



Exponent

Statement of Qualifications

Radiation Measurement,
Risk Assessment, Nuclear
Support Services, and
Earthquake Engineering





Radiation Measurement, Risk Assessment, Nuclear Support Services, & Earthquake Engineering

Since the earthquake and tsunami in Japan on March 11, 2011, many concerns have been raised about the relationship between the earthquake and subsequent damage to Japan's nuclear power plants and the potential effects of radiation on human health of individuals and operations of corporations worldwide.

Exponent has coordinated a team of highly experienced staff who have considerable experience in low-dose radiation risk and exposure, human health and safety programs, biological and environmental contamination, supply chain management, product and food safety, medical evaluations and surveillance, radiation decontamination, and nuclear plant safety status and dose projections that can be utilized by corporations assessing potential risks as a result of this disaster. Below are brief descriptions of our capabilities in areas that might be of concern to you.

Exponent offers unparalleled multi-disciplinary expertise and rapid response capabilities to provide stewardship in addressing complex engineering and scientific problems. We provide our clients with a team of engineering, construction, environmental, risk, and health specialists that is unique in the industry.

Key Client Issues

- 1) Potential contamination of raw materials or products from Japan
- 2) Related exposure and potential health risks for workers and user communities
- 3) Environmental concerns
- 4) Risk perception related to nuclear powered facilities
- 5) Construction concerns related to the earthquakes
- 6) Potential liability related to any of these matters

Feel free to contact us related to concerns you might have related to:

Product / Health Assessment:

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Related Capabilities

Product Contamination Assessment

Companies have voiced concerns about potential contamination of raw materials and end products that are imported from Japan and question the potential human health impacts of using or handling these materials. Exponent staff members have experience reviewing the safety of contaminated materials at various points along the production cycle, beginning with the receipt of raw materials to the final product as it leaves the manufacturing plant, as well as the disposal of production wastes. Our staff has developed screening programs which can be applied at each of these points to determine if the materials have radioactivity at levels of public health or regulatory concern. While there may be a number of check points along the process, the effectiveness of the process is integral to the production of a safe product.

Exponent scientists offer clients a great depth of experience with the evaluation of exposure to consumer products and raw materials and can use that experience in conjunction with experience in radiation safety to develop approaches to testing and evaluating radiation safety for consumer products. We can also help clients develop risk communication materials to help companies understand if any measured level of radiation poses a level of exposure above background, are within regulatory standards established for a particular product or use, or are within other relevant radiation exposure limits. If needed, we can estimate any incremental health risks posed by measured levels of radiation and help companies understand if the risks are significant.

Supply Chain Health and Safety Issues

Japan supplies key parts used in industries ranging from car manufacturing to consumer electronics and data processing, as well as food, toys, and other consumer products. The recent nuclear crisis has also caused great concern around the world regarding potential radiation exposure to which these imports may have been subject. This has led to testing of many products (especially food items) in the U.S. supply chain. Seafood products pose a particular risk because of the potential for exposure and because they are an important part of the Japanese export market. Algae (for sushi and agar), oysters, and other seafood are grown along the Japanese Pacific coastline and in the region within which the reactor is located. A substantial amount of radioactive water was released to the Japanese coast where it can be transported by coastal currents. For these reasons, Exponent has been examining the locations from which the seafood products are harvested as well as the potential for contamination.

Exponent has performed a number of investigations to help clients address supply-chain issues regarding imports of potentially hazardous substances. Based on this experience, we can assist with designing radiological monitoring programs to minimize the risk of suppliers shipping contaminated products. We can also assist with development of contingency plans for managing supply-chain contamination problems.

Nuclear Plant Radiation Dose Projections

Exponent can model releases from the Fukushima site and calculate the radiation dose consequences at your facilities kilometers away. The atmospheric dispersion modeling can be of use in determining your company's plans for resuming operations. Additionally our monitoring teams can assess the degree of local contamination and provide advice on decontamination should that be required.

Low-Dose Radiation Exposure Assessment

Potential radiation exposures exist from a variety of natural and man-made sources. The assessment of low dose radiation exposures involves quantification of potential exposures, comparison of exposures in the context of existing sources, and evaluation of potentially sensitive sub-populations. Exponent scientists have extensive experience in each of these areas. Read More: <http://announce.exponent.com/alerts/japanradiationrisk/>

Health Inspection & Regulatory Compliance

There is a potential health concern for those who work, live, or have visited areas close to the Fukushima plant. We have significant expertise in monitoring and evaluating exposures and associated health effects related to radiation. We are capable in assisting in the development and implementation of exposure monitoring programs in the workplace and community. Our certified industrial hygienists have worked as radiation safety officers, developed and implemented radiation health and safety programs, and responded to spill or incidents related to radiation contamination working with a variety of monitoring instruments. We also have air modeling capabilities to estimate the potential for exposure at various distances from the radiation source. Our team is familiar with regulatory compliance requirements having previously worked in industry and governmental agencies.

Our scientists can assist in developing written protocols, screening methodologies both in Japan or in the U.S., and guidance for training of company employees who are responsible for monitoring processes. Our knowledge of radiation and manufacturing processes will provide efficient and focused programs that monitor production and provide a high level of effectiveness regarding the radiological safety of the company's employees as well as their consumers.

Occupational Health & Safety

Members of our team have served as corporate health and safety directors, occupational physicians, epidemiologists, industrial hygienists, and health physicists. We are able to compare these levels monitored in the workplace, community, or during product screening evaluations to regulatory and guidance levels to help assess potential risks to human health. We have significant expertise in the evaluation of exposures and associated health effects related to low-dose radiation. Staff members have been instrumental in cohort studies evaluating the effects of radiation on the survivors of the Nagasaki and Hiroshima bombings. These studies form the bases for the current understanding of radiation health effects.

Ecological & Environmental Risk Assessment

Exponent has a diverse group of professionals that make up our ecological sciences practice. Expertise within this group encompasses a variety of disciplines, including biology, ecology, toxicology, fisheries, oceanography, limnology, statistics, and spatial analysis. The Exponent team not only addresses the environmental effects of radionuclides, but also addresses new technologies, facilities, biological stressors (introduced species), physical alterations of ecosystems, and aspects of climate change. Projects have been implemented in most environments of the world, including suburban environments, watersheds, deserts, rain forests, and oceans.

Transport & Fate of Radionuclides

Exponent's Environmental and Earth Science practice includes scientists and engineers with relevant capabilities in transport, fate, and effects of radionuclides via all environmental pathways (i.e., air dispersion, surface water, vadose zone transport, groundwater migration, and sediment transport). We can evaluate the quality of radionuclide chemical analyses and manage large amounts of data so that clients can access useful data summaries. Our scientists and engineers also investigate the proper management and remediation of radioactive waste and media contaminated by radionuclides.

Nuclear Plant Safety Assessment & Support Services

Exponent engineers can also assist nuclear operating companies in performing reviews of coping capabilities of nuclear plants for extreme events such as the Japanese earthquake and tsunami. Unique solutions to extended loss of power or loss of function of critical safety components can be found using innovative techniques to provide water to the core and spent fuel pool. Assisting nuclear companies in making the nuclear plants more easily adaptable to deal with such events is a service that can be provided. Exponent also has significant experience in decommissioning nuclear power plants and other facilities.

Risk Communication

Many Exponent scientists, engineers, and physicians are professionally trained in risk communication—in addition to their technical area of expertise—and have years of experience communicating potential hazards to the lay public, the news media, and government decision makers in times of controversy and fear. Exponent's scientists and engineers have considerable experience in nuclear plant design, operations, and safety analysis. Given that the Fukushima event is still evolving, Exponent has capabilities that can be of use to companies to explain what is going on and potential consequences to their operations based on location from the Fukushima reactors. It is especially critical when communicating the potential health risks associated with radiation exposures to an audience that is not familiar with the technical approaches and jargon used to assess risk, or with the scientific or regulatory process. Risk communicators must be cognizant of the needs, technical sophistication, and vocabulary of the audience. Because the use and output of risk assessment are socially determined, Exponent's specialists in risk assessment, radiation health effects, and medicine work with our in-house colleagues in the social sciences. The communication team identifies the critical issues concerning the audience, establishes the means of communication that will best convey the technical information in a clear and understandable manner (e.g., decode the science), and tracks the effectiveness of such communication. Exponent staff have lead nuclear public information programs.

Earthquake Engineering

The focus of our Earthquake Engineering practice is two-fold: post-earthquake damage and repair which focuses on determination of the true nature and extent of physical earthquake damage to facilities; and earthquake planning and risk mitigation, which includes identification, quantification, and mitigation of risk through optimal repair strategies, performance-based upgrades, and customized solutions. We offer multi-faceted holistic support to property owners, insurance and legal communities, and government agencies, both in the aftermath of earthquakes and in pre-earthquake planning and mitigation.

Business Interruption Services

Exponent has experienced professionals to assist clients in the preparation of damage assessments for economic recovery. Business interruption insurance should stand to put a firm in the same position it would have been, had it not suffered the interruption. As a result, any lost revenue or additional expenditures incurred during this period should be claimed. To maximize this recovery, a timeline of key events should be maintained to document the key phases of recovery. In doing so, it is vital that any additional expenditure incurred and revenue lost throughout the period of interruption be clearly documented. These actions will allow a claim to be much more detailed and supportable, which will help to streamline the claim process. In addition, Exponent professionals have the experience to prepare rebuild schedules to document the period of restoration or duration of the interruption to rebuild the facility taking into account the damage assessment for engineering, material or equipment procurement, construction and commissioning.

How Exponent Can Help

Exponent offers unparalleled multi-disciplinary expertise and rapid response capabilities to help address complex engineering and scientific problems. We provide our clients with a team of specialists in engineering, construction, environmental science, risk, and health that is unique in the industry.

The following staff scientists have direct experience with radiation, supply-chain, health, nuclear facility, and contamination issues:

Health Sciences

[David Hoel, Ph.D.](#) – Dr. Hoel has extensive experience in research and the evaluation of the potential health effects of ionizing radiation. He spent several years in Hiroshima for the National Academy of Sciences as an American Director of the joint American-Japanese Radiation Effects Research Foundation which studies the effects of radiation on the atomic-bomb survivors. These studies form the bases for the current understanding of radiation health effects. Currently, Dr. Hoel is a member of the Foundation’s Scientific Councilors which advise the Foundation each year on their research program, and he coincidentally returned from Japan from this year’s review the day before the first earthquake. Dr. Hoel also serves as a member of the Academy’s Board on Nuclear and Radiation Studies. He just returned from Japan where he, with a team of experts, evaluated possible contamination by radionuclides of products currently manufactured by local suppliers in the Fukushima region.

[Elizabeth Anderson, Ph.D., Fellow ATS](#) – Dr. Anderson founded the U S Environmental Protection Agencies Health Risk Assessment Programs and directed them for 10 years. Also she is a founder of the Risk Analysis Society, a past president, and was Editor in Chief of the Journal Risk Analysis: An International Journal for 10 years. She has worked extensively in the areas of exposure and risk. For example, she led the evaluation of a program to rank radiation risk across the former DOE weapon facilities. She leads health risk assessment programs, places the risk associated with specific exposures into context of regulatory risk and risk experienced in everyday life. Frequently she not only performs risk assessment but communicates the results to the public.

Mike Cooper, M.P.H., CIH – Mr. Cooper specializes in occupational health, industrial hygiene, and corporate health and safety program management. He has managed and directed corporate health and safety programs in the semiconductor industry for many years. Mr. Cooper also worked as a radiation safety officer, responsible for monitoring workplace environments, maintaining equipment, developing and implementing radiation health and safety programs, and conducting radiation training programs. He has written and implemented sampling protocols related to radioactive materials and incidents. He is experienced with the technical matters and corporate issues involved with radioactive spills and decontamination of materials.

Terry Troxell, Ph.D. – Dr. Troxell worked for the U.S. Food and Drug Administration (FDA) as Director of the Office of Plant and Dairy Food and Beverages. While at the FDA, Dr. Troxell directed the development of policy on derived intervention levels (DILs) for radionuclides in foods. He can provide regulatory guidance on tolerable levels of radionuclides found in food. Dr. Troxell can also assist from the international perspective as he was involved in adoption of these levels as head of the U.S. delegation to Codex Committee on Food Additives and Contaminants (CCFAC).

Suresh H. Moolgavkar, M.D., Ph.D. – Dr. Moolgavkar has more than 30 years of experience in the fields of epidemiology, biostatistics, and quantitative risk assessment. He is currently Professor of Epidemiology at the University of Washington and has been a visiting scientist at the Radiation Effects Research Foundation in Hiroshima, the International Agency for Research on Cancer in Lyon, and the German Cancer Research Center in Heidelberg. He has also served on the External Advisory Committee to the Risc-Rad program of the European Union, a research program focused on investigating the health impact of exposure to low levels of radiation. Dr. Moolgavkar has published numerous papers on epidemiologic studies of radiation and cancer. His research in this area has been supported by grants from the National Cancer Institute and the Department of Energy.

Joseph Scire, M.S., C.C.M. – Mr. Scire is a Principal Scientist and a Certified Consulting Meteorologist (CCM) with more than 30 years of experience in the design, development, and application of research and regulatory air quality models, including several U.S. EPA Guideline Models. He has played a major role in the development of several widely-used models, including the CALPUFF modeling system. Mr. Scire is a consultant to the International Atomic Energy Agency (IAEA) of the United Nations on the use of the CALPUFF system in the IAEA's energy planning tool (SIMFACTS). In 2010, Mr. Scire served as a reviewer for the U.S. National Academy of Sciences on a homeland security risk assessment study.

Mark Roberts, M.D., Ph.D., FACOEM – Dr. Roberts is an epidemiologist and physician board certified by the American Board of Preventive Medicine with a subspecialty in Occupational Medicine. He has served as State Epidemiologist of the Oklahoma State Department of Health and the Corporate Medical Director of large corporations. He has directed large-scale communication efforts relative to public health issues as well as worked with corporations to communicate health risks of products and manufacturing processes. Dr. Roberts has extensive experience in dealing with the public, both in public meeting forum as well as interviews with the media.

Robert Scofield, D.Env. – Dr. Scofield has 30 years of experience with chemical exposure estimation and health risk assessment for consumer products and environmental exposures. He has performed several hundred product-specific risk assessments and has helped clients develop supply chain compliance strategies. He has also helped many companies develop risk communication materials for their customers, employees, and the general public. Dr. Scofield has been responsible for many risk assessments involving exposure to mixtures of radioactive and non-radioactive materials.

Environmental Sciences

Charles Menzie, Ph.D. – Dr. Menzie has extensive experience at assessing exposures and risks associated with radionuclides and chemicals. He has served as an expert on environmental issues at nuclear power plants in North America. His particular expertise in this regard involved assessing the fate of releases in marine environments. He has examined exposures to many seafood products including algae, fish and shellfish. Dr. Menzie was retained by the U.S. Department of Energy to lead the review of radionuclide transport and risks at the Nevada Test Site.

Brian L. Murphy, Ph.D. – Dr. Murphy is a physicist with a background in environmental modeling, particularly air dispersion modeling, and dose reconstruction. His dose reconstruction work includes both retrospective analysis and prospective analysis for postulated accident scenarios. He is the coeditor of two textbooks on Environmental Forensics, methods for determining how and when contamination occurred. His Environmental Forensics work frequently involves isotopic analysis as well as determination of background as distinct from “contamination.” His radiological experience in these areas includes several uranium mills, a tailings pile at a mining research institute and a nuclear power plant.

Steve Mudge, Ph.D. – Dr. Mudge is a chemist specializing in environmental forensics with extensive experience in evaluating the fate and effects of radionuclides in marine environments. He spent four years studying the fate of radionuclides discharged from British Nuclear Fuels Limited (BNFL) Sellafield reprocessing facility, specifically the heavier transuranic elements. He spent a further two years investigating the source of Technologically Enhanced Naturally Occurring Radioactive Materials (TENORMs) (specifically ²¹⁰Po) with an atmospheric transport route from industrial facilities. Dr. Mudge conducted surveys in the Ribble Estuary, UK to determine the fate and impact of ²³⁴Th and ^{234m}Pa discharged from BNFL Springfields’ nuclear fuel fabrication facility. This work included dose assessment to users and inhabitants of the area, new approaches to the quantification of beta dose rates and micro and meso-scale variability in measurements of both radioactive and non-radioactive elements; this becomes important in determining the real doses experienced by the users. Dr. Mudge has direct analytical chemistry experience including assays for ⁶⁰Co, ¹³⁷Cs, ¹³⁴Cs, ¹³¹I, ¹³²I, ¹³²Te, ¹⁰⁶Ru, ²⁴¹Am, ²⁴³Cu, ²³⁸Pu, ^{239,240}Pu, ²¹⁰Po, ²³²Th, ²³⁴Th, ^{234m}Pa, ²³⁴U, ²³⁸U, and ²²²Rn among others.

Walter J. Shields, Ph.D. – Dr. Shields is a soil scientist specializing in the transport and fate of contaminants, particularly aerial dispersion of contaminated dust and fugitive emissions. He managed the Site Decommissioning of a low-level radioactive slag disposal site. He also managed a remedial investigation/feasibility study that addressed soil and groundwater contamination with a variety of radionuclides including thorium-232 and progeny, Uranium-235 and progeny, and Uranium-238 and progeny. Dr. Shields served as deputy program manager for state oversight of the RCRA facility investigations at the Hanford Reservation in Washington.

Carlo Monti, Ph.D. – Dr. Monti is an environmental chemist specializing in radionuclides. He has managed a large project for SOGIN (Società Gestione Impianti Nucleari or Nuclear Plant management Company), regarding the reprocessing of spent fuel. The project included a strategic evaluation of the MOX (Mixed Oxide Fuel) fabrication compared to the fabrication of U or U-Th fuel (UOX, Enriched Uranium Oxide). The project included the comparison of the two fuels in terms of environmental effects both in terms of radionuclides release and in terms of nuclear wastes generated, both quantitatively and qualitatively. He developed a plan for the proper management of radioactive reprocessing fuel bundles stored in the plant pool following Italian and the IAEA safety, security and environmental directives. Dr. Monti performed a multi-attribute analysis of SOGIN’s CEMEX nuclear liquid wastes treatment plant at Saluggia site (North Italy). Included an evaluation of the radiological effects on the environment of the different technologies. He also developed guidelines for TENORMs (Technologically-Enhanced Naturally Occurring Radioactive Materials) classification and management. Dr. Monti manages the technical coordination of a large program to monitor nuclear materials in ports in Italy.

Engineering

Troy Hayes, Ph.D., P.E. – Dr. Hayes has extensive experience with supply chain management and factory auditing in Asia, the US and Europe. His experience includes screening parts for radioactive contamination and developing quality control programs to assist factories screen for such issues. Dr. Hayes, who is serving as General Manager of Exponent's Hangzhou, China Office, has conducted engineering audits of more than 60 factories since 2008 involving various technologies from materials processing (metal casting & forming, injection molding, etc.) to component manufacturing (battery cells, capacitors, connectors, etc.) to complex assemblies (battery packs, notebook computers, navigation equipment, etc.).

Feifei Zhang, Ph.D. – Dr. Zhang is a Senior Engineer at Exponent China office. He has experience in radiation detection and radioactive contamination screening by assisting the US importers and Chinese manufacturers to screen radioactive contaminated products and to implement control measures. Dr. Zhang also has solid background in supplier management and process auditing, including HS&E, quality process, supply chain audits etc, in various industrial sectors of consumer goods, electronics, battery and renewable energy.

Joseph C. McGowan, Ph.D., P.E. – Dr. McGowan is a US NRC-certified Senior Reactor Operator on three BWR plants (Limerick I, Limerick II, Shoreham) and the Black Fox Simulator. He was also a BWR Simulator Instructor. He was a US Navy qualified Engineering Officer of the Watch on S5G and S5W power plants, a US Navy qualified Chief Engineer of a Nuclear Submarine, and a Navy Nuclear Power School Division Director and Instructor. All qualifications and certifications include competence and experience in occupational radiation exposure, decontamination, estimation of health effects, and regulatory requirements. He also completed GE BWR training in Fuel Handling and Station Nuclear Engineering.

Carlos Barrera, Ph.D., P.E. – Dr. Barrera has extensive field experience with radiation detection and component/facilities contamination surveys, particularly with tritium. He is has been in Japan conducting radiation surveys for a company.

Brian M. McDonald, Ph.D., S.E. – Dr. McDonald is a Structural Engineer who has conducted damage assessment and repair studies for hundreds of buildings and structures following earthquakes and floods. He is actively involved in research regarding seismic probabilistic risk assessments and performance based structural design. Dr. McDonald provides peer review services for both fossil and nuclear power plant structural designs, including the seismic design aspects of a new ABWR plant.

John D. Osteraas, Ph.D., P.E. – Dr. Osteraas has spent his career studying earthquake engineering and investigating the performance of thousands of buildings and structures subjected to earthquake loading. He specializes in the evaluation of the performance of buildings under extreme loads, including earthquake, flood, landslide, and explosion.