earth-formatted interactive maps of predicted risks and exposures, including cancer and non-cancer risk values and (2) a procedure that accepts user input and formats it into the input file needed to run AERMOD, including approaches to allow rapid completion of the modeling analyses after quality assurance of emissions inputs by state agencies and EPA regional offices.

## Information, Communication, and Editing Services

Our staff designed and developed the HEM-3 database that contains meteorology information needed for the AERMOD model and developed query tools to allow quick access to detailed results for each census block, modeled facility and chemical. These query tools were used to provide quick response support for the development of the EPA's school monitoring program.

- ✓ **Website Design and Maintenance for Task Forces and Work Groups:** SC&A is experienced in creating and maintaining the hardware and software infrastructure for client websites. For example, SC&A (EC/R) designed and maintained the Cleanairinfo.com hub for the Regional/State/Local Dispersion Modeler's Workgroup. We regularly create event-specific websites for clients as part of our meeting support services. One example is the bilingual English-Russian website for workshops on diesel emissions, pollution mitigation, and clean and alternative technologies in the Arctic co-sponsored by the EPA and held in Moscow, Russian Federation. The site includes background information on the black carbon diesel issue and a copy of the final report, as well as agenda, hotel, and travel information for the workshops (<http://www.russianarcticbc.org/index.htm>).
- ✓ **Community Reception Center Drill Toolkit (CDC):** For the Centers for Disease Control and Prevention (CDC) Radiation Studies Branch, SC&A developed an exercise toolkit for use by a state or local jurisdiction to plan and execute a drill of a Community Reception Center, which provides population monitoring and decontamination after a radiological incident. SC&A developed drill objectives and scenarios, a master scenario events list, and symptomology cards. SC&A also prepared agendas and meeting materials for planning meetings, guidance for venue selection, sample exercise policies, and an exercise supply list. For play, we created an exercise plan, controller and evaluator handbook, player handouts, exercise evaluation guides, and templates for exercise briefing presentations. Other materials included a sample agenda and meeting materials for the controller/evaluator debrief, participant feedback form, and name badge templates. We created an overview document with instructions for adapting and using the toolkit in a particular jurisdiction.
- ✓ **Webinar Support:** SC&A (EC/R) facilitated three webinars on "Greening the Food Services Sector" for EPA Region 2, featuring live audio and video of presentation materials. Support included pre-meeting publicity and contacting potential participants, creation of a website for publicity and information, and coordination between seminar organizers and technical providers. Streaming video of the presentations with active close-caption transcripts was posted on websites developed for the webinars. SC&A also supported a webinar meeting of DOE NEPA Compliance Officers for the DOE Office of NEPA Policy and Compliance, including testing the webinar interface and training DOE staff, preparing PowerPoint presentations, and monitoring the meeting for technical difficulties.
- ✓ **Preparation of Public Outreach Materials (EPA):** On behalf of the EPA Indoor Environments Division and the former Radon Division, SC&A supplied subject-matter experts to respond to public comments, technical writers and editors to revise and finalize the text, and graphic artists to develop and prepare the print files for public information documents, including *Mold Remediation in Schools and Commercial Buildings*, *Building a New Home: Have You Considered Radon*, *Healthy Buildings*, *Healthy People*, the Community Action Kit, and the Smoke-Free Home Pledge Kit. For the mold guidance and *Healthy Buildings*, SC&A developed a Microsoft Access database to compile and sort comments on the documents and proposed text revisions to resolve complex comments. SC&A also modified documents for availability on the EPA website.
- ✓ **Public Hearing Support (EPA).** SC&A organized and facilitated more than a dozen EPA-sponsored public hearings on newly proposed/modified air quality regulations specifically aimed at addressing greenhouse gas emissions and/or emissions from the oil and natural gas industry. Support included contract negotiations, budget management, the arrangement of audiovisual equipment, and securing appropriate vendors (e.g., court reporters, interpreters, and security). Conducted site visits to ensure the adequacy of the event space and

## Information, Communication, and Editing Services

prepared/modified room layouts based on EPA's objective and/or specific requests. Prepared event materials (e.g., name badges/tents) and arranged for the production of event signs/posters. Provided onsite logistical support (e.g., the setup/breakdown of event space), and closed out all event-related contracts.

- ✓ **Radiation Basics for Water Systems Staff (EPA):** SC&A helped the EPA Office of Radiation and Indoor Air provide training to Tribal water systems staff to help them reduce their risk from exposure to radioactivity at work. The training covered the basics of radiation and radiation protection, decommissioning of wells and radioactive waste management, and planning for worker safety in water line planning and construction work in uranium- and radium-contaminated soil. SC&A wrote, prepared, and presented a 2-hour segment of each training session on the management of contaminated water wells. SC&A identified training facilities, provided audiovisual equipment, staffed the registration location, and helped run the conferences in Flagstaff, AZ; Window Rock, AZ; and Farmington, NM. An SC&A geologist developed and presented a module on decommissioning of wells and the associated regulations and requirements of Arizona, New Mexico, Colorado, and Utah. The course was attended by water treatment professionals of the Navajo, Pueblo, and Ute Tribes.
- ✓ **Development of the I-BEAM Model (EPA):** SC&A supported the EPA's Indoor Air Quality (IAQ) Building Education and Assessment Model (IBEAM), available at <https://www.epa.gov/indoor-air-quality-iaq/iaq-building-education-and-assessment-model-ibeam-diagnosing-and-solving>. IBEAM is an educational budget analysis tool designed to demonstrate the financial, air quality, and energy-use impacts of IAQ decisions. To maintain flexibility, SC&A provided the information in a variety of formats, including HTML pages with embedded static and animated graphics, generic rich text format word processor files, and Adobe Acrobat PDF files.
- ✓ **Long-Range Transboundary Air Pollution Task Force on Hemispheric Transport of Air Pollutants (EPA):** SC&A supports the EPA (the U.S. co-chair) in organizing the activities of the Task Force on Hemispheric Transport of Air Pollutants (HTAP). Since 2005, the task force has met in more than 15 locations around the world. SC&A has provided both logistical and technical support through development and maintenance of the HTAP website (<http://www.htap.org/>), online registration, and travel support to international participants. In addition, our staff provided technical and editorial support in the development of the four-part series *Hemispheric Transport of Air Pollution 2010, Part B: Mercury* (Air Pollution Studies No. 18), published by the United Nations Economic Commission for Europe.
- ✓ **Clean Air Act Advisory Committee Meeting Support (EPA):** Since 2015, SC&A has provided facilitation and logistical support for the semi-annual meetings of the Clean Air Act Advisory Committee, the Permits, New Source Review and Toxics Subcommittee, and for the Clean Air Excellence Award Program. This includes planning, administrative, and logistical meeting support and the preparation of draft and final documents summarizing meeting proceedings, recommendations, and technical advice provided by committee members. Key areas of support included meeting venue identification, venue contract negotiations, and budget management. Logistical support has included onsite meeting registration support and meeting facilitation services. In addition to providing similar logistical and administrative support for the Clean Air Excellence Award Program, SC&A has also developed materials for the awards ceremony, including programs, brochures, and award certificates, as well as development of PowerPoint presentations showcasing the award winners.
- ✓ **Great American Wood Stove Changeout Program (EPA):** Through support of the voluntary Residential Wood Smoke Reduction Initiative and the Great American Wood Stove Changeout Program, SC&A staff developed sample education and outreach tools for use by state, local, and Tribal agencies for implementing a voluntary woodstove changeout campaign. Priority activities have included a study of innovative financing options available to homeowners to change out old wood stoves, and funding options for municipalities, universities, schools, hospitals, and industry to retrofit or replace boilers affected by the Maximum Achievable Control Technology rule for boilers.

# Licensing and Performance Assessments of Nuclear Facilities

## Overview of Capability



Since our founding in 1981, SC&A has provided expertise to help governments promote safety and environmental stewardship associated with nuclear facilities. SC&A's licensing engineers and nuclear engineering and radiological specialists provide analytic and regulatory compliance services in support of the licensing, operation, and cleanup of nuclear fuel cycle facilities, which operate in an extensive and complex regulatory environment. SC&A provides a suite of services and nationally recognized expertise that can support the life cycle of nuclear facility operations, as well as evaluations that support effective regulations and safety in this sector.

## Capabilities

- ✓ Licensing and Regulatory Compliance Support
- ✓ Technical and Scientific Analysis
- ✓ System Design and Support
- ✓ Cost Estimation and Impact Analyses
- ✓ Environmental Impact Analysis
- ✓ Auditing and Documentation Services
- ✓ Air and HVAC Analysis
- ✓ Engineering Support

### Selected Examples of Clients Served

- ✓ Progress Energy Florida, Inc.
- ✓ State of Utah, Department of Environmental Quality
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Nuclear Regulatory Commission

# Licensing and Performance Assessments of Nuclear Facilities

## Examples of SC&A Projects and Corporate Experience

- ✓ **In Situ Recovery Uranium Facility Licensing (NRC):** SC&A assisted the U.S. Nuclear Regulatory Commission (NRC) Office of Nuclear Material Safety and Safeguards review of a request for amendment to the Ross uranium in situ recovery (ISR) project (License SUA-1601) for the Kendrick Expansion Area in Wyoming. SC&A's role included conducting the environmental review under the National Environmental Policy Act (NEPA), conducting the National Historic Preservation Act Section 106 review, and providing hearing support. SC&A performed an acceptance review of the application materials, noting data gaps and potential requests for additional information. We reviewed the licensee's submission, considering NRC regulations and guidance, to recommend the type of NEPA review required and whether a supplemental environmental impact statement (EIS) or an environmental assessment (EA) should be prepared. SC&A recommended development of a supplemental EIS, which the NRC accepted. SC&A developed a detailed, annotated outline of the proposed EIS, conducted a site visit, and developed draft chapters for NRC review. This support required multidisciplinary expertise in engineering; land use; geology, soils, and seismology; water resources (surface and groundwater); ecological resources; climate, meteorology, and air quality; historic and cultural resources; demographics and socioeconomics; environmental justice; transportation; noise; visual and scenic resources; public and occupational health (radiological and nonradiological); hazardous materials and waste management; environmental monitoring; and mitigation.

Similarly, SC&A helped the NRC prepare EAs for the renewal of the license for the Crow Butte ISR facility in Nebraska and amendment to that license to permit activities at the Marsland Expansion Area. For the Crow Butte license renewal, SC&A conducted the analyses for surface and groundwater resources and cultural resources, including compliance with Section 106 of the National Historic Preservation Act. SC&A prepared the Marsland EA in its entirety and is currently working with the NRC to finalize the draft for public review.

- ✓ **Review of Utah Shallow Land Disposal Facility for Depleted Uranium (State of Utah):** SC&A is assisting the State of Utah Department of Environmental Quality in evaluating a performance assessment (PA) prepared by the site operator for the proposed disposal of depleted uranium oxide at a commercial disposal facility in Clive, Utah. SC&A acts as an extension of the regulatory agency—interpreting regulations and evaluating licensing submittals against them, preparing requests for additional information (interrogatories), and participating in outreach meetings with the public and the media. SC&A performed a detailed review of a highly technical licensing submittal, focusing on its technical adequacy, the appropriateness of data and models used, and the treatment of uncertainty.
- ✓ **Safety Review of Medical Isotope Applications (ISL/NRC):** As a subcontractor to ISL, SC&A provides technical assistance to the NRC Office of Nuclear Reactor Regulation, Division of Policy and Rulemaking, for the review and evaluation of construction permit and operating license applications for medical isotope production facilities. Specifically, SC&A critically reviews the applicant's safety analysis report (SAR), technical specifications, radiation protection and waste management programs, and financial assurance documents. Under this contract, SC&A reviewed the license application SAR prepared by SHINE Medical Technologies for the use of a non-reactor-based, subcritical fission process that combines an accelerator-driven beam with a deuterium-tritium gas-target to provide a high-output neutron source. The neutrons from this source are then used to induce fission in a subcritical configuration of a low enriched uranium (LEU) solution. One byproduct of the LEU fission process is molybdenum-99, which is subsequently processed for medical use. SC&A provided technical support in civil engineering, construction engineering, environmental engineering, fire protection, geology, health physics, hydrology, mechanical engineering, nuclear engineering, seismology, and structural engineering.

# Licensing and Performance Assessments of Nuclear Facilities

- ✓ **Consulting Assistance for Crystal River Nuclear Plant Decommissioning Activities (Progress Energy Florida, Inc.):** SC&A prepared a post-shutdown decommissioning activities report, as required by 10 CFR 50.82(a)(4), in accordance with NRC guidance. SC&A also served as an independent reviewer of the detailed cost estimate.
- ✓ **Technical Basis for Revision of 40 CFR Part 190 Environmental Radiation Protection Standards for Nuclear Power Operations (EPA):** Under multiple work assignments, SC&A supported the EPA's development of the technical basis for revision of 40 CFR Part 190. SC&A staff members used their knowledge of current nuclear power operations to review the causes of groundwater contamination at nuclear power operations and assess the impact to human health and the environment, review the new nuclear power plant designs being considered and determine the potential radiological contaminants to the environment and assess the impact to human health and the environment, and address other technical aspects of increased nuclear power and assess the impact to human health and the environment. Among other tasks, we (1) analyzed and summarized the impacts of long-term storage of spent fuel at nuclear power plant sites, (2) examined how to protect the public and the environment from exposure to radiation resulting from radiological effluents from the operations of several proposed new nuclear technologies, and (3) analyzed and compared methods for calculating annual limits for radiation dose to the public.
- ✓ **Callaway Nuclear Power Plant License Renewal (E&E/NRC):** As a subcontractor to E&E, SC&A helped the NRC Office of Nuclear Reactor Regulation prepare the supplemental EIS for the licensee's application to renew the operating license for Callaway Plant Unit 1 for an additional 20 years. SC&A prepared the preliminary analysis for the supplemental EIS that evaluated the environmental impacts of the proposed action and alternatives to the proposed action. SC&A worked with E&E to develop the site audit plan and conduct the site audit for the initial phase of the project. SC&A reviewed the environmental report for Callaway; NUREG-1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*; and NUREG-1555, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants*, Supplement 1, *Operating License Renewal*, and identified site-specific information gaps. SC&A developed a significant portion of the supplemental EIS and provided technical expertise for the development of the affected environment section, including reactor and containment systems, radioactive waste management, nonradioactive waste management, plant operations and maintenance, power transmission system, cooling and auxiliary water systems, land use, air quality, water resources, and socioeconomics.
- ✓ **Support to the AP1000 Design Center (NRC):** SC&A supported the NRC licensing reviews of all 10 CFR Part 52 combined operating license (COL) applications that referenced the Westinghouse Advanced Passive 1000 (AP1000) pressurized-water reactor, including Bellefonte Nuclear Station Units 3 and 4, William States Lee III Units 1 and 2, Vogtle Electric Generating Plant Units 3 and 4, Virgil C. Summer Nuclear Station Units 2 and 3, and Shearon Harris Nuclear Power Plant Units 2 and 3. SC&A engineers and scientists assessed the COL applications with respect to NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*; the Westinghouse AP1000 design control document (DCD); NUREG-1793, *Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design*; and all applicable regulatory guides. In addition, SC&A supported scoping meetings and public hearing activities, the request-for-additional-information process, and preparation of the draft EIS.
- ✓ **Support to the U.S. APWR Design Center (NRC):** SC&A provided safety and environmental technical support to the NRC review of the U.S. APWR DCD for design certification and then the COL final safety analysis reports for Comanche Peak Nuclear Power Plant Units 3 and 4. We provided expertise in preparing templates for the safety evaluation reports to facilitate NRC staff reviews of the applications. SC&A engineers and scientists assessed the new reactor applications for compliance with NUREG-0800, license guidance

# Licensing and Performance Assessments of Nuclear Facilities

documents, and applicable regulatory guides. Based on these reviews, SC&A determined whether the COL applicant properly incorporated the DCD by reference.

- ✓ **Yucca Mountain 40 CFR Part 197 Support (EPA):** For the U.S. Environmental Protection Agency (EPA), SC&A implemented advanced numerical modeling to assess future performance for the proposed Yucca Mountain high-level radioactive waste repository beyond 10,000 years and prepared a Background Information Document to support the EPA's proposed rulemaking (40 CFR Part 197). SC&A advised the EPA on several technical issues, preparing a comprehensive report documenting key assumptions, uncertainties, and conservatisms in PAs and the final EIS and supplemental EIS prepared by the U.S. Department of Energy (DOE) to characterize the proposed repository. SC&A evaluated the following topics: climate change, precipitation, and infiltration; unsaturated zone flow and transport; near-field and in-drift chemical environment; waste package and drip shield degradation; performance of engineered barrier systems; waste form degradation and radionuclide release; saturated zone flow and transport; biosphere doses; disruptive seismic and igneous events; summary of conservative factors in Yucca Mountain PAs; and summary of long-term uncertainties in characterizing the performance of the Yucca Mountain repository.
- ✓ **Support to Clark County on Yucca Mountain Issues (Clark County, NV):** SC&A's experience providing technical assistance to the EPA in its development of an environmental dose standard for a possible high-level waste repository at Yucca Mountain, NV, was the main reason Clark County, NV, selected SC&A to perform an independent review of DOE's total systems performance assessment (TSPA) associated with the viability assessment (VA) of a repository at Yucca Mountain. SC&A's review attempted to determine whether the methods and information presented in the TSPA-VA had the potential to produce results that were defensible under regulatory reviews. SC&A reviewed the technical factors that contribute to repository performance, including the flow and radionuclide transport in the unsaturated and saturated hydrologic regimes, the degradation of waste forms and waste packages, the thermal and geochemical environment near the packages, human uptake of radionuclides in the biosphere that result in radiation doses, and the computer codes used to produce the results. In the second phase of this work, SC&A provided an independent review of the Yucca Mountain preliminary site suitability evaluation and many documents previously issued or identified by DOE to support it.
- ✓ **Certification of the Waste Isolation Pilot Plant (WIPP) (EPA):** Since 2004, SC&A has supported the EPA Office of Radiation and Indoor Air each time it has certified and recertified the WIPP. This includes performing an initial completeness and subsequent in-depth review of DOE's application and providing comments on deficiencies. SC&A geologists, hydrogeologists, geochemists, statisticians, health physicists, waste characterization specialists, and mining engineers performed a detailed examination of the PA; identified and evaluated all significant features, events, and processes; and established that (1) all computer codes were validated, (2) the provenance of all input parameters was documented, and (3) the outputs complied with the appropriate EPA regulations. SC&A helped the EPA form questions for DOE and evaluate the adequacy of the responses. In-depth analyses were conducted in areas of importance to PA results, including the use of computer modeling in general and the specific use of groundwater modeling, to support DOE's compliance certification application. SC&A provided geotechnical advice on the significance of local geologic formations on repository performance, with a focus on documenting the uncertainties associated with waste characterization; the extent to which microbes will degrade cellulosic, plastic, and rubber materials after closure of the WIPP repository; and how such degradation processes would affect the safety of the repository. SC&A continues to provide technical support to the WIPP project.

# NEPA Services

## Overview of Capability



One of SC&A's core business areas is helping clients comply with the National Environmental Policy Act (NEPA) and also evaluate the cultural resources, endangered species, and other related topics that often arise in conjunction with a NEPA environmental review. Other areas of expertise include regulatory analysis and rulemaking associated with environmental issues. In addition to SC&A's corporate experience, many of our staff members have supported federal agencies throughout the entire NEPA process, from scoping through document development, public hearings, and consultation, while others specialize in specific resource areas. SC&A has more than 150 staff members who do NEPA-related work located across the United States, offering capabilities in all the areas associated with NEPA analyses, including environmental science, many engineering disciplines, physical sciences, economics, cultural resources, public health, and public outreach.

## Capabilities

- ✓ Preparation and Review of Environmental Impact Statements (EISs), Supplemental EISs, and Environmental Assessments (EAs)
- ✓ Review of NEPA Topics, Including Air Quality, Climate Change, Ecological Resources, Environmental Justice, Geological Resources, Seismology, Surface and Groundwater Hydrology, and Waste Management
- ✓ Development of Methodologies for EIS Reviews
- ✓ Policies and Procedures for Complying with NEPA-Related Laws and Regulations
- ✓ Training on NEPA Compliance and Review
- ✓ NEPA Compliance Audits
- ✓ Consultation with Indian Tribes under NEPA and Section 106 of the National Historic Preservation Act

### Selected Examples of Clients Served

- ✓ New York State Energy Research and Development Authority
- ✓ U.S. Coast Guard
- ✓ U.S. Department of Energy
- ✓ U.S. Department of the Interior, Bureau of Land Management
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Nuclear Regulatory Commission

# NEPA Services

## Examples of SC&A Projects and Corporate Experience

- ✓ **Phase 2 Decommissioning Support for the West Valley Demonstration Project (DOE and NYSERDA):** For the U.S. Department of Energy (DOE) and New York State Energy Research and Development Authority (NYSERDA), SC&A is leading a team preparing documents to support Phase 2 decision-making for the DOE West Valley Demonstration Project, the Western New York Nuclear Service Center, and the State-Licensed Disposal Area. This includes supporting the NEPA process, such as development of the Notice of Intent, conduct of the scoping process, development of alternatives, preparation of conceptual engineering design reports, development of the supplemental EIS. We are also preparing decommissioning plans and preparing applications for permitting or licensing modifications.
- ✓ **DOE Office of NEPA Policy and Compliance Headquarters Support:** Since 2008, SC&A has provided technical, analytical, and publication support to the DOE Office of NEPA Policy and Compliance. This includes assisting in the Office's review of EISs, EAs, and other NEPA-related documents for projects involving nuclear and non-nuclear waste management, construction and operation of facilities, nuclear energy projects, alternative energy, and fissile materials disposition, among other topics. SC&A reviewers consider nuclear engineering and physics, radiation, health physics, risk assessment and management, accident analysis, ecology and natural resources, surface and groundwater hydrology and water quality, geology, air quality, radioactive and chemical materials transport, waste management, human health and safety, and cultural resources. SC&A focuses on identifying technical inadequacies; the degree to which technical assumptions and conclusions are justified based on available data; appropriateness of data, models, and associated limitations; the treatment of uncertainties and alternatives; and internal consistency. SC&A also tracks DOE's use of categorical exclusions and developed, updates, and maintains the Office's NEPA Document Database, which tracks the history and status of all DOE NEPA EISs, EAs, and related documents. We have also helped develop and update guidance, including guidance related to accident analysis.
- ✓ **NEPA Support (NRC):** SC&A has assisted the NRC Office of Nuclear Material Safety and Safeguards in preparing the NEPA documents necessary to support its review of licensing applications for several facilities, including the license renewal of the Crow Butte uranium in situ recovery (ISR) project in Nebraska, the amendment of the Crow Butte license to allow ISR activities at the Marsland Expansion Area, the amendment of another ISR facility license to allow activities at the Kendrick Expansion Area in Wyoming, and the license renewal of the Honeywell uranium hexafluoride processing plant at the Metropolis Works Facility in Illinois. SC&A performed an acceptance review of the application materials, prepared requests for additional information, addressed scoping comments, conducted a site visit, drafted the EIS or EA, and made revisions over several rounds of review. SC&A also conducted the National Historic Preservation Act Section 106 review and provided hearing support as needed. SC&A provided expertise in engineering; land use; geology, soils, and seismology; water resources (surface and groundwater); ecological resources; climate, meteorology, and air quality; historic and cultural resources; demographics and socioeconomics; environmental justice; transportation; noise; visual and scenic resources; public and occupational health (radiological and nonradiological); hazardous materials and waste management; environmental monitoring; and mitigation.
- ✓ **Callaway Nuclear Power Plant License Renewal (E&E/NRC):** As a subcontractor to E&E, SC&A helped the NRC Office of Nuclear Reactor Regulation, Division of License Renewal, prepare the supplemental EIS for renewal of the operating license for Callaway Plant Unit 1 for an additional 20 years. SC&A worked with E&E to develop the site audit plan and conduct the site audit for the initial phase of the project. SC&A reviewed the plant environmental report against NRC guidance and identified site-specific information gaps. SC&A

# NEPA Services

developed a significant portion of the supplemental EIS and provided technical expertise related to the affected environment, including reactor and containment systems, radioactive waste management, nonradioactive waste management, plant operations and maintenance, power transmission system, cooling and auxiliary water systems, land use, air quality, water resources, and socioeconomics.

- ✓ **Supplemental EIS for Proposed Ward Valley Low-Level Waste Facility:** SC&A was responsible for preparing the draft and final supplemental EIS for the highly controversial and politically sensitive Ward Valley Low-Level Radioactive Waste Facility in San Bernardino County, California. This supplemental EIS focused on issues raised in prior NEPA reviews: possible migration of radionuclides and contamination of the Colorado River, feasibility of revegetation, re-analysis of the Southwestern Compact nuclear waste stream, alternative methods of disposal, Native American issues, environmental justice, desert tortoise issues, public health impacts, and concerns about the long-term liabilities of the host state (California) and solvency of the operator (U.S. Ecology). In addition, SC&A identified and proposed analyses for (1) the potential for contamination of local aquifers and (2) gross uncertainties about the source term (and the preliminary assessments of radiological impacts).
- ✓ **Review of Draft DOE Waste Management Programmatic EIS:** SC&A helped Analytical Services, the prime contractor, review preliminary drafts of this programmatic EIS and accompanying appendices (totaling about 5,000 pages) for DOE's Office of NEPA Policy and Compliance. Assigned areas of review included:
  - Affected Environment
  - Restoration Sensitivity Analysis
  - Transuranic Waste
  - High-Level Waste
  - Human Health Risk
  - Transportation
  - Treatment, Storage, and Disposal Facility Accidents
  - Selected Site Summaries
  - Modeling

SC&A reviewers identified, and provided suggestions for correction of, many problems in the technical analyses, NEPA compliance, and the organization and presentation of material. This review resulted in a completely rewritten and restructured draft document, presenting technically correct and objective analyses in shorter and more coherent form.

- ✓ **Additional Experience:** SC&A or SC&A staff have supported the following other efforts:
  - EIS for Decommissioning of the West Valley Demonstration Project (DOE/EIS-0226)
  - EIS for the Treatment and Management of Sodium Bonded Spent Nuclear Fuel (DOE/EIS-0306)
  - EIS for the Production of Tritium in a Commercial Light Water Reactor (DOE/EIS-0288)
  - EIS on Management of Certain Plutonium Residues and Scrub Allow Stored at the Rocky Flats Environmental Technology Site

# NEPA Services

- (DOE/EIS-0277), as well as the amended Record of Decision and associated communication plan
- EIS on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (DOE/EIS-0218), as well as the mitigation plan and communication plan
- Draft DOE Waste Management Programmatic EIS
- Draft EIS for Combined Licenses for Levy Nuclear Plant Units 1 and 2 (NUREG-1941)
- Draft EIS for the licensing of Florida Power and Light Turkey Point Nuclear Generating Units 6 and 7
- Generic EIS (GEIS) for the NRC rulemaking on radiological criteria for decommissioning (NUREG-1496)
- GEIS for the Use of Recycled Plutonium in Mixed-Oxide Fuel in Light-Water Reactors (NUREG-0002)
- Generic EA for license renewal of nuclear power plants (NUREG-1437), on behalf of the Nuclear Management and Resources Council for NRC consideration
- EIS support for radionuclide National Emission Standards for Hazardous Air Pollutants (EPA 520/1-89-00)
- GEIS for the High-Level Waste Repository (DOE/EIS-0046)
- GEIS on uranium milling (NUREG-0706)
- EIS for the decommissioning of Sequoyah Fuels Corporation Facility
- EIS for the proposed National Enrichment Facility in Lee County, NM (NUREG-1790)
- EIS for the proposed National Enrichment Facility in Homer, LA (NUREG-1484)
- EIS for the Hanford Site solid (radioactive and hazardous) waste program

# Nuclear Safety and Radiological Sciences

## Overview of Capability



Since our founding in 1981, SC&A has served government and industry with nuclear and radiological expertise. SC&A is nationally recognized for our ability to assess the potential environmental and public health impacts of radioactive material and ionizing radiation in the workplace and the environment. Our staff of nuclear physicists, nuclear engineers and chemists, health physicists (including Certified Health Physicists (CHPs)), and public health and safety professionals provide the full range of radiological assessment services. SC&A radiochemists, scientists, engineers, Radiation Safety Officers, and Nuclear Quality Assurance-1 (NQA-1) trained auditors understand all types of radioactive and hazardous wastes, their characterization techniques, and their governing regulations, specifically, high-level radioactive waste, spent nuclear fuel, remote-handled and contact-handled transuranic waste, low-level radioactive waste, naturally occurring radioactive materials/technologically enhanced radioactive materials (NORM/TENORM), 10 CFR Part 194, and the U.S. Department of Energy's (DOE's) Waste Isolation Pilot Plant Waste Acceptance Criteria). SC&A health physicists have also reconstructed radiation doses to workers at DOE and Atomic Weapons Employer facilities.

SC&A also inspects and approves systems and processes to assay radioactive and hazardous wastes; audits radioactive waste packaging procedures for regulatory compliance; analyzes radionuclide transport; supports technical analyses for rulemaking; models seismic events, climate change, potential flooding, and precipitation effects; models waste package and shield degradation; assesses waste form degradation and radionuclide release; and inspects waste-generating, processing, and storage systems and sites.

## Capabilities

- ✓ Dose Assessment and Health Effects
- ✓ Multimedia Pathway Modeling
- ✓ Nuclear Engineering
- ✓ Nuclear Licensing and Radiological Analysis
- ✓ [Occupational Health and Safety](#)
- ✓ Radioecological Analysis
- ✓ [Remediation, Decommissioning, and Outage Support](#)
- ✓ Waste Management Facility Performance Assessment
- ✓ NORM/TENORM Surveys, Assessments, and Facility Audits

## Selected Examples of Clients Served

- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ Centers for Disease Control and Prevention
- ✓ U.S. Federal Aviation Administration
- ✓ U.S. Federal Emergency Management Agency
- ✓ U.S. Nuclear Regulatory Commission
- ✓ Utah Department of Environmental Quality

# Nuclear Safety and Radiological Sciences

## Examples of SC&A Projects and Corporate Experience

- ✓ **Safety Review Planning (NRC):** SC&A is helping the U.S. Nuclear Regulatory Commission (NRC) Office of Nuclear Material Safety and Safeguards update Standard Review Plans (SRPs) related to the review of spent fuel storage and transportation applications. SC&A evaluated the feasibility of combining the SRPs for spent fuel dry storage facilities and systems at a general license facility into a single “storage” guidance document. Similarly, SC&A evaluated the feasibility of consolidating the SRPs on transportation packages for radioactive material and spent nuclear fuel. The feasibility analysis considered the complexity of the current documents, the amount of updating required, and whether the information in the different documents could be combined in an efficient and understandable manner. The wide range of expertise we used included structural, criticality, shielding, materials, dose assessment, radiation protection, containment/confinement evaluations, seismology, and operational aspects. SC&A completed a draft combined spent fuel storage SRP that the NRC staff has reviewed and issued for public comment (NUREG-2215, *Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities*). SC&A will assist with addressing public comments and finalization of NUREG-2215. SC&A also developed a draft combined transportation SRP (to be designated NUREG-2216) that is currently under NRC review prior to issuance for public comment.
- ✓ **NORM/TENORM Surveys, Assessments, and Facility Audits:** SC&A provides radiological surveys, assessments, and facility audits for government and private industries worldwide. Our regulatory compliance experts maintain current expertise in State-specific and federal regulations on NORM/TENORM and are routinely called upon by private industry to perform compliance audits. Current work includes assessment surveys and release surveys on equipment, facilities, and land for unrestricted use. We regularly provide clients with guidance on Department of Transportation shipping regulations for TENORM. Our staff also provide Radiation Safety Officer services for outages at plants and refineries.
- ✓ **Assessing Impacts of Iodine-131 Treatments (NRC):** The NRC’s Office of Nuclear Regulatory Research awarded SC&A a technical support contract to determine if the release criteria of 10 CFR 35.75 adequately protect public health and safety. The NRC asked us to ascertain the prevalence of patients treated with I-131 staying in locations other than their homes directly following treatment and to determine potential exposures to the public. SC&A performed these studies from September 2014 through September 2016, when the NRC issued a stop-work order due to insufficient agency funding and satisfaction that it had already obtained sufficient information to develop a final recommendation to the Commission. The SC&A team included several PhDs and CHPs, an MD in Nuclear Medicine, a member of the Medical Physics faculty of Columbia University, and the Radiation Safety Officers of Columbia University and the Penn State Hershey Medical Center. The team developed surveys and analyzed data for measuring actual exposures to the general public in cases where radiological exposure and contamination data can be collected and in cases where it cannot.
- ✓ **Compliance Certification of WIPP (EPA):** SC&A provides high-level technical assistance to the U.S. Environmental Protection Agency (EPA) Office of Radiation and Indoor Air in identifying and resolving outstanding issues related to the recertification requirements of DOE’s operation of the Waste Isolation Pilot Plant (WIPP), as mandated in 40 CFR Parts 191 and 194 and the WIPP Land Withdrawal Act (LWA). The WIPP is located in southeastern New Mexico near Carlsbad, and DOE operates it as a deep geologic repository for the disposal of defense-related mixed and non-mixed transuranic (plutonium-bearing or TRU) wastes. SC&A’s work involves actinide chemistry, including changes to modeling actinide solubility incorporated into the chemistry database, water balance, colloid and ligand-

# Nuclear Safety and Radiological Sciences

related issues in the repository. The LWA requires the EPA to recertify the WIPP every 5 years after the initial certification, and SC&A supports the EPA in assessing the programmatic changes, peer reviews, laboratory research, and conditions of the underground disposal system that could alter the basis of the EPA's certification of the WIPP's compliance. This work takes the form of the WIPP Performance Assessment, which involves execution of groundwater and geochemical computer modeling and evaluation of the supporting input parameters.

- ✓ **WIPP TRU Waste Characterization (EPA):** SC&A supports the EPA's baseline approval of all DOE sites that characterize TRU wastes for the WIPP. SC&A technical personnel are nationally recognized experts in current waste characterization techniques such as nondestructive assay and nondestructive examination, and they inspect all DOE sites that generate TRU wastes for the WIPP. SC&A inspection teams typically spend a week at each site and evaluate all aspects of the site's TRU waste characterization program. SC&A's reports provide the technical basis for the EPA's approval of each site's TRU waste characterization program for both contact-handled and remote-handled TRU wastes. Since 1996, SC&A personnel have inspected and ultimately approved all the DOE characterization facilities that ship wastes to WIPP, including the Rocky Flats and Savannah River sites and the Idaho, Oak Ridge, Lawrence Livermore, Los Alamos, and Argonne National Laboratories.
- ✓ **Technical Support for the Advisory Board on Radiation and Worker Health's Review of the NIOSH Dose Reconstruction Program (NIOSH):** SC&A's contract with the National Institute for Occupational Safety and Health (NIOSH) is to assist the Advisory Board in the fulfillment of its oversight mission under legislation enacted to compensate employees who developed a listed cancer and worked at certain DOE and Atomic Weapons Employer facilities. SC&A evaluates NIOSH's technical work and worker outreach activities for the Advisory Board. To accomplish this, SC&A reviews all relevant DOE nuclear site environmental, operational, and safety documents and data, including DOE site operations reports, nuclear facility designs, and documentation of emissions and releases. SC&A audits the reconstructed claimant doses prepared by another contractor. Specifically, SC&A reviews environmental radiological surveillance programs (i.e., radiological analysis of air and soil samples and measurements of external gamma radiation); reviews data characterizing airborne radionuclide emissions and the models used to simulate atmospheric transport and deposition; reviews facilities operations and historical incidents and accidents; and conducts the assessment of the radiological exposures of DOE and contractor workers on site. SC&A also interviews current and former DOE and contractor workers at each site to ensure our full understanding of the site operational issues and the exposure pathways and scenarios. As part of this contract, SC&A participates in all full Advisory Board and subcommittee meetings, work group meetings, and periodic meetings with Congressional staffers.
- ✓ **Review of Utah Shallow Land Disposal Facility for Depleted Uranium (State of Utah):** SC&A is assisting the State of Utah Department of Environmental Quality in evaluating a performance assessment prepared by the site operator for the proposed disposal of depleted uranium oxide at a commercial disposal facility in Clive, Utah. SC&A acts as an extension of the regulatory agency—interpreting regulations and evaluating licensing submittals against them, preparing requests for additional information (interrogatories), and participating in outreach meetings with the public and the media. SC&A performed a detailed review of a highly technical licensing submittal, focusing on its technical adequacy, the appropriateness of data and models used, and the treatment of uncertainty.

# Nuclear Safety and Radiological Sciences

- ✓ **Impact of Reduced Dose Limits Study (NRC):** SC&A issued a draft report for the NRC Office of Nuclear Regulatory Research assessing the potential impacts of reducing the 10 CFR Part 20 dose limits to the values in International Commission on Radiological Protection Publication No. 103. SC&A conducted a thorough review of occupational exposures received in recent years by workers associated with NRC-licensed facilities, as well as Agreement State licensees and state-affiliated registrants of radiation-emitting instrumentation. SC&A captured dosimetry records across all categories of licensees (such as medical, nuclear power, fuel cycle, industrial, research, and academic). The draft report presents tables of exposures and makes several conclusions about exposure levels by category and the effects of the proposed regulatory change on the operations of the medical center.
- ✓ **Analysis of the Use of Potassium Iodide (KI) in the Event of a Nuclear Accident (NRC):** Based on guidance from the Federal Emergency Management Agency and the NRC, state and local health authorities have the option to use KI for its thyroid-blocking properties to protect the general public in the event of a radioactive release. After the Chernobyl incident, the NRC sought to reexamine this policy and directed SC&A to perform a comprehensive value-impact analysis using the most current technical information and experience available nationally and internationally. SC&A was also tasked to include a more comprehensive and defensible evaluation of the monetary values assigned to thyroid health effects in this value-impact analysis. SC&A assessed offsite doses and risks using MACCS Version 1.5, NUREG-1150 data, and thyroid risk coefficients.
- ✓ **Recycling of Scrap Metal from Nuclear Facilities (EPA):** The EPA evaluated the feasibility of establishing risk-based standards for the safe recycling of scrap metal generated from the operations, decommissioning, and cleanup of federal government and NRC licensee facilities. SC&A supported these efforts by reviewing risk analyses performed by other agencies, analyzing normalized doses from personal devices, evaluating the impact of the proposed recycling on sensitive industries, performing cost benefit analyses and strontium-90 investigations, responding to stakeholder questions and concerns, preparing issues and options papers, reviewing and summarizing public comments on the associated technical support document (TSD), and revising the TSD to include the most recent information.
- ✓ **Technical Basis for Clearance of Materials and Equipment (NRC):** The NRC investigated the need for a clearance rule that would establish numerical criteria for the clearance of material from licensed facilities. SC&A was asked to prepare an inventory report, a collective dose report, and a cost report. The inventory report consists of a compendium of information characterizing the types, quantities, and physical and radiological characteristics of all material, equipment, tools, and wastes that may be candidates for clearance from nuclear facilities during operations and at the time of decommissioning and license termination. This report establishes a baseline for use in evaluating the costs and benefits of alternative rulemaking strategies for clearance.
- ✓ **Review of Ionizing Radiation Levels Around Radar Transmitters (FAA):** The Federal Aviation Administration (FAA) was concerned about x-rays produced by high voltages and currents applied across microwave tube filaments. SC&A was asked to review the results of prior radiation surveys, identify trends, determine whether additional surveys should be conducted routinely, and make specific recommendations about the necessity for an ongoing radiation monitoring program, personnel safety and training, and development of new or revisions to existing administrative procedures.

# Occupational Health and Safety

## Overview of Capability



Since 1981, SC&A has assessed the potential environmental and public health impacts of radioactive material in the workplace. Our nuclear physicists, nuclear engineers, health physicists, and public health and safety professionals provide a full range of services. For example, in the area of occupational health, SC&A helps our clients assess worker doses and health effects in support of new license applications and license renewals, performs “as low as is reasonably achievable” (ALARA) analyses and design/procedure reviews, collects and reviews worker radiation exposure records, and performs historic worker dose reconstructions in support of worker compensation programs.

In the area of occupational safety support services, SC&A reviews safety design for nuclear facility applications and license renewals in accordance with all federal and state radiation protection standards, designs to minimize the potential for serious radiological accidents, performs consequence analysis in support of nuclear facility applications and emergency planning, and performs probabilistic risk assessments in support of severe accident analyses for nuclear power plants and fuel cycle facilities, among other services

## Capabilities

- ✓ Worker Dose and Health Assessments
- ✓ ALARA Analysis
- ✓ Risk and Safety Assessments
- ✓ Long-Term/Historical Assessment and Modeling
- ✓ Safety Design, Facility Applications, and License Renewal Support
- ✓ Incident Assessment and Lessons Learned Reporting
- ✓ Accident/Incident Prevention Planning
- ✓ NORM/TENORM and Radiation Safety Officer Training

### Selected Examples of Clients Served

- ✓ Entergy Operations, Inc.
- ✓ Manufacturing Sciences Corporation
- ✓ National Institute for Occupational Safety and Health
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Nuclear Regulatory Commission

# Occupational Health & Safety

## Examples of SC&A Projects and Corporate Experience

- ✓ **Technical Support for the Advisory Board on Radiation and Worker Health's Review of the NIOSH Dose Reconstruction Program:** SC&A's contract with the National Institute for Occupational Safety and Health (NIOSH) is to assist the Advisory Board in the fulfillment of its oversight mission under legislation enacted to compensate employees who developed a listed cancer and worked at certain U.S. Department of Energy (DOE) and Atomic Weapons Employer facilities. SC&A evaluates NIOSH's technical work and worker outreach activities for the Advisory Board. To accomplish this, SC&A reviews all relevant DOE nuclear site environmental, operational, and safety documents and data, including DOE site operations reports, nuclear facility designs, and documentation of emissions and releases. SC&A audits the reconstructed claimant doses prepared by another contractor. Specifically, SC&A reviews environmental radiological surveillance programs (i.e., radiological analysis of air and soil samples and measurements of external gamma radiation); reviews data characterizing airborne radionuclide emissions and the models used to simulate atmospheric transport and deposition; reviews facilities operations and historical incidents and accidents; and conducts the assessment of the radiological exposures of DOE and contractor workers on site. SC&A also interviews current and former DOE and contractor workers at each site to ensure our full understanding of the site operational issues and the exposure pathways and scenarios. As part of this contract, SC&A participates in all full Advisory Board and subcommittee meetings, working group meetings, and periodic meetings with Congressional staffers.
- ✓ **NORM/TENORM and Radiation Safety Officer Training:** SC&A developed and offers in-person and online training to oil and gas industry workers on naturally occurring radioactive material (NORM) and technologically enhanced naturally occurring radioactive material (TENORM). The courses are applicable to both new employees with little education and experienced and educated health and safety professionals. In-person courses include NORM Awareness, NORM/TENORM Surveyor, and NORM Radiation Safety Officer. They meet various regulatory training requirements and include recent and up-to-date NORM/TENORM information, such as new regulatory guidance, new types of survey instruments, NORM/TENORM associated with fracking operations, and a hands-on NORM surveying exercise. The NORM Awareness course is also available in an on-demand online version at <https://scainc.learnupon.com/store>.
- ✓ **Health Physics Consulting Services:** SC&A has provided health physics consulting services to many facilities licensed by the U.S. Nuclear Regulatory Commission (NRC) and Agreement States for assessing compliance with the requirements of 10 CFR Parts 19, 20, 30, and 61 or their Agreement State counterparts. These services have included the inspection of facility activities for the possession, use, storage, and disposal of radioactive materials. The scope of services also included revising radiation safety programs to meet the requirements of 10 CFR Part 20 and evaluating long-term low-level radioactive waste storage options. SC&A reviewed personnel dosimetry results, radiation protection practices, bioassay program results, ALARA programs, air and waterborne releases, the conduct of radiological surveys, calibration and maintenance of radiation survey and analytical equipment, radioactive materials inventory and tracking systems, waste collection, storage and disposal practices, and waste minimization programs. SC&A also participated in radiation safety committee meetings, performed regulatory analyses, and assisted in preparing and responding to NRC/Agreement State audits.
- ✓ **EPA Radiation Safety and Health Protection Program (EPA):** The U.S. Environmental Protection Agency (EPA) has staff assigned to permitting, remediation, and compliance activities at radioactively contaminated sites, where they face potential radiation exposure or contamination. Therefore, the EPA developed and implemented a Radiation Safety and Health Protection Program, for which SC&A provided support from the program's inception. The program uses written policies, programs, plans, practices, and methods, as well as a

# Occupational Health & Safety

Radiation Safety Information Management System (RADSIMS), to centrally administer and oversee individual program components. These components include training and education, monitoring and dosimetry, medical/health physics consultation, and quality assurance. SC&A prepared more than 30 documents to support the development of these individual program components.

- ✓ **Radiological Assessment of National Conversion Pilot Project (MSC):** Manufacturing Sciences Corporation (MSC) had a cooperative agreement with DOE to conduct the National Conversion Pilot Project (NCPP) at Rocky Flats. Stage III of the NCPP consisted of the restricted recycling of radioactive scrap metal from the cleanup of Rocky Flats and other DOE facilities. MSC contracted SC&A to assess the potential radiological impacts of the Stage III operation on the occupationally exposed workers and members of the general public. SC&A reviewed all applicable rules and regulations, identified likely sources of radioactive scrap metal that would be recycled by the NCPP, and evaluated the potential levels of radioactive contamination. SC&A then prepared a detailed time and motion study on personnel who would be performing the operation and formulated a set of exposure scenarios that depicted all relevant activities associated with each step of the recycling process. SC&A developed and refined models to assess both collective and individual doses and risks for workers and members of the public from the NCPP, fugitive emissions from the Rocky Flats Environmental Technology Site, and transportation of radioactive scrap metal.
- ✓ **Control Room Habitability Following a Toxic Gas Release Accident (Entergy):** Entergy Operations, Inc. planned to modify the Broad Range Toxic Gas Detector System that monitors the control room air intake at Waterford Steam Electric Station Unit 3 by replacing the photoionization detectors with ones that use a Fast-Fourier transform infrared spectrometer. SC&A, as a subcontractor to Raytheon Engineers & Constructors, was asked to assess the impact of hypothetical accidents involving the release of volatile toxic chemicals from stationary and transient sources to determine which of them posed hazards to control room habitability. SC&A evaluated approximately 600 separate sources of toxic materials, about 150 of which required detailed analyses. Detailed analyses of control room habitability following a hypothetical toxic chemical release were performed with the TOXCHM computer program, which is an implementation of and an extension to the methodology presented in NUREG-0570. Based on these analyses, SC&A provided Entergy with a list of chemicals that pose a potential hazard to control room habitability. SC&A also evaluated the level of protection afforded by the new system in detecting these chemicals under different assumed sets of operating parameters. In a second phase of the project, SC&A reassessed the performance of the existing dedicated chlorine monitors and recommended an alarm setpoint that assures full compliance with NRC regulatory guidance. All calculations were documented to nuclear safety-related standards to allow Entergy to use them in the development of its 10 CFR 50.59 evaluation and in support of potential updates to the final safety analysis report.

# Regulation Development and Litigation Support

## Overview of Capability



SC&A has extensive regulatory experience helping agencies develop the technical basis for new or revised regulations, develop the regulatory package, conduct public hearings, organize and respond to public comments, and manage litigation. For example, SC&A (EC/R) has more than 25 years of providing support to the U.S. Environmental Protection Agency (EPA) Office of Air Quality Planning and Standards in the development of standards for more than 40 major source categories for maximum achievable control technologies (MACT), more than 20 source categories for residual risk, and 20 area source categories (generally available control technology). In addition, SC&A has supported the EPA in several rulemakings related to New Source Review, New Source Performance Standards (NSPS), volatile organic compounds, control of residual radioactive material at uranium processing and depository sites, and environmental protection radiation standards for nuclear power operations. Support has included technical support, regulatory package development, preparation of comment summary and response documents, docket support, public hearing support, preparation of lists for judicial record certification, legislative history research, and litigation support. SC&A's experience and expertise go beyond these primarily technical projects, as we have also supported the EPA in defining and implementing these programs. In the area source program, SC&A staff supported the area source listing notices; assessed impacts of area source listing decisions and regulatory formats; and developed a Quality Assurance Project Plan template and example for an area source project.

## Capabilities

- ✓ Data Collection – Section 114 Questionnaires/Information Collection Requests (ICRs) (Including Preparation of OMB I-83 Forms, ICR Worksheet/Supporting Statements), Site Visits, and Surveys
- ✓ Preliminary and Detailed Analytical Blue Prints
- ✓ Development and Analysis of Regulatory Options
- ✓ Life-Cycle Docket Support
- ✓ Proposal and Promulgation of *Federal Register* Preamble/Regulation Language and Packages
- ✓ Public Hearing and Stakeholder Meeting Support
- ✓ Intra-Agency Review Support – Early Guidance, Options Selection, Work Group Review, Senior Management Review, Final Agency Review
- ✓ Inter-Agency Review Support – Office of Management and Budget (OMB) Briefing Materials, Addressing OMB and Other Inter-Agency Review Comments
- ✓ Judicial Review Support – Response to Petitioner Briefs, Response to Office of the General Counsel Counter Briefs, Response to Petitioner Counter Briefs, Preparation of Administrative Record for Certification

# Regulation Development and Litigation Support

## Examples of SC&A Projects and Corporate Experience

SC&A staff have supported the EPA from pre-proposal to post-promulgation activities for several programs and many years. Support has included data collection, preparing draft analytical blueprints, preparing draft regulatory analysis options, docket support, preparing draft and promulgation *Federal Register* packages, public hearing and stakeholder support, intra- and inter-agency support, and judicial review support. Although some basic regulatory process activities are common to all the EPA rulemakings we have supported, each program has different goals and analyses. Some of our more recent experiences with these programs include the following:

- ✓ **Risk and Technology Review (EPA):** SC&A (EC/R) has supported the EPA in data gathering, technical review, and development of regulatory alternatives for more than 20 major source categories as part of the EPA's Risk and Technology Review (RTR) program. For each category assigned, SC&A evaluated the risks remaining after the application of MACT standards ("residual risks") to help the EPA determine if additional standards are needed to reduce residual risks, as required by 40 CFR 112(f). For the technology review required by 40 CFR 112(d)(6), SC&A evaluated whether there had been advancements in available practices, processes, and control technologies that warranted revision of the MACT standard. SC&A prepared risk modeling files for each category; identified control options to achieve additional risk reduction; and estimated and documented the emission reductions, costs, and other impacts of each option. SC&A is currently supporting the EPA's conduct of an RTR for the offsite waste recovery operations source category.
- ✓ **Residential Wood Heaters NSPS (EPA):** SC&A (EC/R) provided support to the EPA's Office of Air Quality Planning and Standards, Outreach and Information Division, for the residential wood heater NSPS from proposal to final rule promulgation (80 FR 13671; March 16, 2015) and is continuing to provide ongoing post-promulgation support. Rulemaking support has included preparing background technical support documents for the rule (including estimating future baseline and post-control emissions and potential cost impacts to manufacturers), summarizing EPA and stakeholder meetings, helping to draft the preamble and regulatory text for both the proposed and final rule, revising the rule and supporting documents in response to EPA and OMB review, public hearing support, docket preparation, preparing the comment summaries, and drafting EPA responses to many public comments in the response to comments document. Post-promulgation support has included the preparation of a small entity compliance guide; drafting rule corrections for a direct final rule; litigation support; stakeholder meeting support; and assisting the EPA with responses to questions posed by the press, legislators, stakeholders, and concerned citizens.
- ✓ **Site Remediation MACT Standards (EPA):** SC&A is currently supporting the EPA's revision of the MACT standards for the site remediation source category in response to a petition for reconsideration of the original 2003 MACT standards for the source category. The revisions entail removing exemptions for remediation conducted under the Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and involve potential overlap and disagreement between existing provisions in the Clean Air Act and CERCLA. Our staff retrieved and analyzed data from the RCRA and Superfund programs; prepared documentation of emissions, potential emission reductions, and cost analyses; developed the preamble and revised regulatory language for the notice of proposed rulemaking; prepared the related information collection request; and summarized comments on the proposed amendments submitted to the docket.

# Regulation Development and Litigation Support

- ✓ **Support for Methane Regulations for the Oil and Natural Gas Industry (EPA):** SC&A has been the EPA's primary support contractor for development of air regulations for the oil and natural gas sector, beginning with the data gathering and analysis that led up to the 2011 proposed NSPS for criteria pollutants and National Emissions Standard for Hazardous Air Pollutants (NESHAP). Following the 2012 final rules and subsequent rule reconsideration efforts, SC&A supported development of the 2015 proposed and 2016 final NSPS that regulates greenhouse gas emissions (in the form of methane) from the oil and natural gas sector. SC&A prepared draft regulatory notices for the proposed and final NSPS, as well as supporting technical documents and the response-to-comments document. SC&A's support also included providing technical information for use in intra-agency and inter-agency (OMB) briefings and presentations and providing technical support in responding to intra-agency and OMB comments on the regulatory package.
- ✓ **Title V Operating Permit and New Source Review Program Support (EPA):** SC&A (EC/R) has assisted the EPA on many regulatory development projects for the Title V Operating Permit and New Source Review programs. Recent activities have primarily focused on greenhouse gas regulation under the Tailoring Rule and succeeding Step 3 Rule, as well as data gathering and analysis in support of potential permit-streamlining approaches and a potential significance level for prevention-of-significant-deterioration permitting. SC&A (EC/R) has also provided support in the development of the proposal and promulgation of rules for Flexible Air Permits. More generally, these support projects have encompassed all stages of rulemaking development and employed all our listed capabilities.
- ✓ **SPPD Regulatory Development Procedures Manual (EPA):** SC&A (EC/R) helped the EPA develop a regulatory development procedures manual for the Sector Policies and Programs Division (SPPD). The purpose of the manual was to consolidate all regulatory development information and resources in the manual so that it could be used as a resource for new employees and others unfamiliar with SPPD's regulatory procedures.
- ✓ **EPA Reference Test Methods and Procedures:** SC&A (EC/R) has supported the EPA's preparation of draft rulemaking notices and supporting documentation for new, updated, and corrected EPA Reference Test Methods and procedures. Examples include the following:
  - Supported the EPA's development of the proposal and promulgation *Federal Register* preamble and Performance Specification 18 and Procedure 6 for HCl continuous emissions monitoring system (CEMS). SC&A staff also provided support to the EPA in the preparation of the draft comment response document that summarized and collated public comments on the proposed specification/procedure.
  - Supported the EPA's development of a proposal *Federal Register* preamble and regulatory amendment package for 40 CFR Part 63, Appendix A, Test Method 301, for the field validation of pollutant measurement methods for various waste media.
  - Supported the EPA in identifying 40 CFR Part 60, 61, and 63 test methods and procedures that should be amended and suggested amendatory language, based on public feedback and identified errors.

## Regulation Development and Litigation Support

- ✓ **Public Comment Summary and Response Documents:** SC&A personnel have extensive experience in organizing and summarizing public comments. *Federal Register* actions have resulted in the need to manage from less than a hundred to approximately 900 thousand comments. SC&A tailors the comment management system/methodology based on the type of action, scope and magnitude of comments, and the client's desired end point (e.g., project-specific database and spreadsheet-based systems, Web-based comment and response systems, summarizing comments within a prepared outline in a shared Microsoft Word document in SharePoint). In addition to our experience using several comment management systems, SC&A has also developed a Web-based comment and information management system that allows secure access and simultaneous use by multiple approved users. The following are a few examples of recent comment/response support:
  - SC&A was the lead in excerpting, summarizing, and responding to comments received on the proposed Oil and Natural Gas Sector NSPS (70 FR 56593; September 18, 2015) and draft "Oil and Natural Gas Industry Control Techniques" document (Notice of Availability, 80 FR 56577; September 18, 2015). More than 900,000 public comments were received, including 2,480 unique comment letters. We used a commercially available comment/response system for this effort.
  - SC&A provided technical support in excerpting and summarizing public comments on the EPA's proposed Clean Power Plan (or emission guidelines for existing fossil fuel electric utility steam generating units) using a commercially available comment/response system. The EPA received more than 4.3 million public comments on this rulemaking.
  - SC&A provided support to the EPA in excerpting and summarizing comments on the EPA's "Protection of Visibility: Amendments to Requirements for State Plans" (or Regional Haze Rule Revisions, 81 FR 43181, July 1, 2016), which received more than 180,000 public comments. SC&A provided technical support to the EPA in organizing, summarizing, and analyzing public comments received in the EPA Docket for Executive Order 13777, Enforcing the Regulatory Reform Agenda. The purpose of this project was to vet the comments submitted in response to Executive Order 13777 in a manner that would allow each EPA office to quickly focus on the comments and recommendations that pertain to regulations, policies, and programs for which they are responsible. The *Federal Register* request for feedback on the Executive Order 13777 received more than 400,000 comments.

# Remediation Services

## Overview of Capability



SC&A has provided remediation and decommissioning support for projects as small as the decontamination of a pig trap to as large as remediation of 400 acres. The company's health physicists, hydrogeologists, geochemists, radiochemists, geographic information system (GIS) specialists, risk assessment specialists, engineers, and public outreach specialists provide the full range of remediation and decommissioning services. SC&A employs nationally recognized experts in naturally occurring radioactive material/technologically enhanced naturally occurring radioactive material (NORM/TENORM) who have provided remediation and training services to both government and industry. SC&A also recently acquired Professional Radiation Consulting (PRC), which will expand SC&A's offerings in environmental remediation analysis, health physics, radiation monitoring, and remediation training.

## Capabilities

- ✓ NORM/TENORM Training, Surveys, Assessments, and Facility Audits
- ✓ Outage Support Involving Equipment and Facilities Contaminated with NORM/TENORM
- ✓ Planning, Scoping, and Designing Characterization, Remediation Support, and Final Status Surveys for Industrial Sites
- ✓ Historical Site Assessments
- ✓ Quality Assurance/Quality Control in Data Acquisition and Analysis
- ✓ Conducting Surveys
- ✓ Implementing EPA- and State-Approved Laboratory Methods and Instrumentation and Interfacing with Radiation Laboratories
- ✓ Developing Remediation Management Plans, Manuals, and Training
- ✓ Testing Statistical Hypotheses and Interpreting Statistical Data
- ✓ Documentation and Defense

### Selected Examples of Clients Served

- ✓ BBL Environmental Services
- ✓ DPRA
- ✓ EA Engineering
- ✓ Republic of the Marshall Islands
- ✓ SAIC
- ✓ U.S. Army Corps of Engineers
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Nuclear Regulatory Commission

# Remediation Services

## Examples of SC&A Projects and Corporate Experience

- ✓ **MARSSIM Development:** SC&A supported the development of the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM). The U.S. Environmental Protection Agency (EPA) Office of Radiation and Indoor Air, the U.S. Nuclear Regulatory Commission (NRC), U.S. Department of Energy (DOE), and U.S. Department of Defense worked together to develop a single federal guidance document for planning, implementing, and evaluating surveys used to demonstrate compliance with regulatory limits. SC&A provided support to the EPA and the MARSSIM Work Group throughout the development of the manual and its revisions. Other responsibilities included preparing MARSSIM Work Group meeting minutes to document the development of the manual, technical review of all sections of the manual, final formatting, and production of a camera-ready original for printing. SC&A supported the preparation and internal review of two additional drafts of the document based on public and peer-review comments.
- ✓ **MARSSIM Training:** SC&A provided technical and logistical support for the MARSSIM training courses. The 3-day courses focused on the use of MARSSIM, particularly the development of capabilities and proficiency in using the MARSSIM methodology. SC&A was responsible for organizing each course, providing training materials, recording comments, providing summaries of student evaluations, recommending improvements to the course, and incorporating approved modifications to the course materials. SC&A conducted a similar training process for the *Multi-Agency Radiation Survey and Assessment of Materials and Equipment Manual* (MARSAME).
- ✓ **Characterization of Contaminated Industrial Site (DPRA):** SC&A assisted DPRA in the characterization of a site in New Jersey. The site formerly housed a facility that extracted titanium dioxide from raw ilmenite ore. SC&A set up a scanning procedure to identify radioactive waste from the demolition of buildings on the site by scanning the waste before it was removed off site. With this procedure, debris with radiation content too high to be acceptable for offsite disposal or treatment could be separated and treated on site. To speed up the scanning process and improve documentation of scanning surveys, SC&A designed and built a scanning cart, which fed the output from two gamma detectors and a Global Positioning System (GPS) unit into a custom computer program that collected and recorded the data at 1-second intervals.
- ✓ **Characterization of Building 23 at Curtis Bay Depot (EA Engineering):** EA Engineering contracted SC&A to provide radiological health and safety monitoring for personnel involved in the cleanup of an industrial building still in use near Curtis Bay, Maryland. SC&A provided basic radiation safety training for all personnel, advised on levels and types of personal protective equipment (PPE), helped to develop a containment plan for cleanup, monitored levels of airborne radiation on each floor of the building, supervised cleanup personnel as they suited up to enter hot zones, assisted with the removal of PPE in the warm zone, scanned personnel for contamination before entering the cold zone, collected smears of various surfaces within the building (including equipment), supervised the use of thermoluminescent dosimetry badges and finger rings used to assess dose, counted samples for alpha and beta, assisted with a radiological survey of the building, answered questions about radiation and radiation safety from cleanup personnel and personnel involved in the day-to-day operation of the building, cleared equipment and materials or determined which items constituted hazardous waste, and provided information, labels, and necessary documents for the shipping of hazardous materials and waste.

# Remediation Services

- ✓ **Radiological Support for Remedial Investigation/Feasibility Study for W.R. Grace FUSRAP Site (EA Engineering):** SC&A supported EA Engineering with the radiological aspects of the Radioactive Waste Disposal Area of the W.R. Grace Formerly Utilized Sites Remedial Action Program (FUSRAP) site at Curtis Bay, Maryland. SC&A was responsible for the radiological sections of the Remedial Investigation Work Plan (including the Sampling and Analysis Plan, the Quality Assurance Project Plan, and the Site Safety and Health Plan), the Remedial Action Plan, the Record of Decision, Remedial Action Design Report, and the Community Relations Plan.
- ✓ **Final Status Survey Design, Implementation, and Analysis (BBL):** BBL Environmental Services contracted with SC&A to design, implement, and assess the results of a final status survey for a parcel of land in Hopewell, New Jersey. SC&A developed a final status survey plan to evaluate remediated land areas and to demonstrate compliance with the release criteria for radioactive materials outlined by the State of New Jersey.
- ✓ **Treatability Study for Soil Remediation Technologies for FUSRAP (SAIC):** Under contract to Science Applications International Corporation (SAIC), SC&A conducted an extensive treatability study on soils contaminated with naturally occurring radionuclides from the Maywood and Wayne FUSRAP sites. Soils representing material to be disposed of or treated at each of these sites were subjected to physical, chemical, and radiochemical testing to determine if treatment of the soils from these sites was technically and economically feasible.
- ✓ **Remediation Services for 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. SC&A performed MARSSIM radiological surveys for selected northern atolls to determine whether remediation is required or to certify that the islands comply with the cleanup criteria. SC&A also evaluated the northern atolls for polychlorinated biphenyls (PCB) contamination. SC&A collected soil, lagoon sediment, and fish and analyzed them for a broad range of PCB congeners and heavy metals.
- ✓ **Radiological Remediation Support at New Jersey Facilities:** In addition to the sites mentioned above, SC&A has provided radiological remediation support at the following sites in New Jersey: Magnesium Elecktron, ProLogis Teterboro, ProLogis Sumitomo, Nuodex, Inc. (Fords site), Agrico, BOMARC, and Callite Tungsten Facility.
- ✓ **Independent Evaluation of the Groundwater Pathway for a Baseline Risk Assessment (EPA):** As part of a remedial investigation/feasibility study for the Maxey Flats site, SC&A performed an EPA-sponsored independent evaluation of the groundwater pathway for the baseline risk assessment. Results of this groundwater modeling were incorporated into the Record of Decision. SC&A evaluated the offsite exposures associated with the “bathtub” effect and soil erosion and the onsite exposure pathways, including the trespasser, construction, and agriculture scenarios.
- ✓ **Groundwater Modeling for the WIPP (EPA):** On behalf of the EPA, SC&A conducted analyses designed to verify the modeling results obtained by DOE in its assessment of the long-term integrity of the Waste Isolation Pilot Plant (WIPP). These analyses included two- and three-dimensional modeling that involved multiphase flow and radionuclide transport through a fractured medium, at variable densities (i.e., brine) and under partially saturated conditions. SC&A also considered human intrusion, exercised the 13 major computer codes used in the performance assessment, and critiqued the methods used by DOE to develop the transmissivity fields needed to model groundwater flow.

## Remediation Services

- ✓ **Characterization of Groundwater Flow at Candidate High-Level Waste Repository Sites (DOE):** SC&A developed technical approaches for the characterization of the groundwater flow and radionuclide transport systems at three candidate high-level waste repository sites. The hydrogeologic systems at these sites included fractured basalt flows at Hanford, Washington, low-permeability salt beds in Deaf Smith County, Texas, and thick unsaturated deposits at Yucca Mountain, Nevada.
- ✓ **Evaluation of the Yucca Mountain Total Systems Performance Assessment (Clark County, NV):** Because of our experience in providing technical assistance to the EPA in its development of an environmental dose standard for a possible high-level waste repository at Yucca Mountain, Nevada, SC&A was selected by Clark County, Nevada, to perform an independent review of DOE's total systems performance assessment associated with the viability assessment of a repository at Yucca Mountain. SC&A's review attempted to determine whether the methods and information presented have the potential to produce results that are defensible under regulatory reviews. SC&A reviewed the technical factors that contribute to repository performance, including the flow and radionuclide transport in the unsaturated and saturated hydrologic regimes, the degradation of waste forms and waste packages, the thermal and geochemical environment near the packages, human uptake of radionuclides in the biosphere that result in radiation doses, and the computer codes used to produce the results.
- ✓ **EPA/DOE/NRC Joint Guidance Documents on the Selection of Groundwater Models:** SC&A wrote several EPA/DOE/NRC joint guidance documents to facilitate the selection and application of groundwater models at federal facilities, EPA sites, and potential low-level radioactive waste disposal sites. SC&A developed specific guidance as a function of (1) the phase in the remedial process, (2) the types and quantities of specific radionuclides, and (3) the critical geohydrologic features of the site. We also conducted a detailed review of selected one-, two-, and three-dimensional models to demonstrate the process recommended by the EPA for selecting models that support remedial decision-making under the Comprehensive Environmental Response, Compensation, and Liability Act and the Resource Conservation and Recovery Act.
- ✓ **Decommissioning Plan for EPA Laboratories at the University of Nevada, Las Vegas (UNLV):** SC&A helped the EPA plan for the decommissioning of its laboratory facilities at UNLV. This included developing an historical site assessment and decommissioning plan addressing the radiological conditions of the site for the first part of the decommissioning project. Our work included site characterization information, a remediation plan, and a site-specific cost estimate for decommissioning.

# Resiliency and Emergency Management Services

## Overview of Capability



SC&A provides technical and functional capabilities to support clients during all phases of the emergency management cycle (preparedness, prevention, response, recovery, and mitigation). With SC&A's deep scientific expertise, the company offers unique capabilities associated with weapons of mass destruction (WMD)/chemical, biological, radiological, and nuclear (CBRN) policy, program, and assessment support. SC&A has more than 30 years of experience in addressing emergency management radiological issues, such as conducting evaluations of policy to stockpile potassium iodide for public use, developing U.S. Environmental Protection Agency (EPA) Protective Action Guides (PAGs), examining the habitability of nuclear power plant control rooms, and training on radiological issues for first responders. SC&A evaluated Federal Emergency Management Agency (FEMA) Radiological Emergency Preparedness Program exercises, supported the EPA's Radiological Emergency Response Program and the Domestic Nuclear Detection Office's (DNDO's) Training, Exercise, and Assistance programs, and currently supports FEMA's implementation of CBRN programs, as examples.

## Capabilites

- ✓ Program and Mission Support
- ✓ Strategic, Program, and Operational Planning
- ✓ Continuity of Operations (COOP), Response, Mitigation, and Resiliency Planning
- ✓ Training and Exercises
- ✓ Crisis Communication
- ✓ Business Impact/Process and Risk Analysis
- ✓ Operations Center and Response Team Support
- ✓ Cadre Program Management
- ✓ CBRN Scientific and Technical Expertise
- ✓ Threat Response and Mitigation

### Selected Examples of Clients Served

- ✓ Centers for Disease Control and Prevention
- ✓ County of Santa Cruz, CA, Public Health Department
- ✓ Dallas/Ft. Worth International Airport
- ✓ Defense Advanced Research Projects Agency
- ✓ Federal Emergency Management Agency
- ✓ National Institute of Standards and Technology, Community Resilience Panel
- ✓ Northern Virginia Emergency Response System
- ✓ U.S. Department of Energy/National Nuclear Safety Administration
- ✓ U.S. Department of Homeland Security
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Occupational Safety and Health Administration

# Resiliency and Emergency Management Services

## Examples of SC&A Projects and Corporate Experience

- ✓ **Training, Exercise, and Program Assistance Support (DNDO):** SC&A supported the U.S. Department of Homeland Security (DHS) DNDO in implementing its primary mission to improve the Nation's capability to detect and report unauthorized attempts to import, possess, store, develop, or transport radiological/nuclear material for use against the Nation, and to further enhance this capability over time. SC&A helped DNDO engage, support, and promote state and local involvement and capability in detection with the goal of improving preparedness, response, recovery, and mitigation associated with nuclear risks and threats. SC&A's support was separated into three focus areas: state and local field training, exercise support at all levels of government, and programmatic assistance. SC&A supported more than 15 exercises, delivered 10 training events, and provided strategic planning and assessment support for DNDO's Assistance program.
- ✓ **CBRN Expertise and Technical Support Services (FEMA):** SC&A serves as prime contractor for this 3-year, ~\$10M contract. SC&A provides expertise and technical and analytical services to (1) assist the FEMA CBRN Office's response and recovery in developing CBRN policies, protocols, plans, and procedures during both crisis and consequence management phases of a CBRN response and (2) provide technical, program, and project management support for exercise development and execution. We deliver program planning and execution and capability enhancement projects related to the multi-agency Domestic Emergency Support Team (DEST), which includes, but is not necessary limited to, providing subject-matter experts to support training development and execution, exercise development and execution, and logistical and technical experience for the DEST program and to ensure mission readiness. Support includes both headquarters and field deployment, training, and exercise assistance; providing strategic, mission, tactical, and operational support related to the CBRN Office, programs, and initiatives; and other efforts related to FEMA's and the CBRN Office's mission. In addition, SC&A supports the ongoing engagement of five inter-agency working groups and supports CBRN in conceiving, developing, training, managing, and implementing the Radiological Operations Support Specialist (ROSS) Cadre program.
- ✓ **Regulation, Evaluation, and Technical Support (EPA):** The EPA Office of Emergency Management (OEM) works with other EPA partners, federal agencies, state and local response agencies, industry, and other related stakeholders to prevent accidents and maintain superior response capabilities. As directed by OEM and the prime contractor, SC&A provides technical, analytical, and regulatory support; meeting and conference support; training and exercise support; outreach support; program evaluation; planning and administration support; and other related mission support requirements.
- ✓ **Technical, Engineering, and Programmatic Support Services (DOE and NNSA):** SC&A was recently awarded a 5-year multi-award Blanket Purchase Agreement to provide a broad range of services related to science and energy, nuclear security, and management and performance related to U.S. Department of Energy (DOE) and National Nuclear Security Administration (NNSA) missions. The vehicle can be accessed by 29 separate DOE and NNSA program offices, regional offices, laboratories, and other Departmental elements. The scope of the contract includes more than 167 tasks under seven functional/technical areas, including program management support, nuclear engineering subject-matter expertise and analytical support, training support, security management support, emergency operations (domestic/international) support, nuclear nonproliferation support, and environmental management and sustainability.

# Resiliency and Emergency Management Services

- ✓ **Continuity of Operations Support:** SC&A staff have supported government COOP programs for more than 20 years. This support covers the entire life cycle of COOP program management and includes business process/impact analyses, COOP plan and program development, COOP program management and maintenance, COOP training and exercises, Alternative Relocation Site support, procedure development, records management, COOP activation and plan implementation support, and incident and program evaluation. Clients supported include the Executive Office of the President, the Bureau of Engraving and Printing, U.S. Department of the Interior, U.S. Department of Transportation, the EPA, the Small Business Administration, United States Coast Guard, U.S. Agency for International Development, U.S. Forest Service, and more than 50 state and local clients. SC&A's emergency management and COOP work includes efforts in California, Texas, and Virginia.
- ✓ **Emergency Planning Compliance Support (TEC):** SC&A prepared Emergency Planning and Community Right-to-Know Act (EPCRA) Tier II chemical inventories for multiple sites of The Energy Cooperative (TEC), including gas and oil wells, processing plants, propane distribution facilities, and underground natural gas storage areas. Because oil and gas wells were not originally included in the Ohio EPCRA Tier II program, SC&A developed criteria by which the wells could be grouped.
- ✓ **Spill Prevention, Control, and Countermeasure (SPCC) Planning Support (TEC):** SC&A has developed SPCC plans for two TEC sites. SC&A researched discharge controls, best management practices, and inspection requirements to develop a discharge control methodology supported by relevant consensus standards. The emergency response and accidental release sections of each SPCC are integrated with the same sections of each site's risk management plan and hazardous waste management plan. SC&A also created site-specific inspection forms, operating and maintenance procedures, and agency notification flowcharts.
- ✓ **Emergency Preparedness Program Exercise Evaluations (FEMA):** SC&A provided qualified evaluators for DHS/FEMA emergency response exercises at nuclear power plants. SC&A's pool of evaluators, located throughout the United States, was experienced in a wide variety of technical and non-technical areas. They evaluated a range of parameters, including local facilities, general field conditions, dose assessment, ingestion pathway sampling, state and local emergency operation centers, media centers, hospital and ambulance drills, and school evacuations.
- ✓ **Support for the EPA's Radiological Emergency Response Program:** The EPA is responsible for maintaining a state of readiness to respond to radiological emergencies and incidents through the Radiological Emergency Response Program (RERP). The program oversees and maintains the Radiological Emergency Response Team (RERT). SC&A has assisted the EPA in planning, implementing, and analyzing many training events, drills, and exercises designed to prepare the RERP. These include tabletop exercises, training on specialized software and equipment, and multi-party coordination. SC&A also developed plans, Standard Operating Procedures (SOPs), and guidance. SC&A analyzed the functional descriptions of the positions on the RERT against those required by the National Response Framework and EPA responsibilities in emergency response to determine gaps, then drafted new position descriptions as needed. SC&A also helped update the RERP Concept of Operations Plan and Radiological Emergency Response Plan to reflect current EPA decisions and changes in EPA operations necessitated by new developments in the National Response Framework.
- ✓ **CDC Advisory Team for Environment, Food and Health Support:** SC&A assisted the Centers for Disease Control and Prevention (CDC) Radiation Studies Branch participation in the inter-agency Advisory Team for Environment, Food and Health. SC&A developed an SOP for Advisory Team activities, including how member agencies will coordinate with each other and with other organizations to

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respond to radiological incidents. SC&A developed an initial draft related to the planning functions and prepared a complete SOP for Advisory Team operations, the first for the Team.

- ✓ **Developing Guidance for the Transition of the Federal Radiological Monitoring and Assessment Center (FRMAC):** As part of the federal response to radiological emergencies, DOE maintains and deploys the FRMAC, and the EPA provides personnel to the FRMAC. DOE is responsible for the operation of the FRMAC until the DOE FRMAC Director and the Senior EPA representative agree on the time to transition the responsibility to the EPA. To help the EPA further define these criteria, SC&A developed and presented six scenarios representing a range of examples for nuclear incidents that would result in the establishment of a FRMAC and a subsequent transition of the management responsibility from DOE to the EPA. SC&A drafted a guidance document to establish a basis and procedure for transitioning the role of leading the FRMAC from DOE to the EPA.
- ✓ **Defense Threat Reduction Agency (DTRA), Phase I Small Business Innovation Research (SBIR):** SC&A assisted in the development of a system for the indirect remote detection of shielded radiological and nuclear threats (including from special nuclear material) by non-atmospheric secondary effects in electromagnetic materials, in this case, a metamaterial. In addition, SC&A assisted in the development of a system to develop a nontraditional, high-output, sensitive, high-dynamic range, continuous wave, compressive sensing terahertz spectrometer to detect at distance hazardous low-vapor-pressure chemicals.
- ✓ **Defense Advanced Research Projects Agency (DARPA):** SC&A, as a subcontractor to PNTS, Inc. on a Phase I SBIR project, assisted in the development of an inexpensive portable sensor for chemical-biological agent detection, specifically, a continuous wave terahertz spectroscopy system to detect from a distance a wide range of hazardous chemical and biological analytes. The system detects a wide range of analytes, ranging from biologicals and chemicals, through low-vapor-pressure chemical residues left by “fingerprints” on external surfaces by clandestine deployment, as well as trace vapor products.
- ✓ **Department of Homeland Security Science & Technology Directorate, Homeland Security Advanced Research Projects Agency:** SC&A led a multi-organization industry and university team in a project to develop a terahertz radiation-based portable system to detect and identify toxic and other low-vapor-pressure chemicals (including explosives) rapidly and accurately from a distance. SC&A successfully completed an over \$1 million Phase I laboratory proof-of-concept demonstration of detection under various environmental conditions, which highlighted the ability of both time domain terahertz and continuous wave terahertz modalities to detect microgram/cm<sup>2</sup> concentrations of explosives and surrogate chemical warfare agents in both transmission and standoff reflection modes.

In addition to the projects above, SC&A has also supported the EPA in responding to international incidents; provided technical support to the EPA in implementing RadNet; developed data quality objectives for RERP Laboratory Operations; helped the U.S. Occupational Safety and Health Administration develop guidance and training related to radiological incidents; provided expertise to assist the EPA in the revision of the *PAG Manual*; and provided technical assistance to the CDC to develop procedures that can be used by hospitals. SC&A also can assist clients in threat response and mitigation. SC&A employees with former roles within the U.S. Department of Defense and the private sector can assist in (1) developing and implementing programs associated with countering WMD, counter-improvised explosive devices (C-IEDs), electronics, alarm defeat, and blasting cap diagnostics; (2) designing, delivering, and evaluating IED responses, radiological/nuclear, and chemical/biological threat preparedness and response training; and (3) addressing risks and developing plans for addressing homemade explosives, as examples.

# Risk Assessment and Management

## Overview of Capability



SC&A has performed more than 300 risk assessment studies, which involved risk assessment as part of the study or included the gathering and/or analysis of data and developing mathematical models and computer codes for use in risk assessments. These have been in support of U.S. Environmental Protection Agency (EPA) rulemaking or standard setting; waste site cleanups, including under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Resource Conservation and

Recovery Act (RCRA); U.S. Department of Energy (DOE) environmental restoration and nuclear facility decommissioning/decontamination; Formerly Utilized Sites Remedial Action Program (FUSRAP) sites; and other remediation efforts. SC&A has evaluated all media, used and developed multimedia risk models, applied quantitative uncertainty analysis and probabilistic risk assessments techniques, and performed training on the techniques and applications of risk assessment.

## Capabilities

- ✓ Risk Analysis and Assessment
- ✓ Risk Modeling
- ✓ Radiological and Other Human Health Risks and Effects
- ✓ Economic and Social Impact Risks
- ✓ Environmental Risk Analysis
- ✓ Risk Mitigation
- ✓ Expert Witness Testimony
- ✓ Risk Training

### Selected Examples of Clients Served

- ✓ New Mexico Environmental Division
- ✓ Republic of the Marshall Islands
- ✓ U.S. Department of Energy
- ✓ U.S. Environmental Protection Agency
- ✓ U.S. Nuclear Regulatory Commission

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## Examples of SC&A Projects and Corporate Experience

- ✓ **Risk Assessment for 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. SC&A reconstructed the historical radiation exposures and associated health risks to the people of the Marshall Islands from fallout from nuclear weapons testing in support of claims compensation for adverse impacts on public health.
- ✓ **Shattuck Five-Year Review (EPA):** Shattuck is a Superfund site with radioactive waste in urban Denver that was remediated in 1998. The final remedy under the Record of Decision was a significant departure from the remedy implied during public hearings. In reaction to community and political outrage, the EPA asked SC&A to conduct an independent review of the actual technical performance of the remedy. To assist with the review, SC&A convened an expert panel of six prominent practitioners from relevant science and engineering disciplines. The Shattuck Five-Year Review was undoubtedly the most extensive Five-Year Review ever completed under the Superfund Program.
- ✓ **Radiological Screening Levels (State of New Mexico):** The State of New Mexico Environmental Division contracted with SC&A to derive radioecological screening levels for use as part of the State's CERCLA/RCRA review and approval process for permitting and site cleanup and corrective actions. SC&A derived radioecological screening levels, expressed in units of picocuries per gram (pCi/g) of soil and sediment, and picocuries per liter of fresh water, which correspond to levels that are unlikely to have an adverse effect on aquatic and terrestrial ecosystems.
- ✓ **Technical Assistance for Evaluating WIPP Compliance with Standards (EPA):** The Waste Isolation Pilot Plant (WIPP) is an underground repository for the disposal of defense-related transuranic wastes that DOE operates near Carlsbad, New Mexico. The EPA must certify whether the WIPP complies with the Agency's radioactive waste disposal standards. SC&A assisted in the revision of the Compliance Application Review Document and Technical Support Document for Section 23, "Models and Computer Codes," of 40 CFR Part 194. SC&A worked with the EPA to review and revise information on the use of computer modeling in general and the specific use of groundwater modeling to support performance assessment in DOE's Compliance Certification Application, among other activities.
- ✓ **Technical Assistance in Finalizing NUREG-1640 (NRC):** SC&A assisted the U.S. Nuclear Regulatory Commission (NRC) in revising the draft report, NUREG-1640, *Radiological Assessment for Clearance of Equipment and Materials from Nuclear Facilities*, in response to public comment. Establishing the relationships between the equipment and materials and radiation exposure required SC&A to develop mathematical models simulating the life cycle of these materials from clearance to eventual disposal. The models simulated approximately 35 scenarios and 115 radionuclides. The scenarios included modeling radiation exposures to transportation workers, scrap yard and steel mill workers, manufacturers, end-product and byproduct users, and workers at waste disposal facilities. The end product of these analyses was a set of "dose factors" expressed in units of millirem per year to critical population groups per pCi/g (and per pCi/cm<sup>2</sup>) of residual radionuclides on steel, copper, aluminum, and concrete cleared from nuclear facilities.

# Risk Assessment and Management

- ✓ **Technical Revisions for 40 CFR Part 190 Environmental Protection Radiation Standards for Nuclear Power Operations (EPA):** As part of our support for the EPA’s reevaluation of 40 CFR Part 190, SC&A analyzed the issue of expressing portions of the nuclear power operations standard in terms of risk to the public. Our report considered how a risk standard could be implemented and provided a comparison with the existing dose standard and the projected dose standard. We first provided a general description of using risk to limit radiation doses, a general discussion of existing standards using risk to regulate radiation in the United States and internationally, and a discussion of the radiological effluents from facilities that meet the definition of the standard, including the policy issues (pros and cons) of using risk as the standard. Issues considered included the optimization process, acceptable dose levels, and use of collective dose. SC&A then selected and implemented an appropriate model for determining the radiological impact of these facilities to the public.
- ✓ **Integrating Low-Level Waste Disposal Facility Effects on the Environment and the Public (DNFSB):** DOE Order 5820.2A, “Radioactive Waste Management,” requires that active and future land disposal facilities use performance assessments to demonstrate compliance with health and safety criteria. The Defense Nuclear Facilities Safety Board (DNFSB) wished to create a standard review plan to evaluate the DOE response to its recommendations. In support of this effort, SC&A developed the technical basis and methodology for completion and approval of a performance assessment based on a systems approach to land disposal of radioactive waste. In its evaluation, SC&A developed objective criteria as the technical basis for establishing a system boundary representative of DOE sites. The results of SC&A’s evaluation formed the basis for a potential standard review plan to train DNFSB staff to evaluate compliance with the recommendations.
- ✓ **Yucca Mountain 40 CFR Part 197 Support (EPA):** The EPA is required to promulgate standards for protection of the public from releases from radioactive materials stored and disposed of at the proposed Yucca Mountain site in Nevada. SC&A’s support of this work included preparation of a draft Background Information Document, which provided background information, technical analyses, and justifications needed in support of the proposed standards. SC&A also produced a draft report on characterization of uncertainties in individual natural and engineered factors that affect radionuclide release from a potential repository at Yucca Mountain and transport through the environment, and on ranges of potential repository system performance based on uncertainties in the individual factors.
- ✓ **Risk Model Development (EPA):** SC&A (EC/R) has developed and continues to develop several models for the EPA that have been and continue to be used in the assessment of individual and community risks from inhalation exposure to air toxics. These models include the following:
  - **Human Exposure Model – 3 (HEM-3).** The HEM-3 is a streamlined but rigorous tool used for estimating ambient concentrations, human exposures, and health risks that may result from air pollution emissions from a complex industrial facility, or a cluster of facilities located near one another. HEM-3 estimates cancer and noncancer risks at the level of census blocks using the AERMOD state-of-the-art air dispersion model developed under the direction of the American Meteorological Society/EPA Regulatory Model Improvement Committee. SC&A also supported the EPA in the preparation of the detailed user’s guides for the single-facility version and the multi-facility version of HEM-3 for use by EPA staff and the public in modeling the health risks (cancer, noncancer chronic, and acute impacts). SC&A is currently updating the model to use the open-source programming language of Python to enable more model code transparency to users and the public and also to eliminate the model’s prior dependency on proprietary database files.

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- ***Environmental Justice (EJ) Risk and Proximity Analysis Tool.*** The Environmental Justice (EJ) Risk and Proximity Analysis Tool (EJ Tool), is a program created to accompany the EPA HEM-3. The EJ Tool is used to evaluate the potential cancer and noncancer risks associated with inhalation of hazardous air pollutants (HAPs) by different socioeconomic demographic groups within the population living near HAP sources in the United States. The EJ Tool is generally used in support of regulatory analyses for the EPA's Risk and Technology Review (RTR) program.
- ***CenRANK.*** CenRANK is a database and mapping tool that can help users identify any potential environmental justice impacts. The tool identifies and ranks census blocks and block groups by various social vulnerability and air pollution indicators. This identification allows users to determine where low-income, minority, and Tribal populations live; which areas have a high proportion of vulnerable populations; which areas experience the worst air quality; and the areas where social vulnerability and poor air quality overlap. CenRANK covers the entire United States and territories.
- ✓ ***Risk Modeling:*** SC&A has extensive point, area, and mobile source inhalation risk modeling experience. Some of this experience includes:
  - ***HEM-3 Modeling.*** SC&A has performed hundreds of exposure and risk analyses for industrial sectors under the EPA's RTR program. These analyses estimated cancer and noncancer risks due to the inhalation of HAPs for populations residing near industry sector operations.
  - ***EJ Risk Modeling.*** Using the Environmental Justice (EJ) Risk and Proximity Analysis Tool (EJ Tool) (and previously using the CenRANK EJ tool), SC&A staff conducted demographic analyses for many of the hundreds of industry sectors modeled using HEM-3 under the EPA's RTR program. The EJ Tool compiles and allows for the analysis of extensive census-based demographic data. Using this program, we evaluated the distribution of cancer and noncancer risks for different demographic factors (including racial, ethnic, age, economic, educational, and linguistically isolated population categories) for source categories modeled under the RTR program.
  - ***National Air Toxics Assessment (NATA).*** SC&A has modeled exposure and risk for more than 60,000 industrial facilities and 20,000 airports under the 2002, 2005, and 2011 NATA. SC&A is currently modeling exposure for the 2014 NATA (which is planned to be final in the summer of 2018). The NATA involves modeling cancer risks and noncancer risks for 189 HAPs from about 65,000 industrial facilities and modeling onroad and nonroad mobile source impacts on 60,000 census tracts. SC&A also supported the EPA's development of the technical support documents for the NATA. The EPA uses the results from NATA assessments to (1) work with communities in designing their own local assessments, (2) prioritize emission inventory improvements, and (3) prioritize improvements in air toxics monitoring.