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- Decontamination & Decommissioning
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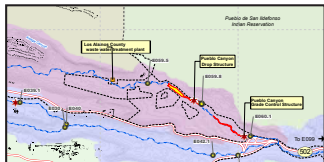
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Acknowledgments: The directory sections of this Buyers Guide are kept current by means of an online database that was set up by Joe Koblich, Director, Information Technology, and his staff. Special acknowledgment goes to Advertising Department Staffers Erica McGowan and Jessica Vazquez for their diligence and perseverance in carrying out the advertising coordination, data collection, editing, and input processes. Layout and production are carried out by Chris Salvato, Radwaste Solutions Desktop Editor.

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Radwaste Solutions (ISSN 1529-4900), Volume 25, Number 2. Published two times a year (Spring and Fall) by the American Nuclear Society, Inc., with business, executive, and editorial offices at 555 N. Kensington Ave., La-Grange Park, IL 60526. Copyright © 2018 by the American Nuclear Society.

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Sing the body electric

It is mid-August as I write this, and I find it difficult to believe that summer is coming to an end. Every year seems to get shorter and shorter. Looking back, it has been a full five months since the 2018 Waste Management Conference in Phoenix, Ariz., a report on which begins on page 51, but to me, it may as well have been last week.

The theme of the WM2018 was “Nuclear and Industrial Robotics, Remote Systems, and Other Emerging Technologies,” and this issue of *Radwaste Solutions* contains three articles based on papers from the conference with that theme in mind. Following Moore’s Law, which predicts the growth rate of technological progress, advancements in robotics and remote systems have been happening at breakneck speed. At least, that is how it appears to those of us watching from the sidelines.

The question—which the conference tried, quite successfully I thought, to answer—is what role can robotic and remote system technologies play in safely and efficiently performing decontamination and decommissioning work. It is not a new question, but one that is becoming ever more front and center as more commercial nuclear reactors are being transitioned to decommissioning status and the Department of Energy works to complete its most challenging cleanup tasks at sites such as Hanford, Savannah River, and Portsmouth/Paducah.

As robotics and advanced technologies evolve, so does their role in accomplishing D&D work.

In the opening feature, “Portsmouth D&D Technology Progress: Are We There Yet?” starting on page 20, Marty Reibold discusses DOE initiatives to adapt new technologies to facilitate the department’s cleanup mission at Ohio’s Portsmouth Site. While Reibold showcases several new robotic systems that are successfully being deployed at Portsmouth, such as the Brokk 400 machine and the RadPiper pipe-crawling robot, he makes two points that are worth highlighting.

First, Reibold makes the case that when introducing a new technology to a D&D project, it’s important not to put the cart before the horse. That is, the job should dictate the technology, and not the other way around. No matter how cool the new machine is, if it cannot be utilized effectively, it’s not a good fit. Second, worker acceptance is a key factor in bringing in a new technology. Reibold notes that Portsmouth is fortunate in that its workforce has been accepting of new technologies, seeing them not as a threat to job security (the systems still require human operators) but as a way to make their jobs safer and easier.

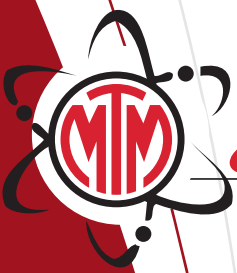
The ability of advanced technologies to streamline cleanup work is also explored in the features “Autonomous Radiation Survey Inside Contaminated Buildings at Fukushima Daiichi with the RISER UAV” (page 28) and “Aerial Lidar and Geomorphic Change Detection Software: Tools for Monitoring Canyon Sediments at LANL”



(page 39). Both articles demonstrate how lidar—light detection and ranging—can be used in very different ways. At Fukushima, it is being used in conjunction with a semi-autonomous drone to survey otherwise inaccessible areas, while at Los Alamos, aerial lidar surveys are being used to help track low-level contamination in the open environment.

We round out this issue with two photo-essay features. The first, “A D&D Trifecta” (page 34), is on three different decommissioning projects that are nearing completion, and the second, “Cleaning Up in Canada” (page 46), is on the environmental remediation of the Port Hope area on the shore of Lake Ontario.

And of course, starting on page 56, you’ll find our annual buyers guide, an indispensable resource on radwaste-related products, materials, and services, along with the vendors supplying them.—*Tim Gregoire, Editor*



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Oyster Creek to enter SAFSTOR

Exelon estimates that it will cost about \$1.1 billion to decommission its Oyster Creek nuclear power plant near Forked River, N.J., plus an additional \$290 million to manage the spent nuclear fuel and about \$60 million to restore the site following the termination of the reactor's license. The decommissioning cost estimate is contained in Exelon's post-shutdown decommissioning activities report (PSDAR) to the Nuclear Regulatory Commission, dated May 21.

Exelon notified the NRC in January 2011 that it intended to permanently cease power operations of the 620-MWe boiling water reactor no later than December 31, 2019, as part of an agreement with the state of New Jersey. In February, the company moved the closing date to no later than October 31, 2018, at the end of the reactor's current operating cycle. According to the



PSDAR, Oyster Creek is scheduled to permanently cease operation on September 17.

Exelon has chosen to decommission Oyster Creek under the NRC's SAFSTOR method. The decommissioning schedule calls for a 53-year safe-storage period (dormancy) beginning in 2020, after 18 months of preparation work. Decommissioning of the plant is to begin in 2073 and restoration of the site is to be completed by 2080. Exelon intends to complete the transfer of the reactor's spent nuclear fuel to dry storage by 2024. Exelon's schedule assumes that the Department of Energy will take possession of the spent fuel by 2034.

Exelon reported that it currently has about \$982 million in two nuclear decommissioning trust fund accounts held by Northern Trust Bank. In a March 22 letter to the NRC, Exelon said that a cash flow analysis demonstrates that, with credited earnings during the SAFSTOR period, the trust fund accounts contain sufficient funds to cover the cost of radiological decommissioning, spent fuel management, and site restoration activities.

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Hanford Site

An overreliance on continuous air monitors and a failure to adequately evaluate the risks associated with changing conditions resulted in the spread of radiological contamination at Hanford's Plutonium Finishing Plant (PFP), according to the draft root cause evaluation report by Department of Energy contractor CH2M Hill Plateau Remediation Company (CHPRC). Demolition of the PFP at the Hanford Site near Richland, Wash., has been on hold since December 2017, when particles of low-level contamination were found outside the facility's demolition zone, including around mobile office trailers and on multiple vehicles located outside the radiological boundary (*RS*, Spring 2018, p. 6).

Released on March 8, the causal analysis report focuses on the events leading up to and including the contamination spread outside the PFP demolition zone and the development of corrective actions to prevent a recurrence of such an event. The report identified two root causes for the contamination spread, including project management's overreliance on selective empirical data from workplace radiological indicators (primarily continuous air monitors) in setting the pace of demolition work.



Demolition of Hanford's Plutonium Finishing Plant has been on hold since December 2017, when contamination was found outside the demolition zone. (Photo: DOE)

Prior to the event, the air monitors did not indicate any sign of a spread of contamination. According to the report, this gave false assurance that existing controls were effective, and management's confidence in the monitoring system influenced the decision to increase the rate of demolition and provided assurance that debris piles were being adequately managed.

The report also found that the risks and consequences associated with the emerging and changing conditions of the PFP demolition were not adequately reviewed and evaluated. According to the report, while workers were able to address previous, individual contamination events, project management did not recognize the early signs indicating a trend of contamination control issues.

The report, *Discovery of Contamination Spread at the Plutonium Finishing Plant during Demolition Activities: Root Cause Evaluation Report*, can be found on the Hanford website, at www.hanford.gov.

● Marking progress toward achieving the direct feed low-activity waste (DFLAW) approach to treating tank waste at the Hanford Site, the Department of Energy announced on May 1 that it has transferred to plant management for commissioning the Nonradioactive Liquid Waste Disposal System (NLD) building at the Waste Treatment and Immobilization Plant (WTP). While dozens of systems have been turned over from construction status to startup procedures across the WTP project, the handover of the NLD marks the first transfer of an entire building for commissioning.

The NLD system consists of sumps, pumps, pipes, valves, and instruments, as well as a 540,000-gallon tank, all of which are designed to collect nonradioactive, nonhazardous effluent from the WTP's Low-Activity Waste (LAW) Facility, Analytical Laboratory, and other ancillary support facilities. Under DFLAW, some low-activity waste will be fed directly from the Hanford tank farms to the LAW Facility in advance of a court-ordered milestone date of 2023.

Brian Reilly, WTP project director for Bechtel National, said in a statement, "This occasion reinforces the progress being made at WTP and progress toward successfully demonstrating hot commissioning by 2022."

The DOE also announced on July 3 that the Washington State Department of Ecology has

approved the operating permit for the WTP's Analytical Laboratory. The laboratory supports the DOE's plans to treating Hanford tank waste under DFLAW.

According to the DOE, approval of the permit marks the first major WTP facility to complete all phases of the state's mandated permit life cycle: from initial design, through groundbreaking and construction, and now to the issuance of an approved operating permit. The key function of the laboratory is to confirm that the vitrified waste (glass) produced by the LAW Facility meets regulatory requirements. The laboratory will analyze approximately 3,000 WTP process samples each year. Samples of incoming low-activity tank waste will be analyzed to confirm the correct glass-former "recipe" to produce a consistent glass form suitable for long-term disposal.

● The Department of Energy intends to transfer capsules containing radioactive cesium and strontium from underwater storage to a new interim dry storage facility at the Hanford Site. As published in the May 18 *Federal Register*, the DOE has issued an amended record of decision announcing the department's decision to move the capsules from wet storage at Hanford's Waste Encapsulation and Storage Facility (WESF) to the new facility.

From 1974 to 1985, Cs-137 and Sr-90 were recovered from high-level radioactive waste stored in underground tanks at the site, packed in sealed stainless steel capsules in the form of cesium chloride and strontium fluoride, and placed in storage under water at the WESF. Delays in the construction of Hanford's Waste Treatment and Immobilization Plant and the reduced integrity of WESF structures due to age and radiation has put pressure on the DOE to find an alternative management path for the capsules.

The DOE intends to place the capsules in dry storage casks, which would be transported to a storage facility located approximately 400 meters (440 yards) from the WESF. The casks would sit on a 753-square-meter (8,100-square-foot) concrete pad within the facility. The storage facility would be permitted under the Hanford Facility Resource Conservation and Recovery Act permit through a modification to be issued by the state of Washington.

According to the DOE, the potential environmental impacts



The Analytical Laboratory at the Hanford Waste Treatment and Immobilization Plant is the first major WTP facility to complete all phases of the state's mandated permit life cycle. (Photo: DOE)

from the interim dry storage of the capsules would be less than those initially identified in a 2012 environmental impact statement (EIS), primarily due to the decay of radioactivity in the capsules. The EIS estimated that the capsules contained about 68 million curies. In June 2017, however, the DOE estimated that the radioactivity in the capsules had decayed to 46 million Ci.

The DOE said that it is not making any decisions at this time on the eventual treatment or final disposition of the capsules.

● The Department of Energy intends to dispose of 16 underground single-shell tanks in place as low-level radioactive waste at the Hanford Site's C Tank Farm. The DOE is proposing to classify the emptied tanks, which had held high-level radioactive waste, as waste incidental to reprocessing (WIR), and not HLW, allowing the tanks to remain buried at the C Tank Farm.

As published in the June 4 *Federal Register*, the DOE has made available a draft evaluation, *Draft Waste Incidental to Reprocessing Evaluation for Closure of Waste Management Area C at the Hanford Site, Washington* (draft WIR evaluation), which demonstrates that the tanks and their residual waste meet the criteria in DOE Order 435.1, *Radioactive Waste Management*, and may be managed and disposed of as LLW.

The DOE said it will consult with the Nuclear Regulatory Commission on the draft WIR evaluation before it is finalized. The DOE is also making the evaluation available for comment from states, tribal nations, and the public until September 7. The DOE will make a final determination on the tanks following the comment period and consultation with the NRC.

● Radioactive sludge from a Hanford basin is being moved to a more secure long-term storage location, the Department of Energy announced on June 13. The highly radioactive sludge, a mixture of fuel corrosion particles, metal fragments, and dirt that had accumulated over time, has been stored in containers inside Hanford's 105-K West Basin, located adjacent to the 105-K West Reactor and about 400 yards from the Columbia River.

According to the DOE, the basin contains 35 cubic yards of sludge. The DOE and its contractor CH2M Hill Plateau Remediation Company will pump the sludge to an adjacent building, the 105-K West Annex, where workers will package and prepare the sludge for transfer to the T Plant, a nuclear facility at the



Workers operate a sludge removal equipment control panel during the transfer of the mixture out of Hanford's 105-K West Basin. (Photo: DOE)

center of the Hanford Site that was modified for the safe storage of the sludge. The sludge will remain at the T Plant until a final decision on disposition is made. Removal of the sludge is expected to be completed in 2019.

Used nuclear fuel

The Nuclear Regulatory Commission is preparing an environmental impact statement (EIS) for Holtec International's proposed consolidated interim storage facility (CISF) for used nuclear fuel and has accepted public comment on the scope of the environmental review. Notice of intent to prepare the EIS was published in the March 30 *Federal Register*.

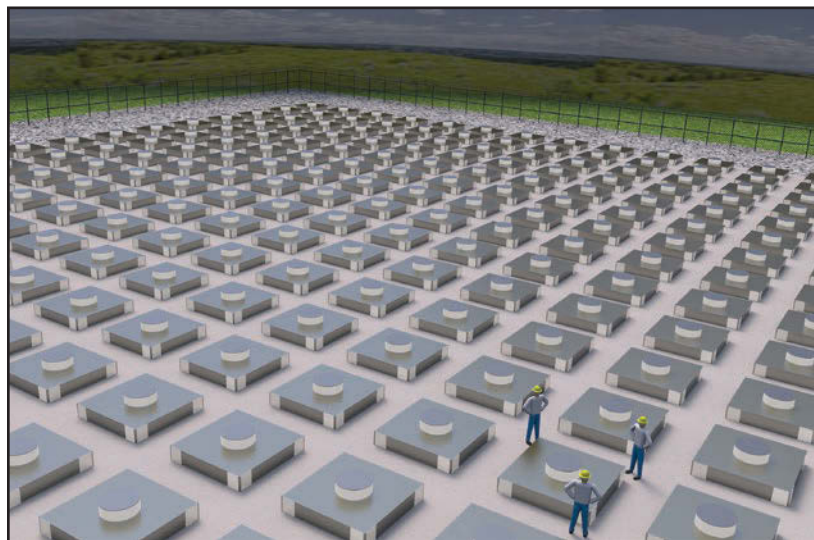
Holtec is working with the Eddy-Lea Energy Alliance to license, construct, and operate the CISF at a site located about 30 miles east of Carlsbad in southeastern New Mexico. Called the HI-STORE CISF, the facility would store up to 8,680 metric tons of used fuel for a 40-year license term using the company's HI-STORM UMAX underground canister storage system. Holtec submitted its license application in March 2017.

According to the NRC, the anticipated scope of the EIS will consider both the radiological and nonradiological impacts associated with the CISF project and its alternatives. The EIS will also consider unavoidable adverse environmental impacts, the relationship between short-term uses of resources and long-term productivity, and irreversible and irretrievable commitments of resources.

The NRC has also published in the July 16 *Federal Register* a notice of opportunity to request a hearing or petition to intervene in Holtec's CISF license application. The deadline to contend the application was September 14.

● Waste Control Specialists' (WCS) application for a used fuel storage facility in Texas has been re-submitted to the Nuclear Regulatory Commission, according to a June 11 press release from Interim Storage Partners (ISP), a joint venture of WCS and Orano USA. ISP is asking the NRC to review the revised license application to construct and operate a consolidated interim storage facility at the existing WCS site in Andrews County in West Texas.

WCS submitted the original application in partnership with Areva (now Orano) and NAC



The NRC has begun its environmental review of Holtec's proposed consolidated interim storage facility in New Mexico, shown here in a computer-generated rendering. (Graphic: Holtec International)

International in April 2016. A year later, however, WCS asked the NRC to suspend the application, claiming that the company did not have the resources to continue the licensing process. WCS and Orano formed the ISP joint venture in March following the sale of WCS to an affiliate of J.F. Lehman & Company.

According to ISP, the revised application is unchanged from the original application's proposal to receive, store, and manage used fuel from shutdown U.S. nuclear reactors at a facility to be built on WCS's existing 14,900-acre low-level radioactive waste storage site. In the application, ISP proposes an initial 40-year license to consolidate and store up to 40,000 metric tons of spent fuel.

● A proposal to recycle used naval nuclear fuel for use in advanced reactors was adopted by the full U.S. Senate on June 20. The proposal, which was contained in an amendment introduced by Sens. Mike Crapo (R., Idaho), James Risch (R., Idaho), and Sheldon Whitehouse (D., R.I.) to the 2019 Energy and Water Appropriations bill (approved by the Senate on June 25 and sent back to the House), would create a \$15-million pilot program at Idaho National Laboratory to blend high-enriched uranium from used naval fuel to produce the high-assay low-enriched uranium (HALEU) that advanced nuclear reactors are designed to use.

According to Crapo, the nuclear fuel recycling program has the potential to reduce waste that would otherwise be disposed of at taxpayers' expense while addressing the current lack of a domestic supply of HALEU. In a statement, Crapo said, "By reusing spent fuel to power advanced reactors, we can supply the inputs necessary for critical research initiatives, such as those at the INL, and provide a cost-saving and environmental service by reducing the amount of spent [fuel] otherwise stored or cleaned up."

● Orano announced on June 25 that it has agreed to cooperate with China National Nuclear Corporation (CNNC) subsidiary CNLA on a proposed used nuclear fuel reprocessing and recycling plant. The companies signed an agreement during a visit to China by French Prime Minister Edouard Philippe. According to Orano, the agreement runs until the end of 2018 and covers the work to be carried out in advance by the company in preparation for the recycling plant project. In January, Orano and CNNC signed a memorandum of commercial agreement reaffirming their mutual commitment to completing contract negotiations for the project. The 800-ton capacity plant is to be modeled on the La Hague and Melox plants in France.

San Onofre

A technical issue with a spent nuclear fuel canister stopped the transfer of spent fuel from wet to dry storage at the San Onofre Nuclear Generating Station for about a week, Tom Palmisano, vice president of decommissioning and chief nuclear officer of Southern California Edison (SCE), told a community engagement panel on March 22. Spent fuel at San Onofre is currently being transferred from the Unit 2 and 3 spent fuel pools to the site's independent spent fuel storage installation.

According to Palmisano, during receipt inspection of a Holtec International MPC-37 spent fuel canister, workers discovered a loose pin in the empty canister. The pin came from the bottom of one of the aluminum shims that provide lateral support to the fuel-holding basket inside the canister as well as a path for helium to circulate through the canister via convection. The pins, approximately 4 inches long, raise the hollow shims off the bottom of the canister. These shims replaced an older Holtec shim



Transfer of used fuel to dry storage at San Onofre was disrupted in March when a loose shim pin was found in a fuel storage canister.

design that did not have pins and instead used cutouts at the bottom of the shims to allow the helium to circulate.

Palmisano told the panel that he is very confident that the four loaded canisters are capable of meeting their safety function, adding that they are of a robust design with a large margin of safety. SCE is loading the canisters, which have a rated thermal capacity of 35 kW, to a 28 kW heat load limit.

According to Holtec, the canisters are capable of performing their safety function even if all of the shim pins were to fail and the flow of helium were to stop, a situation the company said is extremely unlikely.

Fuel loading was immediately suspended following the discovery of the loose pin, Palmisano said, but was later resumed using canisters of the original design. Fuel loading was also temporarily suspended at other nuclear power plants using Holtec canisters, including Vermont Yankee. Holtec is conducting a root cause analysis of the pin failure. It has been reported that the pin may have come loose as the canister was spun during laser peening of the canister welds.

NRC

In May, the Nuclear Regulatory Commission staff submitted a proposed rule (SECY-18-0055) to the NRC commissioners, seeking approval for its publication in the *Federal Register*. The rulemaking would amend the NRC's regulations for reactors transitioning to decommissioning. The proposed changes are primarily meant to make the decommissioning process more efficient by reducing the need for license amendments and exemptions from existing regulations. If approved by the commissioners, the proposed rule will be open to a 75-day public comment period following publication in the *FR*.

The NRC commissioners directed the staff to undertake a rulemaking on power reactor decommissioning in December 2014, and in November 2015, the agency published in the *FR* an advance notice of proposed rulemaking with a request for public comments. A regulatory basis in support of the new rule was published in November 2017, and a regulatory analysis was published in February 2018. The NRC staff used the regulatory basis and the associated regulatory analysis to inform its development of the rulemaking, which would amend the NRC's regulations under 10 CFR Parts 20, 26, 50, 51, 52, 72, 73, and 140.

Under the new rule, the NRC would adopt a graded approach that is commensurate with the reductions in radiological risk

at four levels of decommissioning: (1) permanent cessation of operations and removal of all fuel from the reactor vessel, (2) sufficient decay of fuel in the spent fuel pool such that it would not reach ignition temperature within 10 hours without cooling, (3) transfer of all fuel to dry storage, and (4) removal of all fuel from the site.

The major provisions of the proposed rule include changes in the following areas: emergency preparedness; physical security; cybersecurity; drug and alcohol testing; certified fuel handler definition and elimination of the shift technical advisor; decommissioning funding assurance; off-site and on-site financial protection requirements and indemnity agreements; environmental considerations; record retention requirements; low-level radioactive waste transportation; spent nuclear fuel management planning; application of the backfit rule; foreign ownership, control, or domination; and clarification of the scope of the license termination plan requirement.

● The Southwest Research Institute (SwRI) announced in April that it will continue to operate the Center for Nuclear Waste Regulatory Analyses (CNWRA) under a contract renewal with the Nuclear Regulatory Commission. Potentially worth up to \$52 million, the five-year contract provides continuing technical assistance and research support to NRC activities related to the storage, transportation, possible reprocessing, and ultimate geological disposal of spent nuclear fuel and high-level radioactive wastes.

SwRI has operated CNWRA since it was created in 1987 as a federally funded research and development center. According to SwRI, CNWRA supports the NRC with a broad range of technical assistance and research, including environmental evaluations, fire protection engineering, hazard assessments, materials degradation, and aging management. The center also provides performance and probabilistic risk assessments, risk-informed license review, and site characterization, and supports public outreach and stakeholder engagement associated with rulemaking and licensing activities.

SwRI operates CNWRA facilities in San Antonio, Texas, and Rockville, Md. Beyond its primary mission of supporting the NRC, CNWRA conducts independent research and peer reviews related to radioactive waste management for foreign governments and regulatory agencies around the world.

Vermont Yankee

The Vermont Public Utility Commission (PUC) issued an order on July 6 delaying a decision on the sale of the Vermont Yankee nuclear power plant until after the Nuclear Regulatory Commission has issued its own ruling in the license transfer proceedings. Entergy is seeking to sell Vermont Yankee and transfer its operating license and decommissioning trust fund to NorthStar Group Services for accelerated decommissioning. The sale is contingent on approval from the Vermont PUC and the NRC.

During evidentiary hearings held in May on the proposed sale, the PUC asked the parties in the proceeding if the commission should wait until the NRC's decision before issuing a final decision. In addition to petitioners Entergy and NorthStar, parties in the proceeding include Vermont's Department of Public Service, Agency of Natural Resources, and Attorney General's Office, along with the Conservation Law Foundation. In their responses, the parties generally agreed that the PUC should await a decision by the NRC.

In the order delaying its decision, the PUC noted that its review of the sale differs from the federal review, but that the NRC's eventual ruling may have some relevance to issues raised by the state's case. The PUC also agreed with the parties that the

NRC's ruling may conflict with the terms of a memorandum of understanding signed in March.

Entergy filed its license transfer application to the NRC in February 2017 and the company is hoping to complete the sale by the end of the year, pending the approvals. Entergy said it does not expect the PUC decision will postpone the sale.

D&D

Électricité de France (EDF) and French waste management company Veolia have entered into a partnership agreement on nuclear power plant decommissioning and radioactive waste management processing, the companies announced on June 26. Under the agreement, EDF and Veolia will codevelop technologies for dismantling gas-cooled reactors (natural uranium graphite gas) by remote control and for vitrifying radioactive waste, in France and worldwide.

EDF is currently decommissioning six gas-cooled reactors in France at Bugey (Loyettes, Ain), Chinon (Indre-et-Loire), and Saint-Laurent-des-Eaux (Loir-et-Cher). According to EDF, key milestones have already been met on all the projects and the company said that its objective is to dismantle these nuclear facilities in the shortest time frame possible. To accomplish this, Veolia will provide EDF with its experience in remote handling and robotics technologies in an effort to design and deliver innovative solutions to access the cores of gas-cooled reactors and to cut up and extract components under optimum safety and security conditions.

In parallel, EDF and Veolia will work to develop an industrial solution for the vitrification of low- and intermediate-level waste using Veolia's GeoMelt technology, which immobilizes the waste in a glass matrix. This, the company said, makes it ideal for radioactive waste, transforming it into a stable and durable waste form that is easy to transport and store.

The two companies said that their objective is the industrial implementation and joint commercial operation of these robotics and vitrification technologies.

● The U.S. Congress has provided the University of Arkansas (UA) with an additional \$10 million in decommissioning funds for the Southwest Experimental Fast Oxide Reactor (SEFOR), according to an April 4 announcement by UA Chancellor Joseph Steinmetz, Sen. John Boozman (R., Ark.), and Rep. Steve Womack (R., Ark.). The funding to complete the dismantling and remediation of SEFOR was provided by the Consolidated Appropriations Act of 2018, which was passed on March 23. The Department of Energy had awarded a \$10.5-million grant in October 2016 for the dismantling of the 20-MWt sodium-cooled nuclear test reactor, and the first phase of the cleanup was completed in September 2017. Mike Johnson, UA's associate vice chancellor for facilities, told *ArkansasOnline* that without the additional funding, work to complete the remediation of the SEFOR site would have to be halted. SEFOR operated from 1969 to 1972, and UA took ownership of the reactor in 1975. For more, see "A D&D Trifecta," beginning on page 34.

● The Nuclear Regulatory Commission is reviewing plans to decommission the American Centrifuge Lead Cascade Facility in Piketon, Ohio, as announced in the May 1 *Federal Register*. Centrus Energy Corporation applied to the NRC in January to amend its material license to authorize the decommissioning of the uranium enrichment facility.

The Lead Cascade Facility was a test loop of the American Centrifuge Plant, which Centrus (formerly USEC) planned to build and operate at the site of the Department of Energy's former Portsmouth Gaseous Diffusion Plant. The company ceased operation of the Lead Cascade Facility in 2016 and removed all uranium process gas (UF₆) and equipment for off-site disposal.



The NRC is reviewing Centrus' plan for decommissioning the American Centrifuge Lead Cascade Facility in Piketon, Ohio. (Photo: Centrus)

With the UF₆ and equipment removed, the NRC is limiting its review of the decommissioning plan to the facility's decommissioning funding, dose assessment and derived concentration guideline levels and methodology, and design of the final status survey.

● The project, engineering, and technical services company Wood announced on June 21 that it has launched a new nuclear D&D technology fund. According to the company, the goal of the Wood Nuclear Innovation Fund, which will invest in technologies for nuclear decontamination and decommissioning developed by small- and medium-sized enterprises (SME), is to bring about a step change in the decontamination and decommissioning process at nuclear facilities by finding new ways to minimize human intervention, increase productivity, and optimize waste management activities.

Bob MacDonald, chief executive officer of specialist technical solutions at Wood, said that the fund will enable SMEs to grow while helping Wood achieve its objective of becoming a valuable and trusted provider of waste management and decommissioning services. Wood's technical experts will assess proposals from SMEs, and those that are successful will be assisted by Wood's commercial, operations, and business development teams.



Waste handling operations at the Waste Isolation Pilot Plant were briefly suspended in May due to a misaligned waste container. (Photo: DOE)

WIPP

The New Mexico Environment Department (NMED) will not consider a request by the Department of Energy and its contractor Nuclear Waste Partnership (NWP) to modify the waste facility permit for the Waste Isolation Pilot Plant (WIPP) near Carlsbad, N.M., and has sent the request back to the DOE for further review. Modification of the permit would have allowed the DOE to change how it tracks and reports the volume of transuranic (TRU) waste disposed of at WIPP.

Currently, waste volume is calculated based on the total volume of the waste container, including the overpack that holds the TRU waste drums. Through the permit modification, the total waste volume would be based on the inner volume of the overpack, and not the larger outer volume. According to proponents of the modification, excluding the "air waste" surrounding the waste drums would increase WIPP's waste storage capacity by about one-third without exceeding the 6.2-million-cubic-foot capacity limit set by the WIPP Land Withdrawal Act.

The DOE and NWP submitted the request as a Class 2 permit modification, which involved a 60-day public comment period that ended on April 3. NMED received more than 50 comments for and against approving the permit modification, including a number of form letters against it. NMED declined to process the request as a Class 2 modification under 10 CFR Part 270.42 and sent it back to the DOE to resubmit as a Class 3 modification, which requires a more stringent approval process. In a June 1 letter to the DOE and NWP, NMED Secretary Butch Tongate wrote, "After reviewing the comments, and in accordance with 40 CFR 270.42(b)(6)(i)(C), I have determined that it is appropriate for NMED to process the modification as a Class 3 modification under 40 CFR 270.42(c), as there is significant public concern and the complex nature of the proposed change requires the more extensive procedures of a Class 3 modification."

● Assistant Secretary for Environmental Management Anne White has approved the construction of a new ventilation system at the Waste Isolation Pilot Plant, the Department of Energy

announced in May. The DOE said that the \$288-million Safety Significant Confinement Ventilation System (SSCVS) is key to its plans to increase shipments of transuranic waste to WIPP from cleanup sites across the DOE complex.

Following the accidental radiological release in February 2014, airflow to the underground was reduced, limiting the amount of activity that could take place within the repository. The SSCVS will significantly increase the amount of air available in the WIPP underground, allowing TRU waste emplacement work to occur simultaneously with facility mining and maintenance operations. According to the DOE, the SSCVS is one of a number of infrastructure projects planned for WIPP in the coming years. The DOE expects that construction of the new ventilation system will be completed by early 2021.

- Routine transuranic waste handling operations and underground emplacement activities resumed at the Waste Isolation Pilot Plant on June 2 after workers completed a recovery plan that involved repacking a seven-pack of waste drums that contained a misaligned waste container. The misaligned container was discovered during routine waste handling operations on the evening of May 24, and as a precautionary measure, underground activities were halted and the WIPP Emergency Operations Center was activated, the DOE said. There were no injuries or radiological release.

As part of the recovery plan approved by the DOE's Carlsbad Field Office on May 29, underground waste handling personnel disassembled the seven-pack of waste drums containing the misaligned container. They then rebuilt the waste assembly package before disposing of it in Room 5 of Panel 7 in the WIPP underground.

In addition to repackaging the waste assembly, some ground control work was also completed in Panel 7 due to uneven flooring in that area, the DOE said.

International

The United Kingdom's Engineering and Physical Sciences Research Council issued a £1.1-million (about-\$1.5 million) grant to develop self-learning robots for nuclear sites, it was announced in May by the University of Lincoln, which is leading the artificial intelligence research project as part of the U.K.'s National Centre for Nuclear Robotics. Computer scientists from the university will create machine-learning algorithms to increase capabilities in several areas of nuclear robotics, including waste handling, cell decommissioning, and site monitoring with mobile robots. With the aim of building robotic systems that can adapt to the unique conditions of nuclear sites, including locations contaminated by radiation, the team will develop algorithms for vision-guided robot grasping and manipulation, mobile robot navigation, and outdoor mapping and navigation.

- The Nuclear Decommissioning Authority (NDA) of the United Kingdom announced on July 2 that the government is taking over the Magnox cleanup contract. Magnox Limited, the company responsible for cleanup operations at the U.K.'s 12 nuclear sites and one hydroelectric plant, will become a subsidiary of the NDA starting on September 1, 2019.

In March 2017, the NDA announced that it was terminating its £6.1-billion (about \$8-billion) contract with Cavendish Fluor Partnership (CFP) to decommission the Magnox sites. According to the NDA, in line with a recent change to the way its Sellafield nuclear site is managed, expertise from the private sector will be engaged through multiple smaller contracts, rather than through a single large parent body organization. As the site license company, Magnox Ltd. is controlled by CFP, the parent body organization. CFP will continue to manage Magnox Ltd. until the NDA takes over next year.

- The International Atomic Energy Agency announced on April 30 that it has helped remove 27 disused highly radioactive sources from five South American countries. According to the agency, it was the largest such project ever facilitated by the IAEA and marks a significant step forward for nuclear safety and security in the region.

The material—including sealed cobalt-60 and caesium-137 sources used mainly for medical purposes, such as treating cancer and sterilizing instruments—was transported to Germany and the United States for recycling. Canada, where some of the sources were manufactured, funded the project upon requests for IAEA support from Bolivia, Ecuador, Paraguay, Peru, and Uruguay. The project, carried out over five months, started in Peru and Uruguay late last year before continuing in Bolivia, Ecuador, and Paraguay in February and March. The transport of sources to Germany and the U.S. was completed at the end of March.

- Canada's Nuclear Waste Management Organization (NWMO) signed or renewed international cooperation agreements with its counterparts in Belgium, France, Sweden, Switzerland, and the United Kingdom. The agreements join accords already in place with nuclear waste organizations in Finland, South Korea, and Japan. The agreements were signed in Toronto on May 14 during the annual meeting of the International Association for Environmentally Safe Disposal of Radioactive Material, which was hosted by the NWMO.

Laurie Swami, president and chief executive officer of the NWMO, said in a statement, "As our work to identify a single, preferred site for a deep geological repository intensifies, now is the perfect time to renew and sign knowledge-sharing agreements with our international partners. These agreements ensure we are applying the best international practice to Canada's plan for the safe, long-term management of used nuclear fuel and sharing our experience with our global counterparts."

DOE updates

The transfer of the legacy waste cleanup contract for Los Alamos National Laboratory (LANL) to the consortium Newport News Nuclear BWXT-Los Alamos (N3B) has been completed, the Department of Energy's Environmental Management Los Alamos Field Office (EM-LA) announced in May. N3B is made up of Stoller Newport News Nuclear and BWXT Technical Services Group, along with subcontractors Tech 2 Solutions and Longenecker & Associates.

The transition to the new contract from a bridge contract, which was held by Los Alamos National Security (LANS), was completed on April 29, according to EM-LA. The DOE awarded N3B the \$1.39-billion Los Alamos cleanup contract in December 2017. EM-LA took over the management of legacy waste cleanup at LANL from the National Nuclear Security Administration in 2014 following the accidents at the Waste Isolation Pilot Plant in New Mexico.

EM-LA Manager Doug Hintze said in a statement that the transition was unique within the entire DOE complex and was successfully completed through the close collaboration of N3B, LANS, and EM-LA, along with EM-LA's federal partners at the NNSA Los Alamos Field Office. NNSA is the LANL landlord organization, and LANS, a consortium of Bechtel, AECOM, BWXT Technologies, and the University of California, is the laboratory's management and operations contractor.

- To expedite the removal of radioactive waste from underground tanks at the Savannah River Site, a new cesium removal system, called Tank Closure Cesium Removal (TCCR), is being installed at the site's H Tank Farm, the Department of Energy announced in April. The technology will remove the radioactive element from the Cold War legacy salt waste at SRS, accelerating



The Savannah River Site's Salt Waste Processing Facility is currently undergoing testing and commissioning. (Photo: DOE)

waste removal and tank closure, the DOE said.

The TCCR technology uses an ion exchange process within a self-shielded, self-contained column to pull cesium from the waste, reducing risk to workers, the public, and the environment. Westinghouse Electric Company and Columbia Energy and Environmental Services completed the design, fabrication, assembly, and factory testing of the TCCR equipment off-site. SRS's liquid waste contractor, Savannah River Remediation (SRR), is leading the on-site installation process. According to the DOE, after the completion of installation, testing, and readiness for startup, demonstration operations are expected to begin in late 2018.

- In April, the DOE marked the 10th anniversary of the start of radioactive operations at the Savannah River Site's Actinide Removal Process/Modular Caustic Side Solvent Extraction Unit (ARP/MCU) facilities. According to the DOE, the two salt-decontamination facilities are key players in the mission of dispositioning the salt waste in liquid waste operations at the site and have played a significant role in the closure of six high-level waste tanks.

Nearly 7 million gallons of salt waste have been processed through ARP/MCU since hot operations began in April 2008. The two facilities will continue processing salt waste until the Salt Waste Processing Facility at SRS begins radioactive operations.

- The Department of Energy's Oak Ridge Office of Environmental Management (OREM) and its cleanup contractor URS-CH2M Oak Ridge (UCOR) completed the demolition of the K-633 Test Loop Facility at Tennessee's Oak Ridge Reservation in June. According to the DOE, the project eliminates one of the most contaminated buildings remaining at the East Tennessee Technology Park (ETTP), site of the former Oak Ridge Gaseous Diffusion Plant.

Building K-633 is the fourth building that OREM's program has removed from ETTP's Poplar Creek area since last year. Prior to those tear-downs, the area contained 11 large buildings and numerous structures built in the 1940s and 1950s to support the site's former nuclear program and operations. According to the DOE, the Poplar Creek area contains the most contaminated facilities left at the site, following the demolition of five massive gaseous diffusion uranium enrichment buildings (K-25, K-27, K-29, K-31, and K-33). Crews began taking down K-633 in early May, and they finished removing debris on June 14.

The DOE also announced on July 3 that OREM and UCOR have begun demolition of the Toxic Substances Control Act (TSCA) Incinerator at the ETTP site. The incinerator, which was capable of burning hazardous and radioactive waste that contained polychlorinated biphenyls (PCBs), treated more than 35 million pounds of liquid and solid waste during its operation from 1991 to 2009.

- A radioactive waste drum at the Department of Energy's Idaho Site ruptured on April 11 due to an exothermic reaction within the container, according to DOE cleanup contractor Fluor Idaho. No injuries were reported, and no environmental contamination was detected outside the Accelerated Retrieval Project V (ARP V) building where the incident occurred, Fluor said. An investigative team later found that the lids of three additional drums had been ejected due to excessive internal pressure.

Since 2012, the ARP V facility has processed and repackaged approximately 9,500 drums of sludge-contaminated waste, preparing it for certification and shipment to the Waste Isolation Pilot

Plant (WIPP) in New Mexico for permanent disposal. The waste drums from the April 11 incident had been processed earlier that day and were repackaged and staged for several hours before the incident occurred, according to Fluor. None of the drums had completed the final characterization, treatment, and certification process required for shipment to WIPP.

- The last of the Separations Process Research Unit (SPRU) buildings at the Knolls Atomic Power Laboratory in New York were demolished in May, completing the final phase of building demolition at site, the Department of Energy announced in June.

According to the DOE, the demolition of SPRU culminates several years of demolition operations by AECOM, the department's cleanup contractor at the site. Demolition of SPRU buildings H2 and G2, which supported improvements in the chemical separation of plutonium for the nation's strategic defense early in the Cold War, began in 2016. Remaining remediation work includes removing concrete debris, verifying that the remaining soil meets cleanup objectives, and backfilling the excavations and restoring the work area.

The DOE said that the project is expected to be completed this fall. A small amount of transuranic waste will be stored on-site until it can be shipped to the Waste Isolation Pilot Plant in New Mexico for disposal. ■



Crews began tearing down the K-633 Test Loop Facility at the DOE's Oak Ridge Reservation in May and completed the project in June. (Photo: DOE)



The Portsmouth Gaseous Diffusion Plant is the DOE's largest facility under one roof, with three large process buildings that house the gaseous diffusion equipment and span the size of 158 football fields.

Portsmouth D&D Technology Progress: *Are We There Yet?*

By *Marty Reibold*

The Portsmouth site is a 3,778-acre federal reservation in south central Ohio. In the early 1950s, the Atomic Energy Commission—predecessor to the Department of Energy—built the Portsmouth Gaseous Diffusion Plant (GDP) to enrich uranium for defense purposes and commercial nuclear fuel sales. In 2001, enrichment operations at the Portsmouth site ceased, and the DOE decided that the GDP should be maintained in a cold standby status. The facilities were shut down entirely in 2005, and in 2010 the DOE issued a record of decision allowing decontamination and decommissioning activities to begin.

A massive plant of incredible size and scale, Portsmouth uses 1950s-vintage technology and is supported by a large, potentially capable, workforce. This workforce, however, has not operated the plant in nearly two decades and has never been challenged with implementing new or emerging technologies. While introducing innovative methods and systems promises benefits and opportunity, the challenge of successfully introducing and adopting new technologies in this setting has never been more daunting.

In 2016, the DOE's Technology Development Office, part of the DOE Office of Environmental Management (DOE-EM), requested that Portsmouth support the DOE Science of Safety initiative by hosting a technology demonstration at the site. Called the Robotics Challenge, the event had two objectives: demonstrate the relevancy and utility of robotic technologies as catalysts for the Science of Safety initiative; and educate and orient the Portsmouth workforce in understanding and applying robotics and related enabling technologies. As the site D&D contractor to the DOE, Fluor-BWXT Portsmouth (FBP) arranged and hosted 24 technology demonstrations from 11 participating

entities that included universities, national laboratories, federal agencies, and not-for-profit organizations. The event drew more than 150 participants, including site operators, roboticists, and FBP support personnel. All demonstrations were either operated by or assisted by United Steel Worker (USW) union personnel.

DOE-EM has been actively promoting the use of advanced robotic technologies at its sites as a key mission enabler. Given the success of the Robotics Challenge and with continued support from the Technology Development Office, the Portsmouth site has proceeded with several technology initiatives over the past year.

Technology applications and implementation

Historically, most robotic applications can be considered as either reactive or proactive. Reactive applications are the most noteworthy and receive by far the most attention. Typically, these applications are disaster-recovery scenarios responding to an unplanned and unwanted event. The robotic application is usually a custom one-off solution intended to solve a very specific challenge and a unique set of requirements. These are mission-critical situations with consequences of high risk and high reward. The tangible benefits do not usually include any required return on business investment and are often time-sensitive.

Proactive robotic applications, on the other hand, are by nature low-key and mundane. They result from the careful analysis of repetitive labor-intensive work practices and the subsequent application of robotics or advanced technologies to improve

worker safety and performance. Proactive applications seek to identify efficiencies, costs, and benefits in order to construct a business case for current or future activities. They require a repeatable solution for routine work processes and, upon deployment, rely heavily on workforce engagement. The observations in the following discussions are focused primarily on proactive-type applications.

Technology and application selection

Aligning technology with a well-defined work process is both the art and the science of successful application and the element most critical to success. Said another way, the most critical success factor is identifying tasks appropriate for the technology. Robots can be designed to perform or assist many activities currently accomplished by humans. Ideal applications for robots are jobs that exhibit the four D's: Dull (routine, labor-intensive, repetitive, mundane), Dirty (contaminated, toxic, nuisance), Dangerous (significant safety and health risks), and Difficult (requiring engineered measures).

To make a reasonable business case for introducing robotic technology, however, there must be a compelling need and significant benefits (safety, performance, cost, quality, or schedule) that make it worth changing the paradigm, gaining the buy-in and confidence of the workforce, and overcoming all the institutional barriers. The need for a repeatable application must be at the heart of the process and, when properly analyzed, may result in a robotic solution that meets the needs in a cost-effective and efficient way.

Too often the industry looks at a robotic technology and then imagines how best to make use of it. This approach can be effective in introducing the workforce to the idea of technology, as was achieved in the Science of Safety Robotics Challenge at Portsmouth in 2016. What began as a technology demonstration was transformed into a technology application by working with each of the roboticists to demonstrate some functionality relevant and applicable to the Portsmouth site rather than a canned program of features. The surprising outcome of that approach was that it not only manifested the technology in association with a function the workers could relate to, it also generated a myriad of new ideas and uses through the hands-on process of staff involvement. Hands-on use by workers was by far the best way of identifying and confirming potential applications.

Many available commercial and prototype robotics are not "nuclearized," and are either not robust enough to operate in a harsh environment or are challenging to decontaminate. One common observation that arose from the Robotics Challenge was that several of the more interesting systems that held some promise for applications at Portsmouth would require redesign or retrofitting to withstand the work environment. Many of the systems that were put forward showed promise but lacked potential for surviving in an industrial or radioactive setting with any sort of reasonable life span.

Each potential application needs to be aligned with the best-fit robotic solution, and not every operation is destined for robotic applications. Task-specific systems are only of value until the task changes. Flexible capability systems may be more forgiving but less efficient. "Plug-and-play" standardization and ease of use can encourage innovation and even partially overcome shortfalls in functionality. Commercial off-the-shelf robotic systems usually require modification and testing for nuclear or hazardous environments. Customized systems are always more expensive but are more likely to achieve the objectives and support a compelling business case.

While the Robotics Challenge was deemed a success, it provided only ideas of how to use existing technologies, rather than a list of repeatable work processes that needed to be solved. Deploying robotics for the sake of claiming robotics usage has no tangible long-term benefit. Without relevant, repeatable applications, significant implementation planning, and active workforce engagement, the system will at best be underutilized or at worst bypassed or discounted as a toy. Fortunately, at Portsmouth, the scale, volume, and repeatability of the existing processes present opportunities for identifying relevant robotic applications.

Cost barriers

There are a number of challenges related to cost that can be difficult to overcome when implementing a new technology or robotic system. The initial capital cost must be reasonable in order to take the next step. Unless a clear return on investment can be generated in the business case, with quantifiable savings, it can be challenging to convince senior management and cost-account managers to allocate sufficient budget up front to achieve the cost savings in the future. Likewise, the training and qualification of workers can become a soft, or hidden, cost, regardless

Once proficiency was achieved, workers embraced the opportunity to perform the work using these new tools, and a waiting list emerged for those who wanted to transfer into what previously had been regarded as dirty, "knuckle-dragging" operations.

of how intuitive the system implementation appears. Maintenance costs only matter if the maintenance staff is capable and qualified with the new technology, which is another element of workforce engagement and operator training. Ideally, if the unit costs are small they may be considered a consumable item. In any event, the business case needs to consider all costs and give them proper visibility in the analysis.

Workforce engagement

Technology demonstrations such as the Robotics Challenge help raise awareness of both operating staff and management teams. During the six months following the Robotics Challenge, FBP completed a design for clearing and constructing a material sizing area (MSA) in Portsmouth's X-333 process building. The design team took full advantage of the desire to improve worker safety and work performance by incorporating tele-operated robotic systems and features (Brokk work platforms, Omnicart transfer systems, and remote-controlled straddle cranes) for repetitive and repeatable activities. To support this new project successfully, a training and demonstration area (TDA) was established in the X-700 building to provide a suitable workspace and supporting infrastructure for mock-up and simulation to accomplish prerequisite and planning activities for startup and commissioning of the MSA operations.

Once the TDA was established, it provided the opportunity

for hands-on training for workers to become familiar and proficient with the new equipment and technologies. The TDA also became the development location for creating procedures and work instructions, while enabling the confirmation of proposed techniques and approaches.

More than anything else, the TDA became the setting for worker engagement to begin. Workers, who previously had been performing plasma arc cutting operations manually in supplied-air and personal protective equipment, learned how to perform the same cutting operation remotely using a Brokk-mounted plasma torch. Virtual reality systems allowed workers to disassemble the large converters one piece at a time through a series of sequenced cuts and to practice specific steps without leaving the training module. Automated carts and cranes were manipulated, serviced, and maintained in a clean environment prior to performing that work in a radiologically contaminated area. Each of the workers received instruction on their specific duties and received qualification through classroom and practical testing. Once proficiency was achieved, workers embraced the opportunity to perform the work using these new tools, and a waiting list emerged for those who wanted to transfer into what previously had been regarded as dirty, “knuckle-dragging” operations.

Worker acceptance

Worker acceptance of a new technology goes hand-in-hand with workforce engagement. Regardless of how rigorous and involved the worker training and qualification program becomes, there is still residual doubt about job security. The counter-argument is the acquisition of new skills, and for many that is a reasonable trade-off. In a unionized workforce it can be hard to predict what the reaction might be to new technologies, so the best advice is direct and honest communication combined with early engagement.

In many ways, labor unions are no different than other support groups, such as security or work planning. Their systems and procedures are geared around traditional work functions and general assumptions about labor requirements. Unions will usually be supportive of any system that improves worker safety and will be skeptical of any system that eliminates the need for workers. The systems being deployed at Portsmouth are generally tele-operated and thus still require a worker to operate. Workforce reductions, therefore, are not an issue, and the USW has been engaged and supportive.

Institutional barriers and paradigms

Existing work-control procedures are typically written with manual operations in mind and will require revision to accommodate robotic technologies. At plants such as Portsmouth, nothing gets accomplished without a work package, and the



Remote-controlled straddle carriers will be used to handle converter components and eliminate the reliance on aging building cranes.

planners are highly skilled at generating these packages based on a host of templates and prior practices. Converting that mindset to think through each step of the operation when performing that work with a robotic tool or technology assist can be a significant challenge to overcome and should not be overlooked. The entire spectrum of job hazards and safety controls must be revisited from the perspective of using robotic systems, eliminating some and potentially adding others.

Security programs, procedures, restrictions, and specifically the mindset of security personnel at most DOE sites are not conducive to implementing robotic technologies. Over the years, an intricate set of administrative and engineered controls have been put in place to keep the plants secure and prevent inadvertent or intentional disclosure of information. For example, many robotic operations rely upon cameras to help remotely position, conduct, and view operations. Cameras, however, are typically banned from the limited areas of DOE facilities, and security personnel find it difficult to reconcile the operational need. Likewise, most new technologies rely upon wireless technology for monitoring and control, which again potentially raise concerns over compromising existing security protocols.

Management commitment

Without broad commitment from senior management, the implementation of new technologies faces an uncertain outcome. Many organizations function as tribal cultures in closed systems. The system is closed in how information and knowledge is shared, how power is gained and held, and how formal rules are ignored and informal rules are enforced to maintain the status quo. Robotic and advanced technologies challenge the status quo and therefore are often viewed with circumspection. The closed systems will maintain themselves in some degree of balance, and for change to the status quo to occur the balance must be significantly disrupted in a sustained manner. To change the culture

requires a champion who believes in the business case and is passionate about ensuring the successful implementation of the system. The champion must act as a change agent, or “dragon slayer,” to overcome inertia and existing practices and introduce new ideas and methods with a significant and sustained effort. Management-stated commitment alone may not be sufficient to overcome the inertia. Without a concerted effort, the workforce will likely revert to manual operations to get their job done.

Operational team engagement

The Portsmouth site, like most organizations, operates with a tribal culture, enhanced somewhat by geographical seclusion, more than 60 years of operations with 1950s technology, and further isolation due to national security considerations cloaking the specifics of the plant’s operations. Combined with this is the current D&D mission. D&D activities and personnel who have worked in that field are notoriously resistant to technology improvements. The schedule and budget for characterizing and dismantling buildings and systems places a premium on known methods and proven techniques. D&D sites in general are not a particularly receptive atmosphere for engaging or trying out new technologies.

Implementation teams

To successfully implement new technologies at Portsmouth, implementation teams were formed to ensure execution in a safe and compliant manner so as to achieve the expected efficiencies. Since work processes often cross the boundaries of multiple subsystems, any process improvements require cross-functional representation from each subsystem to be effective. These teams must collaborate and buy in to the project to achieve broad change while respecting the inputs of each stakeholder. The purpose of the team with representatives from each of the affected groups or support organizations is to ensure that the system is successfully implemented through strong communication, technical and logistical input, mutual cooperation, and prioritized and timely support. Operating as an integrated project team, the result has been increased visibility, cooperation, and a general sanctioning of the management message that “we are going to do this.”

Operator training

Effective implementation of new technologies at any site is dependent on a robust and effective operator training program. With appropriate operator training, workers usually adapt quickly to the new technology and can be relatively proficient within a short time. From a worker perspective, the exposure to and use of these technologies allows the workforce to learn new skills that are transferable to other industries. Manufacturing and other industrial sectors are becoming more dependent on technology to drive productivity growth. At Portsmouth, the acquisition of new skills is seen as a positive factor, given the depressed economic environment in the region. The four-county region surrounding the Portsmouth plant has had a modest 0.9 percent increase in total population since 2000. When analyzed by age, the 55-plus segment of the population experienced the most growth, while key workforce population segments (e.g., 25-44) decreased in size primarily due to migration out of the area. Significant unemployment and underemployment rates exist throughout the four-county region. Skills gained in the use of robotics and advanced technologies provide the workers with abilities and expertise transferable to other industries.

Benefits to the Portsmouth site

There is a significant opportunity to achieve a range of benefits at Portsmouth from each of the technologies currently being deployed. Improvements in worker safety and/or overall work performance can be achieved through each of the technologies being deployed on-site. The tele-operated devices focused primarily on enhanced worker safety have been an integral part of the worker engagement process as they prepare for deployment in the MSA. The repetitious nature of the MSA function provides the prospect of improved work performance. The deployment later this year of production prototypes for an in-pipe nondestructive assay (NDA) system (RadPiper) will replace the labor-intensive manual method of exterior scanning of pipes. Based on testing to date, the projected results indicate that the improved accuracy, quality, and efficiency (speed) will lead to improved work performance and worker safety.

From a worker perspective, the exposure to and use of these technologies allows the workforce to learn new skills that are transferable to other industries.

Benefits to others

Also having had a dedicated mission of uranium enrichment, the Paducah Gaseous Diffusion Plant is a sister facility to Portsmouth and faces similar systems and challenges. The Paducah D&D schedule lags the Portsmouth schedule by about five years and could benefit greatly from advances made at Portsmouth. Likewise, many of the challenges being addressed by robotic and remote technologies at Portsmouth are analogous, if not identical, to existing opportunities across the DOE complex. This commonality has prompted DOE-EM to identify Portsmouth as its primary demonstration site for potential new technologies.

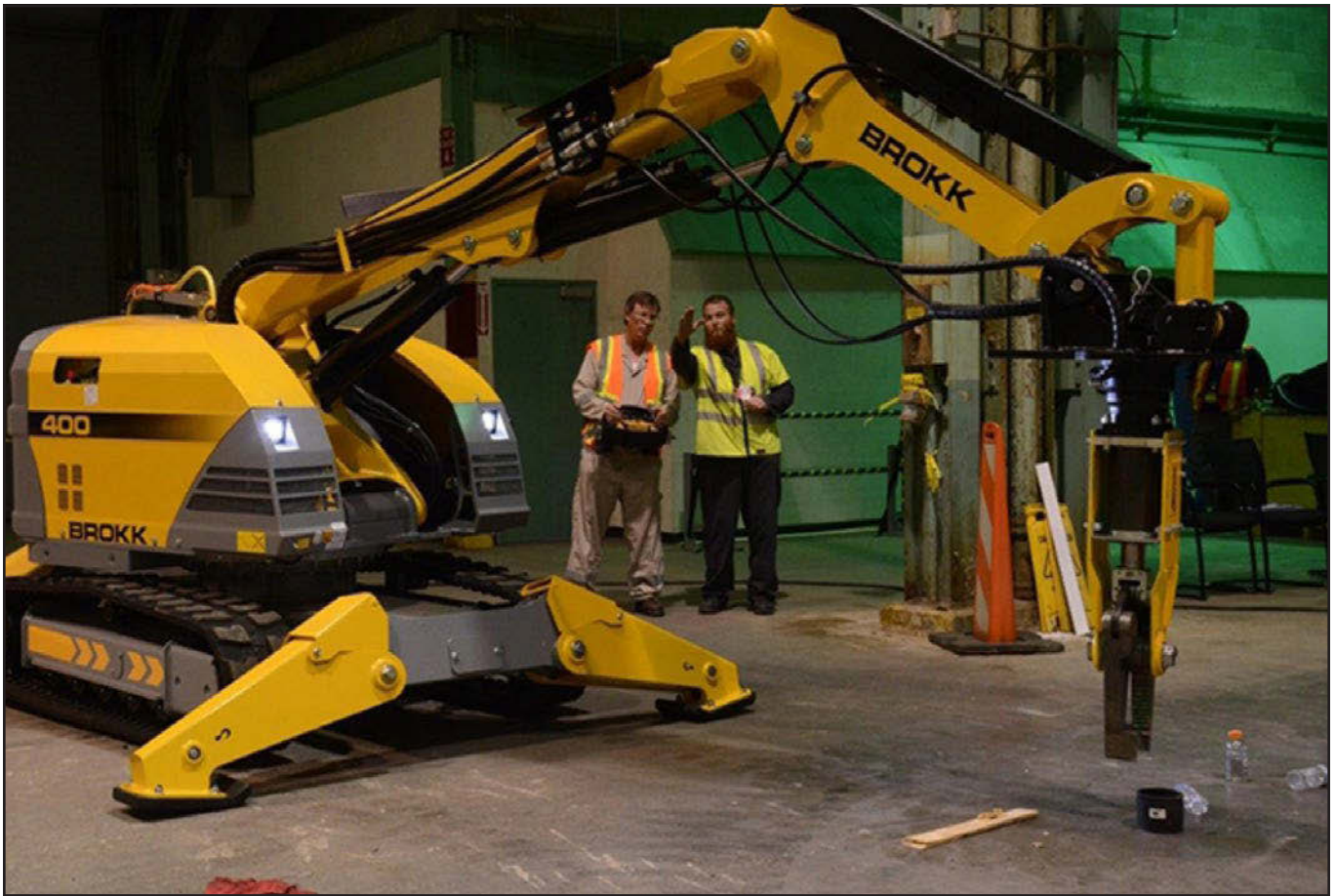
Deployments

Improving worker safety

One of the key tenets of the DOE-EM Science of Safety initiative is to improve worker safety. Robots and advanced technologies in general are tools to be used by trained operators to do their jobs better, safer, and more efficiently. Tele-operation systems use machines to remove a worker from a hazardous work face and extend his/her sensing and/or manipulating capability to a physically remote location. Tele-operated systems keep the worker in the loop while minimizing their risk of harm.

Extensive use of tele-operated systems and wireless technologies is being implemented at Portsmouth, including six Brokk work platforms, two wirelessly controlled omnidirectional carts, and two remote-controlled straddle carriers. The specific applications are within the MSA to be cleared and constructed in one of the process buildings (X-333). The MSA mission is a repetitive and repeatable application for disassembling and size reducing 626 large (35-ton) process converter vessels and removing and recovering uranium deposits from nearly 100 large (18-ton) compressors.

The Brokk 400 systems serve as a tele-operated work platform to remove the worker from the work face. The Brokks are wirelessly controlled by joystick and have a capacity comparable to a 20-ton excavator. They have a compact footprint with an exceptional reach of 23 feet. The Brokks are extremely precise and



Portsmouth workers train to become proficient in using the tele-operated Brokk 400 work platform, which will be used to disassemble Portsmouth's large process converters.

dexterous and have been equipped with multiple interchangeable attachments, including plasma cutters, shears, electromagnets, and various grapples.

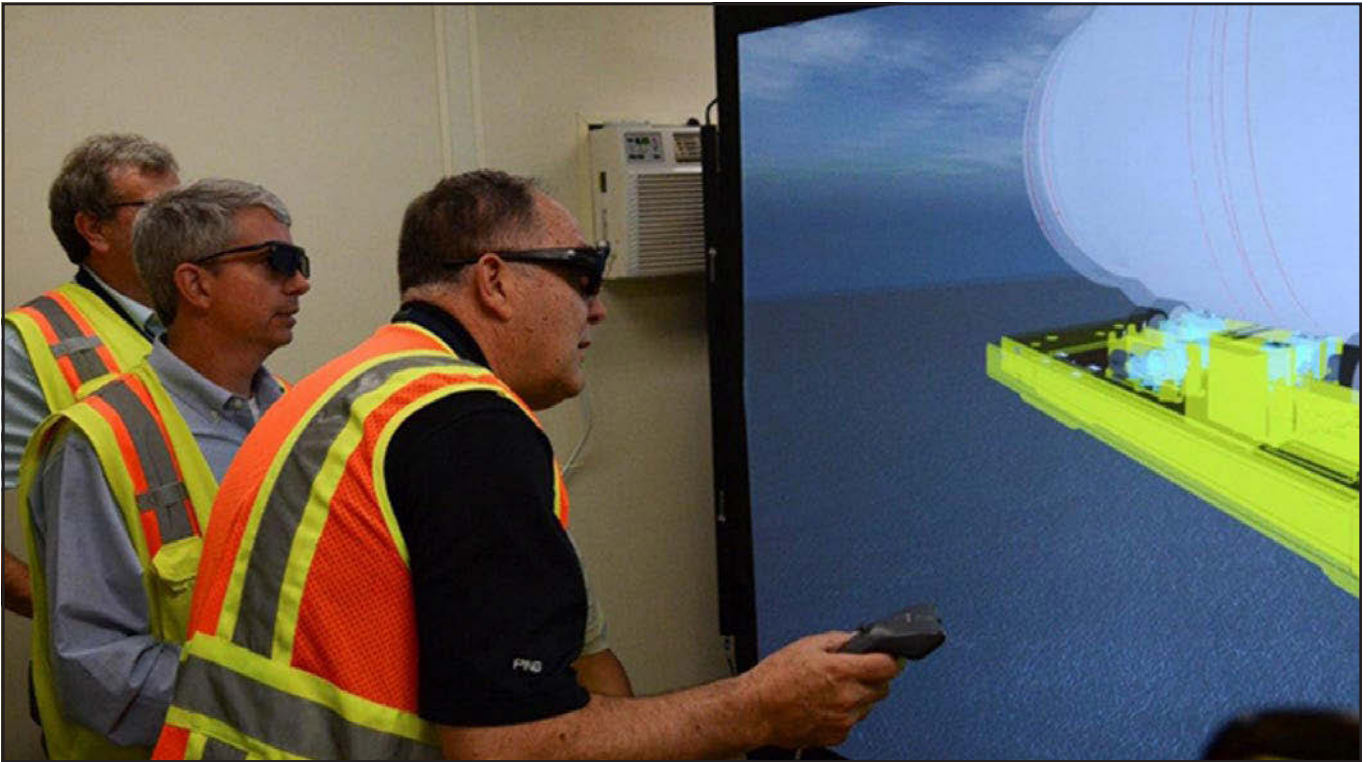
Another advanced system to be used will be a pair of self-propelled transporters (platforms) for transferring and rotating the 35-ton converters. The Omnicart platform acts as a transporter, moving the converters from the process cells to the MSA, and serves as the workstation for the Brokks to cut and disassemble the converters. The wireless Omnicart has

nine load-equalized suspension modules, can rotate the converters for angular and circumferential cuts, and is capable of omnidirectional travel, including rotating around its own axis. The joystick-operated system is highly maneuverable with exceptional precision within 0.02 inches and is battery powered with a 100,000-pound capacity. Its live center-of-gravity monitoring improves safety through optimum balance and secure loading.

The MSA is also being equipped with two remote-controlled straddle carriers for material handling. These mobile cranes were custom configured to span the converter disassembly workstation and remove converter components safely and efficiently. By deploying the straddle carriers, the MSA operations no longer rely on using the existing 40-ton overhead cranes to execute relatively lighter material transfers. The overhead building cranes are at the end of their useful life and represent a significant availability concern due to reliability and maintenance issues that could impede MSA operations if the straddle carriers were not deployed. In addition to the simplified hoisting and rigging operations, the battery-powered straddle carriers will be more adept than the overhead cranes at moving items to work tables and stands for further disassembly and inspection for uranium deposits.



Tele-operation of the Omnicart (shown here with a simulated test weight) will provide for the safe and secure transport of converters.



As an integral element of the readiness process, virtual reality modeling is used in the TDA at Portsmouth to facilitate work planning and worker engagement.

Work planning

An example of workforce engagement in the TDA is the development and use of virtual-reality systems. Using 3-D models of converters and process cells created by Savannah River National Laboratory, workers have developed work-planning packages and job procedures for each step of converter disassembly. The virtual-reality systems allow workers, without leaving the training module, to practice taking the large converters apart a piece at a time through a series of sequenced cuts. Additional

tools deployed to support work-planning activities include the development of a comprehensive discrete-element simulation model (time and motion) that identifies throughputs, confirms shifts and schedule parameters, detects potential bottlenecks in the process, and calculates usage and constraints for equipment and resources used in the process.

Emergency response

A Talon robot that was acquired as part of the upgrades to the site's Emergency Operations Center is now available for emergency-response applications and is being incorporated into mock drills. The remotely operated platform and articulating arm were fitted with a suite of chemical, biological, radiological, nuclear, and explosive sensors. The robot allows first responders to collect situational data before entering hazardous situations.



The Talon system, which has successfully supported hundreds of missions in Iraq and Afghanistan, is being used at several DOE sites for emergency response situations.

Improving work performance

Through a collaborative arrangement with Carnegie Mellon University, FBP has successfully demonstrated proof-of-concept and operational viability of two innovative inspection technologies for detecting uranium deposits inside piping. The two methods employ radiological (RadPiper) and volumetric (PipeDream) measurement methods from inside the pipe using novel and innovative approaches. Demonstration testing has been conducted in both cold (nonradioactive) and hot (contaminated) piping systems at the site.

These systems can significantly improve upon and potentially replace the current manual NDA measurement methodology for characterizing piping. The NDA measurements are required for each pipe run and equipment component to establish that the building has achieved a state of "criticality incredibility" before it can be decommissioned to a status of "cold and dark." The existing method for characterizing the first process building (X-326) at Portsmouth has required more than a million manual



RadPiper is a track-driven robot carrying a disc-collimated scintillating radiation detector that collects gamma spectra while traveling down the pipe. In addition to auto-analysis and report generation, the data-management module maintains visual images displaying piping features and uranium deposits in a Portsmouth pipe.

measurements using hand-held external radiological detection devices. In the case of piping systems, the external measurements must account for associated uncertainty of deposit location in the pipe by increased conservatism. The potential cost avoidance for implementing these systems in the remaining process buildings at Portsmouth could well exceed \$40 million and 500,000 labor-hours.

These applications are excellent examples of engaging a new technological solution with significant benefits (safety, performance, cost, quality, and schedule) to fill a compelling need. The application delivers a repeatable solution that can be implemented efficiently and cost effectively. DOE-EM and the Portsmouth/Paducah Project Office have authorized and funded the development of production prototypes for the RadPiper system to be deployed into operation by the summer of 2018.

Conclusions

Clearly there are significant potential benefits to implementing robotics and advanced technologies into D&D project environments. Robotics can be effective at tele-operation by safely removing the worker from the work face while maintaining remote control and keeping the worker in the loop. Worker safety can be improved through reductions in worker exposure to hazardous environments as well as reductions in potential injuries from repetitive or high-risk tasks.

When properly analyzed in advance, the implementation of robotic and advanced technologies can deliver significant business returns both monetarily and in fewer lost workdays. The business case must demonstrate promise, with initial capital costs low enough to encourage investment and benefit from the future savings. If the initial costs are too high, then a phased approach should be considered to mitigate risk through proof-of-concept testing.

The in-pipe inspection systems being developed by Carnegie Mellon University in support of the Portsmouth D&D project represent a definitive example of technology development and subsequent deployment serving a critical need in a schedule-sensitive time frame. The system was conceived, developed, and successfully tested in less than six months. RadPiper has been demonstrated to achieve greater accuracy and certainty than current methods, and its rapid deployment presents an opportunity to save significant time and cost (more than \$40 million)

while improving the overall safety of the operation through the elimination of more than 500,000 labor-hours of fieldwork in elevated and potentially contaminated operations. The system transforms the measurement of uranium holdup deposits by detecting robotically from inside pipes and streamlines the NDA process significantly via auto-analysis and auto-reporting. In addition to the immediate near-term impacts at Portsmouth, the system can certainly be applied to achieve even greater savings at the Paducah plant and potentially other DOE-EM sites.

Successful implementation relies first and foremost on selecting the proper application. Often that requires looking for the mundane rather than the sexy application. Proper applications look to solve problems that will benefit the workforce either through improved safety or improved performance. It is important to resist the temptation to force fit a “high-tech” solution and keep in mind that not every operation is destined for robotic applications. Likewise, good applications focus on work processes with sufficient volume and repeatability to generate reasonable business cases for return on investment. Often the workers themselves are best suited to identify the most successful applications.

Early engagement of both management and the workforce is important to successful implementation of new technologies. At Portsmouth, an implementation-team concept has been put into action. The purpose of the integrated project team, with representatives from each of the affected groups or support organizations, is to ensure that the system is successfully implemented through strong communication, technical and logistical input, mutual cooperation, and prioritized and timely support. Finally, effective implementation of new technology at a site such as Portsmouth requires a champion (dragon slayer) who believes in the business case and is passionate about ensuring the success of the system. The challenge of implementing new robotic technologies can be best summed up by this quotation from the political philosopher and historian Niccolo Machiavelli:

“There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things.”

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Acknowledgements

Funding and support for the Science of Safety initiative and subsequent technology development and application at Portsmouth were provided by the DOE-EM Office of Technology Development. Collaboration among the DOE site office, Savannah River National Laboratory, and specifically Carnegie Mellon University was instrumental in developing and deploying these technologies.

Marty Reibold is a senior project director at Fluor Government Group and served as the Director of Strategic Initiatives at the Portsmouth site.

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Autonomous Radiation Survey Inside Contaminated Buildings at Fukushima Daiichi with the RISER UAV

By Matt Mellor and Ashley Napier

Nuclear decontamination and decommissioning is constrained and defined by radiation and radioactive contamination. Where radiation is high and its distribution unknown, simply gathering the data needed for project planning can become a challenge. Fukushima Daiichi epitomizes this challenge. The complex sequence of events at the plant following the March 2011 earthquake and tsunami has resulted in extensive physical damage and an essentially unpredictable distribution of contamination.

Tokyo Electric Power Company (TEPCO) has applied a range of manual and robotic techniques to map the status of the plant, but many significant areas have remained no-go zones due to a combination of high radiation, physical hazards, and obstacles. Further, even in areas where manual survey is feasible, there is strong desire to minimize human exposure to radiation by deploying robots where possible.

RISER is a fully autonomous unmanned aerial vehicle (UAV) equipped with an infrastructure-free, three-dimensional navigation and mapping system, inspection cameras, and a cadmium zinc telluride (CZT) spectrometric measurement capability. The system has been custom designed specifically to meet the needs of the nuclear inspection. RISER is capable of accessing areas with dose rates of hundreds of millisieverts per hour and producing 3-D models and radiation surveys with accurately located data points. The data from RISER can subsequently be fused using Createc's N-Visage engine to produce 3-D contamination maps, which can be used for predictive modeling of future D&D activity. RISER has been deployed at Fukushima Daiichi since March 2017. This article presents examples of data and analysis outputs, as well as general learning about deploying autonomous robots at a nuclear site.

Robotics in D&D

Robotics in a variety of forms has been used in nuclear decommissioning since the outset. Despite this, nuclear robotics remains far from a solved problem. The unique nature of each project has defied attempts to make decommissioning machines for general application, and the unpredictable nature of the work makes it frustratingly difficult to design bespoke solutions that perform as desired.

Mainstream robotics has traditionally focused on manufacturing applications, where qualities such as speed and precision are essential to success; much of this development has therefore not been directly relevant to nuclear D&D, which demands robustness and adaptability. Recent years have seen the debut of



The RISER drone as seen from underneath.

a new generation of robotics systems that focus on using autonomy to enable basic robots to operate within complex environments to complete complex tasks. The classic examples have become delivery drones [1], autonomous driving [2], and warehousing automation [3]. These applications all implement clearly defined “A to B” transport tasks but do so within a complex, dynamic environment that requires the robots to actively adapt to the unexpected to meet their objective. The work described in this article applies some of these new robotics techniques to the task of characterizing inaccessible nuclear facilities to enable decommissioning.

The characteristic that enables these robots to cope with dynamic environments is perception; the robots can in some sense see and respond to their environments. In the application we describe here, a drone, RISER, is enabled to undertake a gamma spectrometry survey in an unknown environment using a technique called simultaneous localization and mapping (SLAM). SLAM uses onboard sensor data to both build a map and infer the current location of the robot within that map in real time.

SLAM itself is a passive process, but if the output of the SLAM algorithm is fed back to the robot controller, it is possible to enable the robot to perform closed-loop position control. This enables the operator to interact with the robot by specifying position objectives rather than motor inputs.

One benefit of such a system is that the onboard control system keeps the drone safe and stable without user input. This means that there is no need for piloting skills to operate the drone; when the operator wants the drone to move they simply click the corresponding button and the drone executes the command. When we describe the system as autonomous, this is

the behavior we refer to: RISER does not make its own decisions about what to do or where to go, but autonomously translates high-level “intent” commands into low-level actions.

A second, very important benefit is that any measurements recorded by onboard sensors can be located in space. When measuring radiation, knowing the position and attitude of the detector is essential to meaningful interpretation of the radiation data. Here, we describe a semiautomatic process to extract activity information from observed radiation spectra from RISER using the N-Visage inverse modeling software. The overall effect of the system is to enable a nonexpert team to carry out a task that would normally require significant expertise in both operating drones and radiological characterization.

RISER

Physical system

RISER consists of a custom-designed drone developed by Bluebear System Research coupled with an onboard navigation system developed by Createc. The drone is designed with indoor flight in mind, with the intended application of radiological characterization in hard-to-reach areas.

The physical dimensions of the system are approximately 0.9 meters by 0.9 m in width and length by 0.2 m deep. System mass is less than 4 kilograms, a large proportion of the weight being the battery. The practical flight time is 15 minutes, including a 30 percent contingency in battery capacity.

Although it has been assumed that it is not possible to keep RISER completely free of contamination under practical conditions, it has been designed to make managing contamination as easy as possible. The parts that are most likely to become contaminated, such as the props, motors, and shrouds, are treated as semidisposable parts that can be readily removed and replaced. The more expensive components, such as sensors, processors, and autopilot, are contained within a smooth-shelled

body that can be easily decontaminated.

Sensor suite

RISER carries a number of sensors for a variety of purposes. It is equipped with forward- and downward-facing video cameras that are fed back to a ground station for inspection and operator orientation. The cameras also have dedicated lights to improve operator feedback when operating in dark areas. It has two planar lidar sensors, one mounted in the horizontal plane and one mounted in the vertical plane, which are used for navigation and to build a 3-D point cloud. An inertial measurement unit (IMU) is used for attitude control and a CZT spectrometer with replaceable crystal provides radiation-sensing capability.

There are two separate sensor-fusion tasks running in the system. The first fuses IMU and lidar data to produce a current position and attitude estimate, as well as update the 3-D point-cloud map. The second combines the position and 3-D point-cloud data with the radiation data to produce an estimated contamination map, which can help the operator guide the survey. These methods are described in more detail below.

SLAM

SLAM has been a very active academic research field for around 10 years, and a plethora of techniques are described in the literature. The techniques we used for RISER are based on an extension to 3-D of the 2-D techniques used by the well-known HectorSLAM algorithm [4]. Because RISER has to do all of its SLAM computations onboard in real time, Createc has developed its own SLAM approach that simplifies the 3-D SLAM process into a series of robust 1-D and 2-D processes, resulting in a highly reliable navigation system at low computational complexity. Further off-line post-processing of the data can produce higher accuracy 3-D point clouds, if required.

Fig. 1 shows the internal state of the mapping system partway through a flight. The red track indicates the position history of the drone, while the black dot at the head of the track indicates its current position. The dark gray and green points represent the abbreviated point cloud that the navigation system uses as

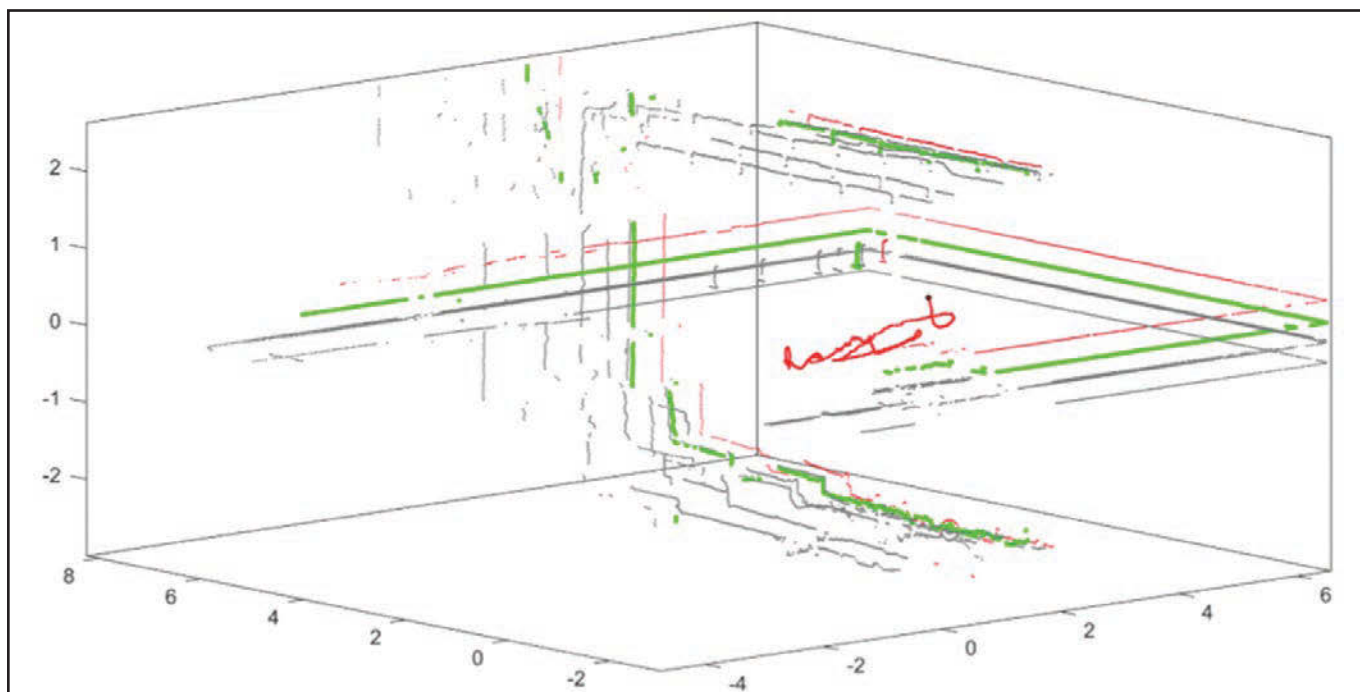


Fig. 1. An illustration of the internal state of the SLAM system mid-flight. The thick red line represents trajectory (this trajectory is from a windy flight with excursions up to 1 m from the intended position) and the thin red lines represent most recent lidar data. Gray and green represent the internal map, with green being the part currently referenced. The black dot is the current position of the drone.

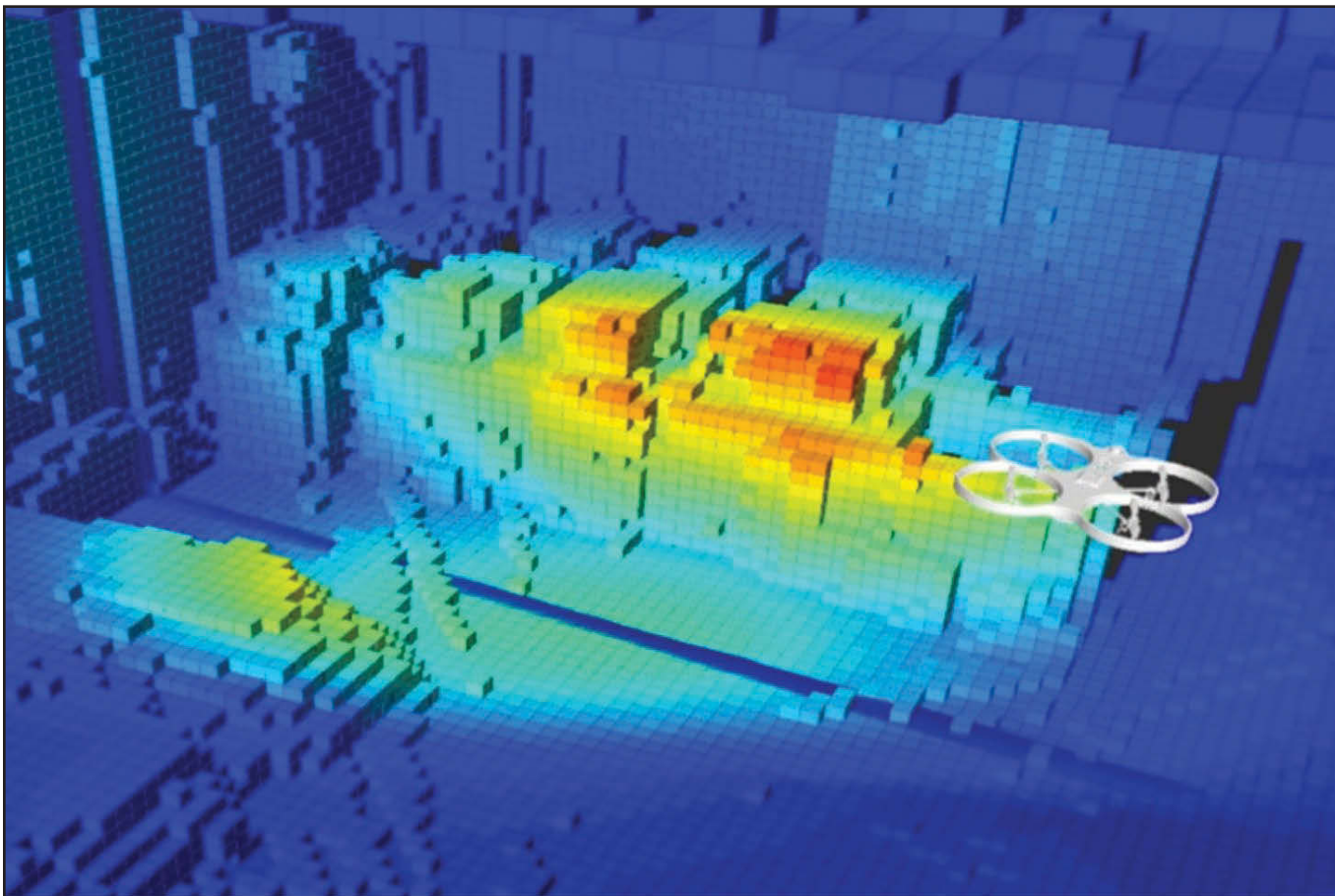


Fig. 2. Real-time visualization of estimated activity distribution mid-survey. Blue indicates a low density of contamination, while green, yellow, and red represent progressively more intense contamination.

its map of the environment; the green points represent points that are being used by the navigation system to fix the current position, while gray points are not currently being used.

Radiation data fusion

As RISER flies, the onboard CZT gamma spectrometer continuously records radiation data. The data is binned into fixed time intervals (or, optionally, fixed distance intervals). Because the position of the drone is known during each exposure, it is possible to associate each individual spectrum file with a zone in space. Spatial trends in the observed radiation intensity contain implicit information about the location and magnitude of radiation sources. This information can be extracted in real time to produce an approximation of the three-dimensional contamination distribution that can be used to guide the survey.

The real-time contamination distribution estimate is produced by building and inverting a simple radiation transport model. First, the point cloud is converted into a coarse “voxel” model in which the world is represented by a 3-D grid of cubes. Each cube is considered solid if it contains more than K lidar points, where K is a small number in the range of 2-5. Contamination is assumed to be located on solid voxels. At any given moment in time, RISER will have recorded N radiation readings and be aware of M solid voxels. Ignoring shielding, the effect of the m th voxel on the n th radiation reading can be approximated by $k/r(n,m)^2$, where k is a sensitivity factor for the detector and $r(n,m)$ is the distance between the n th radiation reading and the m th voxel. If the radiation readings and voxel activity values are represented as the vectors R and V , respectively, then the entire system can be succinctly described by the equation $R=AV$, where $A(n,m)=k/r(n,m)^2$. An approximate solution to this equation can be calculated on the fly by a variant of the algebraic reconstruction technique (ART), modified to be

able to accept variables N and M . Createc has been granted a patent for this technique.

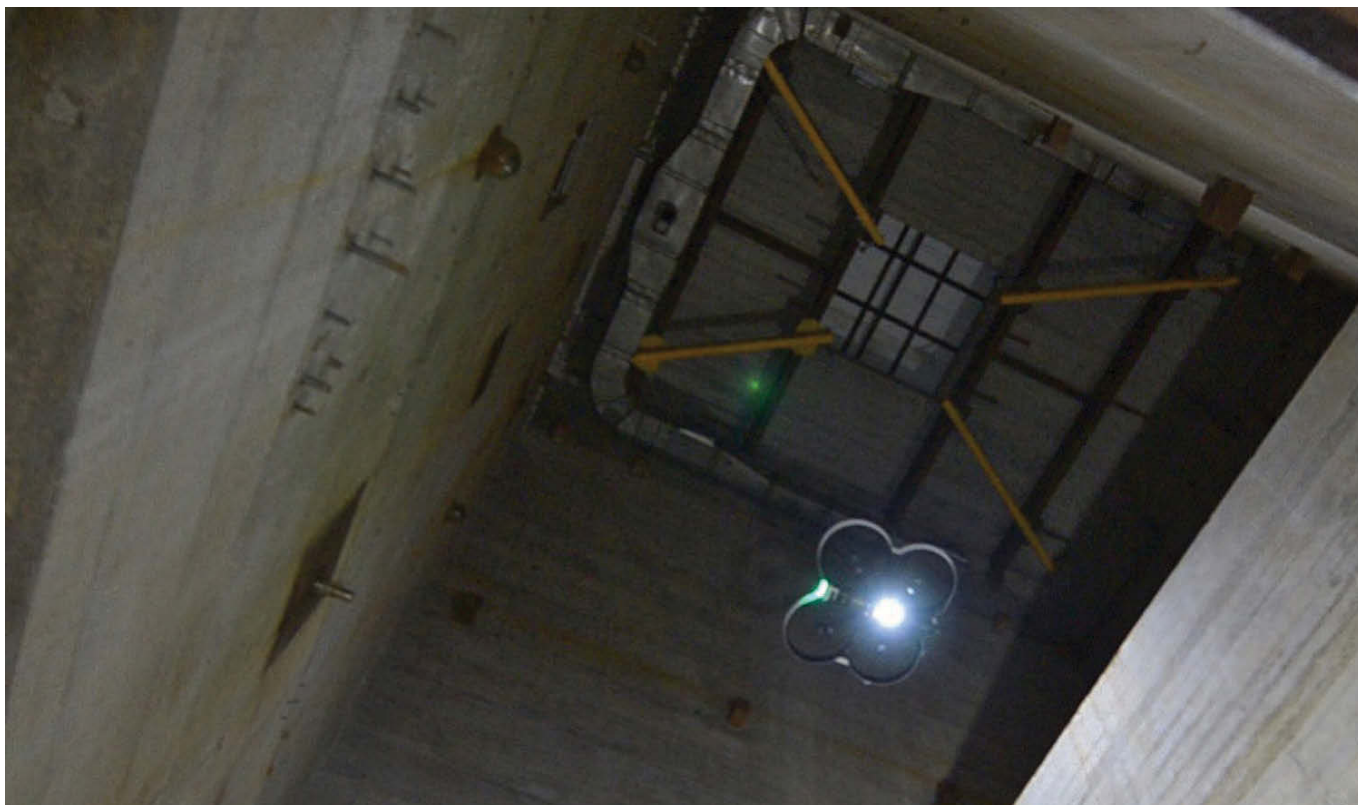
Fig. 2 shows how a real-time visualization of the estimated contamination distribution.

Operation

The drone is operated from a ground station consisting of two laptops and a Wi-Fi receiver station. The drone operates autonomously in the sense that the onboard autopilot takes full control of the motors. Under normal operation, however, the system is configured such that the drone will only take action without user input under two very specific circumstances: if communication with the ground station is lost, or if the operator supplies a command that would obviously result in an impact. In the former case, RISER will simply hold station, waiting for communications to be re-established. In the latter case, RISER will move as close as possible to the requested location, while remaining a safe distance from any objects that it would have collided with or gotten dangerously close to had it followed the command as given.

The operator interacts with the drone via a computer game control pad. The operator does not have direct control over the attitude or velocity of RISER. Instead, the control pad moves the location of the target position coordinate supplied to the autopilot. The operator is aided by various sensor feeds presented through the ground station: a 2-D map of the flight area showing the current position and recent track, a forward-looking camera showing potential obstacles ahead of RISER, and a downward-facing camera.

The operator is supported by a remote-control pilot who controls landings and takeoffs and can take control of RISER as a precaution in the event of sensor failure or Wi-Fi communications loss, provided that RISER remains visible.



The RISER drone in action at the Sellafield nuclear site.

Discussion

RISER was initially proven through a series of test flights at the Sellafield nuclear site in the United Kingdom. These began in a largely decommissioned reprocessing cell housing temporarily stored wastes (these are the sources of radiation mapped out in Fig. 2) and culminated in a flight in a large chimney being prepared for decommissioning.

To avoid the potential spread of contamination caused by prop wash, the takeoff and landing area was prepared by covering it with a reinforced paper sheet held down by tape. The takeoff area was only accessible to workers wearing respirators and paper suits. Since it was not possible to see a great distance into the chimney from the takeoff area, the operator and safety pilot were placed outside the takeoff area with a view to the takeoff point through a large window. The drone was brought into the takeoff area, the battery was carefully installed, and then the team members in personal protection equipment retreated a safe distance.

Despite winds of up to 20 kilometers per hour around the doorway, four successful flights were made into the chimney, two going up into the chimney beyond the line of sight. An air monitor was present throughout in the expectation that contaminated dust could be kicked up during the flight. Despite the fact that some small items, such as fragments of plastic material, could clearly be seen to be blown around, no activity in air was recorded, and the drone itself was found to be uncontaminated at the end of the flights.

Deployment at Fukushima

RISER has been deployed in a number of locations around the turbine buildings and similar locations at Fukushima since March 2017. The turbine halls provide a range of challenges to operating the drone, and a series of missions of gradually escalating difficulty has been implemented. The earliest flights were in a semioutdoor area outside the turbine buildings informally called “the pit,” which provides access to the seawater cooling lines. Subsequent flights were at various locations within the

turbine buildings, including both a turbine hall and some more spatially constrained areas.

The pit was the smallest area that we have yet flown the drone in. It is half subterranean, with the upper half protected from rain by a roof, but without solid walls. The ground station was set up outside the pit, with no direct view of RISER, while the safety pilot was located closer to the pit with a partial view of the drone through the open walls. The pit is on the seaward side of the turbine, and on the day of the survey there was an onshore breeze gusting up to 30 km/hr. This created turbulent conditions in the pit itself, which meant that RISER could typically only hold station to within +/- 1 m of its target location. Combined with the small physical space (largest dimension 10 m) this made the flying quite challenging, and the survey plan had to be adjusted to avoid RISER flying too close to walls and other structures. Nevertheless, over the course of four flights, an adequate radiation survey was completed.

One of the turbine halls also was surveyed. In contrast to the pit, the turbine hall is a large, open area with the longest dimension in excess of 100 m. The maximum effective range of the lidar sensors is 60 m, with many darker objects becoming invisible beyond 30 m. This means that in many locations in the middle of the turbine hall, RISER could only see the hall as two long parallel walls with no obvious end; the only features RISER could use to judge its position down the length of the hall at some heights were small features such as cable conduits. In order to ensure that RISER always had a stable position reference, it was therefore necessary to design the survey plan with landmarks in mind, such that when RISER was near the middle of the turbine hall it always had suitable features in view.

The turbine hall was also very dark, with some cables and rebar dangling down to floor level as a result of damage to the roof from the reactor explosions. This also meant that flying in areas more than 20 m from the safety pilot and operator (the vast majority) had to be conducted slowly and carefully, requiring many individual flights.

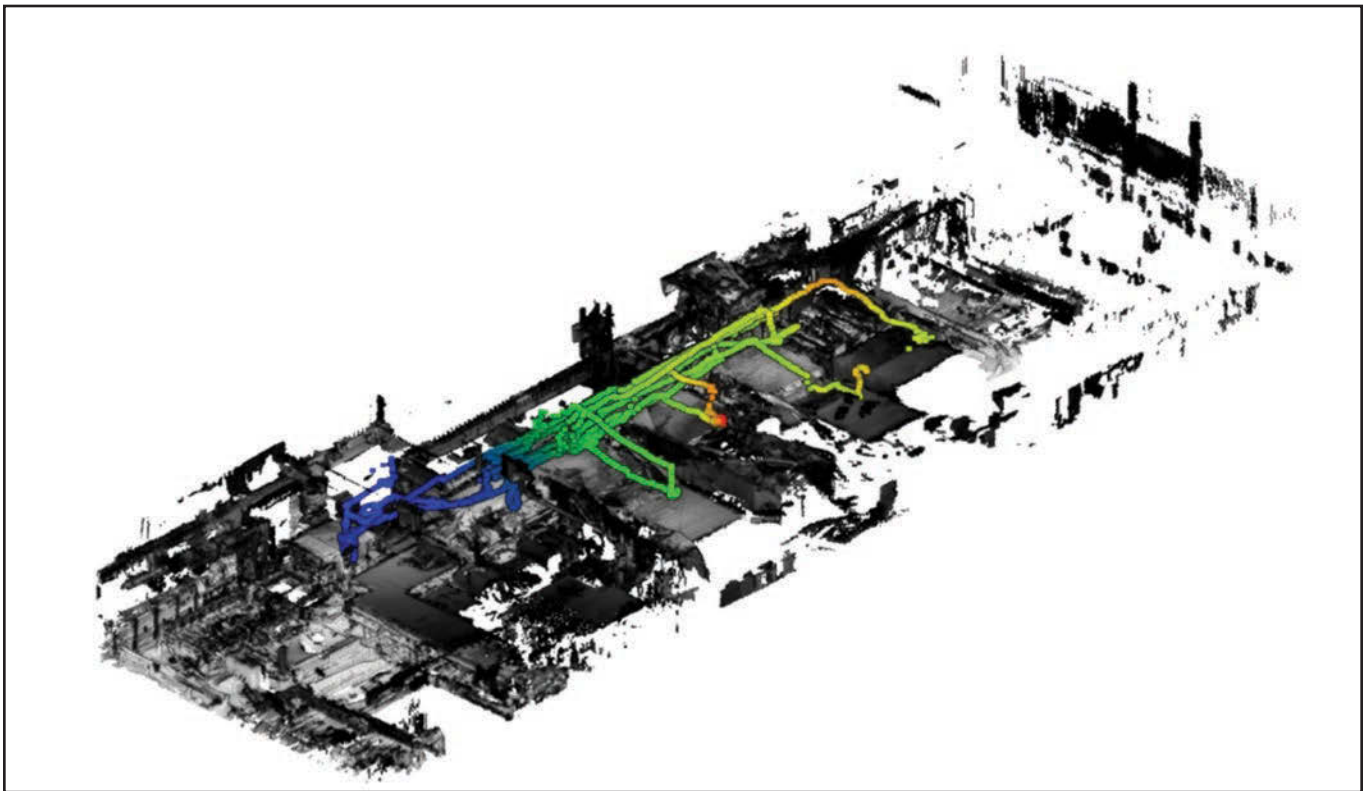


Fig. 3. A view of the Fukushima Daiichi turbine hall surveyed by RISER. The black and white structure is the point cloud of the internal structure of the turbine hall (wall and ceiling removed). The length of this point cloud is in excess of 100 m. The colored points indicate the locations at which RISER recorded radiation data.

Fig. 3 shows a view of the whole turbine hall survey area. The end of the turbine hall on the right of the figure was never visited by RISER, so the point cloud in this area is quite sparse. In most other areas, however, a reasonably dense point cloud was produced. The radiation readings clearly show a trend of rising dose rate from left to right in the figure, which was known before the survey, but subsequent analysis using the radiation data fusion technique described above showed that the origin of much of this radiation was two relatively localized piles of contaminated debris. Knowing this will potentially provide TEPCO with better information to guide future dose rate reduction and decontamination activities.

Conclusions

RISER has successfully demonstrated that an autonomous flying system can access areas beyond the reach of other less-automated systems. We believe this is the beginning of a trend that will become increasingly valuable in nuclear cleanup over the coming decade. In particular, we expect that the form of autonomy used here—a transparent layer that translates user intent into controlled action—will be very valuable, as opposed to the “full automation” that is used in a factory setting. This transparent form of autonomy works particularly well in nuclear cleanup because it compensates for the loss of dexterity and perception inevitable in remote working.

RISER itself has successfully completed every mission so far at Fukushima. But it is also true that as the missions have become more challenging, RISER has needed continual development to enhance its perception and autonomy capabilities. It is hoped that the maturity that is building in the RISER system can be transferred to other robots in the future by simply transposing the navigation and autonomy algorithms. If so, RISER may become the first of a series of autonomous nuclear operator platforms with the potential to transform decommissioning.

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Acknowledgements

The authors would like to thank TEPCO for granting permission to share data and experience from applications of RISER at Fukushima, and Sellafield Ltd. for providing access and support during the development of RISER. The work described in this report was carried out in collaboration with ATOX and Bluebear Systems Research.

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This article is based on a paper presented at the 2018 Waste Management Conference, held March 18-22, 2018, in Phoenix, Ariz. Copyright WM Symposia Inc. ■



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A D&D Trifecta

A look at three different EnergySolutions-led decommissioning projects that are nearing completion.

Utah-based EnergySolutions is nearing the tail end of three separate decontamination and decommissioning projects: the Zion nuclear power station on the shores of Lake Michigan, an hour north of Chicago, Ill.; the La Crosse Boiling Water Reactor (LACBWR) on the banks of the Mississippi River near La Crosse, Wis.; and the Southwest Experimental Fast Oxide Reactor (SEFOR) on University of Arkansas (UA) property southwest of Fayetteville, Ark. Photographs show a few highlights of the decommissioning work being completed on each of these similar but very distinct projects.

Zion



In March 2016, the last of the large components from Zion were successfully removed and prepared for shipment and final disposition at EnergySolutions' Clive Disposal Site in Utah's west desert. Lessons learned resulted in the steam generators from Zion's Unit 2 reactor being removed in three months, two times faster than they were removed from Unit 1.



On Jan. 10, 2015, fuel transfer operations were completed when the 61st canister was safely placed at Zion's independent spent fuel storage installation (ISFSI), 366 days after the first canister arrived on the pad. According to EnergySolutions, this is the largest D&D ISFSI project in the U.S. to date—with the first modern security command center to be accepted by the Nuclear Regulatory Commission.



On May 14, 2015, the Zion D&D team completed the shipping campaign for Class B and C waste. The campaign resulted in 37 over-the-road shipments, covering roughly 96,000 miles. In total, the waste contained 32,390 curies of radioactivity, weighed 506,443 pounds, and measured 4,440 cubic feet.



Zion's reactor vessel (and internals) segmentation is the most cost-effective project of its kind to date, EnergySolutions said. Mechanical cutting was used to avoid the significant radiological concerns experienced in previous D&D projects. The team optimized cutting and waste loading campaigns to minimize Class B and C waste costs.

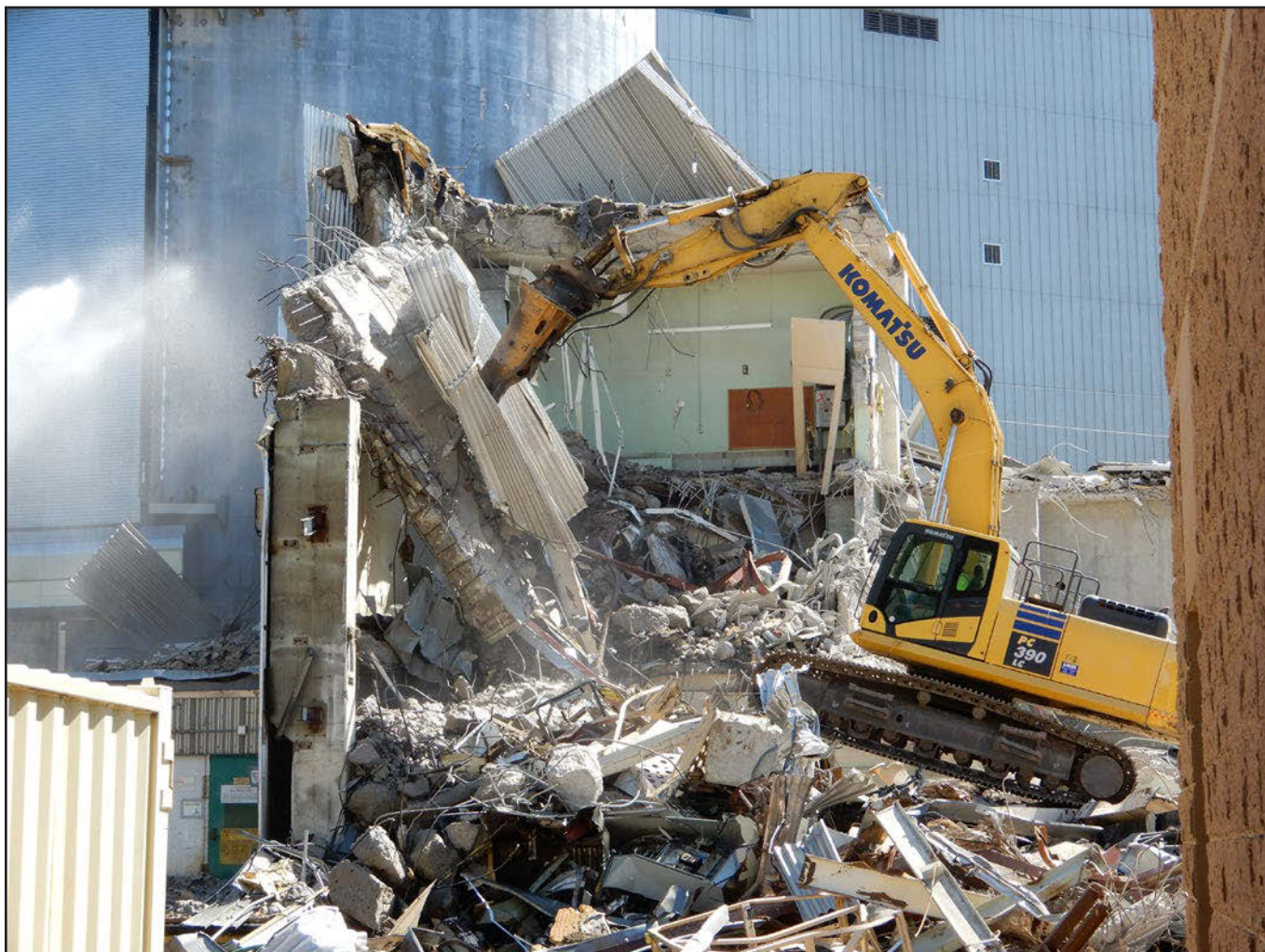
La Crosse



A key decommissioning activity occurred in 2007 when Dairyland Power Cooperative contracted with EnergySolutions to facilitate the removal, transportation, and disposal of LACBWR's reactor pressure vessel to the Barnwell disposal facility in South Carolina.



In 2016, EnergySolutions took operational control of LACBWR, allowing the company—as the 10 CFR Part 50 licensee—to continue expedited decommissioning activities at the plant. Demolition of LACBWR is expected to be completed in 2018. Removal of the plant's 350-foot-tall ventilation stack took about 150 days.



Demolition of the power plant's turbine building, waste treatment building, and underground structures was completed in August 2017. EnergySolutions said that its safety performance exceeded expectations, with zero recordable OSHA incidents during major demolition activities.

SEFOR



Sponsored by the U.S. Atomic Energy Commission (AEC), SEFOR is a former fast breeder test reactor that operated during the late 1960s and early 1970s. After operations and testing were completed at SEFOR, the reactor's fuel was removed by the AEC and the facility was placed in SAFSTOR.



In 2009, UA received funding from the Department of Energy to perform site characterization, develop a decommissioning cost estimate, and write the decommissioning plan for SEFOR. Contracted by the university, EnergySolutions completed the work in 2011. SEFOR D&D Project Manager Dean Wheeler, seen here, inspects the facility before deconstruction work begins.



EnergySolutions' contract was modified in 2017 to incorporate further work that was supported by additional funding granted to UA. The second phase consisted of deconstruction of the operations and reactor support buildings, with additional efforts to characterize the reactor internals and complete passivation of all sodium waste in the primary system. Phase 2 work was completed in September 2017 and only the containment building remains.

Aerial Lidar and Geomorphic Change Detection Software: Tools for Monitoring Canyon Sediments at LANL

By Kevin D. Reid, Thomas B. Walker, Amanda B. White, Thaddeus L. Kostrubala, Scott R. Muggleton, and Steve Veenis

The Los Alamos National Laboratory (LANL) Environmental Remediation program has conducted extensive geomorphic surveys of sediment deposits in the canyon bottoms within and surrounding the facility [1, 2, 3]. The goal of the geomorphic surveys was to provide basic information needed to characterize chemical inventories of the sediments downstream of historical release sites.

Sediment units were mapped based on depositional setting and relative age. Representative characterization samples were collected for each unit and submitted for chemical analysis. Chemical inventories were estimated by calculating the total volume of each depositional unit and multiplying by average chemical concentration. This method of characterization provides a spatial distribution of chemical data based on fluvial processes and was developed and refined as part of the canyons investigation at LANL [4]. In general, for the canyon-bottom sediments, the higher concentrations of industrial chemicals were associated with fine-grained floodplain deposits closest to the source [5].

Since initial characterization, many of the reaches have undergone changes in response to post-wildfire floods and severe rain events. These events impacted the channel and floodplain deposits. Much of the elevated concentrations are confined to the overbank deposits distal from the primary channel. In order to confirm that the sediment units containing elevated chemical concentrations are unchanged, repeat aerial light detection and ranging (lidar) surveys are conducted and changes are assessed using the Geomorphic Change Detection (GCD) plugin for ArcGIS. These tools provide high-confidence uncertainty estimates and extensive areal coverage. This is a valuable method for the long-term monitoring of surface sediments with low-level but widespread contaminant distributions. All of the monitored canyon-bottom reaches pass risk assessment and present technically infeasible sediment removal options.

Following the 2014 monsoon season, aerial lidar data have been collected annually and the resulting digital elevation models (DEMs) processed using the GCD method. Changes are identified using GCD and are verified by field walk-downs. If erosion is identified in areas that are vulnerable to mobilizing contaminated sediment, enhanced controls can be installed to stabilize banks or other areas with high erosion potential. Annual

sediment monitoring samples are collected where there is evidence for flow and deposition within the past year. Since 2014, no severe floods have been cataloged using the lidar surveys and GCD software. The rainfall/runoff events from 2014-2017 have not caused major changes to the canyon-bottom channels and floodplains. Geomorphic processes identified in the monitoring results include both channel aggradation and incision, which over the course of a monsoon season results in net minor changes to the system. Other active processes contributing to observed changes are minor slides, flows, slumps, and falls of unconsolidated sediment on steep bedrock or soil surfaces.



Areas that showed changes when compared with lidar were field-verified.

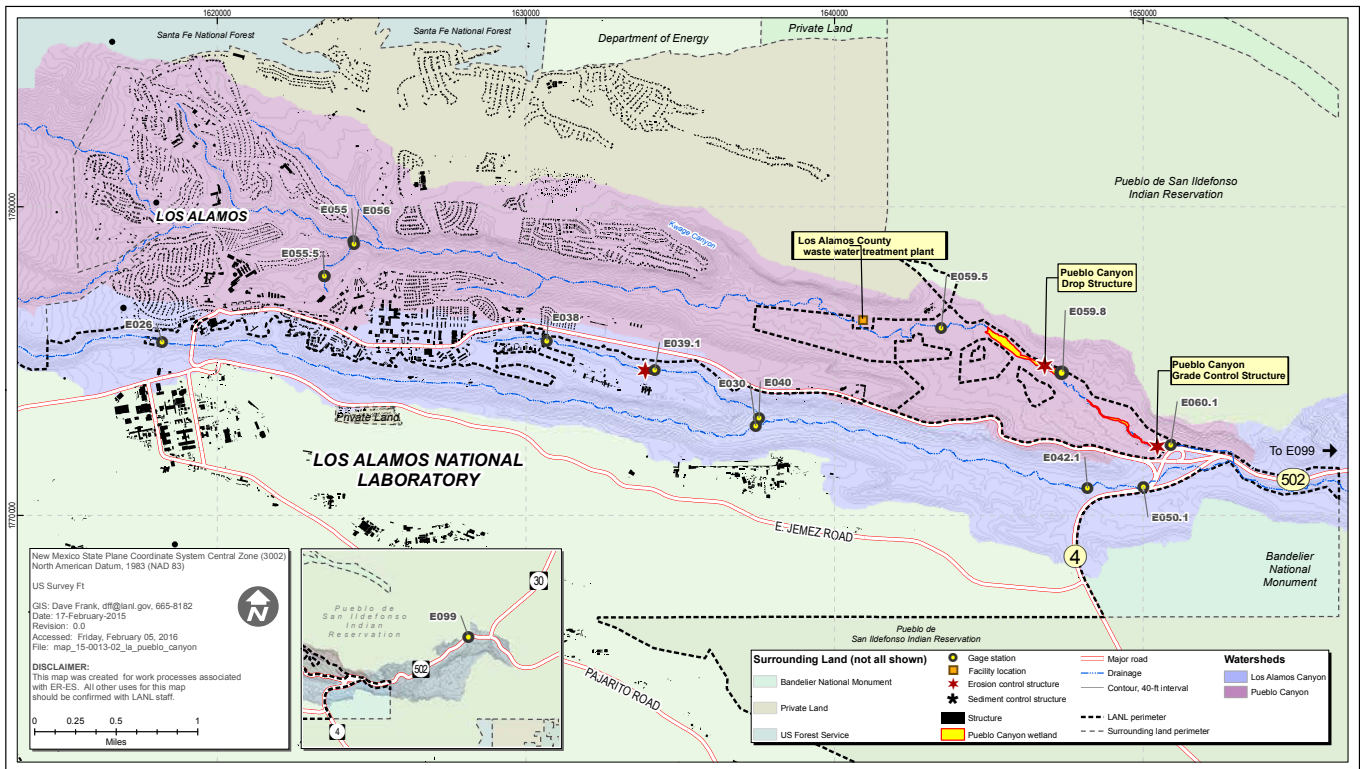


Fig. 1. Location map showing the monitored reaches within Pueblo Canyon.

A comprehensive baseline has been established by geomorphic mapping and characterization sampling. Periodic monitoring consists of lidar surveys and GCD analysis, which offers an effective and defensible methodology for documenting stability of the mapped sediment deposits.

Pueblo Canyon watershed

This study focuses on the Pueblo Canyon watershed, which is a subwatershed of the Los Alamos Canyon watershed and flows to the Rio Grande (Fig. 1). Chemical and radiological contamination is dispersed throughout the canyon sediment deposits at low concentrations [1, 6]. The concentrations are above background but are below the New Mexico Environment Department's and the Department of Energy's target levels for present-day and foreseeable future land uses, and adverse ecological effects have not been observed within terrestrial and aquatic systems in the watershed [6].

The site is subject to long-term monitoring because there is a contaminant inventory above background and there is potential for off-site migration. Contamination is present in canyon sediments for approximately 10 kilometers, which presents a technically infeasible scenario of removing all sediment above background. Consequently, there is a continued need for monitoring to ensure that areas with higher contaminant concentrations are not eroded. Monitoring consists of sampling stormwater runoff, surveying topographic changes, and inspecting and maintaining sediment control structures [7].

The Pueblo Canyon watershed includes land owned by the DOE and Los Alamos County (Fig. 1). The total drainage area of the Pueblo Canyon watershed is approximately 21.7 square km, and the drainage length is approximately 10 km. There are no active laboratory operations within the watershed other than environmental monitoring.

Historic laboratory releases from LANL operations contributed radionuclides and inorganic and organic chemicals to the

watershed [6]. In general, higher contamination is associated with fine-grained sediments closest to the source [5]. Concentrations decrease in coarse sediments, younger deposits, and deposits farther down the canyon [8]. Finer particles are deposited on floodplains during flood events and are remobilized as the floodplains erode [9].

Methods

Geomorphic characterization

Sediment deposits were characterized based on physical characteristics and contaminant levels. Physical characteristics included particle size, thickness, stratigraphic position, and depositional environment. Representative samples were submitted for off-site chemical analysis [4]. Volume estimates were calculated by multiplying the area by average thickness. Total inventories were determined by multiplying the concentrations by volumes to estimate the mass of chemical constituents [6]. An example of the mapped geomorphic units in Pueblo Canyon and the surveyed bank boundary is shown in Fig. 2.

Topographic surveys: 2009-2014

From 2009 to 2014, topographic changes were monitored by conducting repeat cross-section surveys at established transects within discontinuous reaches (Fig. 1 and Fig. 3) [9]. A thalweg profile was also surveyed within each monitored reach. Surveys were conducted using a combination of a differentially corrected global positioning system (GPS) and a total station tied to GPS control points, depending on tree cover.

Surveys were supplemented with sediment thickness measurements obtained from hand-dug or hand-augered holes at some locations. Cross sections were evaluated using previous survey data and the latest resurvey data, indicating where erosion and deposition have occurred along each section over the last year. The net changes in cross-sectional area along each section were

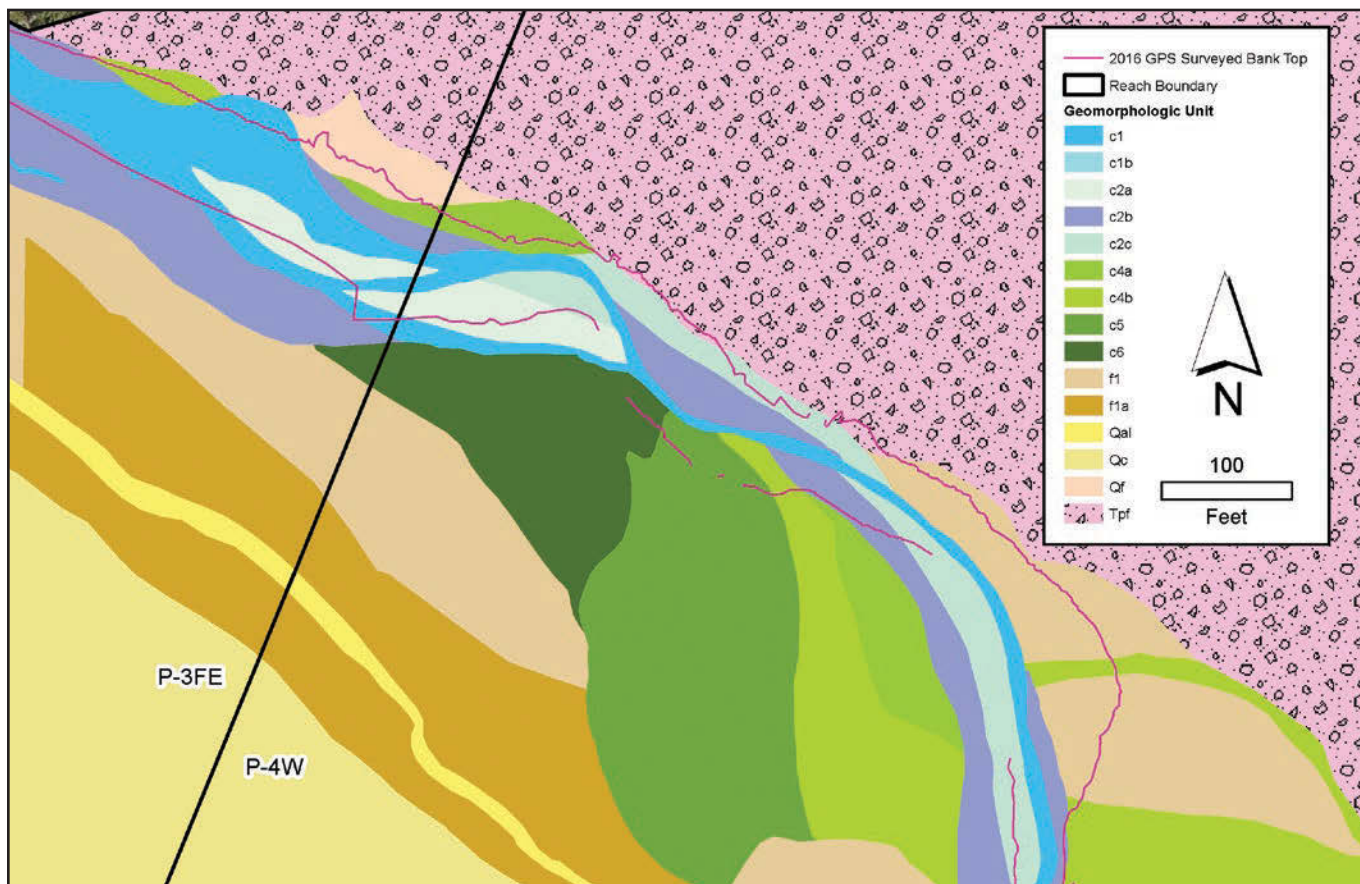


Fig. 2. Geomorphic map of sediment deposits in Pueblo Canyon. Channel deposits are denoted as 'c', floodplain 'f', Quaternary alluvium 'Qal', Quaternary colluvium 'Qc', Quaternary fan 'Qf', and Tertiary Puye formation 'Tpf'. P-3FE and P-4W are names of subreaches within the monitoring area.

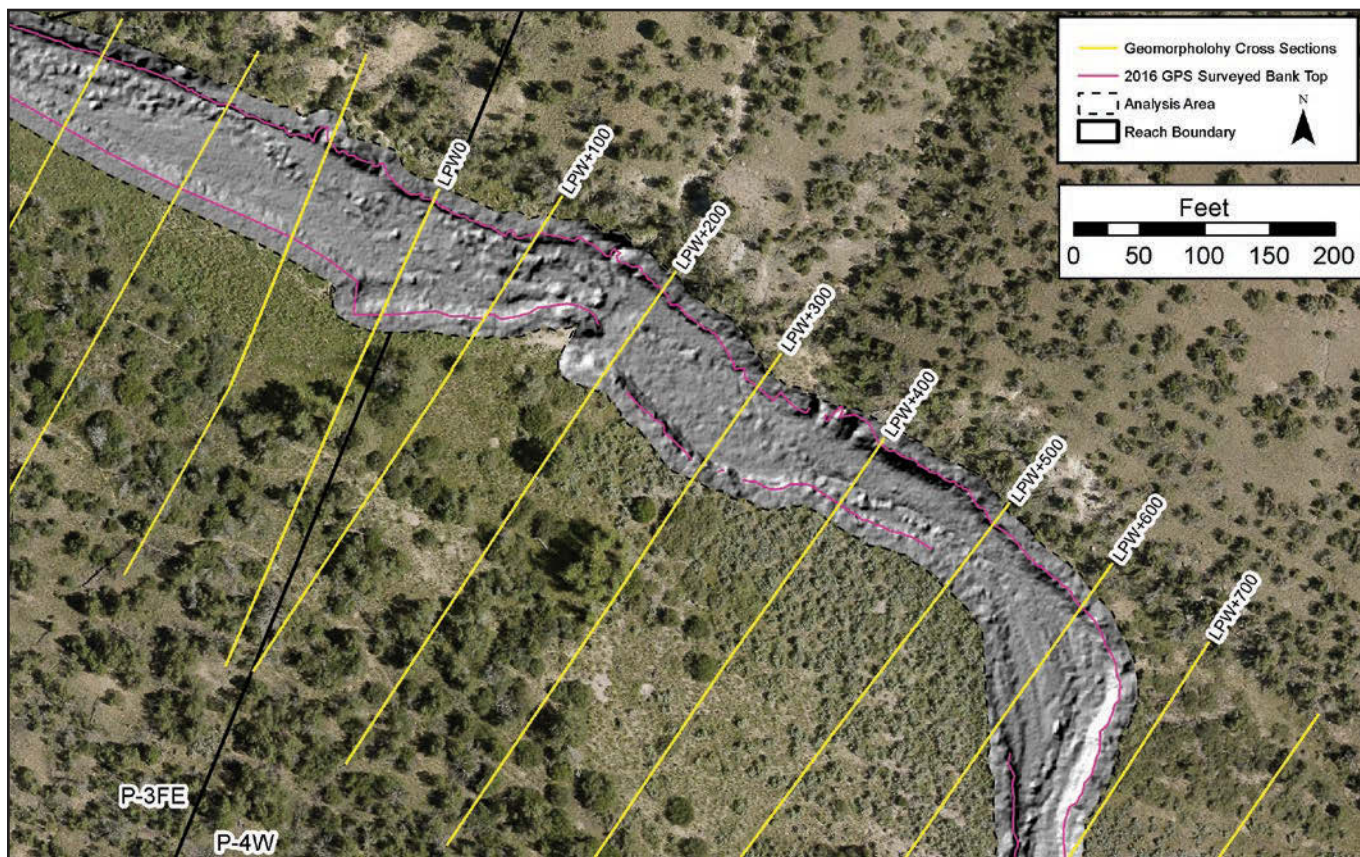


Fig. 3. Hillshade DEM showing surface topography of channel bottom. The locations of cross-section survey lines and bank surveys are also presented.

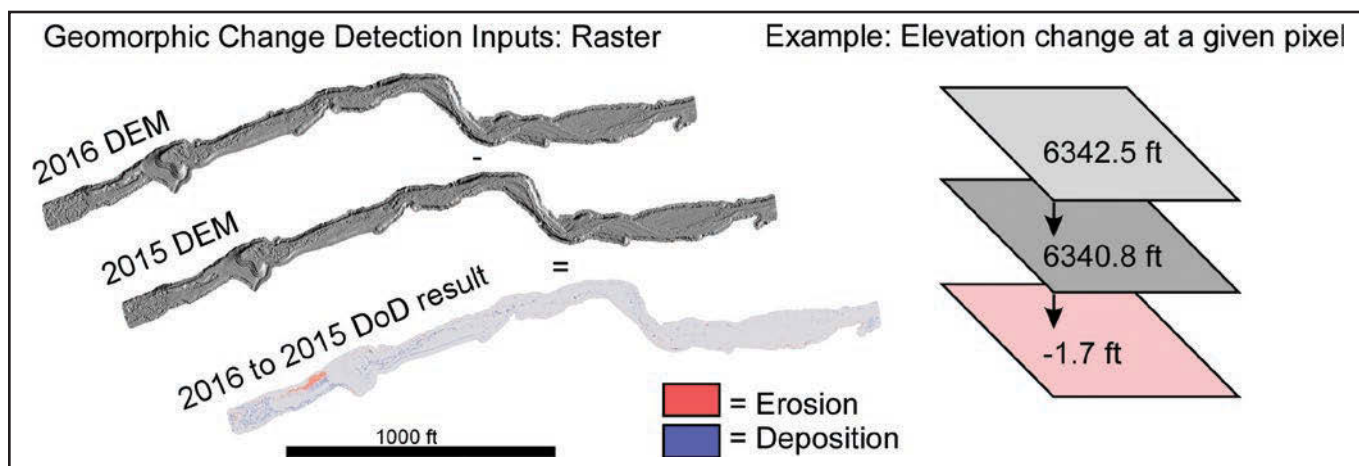


Fig. 4. Schematic showing the process to determine elevation differences between DEMs.

calculated and used to estimate total deposition or erosion over the surveyed area. At each cross section, the changes in thalweg elevation are compiled and are used to indicate whether, on average, the channel elevation has been stable, aggrading, or incising.

Topographic surveys: 2015-present

Beginning in 2015, a new method was introduced to quantify sediment erosion and deposition in the watershed using aerial lidar surveys and GCD software continuously along the Pueblo Canyon study area [11]. Aerial lidar surveying involves mounting the lidar equipment in an airplane and flying a known course while directing lasers at the ground surface to generate a three-dimensional point cloud of the surface. These data can be processed to create a digital elevation model (DEM) of the surface topography. Aerial lidar surveys were flown over the Laboratory in June 2014, November 2015, and October 2016. Aerial lidar surveying is a very effective technique to measure topography over the large and extensive Pueblo Canyon watershed.

Aerial lidar surveys provided a higher density of collected data points compared with ground-based traditional cross-section surveys and removed the need to interpolate between the cross-section transects to estimate erosion or deposition between cross sections.

However, known disadvantages of the aerial lidar compared with the ground-based transect surveys include the following: (1) dense vegetation can result in the misclassification of some lidar points as “ground” that should actually be “nonground,” resulting in elevation discrepancies, and (2) changes along steep channel banks in topography are difficult to thoroughly characterize using aerial lidar, so sediment erosional or depositional features related to bank collapse have a higher associated uncertainty.

To supplement the lidar surveys, additional survey data were collected using a ground-based GPS. Channel banks and thalweg were surveyed to avoid difficulties with applying aerial lidar-derived data in steep bank sections or on the channel thalweg, which could be covered by water or dense vegetation, making it difficult to accurately extract from the DEM.

Reasonable error assessment of the survey methods yields thresholds above which all detected change is assumed to be actual elevation change of the surface—although this elevation change includes those caused by geomorphic and nongeomorphic processes. Some small-magnitude actual elevation changes (e.g., deposition of a very thin sediment layer), however, may also fall below the threshold and thus be discounted from change detection calculations, even if physically observed.

The points designated as “ground” in the aerial lidar data set from each survey year were used to generate DEMs that were clipped to the geographic boundaries of the study reach before

further analysis. The 2015 DEM was then subtracted from the 2016 DEM to create a DEM of Difference (DoD) using the GCD plug-in for ArcGIS [12]. Positive values of the DoD indicate deposition between the 2015 and 2016 surveys; negative values indicate erosion over the same time period (Fig. 4).

Grid resolution for the DEMs and DoD output are both 1x1 feet. Areas of DoD predicted geomorphic change were confirmed with field observations. Maximum detected positive and negative changes in elevation are specifically evaluated in the field to confirm whether they are the result of geomorphic or nongeomorphic processes.

Precision of the data collected during an aerial lidar survey is affected by variation of the ground surface, which in turn influences the accuracy of any surface interpolated from a point cloud of elevation values. Primary among these attributes are slope, point density, and surface roughness:

a. *Slope*: Measurements collected on an inclined surface have a higher inherent error than those collected on a relatively level one. In general, the more inclined the surface, the less accurate the elevation (Z) values derived by lidar will be, resulting in a higher uncertainty.

b. *Point density*: Only ground-classified points are used to build the DEM. It is therefore expected that a high point density will yield a more realistic representation of the ground surface. When points are sparse, the modeling of the ground surface is less realistic. An indicator of low point density in a DEM surface is the presence of irregular polygons on the DEM surface. Presence of these polygons indicates that the low point density resulted in an overinterpolated model of the actual surface. Low point density areas have inherently higher error due to their less accurate representation of actual ground surface.

c. *Surface roughness*: Measurement of local differences in elevation between individual neighboring points gives an assessment of surface roughness. A surface with high local variability in Z values is less well-represented by lidar than a smooth, continuous surface. Therefore, a high degree of surface roughness results in an inherent decrease of elevation accuracy. In general, smooth surfaces are represented well, and rougher, or more variable, surfaces, less well.

To compute the spatially variable error of a DEM surface, raster models of the previously mentioned point cloud-derived attributes are required. A set of rules defining a “fuzzy inference system,” or FIS, determines the amount of error applied to any given pixel involved in a DoD calculation. The FIS is structured with a set of membership functions that categorize individual point cloud attributes into discreet groups based on the distribution of values the surface represents. For example, slope is grouped into: low [0–20], medium [20–45], and high [45–90]. After the surfaces have been analyzed and grouped, the rules are processed that

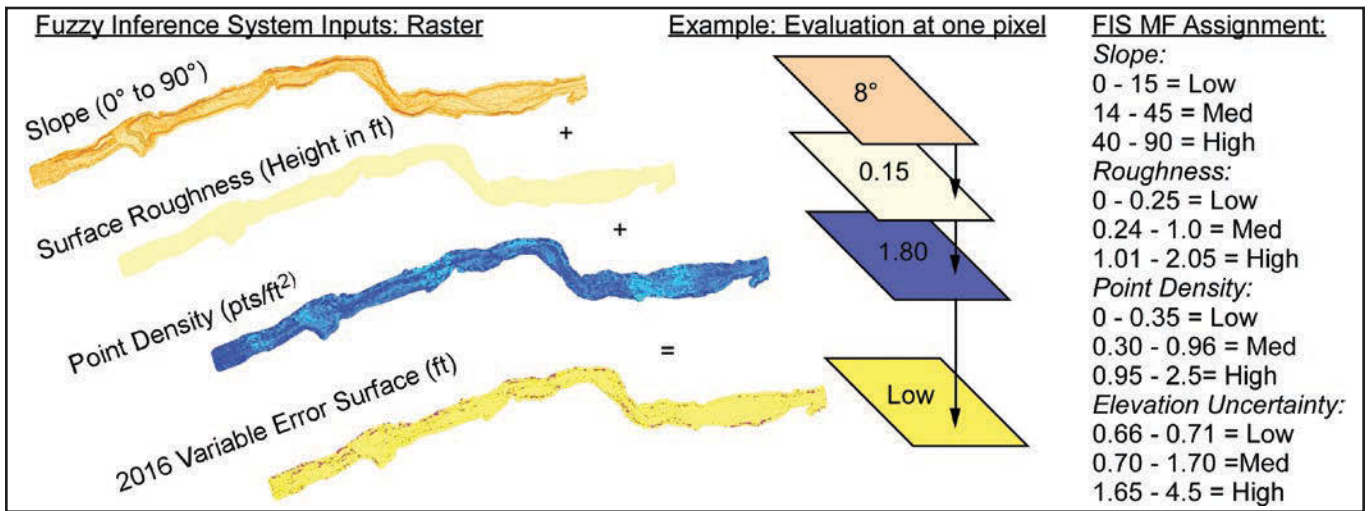


Fig. 5. Components of error estimates including slope, roughness, and point density.

determine the pixel’s individual value of error (Fig. 5).

For the purposes of calculating net volume change, all elevation changes above the threshold are assumed to represent sediment erosion or deposition. This assumption necessarily excluded small but real changes that occurred below the threshold, and included elevation changes that occurred above the threshold due to nongeomorphic processes. Nongeomorphic elevation changes are often represented by a mottling on the DoD of both positive and negative detections in areas of steep terrain and dense tree canopy that do not represent actual geomorphic changes. These detections can often be attributed to misclassification of point cloud data.

The DEM comparison indicated that net deposition in the Pueblo Canyon monitoring areas occurred between the 2015 and 2016 lidar surveys. The error, however, is larger than the calculated deposition in most areas, suggesting that the amount of change is less than the method detection limit (Table 1). When areas are classified as ground in lidar data set for one year and nonground in the other year, then the DoD calculations identify erosion or deposition in that area even in the absence of real topographic change. These areas have been verified as unrelated to geomorphic processes using field observations and are discussed in the study results. These detections, however, are above the error thresholds and do contribute to overall DoD volume calculations. Due to the inclusion of these nongeomorphic changes, net erosion and deposition volumes are generally overestimated and should be considered upper limits.

Utilizing a spatially variable error in DoD calculations has made it possible to more accurately assess geomorphic processes on surfaces that have been traditionally difficult to model with lidar data. The incorporation of spatially variable error surfaces into the DoD calculations improves the analysis of steeply inclined surfaces, including stream banks, and has allowed for an accurate assessment of geomorphic activity on such features for the comparison between 2015 and 2016 DEMs.

Geomorphic processes identified by the DoD results include channel aggradation and incision that over the course of the 2015 monsoon season resulted in insignificant changes to the system. Other active processes that contribute to observed changes are characterized by typical ephemeral channel mass wasting processes, specifically minor slides, flows, slumps, and falls of unconsolidated sediment on steep bedrock or soil surfaces.

The field-checked DoD analyses and thalweg surveys conducted support the conclusion of overall stability of the channels and banks in Pueblo Canyon. Notably, at the 95 percent confidence level, all elevation change (regardless of cause of change) greater than 20 centimeters, or 0.7 ft, in all areas has

been detected and identified using this method. These DoD results from rainfall years such as 2015 and 2016 establish the expected amount of geomorphic change to be minor and localized.

In addition to prescribed lidar and GCD analyses, stream banks and channel thalweg were surveyed annually with GPS in the Pueblo Canyon monitoring reaches. These surveys indicate few and minor changes in channel banks and thalweg profile. The field-checked DoD evaluation results, paired with the bank surveys and thalweg survey, support the conclusion of overall stability of the stream channel in Pueblo Canyon.

Discussion

Lidar monitoring allows for the defensible quantitative assessment of changes to, or stability of, a monitored sediment inventory. Using the GCD software allows for quantification of the amount of sediment eroded and deposited. There are bounds of accuracy and a threshold of minimum change detected. Conditions that decrease the accuracy are inconsistent ground cover classifications from year to year and steep slopes. The method used in previous years of measuring geomorphic change along representative cross sections and interpolation upstream and downstream between cross sections has been replaced with a comparison of aerial lidar data and was found to provide a more continuous representation of the channel conditions.

This method could be applicable to monitoring other regulated sites, such as landfill covers, spoils piles from excavation, mine tailings, earthen dams, levees, etc. It is a nonintrusive technique that can be applied to areas that are not accessible due to land use restrictions, administrative access restrictions, or

Area	Net Volume Change (m ³)	Uncertainty ± (m ³)
Pueblo Canyon		
Background Area above the County waste water treatment facility	24	32
Upper willow planting area	28	31
Wing ditch area	620	528
Lower willow planting area	22	111
GCS area	197	125

prohibitive due to health and safety reasons (e.g., firing range or abundant surface contamination). With this approach a quantified report can be provided to regulators describing the status of the sediment inventory and if any changes have occurred.

Where cover and conditions are not conducive to accurate lidar surveys, such as in areas with dense vegetation or standing water, a DEM can be created using manually surveyed points. The scale of the area and available labor resources would be the limits to evaluate for the project. The manual survey approach may be only beneficial for smaller-scale projects. With larger watershed-scale projects, aerial lidar is more appropriate. It is important to establish an accurate baseline and evaluate the rate of change for the system with respect to the detection threshold. This would direct the recurrence interval for lidar surveys.

For the case presented for Pueblo Canyon, there are three consecutive years of lidar surveys. The error of the first-year survey was high due to the data collection and point classification routines. Subsequent years have yielded much lower errors because of survey technique and repeat use of the same survey company, which is now more familiar with the terrain and challenges.

Minimal changes, occurring as a result of average to below average rainfall years, dictate that monitoring conducted by aerial lidar is implemented at LANL following major channel-changing events. To document that there has been minimal change in bank and thalweg morphology, repeat GPS surveys are conducted on an annual basis of those features. These surveys have the required resolution to document bank collapse or channel incision, which could be indicative of channel erosion.

The benefit of conducting an annual lidar survey is that it can demonstrate that within the entire watershed there have been no changes greater than the calculated threshold values at a 95 percent confidence interval. Or, to phrase it another way, at the 95 percent confidence level, all elevation change (regardless of cause of change) greater than the calculated threshold has been detected and identified.

Conclusion

Using lidar and GCD software permitted a detailed analysis of topographic change for a continuous reach in a canyon. During the three years of monitoring there were no major channel-changing runoff events. The changes documented were incremental changes of localized erosion and deposition. The power of this technique is to have a quantified and spatially variable threshold, below which, at a 95 percent confidence level, there was no change detected. The changes documented with GCD analyses included incremental and localized erosion and deposition. Strengths of utilizing this technique include:

1. A quantifiable threshold below which, at a 95 percent confidence level, there is no change detected. This establishes a lower limit of detection to recognize what can be measured.

2. Continuous coverage of a monitoring area as opposed to extrapolating between transects.

3. Increased precision in assessing error—specifically spatially variable error versus a uniform error valuation.

4. Nonintrusive method: applicable in technically dangerous and/or infeasible access scenarios.

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Acknowledgements

This work was funded by the U. S. Department of Energy, Office of Environmental Management, and it was managed by the Los Alamos National Laboratory, Associate Directorate of Environmental Management. Steven L. Reneau, LANL retired, developed and implemented the geomorphic approach to characterizing sediments in the canyons around LANL; his work and contributions were essential to the sediment monitoring program. Joe Wheaton of Utah State University developed the geomorphic change detection software.

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This article is based on a paper presented at the 2018 Waste Management Conference, held March 18-22, 2018, in Phoenix, Ariz. Copyright WM Symposia Inc.

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A truck is decontaminated at the Port Hope Project long-term waste management facility after depositing waste in the facility's baseliner storage cell.

Cleaning Up in Canada

On the shores of Lake Ontario, Canadian Nuclear Laboratories is tackling one of the country's largest environmental remediation projects.

The \$1.28 billion cleanup of legacy low-level radioactive waste in the Ontario communities of Port Hope and Clarington is well underway.

The cleanup project, called the Port Hope Area Initiative (PHAI), is based on a legal agreement between the government of Canada and the adjacent municipalities of Port Hope and Clarington, along the northern shore of Lake Ontario. It comprises two separate projects for the long-term management of waste located in each of these municipalities. The waste is the result of past radium and uranium processing by the former crown corporation Eldorado Nuclear Limited and its predecessor companies, during the period between 1932 and 1988. Canadian Nuclear Laboratories (CNL) is implementing these projects on behalf of Atomic Energy of Canada Limited, a Canadian crown corporation.

In Port Hope, history was made this summer when the first load of low-level radioactive waste was safely removed from the Centre Pier on Port Hope's waterfront and placed into long-term

storage at an engineered facility being built as part of the project. This means that the cleanup in the community of Port Hope has begun, following years of public consultation and planning. Removal of the waste from the Centre Pier and other temporary storage sites is being completed by Amec Foster Wheeler at an approximate cost of Can\$2.6 million (about \$2 million).

Once the waste has been removed from the temporary storage site, the Centre Pier will be used as a future staging area for the remediation of Port Hope's harbor. This work will include the rehabilitation of the harbor walls, installation of a wave attenuator and silt curtain to isolate the harbor, and dredging of more than 120,000 cubic meters (156,954 cubic yards) of contaminated sediment. The contract to complete this work, starting later this summer, has been awarded to Milestone Engineering & Construction for approximately Can\$90 million (about \$69 million).

At the same time, radiological testing of almost 5,000 Port Hope properties is ongoing to identify the presence or absence of



Construction of the baseliner cells of the Port Hope Project engineered waste storage facility began last year. The baseliner is a multilayered system used to isolate the waste from the environment. Materials such as clay, geosynthetic liner, and aggregate are sourced from regional suppliers.

2017.06.05



Low-level radioactive waste previously stored under tarps is excavated from Port Hope's Centre Pier and loaded into trucks for transportation to the new long-term waste management facility in Port Hope.



Dust monitoring is ongoing whenever PHAI construction is underway. The PHAI dust management plan sets out limits and action levels to ensure that dust is controlled and mitigated on-site for the protection of people and the environment.

low-level waste at homes and businesses within the community. To date, CNL has identified more than 800 properties that will require some amount of remediation. The cleanup of the first residential properties is scheduled to start later this summer.

As part of the cleanup of these residences, CNL will remove the waste and restore these properties at no cost to the owner. Each property involved in the program will be cleaned up to stringent criteria and verified through testing and monitoring. Once the property has been confirmed clean, the owner will receive a compliance letter from CNL. Property testing and remediation will continue until 2024.

All waste excavated through the PHAI is safely transported along designated haul routes to a new long-term waste management facility under construction at a site located north of urban Port Hope. Approximately 1.2 million m³ (1.57 million yd³) of waste will be excavated from various sites within the community and stored and monitored at the engineered facility for hundreds of years.

Scott Parnell, CNL's general manager of Historic Waste Programs, stated that CNL is taking every measure to ensure that the waste is safely managed as it arrives at the facility.

"Continuous oversight and monitoring is critical to making sure that this project is done safely," Parnell said. "By taking a cautious, planned approach to our work, we are continually raising the bar and creating the safest work environment possible for our people, while meeting all regulatory requirements."

Meanwhile, in the Port Granby area of Clarington, more than half of the low-level waste has already been excavated from a legacy waste site on the shoreline of Lake Ontario. All of the waste is being transported almost 1 kilometer (0.62 miles) north of Lake Ontario to a separate long-term waste management facility, currently under construction. This work is being completed by a joint venture of Amec Foster Wheeler and CB&I and will cost approximately Can\$300 million (about \$230 million) to complete.

Before waste movement in Port Granby began in 2016, it was estimated that 450,000 m³ (588,578 yd³) of waste would need to be removed from the legacy site. After more than a year of digging, more waste than anticipated is being discovered and

An articulated rock truck carries radioactive waste to the cells of the engineered facility in Port Granby, part of Clarington, Ontario.

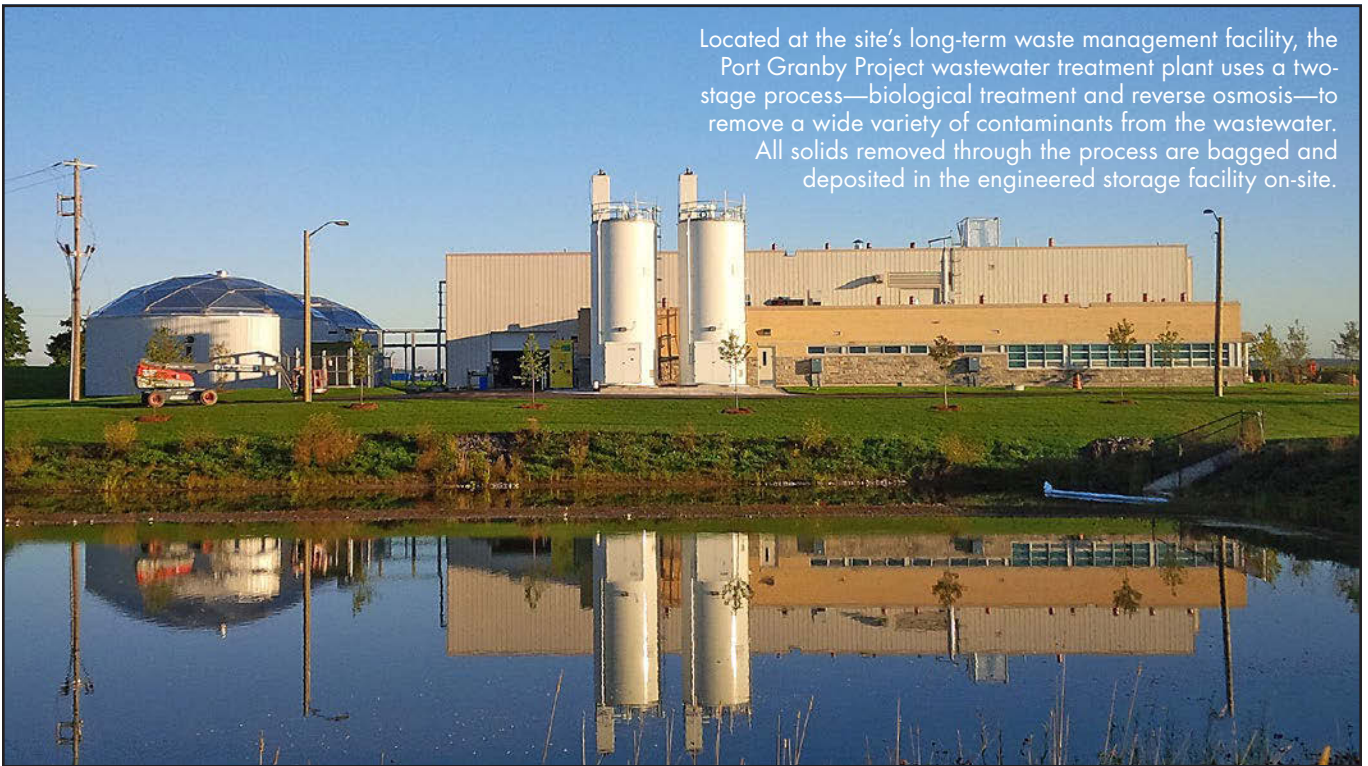


As part of the ongoing radiological investigations, borehole drilling is done at Port Hope private properties to determine the presence or absence of legacy low-level waste at residences and businesses located in town.

Waste excavation is conducted at the legacy waste site on the shoreline of Lake Ontario in Port Granby.



Located at the site's long-term waste management facility, the Port Granby Project wastewater treatment plant uses a two-stage process—biological treatment and reverse osmosis—to remove a wide variety of contaminants from the wastewater. All solids removed through the process are bagged and deposited in the engineered storage facility on-site.



removed. This increase in total waste will not impact the long-term facility, which is designed with contingency space.

CNL has said that protection of the surrounding environment is one of its top priorities. To that end, advanced technology wastewater treatment plants have been commissioned for each project to remove a wide range of contaminants from groundwater, surface water, and leachate collected during the construction and remediation phase of the PHAI. According to CNL, each treatment process has been designed to ensure that the quality of treated water being discharged into Lake Ontario meets stringent regulatory requirements, resulting in enhanced protection

of the Great Lakes basin ecosystem.

As one of Canada's largest environmental remediation projects, the PHAI is a complex undertaking, with appropriate regulatory approvals in place. Ongoing communications with the two communities have resulted in a well-informed public that is eager to realize Canada's commitment to the cleanup of legacy waste in the communities, which will leave an honorable legacy for future generations. ■

Article and photos appear courtesy of Canadian Nuclear Laboratories.

Advanced technologies

The potential of robotics and remote systems to improve the safety and efficiency of nuclear decommissioning and remediation was the focus of this year's Waste Management Conference.

The theme of WM Symposia's 2018 Waste Management Conference, held March 18–22 in Phoenix, Ariz., was “Nuclear and Industrial Robotics, Remote Systems, and Other Emerging Technologies,” and based on many of the discussions held during the conference, both in the sessions and on the exhibit floor, the spirit of the conference was very forward-looking. Along with new technologies aimed at making decommissioning and the cleanup of legacy radioactive waste safer and more efficient, talk circled around the challenges that lie ahead and the pathways for making progress, both in the near and long terms.

One subject that came up repeatedly during the meeting's opening plenary session was the future of the nuclear workforce—an issue long talked about but with no real clear answers. As one attendee put it, “It is time to stop admiring the problem and start working on it.”

Rep. Chuck Fleischmann (R., Tenn.), appearing via prerecorded video, spoke on the need to train and keep a skilled nuclear workforce to support the work of the Department of Energy's Office of Environmental Management (EM). “Workforce development is critically important,” he said. “Not only in the EM field as we clean up these sites, but also to make sure that we have a new crop of great, young nuclear engineers and a workforce to support them as we move America's nuclear industry forward.”

Fleischmann, who said he has seen a decline in interest in nuclear education and programs on the part of young people, often speaks at schools and universities about the importance of nuclear energy, and he urged the meeting attendees to do the same. As chairman of the Congressional Nuclear Cleanup Caucus,

Fleischmann also urged the attendees to continue to work with members of Congress and to advocate for the cleanup mission. “We're getting it done,” he said, “but with your help, we're going to do an even better job in the future.”

As a model of what is possible, Fleischmann pointed to the cleanup work being done at the Oak Ridge Reservation, which is in his district, and the East Tennessee Technology Park (ETTP), which is turning over remediated land from Oak Ridge's decommissioned gaseous diffusion plant to private companies for economic redevelopment. The ETTP model, and the public/private partnerships that helped create it, is one that could work very well across the United States, Fleischmann said, adding that it demonstrates to taxpayers that they are “getting great bang for their buck.”

Following Fleischmann, Billy Morrison, president and chief executive officer of VNS Federal Services, also called attention to the “human-capital cliff,” noting that in two years, fully half of the nuclear workforce will be at retirement age. “We are at a point now where we have to invest in the employees and the leaders that will stand on the shoulders of all of you in this room and get this job done,” he said.

In addition to workforce issues, Morrison noted the challenges that vendors face in completing cleanup missions, including the difficulties of working in technically challenging environments, completing complex projects, maintaining a robust supply chain, and planning projects based on federal appropriations and continuing resolutions.

Morrison also discussed the difficulty corporations have in weighing risk against possible reward. A contractor's revenue margin may be 5 to 7 percent

when everything goes well, he said, adding that the margin may go down to 2 to 4 percent or less when unforeseen expenses and the costs of putting together a bid proposal and contract are added in. “We have to sell that back to our companies, and it is not always an easy sell,” he said. The low margins, Morrison said, are among the reasons the industry has seen a lot of consolidation.

According to Morrison, progress is largely contingent on what he called the “art of the possible.” This includes clarifying the regulatory definition of high-level radioactive waste and how it is managed based on its risk and not its source. In Morrison's view, clearer HLW regulations have “the largest potential to have the biggest impact and the soonest.” Morrison also said that it is past time for the update to the DOE's Order 435.1 on radioactive waste management to be completed. “We need to stop polishing this cannonball,” he said.

To get the cleanup work accomplished, Morrison said, companies have to be nimble and move past the “this is the way we have always done it” way of thinking. “I believe that kicking the can down the road and having protracted cleanup schedules is ultimately what could be the most risky thing that we have in front of us,” he said. “It's incumbent upon us to do the things we know we can do now, and do them safely.”

James Colgary, chief of staff to the deputy secretary of energy, agreed with Morrison that things need to get done now,

and he assured the audience that DOE leadership is moving in the right direction. “We don't need more information, we don't need another study,” he said. “We need to get it done quickly, now. Even if it's just small victories, let's



Fleischmann



Morrison



Colgary

get it done.”

Colgary said that the DOE’s leadership is focusing on a few key priorities, including energy dominance, which, he explained, means promoting an energy plan that includes fossil fuels, nuclear, and renewables. The DOE is also looking at energy storage options, which he said include everything from battery storage to pumped hydroelectric systems.

Colgary also pointed to the work the DOE is doing to nurture domestic innovation through the national laboratories and university programs, to enhance national security by rebuilding the U.S. nuclear security enterprise, and to meet its legacy waste cleanup obligations. The cleanup of legacy waste, he said, “is a commitment that the department and the administration take very seriously.”

Colgary also called attention to the DOE’s administrative reorganization, which he said is an improvement that will boost cleanup momentum. The DOE’s reorganization plan, announced in December 2017, places the EM office under the purview of Paul Dabbar, the undersecretary for science, and, Colgary said, will leverage the expertise and project management capabilities of the DOE’s Office of Science and the national laboratories to better solve EM challenges and manage costs while ensuring a high level of safety. “Paul is the right man at the right time in history to be able to get this done,” he said.

DOE-EM ROBOTICS

In addition to a robotics pavilion on the exhibit floor, there were eight panel sessions and 11 technical sessions devoted to robotics, remote systems, and other emerging technologies. Kicking off the conference was a panel session titled “DOE-EM Robotics,” which set the stage for many of the following sessions and presentations. The panel featured presentations on the subject from various perspectives, including federal and international agencies, universities and national laboratories, and end users.

Rodrigo Rimando, director of technology development in the DOE’s Office of Environmental Management, led off the session by discussing the role of robotics as it applies to EM’s cleanup mission. He began by putting robotics in the context of what he referred to as the fourth industrial revolution (4IR), which he said is transforming entire systems of production, management, and governance. “Unlike the past three industrial revolutions, 4IR is evolving at an exponential pace, rather than a linear pace,” he said.

This new industrial revolution is marked by the fusion of advanced technologies that blends physical, digital, and



Photo: WM Symposia

Rodrigo Rimando, director of technology development in the DOE’s Office of Environmental Management, speaks during a panel session on robotics.

biological systems, Rimando said, adding that at its core, robotics is an integrated system of many variant technologies. Because of the nature of its work, he said, EM has the opportunity to leverage and exploit robotics to help complete its mission.

Rimando then provided his top 10 mission drivers, or reasons that robotics and remote systems are needed to advance EM’s cleanup work. They include, in no order of priority or importance, the following:

- To reduce the nation’s environmental liability.
- To complete tasks that are high hazard, high consequence, high risk, and high value.
- To reduce worker dose.
- To prevent injuries.
- To help assist an aging and aged workforce.
- To provide tools for planning, ALARA studies, and modeling.
- To assist workers in dull, dirty, dangerous, and difficult work.
- To allow entry into challenging spaces and conditions.
- To sustain national assets, one-of-a-kind facilities, and critical infrastructure.
- To respond to off-normal events, operational upsets, and emergencies.

Thomas Nance, director of research and development engineering at Savannah River National Laboratory, followed Rimando with a discussion of robotics and remote systems from the perspective of the DOE’s national laboratories. He described some of EM’s early work with

robotics, adding that EM is entering a “new era of deployment” of robots and remote systems, including the use of crawlers for remotely inspecting Savannah River’s H Canyon and removing debris from liquid-waste vitrification melters.

The use of robotics is allowing workers to access hazardous environments while reducing their dose and also reducing the physical demands of the work.

Nance noted that there are many quality off-the-shelf remote vehicles that can be used for nuclear work. They simply need to be modified to the specific task, he said, with the addition of battery packs and tethers to increase the vehicle’s range and operational capacity, actuators and other tools for completing specific tasks, and cameras and sensors for gathering data.

Echoing Rimando, Nance said that much of the work EM does can be accomplished by leveraging existing technologies and resources. “Robots are tools,” he said. “We’ve been blessed with a number of advanced technologies that are very commonplace now. It is just a matter of applying them.”

As president of the United Steelworkers’ Atomic Energy Workers Council, Jim Key provided insight into the end users’ experience with robotic technologies. He said that robotics, specifically worker augmentation technologies such as robotic exoskeleton and physical assist systems, has the ability to improve worker safety and performance.

Initially, Key said, the union saw



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WM Symposia's Jan Carlin

Jan Carlin says she feels blessed in her 40-plus-year career in the nuclear industry, a career that began with Westinghouse Electric Company in its Nuclear Fuels Division. And now Carlin, who joined Wälischmiller Engineering in 2014 as director of business development, is taking on a new role as the managing director of WM Symposia (WMS), having replaced longtime director James Voss in September 2017.

"People ask, 'Aren't you ready to retire?'" Carlin said. "It hasn't even entered my mind. I'm excited about this opportunity with Waste Management. I'm working with great people who are the lions of the industry. And now with the opportunity to do STEM [education] and take on some more interesting things, why would I quit?"

STEM (science, technology, engineering, and math) education is something that Carlin said she is passionate about, and as managing director, she plans to pursue a much larger and more aggressive STEM program through WMS, which already recognizes teachers for their work in STEM education. Using the work Washington state is doing in STEM education as an example, Carlin said that she would like to create a pilot program based on the Washington model to use at other sites.

In addition to increased involvement in STEM programs, Carlin listed three other areas in which she would like to see growth within WMS, including raising the role of women in the conference, an increased participation by the United

Kingdom and European countries, and a larger presence of utility companies, which she admits have not been involved with the conference in the way they once were. "I want to very aggressively engage the utility community and get them to come back to Waste Management," she said, noting that the 2019 conference will feature panels and sessions focused on issues specifically related to utilities.

Carlin also said that she feels that women are underrepresented at the conference. In her position with German-based Wälischmiller, she said, she sees a larger percentage of women in key technical roles in Europe than she does in the United States. The question, she said, is how to get professional women, and their management, to recognize the value of participating in WMS and attending the conference.

As for the United Kingdom and the rest of Europe, Carlin pointed out that those countries are forging ahead with nuclear programs, and their presence at the conference would be valuable.

Noting that for 2018, WMS exceeded its previous registration by 10 percent and had a record number of papers and panels, Carlin said that the WMS brand remains strong, and the conference fills a valuable service for the nuclear industry. "I don't know of any other conference like it anywhere in the world," she said. "I think this year we had more than 400 Department of Energy representatives here. That interface, and that ability for our vendors to be in close contact and everybody being in the same place at the same time, I think is a very important service to the industry."—T.G.



Photo: WM Symposia

robotics as a "job-threatening" development, as has been the case in other industries where automation has replaced human workers. Nuclear cleanup tasks, however, require a lot of human interaction and cannot be performed with a high level of automation, Key said, adding that robotics has become a job enabler, not a job killer for the nuclear industry. The use of robotics is allowing workers to access hazardous environments while reducing their dose and also reducing the physical demands of the work.

Key particularly noted the importance of robotics to an aging nuclear workforce. "We have a huge vacuum of workers across the nation that will take 10 to 15 years to fill," he said. As the industry deals with an older workforce, worker augmentation systems such as the robotic exoskeleton have become more valuable in helping workers complete tasks. New technologies also have the potential of creating another class of worker, which can attract younger workers, Key added. "It's just another method to modernize our toolbox," he said.

The potential of robotics and advanced technologies to draw younger people into nuclear was also addressed by Rob Buckingham, a director at the U.K. Atomic Energy Authority, who provided an international perspective on robotics. "How do you get young people into nuclear? You give them the tools to do really cool stuff,"

he said, pointing to advancements in artificial intelligence.

Buckingham noted the emerging use of autonomous vehicles, such as self-driving cars, saying they are important to consider as part of the vanguard of robotic applications. "They are coming, and they are going to affect the lives of everyone in this room," he said. The question, he added, is how do we use the technology and adapt it to decontamination and decommissioning work.

Buckingham said that his agency has been working with robotics for decades and that only by using the technology can workers and project managers get comfortable with it and maximize its potential. He noted that there is a wide array of technologies available and said, "What we need to do in the nuclear sector is grab it, use it, and get on with it."

A U.S. government perspective was offered by Robert Ambrose, division chief of software, robotics, and simulation at NASA. He provided an overview of developments within the National Robotics Initiative (NRI), the National Science Foundation program to accelerate the development and use of robots in the United States. The initiative, Ambrose said, has two phases, beginning with NRI 1.0, which lasted from 2012 to 2017 and focused on collaborative robots that work beside or cooperatively with people.

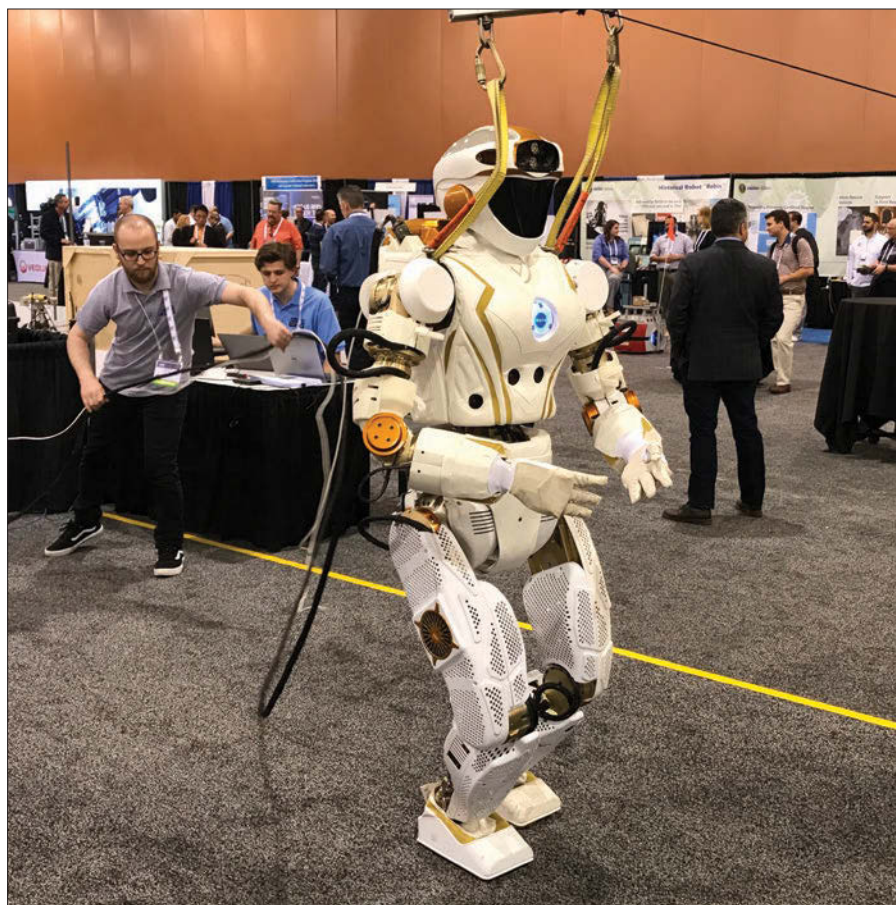
The second phase, NRI 2.0, which will run from 2018 to 2023, will focus on the ubiquity of robotics and the seamless integration of collaborative robots into the workplace.

Ambrose said that to date, nearly \$200 million in NRI grants has been awarded to universities by the government agencies involved in the program. "In the world of university robotics research, that's considered a big deal," he said.

Ambrose finished by noting a couple of case studies of robotics development that NASA has been working on, including the development of a robotic glove that allows the user to do physically demanding work for an extended period. He said that NASA is currently licensing the glove to various companies for industrial applications, including healthcare. "If you have an application where a worker needs to hold something for a long time, give us a call," he said.

DECOMMISSIONING

Closing a nuclear power plant—taking it from operations to decommissioning status—requires not only a lot of strategy and planning but also a cultural shift. That cultural shift has been noted by many people involved in commercial reactor decommissioning, including Kerry Rod, who



The Robotics Pavilion at WM2018 featured NASA's Valkyrie humanoid robot.

spoke on the San Onofre Nuclear Generating Station decommissioning project during the technical session "Plans for and Experience in Transitioning from Operations to Decommissioning."

Rod, general manager of decommissioning oversight at San Onofre, explained that the plant had 21 discrete management systems that had to be transitioned from an operational standpoint to one focused on decommissioning. That transition, he said, was a gradual process that began even before Southern California Edison (SCE) awarded the San Onofre decommissioning contract in 2016. To facilitate the transition, SCE directed program owners to develop transition plans for each of the 21 management systems.

Rod said that a number of factors contributed to SCE's successfully completing the transition of management systems to the decommissioning contractor within a year. These included actively fostering a collaborative environment with the contractor, facilitating the transfer of knowledge, keeping to a rigorous schedule, and working to keep transition teams aligned. Experience shows, Rod said, that a one-year period is a reasonable amount of time to complete the transition process.

Andreas Roos, a manager at Sweden's OKG Aktiebolag, also noted the change in mindset that needs to occur when a nuclear reactor is transitioned from operations

to decommissioning. That transition is further complicated, he said, when it occurs at a site where other reactors remain operational, such as at Oskarshamn in Sweden, where Units 1 and 2 were shut down in 2017 and 2016, respectively, and Unit 3 remains in operation.

Having operating and decommissioning reactors at the same site presents a number of challenges, Roos said. These include transferring personnel within the company, finding the needed competencies within the available workforce, and acclimating personnel to new interfaces with different authorities and stakeholders.

OKG, however, had a number of factors in its favor. Roos noted that the company had a skilled workforce to draw upon, as well as a healthy decommissioning fund available to finance the work. In addition, he said, OKG was able to coordinate work with Oskarshamn's sister plant, Barsebäck, which is also undergoing decommissioning.

To prepare the two Oskarshamn units for dismantling, Roos said, OKG began intensive preparations early in the process, including obtaining the necessary permits, moving spent fuel to storage, and completing partial dismantling. Cutting and segregation of reactor internals is to begin at Oskarshamn-2 in 2018 and at Oskarshamn-1 in 2019.—*Tim Gregoire* ■

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- C Coated
- LP Lapping & Polishing Grits
- NW Non-Woven Fiber

Uticom Systems, Inc., Coatesville, PA (C)

00400 Absorbers, Nuclear Radiation—

also see *Neutron Absorbers; Sorbents*

Camfil USA, Washington, NC
 Ceradyne, Inc., a 3M company, Quapaw, OK
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom
 Hopewell Designs, Inc., Alpharetta, GA
 METOIL, Praha, Czech Republic

03000 Air-Conditioning & Ventilation

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Housings; Filters; Training

- AC Air-Conditioning
- AN Air Distribution Nozzles
- AD Air Dryers
- AF Air Filtration Units
- AH Air Handling
- C Chillers
- CO Condensing Units
- DH Dehumidifiers
- D Ductwork
- EC Evaporative Coolers
- F Fans & Blowers
- L Louvers
- V Ventilation
- VP Ventilation, Portable
- VT Ventilation, Test Equipment

AZZ Nuclear Engineered Solutions, Fort Worth, TX (AC, AF, C, EC, F, V)

Ellis & Watts Global Industries, Inc., Batavia, OH (AC, AD, AF, AH, C, CO, DH, D, EC, F, L, V)

Fram Safety Products, Inc., Nashville, TN (AD, AF)
 James Fisher Nuclear Ltd, Preston, United Kingdom (AF, V, VP)

James Fisher Technologies, Loveland, CO (AF, V)

Radiation Protection Systems, Inc., Groton, CT (AF, D, F, VP, VT)

River Technologies, LLC, Forest, VA (AF, D, F, V, VP)
 The Spencer Turbine Co., Windsor, CT (F)

◆SSM Industries, Inc., Pittsburgh, PA (AC, AD, AF, AH, C, CO, DH, D, EC, F, L, V)

◆Vigor (formerly Oregon Iron Works), Clackamas, OR (EC)

03180 Alarm Status Reporting & Control Systems

NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada

◆Radiation Safety & Control Services, Inc., Stratham, NH

Southwest Microwave, Inc., (Security Systems Div.), Tempe, AZ

03200 Alarm Systems—also see

Emergency Warning Systems; Security Systems

- AI Anti-Intrusion
- AS Audible Signal
- C Criticality
- F Fire
- FR Flow Rate
- LE Level
- LI Limit
- P Pressure
- R Radiation
- RT Reactivity Transient
- RV Recorded Voice, Digital (Multiple Messages)
- V Visual Signal

Arrow-Tech, Inc., Rolla, ND (R)

Cablelan Nuclear, Inc., Fort Myers, FL (C)

CAEN SyS srl, Viareggio, LU, Italy (R)

Canberra, part of Mirion Technologies, Meriden, CT (AS, C, FR, LE, LI, R, RT, V)

FCI-Fluid Components International LLC, San Marcos, CA (FR, LE)

Fire & Pump Service Group, Rancho Dominguez, CA (F)

James Fisher Nuclear Ltd, Preston, United Kingdom (R)

James Fisher Technologies, Loveland, CO (AS, C, R)

LabLogic Systems, Inc., Brandon, FL (R)

Magnetrol International, Aurora, IL (LE)

NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (R)

ORTEC, Oak Ridge, TN (R)

OTEK Corp., Tucson, AZ (FR, LE, P)

Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (R)

◆ Denotes Advertiser

Premium Analyse, Norroy Le Veneur, France (R)
 Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada (R)

◆Radiation Safety & Control Services, Inc., Stratham, NH (R)

Rockwell Automation, Inc., Milwaukee, WI (FR, LE, LI, P)

Saphymo - Bertin Instruments, Montigny le Bretonneux, France (R)

Siemens Process Industries and Drives, (Industry Automation Div.), (Process Instrumentation & Analytics), Hauppauge, NY (FR)

Southwest Microwave, Inc., (Security Systems Div.), Tempe, AZ (AI)

◆Thermo Fisher Scientific, Oakwood Village, OH (R)
 Tyne Engineering Inc., Burlington, Ontario, Canada (R)

Whelen Engineering Co., Inc., (Mass Notification Products), Chester, CT (AS, RV, V)

03800 Analysis

- C Chemical
- DE Design Basis
- DD Due Diligence
- EL Elemental, Isotopic
- E Environmental
- EQ Equipment Qualification
- FE Failure, Electrical/Electronic
- FM Failure, Metallurgical
- FI Finite Element
- FP Fuel Cycle & Fuel Performance
- G Geotechnical
- GM Groundwater Modeling
- HE Helium
- H Hydrological
- LA Laser-Based
- LP Loose Parts
- L Lubrication
- M Materials
- RS Risk
- SE Seismic
- SH Shielding
- SC Site Characterization
- SI Siting
- ST Stress
- SS Sump/Strainer Blockage (Reg. Guide 1.82)
- T Thermal
- V Vibration
- W Waste

ABZ, Inc., Chantilly, VA (RS, SC, W)

AGI Engineering, Stockton, CA (FI, ST)
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (EL, M, SC, W)
 American Beryllia, Inc., Haskell, NJ (M)
 Anamet Inc., Hayward, CA (C, FM, M)
 Ansaldo Nucleare S.p.A., Genova, Italy (DE, FI)
 Applied Health Physics, LLC, Bethel Park, PA (E, RS)
 Applied Science Professionals, (ASP-LLC), Salt Lake City, UT (SC)
 Attention IT, Inc., Knoxville, TN (E)
 Attenuation Environmental Co., Seattle, WA (E, W)
 AZZ Nuclear Engineered Solutions, Fort Worth, TX (SE)
 G.D. Barri & Associates, Inc., Peoria, AZ (DE, E, FE, G, H, M, SE, SH, SC, ST)
 BCP Engineers & Consultants, Gretna, LA (EQ, RS, ST, V)
 Boston Government Services, LLC (BGS), Oak Ridge, TN (DE, DD, E, EQ, FE, RS, SE, SC, SI, W)
 Burns & McDonnell Engineering Company, Inc., (Aviation & Federal Global Practice), Kansas City, MO (C, G, H, SI)
 ◆BWX Technologies, Inc., Lynchburg, VA (C, EL, E, FE, FM, FI, FP, M, SH, ST, T, V, W)
 Cablelan Nuclear, Inc., Fort Myers, FL (ST, SS)
 Cabrera Services Inc., East Hartford, CT (EL, E, H, M, RS)
 CAEN SyS srl, Viareggio, LU, Italy (FP)
 Canadian Nuclear Laboratories, Chalk River, Ontario, Canada (C, EL, FE, FM, FP, H, M, SC, V, W)
 Canberra, part of Mirion Technologies, Meriden, CT (EL, E, EQ, W)
 Chemchek Instruments, Inc. (TM), Richland, WA (EL, E)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (SC)
 ◆Container Technologies Industries, LLC, Helenwood, TN (FI, M, RS, ST)
 CS-2 Inc., Grand Island, NY (E, RS, SC, T, W)
 Curie Environmental Services, Albuquerque, NM (W)
 Curtiss-Wright Energetech, Brea, CA (DE, RS, SE)
 CYCLIFE, (Brand of EDF Group), Paris la Défense, France (SC, W)
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom (SE, ST)
 DCS Systems, Inc., Simsbury, CT (FP)
 The Delphi Groupe, Inc., Austin, TX (E, RS)
 DP Engineering Ltd. Co., Fort Worth, TX (DE, DD, EQ, FE, SE)
 Dufrane Nuclear Inc., Winsted, CT (SH, W)
 Elcometer Inc., Rochester Hills, MI (E)
 Encoron Group, (dba RJR Engineering, P.C.), Springville, NY (C, DE, E, FE, FM, FI, SE, ST, T, V)
 Enercon Services, Inc., Kennesaw, GA (DE, E, EQ, FE, G, H, LP, L, M, RS, SE, SH, SC, SI, ST, SS, T, V, W)
 ◆EnergySolutions LLC, Salt Lake City, UT (C, DE, EL, FM, M, RS, SE, SH, SC, SI, ST, T, V, W)
 Energy Steel, Lapeer, MI (C, DE, EQ, FE, FM, FP, LP, L, M, RS, SE, SH, ST, SS, T, V)
 Fortum Power & Heat Oy, Nuclear Services, Espoo, Finland, Finland (E, FP, M, RS, SE, SH, ST, SS, T, W)
 Fuel Tank Maintenance Co., LLC, Cookeville, TN (FP)
 The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC (E)
 GLSEQ, LLC, Huntsville, AL (EQ, SE)
 G/O Corp., Abita Springs, LA (SH)
 GoldSim Technology Group, Issaquah, WA (RS)
 Hawks, Giffels & Pullin (HGP), Inc., Greenville, SC (DD, RS)
 ◆Holtec International, Camden, NJ (EQ, SE, SH, ST, T, V)
 ILD, Inc., Baton Rouge, LA (SE, T, V)
 Interdevelopment, Inc., Falls Church, VA (RS)
 Interface Analysis Centre, University of Bristol, Bristol, United Kingdom (EL, M)
 InTomes Technical Services, Inc., Springville, NY (DE, FE, FI, SE, ST, T, V)
 James Fisher Technologies, Loveland, CO (W)
 ◆Joseph Oat Corp., Camden, NJ (H, M, ST, T, V)
 Kinectrics Inc., Toronto, Ontario, Canada (C, DE, DD, EL, E, EQ, FE, FM, FP, H, LP, L, M, RS, SE, SH, ST, T, V, W)
 LabLogic Systems, Inc., Brandon, FL (SH)

Lucideon, Research Triangle Park, NC (C, DE, EL, FM, FI, M, T)
 LUDECA, Inc., Doral, FL (V)
 Merrick & Company, Greenwood Village, CO (DE, EQ, FI, LA, RS, SE, SH)
 MPR Associates, Inc., Alexandria, VA (EQ, FM, M, SE, ST, T, V)
 ◆NAC International Inc., Norcross, GA (FP, SH, ST, T)
 National Nuclear Laboratory (UK), Warrington, United Kingdom (C, E, FP, M, SH, SC, W)
 Navarro Research and Engineering, Inc., Oak Ridge, TN (DE, DD, E, GM, H, RS, SC, W)
 Neptune and Company, Inc., Lakewood, CO (E, FI, GM, H, RS)
 North Wind Group, Idaho Falls, ID (E, GM, SC, SI, W)
 NV5 Global, Richland, WA (G, GM, H, SH, SI)
 NWT Corp., San Jose, CA (C)
 Orano, Charlotte, NC (DE, EQ, FP, SE, SH, SC, SI)
 Pace National Center for Testing & Innovation, Mt. Juliet, TN (C, EL, E, SC, W)
 PaR Systems, LLC, Shoreview, MN (SE)
 ◆Precision Custom Components, LLC, York, PA (FM, ST, T, V)
 Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (C, FI, M, SE)
 Project Assistance Corp. (PAC), Lafayette, CA (DE, E, EQ, FE, FM, FI, FP, G, H, M, RS, SE, SI, ST, T)
 Promatom Nuclear, Oakville, Canada (DE, EQ, FM, M, SE, SH, ST)
 Qal-Tek Associates, LLC, Idaho Falls, ID (SC)
 Radiation Protection Systems, Inc., Groton, CT (SH, SC)
 ◆Radiation Safety & Control Services, Inc., Stratham, NH (EL, E, G, W)
 REEL COH Inc., Boisbriand, Quebec, Canada (SE)
 REI Nuclear, LLC, Columbia, SC (E, EQ, RS, SH, SC, W)
 Remtech SA, Velizy, Villacoublay, France (E)
 R&G Laboratories, Inc., Tampa, FL (C, L)
 Sargent & Lundy LLC, Chicago, IL (C, DE, DD, E, EQ, FE, FM, FI, G, H, LP, L, M, RS, SE, SH, SC, SI, ST, SS, T, V, W)
 ◆SECUR, Sewickley, PA (SC)
 Shipsrock Consulting, LLC, Westport, MA (C, DD, EL, E)
 Siemens PLM Software, Melville, NY (E, FI, ST, SS, T, V)
 SNC-Lavalin, Mississauga, Ontario, Canada (EQ, FE, FM, FI, FP, M, SE, SH, ST, SS, T, V, W)
 Howard L. Sobel, P.E., Oceanside, NY (FP, W)
 Southwest Research Institute, San Antonio, TX (C, EL, E, EQ, FE, FM, FI, G, GM, H, L, M, RS, SE, SH, SC, SI, ST, SS, T, V, W)
 ◆SSM Industries, Inc., Pittsburgh, PA (SE)
 Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (E, G, H, RS, SC, W)
 Teledyne Brown Engineering, Inc., Huntsville, AL (E, SC, W)
 TFE, Inc., North Augusta, SC (C, DE, DD, EL, RS, SH, W)
 ◆Thermo Fisher Scientific, Oakwood Village, OH (C, E)
 TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (SC)
 Tyne Engineering Inc., Burlington, Ontario, Canada (ST)
 University of Bristol, (Interface Analysis Centre), Bristol, United Kingdom (C, EL, E, FM, FP, LA, LP, M, SC, ST, W)
 Veolia Nuclear Solutions, Westminster, CO (DE, DD, E, EQ, FE, FI, G, SE, SH, SC, SI, ST, W)
 VTT Technical Research Centre of Finland, VTT, Finland (C, DE, EL, E, EQ, FM, FI, FP, G, GM, H, M, RS, SE, SC, SI, T, V, W)
 WD Associates, Inc., Whiteford, MD (DE, DD)
 ◆Westinghouse Electric Co. LLC, Cranberry Township, PA (EL, EQ, FM, FP, LP, L, M, RS, SE, SH, ST, T, V, W)
 Whiting Corp., Monee, IL (DE, EQ, FI, SE)
 WMG, Inc., Peekskill, NY (EL, SH, SC, W)
 WorleyParsons, Reading, PA (DE, E, EQ, FI, RS, SE, SC, SI, ST, T)
 Worthington Industries, Columbus, OH (M)
 Zachry Nuclear Engineering, Inc., Stonington, CT (DE, EQ, FE, FI, SE, ST, T)

04000 Analyzers

A Air
 CA Coincidence & Anti-Coincidence
 D Density
 DH Dissolved Hydrogen
 DO Dissolved Oxygen
 E Effluent
 G Gas
 CG Gas, Containment
 H Hydrazine
 MP Multi-Parameter
 OG Off-Gas Hydrogen
 OX Oxygen
 PO Portable Multichannel
 PA Post-Accident Sampling (O2 & H2)
 PM Pulse-Height, Multi-Channel
 PH Phosphorescence
 PS Pulse-Height, Single-Channel
 SI Silica
 SL Sludge
 SO Sodium
 ST Steam
 TF Time-of-Flight
 TO Total Organic Carbon
 V Viscosity
 WG Waste-Gas, Oxygen & Hydrogen
 W Water
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (PO, SL)
 Automation Products, Inc., (Dynatrol® Div.), Houston, TX (D, V, W)
 CAEN SyS srl, Viareggio, LU, Italy (CA, E, G, MP, PO, PM, PS, SL, TF, W)
 Canberra, part of Mirion Technologies, Meriden, CT (A, CA, PO, PM, PS)
 Elcometer Inc., Rochester Hills, MI (V)
 ◆EnergySolutions LLC, Salt Lake City, UT (SL, W)
 The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC (A, DO, E, G, CG, W)
 GLSEQ, LLC, Huntsville, AL (CG, OG, OX, PA, WG)
 HI-Q Environmental Products Co., Inc., San Diego, CA (A)
 James Fisher Nuclear Ltd, Preston, United Kingdom (PA, TF)
 James Fisher Technologies, Loveland, CO (A, TF)
 LabLogic Systems, Inc., Brandon, FL (W)
 Ludlum Measurements, Inc., Sweetwater, TX (PS)
 NUCON International, Inc., Columbus, OH (G)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (MP, PO, PM, PS, W)
 ORTEC, Oak Ridge, TN (CA, E, MP, PO, PM, PS, TF)
 ◆Radiation Safety & Control Services, Inc., Stratham, NH (PO, PM)
 Radiological Solutions, Inc., Rockdale, IL (W)
 REEL COH Inc., Boisbriand, Quebec, Canada (G)
 Saphymo - Bertin Instruments, Montigny le Bretonneux, France (G, OX)
 Sentry Equipment, Oconomowoc, WI (DO, H, OX, PA, SI, SO, ST, W)
 Teledyne Brown Engineering, Inc., Huntsville, AL (OG, TO)
 ◆Thermo Fisher Scientific, Oakwood Village, OH (A, D, DH, DO, G, MP, OX, PO, SO, V, WG, W)
 Tyne Engineering Inc., Burlington, Ontario, Canada (DH, G, OG, PO)
 Ultra Electronics Energy, Wimborne, Dorset, United Kingdom (PM, PS)
 VTT Technical Research Centre of Finland, VTT, Finland (A, E, G, CG, MP, PA, PH, SI, SL, SO, TO, V, WG, W)
 Waters Equipment, Oconomowoc, WI (ST, W)
 06790 Asbestos Abatement/Removal Products & Services
 ◆American DND Inc., Grand Island, NY
 Burns & McDonnell Engineering Company, Inc., (Aviation & Federal Global Practice), Kansas City, MO
 CS-2 Inc., Grand Island, NY
 Enercon Services, Inc., Kennesaw, GA
 Fuel Tank Maintenance Co., LLC, Cookeville, TN
 North Wind Group, Idaho Falls, ID
 NV5 Global, Richland, WA
 Tecnubel-Transnubel-ECS, Dessel, Belgium

Williams Industrial Services Group, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), Tucker, GA

06950 **Bar-Coding Devices & Supplies**

Alphasource, Inc., Philadelphia, PA
 Attention IT, Inc., Knoxville, TN
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL
 Promotion Nuclear, Oakville, Canada

08800 **Cable, Electrical—also see**

Connectors; Wire

- CO Coaxial
- C Control
- DC Data Communications
- FI Fiber Optic
- FR Flame-Resistant
- HT High-Temperature
- I Instrumentation
- MI Mineral-Insulated, Metal-Jacketed
- P Power
- PA Prefabricated Assemblies
- RR Radiation-Resistant
- R Repair, In-Site
- UC Umbilical Cord, Nuclear Grade (Robotic)
- U Underwater

LEMO S.A., Ecublens, Switzerland (CO, DC)
 Lights Camera Action, LLC, Gilbert, AZ (RR, U)
 Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (MI, PA, RR)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (I)
 Promotion Nuclear, Oakville, Canada (CO, C, DC, FI, FR, HT, I, MI, P, PA, RR, R, UC, U)
 Prysman Group, (ULTROL® 60+), Willimantic, CT (CO, C, DC, FI, FR, I, P, RR)
 ♦ Reef Industries, Inc., Houston, TX (FR, PA)
 Remote Ocean Systems (ROS), San Diego, CA (U)
 RSCC Wire & Cable LLC, East Granby, CT (CO, C, DC, FI, FR, HT, I, P, RR)
 Sidus Solutions LLC, San Diego, CA (UC, U)
 Tyne Engineering Inc., Burlington, Ontario, Canada (RR)
 VTT Technical Research Centre of Finland, VTT, Finland (C, DC, FI, FR, HT, I, RR)

09730 **Calciners—also see Radioactive**

Waste Handling & Treatment Equipment

Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil
 Orano, Charlotte, NC
 ♦ Petersen Inc., Ogden, UT
 ♦ Vigor (formerly Oregon Iron Works), Clackamas, OR
 Whiting Corp., Monree, IL
 Wyssmont Co., Fort Lee, NJ

09750 **Calibration Equipment & Systems**

- D Dose, Nuclear Medicine
- E Electrical Test Equipment
- ET Electrical Test Equipment
- IC Instrumentation and Control
- LF Laminar Flow
- P Pressure
- R Radiation Measuring

Arrow-Tech, Inc., Rolla, ND (R)
 Beamex, Inc., Marietta, GA (E, ET, IC, P)
 Biodex Medical Systems, Inc., Shirley, NY (D, R)
 Canadian Nuclear Laboratories, Chalk River, Ontario, Canada (R)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (R)
 James Fisher Nuclear Ltd, Preston, United Kingdom (D, R)
 James Fisher Technologies, Loveland, CO (R)
 North Wind Group, Idaho Falls, ID (R)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (D, R)
 Radiation Protection Systems, Inc., Groton, CT (R)
 ♦ Thermo Fisher Scientific, Oakwood Village, OH (R)
 Tyne Engineering Inc., Burlington, Ontario, Canada (R)

09800 **Calibration Services—also see**

Health Physics Services

- E Electrical Test Equipment
- ET Electronic Test Equipment
- F Flow
- IC Instrumentation & Control
- PT Pressure, Temperature, Humidity
- R Radiation Measuring
- T Tools, Physical/Dimensional/Mechanical

ANTECH Corp., Westminster, CO (R)
 Applied Health Physics, LLC, Bethel Park, PA (R)
 Arrow-Tech, Inc., Rolla, ND (R)
 BCP Engineers & Consultants, Gretna, LA (E, F, IC)
 Berkeley Nucleonics Corp., San Rafael, CA (ET, R)
 Cabrera Services Inc., East Hartford, CT (R)
 Campoverde srl, Milano, Italy (R)
 Canberra, part of Mirion Technologies, Meriden, CT (R)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (R)
 Curtiss-Wright EnerTech, Brea, CA (F, IC, PT)
 Enercon Services, Inc., Kennesaw, GA (R)
 ♦ EnergySolutions LLC, Salt Lake City, UT (IC, R)
 FCI-Fluid Components International LLC, San Marcos, CA (F)
 F&J Specialty Products, Inc., Ocala, FL (F)
 Foss Therapy Services, Inc., North Hollywood, CA (IC, R)
 Health Physics Instruments, (Division of Far West Technology, Inc.), Goleta, CA (R)
 HI-Q Environmental Products Co., Inc., San Diego, CA (F)
 Hopewell Designs, Inc., Alpharetta, GA (R, T)
 Stan A. Huber Consultants, Inc., New Lenox, IL (R)
 James Fisher Nuclear Ltd, Preston, United Kingdom (E, ET, R)
 James Fisher Technologies, Loveland, CO (R, T)
 Kinectrics Inc., Toronto, Ontario, Canada (E, ET, IC)
 North Wind Group, Idaho Falls, ID (R)
 NUCON International, Inc., Columbus, OH (E, ET, F, IC, PT, R, T)
 NWT Corp., San Jose, CA (F)
 Perma-Fix Environmental Services, Inc., Oak Ridge, TN (PT, R)
 ♦ Precision Custom Components, LLC, York, PA (T)
 Radiation Protection Systems, Inc., Groton, CT (R)
 Radiation Safety Assoc., Inc., Hebron, CT (R)
 ♦ Radiation Safety & Control Services, Inc., Stratham, NH (R)
 RSO, Inc./Radiation Service Organization, Laurel, MD (R)
 Saphymo - Bertin Instruments, Montigny le Bretonneux, France (R)
 Sentry Equipment, Oconomowoc, WI (F, IC, PT, R)
 Siemens Process Industries and Drives, (Industry Automation Div.), (Process Instrumentation & Analytics), Hauppauge, NY (F, IC)
 Southwest Research Institute, San Antonio, TX (E, ET, F, IC, PT, R, T)
 System One, Pittsburgh, PA (E, ET, F, IC, PT, R, T)
 Tecubel-Transubel-ECS, Dessel, Belgium (IC, R)
 ♦ Thermo Fisher Scientific, Oakwood Village, OH (R)

09950 **Cars, Railroad**

- CH Cask-Handling
- L Liners

AVANTech, Inc., Columbia, SC (L)
 Dufrane Nuclear Inc., Winsted, CT (CH, L)
 ♦ EnergySolutions LLC, Salt Lake City, UT (L)
 Hilman Rollers, Marlboro, NJ (CH)
 ♦ Joseph Oat Corp., Camden, NJ (L)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CH)
 Orano, Charlotte, NC (CH, L)
 ♦ PacTec, Inc., Clinton, LA (L)
 REEL COH Inc., Boisbriand, Quebec, Canada (CH)
 ♦ SECUR, Sewickley, PA (CH, L)
 ♦ Vigor (formerly Oregon Iron Works), Clackamas, OR (CH, L)

10780 **Cleaning Equipment—also see**

Decon. Chem. & Equip.; Health Phys. Equip.

- A Abrasive

♦ Denotes Advertiser

- CP Cavity Pool
- CS Chemical Services
- P Parts Washers
- PC Pipe Cleaning
- PW Pressure Washing
- R Robotic
- S Steam
- TC Tube Cleaning
- U Ultrasonic
- UW Underwater
- V Vacuum
- VB Vacuum Blasting, Abrasive
- WJ Water Jetting, High-Pressure
- WA Water Jetting, High-Pressure, Abrasive

AGI Engineering, Stockton, CA (PC, PW, R, V, WJ)
 Alphasource, Inc., Philadelphia, PA (PC)
 AVANTech, Inc., Columbia, SC (CP, P, R, UW, V)
 Brokk AB, Skelleftea, Sweden (R)
 ♦ BWX Technologies, Inc., Lynchburg, VA (R, TC, WJ)
 ♦ Container Technologies Industries, LLC, Helenwood, TN (A)
 ♦ Curtiss-Wright EST Group, Hatfield, PA (TC)
 ♦ EnergySolutions LLC, Salt Lake City, UT (CP, V)
 Environmental Alternatives, Inc., Swanzey, NH (A, CP, CS, PC, R, S, TC, U, V, VB, WJ)
 Frham Safety Products, Inc., Nashville, TN (V, VB)
 G/O Corp., Abita Springs, LA (V)
 Inuktun Services Ltd., Nanaimo, BC, Canada (R)
 James Fisher Nuclear Ltd, Preston, United Kingdom (R)
 Master-Lee Engineered Products Inc., Latrobe, PA (V)
 PaR Systems, LLC, Shoreview, MN (R, WJ, WA)
 ♦ Precision Custom Components, LLC, York, PA (A)
 Promotion Nuclear, Oakville, Canada (PC, R, TC, UW)
 Radiation Protection Systems, Inc., Groton, CT (V)
 Remote Ocean Systems (ROS), San Diego, CA (R)
 River Technologies, LLC, Forest, VA (A, CP, P, PC, R, TC, V, VB, WJ)
 SNC-Lavalin, Mississauga, Ontario, Canada (TC)
 The Spencer Turbine Co., Windsor, CT (V)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (UW)
 Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (R)
 Wälischmiller Engineering GmbH, Markdorf, Baden-Württemberg, Germany (R)

10850 **Clothing, Protective, Anti-Contamination—also see Respiratory Protection Equipment**

- BS Bubble Suits
- C Coveralls
- CL Coveralls, Lightweight, Breathable
- D Disposable
- DS Dissolvable
- G Gloves
- H Head Coverings
- L Lab Coats
- MG Modesty Garments, Lightweight, Breathable
- SP Scrub Shirts & Pants
- SC Shoe Covers

Alphasource, Inc., Philadelphia, PA (C, CL, D, G, H, L, MG, SP, SC)
 Coastal Network, Inc., Charlottesville, VA (C, CL, D, G, L, SP, SC)
 Eastern Technologies, Inc., (OREX), Ashford, AL (C, CL, D, DS, G, H, L, MG, SP, SC)
 ♦ EnergySolutions LLC, Salt Lake City, UT (D)
 Frham Safety Products, Inc., Nashville, TN (BS, C, CL, D, G, H, L, MG, SP, SC)
 Getinge-La Chalhene, (Sub. of Getinge Group), Vendome, France (L)
 G/O Corp., Abita Springs, LA (BS, C, CL, D, G, H, L, MG, SP, SC)
 JSM Protective, Inc., Wilmington, NC (C, D, G, H, L, SC)
 Lancs Industries, Kirkland, WA (BS, D, G, SC)
 ♦ Mohawk Safety, Manchester, CT (D, G, L)
 ♦ Radiation Safety & Control Services, Inc., Stratham, NH (C, D, G, H, SC)
 Rich Industries Inc., New Philadelphia, OH (BS, C, CL, D, G, H, L, MG, SP, SC)
 RSO, Inc./Radiation Service Organization, Laurel, MD (D)
 Steele Body Cooling Vests, Kingston, WA (SC)

10850 Clothing, Protective, Anti-Contamination

◆ Thermo Fisher Scientific, Oakwood Village, OH (BS, C, CL, D, G, H, L, MG, SP, SC)

◆ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (BS, C, CL, D, DS, G, H, L, MG, SP, SC)

10900 **Clothing, Protective, Other Than Anti-Contamination—also see Respiratory Protection Equip.**

B Bibs & Aprons
C Coveralls
CL Coveralls, Lightweight, Breathable
FS Face Shields
F Footwear
GG Gloves, Grinding
GW Gloves, Welding
GS Goggles/Spectacles
HH Hard Hats
HL Hat Liners

HP Hearing Protection Devices
HF Helmets, Fire
LC Lab Coats
MG Modesty Garments, Lightweight, Breathable
RW Rainwear
RF RF Shielding
SC Scrub Suits
SS Splash Sleeves
V Vests, Cool

Alphasource, Inc., Philadelphia, PA (B, C, CL, FS, F, GG, GW, GS, HH, HL, HP, LC, MG, RW, RF, SC, SS, V)
American Airworksó, Sophia, WV (FS, GG, GW, HH, V)
Coastal Network, Inc., Charlottesville, VA (FS, GS, HH, MG, RW, V)
Eastern Technologies, Inc., (OREX), Ashford, AL (B, C, CL, F, GG, GW, LC, MG, RW, SC, SS, V)

Frham Safety Products, Inc., Nashville, TN (B, C, CL, FS, F, GG, GW, GS, HH, HL, HP, LC, MG, RW, SC, SS, V)
G/O Corp., Abita Springs, LA (C, CL, FS, LC, MG, SC, SS)
JSM Protective, Inc., Wilmington, NC (C, FS, F, GW, GS, RW, SS, V)
Lancs Industries, Kirkland, WA (RW)
◆ Mohawk Safety, Manchester, CT (B, CL, GW, GS, LC, SC, V)
Rich Industries Inc., New Philadelphia, OH (B, C, CL, F, HL, LC, MG, RW, SC, SS)
Steele Body Cooling Vests, Kingston, WA (V)
◆ Thermo Fisher Scientific, Oakwood Village, OH (B, C, CL, FS, F, GG, GW, GS, HH, HL, HP, LC, MG, RW, SC, SS)
◆ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (B, C, CL, FS, F, GG, GW, GS, HH, HL, HP, HF, LC, MG, RW, RF, SC, SS, V)

11400 **Coatings—also see Consultants; Corrosion Inhibitors; Testing Serv.**

C Cable
CS Concrete Sealing/Restoration/Contamination Control
CR Corrosion-Resistant
FT Floor Toppings
IR Insulation-Related
LC Low-Chloride
S Strippable

Alphasource, Inc., Philadelphia, PA (CS, CR, FT, LC, S)
AZZ Nuclear, Suwanee, GA (CR)
Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (C, CR)
ENECON Corp., Medford, NY (CS, CR, FT)
Frham Safety Products, Inc., Nashville, TN (S)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (CS, CR, FT)
Hexion Inc., Columbus, OH (CS, CR)
Momentive Performance Materials Inc., Waterford, NY (CS, CR)
◆ Reef Industries, Inc., Houston, TX (FT)
Southwest Research Institute, San Antonio, TX (CR, IR)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (CS)
VTT Technical Research Centre of Finland, VTT, Finland (CS, CR)
Williams Industrial Services Group, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), Tucker, GA (CS, CR)

11650 **Communication Systems—also see Emergency Warning Systems; Security Systems**

F Face Mask Accessories
H Headsets
P Paging
RM Repeated Message Tape/Speaker Boxes
T Telephone Conferencing (Audio)
TV Telephone Conferencing (Video)
T Telephonic (Computerized Calling/Answering)
TW Two-Way Radio

Dufrane Nuclear Inc., Winsted, CT (H, T, TW)
Frham Safety Products, Inc., Nashville, TN (F, H)
Whelen Engineering Co., Inc., (Mass Notification Products), Chester, CT (RM)

11680 **Compactor Disks, for Drums**

Hoover Container Solutions, (Formerly Tech Oil Products Inc.), New Iberia, LA
S&G Enterprises, Inc., Germantown, WI

11700 **Compactors—also see Radioactive Waste Treatment Equipment; Solid Waste Reduction Equip.**

Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany
Equipos Nuclear S.A., S.M.E, Madrid, Spain
Hoover Container Solutions, (Formerly Tech Oil Products Inc.), New Iberia, LA

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James Fisher Nuclear Ltd, Preston, United Kingdom
S&G Enterprises, Inc., Germantown, WI
Waste Control Systems, Inc., Phoenix, MD

12800 **Computer Software—also see
Imaging, Digital; Records Management
Sys.**

- AI Artificial Intelligence
- CB Cable Management
- CF Configuration Management/Control
- CA Contract Administration
- CP Critical Path Scheduling
- CD Custom Development
- DB Data Base Management
- DM Decontamination Management
- D Dosimetry
- DD Drawing & Document Control
- EC Economic Analysis
- ET Education/Training
- E Electrical Analysis
- EP Emergency Planning
- ER Emergency Response (In-Plant)
- EA Engineering Analysis
- EM Environmental Monitoring
- EQ Equipment Status/Tagout Tracking
- ES Expert Systems
- FT Fault-Tolerant Automatic Control
- FR Failure/Root Cause Trending
- FS Fire/Safety
- IN Instrument Calibration
- IC Inventory Control (Equipment, Supplies, etc.)
- MC Maintenance Control
- OS Operator Scheduling
- P Piping System Design & Analysis
- PD Plant Design
- PS Procedure Status/Tracking
- PM Project Management
- QA Quality Assurance/Quality Control
- RC Radiological Control/Health Physics
- R Reliability Analysis
- RE Reportability Evaluation
- RI Risk Analysis
- SE Security
- SI Simulation
- SM Software Maintenance/Control
- SP Software Packages
- SN Special Nuclear Material Tracking
- S Spectroscopy
- TS Technical Specification Systems
- TE Telerobotics
- TR Trending
- WM Waste Management
- WC Water Chemistry Management

Alphasource, Inc., Philadelphia, PA (EQ, MC, SN)
AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (S)
Ansaldo Nuclare S.p.A., Genova, Italy (P)
Attention IT, Inc., Knoxville, TN (CF, DB)
AVANTech, Inc., Columbia, SC (WM, WC)
Banda Group International, LLC, Chandler, AZ (CA)
BCP Engineers & Consultants, Gretna, LA (DB, DD, ET, EP, FS, IN, MC, P, PD, PS, PM, QA, RI, SM, SP, TS)
Beamex, Inc., Marietta, GA (IN)
Boston Government Services, LLC (BGS), Oak Ridge, TN (CF, CP, DB, DM, EM, PM, QA, RC, RI, SN, TS, WM)
Burns & McDonnell Engineering Company, Inc., (Aviation & Federal Global Practice), Kansas City, MO (EC, EA, P, PD, PM, QA, RI, SE, WM)
CAEN SyS srl, Viareggio, LU, Italy (D, EM, SI, S, WM)
Campoverde srl, Milano, Italy (D)
Chesapeake Nuclear Services, Inc., Annapolis, MD (EM, RC)
Cogentus, Washington, DC (AI, DM, EC, RE, WM)
Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (PS, PM, SN)
Diakont, San Diego, CA (CD)
ExchangeMonitor Publications & Forums, (RadWaste Monitor, RadWaste Summit, Weapons Complex Monitor, Decommissioning Strategy Forum), Rockville, MD (WM)
Fire & Pump Service Group, Rancho Dominguez, CA (FS)
GSE Systems Inc., Sykesville, MD (ET, SI)

Hawks, Giffels & Pullin (HGP), Inc., Greenville, SC (PM)
♦I.C.E. Service Group, Inc., Ambridge, PA (WM)
James Fisher Nuclear Ltd, Preston, United Kingdom (D, EA, PD, PM)
James Fisher Technologies, Loveland, CO (D)
Kinectrics Inc., Toronto, Ontario, Canada (D)
L3 MAPPS, (Power Systems and Simulation), Montreal, Quebec, Canada (ET, SI)
Neptune and Company, Inc., Lakewood, CO (AI, CD, DB, EC, EM, ES, PM, QA, RI, SI, SP, TR, WM)
NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (CD, DM, D, EM, IN, IC, RC, SP, S)
PaR Systems, LLC, Shoreview, MN (R, TE)
Qal-Tek Associates, LLC, Idaho Falls, ID (RC, WM)
Radiation Protection Systems, Inc., Groton, CT (S)
♦Radiation Safety & Control Services, Inc., Stratham, NH (CP, DB, D, EM, WM, WC)
Rockwell Automation, Inc., Milwaukee, WI (EM, PD, SP, WM)
Saphymo - Bertin Instruments, Montigny le Bretonneux, France (D)
Sarcos Corp., Salt Lake City, UT (TE)
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Siemens PLM Software, Melville, NY (EA, P, PD)
Southwest Research Institute, San Antonio, TX (RC, RI, SI, WM)
♦SSM Industries, Inc., Pittsburgh, PA (EA)
Studsvik, Inc., Atlanta, GA (P, PD, PM, SI)
TFE, Inc., North Augusta, SC (DB, TS, TR, WM)
♦Thermo Fisher Scientific, Oakwood Village, OH (D, ER, EM, IN, IC, RC)
Tyne Engineering Inc., Burlington, Ontario, Canada (WM)
University of Bristol, (Interface Analysis Centre), Bristol, United Kingdom (S)
VTT Technical Research Centre of Finland, VTT, Finland (AI, DB, EP, ER, EA, EM, FR, FS, IN, R, RI, SE, SI, SP, WM)
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WMG, Inc., Peekskill, NY (SN, WM)
WYNSOR, Ogden, UT (DM, EM, WM)
Zachry Nuclear Engineering, Inc., Stonington, CT (EA)

12900 **Computers & Accessories—also see
Data Acq. Sys.; Data Readout**

- A Analog
 - AI Artificial Intelligence Systems
 - CG Color Graphics
 - C Converters
 - D Digital
 - DD Disk Drives
 - ES Expert Systems
 - HH Hand-Held
 - H Hybrid
 - IO Input/Output Interface Units
 - MF Main Frame
 - MS Mass Storage Units
 - M Memory Units
 - MC Micro
 - MP Microprocessor Circuit Boards
 - MN Mini
 - PR Printers
 - TD Tape Drives
 - VD Video Display Units
- ABZ, Inc., Chantilly, VA (AI, ES)
Alphasource, Inc., Philadelphia, PA (HH)
BCP Engineers & Consultants, Gretna, LA (D)
Canberra, part of Mirion Technologies, Meriden, CT (D, MC, MN)
ORTEC, Oak Ridge, TN (IO)
Rockwell Automation, Inc., Milwaukee, WI (IO)
Rolls-Royce, Williamson, NY (AI, D)
Terahertz Technologies, Inc., Oriskany, NY (A, C, D)

13050 **Concrete Breaking, Drilling,
Sawing & Scabbling**

- C Contractors
 - E Equipment
 - R Equipment Rental
- ♦American DND Inc., Grand Island, NY (C, E, R)
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Brokk AB, Skelleftea, Sweden (E)
♦Brokk Inc., Santa Fe, NM (E, R)
Cutting Edge Services Corp., Batavia, OH (C, E)
Cutting Technologies (CTI), Gloucester City, NJ (C, E, R)
Dufrane Nuclear Inc., Winsted, CT (C)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (C)
James Fisher Nuclear Ltd, Preston, United Kingdom (C, E)
James Fisher Technologies, Loveland, CO (C, E)
New Millennium Nuclear Technologies International, Lakewood, CO (C)

13400 **Connectors—also see Feedthroughs**

- DC Data Communications
 - E Electrical
 - EG Electrical, Glovebox
 - EQ Electrical, Quick Disconnect
 - FO Fiber Optic
 - T Thermocouple
- James Fisher Technologies, Loveland, CO (E)
LEMO S.A., Ecublens, Switzerland (DC, E, EQ, FO, T)
Remote Ocean Systems (ROS), San Diego, CA (E)
Souriau, Greer, SC (DC, E, EG, EQ, FO, T)
Teledyne Brown Engineering, Inc., Huntsville, AL (E, EG, EQ, FO, T)

13600 **Consoles, Control**

AGI Engineering, Stockton, CA
Energy Steel, Lapeer, MI
James Fisher Nuclear Ltd, Preston, United Kingdom
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI
Remote Ocean Systems (ROS), San Diego, CA

13700 **Construction Materials**

- AE Anchors, Chemical (Epoxy)
 - A Anchors, Concrete
 - AF Asbestos-Free Fiber Cement
 - C Concrete
 - RB Concrete Reinforcement, Bar (Rebar)
 - RM Concrete Reinforcement, Mesh
 - LF Lumber, Fire-Retardant-Treated
 - R Refractory
 - SP Splices, Rebar
 - SS Steel, Structural--also see Metals, Steel
- Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (A, RB, RM, SP, SS)
♦Container Technologies Industries, LLC, Helenwood, TN (SS)
Dubose National Energy Services, Clinton, NC (A, RB, SS)
Dufrane Nuclear Inc., Winsted, CT (C, RB)
Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (A, SP, SS)
Fire & Pump Service Group, Rancho Dominguez, CA (AE, A, SS)
♦Joseph Oat Corp., Camden, NJ (SS)

13850 **Construction/Engineering
Services—also see Consultants;
Maintenance Services**

- AE Architect-Engineers
 - CE Civil Engineers
 - CS Construction Services
 - EC Engineer-Constructors
 - ES Erection Services
- BCP Engineers & Consultants, Gretna, LA (CE)
♦Bluegrass Concrete Cutting, Inc., Greenville, AL (CS)
Boston Government Services, LLC (BGS), Oak Ridge, TN (AE, CE, CS, EC)
Darchem Engineering Ltd., Stockton on Tees, United Kingdom (EC)
DP Engineering Ltd. Co., Fort Worth, TX (AE, CE)
Dufrane Nuclear Inc., Winsted, CT (CS, EC, ES)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (AE, CE)
Enercon Services, Inc., Kennesaw, GA (AE, CE)
Fire & Pump Service Group, Rancho Dominguez, CA (CS, EC)
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 WorleyParsons, Reading, PA (AE, CE, CS, EC)
 Zachry Nuclear Engineering, Inc., Stonington, CT (AE, CS, EC)

14000 **Consultants—also see Analysis;**

Training

AC Air Cleaning, Filtration
 AU Auditing
 C Chemical Process Design
 CO Coatings/Corrosion
 CM Communications, Management-Employee
 CD Component/System Design & Analysis
 CS Computer Systems & Software
 CC Configuration Control
 CA Contract Administration
 CH Cranes & Hoists
 CE Criticality Hazard Evaluation
 DC Decontamination
 DE Decommissioning
 ES Earth Science Services
 EA Economic Analysis, Trade-off Studies
 EP Emergency Planning & Response
 E Environmental
 EC Equipment Condition Monitoring
 FP Fire Protection
 FT Fuel Transport/Storage
 LP Lightning Protection
 MN Maintenance
 MA Management Audit
 MI Management Information & Control Systems
 M Meteorology
 N Noise Abatement
 OD Organization Development
 PE Performance Measurement
 PH Personnel Stress/Health
 P Piping
 PS Procurement Support
 PP Project Planning & Management
 QA Quality Assurance/Quality Control
 RD Radiation Management
 RE Radiological Engineering
 RM Records Management Systems
 RO Reengineering, Organization
 RC Regulatory Compliance
 RA Risk Analysis
 S Security
 SE Seismic
 SH Shielding
 SS Simulation Services
 SI Siting
 SY System Engineering-Requirements Analysis
 ST Systems Testing
 TE Training Evaluation, Management
 TA Trend Analysis & Corrective Action Programs
 WM Waste Management
 WT Water Treatment
 ABZ, Inc., Chantilly, VA (AU, CA, EP, MA, PS, QA, RM, RA, SY, TA)
 AECOM, Aiken, SC (DC, DE, E, RA, WM)
 Alphasource, Inc., Philadelphia, PA (CO, CA, P, PS, SH)
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (DE)
 American Crane & Equipment Corp., Douglassville, PA (CH)
 ♦American DND Inc., Grand Island, NY (CA, CH, DC, DE, E, PP, WM)
 Anamet Inc., Hayward, CA (CO)

Anata Management Solutions, West Jordan, UT (AU, CM, DE, FT, MA, PP, QA, RC, ST, TE, TA)
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 Attention IT, Inc., Knoxville, TN (MI, WM)
 Attenuation Environmental Co., Seattle, WA (DE, E, RE, RC, WM)
 AVANTech, Inc., Columbia, SC (E, WM, WT)
 AZZ Nuclear, Suwanee, GA (CO, CD, MN)
 Barnhart, Memphis, TN (CH)
 BCP Engineers & Consultants, Gretna, LA (CS, CC, FP, MN, OD, PE, P, PP, QA, RD, RC, RA, SS, SY, ST, TE)
 Bechtel Nuclear, Security & Environmental, Reston, VA (CD, E, MI, PS, PP, QA, RC, S, SI)
 Boston Government Services, LLC (BGS), Oak Ridge, TN (AU, CD, CS, CC, CA, CE, DC, DE, E, FP, LP, MI, P, PS, PP, QA, RD, RE, RM, RC, RA, S, SE, SY, ST, TE, TA, WM)
 Burns & McDonnell Engineering Company, Inc., (Aviation & Federal Global Practice), Kansas City, MO (SH, WM)
 ♦BWx Technologies, Inc., Lynchburg, VA (CD, SH, SY)
 Cabrera Services Inc., East Hartford, CT (CE, DC, DE, ES, EP, E, QA, RD, RE, RC, RA, WM, WT)
 Campoverde srl, Milano, Italy (DC, DE, RE)
 Canberra, part of Mirion Technologies, Meriden, CT (CE, DC, DE, EP, E, MI, PP, RD, RE, RM, SI, WM)
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 Cogentus, Washington, DC (DE, WM)
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 DCS Systems, Inc., Simsbury, CT (CS, MA, QA, TA)
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 DP Engineering Ltd. Co., Fort Worth, TX (AU, CD, CC, FP, MA, P, PS, PP, SE, SY, ST)
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 ENECON Corp., Medford, NY (CO, MN, P)
 Enercon Services, Inc., Kennesaw, GA (AC, AU, C, CO, CM, CD, CS, CC, CA, CH, CE, DC, DE, ES, EA, EP, E, EC, FP, FT, LP, MN, MA, MI, M, N, OD, PH, P, PS, PP, QA, RD, RE, RM, RO, RC, RA, S, SE, SH, SS, SI, SY, ST, TE, TA, WM, WT)
 ♦Energy, Technology and Environmental Business Association, Oak Ridge, TN (WM)
 Environmental Alternatives, Inc., Swanzey, NH (DC)
 Epicor, Inc., Linden, NJ (WT)
 Equipos Nuclear S.A., S.M.E, Madrid, Spain (P)
 ExchangeMonitor Publications & Forums, (RadWaste Monitor, RadWaste Summit, Weapons Complex Monitor, Decommissioning Strategy Forum), Rockville, MD (DC, DE, RD, WM)
 Fire & Pump Service Group, Rancho Dominguez, CA (FP)
 Focus Learning Corp., San Luis Obispo, CA (TE)
 Fortum Power & Heat Oy, Nuclear Services, Espoo, Finland, Finland (CD, CE, DE, E, FP, FT, QA, RD, RE, SH, SS, WM)
 Foss Therapy Services, Inc., North Hollywood, CA (SH, SY)
 Fuel Tank Maintenance Co., LLC, Cookeville, TN (CO, DC, DE, EP, FT, P, WT)

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 INTEGRA Services Technologies Inc., Pasadena, TX (P)
 Interdevelopment, Inc., Falls Church, VA (EA, PS, PP)
 InTomes Technical Services, Inc., Springville, NY (C, CH, CE, E, FP, P, QA, SE, SH, SY, WM)
 James Fisher Nuclear Ltd, Preston, United Kingdom (DE)
 James Fisher Technologies, Loveland, CO (DE)
 ♦Joseph Oat Corp., Camden, NJ (E, P, PS, QA)
 Kinectrics Inc., Toronto, Ontario, Canada (C, CO, CD, DC, DE, E, EC, LP, MN, RD, RE, RC, RA, SE, SH, ST, TE, WM)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CH)
 Laser Safety Solutions, Maricopa, AZ (MA, TE)
 Lucideon, Research Triangle Park, NC (WM)
 LUDECA, Inc., Doral, FL (EC)
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 Met One Instruments, Inc., Grants Pass, OR (M)
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◆ Radiation Safety & Control Services, Inc., Stratham, NH (AU, CE, DC, DE, EP, E, EC, MA, OD, PP, QA, RD, RE, RC, RA, SS, SY, ST, TE, TA, WM)

Radiological Solutions, Inc., Rockdale, IL (E, RE, TA, WM, WT)

REI Nuclear, LLC, Columbia, SC (CD, E, RD, RE, WT)

◆ Robatel Technologies LLC, Roanoke, VA (FT, WM)

Rockwell Automation, Inc., Milwaukee, WI (CS)

Rolls-Royce, Williamson, NY (C)

RSO, Inc./Radiation Service Organization, Laurel, MD (DC, DE, E, RD, WM)

Sargent & Lundy LLC, Chicago, IL (AC, C, CO, CD, CS, CC, CA, CH, CE, DC, DE, ES, EA, EP, E, EC, FP, FT, LP, MN, MA, MI, M, N, PE, P, PS, PP, QA, RD, RE, RM, RC, RA, S, SE, SH, SS, SI, SY, ST, TE, TA, WM, WT)

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Southwest Research Institute, San Antonio, TX (C, CO, CD, CS, CE, DC, DE, ES, E, EC, FP, FT, N, P, QA, RE, RC, RA, SE, SH, SY, ST, TE, WM)

Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (CD, CH, DC, DE, ES, EA, E, FT, MN, MA, MI, PE, PP, QA, RD, RE, RM, RC, RA, SS, SI, TE, TA, WM, WT)

Studsvik, Inc., Atlanta, GA (C, E, P, PP, SS, ST)

Studsvik Scandpower, Wilmington, NC (CS, CE, SS)

System One, Pittsburgh, PA (CM, CD, CA, EC, FP, FT, MA, MI, PS, PP, QA, RO, RC, SY, ST, TE)

TFE, Inc., North Augusta, SC (CE, DC, DE, E, FP, MN, MA, PS, PP, QA, RD, RE, RM, RO, RC, RA, SH, SY, ST, TE, TA, WM)

TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (DC, DE, EA, RE)

Transco Products Inc., Chicago, IL (RD)

Tri Tool Inc., Rancho Cordova, CA (MN, PP)

TSSD Services, Inc., Oakland, ME (DC, DE, OD, PE, PP)

Tyne Engineering Inc., Burlington, Ontario, Canada (C, RD, RO, WM)

Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (DE, MN)

University of Bristol, (Interface Analysis Centre), Bristol, United Kingdom (CO, DC, DE, ES, E, P, WM, WT)

Veolia Nuclear Solutions, Westminster, CO (AC, C, CD, CE, DC, DE, E, LP, P, QA, SE, SH, SS, SI, SY, ST)

Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (CO, DC, DE, WM, WT)

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VTT Technical Research Centre of Finland, VTT, Finland (CO, CD, CS, CE, DE, EP, E, EC, FP, FT, MN, PE, QA, RA, S, SE, SS, SI, SY, TE, WM)

WD Associates, Inc., Whiteford, MD (MA, OD, PE, RC, TE, TA)

◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (CO, CD, CS, CC, CA, CE, DC, DE, EP, E, FP, FT, MN, MI, P, PS, PP, QA, RD, RE, RM, RC, SE, SH, SS, SI, ST, WT)

WMG, Inc., Peekskill, NY (CS, DC, DE, E, FT, RD, RE, RC, SH, WM, WT)

Wolfgang Waelischmiller Solutions, München, Germany (DE)

◆ Wood, (Environment & Infrastructure Solutions, Inc.), (Radiological Services & Engineering Group), Grand Junction, CO (DC, DE, RD, RE, WM)

WorleyParsons, Reading, PA (CO, CD, EA, FP, LP, P, PS, PP, QA, RE, RA, S, SE, SI)

WYNSOR, Ogden, UT (E)

Zachry Nuclear Engineering, Inc., Stonington, CT (CD, CS, CC, DE, EA, EC, FP, MN, P, PS, PP, QA, RC, S, SE, ST)

14300 Containers—also see Radioactive Waste Handling; Shielding Materials

B	Bulk
CR	Casks, Radwaste
SF	Casks, Spent-Fuel Shipping
CS	Casks, Spent-Fuel Storage
CO	Component
DB	Drum Breather Filters
DL	Drum Liners/Inserts
D	Drums
GA	Gamma Source Shipping
GS	Gamma Source Storage
G	Groups 1, 2 and 3 Containers (per IAEA)
HI	High-Integrity (HIC)
LI	Liners/Inserts, LSA Containers
IA	LSA Containers, IAEA
LS	LSA Containers, Strong-Tight
OH	On-Site Storage Containers, High-Level
OL	On-Site Storage Containers, Low-Level
O	Overpacks
SS	Soft-Sided/Flexible
S	Soil
TA	Type A Containers
TB	Type B Containers
TC	Type C Containers

Alphasource, Inc., Philadelphia, PA (DL, O, SS)

Ansaldo Nucleare S.p.A., Genova, Italy (D)

Applied Health Physics, LLC, Bethel Park, PA (TA)

AVANTech, Inc., Columbia, SC (CR, CO, DL, G, HI, LI, IA, LS, OL, O, TA)

AZZ Nuclear, Suwanee, GA (CS)

Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (D)

Biotech Medical Systems, Inc., Shirley, NY (D, OL, TA)

Campoverde srl, Milano, Italy (GA)

Coastal Network, Inc., Charlottesville, VA (D, LS)

Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (LI)

◆ **Container Technologies Industries, LLC, Helenwood, TN (B, CR, CO, G, HI, LI, IA, LS, OH, O, TA, TB, TC)**

Darchem Engineering Ltd., Stockton on Tees, United Kingdom (B, HI, OH, O)

Dufrane Nuclear Inc., Winsted, CT (CR, DL, D, GA, GS, HI, LI, LS, OH, OL, O, TA, TB)

Eastern Technologies, Inc., (OREX), Ashford, AL (LS)

Ellis & Watts Global Industries, Inc., Batavia, OH (CR, OH)

Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (CS)

◆ EnergySolutions LLC, Salt Lake City, UT (CR, SF, CS, CO, D, HI, LI, OH, OL, SS, TA, TB)

Energy Steel, Lapeer, MI (SF, CS, OH)

Foss Therapy Services, Inc., North Hollywood, CA (GA, GS, TA)

Glidewell Specialties Foundry Co., Calera, AL (SF, CS, OL)

Thomas Gray & Associates, Inc., (Owner of Environmental Mgmt. & Controls, Inc.), Orange, CA (DL, D, LS, O, TA)

◆ Holtec International, Camden, NJ (CR, SF, CS, OH, OL, O, TA)

◆ I.C.E. Service Group, Inc., Ambridge, PA (B, LS, SS, S, TA)



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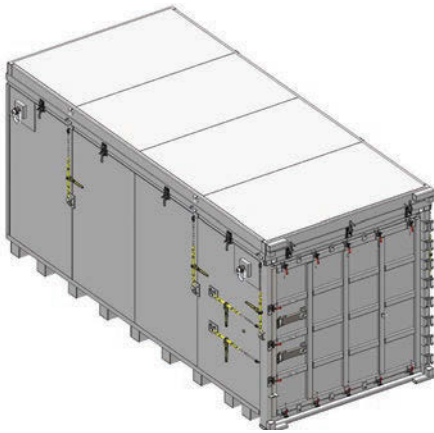
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NAICS Codes: 332312, 332313, 332322, 332420, 332431, 332439, 332999



MS Technology, Inc. (a complete NQA-1 Engineering Development Facility and Organization located in Oak Ridge, TN) and **Container Technologies Industries, LLC (CTI)** have joined forces and entered into the **SBA Mentor Protégé Program**. Under this arrangement, CTI is able to offer and provide top-quality products and cost-effective services while also helping our clients meet their small business goals.

CTI is now pursuing an Joint Venture (TECH²) under 13 C.F.R. § 121.103(h) with MS Technology, Inc. More information to follow!



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Helenwood, TN 37755-0129

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Sales: sales@ctifab.com

Phone: 423-569-2800
Fax: 423-569-2806

14300 Containers

◆ Joseph Oat Corp., Camden, NJ (CR, SF, CS, DL, D, GA, GS, G, LI, IA, LS, OH, OL, O, TA, TB)

Lancs Industries, Kirkland, WA (DL, SS)
Landstar, Burlington, KY (D, IA)

◆ Major Tool & Machine, Inc., Indianapolis, IN (B, CR, SF, CS, CO, OH, OL, O, TA, TB)

See advertisement on page 5

MarShield, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (GS)

Mayco Industries, Birmingham, AL (CR, SF, CS)

◆ NAC International Inc., Norcross, GA (CR, SF, CS, OH, O, TB)

Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil (SF, CS, D)

Orano, Charlotte, NC (CR, SF, CS, DL, LI, OH, OL, O, TA, TB)

◆ PacTec, Inc., Clinton, LA (B, CO, DL, LI, IA, LS, OL, O, SS, S)

◆ Petersen Inc., Ogden, UT (B, CR, SF, CS, LS, OH, OL, O, TA, TB)

See advertisement on Cover 2

Philotechnics, Ltd., Oak Ridge, TN (GA, GS)

Porvair Filtration Group, Hampshire, United Kingdom (DB)

◆ Precision Custom Components, LLC, York, PA (CR, SF, CS, OH, OL)

Promation Nuclear, Oakville, Canada (B, CR, CO, DL, G, OH, OL, TA, TB, TC)

PTP Spent Fuel Services, LLC, Grand Island, NY (CR, SF, CS, OH, OL)

◆ Radiation Safety & Control Services, Inc., Stratham, NH (GA, TA)

◆ Reef Industries, Inc., Houston, TX (B, DL, LI, LS, OL, O, SS, TA)

REI Nuclear, LLC, Columbia, SC (B, SS)

Rich Industries Inc., New Philadelphia, OH (DL)

◆ Robatel Technologies LLC, Roanoke, VA (CR, CO, GA, GS, G, IA, LS, OL, TA, TB)

RSO, Inc./Radiation Service Organization, Laurel, MD (DL, D, LS, TA)

Seafab Metals Co., (Div. of The Doe Run Co.), Casa Grande, AZ (CR, SF, CS, D, OH, OL, O)

◆ SECUR, Sewickley, PA (B, D, LS, OH, OL, SS, TA, TB)

Shipsrock Consulting, LLC, Westport, MA (SF, CS)

SKODA JS a.s., Plzen, Czech Republic (SF, CS, OH, TB)

Skolnik Industries, Chicago, IL (D, O, TA)

SNC-Lavalin, Mississauga, Ontario, Canada (OH)

Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (IA, TA)

Strategic Packaging Systems, Madisonville, TN (B, CO, DL, IA, LS, O, SS, S)

Studsvik, Inc., Atlanta, GA (CR, LI, LS, S)

TAG Technical Solutions, LLC, Knoxville, TN (CR, OL, TA, TB)

Transport Planning & Services Int'l. Inc., Mullica Hill, NJ (G, IA, LS, OH, TA)

◆ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (IA, LS, OL)

◆ Vigor (formerly Oregon Iron Works), Clackamas, OR (CR, SF, CS, G, OH, OL, O, TA, TB)

VTT Technical Research Centre of Finland, VTT, Finland (CR, SF, CS)

◆ Wagstaff Applied Technologies, Spokane, WA (B, CR, SF, CS, CO, DL, GA, GS, HI, LI, OH, OL, O)

Waste Control Systems, Inc., Phoenix, MD (DL, D, HI, IA, LS, O, TA)

◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (CS, TB)

WMG, Inc., Peekskill, NY (CO, LI, IA, LS, OH, OL, TA, TB)

Worthington Industries, Columbus, OH (B, CR, CS, CO, G, HI, OH, OL, O, TA, TB)

17650 Corrosion Inhibitors

Ceradyne, Inc., a 3M company, Quapaw, OK

ENECON Corp., Medford, NY

Fuel Tank Maintenance Co., LLC, Cookeville, TN

Hexion Inc., Columbus, OH

Lights Camera Action, LLC, Gilbert, AZ

Momentive Performance Materials Inc., Waterford, NY

Sentry Equipment, Oconomowoc, WI

17950 Counters, Detectors, Radiation—

also see Monitors

A Alpha
B Beta

G Gamma

N Neutron

C Combinations of Above

DT Desk-Top

ER Dose Rate, Emergency Range

FS Floor-Standing

FL Flow

GM Geiger-Mueller Type

G Germanium Detectors

IC Ion Chamber Type

IS Ion-Implanted Silicon Detectors

LB Low-Background Alpha/Beta

M Modular

P Portable

PC Proportional Counters

SL Scintillation Counters, Liquid

SR Scintillation Counters,

Radioimmunoassay

ST Scintillation Counters, Solid-State

SS Solid-State Semiconductor Type

WT Wipe Test Counters

X X-ray

Alpha Spectra, Inc., Grand Junction, CO (G)

AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (C)

Applied Health Physics, LLC, Bethel Park, PA (A, B, G, N, C, GM, IC)

Arrow-Tech, Inc., Rolla, ND (G, C, ER, GM, P)

Berkeley Neutronics Corp., San Rafael, CA (A, B, G, N, ER, G)

Biodex Medical Systems, Inc., Shirley, NY (A, B, G, IC, P, WT)

Bubble Technology Industries Inc., Chalk River,

Ontario, Canada (B, G, N, C, P, PC, X)

CAEN SyS srl, Viareggio, LU, Italy (A, B, G, N, C, DT, ER, GM, G, IC, IS, LB, M, P, PC, SL, SR, ST, SS)

Canadian Nuclear Laboratories, Chalk River, Ontario, Canada (A)

Canberra, part of Mirion Technologies, Meriden, CT (A, B, G, N, C, DT, ER, FS, FL, GM, G, IC, IS, LB, M, P, PC, ST, SS, WT, X)

CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (A, B, G, N, C, DT, ER, FS, FL, GM, G, IC, IS, LB, M, P, PC, SL, SR, ST, SS, WT, X)

◆ EnergySolutions LLC, Salt Lake City, UT (A, B, G, N, ER, GM, G, IC, P, SL, SR)

FCI-Fluid Components International LLC, San

Marcos, CA (FL)

Gamma Products, Inc., Palos Hills, IL (LB, PC, WT)

Health Physics Instruments, (Division of Far West Technology, Inc.), Goleta, CA (A, B, G, N, C, GM, IC, P, PC, ST, SS)

H3D, Inc., Ann Arbor, MI (G, N, C, DT, M, P, SS)

Interface Analysis Centre, University of Bristol, Bristol, United Kingdom (G)

James Fisher Technologies, Loveland, CO (A, B, G, N, C, DT, ER, FS, FL, GM, G, LB, M, P, ST)

LabLogic Systems, Inc., Brandon, FL (A, B, G, ER, GM, SL)

Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (G, N, C, IC, PC)

NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (A, B, G, N, C, DT, ER, FS, GM, LB, M, P, ST, SS, WT)

ORTEK, Oak Ridge, TN (A, B, G, N, C, DT, ER, FS, GM, G, IC, IS, LB, M, P, PC, SL, ST, SS, WT, X)

OTTEK Corp., Tucson, AZ (FL)

Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (G, N, C)

Perma-Fix Environmental Services, Inc., Oak Ridge, TN (A, B, G, C, GM, LB, P, WT)

PHDS Co., Knoxville, TN (G, G, M, P, SS)

Photonis, Brive la Gaillarde, France (G, N)

Premium Analyse, Norroy Le Veneur, France (B, IC)

Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada (A, P, WT)

Qal-Tek Associates, LLC, Idaho Falls, ID (A, B, G, C, GM)

Radiation Protection Systems, Inc., Groton, CT (A, B, G, N, C, PC)

Radiation Safety Assoc., Inc., Hebron, CT (A, B, G, C, GM, ST, X)

◆ Radiation Safety & Control Services, Inc., Stratham, NH (A, B, G, N, ER, GM, IC, LB, PC, SL, SS, WT)

Research Products International Corp., Mt. Prospect, IL (SL)

Rexon Components, Inc., Beachwood, OH (A, B, G, N, C, ER, GM, IC, LB, P, PC, SR, ST, SS, WT, X)

RSO, Inc./Radiation Service Organization, Laurel, MD (A, B, G, C, GM, IC, P, PC)

Saphymo - Bertin Instruments, Montigny le Bretonneux, France (A, B, G, N, C, ER, GM, LB, P, PC, ST, SS)

S.E. International, Inc., Summertown, TN (A, B, G, C, DT, ER, GM, P, ST, WT, X)

Shipsrock Consulting, LLC, Westport, MA (A, B, G, GM, G, IC, LB, PC, SL)

Siemens Process Industries and Drives, (Industry Automation Div.), (Process Instrumentation & Analytics), Hauppauge, NY (FL)

SNC-Lavalin, Mississauga, Ontario, Canada (A, B, G, N, C, P, SS)

Technical Associates, (US Nuclear Corp.), (Overhoff Technology Corp. Division), Canoga Park, CA (A, B, G, N, C, DT, ER, FS, GM, G, IC, M, P, PC, SL, SR, SS, WT, X)

◆ Thermo Fisher Scientific, Oakwood Village, OH (A, B, G, N, C, DT, ER, FS, FL, GM, IC, LB, M, P, PC, ST, X)

Transco Products Inc., Chicago, IL (G, C)

Tyne Engineering Inc., Burlington, Ontario, Canada (B, G, N, C, DT, IC, M, P)

University of Bristol, (Interface Analysis Centre), Bristol, United Kingdom (A, B, G, C)

18590 Crane Safety Systems

AT Anti-Two-Blocking (Conversion)

SF Single-Failure-Proof

American Crane & Equipment Corp., Douglassville, PA (AT, SF)

Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (AT, SF)

18600 Cranes & Hoists

CS Control System Upgrade/Replacement

CO Controls, Radio

CC Cranes, Conventional, to 300-Ton Cap.

CR Cranes, Conventional, to 500-Ton Cap.

CH Cranes, Heavy-Lift, to 1000-Ton Cap.

CX Cranes, Heavy-Lift, to 2500-Ton Cap.

DG Double-Girder, Top-Riding

E Electric

FB Fuel Building Cranes (Cask Handling)

G Gantry

H Hand Chain-Operated

LM Lug-Mounted Hoists

MH Monorail Hoists

RS Radwaste Storage Facility

SG Semi-Gantry

SF Single-Failure-Proof

ST Single-Girder, Top-Riding

SU Single-Girder, Under-Riding

SP Spent Fuel Pool Cranes

American Crane & Equipment Corp., Douglassville, PA (CS, CO, CC, CR, DG, E, FB, G, H, LM, MH, RS, SG, SF, ST, SU, SP)

◆ American DND Inc., Grand Island, NY (CR, CX, RS)

Barnhart, Memphis, TN (CC, CR, CH, CX, G)

InTomes Technical Services, Inc., Springville, NY (MH, RS)

Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CS, CO, CC, CR, CH, CX, DG, E, FB, G, H, LM, MH, RS, SG, SF, ST, SU, SP)

PaR Systems, LLC, Shoreview, MN (CS, CO, CC, CR, CH, CX, DG, E, FB, G, MH, RS, SG, SF, ST, SU, SP)

PTP Spent Fuel Services, LLC, Grand Island, NY (SP)

Wallace Cranes, Malvern, PA (E, G, H, LM)

19450 Dampers

AF Air-Flow Control

B Backdraft

F Fire

HE High-Energy Line Break

I Isolation

IA Isolation, Bubble-tight

T Tornado Protection

V Volume

Ellis & Watts Global Industries, Inc., Batavia, OH (AF, B, F, HE, I, IA, T, V)

New York Blower Co., Willowbrook, IL (AF)

◆ SSM Industries, Inc., Pittsburgh, PA (AF, B, F, HE, I, IA, T, V)

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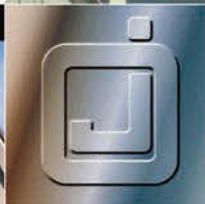
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19700 Data Acquisition/Handling Systems

19700 Data Acquisition/Handling

Systems—also see Computers

- A Analog
- D Digital

- Alphasource, Inc., Philadelphia, PA (D)
- CAEN SyS srl, Viareggio, LU, Italy (A, D)
- Canberra, part of Mirion Technologies, Meriden, CT (A, D)
- Met One Instruments, Inc., Grants Pass, OR (A, D)
- ORTEC, Oak Ridge, TN (D)
- OTEK Corp., Tucson, AZ (D)
- Rockwell Automation, Inc., Milwaukee, WI (A, D)
- Siemens Power Generation Services, Orlando, FL (A, D)
- Terahertz Technologies, Inc., Oriskany, NY (A, D)
- ◆ Thermo Fisher Scientific, Oakwood Village, OH (A, D)

20000 Data Readout Devices, Terminals &

Accessories—also see Computers

- O Oscillographic
- PD Plotters, Digital
- PX Plotters, X-Y
- P Printers
- RC Recording Charts
- RP Recording Pens, Disposable
- SC Strip Chart Recorders
- V Video Display

- Canberra, part of Mirion Technologies, Meriden, CT (PD, P, V)
- ◆ Thermo Fisher Scientific, Oakwood Village, OH (P, SC, V)
- Weschler Instruments, (Div. of Hughes Corp.), Cleveland, OH (PD, SC)

20300 Decommissioning Services

- DC Decontamination
- DM Demolition
- DS Dismantling
- E Engineering Support Services
- RS Radiological Surveys

- SS SAFSTOR
- TI Transportation, Intermodal
- TR Transportation, Rail

- ABZ, Inc., Chantilly, VA (E, SS)
- AECOM, Aiken, SC (DC, DM, DS, E, RS)
- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (DM, DS, RS)

◆ American DND Inc., Grand Island, NY (DC, DM, DS, E, TI, TR)

See advertisement on Cover 3

- American Integrated Services, Inc., Anaheim, CA (DC, DM, DS, TI)
- Ameriphysics, LLC, Knoxville, TN (DC, DM, DS, RS)
- Anata Management Solutions, West Jordan, UT (E)
- Ansaldo Nucleare S.p.A., Genova, Italy (DC)
- Applied Health Physics, LLC, Bethel Park, PA (DC, DS)
- ◆ Argonne National Laboratory, (Decommissioning Training), (EOF Div.), Argonne, IL (E)
- Austin Master Services, LLC, Martins Ferry, PA (DC, DM, DS, RS)
- AVANTech, Inc., Columbia, SC (DC, E)
- Barnhart, Memphis, TN (DS, E)
- BCP Engineers & Consultants, Gretna, LA (E)
- Bechtel Nuclear, Security & Environmental, Reston, VA (DC, DS)
- ◆ Bluegrass Concrete Cutting, Inc., Greenville, AL (DC, DM, DS)
- Boston Government Services, LLC (BGS), Oak Ridge, TN (DC, DM, E, RS)

◆ Brokk Inc., Santa Fe, NM (DS)

See advertisement on page 27

- Burns & McDonnell Engineering Company, Inc., (Aviation & Federal Global Practice), Kansas City, MO (DC, DM, DS)
- ◆ BWX Technologies, Inc., Lynchburg, VA (DC, DM, DS)

See advertisement on pages 10-11

- Cabrera Services Inc., East Hartford, CT (DC, DM, DS, E, RS, SS, TI, TR)
- Canberra, part of Mirion Technologies, Meriden, CT (DC)

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- Chase Environmental Group, Inc., Troy, IL (DC, DS, E, RS)
 - Chesapeake Nuclear Services, Inc., Annapolis, MD (RS)
 - CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (RS)
 - CS-2 Inc., Grand Island, NY (E)
 - Cutting Edge Services Corp., Batavia, OH (DS)
 - Cutting Technologies (CTI), Gloucester City, NJ (DS)
 - CYCLIFE, (Brand of EDF Group), Paris la Défense, France (DS, E)
 - The Delphi Groupe, Inc., Austin, TX (DC)
 - DP Engineering Ltd. Co., Fort Worth, TX (E)
 - Dufrane Nuclear Inc., Winsted, CT (DC, DS, E, SS)
 - DW James Consulting, North Oaks, MN (E)
 - E. H. Wachs, Lincolnshire, IL (DS, E)
 - Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (DC, DM, DS, E)
 - Enercon Services, Inc., Kennesaw, GA (DC, DS, E, RS, TI)
 - ◆ EnergySolutions LLC, Salt Lake City, UT (DC, DM, DS, E, RS, SS, TI, TR)
 - Energy Steel, Lapeer, MI (E)
 - Environmental Alternatives, Inc., Swanzey, NH (DC)
 - ExchangeMonitor Publications & Forums, (RadWaste Monitor, RadWaste Summit, Weapons Complex Monitor, Decommissioning Strategy Forum), Rockville, MD (DC, DS)
 - Foss Therapy Services, Inc., North Hollywood, CA (DS, E, RS)
 - Fuel Tank Maintenance Co., LLC, Cookeville, TN (DC, DM, DS, E)
 - Hopewell Designs, Inc., Alpharetta, GA (DS)
 - H3D, Inc., Ann Arbor, MI (RS)
 - ◆ I.C.E. Service Group, Inc., Ambridge, PA (E, TI, TR)
- See advertisement on page 7
- InTomes Technical Services, Inc., Springville, NY (DM, DS, RS)
 - James Fisher Technologies, Loveland, CO (DC, DM, DS, E, RS)
 - Kinectrics Inc., Toronto, Ontario, Canada (DC, E, RS)
 - Merrick & Company, Greenwood Village, CO (E)
 - National Nuclear Laboratory (UK), Warrington, United Kingdom (DC, DS, RS)



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Berkeley (UK)	Sellafield (UK)
Bradwell (UK)	Sizewell (UK)
Chapelcross (UK)	

A proven partner in the planning, management and execution of complex D&D activities to ensure your decommissioning project stays on time and within budget.

20300 Decommissioning Services

- Navarro Research and Engineering, Inc., Oak Ridge, TN (DC, DM, E)
 North Wind Group, Idaho Falls, ID (DC, DM, DS, E, RS, TI, TR)
 NV5 Global, Richland, WA (RS)
 Onet Technologies, (Sub. of Onet Technologies), Marseille, France (DC, DS, E)
 Orano, Charlotte, NC (DC, DM, DS, E, RS, SS, TI, TR)
 Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (RS)
 Philotechnics, Ltd., Oak Ridge, TN (DC, DM, DS, E, RS, SS, TI, TR)
 Plant Decommissioning, Lake Villa, IL (DS, E)
 Polestar Technical Services, Richland, WA (E)
 Project Assistance Corp. (PAC), Lafayette, CA (E)
 PTP Spent Fuel Services, LLC, Grand Island, NY (DC, E, TI, TR)
 Qal-Tek Associates, LLC, Idaho Falls, ID (DC, RS)
 Radiation Protection Systems, Inc., Groton, CT (RS)
 Radiation Safety Assoc., Inc., Hebron, CT (DC, DS, RS)
 ♦ **Radiation Safety & Control Services, Inc., Stratham, NH (DC, DM, DS, E, RS, SS, TI, TR)**
 REI Nuclear, LLC, Columbia, SC (DM, RS)
 ♦ **Robatel Technologies LLC, Roanoke, VA (E)**
 RSO, Inc./Radiation Service Organization, Laurel, MD (DC, RS)
 Sargent & Lundy LLC, Chicago, IL (DC, DS, E)
 ♦ SECUR, Sewickley, PA (TI, TR)
 Shipsrock Consulting, LLC, Westport, MA (SS)
 SNC-Lavalin, Mississauga, Ontario, Canada (DC, DS, E, RS)
 Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (DC, E, RS, TI, TR)
 Studsvik, Inc., Atlanta, GA (E)
 Technubel-Transnubel-ECS, Dessel, Belgium (DC, DS)
 Teledyne Brown Engineering, Inc., Huntsville, AL (DC, DM, DS, E)
 TFE, Inc., North Augusta, SC (DC, DM, DS, E, RS, TI, TR)
 TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (DC, DM, DS, E, RS, SS)
 Transco Products Inc., Chicago, IL (RS)
 TSSD Services, Inc., Oakland, ME (E)
- Tyne Engineering Inc., Burlington, Ontario, Canada (E)
 Underwater Construction Corp., Essex, CT (DC, DS)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (DC, DM, DS, E, RS)
 ♦ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (DC, DS)
 US Ecology, Inc., Livonia, MI (DC)
 Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (DC)
 VTT Technical Research Centre of Finland, VTT, Finland (DS, E)
 ♦ **Westinghouse Electric Co. LLC, Cranberry Township, PA (DC, DM, DS, E, RS, SS, TI, TR)**
See advertisement on Cover 4
 Williams Industrial Services Group, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), Tucker, GA (DC, DM, DS)
 WMG, Inc., Peekskill, NY (DC, DS, E, RS)
 Wolfgang Waelischmiller Solutions, München, Germany (DS)
 ♦ Wood, (Environment & Infrastructure Solutions, Inc.), (Radiological Services & Engineering Group), Grand Junction, CO (DC, DM, DS, E, RS)
 WorleyParsons, Reading, PA (E)
 WYNSOR, Ogden, UT (DC, DM, RS)
 Zachry Nuclear Engineering, Inc., Stonington, CT (E)

20350 Decontamination Chemicals,

Equip. & Services—also see *Cleaning Equip.*; *Health Physics Equip.*

- AC Abrasive Cleaning
- CD Chemical Decontamination
- C Chemicals
- CS Concrete Scabbling
- CR Cryogenic Cleaning (CO₂)
- D Drainline
- EP Electropolishing
- E Equipment
- HS Hand Scrubbing

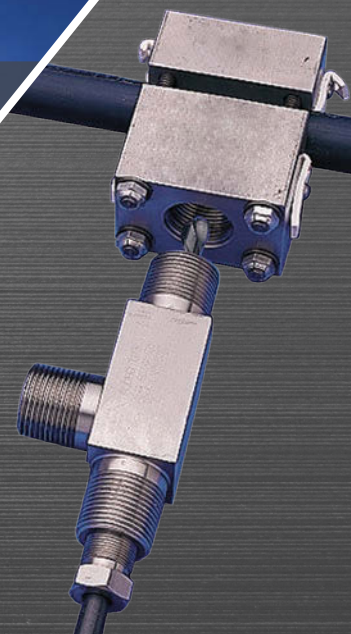
♦ Denotes Advertiser

- HF High-Pressure Freon
- HW High-Pressure Water
- IB Ice Blasting (Wet Ice)
- LD Laser Decontamination
- PS Plugs & Seals
- S Services
- SW Soil Washing
- SC Strippable Coatings
- UW Ultra-High-Pressure Water
- U Ultrasonics
- VB Vacuum Blasting, Abrasive
- VF Vibratory Finishing

- Alphasource, Inc., Philadelphia, PA (PS)
 American Airworksó, Sophia, WV (U)
 ♦ American DND Inc., Grand Island, NY (CS, HS, S, UW)
 American Integrated Services, Inc., Anaheim, CA (AC, CS)
 Ameriphysics, LLC, Knoxville, TN (AC, CD, CS, S)
 Ansaldo Nucleare S.p.A., Genova, Italy (CD)
 Applied Health Physics, LLC, Bethel Park, PA (S)
 Arkema Inc., (formerly ATOFINA Chemicals, Inc.), King of Prussia, PA (C)
 Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (CD, EP)
 Biodex Medical Systems, Inc., Shirley, NY (CD)
 ♦ Brokk Inc., Santa Fe, NM (CS)
 Burns & McDonnell Engineering Company, Inc., (Aviation & Federal Global Practice), Kansas City, MO (CD)
 Canberra, part of Mirion Technologies, Meriden, CT (S)
 CEVIDRA, Grasse, France (CD)
 Chase Environmental Group, Inc., Troy, IL (AC, CS, HS, HW, S)
 Coastal Network, Inc., Charlottesville, VA (C, SC)
 ♦ **Curtiss-Wright EST Group, Hatfield, PA (E, PS)**
 CYCLIFE, (Brand of EDF Group), Paris la Défense, France (CD)
 The Delphi Groupe, Inc., Austin, TX (S)
 Enercon Services, Inc., Kennesaw, GA (S)
 ♦ EnergySolutions LLC, Salt Lake City, UT (CS, S, SW)
 Environmental Alternatives, Inc., Swansey, NH (AC, CD, CS, CR, HW, S, U)
 Foss Therapy Services, Inc., North Hollywood, CA (S)

ELIMINATE SPILLS

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Fuel Tank Maintenance Co., LLC, Cookeville, TN (AC, CD, C, CS, CR, HS, HW, S, SC, UW)
 Graus Chemicals, LLC, Glendale, AZ (CD, C)
 InRoads International LLC, Monroeville, PA (CR, PS)
 Kinectrics Inc., Toronto, Ontario, Canada (CD, C, S)
 Marshallton Research Laboratories, Inc., King, NC (C)
 M2 Polymer Technologies, Inc., West Dundee, IL (C)
 National Nuclear Laboratory (UK), Warrington, United Kingdom (AC, CD, CS, LD, SC)
 New Millennium Nuclear Technologies International, Lakewood, CO (CS)
 North Wind Group, Idaho Falls, ID (CD)
 Orano, Charlotte, NC (AC, CD, CS)
 PaR Systems, LLC, Shoreview, MN (E, HW, LD, UW)
 Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (PS)
 Radiation Safety Assoc., Inc., Hebron, CT (AC, CS, D, HS, S)
 Radiological Solutions, Inc., Rockdale, IL (EP)
 RSO, Inc./Radiation Service Organization, Laurel, MD (S)

SNC-Lavalin, Mississauga, Ontario, Canada (CD)
 Tecnubel-Transnubel-ECS, Dessel, Belgium (AC, CD, C, CS, CR, HW, S, UW, U, VB)
 Teledyne Brown Engineering, Inc., Huntsville, AL (CD)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (E, HW)
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (AC, CD, CR, E, HS, HW, S, VB)
 US Ecology, Inc., Livonia, MI (CD, UW, VB)
 Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (CD, E, S)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (AC, CD, C, E, S, UW, U)
 WMG, Inc., Peekskill, NY (S)
 WYNSOR, Ogden, UT (S)

20700 **Demolition and Dismantlement**
 ABZ, Inc., Chantilly, VA
 American Integrated Services, Inc., Anaheim, CA



Decommissioning • Maintenance • Outages
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Bluegrass Concrete Cutting, Inc., Greenville, AL

- ◆BWX Technologies, Inc., Lynchburg, VA
- Campoverde srl, Milano, Italy
- Chase Environmental Group, Inc., Troy, IL
- Jacobs, (CH2M HILL, Inc.), (CH2M HILL Nuclear Business Group), (CH2M HILL International Nuclear Services, Ltd.), (CH2M HILL Constructors, Inc.), (Jacobs), (Jacobs Engineering), Englewood, CO
- James Fisher Nuclear Ltd, Preston, United Kingdom
- James Fisher Technologies, Loveland, CO
- North Wind Group, Idaho Falls, ID
- PaR Systems, LLC, Shoreview, MN
- Shipsrock Consulting, LLC, Westport, MA
- US Ecology, Inc., Livonia, MI
- ◆Westinghouse Electric Co. LLC, Cranberry Township, PA
- Williams Industrial Services Group, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), Tucker, GA

21270 Detector Heads, Sold Separately

- BF BF3 Neutron Counters
 - GM Geiger-Mueller Tubes/Probes
 - HN He3 Neutron Counters
 - IC Ionization Chambers
 - PM Photomultiplier Tubes
 - PC Proportional Counters
 - SP Self-Powered Type
 - SL Scintillation Counters, Liquid
 - ST Scintillation Counters, Solid-State
 - SS Solid-State Semiconductor Type
- Arrow-Tech, Inc., Rolla, ND (GM)
- Biodex Medical Systems, Inc., Shirley, NY (IC)
- CAEN SyS srl, Viareggio, LU, Italy (BF, GM, HN, IC, PC, SL, ST, SS)
- CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (BF, GM, HN, IC, PM, PC, SP, SL, ST, SS)
- Health Physics Instruments, (Division of Far West Technology, Inc.), Goleta, CA (BF, GM, HN, IC, PC, ST)
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (GM, ST, SS)
- PHDS Co., Knoxville, TN (SS)
- Qal-Tek Associates, LLC, Idaho Falls, ID (GM)
- Radiation Protection Systems, Inc., Groton, CT (HN)
- Tyne Engineering Inc., Burlington, Ontario, Canada (HN, IC)

21300 Detectors, Accelerator Beam

- CAEN SyS srl, Viareggio, LU, Italy

21400 Detectors, Leak—also see Tape,

Moisture-Sensitive

- A Acoustic
 - B Bubble Test
 - EC Electron Capture (SF/6)
 - G Gas
 - HE HEPA Filter
 - IL Integrated Leak Rate Testing
 - MS Mass Spectrometer (He)
 - PC Pressure Change
- GLSEQ, LLC, Huntsville, AL (G)
- Tyne Engineering Inc., Burlington, Ontario, Canada (EC, G)

22200 Detectors, Valve Position

- AZZ Nuclear Engineered Solutions, Fort Worth, TX

22410 Dewatering Systems & Supplies—also see Waste Mgmt. Services

- AVANTech, Inc., Columbia, SC
- North Wind Group, Idaho Falls, ID
- ◆PacTec, Inc., Clinton, LA

22430 Diaphragms, Storage Tank

- Corrosion Control Services, Inc., (CCSI Engineered Diaphragm Div.), Davenport, IA
- ◆Vigor (formerly Oregon Iron Works), Clackamas, OR

22700 Diving Services

- CB Cutting/Burning
 - D Decontamination
 - EI Equipment Installation/Realignment
 - G Grouting
 - I Inspection
 - M Maintenance
 - MJ Metals Joining (Other Than Welding)
 - WD Welding, Dry Box
 - WW Welding, Wet
- AVANTech, Inc., Columbia, SC (D)
- CAEN SyS srl, Viareggio, LU, Italy (I)
- Cutting Technologies (CTI), Gloucester City, NJ (CB, G)
- INTEGRA Services Technologies Inc., Pasadena, TX (CB, EI, M)
- REI Nuclear, LLC, Columbia, SC (CB, D, EI, M, MJ)
- Underwater Construction Corp., Essex, CT (CB, D, EI, G, I, M, MJ, WD, WW)
- Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (CB, D, EI, G, I, M, MJ, WD, WW)

24170 Dryers, Wet Solids—also see

Radioactive Waste Handling & Treatment Equipment

- AVANTech, Inc., Columbia, SC
- BIG Entsorgungstechnologien GmbH, Bad Toelz, Germany
- Equipos Nuclear S.A., S.M.E, Madrid, Spain
- Linn High Therm GmbH, Eschenfelden, Germany
- ◆Vigor (formerly Oregon Iron Works), Clackamas, OR
- Wyssmont Co., Fort Lee, NJ

25000 Electronic Instrumentation & Supplies—also see Analysis

- Automation Products, Inc., (Dynatrol® Div.), Houston, TX
- CAEN SyS srl, Viareggio, LU, Italy
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada
- Rockwell Automation, Inc., Milwaukee, WI
- Tyne Engineering Inc., Burlington, Ontario, Canada
- Weschler Instruments, (Div. of Hughes Corp.), Cleveland, OH

25250 Emergency Response Equipment

- RD Radiation Detection/Survey Meters
- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (RD)
- AVANTech, Inc., Columbia, SC (RD)
- Bubble Technology Industries Inc., Chalk River, Ontario, Canada (RD)
- CAEN SyS srl, Viareggio, LU, Italy (RD)
- Chesapeake Nuclear Services, Inc., Annapolis, MD (RD)
- CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (RD)
- Frham Safety Products, Inc., Nashville, TN (RD)
- H3D, Inc., Ann Arbor, MI (RD)
- James Fisher Nuclear Ltd, Preston, United Kingdom (RD)
- LabLogic Systems, Inc., Brandon, FL (RD)
- North Wind Group, Idaho Falls, ID (RD)
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (RD)
- Qal-Tek Associates, LLC, Idaho Falls, ID (RD)
- ◆Radiation Safety & Control Services, Inc., Stratham, NH (RD)
- Saphymo - Bertin Instruments, Montigny le Bretonneux, France (RD)
- ◆Thermo Fisher Scientific, Oakwood Village, OH (RD)

25300 Emergency Warning Systems (Public)—also see Communications

- SE Sirens, Electronic
 - SM Sirens, Mechanical
 - SR System Readiness Reporting Systems
 - TC Telephonic, Computerized
 - TA Tone Alerting Radios
 - V Voice Alert (Public Address)
- BCP Engineers & Consultants, Gretna, LA (SE, SM)

- Genave Electronics, Rosemount, MN (SE, SM, SR, TA, V)
- ◆Radiation Safety & Control Services, Inc., Stratham, NH (SE)
- ◆Westinghouse Electric Co. LLC, Cranberry Township, PA (SR)
- Whelen Engineering Co., Inc., (Mass Notification Products), Chester, CT (SE, SR, V)

25350 Emergency Warning Systems (Worker)

- BCP Engineers & Consultants, Gretna, LA
- Radiation Protection Systems, Inc., Groton, CT
- ◆Thermo Fisher Scientific, Oakwood Village, OH
- Whelen Engineering Co., Inc., (Mass Notification Products), Chester, CT

25400 Employment/Personnel Support Services—also see Consultants

- A Agencies
 - C Craft Labor Support, Temporary
 - E Executive Recruitment
 - FT Full-Time Permanent Personnel
 - TS Technical, Professional Support, Temporary
- ◆American DND Inc., Grand Island, NY (C)
- Anata Management Solutions, West Jordan, UT (FT, TS)
- AVANTech, Inc., Columbia, SC (TS)
- Boston Government Services, LLC (BGS), Oak Ridge, TN (TS)
- CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (TS)
- CS-2 Inc., Grand Island, NY (A, E, FT, TS)
- Curtiss-Wright EnerTech, Brea, CA (TS)
- DCS Systems, Inc., Simsbury, CT (TS)
- The Delphi Groupe, Inc., Austin, TX (A, E, FT, TS)
- Enercon Services, Inc., Kennesaw, GA (TS)
- Excel Modular Scaffold and Leasing Corp., Weymouth, MA (C, TS)
- Fuel Tank Maintenance Co., LLC, Cookeville, TN (C)
- GSE Systems Inc., Sykesville, MD (TS)
- Navarro Research and Engineering, Inc., Oak Ridge, TN (FT, TS)
- Project Assistance Corp. (PAC), Lafayette, CA (A, C, E, FT, TS)
- Radiation Protection Systems, Inc., Groton, CT (TS)
- Sonic Systems International, Inc., Houston, TX (E, TS)
- System One, Pittsburgh, PA (A, C, E, FT, TS)
- TSSD Services, Inc., Oakland, ME (TS)
- ◆Westinghouse Electric Co. LLC, Cranberry Township, PA (TS)
- Williams Industrial Services Group, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), Tucker, GA (C, TS)
- Zachry Nuclear Engineering, Inc., Stonington, CT (TS)

25600 Encapsulation, Radioactive Source

- AVANTech, Inc., Columbia, SC
- ◆BWX Technologies, Inc., Lynchburg, VA
- Lucideon, Research Triangle Park, NC
- New Millennium Nuclear Technologies International, Lakewood, CO
- Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA

26080 Environmental Monitoring Equipment—also see Monitors, Radiation, Area

- Alpha Spectra, Inc., Grand Junction, CO
- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM
- Berkeley Nucleonics Corp., San Rafael, CA
- Bubble Technology Industries Inc., Chalk River, Ontario, Canada
- Cabrera Services Inc., East Hartford, CT
- CAEN SyS srl, Viareggio, LU, Italy
- Canberra, part of Mirion Technologies, Meriden, CT
- CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN
- Elcometer Inc., Rochester Hills, MI
- Frham Safety Products, Inc., Nashville, TN

HI-Q Environmental Products Co., Inc., San Diego, CA
 JSM Protective, Inc., Wilmington, NC
 Met One Instruments, Inc., Grants Pass, OR
 Munro Instruments Ltd., Harlow, Essex, United Kingdom
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada
 ORTEC, Oak Ridge, TN
 Perma-Fix Environmental Services, Inc., Oak Ridge, TN
 Radiation Protection Systems, Inc., Groton, CT
 Radiological Solutions, Inc., Rockdale, IL
 Research Products International Corp., Mt. Prospect, IL
 Rockwell Automation, Inc., Milwaukee, WI
 Saphymo - Bertin Instruments, Montigny le Bretonneux, France
 Technical Associates, (US Nuclear Corp), (Overhoff Technology Corp. Division), Canoga Park, CA
 ♦ Thermo Fisher Scientific, Oakwood Village, OH
 Tyne Engineering Inc., Burlington, Ontario, Canada

26100 **Environmental Monitoring**

Services—also see Health Physics Serv.; Rad. Monitoring Serv.

Applied Health Physics, LLC, Bethel Park, PA
 ARS International, LLC, Port Allen, LA
 G.D. Barri & Associates, Inc., Peoria, AZ
 Boston Government Services, LLC (BGS), Oak Ridge, TN
 Bubble Technology Industries Inc., Chalk River, Ontario, Canada
 Cabrera Services Inc., East Hartford, CT
 Canberra, part of Mirion Technologies, Meriden, CT
 Chase Environmental Group, Inc., Troy, IL
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom
 Encorus Group, (dba RJR Engineering, P.C.), Springville, NY
 Enercon Services, Inc., Kennesaw, GA
 Frham Safety Products, Inc., Nashville, TN
 The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC
 Navarro Research and Engineering, Inc., Oak Ridge, TN
 New Millennium Nuclear Technologies International, Lakewood, CO
 Perma-Fix Environmental Services, Inc., Oak Ridge, TN
 Radiation Protection Systems, Inc., Groton, CT
 RSO, Inc./Radiation Service Organization, Laurel, MD
 Sargent & Lundy LLC, Chicago, IL
 Siemens Power Generation Services, Orlando, FL
 Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO
 VTT Technical Research Centre of Finland, VTT, Finland

26230 **Equipment Rental**

AC Air Conditioning
 C Chillers
 CN Containers
 CT Cooling Towers
 DE Detectors, Explosives
 DW Detectors, Weapons
 H Hydraulic Systems
 IR Instruments, Radiation Detection
 RL Radiochemistry Labs, Mobile
 RV Remote-Operated Vehicles
 S Scaffolding
 SC Spot-Coolers
 UC Underwater Cameras
 VA Vacuum Systems (HEPA Filtered)
 VT Valve Testers (Off-Line)
 VS Ventilation Systems, HEPA Filtered
 VI Video Inspection Systems
 WB Whole-Body Counting Units
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (DE, IR, RV)
 ♦ American DND Inc., Grand Island, NY (S)
 Applied Health Physics, LLC, Bethel Park, PA (IR, VS)

♦ Brokk Inc., Santa Fe, NM (RV)
 Cabrera Services Inc., East Hartford, CT (IR, RL, RV)
 Camfil USA, Washington, NC (VA, VS)
 Canberra, part of Mirion Technologies, Meriden, CT (IR, RL, WB)
 Curtiss-Wright Enertech, Brea, CA (H)
 ♦ Curtiss-Wright EST Group, Hatfield, PA (H)
 Enercon Services, Inc., Kennesaw, GA (IR)
 ♦ EnergySolutions LLC, Salt Lake City, UT (IR, RL)
 ♦ I.C.E. Service Group, Inc., Ambridge, PA (CN)
 INTEGRA Services Technologies Inc., Pasadena, TX (H)
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (RV, VI)
 Inuktun Services Ltd., Nanaimo, BC, Canada (IR, RV, UC, VI)
 James Fisher Technologies, Loveland, CO (RV)
 Lenox Instrument Co., Inc., Trevoise, PA (VI)
 Lights Camera Action, LLC, Gilbert, AZ (UC)
 Master-Lee Engineered Products Inc., Latrobe, PA (UC)
 NUCON International, Inc., Columbus, OH (VS)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (IR)
 ORTEC, Oak Ridge, TN (IR)
 Perma-Fix Environmental Services, Inc., Oak Ridge, TN (IR)
 Radiation Protection Systems, Inc., Groton, CT (IR)
 Radiation Safety Assoc., Inc., Hebron, CT (IR, VS)
 ♦ Radiation Safety & Control Services, Inc., Stratham, NH (IR)
 RSO, Inc./Radiation Service Organization, Laurel, MD (IR)
 Technical Associates, (US Nuclear Corp), (Overhoff Technology Corp. Division), Canoga Park, CA (RL)
 Tecnel-Transnubel-ECS, Dessel, Belgium (RV)
 ♦ Thermo Fisher Scientific, Oakwood Village, OH (DE, IR, RL, WB)
 Transco Products Inc., Chicago, IL (IR)
 sa TRANSRAD nv, Fleurus, Belgium (CN)
 Tri Tool Inc., Rancho Cordova, CA (H)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (RV, VI)
 ♦ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (IR)

26240 **Equipment Sales, Surplus**

AVANTech, Inc., Columbia, SC
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN
 Foss Therapy Services, Inc., North Hollywood, CA
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX
 Plant Decommissioning, Lake Villa, IL
 Tri Tool Inc., Rancho Cordova, CA

26600 **Fall Protection Equipment & Devices, Construction & Maintenance**

Alphasource, Inc., Philadelphia, PA
 Frham Safety Products, Inc., Nashville, TN
 ♦ Mohawk Safety, Manchester, CT
 ♦ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA

26900 **Fasteners**

B Bolts
 N Nuts
 QT Quick Throw
 S Studs
 TR Threaded Rod
 W Washers
 Dubose National Energy Services, Clinton, NC (B, N, S, TR, W)
 Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (B, N, S, TR, W)
 Fire & Pump Service Group, Rancho Dominguez, CA (B, N, QT, S, TR, W)
 Tioga Pipe Supply Co., Inc., Philadelphia, PA (B, N, S, TR, W)

26910 **Feedthroughs, Bulkhead—also see Sleeves, Wall**

E Electrical

♦ Denotes Advertiser

F Fiber Optic
 GLSEQ, LLC, Huntsville, AL (E, F)
 Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (E, F)
 Rolls-Royce, Williamson, NY (E, F)
 Souriau, Greer, SC (E, F)

26970 **Fiber Optic Components & Systems—also see Cable; Connectors; Feedthroughs; Remote-Viewing**

AMEASOL - American Measurement Solutions LLC, Santa Fe, NM
 Weed Instrument Co., Inc., (d/b/a Ultra Electronics, Nuclear Sensors & Process Instrumentation), Round Rock, TX

27180 **Filter Housings**

B Bag In/Bag Out
 M Manual Changeout
 R Remote Changeout
 SA Side Access
 W Walk-In
 James Fisher Nuclear Ltd, Preston, United Kingdom (R)
 Promatom Nuclear, Oakville, Canada (B, M, R, SA)
 Radiation Protection Systems, Inc., Groton, CT (B, M, SA)
 Radiological Solutions, Inc., Rockdale, IL (M)
 ♦ SSM Industries, Inc., Pittsburgh, PA (B, M, SA, W)

27450 **Filters—also see Containers**

A Air
 C Carbon
 CL Cloth, Straining
 DE Debris
 D Disposable
 HE HEPA
 HY Hydraulic
 LO Lubricating Oil
 SB Stainless Steel, Porous, Backwash
 SU Stainless Steel, Porous, Backwash, Ultrasonic
 SP Stainless Steel, Porous, Blowback
 SS Stainless Steel, Sintered
 TF Thin-Film
 U Ultrafiltration
 V Vacuum (HEPA)
 W Water (Conventional)
 WP Water Purification
 WS Water/Steam, High-Pressure
 X X-ray
 Alphasource, Inc., Philadelphia, PA (CL, DE, D, HE)
 Arkema Inc., (formerly ATOFINA Chemicals, Inc.), King of Prussia, PA (C)
 AVANTech, Inc., Columbia, SC (C, DE, D, LO, SB, U, W, WP)
 AZZ Nuclear Engineered Solutions, Fort Worth, TX (A, W)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (SB, WS)
 Ellis & Watts Global Industries, Inc., Batavia, OH (A, C, HE)
 ♦ EnergySolutions LLC, Salt Lake City, UT (DE, D, U, W, WP)
 Epicor, Inc., Linden, NJ (W)
 F&J Specialty Products, Inc., Ocala, FL (A)
 Frham Safety Products, Inc., Nashville, TN (A, C, D, HE, V)
 G/O Corp., Abita Springs, LA (V)
 Graver Technologies Inc., (A member of The Marmon Group of Companies), Glasgow, DE (C, D, SB, U, W, WP)
 HI-Q Environmental Products Co., Inc., San Diego, CA (A, C)
 IONEX Research Corp., Lafayette, CO (A, C, HE)
 ♦ Joseph Oat Corp., Camden, NJ (LO, W, WP, WS)
 Lancs Industries, Kirkland, WA (A, D, HE)
 ♦ Mohawk Safety, Manchester, CT (HE, V)
 NUCON International, Inc., Columbus, OH (A, C, D, HE, WP)
 ♦ PacTec, Inc., Clinton, LA (CL)
 Porvair Filtration Group, Hampshire, United Kingdom (A, C, DE, D, HE, HY, LO, SB, SP, SS, WS)

27450 Filters

- Radiation Protection Systems, Inc., Groton, CT (A, C, D, HE, U, V)
 ♦Radiation Safety & Control Services, Inc., Stratham, NH (A, C)
 Radiological Solutions, Inc., Rockdale, IL (W, WP)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (D, W)

30040 Fuel Element Consolidation (Spent Fuel)

- SE Services
 SY Systems
 ♦EnergySolutions LLC, Salt Lake City, UT (SE, SY)
 ♦NAC International Inc., Norcross, GA (SE, SY)
 Studsvik Scandpower, Wilmington, NC (SE)

30500 Fuel Handling Equipment & Systems

- CC Computer Control Systems
 FT Fuel Transfer Equipment
 IP In-Pile Inspection & Manipulation
 QC Quick Closures, Fuel Transfer Tube
 R Refueling Equipment
 RS Refueling Shielding
 SP Service Platform Modification/Upgrade
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (IP)
 Diakont, San Diego, CA (CC, FT, IP, R, SP)
 ♦EnergySolutions LLC, Salt Lake City, UT (FT)
 Fuel Tank Maintenance Co., LLC, Cookeville, TN (FT)
 ♦Holtec International, Camden, NJ (FT, R, SP)
 James Fisher Technologies, Loveland, CO (IP)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CC, FT, R, RS, SP)
 ♦Major Tool & Machine, Inc., Indianapolis, IN (R)
 Master-Lee Engineered Products Inc., Latrobe, PA (R)
 Merrick & Company, Greenwood Village, CO (FT, IP, R, RS)
 ♦NAC International Inc., Norcross, GA (FT)
 Nuclear Systems Associates, Inc., Brea, CA (FT, IP)

- PaR Systems, LLC, Shoreview, MN (CC, FT, IP, QC, R, RS, SP)
 ♦Precision Custom Components, LLC, York, PA (R)
 Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (FT, QC, RS, SP)
 PTP Spent Fuel Services, LLC, Grand Island, NY (FT)
 Radiation Protection Systems, Inc., Groton, CT (RS)
 SKODA JS a.s., Plzen, Czech Republic (FT)
 SNC-Lavalin, Mississauga, Ontario, Canada (CC, FT)
 Sonic Systems International, Inc., Houston, TX (IP)
 ♦Vigor (formerly Oregon Iron Works), Clackamas, OR (FT, R, RS, SP)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (FT, QC, R, RS)

32250 Gas Handling Equipment—also see Analyzers, Gas; Filters

- A Adsorbers
 C Circulators
 G Gas Generators
 HC Hydrogen Combiners
 MP Mixers, Proportioners
 OG Off-Gas Treatment Systems
 P Purifiers
 Ellis & Watts Global Industries, Inc., Batavia, OH (OG)
 FCI-Fluid Components International LLC, San Marcos, CA (MP)
 IONEX Research Corp., Lafayette, CO (A, OG)
 NUCON International, Inc., Columbus, OH (A, G, OG, P)
 Porvair Filtration Group, Hampshire, United Kingdom (OG)
 ♦SSM Industries, Inc., Pittsburgh, PA (A)
 Tyne Engineering Inc., Burlington, Ontario, Canada (OG)

36000 Gloveboxes & Accessories—also see Connectors, Electrical, Glovebox; Filters

- B Base Units
 C Containers
 D Drain Assemblies

- GB Glovebag Containments
 GR Glovebag Rings
 G Gloves
 P Ports
 Camfil USA, Washington, NC (GB)
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom (B, C)
 James Fisher Technologies, Loveland, CO (B)
 ♦Joseph Oat Corp., Camden, NJ (B, C)
 ♦Major Tool & Machine, Inc., Indianapolis, IN (B, C)
 Merrick & Company, Greenwood Village, CO (B, C, D, GB, GR, G, P)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (B)
 Orano, Charlotte, NC (B, GB, GR)
 Radiation Protection Systems, Inc., Groton, CT (B, C)
 Research Products International Corp., Mt. Prospect, IL (G)
 ♦Robatel Technologies LLC, Roanoke, VA (B, C, D, GB, GR, P)
 Teledyne Brown Engineering, Inc., Huntsville, AL (B, C)
 ♦Thermo Fisher Scientific, Oakwood Village, OH (B, C, GB, GR, G, P)
 Tyne Engineering Inc., Burlington, Ontario, Canada (B, C, D)
 ♦Vigor (formerly Oregon Iron Works), Clackamas, OR (B, C)
 ♦Wagstaff Applied Technologies, Spokane, WA (B, C, D, GR, G)

36900 Grouts

- Cutting Technologies (CTI), Gloucester City, NJ

37130 Health Physics Equipment & Supplies—also see Counters; Monitors, Rad.; Resp. Prot.; Samplers

- B Bags
 BM Biomedical Radiation-Counting Systems
 BC Body Cooling Systems
 DM Decon Mats
 DT Decon Trailers, Mobile
 DC Dosimeter Chargers
 DV Dosimeter Vests, Caps, Arm & Leg Bands
 DH Dosimeters, High-Range (Mega R)
 DP Dosimeters, Personnel
 DO Dosimetry Systems, Computerized
 DR Dosimetry Systems, Real-Time Remote
 DS Drain Socks
 EM Emergency Medical Equipment & Supplies
 E Enclosures, Radiological Containment (Temporary)
 FT Filter Test Equipment
 HS Heat Stress Monitors
 L Labels, Warning
 MS Metalized Sheeting
 MT Mops, Roll, Tacky
 PR Phantoms, Radiation-Dosimetry
 PC Planchet Changers, Automatic
 P Planchets, Counting
 RT Respirator Tracking Systems
 SI Scanners, Isotope Distribution
 S Sheeting, Plastic
 SW Signs, Warning, Radiation
 SS Smears, Swipes
 SF Stretch Wrap Film
 TW Tapes, Warning
 T Tubing, Plastic
 WC Wheel Covers
 WT Wipers, Tacky
 Alphasource, Inc., Philadelphia, PA (B, DM, DT, DS, EM, L, MT, S, SW, SS, SF, TW, T, WC, WT)
 Applied Health Physics, LLC, Bethel Park, PA (DP, SS)
 Arrow-Tech, Inc., Rolla, ND (DC, DH, DP)
 Biodex Medical Systems, Inc., Shirley, NY (DC, DP, SW, SS)
 Bubble Technology Industries Inc., Chalk River, Ontario, Canada (DP)
 Canberra, part of Mirion Technologies, Meriden, CT (BM, DO, PR, PC, P, SI)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (BM, DC, DP, DO, DR)
 Coastal Network, Inc., Charlottesville, VA (B, DM, DC, DV, DP, E, L, MT, P, S, SW, SS, TW, T, WT)

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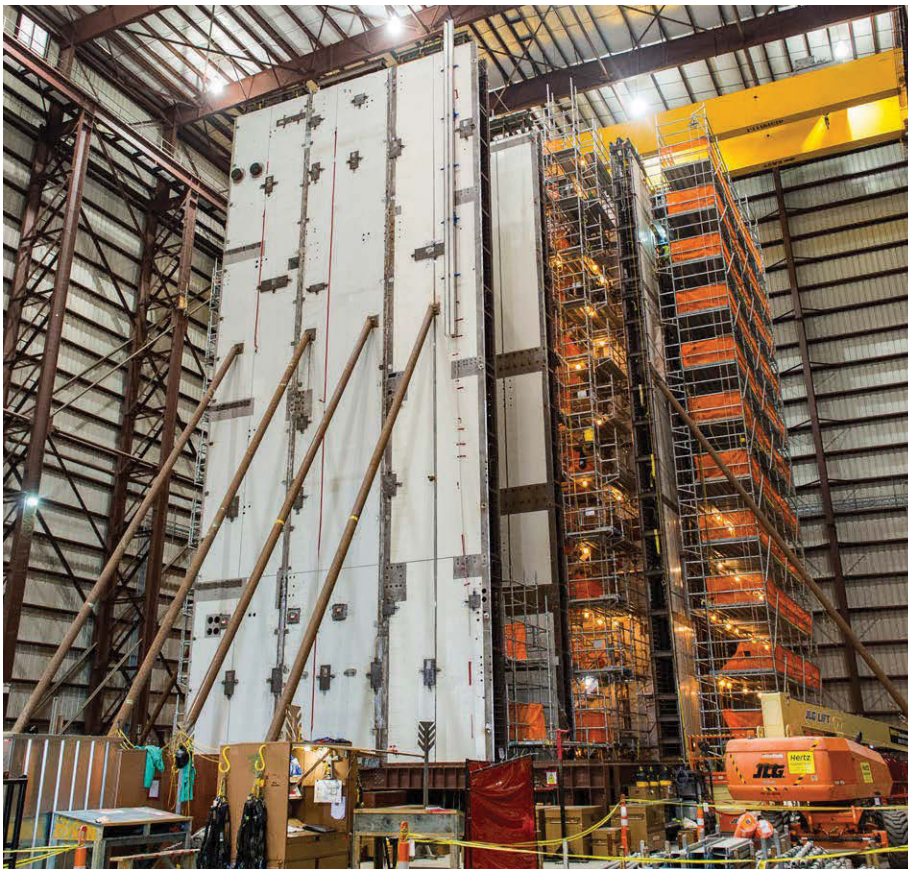
- Gloveboxes/Hot Cells
- ASME Pressure Vessels
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- ASME B30.20 Lifting Devices
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IMPLEMENTED NUCLEAR QUALITY ASSURANCE PROGRAMS

- ASME NQA-1 2008/2009a
- 10 CFR 50 Appendix B
- 10 CFR 830.122
- 10 CFR 71, Subpart H
- ISO 9001:2008
- ASME Div. 1 "U" Stamp
- AWS D1.1, D1.6

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ASME NQA-1 • 10 CFR PART 50, APP B

37130 Health Physics Equipment & Supplies

Dufrane Nuclear Inc., Winsted, CT (E)
 Eastern Technologies, Inc., (OREX), Ashford, AL (B, DM, DV, MT, S, WT)
 Environmental Alternatives, Inc., Swanzey, NH (DT, E)
 Frham Safety Products, Inc., Nashville, TN (B, BC, DM, DV, DS, E, MT, P, S, SW, SS, TW, WC, WT)
 G/O Corp., Abita Springs, LA (B, DM, DV, DS, S, SW, SS, SF, WT)
 Health Physics Instruments, (Division of Far West Technology, Inc.), Goleta, CA (DP)
 HI-Q Environmental Products Co., Inc., San Diego, CA (P)
 Hopewell Designs, Inc., Alpharetta, GA (DC)
 James Fisher Technologies, Loveland, CO (DT, DP, DO, DR)
 JSM Protective, Inc., Wilmington, NC (B, DM, S, TW, T, WT)
 Lancs Industries, Kirkland, WA (B, E, L, S, SW, T)
 ♦ **Mohawk Safety, Manchester, CT (DS, SF, TW)**
 NewAge Industries, Inc., Southampton, PA (T)
 North Wind Group, Idaho Falls, ID (DP)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (DO, DR, EM, FT, PC)
 ORTEC, Oak Ridge, TN (BM, DP, DO, P, SI)
 ♦ PacTec, Inc., Clinton, LA (B, DM, DS, E, S, T)
 Qal-Tek Associates, LLC, Idaho Falls, ID (DP)
 Radiation Protection Systems, Inc., Groton, CT (E, FT)
 ♦ Radiation Safety & Control Services, Inc., Stratham, NH (DP, DO, DR)
 ♦ Reef Industries, Inc., Houston, TX (B, DM, DS, E, S, SW, TW, T)
 Research Products International Corp., Mt. Prospect, IL (L, SS, TW)
 Rexon Components, Inc., Beachwood, OH (DP, DO, PR, P)
 Rich Industries Inc., New Philadelphia, OH (B, S, SW, SS, TW, T)
 RSO, Inc./Radiation Service Organization, Laurel, MD (B, DM, DC, L, P, SW, SS, TW)
 Saphymo - Bertin Instruments, Montigny le Bretonneux, France (DC, DH, DP, DO, DR)
 S.E. International, Inc., Summertown, TN (DP)

Siemens Power Generation Services, Orlando, FL (DH, DP, DO, DR)
 Steele Body Cooling Vests, Kingston, WA (BC)
 Tech Products, Inc., Staten Island, NY (SW)
 ♦ **Thermo Fisher Scientific, Oakwood Village, OH (BM, DC, DV, DH, DP, DO, DR)**
See advertisement on page 9
 Transco Products Inc., Chicago, IL (DO)
 ♦ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (B, BC, DM, DT, DV, DS, EM, E, L, MT, S, SW, SS, TW, T, WT)

37160 Health Physics Equipment & Supplies, Disposable/Soluble


EF Equipment & Floor Covers
 MW Mops, Wet
 W Wipers
 Alphasource, Inc., Philadelphia, PA (EF, MW, W)
 Eastern Technologies, Inc., (OREX), Ashford, AL (EF, MW, W)
 Frham Safety Products, Inc., Nashville, TN (EF, MW, W)
 G/O Corp., Abita Springs, LA (W)
 Hopewell Designs, Inc., Alpharetta, GA (EF)
 ♦ Mohawk Safety, Manchester, CT (EF)
 ♦ PacTec, Inc., Clinton, LA (EF)
 ♦ Radiation Safety & Control Services, Inc., Stratham, NH (EF)
 ♦ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (EF, MW, W)

37200 Health Physics Services—also see Decontamination; Rad. Monitoring Serv.; Waste Mgmt. Serv.

BF Badge Services, Film
 BT Badge Services, TLD
 BI Bioassay
 BA Breathing Air Quality Analysis
 C Calibration
 D Dosimetry Services
 EI Environmental Impact Analysis

HC Hazard Communication (Employee)
 IH Industrial Hygiene Services
 IR Industrial Radiology
 IT Industrial Toxicology
 I In-Plant
 L Laboratory Services
 LD Laundry Services, Dry Cleaning
 LE Laundry Services, Extraction
 LW Laundry Services, Wet Wash
 MR Medical Review Officer Services
 PW Procedures Writing
 Q Quality Assurance, Quality Control
 RS Radiochemistry Services
 RE Radiological Engineering
 RI Radioimmunoassay Services
 RC Regulatory Compliance Support
 RF Respirator Fit Testing
 RT Respiratory Equipment Cleaning, Repair & Testing
 S Surveys
 TH Training, Health Physics
 TM Training, Maintenance Support
 U Urinalysis
 WB Whole-Body Counting Services

AECOM, Aiken, SC (EI, IR)
 Anata Management Solutions, West Jordan, UT (RC, TH, TM)
 Applied Health Physics, LLC, Bethel Park, PA (C, EI, I, L, PW, RE, RC, S, TH)
 ARS International, LLC, Port Allen, LA (D, EI, L, Q, RS, S, TH)
 Attenuation Environmental Co., Seattle, WA (EI, PW, RE, RC)
 BCP Engineers & Consultants, Gretna, LA (IH, I, PW, Q, RE, RC, TH, TM)
 Beamex, Inc., Marietta, GA (C)
 Berkeley Nucleonics Corp., San Rafael, CA (C)
 Boston Government Services, LLC (BGS), Oak Ridge, TN (BA, C, D, EI, IH, IR, PW, Q, RS, RE, RC, RF, S)
 Bubble Technology Industries Inc., Chalk River, Ontario, Canada (D)
 Cabrera Services Inc., East Hartford, CT (BI, BA, C, D, EI, IH, Q, RS, RE, S, TH, TM)
 Campoverde srl, Milano, Italy (C, D, EI, IR, RE, TH)



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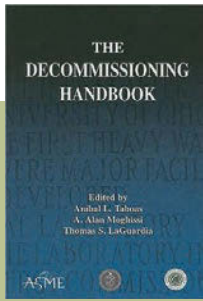
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 Chase Environmental Group, Inc., Troy, IL (EI, PW, Q, RE, S, TH)
 Chesapeake Nuclear Services, Inc., Annapolis, MD (EI, I, PW, Q, RS, RE, RC, S, TH)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (BT, BI, C, D, RE, S, TH, U, WB)
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom (I)
 The Delphi Groupe, Inc., Austin, TX (HC, IH, I, PW, Q, RS, RE, RC, TH, TM)
 Dufrane Nuclear Inc., Winsted, CT (RE)
 DW James Consulting, North Oaks, MN (RE)
 Eastern Technologies, Inc., (OREX), Ashford, AL (LW, RT)
 Enercon Services, Inc., Kennesaw, GA (C, D, EI, HC, IH, IR, IT, PW, Q, RE, RC, RF, S, TH, TM)
 ♦EnergySolutions LLC, Salt Lake City, UT (RE, S)
 Foss Therapy Services, Inc., North Hollywood, CA (S, TM)
 The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC (IH, L, RF)
 Health Physics Instruments, (Division of Far West Technology, Inc.), Goleta, CA (C)
 HI-Q Environmental Products Co., Inc., San Diego, CA (BA, C)
 Hopewell Designs, Inc., Alpharetta, GA (C)
 Stan A. Huber Consultants, Inc., New Lenox, IL (C, D, IH, PW, Q, RC, S, TH)
 Kinectrics Inc., Toronto, Ontario, Canada (D, L, RS, RE, TM, U)
 L3 MAPPS, (Power Systems and Simulation), Montreal, Quebec, Canada (TM)
 Navarro Research and Engineering, Inc., Oak Ridge, TN (HC, IH, PW, Q, RE, RC)
 North Wind Group, Idaho Falls, ID (BI, BA, EI, IH, TH)
 NV5 Global, Richland, WA (BT, C, EI, HC, IH, PW, RE, RC, S, TH)
 Perma-Fix Environmental Services, Inc., Oak Ridge, TN (C)
 Philotechnics, Ltd., Oak Ridge, TN (RE)
 Qal-Tek Associates, LLC, Idaho Falls, ID (BT, C, PW, RE, S, TH)
 Radiation Protection Systems, Inc., Groton, CT (RE, TH, TM)
 Radiation Safety Assoc., Inc., Hebron, CT (C, I, L, PW, RS, RE, RC, RF, RT, S, TH)
 Radiological Solutions, Inc., Rockdale, IL (PW, RC)
 RSO, Inc./Radiation Service Organization, Laurel, MD (BI, C, D, I, L, RI, S, TH, U)
 Saphymo - Bertin Instruments, Montigny le Bretonneux, France (C)
 Sargent & Lundy LLC, Chicago, IL (EI, I, PW, Q, RE, RC, TH, TM)
 Siemens Power Generation Services, Orlando, FL (TH)
 Howard L. Sobel, P.E., Oceanside, NY (Q, RC)
 Sonic Systems International, Inc., Houston, TX (Q)
 Southwest Research Institute, San Antonio, TX (EI, RS, TH)
 Standish Technologies International, Deerfield Beach, FL (RC)
 Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (EI, PW, Q, RE, RC, S)
 Technical Management Services, Inc., New Hartford, CT (TH)
 Teledyne Brown Engineering, Inc., Huntsville, AL (BI, L, RS)
 TFE, Inc., North Augusta, SC (Q, RE, TH, TM)
 ♦Thermo Fisher Scientific, Oakwood Village, OH (BT)
 TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (RE)
 Tyne Engineering Inc., Burlington, Ontario, Canada (RE)
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (HC, LE, LW, RC, RF, RT, S)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (I, Q, RE, RC, S, TH)
 WMG, Inc., Peekskill, NY (PW, RC)
 ♦Wood, (Environment & Infrastructure Solutions, Inc.), (Radiological Services & Engineering Group), Grand Junction, CO (EI, RE, S)
 WorleyParsons, Reading, PA (EI, RE)
 WYNSOR, Ogden, UT (BI, D, IH, RE, RC, RF, RT, S, TH)

37600 Heat Exchangers & Equipment—

also see Computer Software

C Coil
 HP Heat Pipe
 P Plate/Tube
 RF Refacing Equipment (On-Site)
 S Shell/Tube
 SA Sodium/Air
 SS Sodium/Sodium
 SW Sodium/Water
 W Wet Surface Air Coolers
 AZZ Nuclear Engineered Solutions, Fort Worth, TX (P, S)
 ♦BWX Technologies, Inc., Lynchburg, VA (S)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (C, HP, P, RF, S)
 Curtiss-Wright Enertech, Brea, CA (P)
 Ellis & Watts Global Industries, Inc., Batavia, OH (C, HP, P, S)
 Energy Steel, Lapeer, MI (C, P, S)
 ♦Joseph Oat Corp., Camden, NJ (C, S)
 Radiological Solutions, Inc., Rockdale, IL (C)
 Tyne Engineering Inc., Burlington, Ontario, Canada (C, HP, S)
 ♦Vigor (formerly Oregon Iron Works), Clackamas, OR (P, S)
 ♦Wagstaff Applied Technologies, Spokane, WA (C, HP, P, S)

39650 Hydraulic Systems & Components—also see Consultants; Pumps, Other

Curtiss-Wright Enertech, Brea, CA
 PaR Systems, LLC, Shoreview, MN
 39960 **Imaging, Digital**
 CS Consulting Services
 H Hardware
 RS Radiographic Scanning
 RT Real-Time
 S Software
 BCP Engineers & Consultants, Gretna, LA (CS, RS, RT, S)
 CAEN SyS srl, Viareggio, LU, Italy (H, RT)
 Cutting Technologies (CTI), Gloucester City, NJ (RS)
 Diakont, San Diego, CA (CS, H, RT, S)
 General Plastics MFG. Co., Tacoma, WA (CS)
 Merrick & Company, Greenwood Village, CO (CS)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (H, RS, RT, S)
 Remote Ocean Systems (ROS), San Diego, CA (H)

40050 Indicators

F Flow
 LF Laminar Flow
 LE LEDs
 L Level
 P Pressure
 T Temperature
 V Vibration
 Automation Products, Inc., (Dynatrol® Div.), Houston, TX (L)
 AZZ Nuclear Engineered Solutions, Fort Worth, TX (F, L, P, T)
 Curtiss-Wright Enertech, Brea, CA (F, LF, L, P, T)
 FCI-Fluid Components International LLC, San Marcos, CA (F, L, T)
 LUDECA, Inc., Doral, FL (V)
 Magnetrol International, Aurora, IL (L)
 Minco Products, Inc., Minneapolis, MN (T)
 Rockwell Automation, Inc., Milwaukee, WI (F, L, P, T)
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 Weschler Instruments, (Div. of Hughes Corp.), Cleveland, OH (F, LE, L, P, T)

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♦Westinghouse Electric Co. LLC, Cranberry Township, PA (F, L, P, T, V)

40700 Information Services

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 Radwaste Solutions Magazine, La Grange Park, IL
 RussTech Language Services, Inc., Tallahassee, FL
 Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO

40900 Inspection Services—also see NDT;

Video Services

CR Control Rods & Drives
 C Cranes & Hoists
 D Dimensional
 DS Diaphragms, Storage Tank
 EM Electric Motors
 EE Electrical, Electromechanical Equipment
 FI Fuel, Irradiated
 IS In-Service
 IA Inspection Agency, ASME Code
 MS Microscopy, Scanning
 ND Nondestructive Examination
 P Pipeline
 PS Pipe Supports
 Q QA/QC
 SI Safety, Industrial
 S Siren Systems
 SO Solenoids
 ST Structures
 TP Tanks & Pools
 VR Visual, Remote
 W Welding
 U Underwater, Remote, In-Service
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (IS, ND, VR, U)
 American Crane & Equipment Corp., Douglassville, PA (C)
 Anamet Inc., Hayward, CA (MS)
 Anata Management Solutions, West Jordan, UT (Q, SI)
 AZZ Nuclear, Suwanee, GA (W)
 G.D. Barri & Associates, Inc., Peoria, AZ (Q)
 BCP Engineers & Consultants, Gretna, LA (IS, ND, Q, VR)
 Boston Government Services, LLC (BGS), Oak Ridge, TN (Q, SI)
 ♦BWX Technologies, Inc., Lynchburg, VA (FI, MS, ND)
 CAEN SyS srl, Viareggio, LU, Italy (ND)
 Canberra, part of Mirion Technologies, Meriden, CT (ND)
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 Corrosion Control Services, Inc., (CCSI Engineered Diaphragm Div.), Davenport, IA (DS, TP)
 CS-2 Inc., Grand Island, NY (SI)
 Curtiss-Wright Enertech, Brea, CA (IS, ND, PS, Q)
 ♦Curtiss-Wright EST Group, Hatfield, PA (IS, ND, P, VR, W)
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom (W)
 DCS Systems, Inc., Simsbury, CT (Q)
 The Delphi Groupe, Inc., Austin, TX (Q, SI)
 Endeavor Robotics, Chelmsford, MA (VR)
 Enercon Services, Inc., Kennesaw, GA (SI)
 Fuel Tank Maintenance Co., LLC, Cookeville, TN (IS, ND, P, TP, W)
 Genave Electronics, Rosemount, MN (S)
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (IS, ND, P, VR, U)
 James Fisher Technologies, Loveland, CO (DS, ND, P, TP, VR, W, U)
 ♦Joseph Oat Corp., Camden, NJ (ND, PS, Q, TP, W)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (C)
 Lenox Instrument Co., Inc., Trevoze, PA (ND, VR)
 National Inspection & Consultants, Fort Myers, FL (IS, ND, Q)
 NUCON International, Inc., Columbus, OH (IS)
 NV5 Global, Richland, WA (P, SI)
 PaR Systems, LLC, Shoreview, MN (C, EE)

40900 Inspection Services

- ◆ Precision Custom Components, LLC, York, PA (D, ND, Q, W)
Project Assistance Corp. (PAC), Lafayette, CA (IS, Q)
- ◆ Radiation Safety & Control Services, Inc., Stratham, NH (IS, P, PS, ST, TP)
Rockwell Automation, Inc., Milwaukee, WI (EM)
Sargent & Lundy LLC, Chicago, IL (D, IS, PS, Q, TP, VR)
SKODA JS a.s., Plzen, Czech Republic (CR, IS, ND, W)
SNC-Lavalin, Mississauga, Ontario, Canada (FI, IS, ND, PS, VR, W)
Howard L. Sobel, P.E., Oceanside, NY (Q)
- Sonic Systems International, Inc., Houston, TX (CR, D, FI, IS, IA, ND, PS, Q, SI, VR, W, U)
- Southwest Research Institute, San Antonio, TX (ND)
- System One, Pittsburgh, PA (C, IS, ND, P, PS, Q, SI, ST, TP, VR, W)
- TFE, Inc., North Augusta, SC (Q, SI)
- ◆ Thermo Scientific - CIDTEC Cameras & Imagers, (Part of Thermo Fisher Scientific), Liverpool, NY (VR)
Underwater Construction Corp., Essex, CT (ND, Q, TP)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (IS, ND, Q, ST, TP, VR, U)
Veolia Nuclear Solutions, Westminster, CO (TP, VR, U)
- ◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (CR, FI, IS, IA, ND, Q, VR)
Worthington Industries, Columbus, OH (ND, W)
Zachry Nuclear Engineering, Inc., Stonington, CT (P, PS)
Zetec, Inc., Snoqualmie, WA (IS, ND)

41000 Instrument Services—also see

Calibration Services; Health Physics Services

- Applied Health Physics, LLC, Bethel Park, PA
- Berkeley Nuclonics Corp., San Rafael, CA
- Canberra, part of Mirion Technologies, Meriden, CT
- CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN
- Curtiss-Wright Energetech, Brea, CA
- Enercon Services, Inc., Kennesaw, GA
- ◆ EnergySolutions LLC, Salt Lake City, UT
- Equipos Nuclear S.A., S.M.E., Madrid, Spain
- HI-Q Environmental Products Co., Inc., San Diego, CA
- James Fisher Nuclear Ltd, Preston, United Kingdom
- NUCON International, Inc., Columbus, OH
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada
- ◆ Radiation Safety & Control Services, Inc., Stratham, NH
Rockwell Automation, Inc., Milwaukee, WI
Rolls-Royce, Williamson, NY
VTT Technical Research Centre of Finland, VTT, Finland

41015 Instrumentation, Misc.

- A Analyzer, Total Uranium (Water, Soils, Bioassay)

- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (A)
- Cabrera Services Inc., East Hartford, CT (A)
- CAEN SyS srl, Viareggio, LU, Italy (A)
- Tyne Engineering Inc., Burlington, Ontario, Canada (A)

41200 Insulation, Thermal

- B Blanket
- C Cable
- CT Cable Tray
- HT High-Temperature
- MR Metal Reflective
- N Nuclear Quality (Q Materials)
- PT Pipe and Tube

- Alphasource, Inc., Philadelphia, PA (B, C, HT, PT)
- Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (N, PT)
- Rolls-Royce, Williamson, NY (N)
- Transco Products Inc., Chicago, IL (MR)

41700 Ion-Exchange Systems, Materials & Services

- AVANTech, Inc., Columbia, SC
- Epicor, Inc., Linden, NJ
- Veolia Nuclear Solutions, Westminster, CO

44000 Laboratories, Mobile

- A Analytical Services, On-Site
- E Environmental Analysis

- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (A)
- Cabrera Services Inc., East Hartford, CT (A, E)
- ◆ EnergySolutions LLC, Salt Lake City, UT (A)
- Kinectrics Inc., Toronto, Ontario, Canada (A)
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (E)
- Radiation Safety Assoc., Inc., Hebron, CT (A)
- System One, Pittsburgh, PA (A)
- Teledyne Brown Engineering, Inc., Huntsville, AL (A, E)
- ◆ Thermo Fisher Scientific, Oakwood Village, OH (E)
- VTT Technical Research Centre of Finland, VTT, Finland (E)

45550 Lights, Lighting

- C Construction
- E Emergency
- HC Hot Cell
- L LED
- P Pool, Nuclear
- PB Portable, Battery-Powered
- RF Reactor Floor
- U Underwater

- BIRNS, Inc., Oxnard, CA (E, HC, P, RF, U)
- Diakont, San Diego, CA (HC, P, U)
- Inukturn Services Ltd., Nanaimo, BC, Canada (U)
- Lights Camera Action, LLC, Gilbert, AZ (C, P, RF, U)
- Master-Lee Engineered Products Inc., Latrobe, PA (P, RF, U)
- Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (P, U)
- Nuclear Systems Associates, Inc., Brea, CA (E, HC)
- Remote Ocean Systems (ROS), San Diego, CA (HC, P, U)
- Sidus Solutions LLC, San Diego, CA (U)
- ◆ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (E)

47400 Maintenance & Repair Services—

also see Testing Services

- BM Bolt-Maintenance
- BB Bus Bar Insulating (Epoxy Coating)
- C Concrete
- CO Condenser
- CN Construction
- CR Control Rod Drives
- CT Cooling Towers
- CH Cranes & Hoists
- DG Diesel Generators
- E Electrical Equipment
- EJ Expansion Joints
- FP Freeze Plugging/Sealing (Pipe)
- F Fuel Assemblies
- FT Fuel Transfer Equipment
- G General
- HX Heat Exchangers
- HV HVAC Equipment
- H Hydraulic Equipment
- LC Leak Repair, Concrete
- LP Loose Parts Retrieval
- MS Mechanical Seals
- MO Motors, Electric
- OM Outage Management Services
- PS Penetration Seals
- PI Pipe Cleaning, Internal (Bio-Fouling)
- PR Pipe Repair & Replacement
- PL Pool Liner Inspection & Repair
- PT Post-Tensioning System Surveillance
- PA Power Apparatus
- PC Protective Coatings
- PM Pump & Motor, Main Coolant
- PU Pump Inspection & Repair
- RM Radiation Measuring Devices & Systems
- RS Radiation Shielding
- RW Radiation-Shielding Windows

- RI Reactor Internals
- RF Refueling Equipment
- RE Remote Inspection/Repair
- RA Rotating Machinery Alignment
- RO Rotating Machinery, Vibration Monitoring (Predictive)
- SC Screens, Traveling
- ST Seal Table/Flux Thimbles
- SS Security Systems, Anti-Intrusion
- S Snubbers
- SF Spent-Fuel Racks
- SN Stud/Nut Removal
- TC Tank Cleaning, Fuel Storage
- TR Trash Racks
- TS Tubesheet, Epoxy Cladding
- U Underwater Repairs
- VA Valve Actuators
- VR Valve Repair, Recertification
- VO Valve Testing, Off-Line
- VT Valve Testing, On-Line
- WI Water Intake Cavity Cleaning (Bio-Fouling)

- Alphasource, Inc., Philadelphia, PA (OM, PI, PR, RS)
- AVANTech, Inc., Columbia, SC (TC)
- AZZ Nuclear, Suwanee, GA (PR, RI, VR)
- AZZ Nuclear Engineered Solutions, Fort Worth, TX (CO, E, HX, HV, PM, PU)
- Berkeley Nuclonics Corp., San Rafael, CA (RM)
- ◆ BWX Technologies, Inc., Lynchburg, VA (LP, OM, RE)
Camfil USA, Washington, NC (HV)
- CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (RM, RS)
- Curtiss-Wright Energetech, Brea, CA (EJ, HX, HV, H, MS, PU, S)
- Diakont, San Diego, CA (CH, DG, FT, RF, RE, VA)
- Dufrane Nuclear Inc., Winsted, CT (C, CN, G, RS, RW, TR)
- ENECON Corp., Medford, NY (BB, C, CO, CN, CT, EJ, FP, HX, HV, LC, MS, OM, PR, PL, PC, PU, TS)
- Foss Therapy Services, Inc., North Hollywood, CA (RM, RS)
- Fuel Tank Maintenance Co., LLC, Cookeville, TN (C, CN, CT, EJ, G, HV, LC, PI, PR, PL, PC, TC)
- GLSEQ, LLC, Huntsville, AL (PS)
- Health Physics Instruments, (Division of Far West Technology, Inc.), Goleta, CA (RM)
- James Fisher Technologies, Loveland, CO (RE)
- Kinectrics Inc., Toronto, Ontario, Canada (C, LC, OM, RS, RO, SC)
- Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CH, FT)
- LUDECA, Inc., Doral, FL (RA, RO)
- MarShield, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (RS, RW)
- North Wind Group, Idaho Falls, ID (CT, G)
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (RM)
- PaR Systems, LLC, Shoreview, MN (CH, FT, RF, RE, SF, TC)
- Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (RS, RF)
- Qal-Tek Associates, LLC, Idaho Falls, ID (RM)
- Radiation Protection Systems, Inc., Groton, CT (RM, RS, RW)
- ◆ Robatel Technologies LLC, Roanoke, VA (RS)
- Rolls-Royce, Williamson, NY (CR, FT, G, OM, PS, PI, PR, PU, RM, RS, RI, RF, RE)
- Schutte and Koerting, Treviso, PA (VA, VR, VO)
- Sensor Networks, Inc., (formerly Prevision Systems LLC), Boalsburg, PA (LP, RE)
- Tecnubel-Transnubel-ECS, Dessel, Belgium (SF, TC)
- ◆ Thermo Fisher Scientific, Oakwood Village, OH (RM, RS, RW)
- Transco Products Inc., Chicago, IL (RM, RS, RE)
- Tri Tool Inc., Rancho Cordova, CA (HX, OM, PR, RE)
- Tyne Engineering Inc., Burlington, Ontario, Canada (RM)
- Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (CO, G, PI, PA, PC, RF, RE, S, SF, SN, TC, TR, TS, WI)
- US Ecology, Inc., Livonia, MI (TC)
- Valcor Engineering Corp., (Valcor Nuclear)(Valcor), Springfield, NJ (VA)
- Veolia Nuclear Solutions, Westminster, CO (RE)
- Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (MO, PM, PU, RO, SF, TC)

Williams Industrial Services Group, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), Tucker, GA (CO, CN, CT, E), G, HX, OM, PR, PC, SS, VA)
Worthington Industries, Columbus, OH (PR, SF)

VTT Technical Research Centre of Finland, VTT, Finland (CR, E)

◆Wagstaff Applied Technologies, Spokane, WA (CR, E, LR)

◆Westinghouse Electric Co. LLC, Cranberry Township, PA (CR, E, LR)

47600 Manipulators, Remote—also see Remote Control, Handling & Positioning Devices

AGI Engineering, Stockton, CA
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY
InTomes Technical Services, Inc., Springville, NY
Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX
Inuktun Services Ltd., Nanaimo, BC, Canada
James Fisher Nuclear Ltd, Preston, United Kingdom
James Fisher Technologies, Loveland, CO
NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada
PaR Systems, LLC, Shoreview, MN
Plant Decommissioning, Lake Villa, IL
◆Robatel Technologies LLC, Roanoke, VA
Sensor Networks, Inc., (formerly Prevision Systems LLC), Boalsburg, PA
Tecubel-Transnubel-ECS, Dessel, Belgium
Wälischmiller Engineering GmbH, Markdorf, Baden-Württemberg, Germany

47620 Mapping Services

A Automated
C Conventional

Merrick & Company, Greenwood Village, CO (A, C)
Rockwell Automation, Inc., Milwaukee, WI (A)
Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (A, C)
Transco Products Inc., Chicago, IL (A)

47630 Markers, Identification

Coastal Network, Inc., Charlottesville, VA
Tech Products, Inc., Staten Island, NY
◆UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA

51730 Meteorological Equipment—also see Environmental Monitoring Equipment

A Anemometers
B Barometers
H Humidity Sensors
P Precipitation Sensors
SR Solar Radiation Sensors
T Temperature Sensors

Minco Products, Inc., Minneapolis, MN (T)

53950 Mockup Design & Fabrication—also see Training Materials

CR Control Room
E Equipment
LR Local & Remote Control Panels

AGI Engineering, Stockton, CA (LR)
AVANTech, Inc., Columbia, SC (LR)
◆BWX Technologies, Inc., Lynchburg, VA (E)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (CR, E, LR)
Foss Therapy Services, Inc., North Hollywood, CA (CR, E, LR)
James Fisher Technologies, Loveland, CO (E)
A. C. Macris, Consultants, Mystic, CT (CR, E)
Merrick & Company, Greenwood Village, CO (E)
PaR Systems, LLC, Shoreview, MN (E)
Plant Decommissioning, Lake Villa, IL (E)
◆Precision Custom Components, LLC, York, PA (E)
Promation Nuclear, Oakville, Canada (E)
Radiological Solutions, Inc., Rockdale, IL (E)
REI Nuclear, LLC, Columbia, SC (LR)
Rolls-Royce, Williamson, NY (E, LR)
Studsvik, Inc., Atlanta, GA (E)
Transco Products Inc., Chicago, IL (E)
Tyne Engineering Inc., Burlington, Ontario, Canada (CR, E, LR)
Veolia Nuclear Solutions, Westminster, CO (CR, LR)

54750 Monitors, Other Than Radiation

AI Air In-Leak
CC Cable Condition
CV Check Valve
C Chlorine
CW Cooling Water System
CO Corrosion
FE Filter Efficiency
F Fuel Element (Ex-Reactor)
G Gas
HL Humidity, Integrated Leak Rate Test
IL In-Line Process
LP Loose Parts
MC Machinery Condition
N Noise
SW Service Water System
T Temperature
V Vibration
WC Water Chemistry
W Weld

Automation Products, Inc., (Dynatrol® Div.), Houston, TX (IL)

AVANTech, Inc., Columbia, SC (SW, WC)
Curtiss-Wright EnerTech, Brea, CA (AI, CV, T, V)
FCI-Fluid Components International LLC, San Marcos, CA (AI, G)

GLSEQ, LLC, Huntsville, AL (G)

JSM Protective, Inc., Wilmington, NC (T)

LUDECA, Inc., Doral, FL (MC, V)

Minco Products, Inc., Minneapolis, MN (T)

Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (F, LP, N, T)

MPR Associates, Inc., Alexandria, VA (MC, SW)

Munro Instruments Ltd., Harlow, Essex, United Kingdom (G)

NUCON International, Inc., Columbus, OH (FE)

NWT Corp., San Jose, CA (WC)

Radiological Solutions, Inc., Rockdale, IL (CO, WC)

Saphymo - Bertin Instruments, Montigny le Bretonneux, France (G)

Sidus Solutions LLC, San Diego, CA (CW, SW)

Waters Equipment, Oconomowoc, WI (WC)

Weschler Instruments, (Div. of Hughes Corp.), Cleveland, OH (T)

◆Westinghouse Electric Co. LLC, Cranberry Township, PA (F, IL, LP, T, V)

55040 Monitors, Radiation, Area

& Special-Purpose—also see

Environmental; Radiation Monitoring

AA Air, Alpha, Continuous
AP Air, Particulate
AF Automated Floor Survey System
B Bag
CW Conveyorized Waste
DB Drum/Barrel
FA Fixed-Area
F Floor Contamination
FC Food Contamination
GE Gas Effluent
G Gate
LE Liquid Effluent
M Microwave & RF Radiation
MA Mobile (Aircraft)
MV Mobile (Vehicular)
OS Outstations
P Perimeter
PL Pipe/Lumber
PS Portable Survey Meters
R Radon
S Scrap, Radioactive
T Tool
TR Tritium
TP Tritium, Portable
U Underwater

Applied Health Physics, LLC, Bethel Park, PA (F, PS, S)

Arrow-Tech, Inc., Rolla, ND (PS)

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AVANTech, Inc., Columbia, SC (LE)
Berkeley Nucleonics Corp., San Rafael, CA (PS)
Biomed Medical Systems, Inc., Shirley, NY (PS)
Bubble Technology Industries Inc., Chalk River, Ontario, Canada (MA, MV, PS, R, S)
CAEN SyS srl, Viareggio, LU, Italy (AF, B, CW, DB, FA, F, FC, GE, G, LE, MA, MV, OS, P, PL, PS, S, T, U)

Canberra, part of Mirion Technologies, Meriden, CT (AA, AP, CW, DB, FC, GE, LE, R, S, T)

Chase Environmental Group, Inc., Troy, IL (S)

CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (AA, AP, AF, DB, FA, F, FC, P, PS, R, S, T, TR, TP)

Coastal Network, Inc., Charlottesville, VA (AP, PS)

Cutting Technologies (CTI), Gloucester City, NJ (F)

Enercon Services, Inc., Kennesaw, GA (PS, S)

Femto-Tech, Inc., Carlisle, OH (AA, R, TR, TP)

F&J Specialty Products, Inc., Ocala, FL (AP, R)

Health Physics Instruments, (Division of Far West Technology, Inc.), Goleta, CA (PS)

HI-Q Environmental Products Co., Inc., San Diego, CA (AA, AP, TR, TP)

H3D, Inc., Ann Arbor, MI (FA, MA, MV, PS, S, U)

James Fisher Technologies, Loveland, CO (AA, AP, CW, DB, FA, G, S, T)

JSM Protective, Inc., Wilmington, NC (PS)

LabLogic Systems, Inc., Brandon, FL (PS)

Munro Instruments Ltd., Harlow, Essex, United Kingdom (AA, AP, PS)

NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (AA, AP, AF, B, CW, DB, FA, F, FC, GE, G, LE, MA, MV, OS, P, PL, PS, R, S, T, U)

ORTEC, Oak Ridge, TN (AP, B, CW, DB, FA, F, FC, GE, G, LE, MV, P, PL, PS, R, T, TR)

Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (CW, DB, FA)

Premium Analyse, Norroy Le Veneur, France (TR, TP)

Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada (AA, AP, F, PS, R)

Qal-Tek Associates, LLC, Idaho Falls, ID (S)

Radiation Protection Systems, Inc., Groton, CT (CW, DB, FA, F, MV, S)

Radiation Safety Assoc., Inc., Hebron, CT (PS, TP)

◆Radiation Safety & Control Services, Inc., Stratham, NH (AF, FA, P, PS)

Radiological Solutions, Inc., Rockdale, IL (PL, PS)

Rexon Components, Inc., Beachwood, OH (AA, AP, FA, F, GE, P, R, S, TR, TP, U)

RSO, Inc./Radiation Service Organization, Laurel, MD (FA, PS, R)

RTCA-Radon Testing Corp. of America, Inc., Elmsford, NY (R)

Saphymo - Bertin Instruments, Montigny le Bretonneux, France (AA, AP, AF, CW, DB, F, GE, G, LE, PS, R, S, T, TR, TP, U)

S.E. International, Inc., Summertown, TN (PS)

Staplex - Air Sampler Div., Brooklyn, NY (AP)

Technical Associates, (US Nuclear Corp.), (Overhoff Technology Corp. Division), Canoga Park, CA (AA, AP, B, CW, DB, FA, F, FC, GE, G, LE, MA, MV, P, PS, R, S, T, TR, TP, U)

◆Thermo Fisher Scientific, Oakwood Village, OH (AA, AP, AF, B, CW, DB, FA, F, FC, GE, G, LE, M, MA, MV, OS, P, PL, PS, S, T, U)

Transco Products Inc., Chicago, IL (MA, PS, U)

Tyne Engineering Inc., Burlington, Ontario, Canada (TR, TP)

◆UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (M, S)

55060 Monitors, Radiation, Personnel—

also see Health Physics Equipment;

Monitors, Microwave & RF

AL Audible Alarm (Electronic)
D Doorway
FB Film Badges, Films
HF Hand-and-Foot
PI Pocket Ion Chambers
TL Thermoluminescent Dosimeters (TLD)
WB Whole-Body
WM Whole-Body, Mobile

Applied Health Physics, LLC, Bethel Park, PA (PI)
Arrow-Tech, Inc., Rolla, ND (PI)

Biodex Medical Systems, Inc., Shirley, NY (PI)
 CAEN SyS srl, Viareggio, LU, Italy (D, HF, WB, WM)
 Canberra, part of Mirion Technologies, Meriden, CT (AL, WB)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (AL, D, FB, HF, PI, TL, WB, WM)
 Coastal Network, Inc., Charlottesville, VA (PI)
 James Fisher Technologies, Loveland, CO (AL, D, HF, PI, WB, WM)
 Ludlum Measurements, Inc., Sweetwater, TX (D, HF)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (AL, D, HF, WM)
 ORTEC, Oak Ridge, TN (D, HF, WB)
 Qal-Tek Associates, LLC, Idaho Falls, ID (AL, D, FB, HF, PI)
 Rexon Components, Inc., Beachwood, OH (D, HF, TL)
 RSO, Inc./Radiation Service Organization, Laurel, MD (PI, TL)
 Saphymo - Bertin Instruments, Montigny le Bretonneux, France (D, HF, WB)
 S.E. International, Inc., Summertown, TN (PI)
 Siemens Power Generation Services, Orlando, FL (AL)
 Technical Associates, (US Nuclear Corp), (Overhoff Technology Corp. Division), Canoga Park, CA (AL, D, HF, PI, WB)
 ♦Thermo Fisher Scientific, Oakwood Village, OH (AL, D, FB, HF, PI, TL, WB)
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (AL)

55490 Neutron Absorbers—also see Filters, Neutron; Shielding Design; Shielding Materials

- BA Boric Acid
- BC Boron Carbides
- CE Boron Carbides, Enriched (B-10)
- BN Boron, Natural
- BE Boron, Enriched (B-10, B-11)
- OB Other Boron Compounds
- BP Burnable Poisons
- C Cadmium
- CS Cadmium Sulfide
- E Encapsulated
- GD Gadolinium
- G Grain
- IM In Matrixes
- MM Metal Matrix Composites
- MS Molded Shapes
- P Pellets
- PL Plates

Ceradyne, Inc., a 3M company, Quapaw, OK (BA, BC, BN, BE, OB, BP, G, IM, MS, P, PL)
 Dufrane Nuclear Inc., Winsted, CT (BA, BC, BN, E, MS)
 ♦Holtec International, Camden, NJ (E)
 Hopewell Designs, Inc., Alpharetta, GA (IM, MS)
 ♦Robatel Technologies LLC, Roanoke, VA (E, IM, MS, PL)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (BP)

56600 Nondestructive Testing

- AC Acoustic Emission
- EC Eddy Current
- E Equipment Sales
- DP Dye Penetrant
- FP Fluorescent Penetrant
- FL Flux Leakage
- GP Ground Penetrating Radar
- I Infrared
- MP Magnetic Particle
- R Radiographic
- RT Radiographic, Real-Time Imaging
- RS Residual Stress
- S Services
- U Ultrasonic
- UW Underwater

BCP Engineers & Consultants, Gretna, LA (EC, DP, I, MP, R, S, U)
 ♦BWx Technologies, Inc., Lynchburg, VA (EC, S, U)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (DP, FP, MP, R, S, U)
 Curtiss-Wright EnerTech, Brea, CA (E, S)
 ♦Curtiss-Wright EST Group, Hatfield, PA (EC, E, S, U)

Cutting Technologies (CTI), Gloucester City, NJ (GP)
 Dubose National Energy Services, Clinton, NC (DP, FP, MP, R, U)
 Elcometer Inc., Rochester Hills, MI (EC, U)
 Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (DP, MP, U)
 Fuel Tank Maintenance Co., LLC, Cookeville, TN (EC, DP, FP, FL, I, MP, R, RT, RS, S, U)
 INTEGRA Services Technologies Inc., Pasadena, TX (U, UW)
 Inukunt InCommand Robotics, LLC, (Sub. of Inukunt Services Ltd.), Pasadena, TX (EC, E, I, U, UW)
 James Fisher Technologies, Loveland, CO (AC, EC, E, DP, FP, FL, GP, MP, R, RT, RS, S)
 ♦Joseph Oat Corp., Camden, NJ (EC, DP)
 ♦Major Tool & Machine, Inc., Indianapolis, IN (DP, FP, MP, R, U)
 Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil (DP, FP, MP, R, U)
 NUCON International, Inc., Columbus, OH (S)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (E, RT)
 Orano, Charlotte, NC (FP, MP, R, RT, S, U)
 PaR Systems, LLC, Shoreview, MN (EC, I, R, U, UW)
 ♦Precision Custom Components, LLC, York, PA (AC, EC, DP, FP, MP, R, S, U)
 Project Assistance Corp. (PAC), Lafayette, CA (EC, DP, MP, R, S, U)
 Rolls-Royce, Williamson, NY (FP, RT, RS, S, U, UW)
 Sargent & Lundy LLC, Chicago, IL (S)
 SKODA JS a.s., Plzen, Czech Republic (EC, DP, MP, R, U)
 SNC-Lavalin, Mississauga, Ontario, Canada (EC, DP, S, U)
 Sonic Systems International, Inc., Houston, TX (EC, E, DP, FP, MP, R, S, U, UW)
 Southwest Research Institute, San Antonio, TX (AC, EC, DP, GP, MP, R, U)
 System One, Pittsburgh, PA (EC, DP, FP, GP, I, MP, R, RT, RS, S, U)
 Underwater Construction Corp., Essex, CT (U)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (AC, E, S, U, UW)
 University of Bristol, (Interface Analysis Centre), Bristol, United Kingdom (RS, S)
 VTT Technical Research Centre of Finland, VTT, Finland (AC, EC, FL, GP, I, R, RS, S, U)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (EC, E, DP, FP, FL, I, MP, R, S, U)
 Wolfgang Waelischmiller Solutions, München, Germany (RT)
 Worthington Industries, Columbus, OH (DP, MP, R, U)
 Zetec, Inc., Snoqualmie, WA (EC, E, FL, S, U)

58000 Particle-Measuring Instruments

CAEN SyS srl, Viareggio, LU, Italy
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN
 HI-Q Environmental Products Co., Inc., San Diego, CA
 Munro Instruments Ltd., Harlow, Essex, United Kingdom
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada
 ORTEC, Oak Ridge, TN
 ♦Thermo Fisher Scientific, Oakwood Village, OH
 VTT Technical Research Centre of Finland, VTT, Finland

59800 Pipe—also see Cleaning Equip.

- CS Carbon Steel, Seamless
- CM Chrome Moly
- CO Copper
- L Lead
- NC Nickel-Cobalt, Seamless
- PL Plastic-Lined
- SL Seamless
- S Stainless
- SS Stainless, Seamless
- T Titanium
- TS Titanium, Seamless
- Z Zirconium
- ZS Zirconium, Seamless

Alphasource, Inc., Philadelphia, PA (SL, S, SS, T, TS)

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AVANTech, Inc., Columbia, SC (S)
 AZZ Nuclear, Suwanee, GA (S)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (CS, CM, CO, L, NC, PL, SL, S, SS, T, TS, Z, ZS)
 Dubose National Energy Services, Clinton, NC (CS, CM, NC, SL, S, SS)
 Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (CS, SL, S, SS)
 Energy Steel, Lapeer, MI (CS, CM, CO, L, NC, PL, T, TS)
 Fire & Pump Service Group, Rancho Dominguez, CA (CS, CO, SL, S, SS)
 ♦Joseph Oat Corp., Camden, NJ (SL, S, SS)
 MarShield, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (L)
 Seafab Metals Co., (Div. of The Doe Run Co.), Casa Grande, AZ (L)
 Tioga Pipe Supply Co., Inc., Philadelphia, PA (CS, CM, CO, NC, SL, S, SS, T, TS, Z, ZS)

59850 Pipe & Tube Machinery & Equipment—also see Cleaning Equip. (Tube Cleaning)

- B Bending, Pipe
- BT Bending, Tube
- BP Beveling, Pipe
- BV Beveling, Tube
- CR Crimpers, Tube
- CP Cutting, Pipe
- CT Cutting, Tube
- CI Cutting, In-Place
- EH Expanders, Tube, Hydraulic
- EM Expanders, Tube, Mechanical
- IT Instrumentation Tubing, Orbital Welding
- PO Primary, Orbital TIG Welding
- RS Rounding & Sizing
- T Threading, Pipe
- W Weld End Preparation

AZZ Nuclear, Suwanee, GA (CP, CI, IT, PO, W)
 ♦Brokk Inc., Santa Fe, NM (CP, CT, CI)
 ♦Curtiss-Wright EST Group, Hatfield, PA (EH)
 Dubose National Energy Services, Clinton, NC (B)
 E. H. Wachs, Lincolnshire, IL (BP, BV, CP, CT, CI, PO, W)
 Magnatech LLC, East Granby, CT (IT, PO)
 Tioga Pipe Supply Co., Inc., Philadelphia, PA (B, BT, BP, BV, CP, T, W)
 Tri Tool Inc., Rancho Cordova, CA (BP, BV, CP, CT, PO, W)
 Tyne Engineering Inc., Burlington, Ontario, Canada (B, BT, IT, PO, RS, T, W)
 Worthington Industries, Columbus, OH (W)

60100 Pipe Hangers and Supports

Dubose National Energy Services, Clinton, NC
 Tyne Engineering Inc., Burlington, Ontario, Canada

61570 Plugs—also see Decontamination Chemicals, Equip. & Services

- CT Condenser Tube
- CR Control Rod Drive Housing
- FH Feedwater Heater
- F Freeze Plugs
- HL Hot & Cold Leg (Remotely Installed)
- I Isolation
- MS Main Steam Line
- MR Moisture Separator Reheater
- P Pipeline
- RP Reactor Pressure Vessel Drain Line
- RV Reactor Vessel Nozzle
- RO Recirculation Outlet Nozzle
- SL Steamline (Remotely Installed)
- SH Stud Hole
- ST System Test

Alphasource, Inc., Philadelphia, PA (CT, F, I, P)
 ♦BWx Technologies, Inc., Lynchburg, VA (HL)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (CT, CR, FH, I, RO, SH)
 ♦Curtiss-Wright EST Group, Hatfield, PA (CT, CR, FH, HL, I, MS, MR, P, RP, RV, RO, SH, ST)
 Diakont, San Diego, CA (P)
 Dubose National Energy Services, Clinton, NC (RV)

Radiation Monitoring Serv. 67380

Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (CT, F, P, RV)
Energy Steel, Lapeer, MI (CR, I, MR)
Equipos Nuclear S.A., S.M.E, Madrid, Spain (CT, FH, RP, RV)
Master-Lee Engineered Products Inc., Latrobe, PA (SH)
Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (HL, I, MS, P, RP, RV, RO, SL, SH, ST)
Rolls-Royce, Williamson, NY (CT, CR, FH, F, HL, I, MS, MR, P, RP, RV, RO, SL, SH)
◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (CR, MS)

E3 Engineered Class III
HD Heater Drain
NR Non-Code Radwaste
N2 Nuclear Class II
PC Primary Coolant
RF Reactor Feed
SW Service Water, Non-Code
SN Service Water, Nuclear Class III
SC Small Class III Including Radwaste
AGI Engineering, Stockton, CA (E3, NR, SC)
AZZ Nuclear Engineered Solutions, Fort Worth, TX (CW, E3, HD, NR, N2, PC, RF, SW, SN, SC)

◆ Holtec International, Camden, NJ (C, HD)
◆ Major Tool & Machine, Inc., Indianapolis, IN (C, HD)
Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil (C, HD)
PaR Systems, LLC, Shoreview, MN (C, HD)
◆ Precision Custom Components, LLC, York, PA (C, HD)
SKODA JS a.s., Plzen, Czech Republic (HD)
Underwater Construction Corp., Essex, CT (HD)
◆ Vigor (formerly Oregon Iron Works), Clackamas, OR (C, HD)
◆ Wagstaff Applied Technologies, Spokane, WA (C)
◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (C, HD)

63400 Power Supplies

AC AC
C Chargers, Battery
DC DC
HF High-Frequency
HV High-Voltage
I Instrument
IN Inverters
PL Power Line Conditioner
S Stand-by
U Uninterruptible (AC-DC-AC)

AZZ Nuclear Engineered Solutions, Fort Worth, TX (AC, DC, I, PL, S, U)
Rockwell Automation, Inc., Milwaukee, WI (AC, DC, I, U)
Schneider Electric Gutor Technologies, Houston, TX (C, I, IN, PL, U)

64300 Protective Coverings & Tarpaulins

Alphasource, Inc., Philadelphia, PA
◆ PacTec, Inc., Clinton, LA
◆ Reef Industries, Inc., Houston, TX
Rich Industries Inc., New Philadelphia, OH
Strategic Packaging Systems, Madisonville, TN

64700 Pumps, Centrifugal

CW Condensate & Circulating Water

64750 Pumps, Other

A Air-Operated
CL Cleanup
CA Containment Air/Gas Sampling
DH Diaphragm, Hydraulically Actuated
HO Hand-Operated
HP High-Pressure
HY Hydraulic
J Jet
MP Metering & Proportioning
PD Positive-Displacement
SR Sealless Reciprocating
SL Slurry
SO Sodium
SP Special-Purpose
V Vacuum

AGI Engineering, Stockton, CA (SL)
AVANTech, Inc., Columbia, SC (A, CL, SL, V)
Radiological Solutions, Inc., Rockdale, IL (HP, MP, PD)
Schutte and Koerting, Trevese, PA (HP, J, SL, V)

66280 Racks, Fuel Storage—also see

Storage Systems, Spent-Fuel

C Conventional
HD High-Density

Darchem Engineering Ltd., Stockton on Tees, United Kingdom (C, HD)

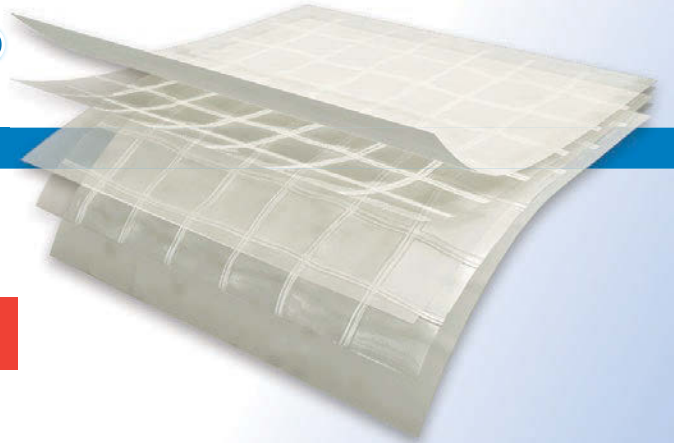
67380 Radiation Monitoring Serv.—also see *Envir. Monitoring; Health Phys. Serv.*

A Analog Systems
DR Design, Retrofit
D Digital Systems
M Maintenance
MO Mobile (Vehicular)
SE Sample Encapsulation
SS Smear Sampling, Area/Environmental
TC Testing & Calibration

AECOM, Aiken, SC (DR)
Applied Health Physics, LLC, Bethel Park, PA (SS, TC)
Applied Science Professionals, (ASP-LLC), Salt Lake City, UT (TC)
ARS International, LLC, Port Allen, LA (SS, TC)
Beamex, Inc., Marietta, GA (TC)
Bubble Technology Industries Inc., Chalk River, Ontario, Canada (SS)
Cabrera Services Inc., East Hartford, CT (SS, TC)
Canberra, part of Mirion Technologies, Meriden, CT (A, DR, D, MO, SS, TC)
Chase Environmental Group, Inc., Troy, IL (SS)
Enercon Services, Inc., Kennesaw, GA (TC)
James Fisher Nuclear Ltd, Preston, United Kingdom (A, DR, D, TC)
National Nuclear Laboratory (UK), Warrington, United Kingdom (D, TC)



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67380 Radiation Monitoring Serv.

NV5 Global, Richland, WA (SS)
 Pace National Center for Testing & Innovation, Mt. Juliet, TN (SS, TC)
 Radiation Safety Assoc., Inc., Hebron, CT (DR, D, TC)
 ♦Radiation Safety & Control Services, Inc., Stratham, NH (TC)
 Radiological Solutions, Inc., Rockdale, IL (TC)
 RSO, Inc./Radiation Service Organization, Laurel, MD (SS)
 Saphymo - Bertin Instruments, Montigny le Bretonneux, France (M, TC)
 Sargent & Lundy LLC, Chicago, IL (A, DR, D)
 SNC-Lavalin, Mississauga, Ontario, Canada (D)
 Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (MO)
 Technical Associates, (US Nuclear Corp), (Overhoff Technology Corp. Division), Canoga Park, CA (A, D, MO, TC)
 Tyne Engineering Inc., Burlington, Ontario, Canada (A, DR, D, M, SE, SS, TC)
 VTT Technical Research Centre of Finland, VTT, Finland (TC)
 ♦Wood, (Environment & Infrastructure Solutions, Inc.), (Radiological Services & Engineering Group), Grand Junction, CO (MO)
 Zachry Nuclear Engineering, Inc., Stonington, CT (DR)

GC Gas Compressors
 I Incinerators
 L Liners
 LV Liquid Volume Reduction
 P Packaging
 R Robotic
 SC Secondary Containment Products
 SH Shredders (Volume Reduction)
 S Solidification
 SS Sorters, Sorting Tables
 ST Storage Systems, On-Site, High-Level
 SF Storage Systems, On-Site, Low-Level
 WT Waste Tracking & Accountability Systems (Computerized)

AECOM, Aiken, SC (E, ST, SF)
 AeroGo, Inc., Seattle, WA (CA, CO, CN, CS, DC, DR, DW, E, F, I, SC, SH, ST, SF)
 AGI Engineering, Stockton, CA (R)
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (DR, R)
 American Crane & Equipment Corp., Douglassville, PA (R, ST, SF, WT)
 AVANTech, Inc., Columbia, SC (CN, L, LV, S, SF)
 Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (CO, DC, L, P, S, SF)
 Brokk AB, Skelleftea, Sweden (R)
 ♦Brokk Inc., Santa Fe, NM (R)
 Canberra, part of Mirion Technologies, Meriden, CT (WT)
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom (L, SC)
 Diakont, San Diego, CA (R)
 Dufrane Nuclear Inc., Winsted, CT (L, P, ST, SF)
 DW James Consulting, North Oaks, MN (WT)
 ♦EnergySolutions LLC, Salt Lake City, UT (I, S)
 Environmental Alternatives, Inc., Swanzey, NH (E, LV, R, S)
 Fortum Power & Heat Oy, Nuclear Services, Espoo, Finland, Finland (LV, S)
 Foss Therapy Services, Inc., North Hollywood, CA (ST, SF)
 ♦Holtec International, Camden, NJ (ST, SF)
 Hoover Container Solutions, (Formerly Tech Oil Products Inc.), New Iberia, LA (CO, CS)

Hopewell Designs, Inc., Alpharetta, GA (P)
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (R)
 Inuktun Services Ltd., Nanaimo, BC, Canada (R)
 James Fisher Nuclear Ltd, Preston, United Kingdom (DC, R)
 James Fisher Technologies, Loveland, CO (DC, DR)
 ♦Joseph Oat Corp., Camden, NJ (E, L)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (R, ST, SF, WT)
 Lancs Industries, Kirkland, WA (L)
 Linn High Therm GmbH, Eschenfelden, Germany (E, F, LV, S)
 ♦Major Tool & Machine, Inc., Indianapolis, IN (CA)
 Merrick & Company, Greenwood Village, CO (R)
 METOIL, Praha, Czech Republic (LV)
 M2 Polymer Technologies, Inc., West Dundee, IL (P, S)
 ♦NAC International Inc., Norcross, GA (ST)
 National Nuclear Laboratory (UK), Warrington, United Kingdom (P)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (R, SS, WT)
 Orano, Charlotte, NC (CA, E, F, L, LV, P, R, SH, ST, SF)
 ♦PacTec, Inc., Clinton, LA (L, P, SC, SF)
 PaR Systems, LLC, Shoreview, MN (DC, DR, DW, P, R)
 ♦Petersen Inc., Ogden, UT (CA, CS, F, SC, SH)
 Promotion Nuclear, Oakville, Canada (L, R, ST, SF)
 PTP Spent Fuel Services, LLC, Grand Island, NY (ST, SF)
 Qal-Tek Associates, LLC, Idaho Falls, ID (WT)
 Radiological Solutions, Inc., Rockdale, IL (S)
 ♦Reef Industries, Inc., Houston, TX (L, P, SC, SF)
 ♦Robatel Technologies LLC, Roanoke, VA (CA, P, R, S, SS, SF)
 Sargent & Lundy LLC, Chicago, IL (ST, SF)
 ♦SECUR, Sewickley, PA (P, WT)
 S&G Enterprises, Inc., Germantown, WI (CO, CS, SH)
 Skolnik Industries, Chicago, IL (P, SC)
 SNC-Lavalin, Mississauga, Ontario, Canada (R, ST, SF)
 The Spencer Turbine Co., Windsor, CT (GC)
 Strategic Packaging Systems, Madisonville, TN (P)

68000 Radioactive Waste Handling & Treatment Equip.—also see Solid Waste Reduction

CA Calciners
 CO Compactors
 CN Concentrators (Cross-Flow Filter)
 CS Crushers, Scintillation Vials
 DC Drum Capping Machines, Remote
 DR Drum Cutting Machines
 DW Drum Washing Systems, Automatic
 E Evaporators
 F Furnaces for Glass Melting

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- Studsvik, Inc., Atlanta, GA (CA, E, I, LV, S)
 Tri Tool Inc., Rancho Cordova, CA (DR)
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (SC, SS)
 Veolia Nuclear Solutions, Westminster, CO (DC, F, R)
 Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (CO, DR, E, LV, P, R, SH, S, WT)
 ♦Vigor (formerly Oregon Iron Works), Clackamas, OR (CA, E, I, L, P, SC, SH, ST, SF)
 VTT Technical Research Centre of Finland, VTT, Finland (I, R, S)
 ♦Wagstaff Applied Technologies, Spokane, WA (CO, DC, DR, DW, E, L, LV, P, R, SC, SH, SS, ST, SF)
 Waste Control Systems, Inc., Phoenix, MD (CO, CS, SC, SH, SS)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (CO, CN, DC, E, LV, P, R, SC, SH, S, SS, ST, SF)
 Whiting Corp., Monee, IL (CA)
 Wälischmiller Engineering GmbH, Markdorf, Baden-Württemberg, Germany (R)
 WMG, Inc., Peekskill, NY (L, P, WT)
 Wolfgang Waelischmiller Solutions, München, Germany (ST)
 ♦Wood, (Environment & Infrastructure Solutions, Inc.), (Radiological Services & Engineering Group), Grand Junction, CO (SS)
 Worthington Industries, Columbus, OH (ST, SF)

68950 Radioisotopes

- CS Calibration Standards
- F Foils
- G Gases, Calibration
- LC Labeled Compounds
- PP Primary & Processed
- RS Radiation Standards
- RC Radiochemicals
- RM Radioisotopes, Medical
- RP Radiopharmaceuticals
- RE Recycling
- SS Sealed Sources

- Beamex, Inc., Marietta, GA (CS)
 Curie Environmental Services, Albuquerque, NM (RE)
 Foss Therapy Services, Inc., North Hollywood, CA (RS, RE, SS)
 Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada (SS)
 ♦Radiation Safety & Control Services, Inc., Stratham, NH (RS)
 VTT Technical Research Centre of Finland, VTT, Finland (CS, G, LC, PP, RC)

71190 Records Management Systems

- CM Configuration Management
- DS Document Storage & Retrieval
- DC Drawing Control
- HP Health Physics
- O Operations Recording
- S Spare Parts
- T Training

- Alphasource, Inc., Philadelphia, PA (HP, O)
 Anata Management Solutions, West Jordan, UT (T)
 Applied Health Physics, LLC, Bethel Park, PA (HP)
 Boston Government Services, LLC (BGS), Oak Ridge, TN (CM, DS, DC, T)
 Canberra, part of Mirion Technologies, Meriden, CT (HP)
 The Delphi Groupe, Inc., Austin, TX (CM, HP, T)
 Enercon Services, Inc., Kennesaw, GA (CM, DS, DC)
 Hawks, Giffels & Pullin (HGP), Inc., Greenville, SC (CM)
 Stan A. Huber Consultants, Inc., New Lenox, IL (HP)
 L3 MAPPS, (Power Systems and Simulation), Montreal, Quebec, Canada (T)
 North Wind Group, Idaho Falls, ID (CM, HP)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (HP)
 Project Assistance Corp. (PAC), Lafayette, CA (CM, DC)
 PTI Systems, (Div. of Pro-Tem, Inc.), League City, TX (HP)
 Qal-Tek Associates, LLC, Idaho Falls, ID (DS, O)
 Sargent & Lundy LLC, Chicago, IL (CM, DC, HP, O, S, T)

- TFE, Inc., North Augusta, SC (DS)
 WMG, Inc., Peekskill, NY (T)

71500 Refrigeration—also see Cooling Systems, Body

- Ellis & Watts Global Industries, Inc., Batavia, OH

72300 Remote Control, Handling & Positioning Devices & Sys.—also see Robotic Devices

- AI Artificial Intelligence/Expert Systems
- EE End Effectors, Grippers, & Wrists
- RC Remote Control
- RH Remote Handling
- RP Remote Positioning
- RO Robotics
- TM Telescoping Masts

- AGI Engineering, Stockton, CA (EE, RC, RO)
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (EE, RC, RH, RP, RO)
 American Crane & Equipment Corp., Douglassville, PA (EE, RC, RH, RP, RO)
 Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (RH)
 Brokk AB, Skelleftea, Sweden (EE, RC, RH, RP, RO)
 ♦Brokk Inc., Santa Fe, NM (RC, RH, RP, RO)
 Diakont, San Diego, CA (AI, EE, RC, RH, RP)
 E. H. Wachs, Lincolnshire, IL (RC)
 Endeavor Robotics, Chelmsford, MA (RO)
 Getinge-La Calhene, (Sub. of Getinge Group), Vendome, France (RC)
 Hilman Rollers, Marlboro, NJ (RH)
 ♦Holtec International, Camden, NJ (RC, RH, RP)
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (EE, RC, RH, RP, RO)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (RH, RP, RO)
 KUKA Systems UK Ltd, West Midlands, United Kingdom (RH, RO)
 Master-Lee Engineered Products Inc., Latrobe, PA (EE)
 Merrick & Company, Greenwood Village, CO (AI, RH, RP, RO)
 Nuclear Systems Associates, Inc., Brea, CA (EE, RC, RH, RP, RO)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (EE, RC, RH, RP, RO)
 PaR Systems, LLC, Shoreview, MN (EE, RC, RH, RP, RO)
 Promotion Nuclear, Oakville, Canada (AI, EE, RC, RH, RP, RO)
 ♦Robatel Technologies LLC, Roanoke, VA (RC, RH, RP)
 Rockwell Automation, Inc., Milwaukee, WI (RC, RP, RO)
 Rolls-Royce, Williamson, NY (AI, RC, RH, RP, RO, TM)
 Sarcos Corp., Salt Lake City, UT (RO)
 Sensor Networks, Inc., (formerly Prevision Systems LLC), Boalsburg, PA (EE)
 Sidus Solutions LLC, San Diego, CA (RP)
 SNC-Lavalin, Mississauga, Ontario, Canada (RC, RH, RP, RO)
 Southwest Research Institute, San Antonio, TX (EE, RC, RH, RP, RO)
 Tecnel-Transnubel-ECS, Dessel, Belgium (RO)
 Tri Tool Inc., Rancho Cordova, CA (RP)
 Underwater Construction Corp., Essex, CT (RC, RH, RP, RO)
 Veolia Nuclear Solutions, Westminster, CO (EE, RC, RH, RP, RO)
 VTT Technical Research Centre of Finland, VTT, Finland (AI, RC, RH, RP, RO)
 Wälischmiller Engineering GmbH, Markdorf, Baden-Württemberg, Germany (EE, RC, RH, RO)
 Wolfgang Waelischmiller Solutions, München, Germany (RC, RH, RP, RO)

73300 Remote-Viewing Instruments & Systems

- BI Binoculars

♦ Denotes Advertiser

- BF Borescopes, Flexible
- BR Borescopes, Rigid
- I Infrared
- M Monocular Scopes, Viewing/ALARA
- P Periscopes
- RR Radiation-Resistant
- S Submersible
- T Telescopes

- Alphasource, Inc., Philadelphia, PA (BF, BR)
 Coastal Network, Inc., Charlottesville, VA (M)
 Hopewell Designs, Inc., Alpharetta, GA (BF, BR)
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (BF, I, S)
 Inuktun Services Ltd., Nanaimo, BC, Canada (S)
 Lights Camera Action, LLC, Gilbert, AZ (RR, S)
 Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (RR, S)
 OC Robotics, Bristol, United Kingdom (BF)
 Remote Ocean Systems (ROS), San Diego, CA (RR, S)
 Rolls-Royce, Williamson, NY (BI, BF, BR, I, M, P, RR, S, T)
 Sensor Networks, Inc., (formerly Prevision Systems LLC), Boalsburg, PA (S)
 Sidus Solutions LLC, San Diego, CA (I, S)
 Symphotic Tii Corp., Camarillo, CA (RR, S)
 ♦Thermo Fisher Scientific, Oakwood Village, OH (RR)
 ♦Thermo Scientific - CIDTEC Cameras & Imagers, (Part of Thermo Fisher Scientific), Liverpool, NY (RR)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (S)

73550 Respiratory Protection Equip.—also see Clothing, Prot.; Health Phys. Serv.

- AP Air Purification Systems
- C Compressors
- FT Fit-Testing Systems
- RC Respirator Cleaning Systems
- RD Respirator Drying Systems
- RL Respirators, Air-Line
- R Respirators, Air-Purifying
- RX Respirators, Combination Type
- RP Respirators, Powered Air-Purifying
- RE Resuscitators
- SC Self-Contained Breathing Apparatus
- SB SCBA Boost Pumps
- SE SCBA (Escape)
- SF SCBA Filling Stations
- ST SCBA Flow Testing & Services
- SW SCBA Software
- SS Storage Systems (Cleaned Equipment)
- V Vessels, High-Pressure, Air

- Ellis & Watts Global Industries, Inc., Batavia, OH (AP, V)
 Frham Safety Products, Inc., Nashville, TN (AP, C, RL, R, RX, SC)
 JSM Protective, Inc., Wilmington, NC (R, RX, RP)
 Lancs Industries, Kirkland, WA (RL)
 NUCON International, Inc., Columbus, OH (AP, FT)
 Radiation Protection Systems, Inc., Groton, CT (AP, RD)
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (C, RC, RD, RL, R, RX, SC, SS)

73570 Rigging Specialists

- Dufrane Nuclear Inc., Winsted, CT

73620 Robotic Devices, Systems—also see Remote Control

- CA CAD-Driven
- C Condenser, In-Service Inspection
- FT Force/Torque Sensors
- N Nuclear
- RV Reactor Vessel Head, ISI
- S Submersible

- AGI Engineering, Stockton, CA (N)
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (N)
 AVANTech, Inc., Columbia, SC (S)
 Brokk AB, Skelleftea, Sweden (RV)
 ♦Brokk Inc., Santa Fe, NM (CA)
 ♦BWX Technologies, Inc., Lynchburg, VA (CA, C, RV)
 Inuktun Services Ltd., Nanaimo, BC, Canada (N, RV, S)

73620 Robotic Devices, Systems

- James Fisher Nuclear Ltd, Preston, United Kingdom (N)
- James Fisher Technologies, Loveland, CO (N, S)
- Kinectrics Inc., Toronto, Ontario, Canada (CA, N)
- KUKA Systems UK Ltd, West Midlands, United Kingdom (N)
- Mitsubishi Heavy Industries America, Inc., Houston, TX (RV, S)
- OC Robotics, Bristol, United Kingdom (N)
- PaR Systems, LLC, Shoreview, MN (N, S)
- Promation Nuclear, Oakville, Canada (CA, N, S)
- Southwest Research Institute, San Antonio, TX (N, RV, S)
- Symphotic Tii Corp., Camarillo, CA (S)
- Tecnubel-Transnubel-ECS, Dessel, Belgium (N)
- Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (N, RV, S)
- Veolia Nuclear Solutions, Westminster, CO (N, S)
- Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (CA, C, FT, N, RV, S)
- Wälischmiller Engineering GmbH, Markdorf, Baden-Württemberg, Germany (CA, C, FT, N, S)
- 74150 Samplers & Sampling Systems**
- A Air (Carried by Personnel)
- AP Air Particulate
- AS Automatic Systems
- EC Evaporator Concentrate
- G Gas
- I Iodine
- L Liquid
- M Metallurgical
- RT Real-Time Remote
- SS Stack Sampling
- W Waste
- AVANTech, Inc., Columbia, SC (L, W)
- CAEN SyS srl, Viareggio, LU, Italy (AS, I, L, RT, SS, W)
- F&J Specialty Products, Inc., Ocala, FL (A, AP, I)
- The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC (SS)
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (AP, AS, G, I, L, RT, SS, W)
- Radiological Solutions, Inc., Rockdale, IL (L)
- Staplex - Air Sampler Div., Brooklyn, NY (A, AP)
- ◆Thermo Fisher Scientific, Oakwood Village, OH (SS)
- Waters Equipment, Oconomowoc, WI (AS, L, W)
- 74320 Sampling Systems Services—also see Radiation Monitoring Services**
- Chase Environmental Group, Inc., Troy, IL
- Encorus Group, (dba RJR Engineering, P.C.), Springfield, NY
- The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC
- Sentry Equipment, Oconomowoc, WI
- 74350 Scaffolding—also see Shoring; Training**
- C Conventional
- M Modular
- SP Scaffold Plank
- S Suspended Type
- T Tube & Clamp Type
- Excel Modular Scaffold and Leasing Corp., Weymouth, MA (C, M, SP, S, T)
- Constantine N. Polites & Co., Yeadon, PA (T)
- ◆UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (C, M, SP, S, T)
- 75190 Seals—also see Decontamination Chemicals & Equipment; Plugs**
- CM Ceramic-Metal Assemblies
- CS Conduit Seal
- ES Equipment Storage Pool
- FG Flat Gasketing
- GR Flat Gasketing, Radiation-Resistant
- FT Flux Thimble Seal
- H Hydraulic
- I Inflatable
- IP Inspection Port
- MS Mechanical, Shaft
- MP Mechanical, Shaft, Reactor Circulating Pump
- M Metal (O-Rings, C-Rings, etc.)
- NI Nuclear Instrumentation Cover
- P Penetration
- RC Reactor Cavity Pool
- SR Sealing Systems, Compressed Rubber
- SS Sealing Systems, Fluid
- Alphasource, Inc., Philadelphia, PA (I)
- AZZ Nuclear Engineered Solutions, Fort Worth, TX (MS)
- Cross Manufacturing Company (1938) Ltd., Bath, United Kingdom (MS, M, SS)
- ◆Curtiss-Wright EST Group, Hatfield, PA (H, I, P)
- Darchem Engineering Ltd., Stockton on Tees, United Kingdom (M, P, RC)
- Energy Steel, Lapeer, MI (FG, MS, MP, M)
- GLSEQ, LLC, Huntsville, AL (P)
- Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (CM, P)
- Pave Technology Co., Dayton, OH (P)
- Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (ES, GR, I, IP, NI, P, RC)
- SNC-Lavalin, Mississauga, Ontario, Canada (I, MS, MP)
- Valcor Engineering Corp., (Valcor Nuclear) (Valcor), Springfield, NJ (M)
- ◆Westinghouse Electric Co. LLC, Cranberry Township, PA (I, MS, MP, RC)
- 75600 Security Services—also see Consultants; Training**
- A Analysis
- D Drug Testing
- E Engineering
- G Guards
- SI Screening & Investigation
- Boston Government Services, LLC (BGS), Oak Ridge, TN (A, E)
- Enercon Services, Inc., Kennesaw, GA (E)
- Merrick & Company, Greenwood Village, CO (E)
- National Nuclear Laboratory (UK), Warrington, United Kingdom (A)
- Sargent & Lundy LLC, Chicago, IL (A, E)
- VTT Technical Research Centre of Finland, VTT, Finland (A, E, SI)
- Zachry Nuclear Engineering, Inc., Stonington, CT (E)
- 75700 Security Structures**
- BW Barbed Wire, Tape
- BG Barrier-Gates
- F Fences
- GO Gate Operators
- G Gates
- GS Guard Stations
- GB Gunports, Bullet-Resistant
- L Lockers, Weapon Storage
- SB Security Booths (Man-Trap)
- T Turnstiles
- WP Wall Panels, Bullet-Resistant
- WB Windows, Bullet-Resistant
- ◆Container Technologies Industries, LLC, Helenwood, TN (BG, GS, GB, WP, WB)
- Dufrane Nuclear Inc., Winsted, CT (GB, WB)
- Fuel Tank Maintenance Co., LLC, Cookeville, TN (BW, BG, F, GO, G, GS, GB, L, SB, T, WP, WB)
- 75850 Security Systems & Devices—also see Consultants**
- AI Anti-Intrusion, Indoor
- AO Anti-Intrusion, Outdoor
- AP Asset Protection (Anti-Removal), Electronic
- AS Automated Security Patrol Robot
- C Computerized
- FI Fully Integrated
- HS Homeland Security Devices
- ID Intruder Detection (Laser, Microwave/Infrared)
- ET Explosives Trace Detection
- MD Metal (Weapon) Detectors
- NV Night Vision Scopes & Devices
- P Personal Alarm
- PA Personnel Access Control
- RT Railcar, Remote Tracking and Cargo Monitoring
- TW Thermal Weapon Sights
- VA Vehicle Access Control
- VS Video Surveillance Systems (CCTV)
- VT Video Transmission Systems
- WI Water Intake, Anti-Intrusion
- X X-ray Inspection Systems
- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (HS)
- Diakont, San Diego, CA (FI, VS, VT)
- Enercon Services, Inc., Kennesaw, GA (FI, ID, PA, VA, VS)
- Fuel Tank Maintenance Co., LLC, Cookeville, TN (AI, AO, C, FI, HS, VS)
- National Nuclear Laboratory (UK), Warrington, United Kingdom (FI)
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (HS, P, PA)
- Saphymo - Bertin Instruments, Montigny le Bretonneux, France (PA, VA)
- Sidus Solutions LLC, San Diego, CA (AI, AO, FI, HS, ID, NV, VS, VT, WI)
- Southwest Microwave, Inc., (Security Systems Div.), Tempe, AZ (AO, AP, C, FI, HS, ID)
- Terahertz Technologies, Inc., Oriskany, NY (VT)
- ◆Thermo Fisher Scientific, Oakwood Village, OH (HS)
- ◆Thermo Scientific - CIDTEC Cameras & Imagers, (Part of Thermo Fisher Scientific), Liverpool, NY (NV, VS)
- Wolfgang Waelischmiller Solutions, München, Germany (C, X)
- 76400 Seismic Instrumentation & Testing**
- AZZ Nuclear Engineered Solutions, Fort Worth, TX
- GLSEQ, LLC, Huntsville, AL
- Kinectrics Inc., Toronto, Ontario, Canada
- Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada
- 77600 Servomechanisms**
- Wolfgang Waelischmiller Solutions, München, Germany
- 77750 Shielding Design, Radiation—also see Analysis; Consultants**
- ◆BW Technologies, Inc., Lynchburg, VA
- Canberra, part of Mirion Technologies, Meriden, CT
- Darchem Engineering Ltd., Stockton on Tees, United Kingdom
- Dufrane Nuclear Inc., Winsted, CT
- Encorus Group, (dba RJR Engineering, P.C.), Springfield, NY
- Enercon Services, Inc., Kennesaw, GA
- Hopewell Designs, Inc., Alpharetta, GA
- Hot Cell Services Corp., Kent, WA
- James Fisher Nuclear Ltd, Preston, United Kingdom
- ◆Joseph Oat Corp., Camden, NJ
- Kinectrics Inc., Toronto, Ontario, Canada
- MarShield, (Div. of Mars Metal Co.), Burlington, Ontario, Canada
- Merrick & Company, Greenwood Village, CO
- NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada
- Radiation Protection Products, Inc., Wayzata, MN
- Radiation Safety Assoc., Inc., Hebron, CT
- Sargent & Lundy LLC, Chicago, IL
- Southwest Research Institute, San Antonio, TX
- Veolia Nuclear Solutions, Westminster, CO
- ◆Westinghouse Electric Co. LLC, Cranberry Township, PA
- WMG, Inc., Peekskill, NY
- 77800 Shielding Materials, Rad.—also see Containers; Doors; Neut. Absorbers; Windows**
- AS Acrylic Sheeting Products, Beta-Shielding
- A Aggregates, High-Density Concrete
- B Blankets
- CB Blocks, Concrete, Lead-Core
- BH Blocks, Concrete, High-Density

BM Blocks, Modular
 BC Boron Carbide Grain & Shapes
 BR Bricks, Composite
 BL Bricks, Lead
 CM Castable Shielding Materials
 CC Castings, Composite
 CL Castings, Lead
 CA Castles, Lead
 CS Collars, Streaming
 CW Container Wraps
 CR Criticality Control
 CU Curtain Shields
 FS Frisker Shields
 GN Gamma/Neutron Composite
 G Glass, X-ray
 IV In-Vessel Shields
 LF Lead Free
 LP Lead Plastic
 LL Low-Level Shields, Lead/Steel
 PW Pipe Wraps/Sleeves
 PC Plugs, Closures
 P Polyethylene
 PB Polyethylene, Borated
 RF Refueling Shields
 TN Thermal Neutron Materials
 TA Tungsten Alloys
 WP Wall Panels
 WS Water Shields, Modular (Gamma/Neutron)

Alphasource, Inc., Philadelphia, PA (B, CW, CU, FS)
 F.N. Anderson & Assoc., Forest, VA (CR)
 AVANTech, Inc., Columbia, SC (WP)
 Biodex Medical Systems, Inc., Shirley, NY (AS, BM, BL, LL, TA)
 Ceradyne, Inc., a 3M company, Quapaw, OK (TN)
 Darchem Engineering Ltd., Stockton on Tees, United Kingdom (B, PW, WP)
 Dufrane Nuclear Inc., Winsted, CT (A, B, CB, BH, BM, BR, BL, CM, CC, CL, CS, CW, CR, CU, FS, GN, G, IV, LL, PW, PC, P, PB, RF, TN, TA, WP, WS)
 ♦EnergySolutions LLC, Salt Lake City, UT (CL, LL, WP)
 Foss Therapy Services, Inc., North Hollywood, CA (TA)
 Gamma Products, Inc., Palos Hills, IL (LL)
 InRoads International LLC, Monroeville, PA (BM, BR, WP)
 Lancs Industries, Kirkland, WA (B, BR, BL, CU, FS, GN, LF, PW, P, TA, WS)
 MarShield, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (AS, A, B, CB, BM, BR, BL, CM, CL, CA, CW, CU, G, LF, LP, LL, PW, P, PB, TA)
 Mayco Industries, Birmingham, AL (AS, A, B, CB, BM, BR, CM, CC, CS, CW, CR, CU, FS, GN, G, IV, LP, PW, PC, P, PB, RF, TN, TA, WP, WS)
 ♦NAC International Inc., Norcross, GA (BM, BR, CM, CC, CS, GN, IV, TN)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (A, BH, BM, CS, FS, LF)
 ORTEC, Oak Ridge, TN (LL)
 Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (RF)
 Radiation Protection Products, Inc., Wayzata, MN (BL, CL, G, PB)
 Radiation Protection Systems, Inc., Groton, CT (B, CM, GN, LF, LL, PW, PC, P, PB, RF, TA, WP, WS)
 ♦Reef Industries, Inc., Houston, TX (CW, P, RF)
 Research Products International Corp., Mt. Prospect, IL (AS)
 Rich Industries Inc., New Philadelphia, OH (AS, CW, CU, P)
 ♦Robatel Technologies LLC, Roanoke, VA (A, BM, BR, BL, CM, CL, GN, IV, TN)
 RSO, Inc./Radiation Service Organization, Laurel, MD (BL, LL)
 Transco Products Inc., Chicago, IL (PW, WP)
 ♦Wagstaff Applied Technologies, Spokane, WA (BL, CM, CL, CW, CR, CU, IV, PW)
 Worthington Industries, Columbus, OH (LL)

77900 Shoring—also see Scaffolding

Excel Modular Scaffold and Leasing Corp., Weymouth, MA

78700 Sleeves, Wall (Pipe)

♦Joseph Oat Corp., Camden, NJ
 Rich Industries Inc., New Philadelphia, OH
 ♦Vigor (formerly Oregon Iron Works), Clackamas, OR

79360 Solid Waste Reduction Equipment & Tools, Radioactive

C Containment
 CR Control Rod Crushers, Reducers
 NW Neutron Window Reducers
 P Packaging
 SB Stellite Ball Punches
 U Underwater Reduction Tools
 VL Velocity Limiter Shears

AECOM, Aiken, SC (C, P)
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (U)
 ♦American DND Inc., Grand Island, NY (C, P)
 BIG Entsorgungstechnologien GmbH, Bad Toelz, Germany (CR, P)
 ♦EnergySolutions LLC, Salt Lake City, UT (U, VL)
 Getinge-La Calhene, (Sub. of Getinge Group), Vendome, France (C, P)
 ♦Holtec International, Camden, NJ (U)
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (U)
 James Fisher Technologies, Loveland, CO (U)
 KUKA Systems UK Ltd, West Midlands, United Kingdom (P)
 ♦Major Tool & Machine, Inc., Indianapolis, IN (C)
 M2 Polymer Technologies, Inc., West Dundee, IL (P)
 Orano, Charlotte, NC (C)
 ♦PacTec, Inc., Clinton, LA (C, P)
 PaR Systems, LLC, Shoreview, MN (U)
 Plant Decommissioning, Lake Villa, IL (U)
 Radiation Protection Systems, Inc., Groton, CT (C)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (C, U)
 Veolia Nuclear Solutions, (Aloron Nuclear Services, Kurion), Wampum, PA (C, P)
 ♦Wagstaff Applied Technologies, Spokane, WA (C, CR)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (CR, U)
 WMG, Inc., Peekskill, NY (P)

79370 Sorbents

ES Environmental Spill
 LR Liquid Radwaste

Alphasource, Inc., Philadelphia, PA (ES, LR)
 AVANTech, Inc., Columbia, SC (LR)
 Frham Safety Products, Inc., Nashville, TN (ES)
 JRM Chemical Inc., Cleveland, OH (ES, LR)
 Kinectrics Inc., Toronto, Ontario, Canada (ES)
 METOIL, Praha, Czech Republic (LR)
 M2 Polymer Technologies, Inc., West Dundee, IL (ES, LR)
 Nochar, Inc., Indianapolis, IN (LR)
 NUCON International, Inc., Columbus, OH (LR)
 Philotechnics, Ltd., Oak Ridge, TN (ES, LR)
 RSO, Inc./Radiation Service Organization, Laurel, MD (ES)
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (ES, LR)

79700 Sources, Radioactive—also see Radioisotopes; Testing Services

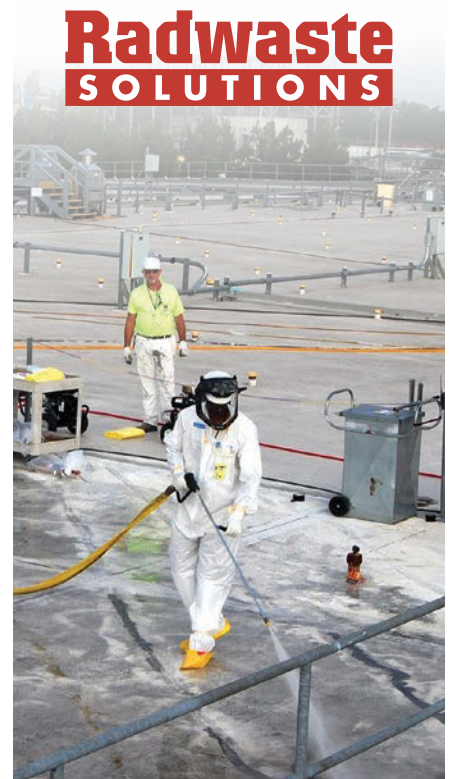
CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN
 General Plastics MFG. Co., Tacoma, WA

81680 Storage Services

E Equipment
 SF Spent Fuel

Enercon Services, Inc., Kennesaw, GA (SF)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (E)
 ♦Petersen Inc., Ogden, UT (E)
 Promotion Nuclear, Oakville, Canada (E)
 PTP Spent Fuel Services, LLC, Grand Island, NY (E, SF)
 Sargent & Lundy LLC, Chicago, IL (SF)
 Tyne Engineering Inc., Burlington, Ontario, Canada (E)
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (E)
 Veolia Nuclear Solutions, (Aloron Nuclear Services, Kurion), Wampum, PA (E)

♦ Denotes Advertiser



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81710 Storage Systems, Spent-Fuel

81710 **Storage Systems, Spent-Fuel**—also
see *Containers; Racks*

D Dry
W Wet

◆ **Holtec International, Camden, NJ (D, W)**

- Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (D, W)
- ◆ Major Tool & Machine, Inc., Indianapolis, IN (D, W)
- ◆ NAC International Inc., Norcross, GA (D)
- ◆ PaR Systems, LLC, Shoreview, MN (W)
- ◆ Precision Custom Components, LLC, York, PA (D, W)
- ◆ PTP Spent Fuel Services, LLC, Grand Island, NY (D, W)
- ◆ Reef Industries, Inc., Houston, TX (D)
- ◆ Robatel Technologies LLC, Roanoke, VA (D)
- ◆ Sargent & Lundy LLC, Chicago, IL (D, W)
- ◆ SKODA JS a.s., Plzen, Czech Republic (D, W)
- ◆ SNC-Lavalin, Mississauga, Ontario, Canada (D)
- ◆ Vigor (formerly Oregon Iron Works), Clackamas, OR (D, W)
- ◆ Wagstaff Applied Technologies, Spokane, WA (D, W)
- ◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (W)

83110 **Tags & Labels (Warning, Inventory, etc.)**—also see *Health Phys*

- Coastal Network, Inc., Charlottesville, VA
- JSM Protective, Inc., Wilmington, NC
- ◆ Mohawk Safety, Manchester, CT
- ◆ RSO, Inc./Radiation Service Organization, Laurel, MD
- ◆ Williams Industrial Services Group, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), Tucker, GA

83120 **Tags, Valve**

- ◆ Mohawk Safety, Manchester, CT

83150 **Tanks, Storage**—also see
Diaphragms; Inspection Services

AL Aluminum

GF Glass Fiber
P Plastic
RC Rubber, Collapsible
S Steel
SS Steel, Stainless

- Aerofin, (Sub. of Ampco-Pittsburgh Corp.), Lynchburg, VA (S, SS)
- AVANTech, Inc., Columbia, SC (S, SS)
- AZZ Nuclear Engineered Solutions, Fort Worth, TX (S, SS)
- Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (S, SS)
- ◆ Container Technologies Industries, LLC, Helenwood, TN (S)
- Corrosion Control Services, Inc., (CCSI Engineered Diaphragm Div.), Davenport, IA (RC)
- Energy Steel, Lapeer, MI (AL)
- Fuel Tank Maintenance Co., LLC, Cookeville, TN (S, SS)
- ◆ Holtec International, Camden, NJ (S, SS)
- ◆ Joseph Oat Corp., Camden, NJ (S, SS)
- ◆ Major Tool & Machine, Inc., Indianapolis, IN (AL, S, SS)
- Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil (S, SS)
- ◆ PacTec, Inc., Clinton, LA (P, RC)
- ◆ Petersen Inc., Ogden, UT (AL)
- ◆ Precision Custom Components, LLC, York, PA (S, SS)
- ◆ Promatom Nuclear, Oakville, Canada (AL, S, SS)
- ◆ Robatel Technologies LLC, Roanoke, VA (SS)
- ◆ SSM Industries, Inc., Pittsburgh, PA (AL, S, SS)
- ◆ Vigor (formerly Oregon Iron Works), Clackamas, OR (S, SS)
- ◆ Wagstaff Applied Technologies, Spokane, WA (AL, S, SS)
- ◆ Worthington Industries, Columbus, OH (AL, S, SS)

83210 **Tape**

C Cloth, Nuclear
E Electrical Splicing Tape
F Foam

◆ Denotes Advertiser

MS Moisture-Sensitive
RS Reinforced Strapping, Nuclear
WL Warning, Luminescent

- Coastal Network, Inc., Charlottesville, VA (C, WL)
- ◆ Frham Safety Products, Inc., Nashville, TN (C, MS, RS, WL)
- General Plastics MFG. Co., Tacoma, WA (F)
- JSM Protective, Inc., Wilmington, NC (C, MS, RS, WL)
- ◆ Lancs Industries, Kirkland, WA (C, MS, RS, WL)
- ◆ Reef Industries, Inc., Houston, TX (WL)
- ◆ Rich Industries Inc., New Philadelphia, OH (C, RS)
- ◆ RSO, Inc./Radiation Service Organization, Laurel, MD (C, WL)
- ◆ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (C, WL)

83600 **Television Systems (CCTV)**—also
see *Security Systems; Video Services*

C Conventional
HT High-Temperature
M Miniature (Remote Viewing)
PI Pipe Inspection
U Underwater, Color, High-Radiation
W Welding Arc Viewing (Color)

- AZZ Nuclear, Suwanee, GA (W)
- ◆ Inuktun Services Ltd., Nanaimo, BC, Canada (C, M, PI, U)
- ◆ Lights Camera Action, LLC, Gilbert, AZ (C, M, PI, U)
- ◆ Magnatech LLC, East Granby, CT (W)
- ◆ Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (C, HT, M, PI, U, W)
- ◆ Remote Ocean Systems (ROS), San Diego, CA (M, PI, U)
- ◆ Rolls-Royce, Williamson, NY (C, HT, M, PI, U)
- ◆ Sensor Networks, Inc., (formerly Prevision Systems LLC), Boalsburg, PA (C, HT, M, PI, U)
- ◆ Sidus Solutions LLC, San Diego, CA (C, HT, M, PI, U)
- ◆ Thermo Scientific - CIDTEC Cameras & Imagers, (Part of Thermo Fisher Scientific), Liverpool, NY (C, M, PI, U, W)
- ◆ Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (U)



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84150 Test Equipment & Supplies—also see Health Physics Equip.; Nondestructive Testing

- A Automated
 - CS Capacitance Strain Gauging
 - CP Coating Porosity Detection
 - CT Coating Thickness Gauging
 - C Concrete Inspection
 - EC Eddy Current
 - EM Electric Motors
 - ES Electrical Systems & Components
 - E Environmental
 - FO Fiber Optic
 - HE HEPA Filter
 - II Infrared Imaging
 - IC Instrumentation & Control
 - LR Leak-Rate, Local
 - M Manual
 - MT Materials
 - ND Nondestructive
 - PH pH Measurement
 - P Portable
 - PA Power Apparatus
 - RT Resistance Temperature Detectors
 - S Stationary
 - SC Structures/Components
 - U Ultrasonic
 - UC Ultrasonic Couplant
 - VL Vacuum Leak Testers, Tube
 - V Valve
 - VM Valve, Motor-Operated, Diagnostic
 - VS Valve, Solenoid Operated, Diagnostic
 - V Vibration
- Berkeley Nucleonics Corp., San Rafael, CA (E, IC)
 Elcometer Inc., Rochester Hills, MI (CP, CT, C, EC)
 GLSEQ, LLC, Huntsville, AL (IC, RT)
 InRoads International LLC, Monroeville, PA (V)
 Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (EC, ND, U)
 Inuktun Services Ltd., Nanaimo, BC, Canada (CT, C, EC, II, ND, U)
 ♦Mohawk Safety, Manchester, CT (HE)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (A, E, ND, P)
 NV5 Global, Richland, WA (C)
 PaR Systems, LLC, Shoreview, MN (A, ND, U)
 Rockwell Automation, Inc., Milwaukee, WI (A, EM, ES, E)
 Sensor Networks, Inc., (formerly Prevision Systems LLC), Boalsburg, PA (ND)
 Siemens Process Industries and Drives, (Industry Automation Div.), (Process Instrumentation & Analytics), Hauppauge, NY (IC, P, U)
 System One, Pittsburgh, PA (EC, II, IC, ND, U)
 Terahertz Technologies, Inc., Oriskany, NY (FO)
 Valcor Engineering Corp., (Valcor Nuclear)(Valcor), Springfield, NJ (V, VS)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (EC, II, MT, ND, PH, U)

84600 Testing Services—also see Analysis; Maintenance Serv.; Nondestructive Testing

- AI Alloy Identification (On-Site)
- C Coatings
- CD Corrosion Detection
- EM Electric Motors
- ES Electrical Systems & Components
- EQ Environmental Qualification
- FR Fire Resistance/Flammability
- FL Flow
- FM Fracture Mechanics
- I Infrared
- IC Instrumentation & Control
- LF Laminar Flow Facilities
- LD Leak Detection, Tube
- LN Leak, Nuclear Gauge
- LS Leak, Radioactive Sealed Source
- LR Leak-Rate, Integrated
- LL Leak-Rate, Local
- M Materials
- ND Nondestructive
- PH Photometric Testing
- PL Plastics/Polymers
- P Pumps
- QS Quality Services
- SP Sealed Sources (Pressure, Temperature)

- S Seismic
 - SI Siren Systems
 - ST Structures
 - TC Transport Containers
 - U Ultrasonic
 - V Vibration
 - WT Wall Thinning Detection, Tube
- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (AI, M, ND)
 Anamet Inc., Hayward, CA (C, I, M, PL)
 ARS International, LLC, Port Allen, LA (EQ, LS, TC)
 AVANTech, Inc., Columbia, SC (ES, LF, LR, LL, M, ND, P)
 BCP Engineers & Consultants, Gretna, LA (FL, IC, P)
 ♦BWX Technologies, Inc., Lynchburg, VA (C, EQ, FM, LD, LS, M, ND, SP, U)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (LN, LS)
 Diakont, San Diego, CA (CD, WT)
 Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (ES, M, ND, QS, SP, S, ST, V)
 Fuel Tank Maintenance Co., LLC, Cookeville, TN (C, CD, ND, U)
 General Plastics MFG. Co., Tacoma, WA (FR, PL)
 GLSEQ, LLC, Huntsville, AL (EQ, S)
 James Fisher Nuclear Ltd, Preston, United Kingdom (ND, U)
 Kinectrics Inc., Toronto, Ontario, Canada (C, CD, EM, ES, EQ, FL, FM, IC, LD, LN, M, ND, PL, P, QS, S, U, V, WT)
 Lucideon, Research Triangle Park, NC (C, CD, FM, M)
 PaR Systems, LLC, Shoreview, MN (I, ND, U)
 Project Assistance Corp. (PAC), Lafayette, CA (QS)
 Radiation Safety Assoc., Inc., Hebron, CT (LS)
 Rockwell Automation, Inc., Milwaukee, WI (FL, IC)
 Rolls-Royce, Williamson, NY (C, CD, IC, M, ND, ST, TC, U, V, WT)
 RSO, Inc./Radiation Service Organization, Laurel, MD (LS)
 Siemens Process Industries and Drives, (Industry Automation Div.), (Process Instrumentation & Analytics), Hauppauge, NY (FL, IC, LD, U)
 Southwest Research Institute, San Antonio, TX (C, CD, ES, EQ, FR, FM, M, ND, S, V, WT)
 System One, Pittsburgh, PA (CD, IC, M, ND, P, QS, U)
 Teledyne Brown Engineering, Inc., Huntsville, AL (LS)
 Tyne Engineering Inc., Burlington, Ontario, Canada (LS)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (C, CD, ND, QS, U)
 University of Bristol, (Interface Analysis Centre), Bristol, United Kingdom (C, CD, FM, M, ND)
 Veolia Nuclear Solutions, (Alaron Nuclear Services, Kurion), Wampum, PA (C, EM, P, V)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (CD, LD, LN, M, P, S, U, V, WT)

86130 Tools

- C Custom-Made
 - D Drop Prevention
 - E Electric
 - F FME
 - F FOSAR Retrieval
 - H Hydraulic
 - P Pneumatic
 - VA Vacuum-Assisted
- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (C)
 ♦Curtiss-Wright EST Group, Hatfield, PA (C)
 Diakont, San Diego, CA (C)
 Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (C)
 General Plastics MFG. Co., Tacoma, WA (C)
 InTomes Technical Services, Inc., Springville, NY (C)
 James Fisher Nuclear Ltd, Preston, United Kingdom (C)
 Lights Camera Action, LLC, Gilbert, AZ (E)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (C, P)
 PaR Systems, LLC, Shoreview, MN (C, E)
 ♦Petersen Inc., Ogden, UT (C)
 Plant Decommissioning, Lake Villa, IL (C, E, H, P)
 Promotion Nuclear, Oakville, Canada (C, F, F, H, P, VA)
 Sensor Networks, Inc., (formerly Prevision Systems LLC), Boalsburg, PA (C)

86250 Trailers, Spent-Fuel Transport

- Barnhart, Memphis, TN
 Perkins Specialized Transportation Contracting (Perkins STC), Northfield, MN

86260 Trailers, Transport

- Barnhart, Memphis, TN
 Perkins Specialized Transportation Contracting (Perkins STC), Northfield, MN
 sa TRANSRAD nv, Fleurus, Belgium
 ♦UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA

86300 Training—also see Consultants;

Health Physics Services; Training Centers; Training Materials

- AT Air Treatment
 - AC Auditing, Codes & Standards
 - AE Auditing, Environmental
 - CH Chemistry
 - C Communications
 - CP Computer Users/Computer Personnel
 - CM Construction Management Personnel
 - CS Crane & Rigging Safety
 - D Decommissioning
 - EP Emergency Planning & Response
 - EM Engineering Management
 - EE Engineers, Electrical
 - ME Engineers, Mechanical
 - ES Engineers, Structural
 - EL Environmental Laws & Regulation
 - EQ Equipment Qualification
 - FP Fire Protection
 - FD Fitness-for-Duty, Behavioral Observation
 - FC Fuel Cycle/Performance Analysis
 - FT Fuel Transport/Storage
 - HV HVAC Maintenance
 - I Instructors, Classroom & Simulator
 - LD Leadership Development
 - L Licensing
 - M Maintenance
 - MN Management
 - NT Nondestructive Testing
 - OE Organizational Effectiveness
 - OS OSHA Compliance
 - PC Process Control Statistical
 - PM Project Management
 - QA Quality Assurance/Quality Control
 - RM Radiation Management (ALARA)
 - RP Radiation Protection
 - RC Radiochemistry
 - RA Reliability Analysis
 - RS Respiratory Protection
 - RT Root Cause Analysis
 - SE Safety Evaluation
 - S Scaffolding
 - SP Security Personnel
 - SQ Seismic Qualification
 - SR Simulators, Radiation
 - TB Team Building
 - TE Technicians, Electrical
 - TI Technicians, Instrumentation and Control
 - TL Technicians, Laboratory
 - TM Technicians, Mechanical
 - TS Technicians, Security
 - WM Waste Management
 - WP Waste Packaging Transportation & Disposal
 - WC Water Chemistry
- AECOM, Aiken, SC (SE, WM)
 AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (EQ)
 American Crane & Equipment Corp., Douglassville, PA (CS)
 Applied Health Physics, LLC, Bethel Park, PA (AC, AE, EP, L, RM, RP, RT, SE, WM)
 Applied Science Professionals, (ASP-LLC), Salt Lake City, UT (RM, RP, RT)
 ♦Argonne National Laboratory, (Decommissioning Training), (EOF Div.), Argonne, IL (MN)
 AVANTech, Inc., Columbia, SC (TE, WM, WC)
 Banda Group International, LLC, Chandler, AZ (AC, AE, CM, EP, QA, RS, RT, TB)
 BCP Engineers & Consultants, Gretna, LA (CH, CM, EP, EM, EQ, I, M, NT, PM, QA, RM, RP, RC, TE, TI, TL, TM, WM)

Boston Government Services, LLC (BGS), Oak Ridge, TN (QA, RT, SE, SQ, WM, WP)
 Cabrera Services Inc., East Hartford, CT (D, EP, EM, OS, PM, QA, RM, RP, RC, WM, WP, WC)
 Canberra, part of Mirion Technologies, Meriden, CT (NT, QA, RM, RP, RC, WM)
 Chase Environmental Group, Inc., Troy, IL (RP)
 Chesapeake Nuclear Services, Inc., Annapolis, MD (RP, RC)
 CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (RM, RP)
 Curtiss-Wright Energetech, Brea, CA (EQ, I, M, QA, TM)
 CYCLIFE, (Brand of EDF Group), Paris la Défense, France (D, WM, WP)
 DCS Systems, Inc., Simsbury, CT (AC, FC, QA, RT)
 The Delphi Groupe, Inc., Austin, TX (AC, AE, CH, EP, EL, FP, PM, QA, RM, RP, RC, RS, TL, WM, WC)
 Donley Technology, Colonial Beach, VA (AE, EL, OS)
 DW James Consulting, North Oaks, MN (WM, WP)
 Enercon Services, Inc., Kennesaw, GA (CH, EP, EM, EE, ME, ES, EL, EQ, FP, I, L, M, MN, OS, RM, RP, RC, RA, RS, RT, TI, TM)
 ♦EnergySolutions LLC, Salt Lake City, UT (FT)
 ♦Energy, Technology and Environmental Business Association, Oak Ridge, TN (WM)
 Excel Modular Scaffold and Leasing Corp., Weymouth, MA (S)
 Fortum Power & Heat Oy, Nuclear Services, Espoo, Finland, Finland (I)
 Foss Therapy Services, Inc., North Hollywood, CA (M, TE, TI, TM)
 The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC (RC)
 GLSEQ, LLC, Huntsville, AL (EQ, SQ)
 Thomas Gray & Associates, Inc., (Owner of Environmental Mgmt. & Controls, Inc.), Orange, CA (WM)
 GSE Systems Inc., Sykesville, MD (I)
 Stan A. Huber Consultants, Inc., New Lenox, IL (QA, RM, RP)
 InTomes Technical Services, Inc., Springville, NY (EE, ME, ES, FP, PM, QA)
 Kinectrics Inc., Toronto, Ontario, Canada (D, EE, ME, EQ, L, NT, RM, RP, RC, RT, SQ, WM)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CS, FT, I)
 Lancs Industries, Kirkland, WA (RM, RP, WM)
 L3 MAPPs, (Power Systems and Simulation), Montreal, Quebec, Canada (I)
 A. C. Macris, Consultants, Mystic, CT (EM, I, TB)
 METOIL, Praha, Czech Republic (RC)
 MPR Associates, Inc., Alexandria, VA (EM, ME, FP, RT, SQ)
 ♦NAC International Inc., Norcross, GA (FC, FT)
 National Inspection & Consultants, Fort Myers, FL (NT)
 Neptune and Company, Inc., Lakewood, CO (QA, RM)
 North Wind Group, Idaho Falls, ID (AE, SE, SQ, TE, TI, TL, TM, WM)
 Nuclear Plant Journal, Downers Grove, IL (RP)
 Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil (NT, TM)
 NUCON International, Inc., Columbus, OH (AT, NT)
 NV5 Global, Richland, WA (D, EP, OS, RM, RP, WP)
 NWT Corp., San Jose, CA (CH, RC, TL, WC)
 ORTEC, Oak Ridge, TN (RP, RC)
 Polestar Technical Services, Richland, WA (D)
 Project Assistance Corp. (PAC), Lafayette, CA (AC, PM, QA, RT, SE, SQ)
 Qal-Tek Associates, LLC, Idaho Falls, ID (RP, WM)
 Radiation Protection Systems, Inc., Groton, CT (RM, RP)
 Radiation Safety Assoc., Inc., Hebron, CT (AC, L, RM, RP, RS)
 ♦Radiation Safety & Control Services, Inc., Stratham, NH (AE, D, RM, RP, TI)
 Radiological Solutions, Inc., Rockdale, IL (CH, RC, WC)
 RSO, Inc./Radiation Service Organization, Laurel, MD (EP, RM, RP, WM)
 Sargent & Lundy LLC, Chicago, IL (AT, AC, AE, CH, CM, EP, EM, EE, ME, ES, EL, EQ, FP, HV, L, M, MN, NT, PM, QA, RM, RP, RA, RT, SE, SQ, TB, WM, WC)
 Shipsrock Consulting, LLC, Westport, MA (AT, CH, C, D, LD, RC, TB, WC)
 Siemens Power Generation Services, Orlando, FL (RP)
 SNC-Lavalin, Mississauga, Ontario, Canada (L)

Howard L. Sobel, P.E., Oceanside, NY (EM, FC, QA, WM)
 Sonic Systems International, Inc., Houston, TX (AC, NT, QA, TM)
 Southwest Research Institute, San Antonio, TX (EL, FP, RP, RA)
 System One, Pittsburgh, PA (I, NT, QA)
 Teletrix, Pittsburgh, PA (SR)
 TFE, Inc., North Augusta, SC (AC, D, EE, ME, ES, FP, I, LD, L, M, MN, OE, OS, QA, RM, RP, RT, SE, WM, WP)
 TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (D)
 Transco Products Inc., Chicago, IL (SR)
 Tri Tool Inc., Rancho Cordova, CA (EQ, TM)
 Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (QA)
 VTT Technical Research Centre of Finland, VTT, Finland (SE)
 ♦Westinghouse Electric Co. LLC, Cranberry Township, PA (CH, EP, EQ, I, M, RM, RP, RA, RT, SE, SQ, TE, TI, TL, TM, WM, WC)
 WMG, Inc., Peekskill, NY (AC, CP, EL, WM)
 ♦WM Symposia, Tempe, AZ (WM)
 WYNSOR, Ogden, UT (WM)
 Zetec, Inc., Snoqualmie, WA (NT)

86400 Training Centers, Facilities—also see Training; Training Materials

GSE Systems Inc., Sykesville, MD
 Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil
 ♦Radiation Safety & Control Services, Inc., Stratham, NH
 System One, Pittsburgh, PA
 Technical Management Services, Inc., New Hartford, CT

86500 Training Materials, Courseware—also see Mockup Design; Training; Training Centers

AV Audio-Visual Aids
 CA Computer-Aided
 DV Digital Video, Interactive
 M Models, Mockups
 T Textual
 Curtiss-Wright Energetech, Brea, CA (M)
 Donley Technology, Colonial Beach, VA (CA)
 Focus Learning Corp., San Luis Obispo, CA (CA, T)
 GSE Systems Inc., Sykesville, MD (AV, CA, M, T)
 International Atomic Energy Agency, Vienna, Austria (T)
 L3 MAPPs, (Power Systems and Simulation), Montreal, Quebec, Canada (CA)
 A. C. Macris, Consultants, Mystic, CT (CA, M, T)
 NUVIA Dynamics Inc., (formerly PICO Envirotec Inc.), Concord (Toronto), Ontario, Canada (AV, M, T)
 Sargent & Lundy LLC, Chicago, IL (CA, DV, M, T)
 Technical Management Services, Inc., New Hartford, CT (T)
 Transco Products Inc., Chicago, IL (DV, M)
 WD Associates, Inc., Whiteford, MD (T)
 WMG, Inc., Peekskill, NY (CA, T)

86900 Translation Services

RussTech Language Services, Inc., Tallahassee, FL

87000 Transport Services

C Consulting/Transport Management
 DC Dry Cask
 HC Heavy Components
 IR Intermodal/Rail
 L Liners
 HL Radioactive, High-Level
 LL Radioactive, Low-Level
 TP Transload Facility, Permanent
 TT Transload Facility, Temporary

AeroGo, Inc., Seattle, WA (HC, TP, TT)
 Austin Master Services, LLC, Martins Ferry, PA (IR, LL, TP)
 AVANTech, Inc., Columbia, SC (L)

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- March 11-14, 2019, Las Vegas, NV

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Information:

Lawrence E. Boing
 Facility Decommissioning
 TC Director
 Phone 630-252-6729
 Fax 630-252-7577
 email: lboing@anl.gov

Argonne National Laboratory
 Nuclear Engineering Division –
 Special Projects
 9700 South Cass Avenue
 Argonne, IL 60439

See website for latest information -
www.dd.anl.gov/ddtraining/

87000 Transport Services

- Barnhart, Memphis, TN (HC)
 Campoverde srl, Milano, Italy (C)
 Chase Environmental Group, Inc., Troy, IL (C, LL)
 Dufrane Nuclear Inc., Winsted, CT (C, IR)
 ♦EnergySolutions LLC, Salt Lake City, UT (C, HC, IR, HL, LL)
 Hilman Rollers, Marlboro, NJ (HC)
 ♦I.C.E. Service Group, Inc., Ambridge, PA (C, DC, HC, IR, L, HL, LL, TP, TT)
 Kinectrics Inc., Toronto, Ontario, Canada (C, L, LL)
 Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (DC)
 ♦NAC International Inc., Norcross, GA (C, DC, HL)
 North Wind Group, Idaho Falls, ID (C, IR)
 Orano, Charlotte, NC (DC, IR, L, HL, LL, TP, TT)
 Philotechnics, Ltd., Oak Ridge, TN (C, LL)
 ♦Precision Custom Components, LLC, York, PA (HC)
 RSO, Inc./Radiation Service Organization, Laurel, MD (LL, TP)
 ♦SECUR, Sewickley, PA (C, IR, L, HL, LL, TP, TT)
 Studsvik, Inc., Atlanta, GA (HC, IR, LL)

- TFE, Inc., North Augusta, SC (C, HL, LL)
 sa TRANSRAD nv, Fleurus, Belgium (C, IR, HL, LL)
 US Ecology, Inc., Livonia, MI (IR, LL, TP)
 Waste Control Specialists LLC, Andrews, TX (DC, LL)
 Whiting Corp., Monee, IL (HC)

87380 Tritium Handling Equipment

- Kinectrics Inc., Toronto, Ontario, Canada
 ♦Major Tool & Machine, Inc., Indianapolis, IN
 NUCON International, Inc., Columbus, OH
 Tyne Engineering Inc., Burlington, Ontario, Canada
 Veolia Nuclear Solutions, Westminster, CO
 ♦Wagstaff Applied Technologies, Spokane, WA

87395 Tritium Recycle & Extraction Equipment

- ♦Major Tool & Machine, Inc., Indianapolis, IN
 Tyne Engineering Inc., Burlington, Ontario, Canada
 Veolia Nuclear Solutions, Westminster, CO

87400 Tritium Removal Equipment

- NUCON International, Inc., Columbus, OH
 Orano, Charlotte, NC
 SNC-Lavalin, Mississauga, Ontario, Canada
 Tyne Engineering Inc., Burlington, Ontario, Canada
 Veolia Nuclear Solutions, Westminster, CO

90100 Vacuum Equipment & Accessories—also see *Cleaning Equip.*;

Filters

- Coastal Network, Inc., Charlottesville, VA
 E. H. Wachs, Lincolnshire, IL
 HI-Q Environmental Products Co., Inc., San Diego, CA
 Master-Lee Engineered Products Inc., Latrobe, PA
 Pave Technology Co., Dayton, OH
 Schutte and Koerting, Trevoze, PA
 The Spencer Turbine Co., Windsor, CT
 Underwater Construction Corp., Essex, CT

90250 Valve Operators (Actuators)

- A Air
 ES Electric Solenoid
 EH Electrohydraulic
 EX Explosive-Activated
 H Hydraulic
 MN Manual
 M Motor

- AZZ Nuclear Engineered Solutions, Fort Worth, TX (A, ES, H, M)
 Conval, Inc., Enfield, CT (A, ES, EH, H, MN, M)
 E. H. Wachs, Lincolnshire, IL (A, H, M)
 PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (A, ES, MN)
 ♦SSM Industries, Inc., Pittsburgh, PA (A, ES, EH, MN, M)
 Valcor Engineering Corp., (Valcor Nuclear)(Valcor), Springfield, NJ (A, ES, MN)

90330 Valve Stem Gland Packing Systems, Live-Loaded

- Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL

90600 Valves, Check, Stop Check

- AC Air-Cylinder-Assisted
 B Ball
 CC Controlled-Closure
 NS Non-Slam
 PO Piston-Operated
 SL Spring-Loaded
 ST Swing Type
 SA Swing Type, Alloy
 TD Tilting Disk

- AZZ Nuclear Engineered Solutions, Fort Worth, TX (B, ST, SA, TD)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (B, PO, SL, ST, SA)
 Conval, Inc., Enfield, CT (B, PO, SL)
 Flowsolve Flow Control Div., (Div. of Flowsolve Corp.), Raleigh, NC (AC, B, PO, ST, TD)
 PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (B)
 Schutte and Koerting, Trevoze, PA (ST)
 Valcor Engineering Corp., (Valcor Nuclear)(Valcor), Springfield, NJ (PO, SL)

90800 Valves, Control

- F Flow
 FA Flow, Acoustic Emission
 I Intelligent
 P Pressure
 T Temperature
 V Vacuum

- AZZ Nuclear Engineered Solutions, Fort Worth, TX (F)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (F, P)

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Flowserve Flow Control Div., (Div. of Flowserve Corp.), Raleigh, NC (F, P)
 PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (F)
 Schutte and Koerting, Treviso, PA (F)
 Valcor Engineering Corp., (Valcor Nuclear)(Valcor), Springfield, NJ (F, P)

91000 Valves, Gate

- B Bellows Seal
- JA Jacketed Alloy
- K Knife
- PS Parallel Slide Type
- W Wedge Type

AZZ Nuclear Engineered Solutions, Fort Worth, TX (PS, W)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (PS, W)
 Conval, Inc., Enfield, CT (B, W)
 Flowserve Flow Control Div., (Div. of Flowserve Corp.), Raleigh, NC (PS, W)
 Valcor Engineering Corp., (Valcor Nuclear)(Valcor), Springfield, NJ (B)

91260 Valves, Other

- BW Backwater
- B Ball
- BU Burner
- BF Butterfly
- D Diaphragm
- EF Excess-Flow
- FS Fail-Safe
- FI Feedwater Isolation
- FL Filter, In-Line
- FD Fire Deluge
- FM Flow Monitoring/Alarm System
- FB Flush Bottom Tank
- G Globe
- GB Globe, Bellows
- IM Instrumentation Manifold
- IS Isolation Shutoff
- LB Line-Blind

- MS Main Steam Isolation
- M Miniature
- N Needle
- P Packless
- PL Plastic-Lined
- PG Plug
- PR Pressure Regulating
- PU Pump Recirculation
- Q Quick-Opening & -Closing
- R Ram-Type
- RS Relief, Safety
- SL Slurry
- SO Solenoid
- V Vacuum

AVANTech, Inc., Columbia, SC (BW, B, BF, D, SO, V)
 AZZ Nuclear Engineered Solutions, Fort Worth, TX (B, BF, D, FI, G, IM, M, N, PR)
 Camfil USA, Washington, NC (FL)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (B, BF, G, PG, PR, SO)
 Conval, Inc., Enfield, CT (B, FI, FL, G, GB, IS, MS, N, P)
 Curtiss-Wright Energetech, Brea, CA (BF, D, EF, FS, FI, G, GB, IM, IS, MS, N, P, PG, PU, Q, RS, SL, SO, V)
 Dragon Valves, Inc., Norwalk, CA (EF, N, P)
 Dubose National Energy Services, Clinton, NC (B, G)
 Fire & Pump Service Group, Rancho Dominguez, CA (FD)
 Flowserve Flow Control Div., (Div. of Flowserve Corp.), Raleigh, NC (B, BF, FI, G, IS, MS)
 InRoads International LLC, Monroeville, PA (BW, B, BU, BF, D, EF, FS, FI, FL, FD, FM, FB, G, GB, IM, IS, LB, MS, M, N, P, PL, PG, PR, PU, Q, R, RS, SL, SO, V)
 PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (D, FS, FB, IM, IS)
 Schutte and Koerting, Treviso, PA (G, PG, PR, Q)
 Valcor Engineering Corp., (Valcor Nuclear)(Valcor), Springfield, NJ (FS, G, GB, IM, IS, N, P, PR, Q, SO)

91380 Valves, Pressure Seal

- BL Breech Lock
- G Gate

- GL Globe
- PC Piston Check
- SC Swing Check
- TD Tilting Disk
- W Wafer Check Valves

Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (G, GL, PC, SC)
 Conval, Inc., Enfield, CT (G, GL, PC)
 Curtiss-Wright Energetech, Brea, CA (G, GL, PC, TD, W)
 Flowserve Flow Control Div., (Div. of Flowserve Corp.), Raleigh, NC (G, GL, PC, SC, TD)
 Schutte and Koerting, Treviso, PA (G, GL, SC)

92300 Vessels—also see Respiratory Protection Equipment

- F Flasks, Water, Valve-Operating
- P Pressure
- PR Pressure, Reactor

Aerofin, (Sub. of Ampco-Pittsburgh Corp.), Lynchburg, VA (P)
 AVANTech, Inc., Columbia, SC (F, P)
 ♦BW Technologies, Inc., Lynchburg, VA (P, PR)
 Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (P, PR)
 Dubose National Energy Services, Clinton, NC (P)
 Ellis & Watts Global Industries, Inc., Batavia, OH (P)
 Fuel Tank Maintenance Co., LLC, Cookeville, TN (P)
 ♦Holtec International, Camden, NJ (F, P, PR)
 InRoads International LLC, Monroeville, PA (P)
 ♦Joseph Oat Corp., Camden, NJ (P, PR)
 ♦Major Tool & Machine, Inc., Indianapolis, IN (P, PR)
 Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil (P, PR)
 ♦Petersen Inc., Ogden, UT (P)
 ♦Precision Custom Components, LLC, York, PA (F, P, PR)
 Promation Nuclear, Oakville, Canada (F, P, PR)
 Rolls-Royce, Williamson, NY (P)
 SKODA JS a.s., Plzen, Czech Republic (P, PR)
 Teledyne Brown Engineering, Inc., Huntsville, AL (P)

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- ◆ Vigor (formerly Oregon Iron Works), Clackamas, OR (P, PR)
- ◆ Wagstaff Applied Technologies, Spokane, WA (F, P, PR)
- ◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (P, PR)
- Worthington Industries, Columbus, OH (P, PR)

92800 Video Services

- I Inspection
- PP Plant Photodocumentation
- R Remote
- U Underwater

- Lenox Instrument Co., Inc., Trevese, PA (R, U)
- Master-Lee Engineered Products Inc., Latrobe, PA (U)
- Rolls-Royce, Williamson, NY (R, U)
- Sidus Solutions LLC, San Diego, CA (I, R, U)
- Sonic Systems International, Inc., Houston, TX (I, R, U)
- Symphotic Tii Corp., Camarillo, CA (R, U)
- ◆ Thermo Scientific - CIDTEC Cameras & Imagers, (Part of Thermo Fisher Scientific), Liverpool, NY (I, R, U)
- Underwater Construction Corp., Essex, CT (R, U)
- Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (I, PP, R, U)

93040 Waste Management Services—also see Analysis; Health Physics Services

- DM Demineralization
- DW Dewatering, Nonradioactive
- DR Dewatering, Radioactive
- DL Disposal (Low-Level)
- ER Environmental Remediation
- FP Fuel Pool Services
- I Incineration
- IL Intermediate-Level
- LC Lead Contamination
- LW Liquid Waste (High Level & Low Level)
- MW Mixed Waste Analysis & Processing
- MD Mixed Waste Disposal/Treatment
- MS Mixed Waste Solvent Disposal
- MO Molten Salt Oxidizers
- M Monitoring
- NR Non-Radioactive
- OF Off-Site (Fixed Base)
- ON On-Site
- P Packaging/Repackaging
- LL Radioactive, Low-Level
- HL Radioactive, High-Level
- RD Resin Destruction
- RP Resin Pyrolysis
- RR Resin Regeneration
- RC Resource Recovery
- SM Scrap Melting
- SS Sealed Source Decommissioning
- S Solidification
- SR Survey & Release
- T Transuranic (TRU)
- UT Uranium Mill Tailings Reclamation
- V Vitrification
- VR Volume Reduction
- WC Waste Characterization
- WS Waste Sampling
- WD Wood Decontamination

- AECOM, Aiken, SC (DM, DW, DR, DL, ER, FP, IL, LC, MW, MD, MS, M, NR, ON, P, LL, HL, SS, S, T, V, VR, WC, WS)
- AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (MW, M, WC)
- ◆ American DND Inc., Grand Island, NY (DL, ER, FP, LC, NR, P, SM, VR)
- American Integrated Services, Inc., Anaheim, CA (ER, LC, NR)
- Applied Health Physics, LLC, Bethel Park, PA (DL, ER, M, NR, OF, ON, P, HL, RC, SS, S, WC, WD)
- ARS International, LLC, Port Allen, LA (ER, MD, P, LL, HL, T, VR, WC, WS)
- Attenuation Environmental Co., Seattle, WA (ER, MW, WC)
- Augean plc, Wetherby, United Kingdom (DL, I, NR, LL)
- Austin Master Services, LLC, Martins Ferry, PA (DL, ER, MD, OF, P, LL, S, SR, WC, WS)
- AVANTech, Inc., Columbia, SC (DM, DW, DR, DL, ER, FP, LW, MW, MD, OF, LL, HL, RD, RP, RR, S, VR)
- Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (IL, P, LL, HL, S, VR)

- Boston Government Services, LLC (BGS), Oak Ridge, TN (DL, ER, MW, MD, M, NR, P, LL, HL, T, UT, WC, WS)
- Bubble Technology Industries Inc., Chalk River, Ontario, Canada (WC)
- ◆ **BWX Technologies, Inc., Lynchburg, VA (MW, MD, P, LL, HL)**

See advertisement on pages 10-11

- Cabrera Services Inc., East Hartford, CT (DL, ER, MW, MD, M, OF, ON, P, LL, HL, SR, T, UT, V, WC, WS, WD)
- CAEN SyS srl, Viareggio, LU, Italy (M, WC)
- Campoverde srl, Milano, Italy (ER, I, MS, M, RD, RP, T)
- Canberra, part of Mirion Technologies, Meriden, CT (HL)
- Ceradyne, Inc., a 3M company, Quapaw, OK (MW, LL, HL, T)
- Chase Environmental Group, Inc., Troy, IL (DL, ER, M, P, LL, SS, SR, VR, WC, WS, WD)
- Chesapeake Nuclear Services, Inc., Annapolis, MD (SR, WC)
- CHP Consultants/CHP Dosimetry/Counts.Pro, Oak Ridge, TN (M, LL, HL)
- CS-2 Inc., Grand Island, NY (DL, NR, SM, WC)
- Curie Environmental Services, Albuquerque, NM (DL, LC, MW, MD, MS, NR, OF, ON, P, LL, RC, SS, SR, WC, WS)
- ◆ Curtiss-Wright EST Group, Hatfield, PA (WS)
- CYCLIFE, (Brand of EDF Group), Paris la Défense, France (I, LW, MW, MD, OF, ON, P, LL, RD, SM, VR, WC, WS)
- The Delphi Groupe, Inc., Austin, TX (I, IL, M, NR, ON, P, HL, S, VR)
- DW James Consulting, North Oaks, MN (WC)
- Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (ER, FP)
- Enercon Services, Inc., Kennesaw, GA (DW, DR, DL, ER, M, NR, ON, P, LL, SR, WC)
- ◆ EnergySolutions LLC, Salt Lake City, UT (DW, DR, DL, ER, FP, I, LC, MW, MD, MS, P, LL, HL, RC, SM, SS, S, SR, T, V, VR, WC)
- ◆ Energy, Technology and Environmental Business Association, Oak Ridge, TN (ER, WC)
- Environmental Alternatives, Inc., Swanzey, NH (DR, ER, S, SR, VR, WC, WD)
- ExchangeMonitor Publications & Forums, (RadWaste Monitor, RadWaste Summit, Weapons Complex Monitor, Decommissioning Strategy Forum), Rockville, MD (LL, HL)
- Fortum Power & Heat Oy, Nuclear Services, Espoo, Finland, Finland (DL, IL, HL, VR)
- Foss Therapy Services, Inc., North Hollywood, CA (DL, ON, P, LL, HL)
- Fuel Tank Maintenance Co., LLC, Cookeville, TN (DM, DW, ER, LC, NR)
- The GEL Group, Inc., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), Charleston, SC (ER, M, WC)
- Thomas Gray & Associates, Inc., (Owner of Environmental Mgmt. & Controls, Inc.), Orange, CA (DL, MS, NR, P, HL, SS, S, VR)
- ◆ Holtec International, Camden, NJ (DL, ER, FP, ON, P, VR)
- Hoover Container Solutions, (Formerly Tech Oil Products Inc.), New Iberia, LA (VR)
- Stan A. Huber Consultants, Inc., New Lenox, IL (M)
- ◆ I.C.E. Service Group, Inc., Ambridge, PA (DL, ER, I, IL, LC, MW, MD, NR, OF, ON, P, LL, S, UT, VR, WC, WS, WD)
- InRoads International LLC, Monroeville, PA (WC)
- InTomes Technical Services, Inc., Springville, NY (FP)
- James Fisher Technologies, Loveland, CO (MW)
- Kinectrics Inc., Toronto, Ontario, Canada (ER, IL, MW, MD, M, OF, ON, P, LL, HL, WC, WS)
- KUKA Systems UK Ltd, West Midlands, United Kingdom (MW, P, LL, VR, WC)
- Lancs Industries, Kirkland, WA (T)
- Lucideon, Research Triangle Park, NC (LL, S)
- Mayco Industries, Birmingham, AL (LC)
- National Nuclear Laboratory (UK), Warrington, United Kingdom (ER, MW, MD, MS, LL, HL)
- Navarro Research and Engineering, Inc., Oak Ridge, TN (DW, DR, DL, ER, IL, LC, LW, MD, M, NR, P, LL, HL, SR, T, UT, VR, WC, WS)
- Neptune and Company, Inc., Lakewood, CO (M, NR, LL, HL, T)
- New Millennium Nuclear Technologies International, Lakewood, CO (ER, WC, WS)

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- North Wind Group, Idaho Falls, ID (DW, DR, DL, ER, LW, MD, M, NR, OF, ON, LL, HL, S, SR, T, UT, V, VR, WC, WS)
- Off-Site Source Recovery Program, Los Alamos, NM (SS)
- Orano, Charlotte, NC (DR, DL, ER, FP, LW, P, LL, HL, T, V, VR, WC, WS)
- Pace National Center for Testing & Innovation, Mt. Juliet, TN (LL, HL)
- ◆ PacTec, Inc., Clinton, LA (P)
- Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (MW)
- Perma-Fix Environmental Services, Inc., Oak Ridge, TN (DL, ER, I, IL, LC, MW, MD, MS, M, OF, ON, P, LL, RD, S, SR, T, VR, WC, WS)
- Perma-Fix Environmental Services Inc., (Perma-Fix Northwest Richland) (Wholly Owned Sub. of Perma-Fix Environmental Services, Inc.), Richland, WA (DR, DL, ER, I, IL, LC, MW, MD, MS, OF, P, LL, HL, RD, RC, S, SR, T, VR, WC, WS)
- Perma-Fix Environmental Services Inc., (Perma-Fix of Florida) (A Wholly Owned Sub. of Perma-Fix Environmental Services, Inc.), Gainesville, FL (I, MW, MD, MS, NR, OF, P, LL, RD, RC, S, SR, VR, WC, WS)
- Philotechnics, Ltd., Oak Ridge, TN (DR, DL, ER, OF, ON, P, LL, SR, WC)
- Project Assistance Corp. (PAC), Lafayette, CA (IL, MW, HL, VR, WC)
- PTP Spent Fuel Services, LLC, Grand Island, NY (FP, LL, HL)
- Qal-Tek Associates, LLC, Idaho Falls, ID (NR, HL, T, WC)
- Radiac Research Corp., Brooklyn, NY (DL, LW, MD, MS, ON, P, LL, HL)
- Radiation Protection Systems, Inc., Groton, CT (ER, IL, MW, LL, HL, SR, T, VR, WC)
- Radiation Safety Assoc., Inc., Hebron, CT (M, P, VR)
- ◆ Radiation Safety & Control Services, Inc., Stratham, NH (DL, MD, P, LL, HL, SR, WC)
- Radiological Solutions, Inc., Rockdale, IL (RR, WS)
- ◆ Reef Industries, Inc., Houston, TX (P, LL)
- RSO, Inc./Radiation Service Organization, Laurel, MD (DL, ER, MD, M, P, LL, SS, SR, VR, WS)
- Sargent & Lundy LLC, Chicago, IL (FP, IL, HL)
- ◆ SECUR, Sewickley, PA (DL, IL, MD, P, S, VR, WC)
- Sidus Solutions LLC, San Diego, CA (M)
- Sonic Systems International, Inc., Houston, TX (FP)
- Southwest Research Institute, San Antonio, TX (WC, WS)
- Stoller Newport News Nuclear (SN3), (A sub. of Huntington Ingalls Industries), Broomfield, CO (DL, ER, IL, MW, M, NR, P, LL, HL, SR, T, UT, WC)
- Studs vik, Inc., Atlanta, GA (DM, DW, DR, LW, MW, MD, MS, NR, OF, P, LL, RD, RP, S, SR, T, VR)
- Tecnubel-Transnubel-ECS, Dessel, Belgium (FP, MW, P)
- Teledyne Brown Engineering, Inc., Huntsville, AL (WC)
- TFE, Inc., North Augusta, SC (DL, ER, LC, MW, MD, NR, OF, ON, P, LL, HL, RC, SS, SR, T, WC, WS)
- Tranco Products Inc., Chicago, IL (M)
- Tyne Engineering Inc., Burlington, Ontario, Canada (M, LL, HL)
- Underwater Construction Corp., Essex, CT (FP)
- Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (DM, DR, FP, VR)
- ◆ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (DL, LC, OF, SR, VR, WD)
- University of Bristol, (Interface Analysis Centre), Bristol, United Kingdom (ER, WC)
- US Ecology, Inc., Livonia, MI (DW, DL, ER, LW, MW, MD, MS, NR, ON, P, LL, RC, S, WC)
- Veolia Nuclear Solutions, Westminster, CO (DM, DR, ER, MW, MD, OF, ON, HL, S, VR)
- Veolia Nuclear Solutions, (Aaron Nuclear Services, Kurion), Wampum, PA (DR, DL, FP, IL, M, OF, P, LL, HL, RC, SS, SR, V, VR, WC)
- Waste Control Specialists LLC, Andrews, TX (LC, MW, NR, P, LL, SS, S, T, UT)
- WaterWorks America, Inc., Independence, OH (DW, DR, ER, LW, S)
- ◆ Westinghouse Electric Co. LLC, Cranberry Township, PA (FP, IL, M, HL, RD, RR, VR, WC)
- WVG, Inc., Peekskill, NY (FP, IL, LL, WC)
- ◆ **Wood, (Environment & Infrastructure Solutions, Inc.), (Radiological Services & Engineering Group), Grand Junction, CO (ER, SR, UT, VR, WC)**
- WYNSOR, Ogden, UT (DL, ER, T, WC, WS)

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93900 **Welding Services**—also see *Diving*

Services

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C	Canister
DB	Diffusion Bonding
EM	Electromagnetic
EB	Electron Beam
EX	Explosive
LB	Laser Beam
P	Plasma
RM	Remote
S	Stud
UM	Underwater, Manual
UR	Underwater, Remote
WO	Weld Overlays
WC	Weldment Cleaning

AGI Engineering, Stockton, CA (A)

AVANTech, Inc., Columbia, SC (A, AT, C, UM)

AZZ Nuclear, Suwanee, GA (A, AT, C, P, RM, S, WO, WC)

Diakont, San Diego, CA (RM)

Dubose National Energy Services, Clinton, NC (C)

Fuel Tank Maintenance Co., LLC, Cookeville, TN (A, AT, C, DB, EM, EB, EX, P, S, WO, WC)

InRoads International LLC, Monroeville, PA (WO)

Inuktun InCommand Robotics, LLC, (Sub. of Inuktun Services Ltd.), Pasadena, TX (RM)

♦ Joseph Oat Corp., Camden, NJ (C)

♦ Major Tool & Machine, Inc., Indianapolis, IN (A, C, LB, P, S, WO)

Nuclebras Equipamentos Pesados S/A-Nuclep, Itaguaí - RJ, Brazil (A, C, P)

PaR Systems, LLC, Shoreview, MN (RM)

♦ Precision Custom Components, LLC, York, PA (A, P, RM, S, WO)

Tri Tool Inc., Rancho Cordova, CA (AT, WO)

Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (P, UM, UR)

♦ Wagstaff Applied Technologies, Spokane, WA (A, AT, S, WO, WC)

♦ Westinghouse Electric Co. LLC, Cranberry Township, PA (A, C, EM, P, RM, UM, UR, WO)

95750 **Windows, Radiation-Shielding—**

also see *Maintenance & Repair Services; Shielding Materials*

LG	Lead Glass
LP	Lead Plastics

Dufrane Nuclear Inc., Winsted, CT (LG, LP)

Hot Cell Services Corp., Kent, WA (LG)

MarShield, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (LG, LP)

Mayco Industries, Birmingham, AL (LG, LP)

Radiation Protection Products, Inc., Wayzata, MN (LG)

95850 **Wipers, Wiping Cloths—also see**

Health Physics Equipment & Supplies

C	Cotton
CR	Clean Room Laundered
D	Disposable, Soluble
I	Industrial
LF	Lint-Free
OT	Oil-Treated Dusting
T	Tacky

Alphasource, Inc., Philadelphia, PA (C, CR, D, I, LF, OT, T)

Coastal Network, Inc., Charlottesville, VA (C, OT, T)

Eastern Technologies, Inc., (OREX), Ashford, AL (C, D, I, LF, OT, T)

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Frham Safety Products, Inc., Nashville, TN (LF)
JSM Protective, Inc., Wilmington, NC (C, CR, I, LF, T)

♦ Mohawk Safety, Manchester, CT (I, LF)

♦ UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (C, CR, D, I, LF, T)

95900 **Wire—also see Cable**

IS	Insulated, Signal
SW	Insulated, Switchboard
IT	Insulated, Thermocouple
M	Magnet
MH	Magnet, High-Temperature
MS	Metal-Shielded
NM	Nickel, Monel & Nickel-Chromium
RF	Refractory
RS	Resistance
SP	Spring
SU	Superconducting
T	Thermocouple

Dubose National Energy Services, Clinton, NC (SP)
LEMO USA, Inc., (Sub. of LEMO SA), Rohnert Park, CA (MS, T)

Prysmian Group, (ULTROL® 60+), Willimantic, CT (IS, SW, IT)

RSCC Wire & Cable LLC, East Granby, CT (IS, SW, IT, MS, T)

96200 **Work Platforms**

C	Cask Servicing
M	Mobile
S	Stationary

Dubose National Energy Services, Clinton, NC (C, M, S)

Dufrane Nuclear Inc., Winsted, CT (C, M, S)

♦ Petersen Inc., Ogden, UT (S)

Plant Decommissioning, Lake Villa, IL (C, M, S)



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THOMAS GRAY & ASSOCIATES, INC., (Owner of Environmental Mgmt. & Controls, Inc.), 1205 W. Barkley Ave., Orange, CA 92868. Contact: Richard E. Gallego (714/997 8090, Fax: 714/997 3561, E-mail: rgallego@tgainc.com). Web site: www.tgainc.com
Code Nos. 14000, 14300, 86300, 93040

GSE SYSTEMS INC., 1332 Londontown Blvd., Contact: Deanne Bellin (410/970-7800, Fax: 410/970-7800, E-mail: dbellin@gse.com). Web site: www.gses.com
Code Nos. 12800, 14000, 25400, 86300, 86300

HAWKS, GIFFELS & PULLIN (HGP), 1 SC 29608-3709, Contact: Fred Giffels (863/333-3709, Fax: 863/333-3709, E-mail: fgiffels@hgp-inc.com). Web site: www.hgp-inc.com
Code Nos. 03800, 12800, 14000, 71190

HEALTH PHYSICS INSTRUMENTS, 330 S. Kellogg Ave., Suite D, Goleta, CA 93146, Contact: Fred Giffels (863/333-3709, Fax: 863/333-3709, E-mail: fgiffels@hgp-inc.com). Web site: www.hgp-inc.com
Code Nos. 09800, 17950, 21270, 37130

HEXION INC., 180 E. Broad St., Contact: Information (614/225-4000, Fax: 614/225-4000, E-mail: info@momentive.com). Web site: www.momentive.com
Code Nos. 11400, 14000, 17650

HILMAN ROLLERS, 12 Timber Ridge Dr., Contact: Reidy (732/462-6277, 888/276-5555, E-mail: reidy@hilmanrollers.com). Web site: www.hilmanrollers.com
Code Nos. 09950, 72300, 87000

HI-Q ENVIRONMENTAL PRODUCTS, 10000 CA 92121, Contact: Marc A. Hill (951/441-1111, E-mail: marc@hi-q.net). Stamp Symbols: ISO 9001, ISO 14001
Code Nos. 04000, 09800, 26000

HOLTEC INTERNATIONAL, 10000 Blvd., Camden, NJ 08104, Contact: James J. Rusch (856/797-0909, Fax: 856/797-0909, E-mail: jrusch@holtecinternational.com). Stamp Symbols: ASME Stamps: N, NPT, NP, NP1, NP2
Code Nos. 03800, 14000, 83150, 92300, 93040
(See advertisement on page 10)

HOOVER CONTAINERS, 10000 W. Admiral Doyle Dr., Contact: Hoover (337/367-9956, E-mail: info@hcooper.com). Web site: www.hcooper.com
Code Nos. 11680, 11700

NEWELL DESIGN

I.C.E. SERVICE GROUP, INC., 192 Ohio River Blvd., Suite 100, Ambridge, PA 15056. Contact: Dennis Morgan, II (412/916-5710, Fax: 724/266-7583, E-mail: dmorgan@iceservicegroup.com). Stamp Symbols: NQA-1. Web site: www.iceservicegroup.com
Code Nos. 14000, 14300, 20300, 26230, 87000, 93040

U.S. Directory of Suppliers

Is your company listed?

◆ NEW Company Listings

If your company is not listed in the following Directory of Suppliers and you would like to be included in next year's 2019 *Radwaste Solutions* Buyers Guide (company listings are complimentary), simply go to www.ans.org/advertising/newsrbg.

◆ Existing Company Listings

If your company is listed in the following Directory of Suppliers, be advised that we will begin to send email notifications to the contact email address that is provided in your company listing to verify your listing information for RSBG 2019. These email notifications will come from the following email address <rsbg2019@ans.org> starting in July 2019.

Within this email you will find a unique URL which will enable you to access your listing and make updates or verify your contact information and nuclear-related products, services, and certifications remain the same.

Note: Companies that fail to verify their listing each year are subject to be removed from the next directory.

Remember, these are FREE company listings. Looking ahead, the deadline to create a new listing or verify an existing one will be **Monday, August 5, 2019**. The annual *Radwaste Solutions* Buyers Guide remains the commercial reference publication for the business of radioactive waste management and site cleanup and remediation. Thank you for your continued participation and support!

Radwaste SOLUTIONS

The **SOLUTIONS** Buyers Guide issue will assist decision-makers, throughout the upcoming year, assign contracts to vendors who are in the business of radioactive waste management and site cleanup and remediation.

Nearly 400 companies will be listed throughout 167 categories that relate directly to the business of radioactive waste management and site cleanup and remediation.

ABZ, INC., 4451 Brookfield Corporate Dr., #107, Chantilly, VA 20151-1693. Contact: Michael A. Zurlo (703/636-1124, 800/747-7401, Fax: 703/631-5282, E-mail: zurloma@abzinc.com). Web site: www.abzinc.com
Code Nos. 03800, 12900, 14000, 20300, 20700

AECOM, 106 Newberry St., S.W., Aiken, SC 29801. Contact: Keith Wood (803/502-5710, Fax: 803/502-5702, E-mail: keith.wood@aecom.com). Web site: www.aecom.com
Code Nos. 14000, 20300, 37200, 67380, 68000, 79360, 86300, 93040

AEROFIN, (Sub. of Ampco-Pittsburgh Corp.), 4621 Murray Pl., P.O. Box 10819, Lynchburg, VA 24502. Contact: Dan Posid (434/845-7081, 800/237-6346, Fax: 434/528-6242, E-mail: dposid@aerofin.com). Stamp Symbols: N, NPT, NS, S; Classes 2, 3, U, PP, R, Certification by ISO 9001:2000. Web site: www.aerofin.com
Code Nos. 83150, 92300*

AEROGO, INC., 1170 Andover Park W., Seattle, WA 98188. Contact: Barb Kiliz (206/575-3344, 800/426-4757, Fax: 206/575-3505, E-mail: info@aerogo.com). Stamp Symbols: ASME member; ISO 9001:2015; CE compliant. Web site: www.aerogo.com
Code Nos. 68000, 87000

AGI ENGINEERING, 1325 El Pinal Dr., Unit 7G, Stockton, CA 95205. Contact: Alex Innes (209/939-9900, Fax: 209/939-9084, E-mail: alex@agieng.com). Stamp Symbols: ASME Code Piping Design, ASME Code Welding, AWS Code Welding, NQA-1 Compliant. Web site: www.agieng.com
Code Nos. 03800, 10780, 13600, 47600, 53950, 64700, 64750, 68000, 72300, 73620, 93900

ALPHASOURCE, INC., 4837-49 N. Stenton Ave., P.O. Box 12250, Philadelphia, PA 19144. Contact: Andi Bookbinder/Brian Bookbinder (215/844-6470, 800/292-7247, Fax: 215/844-6252, E-mail: sales@alphasourceintl.com). Web site: www.alphasourceintl.com
Code Nos. 06950, 10780, 10850, 10900, 11400, 12800, 12900, 14000, 14300, 19700, 20350, 26600, 27450, 37130, 37160, 41200, 47400, 59800, 61570, 64300, 71190, 73300, 75190, 77800, 79370, 95850

ALPHA SPECTRA, INC., 715 Arrowst Ct., Grand Junction, CO 81505. Contact: Frank Wilkinson III (970/243-4477, 800/231-2545, Fax: 970/244-6947, E-mail: fjwxtals@alphaspectra.com). Web site: www.alphaspectra.com
Code Nos. 17950, 26080

AMEASOL - AMERICAN MEASUREMENT SOLUTIONS LLC, 1 Coral Bell Ct., Santa Fe, NM 87508. Contact: Tony Marlow (505/699-8923, Fax: 480/287-8709, E-mail: t.marlow@ameasol.com). Web site: www.ameasol.com
Code Nos. 03800, 04000, 12800, 14000, 17950, 20300, 25250, 26080, 26230, 26970, 30500, 40900, 41015, 44000, 68000, 72300, 73620, 75850, 79360, 84600, 86130, 86300, 93040

AMERICAN AIRWORKS⁶, 578 Robert C. Byrd Dr., P.O. Box 1000, Sophia, WV 25921-1000. Contact: Ray Lambert (304/683-4595, 800/523-7222, Fax: 304/683-3257, E-mail: sales@americanairworks.com). Web site: www.americanairworks.com
Code Nos. 10900, 20350

AMERICAN BERYLLIA, INC., 16 First Ave., Haskell, NJ 07420. Contact: 973/248-8080, Fax: 973/248-8012, E-mail: info@americanberyllia.com. Web site: www.americanberyllia.com
Code Nos. 03800

AMERICAN CRANE & EQUIPMENT CORP., 531 Old Swede Rd., Douglassville, PA 19518. Contact: 610/385-6061, 877/877-6778, Fax: 610/385-3191, E-mail: info@americancrane.com. Stamp Symbols: NQA-1 Compliant; 10CFR50, Appendix B Compliant. Web site: www.americancrane.com
Code Nos. 14000, 18590, 18600, 40900, 68000, 72300, 86300

◆ **AMERICAN DND INC.**, P.O. Box 553, Grand Island, NY 14072. Contact: Bill Schaab (716/699-5515, 866/699-5515, Fax: 716/773-5515, E-mail: adnd@americandnd.com). Web site: www.americandnd.com
Code Nos. 06790, 13050, 14000, 18600, 20300, 20350, 25400, 26230, 79360, 93040*
(See advertisement on Cover 3)

AMERICAN INTEGRATED SERVICES, INC., 2550 E. Miraloma Way, Anaheim, CA 92806. Contact: Joe Reilly (310/935-8736, 888/423-6060, Fax: 310/522-0474, E-mail: jreilly@americanintegrated.com). Web site: www.americanintegrated.com
Code Nos. 20300, 20350, 20700, 93040

AMERIPHYSICS, LLC, 9111 Cross Park Dr., Suite D200, Knoxville, TN 37923. Contact: Tom Hansen (865/470-4176, 800/563-7497, Fax: 865/470-4179, E-mail: tom@ameriphysics.com). Web site: www.ameriphysics.com
Code Nos. 20300, 20350

ANAMET INC., 26102 Eden Landing Rd., Suite 3, Hayward, CA 94545. Contact: Kenneth R. Pytlewski (510/887-8811, 800/377-7768, Fax: 510/887-8427, E-mail: ken@anametinc.com), Ed Foreman (510/887-8811, 800/377-7768, Fax: 510/887-8427, E-mail: ed@anametinc.com). Stamp Symbols: Nuclear Industry Assessment Committee Approved (NIAC), ISO 17025:2005 American Association for Laboratory Accreditation (A2LA). Web site: www.anametinc.com
Code Nos. 03800, 14000, 40900, 84600

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ANATA MANAGEMENT SOLUTIONS, P.O. Box 1475, West Jordan, UT 84084. Contact: Leslie J. Dugay (801/849-8220, Fax: 866/259-5749, E-mail: operations@anatasolutions.com), Joseph Waligora (801/849-8220, Fax: 866/259-5749, E-mail: jwaligora@anatasolutions.com). Web site: www.anatasolutions.com
Code Nos. 14000, 20300, 25400, 37200, 40900, 71190

F.N. ANDERSON & ASSOC., 1274 Helmsdale Dr., Forest, VA 24551-4760. Contact: Floyd N. Anderson (434/258-3380, Fax: 434/525-2022, E-mail: andersonfn@aol.com). Web site: www.fnaai.com
Code Nos. 77800

ANTECH CORP., 9050 Marshall Ct., Westminster, CO 80031. Contact: Richard Creed (312/833-8334, E-mail: rich.creed55@gmail.com). Web site: www.antech-inc.com
Code Nos. 09800

APPLIED HEALTH PHYSICS, LLC, 2986 Industrial Blvd., Bethel Park, PA 15102. Contact: Todd Mobley (412/835-9555, 800/332-6648, Fax: 412/835-9559, E-mail: tmobley.ahp@comcast.net). Stamp Symbols: Certification by American Board of Health Physics. Web site: www.appliedhealthphysics.com
Code Nos. 03800, 09800, 14000, 14300, 17950, 20300, 20350, 26100, 26230, 37130, 37200, 41000, 55040, 55060, 67380, 71190, 86300, 93040

APPLIED SCIENCE PROFESSIONALS, (ASP-LLC), P.O. Box 9052, Salt Lake City, UT 84109. Contact: Gary M. Sandquist (801/273-0200, Fax: 801/904-4100, E-mail: gms@asp-llc.com). Stamp Symbols: Certified Health Physicist (ABHP), Certified Quality Auditor (ASQ), PE in Nuclear and Mechanical Engineering, SE in Structural Engineering. Web site: www.asp-llc.com
Code Nos. 03800, 67380, 86300

◆ **ARGONNE NATIONAL LABORATORY**, (Decommissioning Training), (EOF Div.), 9700 S. Cass Ave., Bldg. 208, Argonne, IL 60439. Contact: Larry Boing (630/252-6729, Fax: 630/252-7577, E-mail: lboing@anl.gov). Web site: www.dd.anl.gov/ddtraining/
Code Nos. 20300, 86300

(See advertisement on page 93)

ARKEMA INC., (formerly ATOFINA Chemicals, Inc.), 900 1st Ave., King of Prussia, PA 19406-1308. Contact: 610/205-7000, 800/225-7788, Fax: 610/205-7913, E-mail: arkema.usph-general@arkema-americas.com. Web site: www.arkema-americas.com
Code Nos. 20350, 27450

ARROW-TECH, INC., 417 Main Ave. W., P.O. Box 1240, Rolla, ND 58367-1240. Contact: Perry LaFountain (701/477-6461, 877/477-6461, Fax: 701/477-6464, E-mail: sales@dosimeter.com). Web site: www.dosimeter.com
Code Nos. 03200, 09750, 09800, 17950, 21270, 37130, 55040, 55060

ARS INTERNATIONAL, LLC, 2609 N. River Rd., Port Allen, LA 70767. Contact: Jeffrey Ambrose (225/381-2991, 800/401-4277, Fax: 225/381-2996, E-mail: jambrose@amrad.com). Web site: www.amrad.com
Code Nos. 26100, 37200, 67380, 84600, 93040

ATTENTION IT, INC., 1704 Schaeffer Rd., Knoxville, TN 37932. Contact: Jeanice Pratt (865/769-8888 x400, Fax: 865/769-8931, E-mail: jeanice@attentionit.com). Web site: www.attentionit.com
Code Nos. 03800, 06950, 12800, 14000

ATTENUATION ENVIRONMENTAL CO., P.O. Box 30537, Seattle, WA 98113-0537. Contact: Doris Minor (206/783-3208, Fax: 206/783-3989, E-mail: doris@attenuation.us.com). Stamp Symbols: W.B.E./D.B.E. Web site: www.attenuation.us.com
Code Nos. 03800, 14000, 37200, 93040

AUSTIN MASTER SERVICES, LLC, 801 N. 1st St., Martins Ferry, PA 43935. Contact: Nathan Breidenbach (610/906-9698, E-mail: nate@austinmasterservices.com). Web site: www.austinmasterservices.com
Code Nos. 20300, 87000, 93040*

AUTOMATION PRODUCTS, INC., (Dynatrol® Div.), 3030 Maxroy St., Houston, TX 77008-6294. Contact: Technical Sales Dept. (713/869-0361, 800/231-2062, Fax: 713/869-7332, E-mail: sales@dynatrolusa.com). Web site: www.dynatrolusa.com
Code Nos. 04000, 25000, 40050, 54750*

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AVANTECH, INC., 2050 American Italian Way, Columbia, SC 29209. Contact: Jim Braun (803/407-7171, Fax: 803/626-0393, E-mail: jbraun@avantechinc.com), Gary Benda (803/317-1116, Fax: 803/626-0393, E-mail: gbenda@avantechinc.com). Stamp Symbols: ASME U Code Stamp, National Board of Boiler and Pressure Vessel Inspectors R and NB, UL Approved, NQA-1. Web site: www.avantechinc.com
Code Nos. 09950, 10780, 12800, 14000, 14300, 20300, 22410, 22700, 24170, 25250, 25400, 25600, 26240, 27450, 41700, 47400, 53950, 54750, 55040, 59800, 64750, 68000, 73620, 74150, 77800, 79370, 83150, 84600, 86300, 87000, 91260, 92300, 93040, 93900

AZZ NUCLEAR, 560 Horizon Dr., Suite 100, Suwanee, GA 30024. Contact: Chris Futrick (412/915-9363, Fax: 770/449-4684, E-mail: chrisfutrick@azz.com), Douglas Shuda (678/728-9304, E-mail: dougshuda@azz.com). Stamp Symbols: NB, U, U2, R, S, NR, NPT. All classes - No restrictions. Web site: www.azznuclear.com
Code Nos. 11400, 14000, 14300, 40900, 47400, 59800, 59850, 83600, 93900

AZZ NUCLEAR ENGINEERED SOLUTIONS, 7410 Pebble Dr., Fort Worth, TX 76118. Contact: John Portillo (817/239-1693, 800/448-4124, E-mail: johnportillo@azz.com). Stamp Symbols: 10CFR50 Appendix B, NQA-1, ASME III N, NS, NPT. Web site: www.azznuclear.com
Code Nos. 03000, 03800, 22200, 27450, 37600, 40050, 47400, 63400, 64700, 75190, 76400, 83150, 90250, 90600, 90800, 91000, 91260

BANDA GROUP INTERNATIONAL, LLC, 1799 E. Queen Creen Rd., Suite 1, Chandler, AZ 85286. Contact: Tammy Pressnell (865/240-0621, Fax: 865/272-5372, E-mail: tammyp@bandagroupintl.com). Web site: www.bandagroupintl.com
Code Nos. 12800, 86300

BARNHART, 2163 Airways Blvd., Memphis, TN 38114. Contact: Jud Parker (901/271-6564, 800/587-3239, E-mail: jparker@barnhartcrane.com). Web site: www.barnhartcrane.com
Code Nos. 14000, 18600, 20300, 86250, 86260, 87000

G.D. BARRI & ASSOCIATES, INC., 6860 W. Peoria Ave., Peoria, AZ 85345. Contact: Georgia D. Barri (623/773-0410, Fax: 623/773-2924, E-mail: georgia.barri@gdbarri.com). Web site: www.gdbarri.com
Code Nos. 03800, 26100, 40900

BCP ENGINEERS & CONSULTANTS, 401 Whitney Ave., Suite 402, Gretna, LA 70056. Contact: Greg Lormand (504/361-4236 x333, Fax: 504/362-8601, E-mail: glj@bcpengeers.com), Brad Myers (504/957-9678, Fax: 504/362-8601, E-mail: bmb@bcpengeers.com). Web site: www.bcpengineers.com
Code Nos. 03800, 09800, 12800, 12900, 13850, 14000, 20300, 25300, 25350, 37200, 39960, 40900, 56600, 84600, 86300

BEAMEX, INC., 2152 Northwest Pkwy. S.E., Suite A, Marietta, GA 30067-9306. Contact: Sales Dept. (770/951-1927, 800/888-9892, Fax: 770/951-1928, E-mail: beamex.inc@beamex.com). Web site: www.beamex.com
Code Nos. 09750, 12800, 37200, 67380, 68950

BECHTEL NUCLEAR, SECURITY & ENVIRONMENTAL, 12011 Sunset Hills Rd., Reston, VA 20190. Contact: Sara Schmiegl (703/429-6275, Fax: 240/379-2258, E-mail: ssschmiegl@bechtel.com). Web site: www.bechtel.com
Code Nos. 14000, 20300

BERKELEY NUCLEONICS CORP., 2955 Kerner Blvd., San Rafael, CA 94901. Contact: Bernadette Jamieson (415/453-9955, 800/234-7858, Fax: 415/453-9956, E-mail: bernadette@berkeleynucleonics.com). Web site: www.berkeleynucleonics.com
Code Nos. 09800, 17950, 26080, 37200, 41000, 47400, 55040, 84150

BIODEX MEDICAL SYSTEMS, INC., 20 Ramsey Rd., Shirley, NY 11967-4704. Contact: Ann Marie Alessi (631/924-9000, 800/224-6339, Fax: 631/924-9241, E-mail: info@biomed.com). Web site: www.biomed.com/nuclearmedicine
Code Nos. 09750, 14300, 17950, 20350, 21270, 37130, 55040, 55060, 77800*

BIRNS, INC., 1720 Fiske Pl., Oxnard, CA 93033-1863. Contact: Eric F. Birns (805/830-5885, 888/247-6788, Fax: 805/487-0427, E-mail: service@birns.com), Laura Powell (805/830-5869, 888/247-6788, Fax: 805/487-0427, E-mail: lpowell@birns.com). Stamp Symbols: ISO 9001:2008. Web site: www.birns.com
Code Nos. 45550

◆ **BLUEGRASS CONCRETE CUTTING, INC.**, P.O. Box 427, Greenville, AL 36037. Contact: Robert Hulick (334/382-0200, 800/320-1462, Fax: 334/382-0815, E-mail: bhulick@concretecutters.com). Stamp Symbols: Self Certified Small Business. Web site: www.concretecutters.com
Code Nos. 13850, 20300, 20700
(See advertisement on page 75)

BOSTON GOVERNMENT SERVICES, LLC (BGS), 105 Mitchell Rd., Suite 101, Oak Ridge, TN 37830. Contact: Karen Harris (865/272-8400, 865/730-7353, Fax: 865/622-6494, E-mail: kharris@bgs-llc.com). Web site: www.bgs-llc.com
Code Nos. 03800, 12800, 13850, 14000, 20300, 25400, 26100, 37200, 40700, 40900, 71190, 75600, 86300, 93040

◆ **BROKK INC.**, 1 Coral Bell Ct., Santa Fe, NM 87508. Contact: Tony Marlow (505/466-3614, 800/621-7856, E-mail: tony@brokkinc.com). Stamp Symbols: Certification by ISO 9001. Web site: www.brokkinc.com
Code Nos. 13050, 20300, 20350, 26230, 59850, 68000, 72300, 73620*
(See advertisement on page 27)

BURNS & MCDONNELL ENGINEERING COMPANY, INC., (Aviation & Federal Global Practice), 9400 Ward Pkwy., Kansas City, MO 64114. Contact: Willie Clark (571/444-1616, E-mail: wclark@burnsmcd.com). Web site: www.burnsmcd.com
Code Nos. 03800, 06790, 12800, 14000, 20300, 20350

◆ **BWX TECHNOLOGIES, INC.**, 2016 Mt. Athos Rd., Lynchburg, VA 24504. Contact: Dave Ferris (434/316-7501, E-mail: drferris@bwxt.com). Stamp Symbols: NQ-A-1. N Stamp NBIC ASME Sec. 11 Services Provider. Web site: www.bwxt.com
Code Nos. 03800, 10780, 14000, 20300, 20700, 25600, 37600, 40900, 47400, 53950, 56600, 61570, 73620, 77750, 84600, 92300, 93040
(See advertisement on pages 10-11)

CABLELAN NUCLEAR, INC., 13721 Jetport Commerce Pkwy., Suite 6, Fort Myers, FL 33913. Contact: Jan Pirrong (508/384-7811, 800/840-6655, Fax: 508/384-8554, E-mail: jpirrong@cablelan.com). Web site: www.cablelan.com
Code Nos. 03200, 03800

CABRERA SERVICES INC., 50 Founders Plaza, Suite 207, East Hartford, CT 06108. Contact: Shannan Ryll (860/569-0095, Fax: 860/569-0277, E-mail: sryll@cabreraseservices.com). Web site: www.cabreraseservices.com
Code Nos. 03800, 09800, 14000, 20300, 26080, 26100, 26230, 37200, 41015, 44000, 67380, 86300, 93040

CAMFIL USA, 200 Creekside Dr., Washington, NC 27889. Contact: Glen Moore (252/975-1141, Fax: 252/975-1041, E-mail: glen.moore@camfil.com). Stamp Symbols: ASME NQA-1, ASME AG-1. Web site: www.camfil.com
Code Nos. 00400, 26230, 36000, 47400, 91260

CANBERRA, PART OF MIRION TECHNOLOGIES, 800 Research Pkwy., Meriden, CT 06450. Contact: 203/238-2351, 800/243-3955, Fax: 203/235-1347, E-mail: customersupport@canberra.com. Stamp Symbols: Certification by ISO 9001. Web site: www.canberra.com
Code Nos. 03200, 03800, 04000, 09800, 12900, 14000, 17950, 19700, 20000, 20300, 20350, 26080, 26100, 26230, 37130, 37200, 40900, 41000, 55040, 55060, 67380, 68000, 71190, 77750, 86300, 93040

CERADYNE, INC., A 3M COMPANY, 3250 S. 614 Rd., Quapaw, OK 74363. Contact: Sandra Rushin (918/673-2201, Fax: 918/673-1159, E-mail: sjrushin@mmm.com), Beth Utley (918/336-8117, Fax: 918/673-1159, E-mail: erutley@mmm.com). Web site: www.3m.com/boron
Code Nos. 00400, 17650, 55490, 77800, 93040

CHASE ENVIRONMENTAL GROUP, INC., 503 Buckeye Dr., Suite 110, Troy, IL 62294. Contact: Dustin G. Miller, CHP/RRPT (314/240-0507, E-mail: dmiller@chaseenv.com).
Code Nos. 20300, 20350, 20700, 26100, 37200, 55040, 67380, 74320, 86300, 87000, 93040

CHEMCEK INSTRUMENTS, INC. (TM), 1845 Terminal Dr., #101, Richland, WA 99354. Contact: B.R. Miller-Collins (509/943-5000, Fax: 509/946-3368, E-mail: sales@chemcek.com). Web site: www.chemcek.com
Code Nos. 03800

CHESAPEAKE NUCLEAR SERVICES, INC., 788 Sonne Dr., Annapolis, MD 21401. Contact: J. Stewart Bland (410/266-9174, Fax: 410/266-5811, E-mail: jsbland@chesnuc.com). Web site: www.chesnuc.com
Code Nos. 12800, 14000, 20300, 25250, 37200, 86300, 93040

CHP CONSULTANTS/CHP DOSIMETRY/COUNTS.PRO, P.O. Box 4126, Oak Ridge, TN 37831. Contact: Robert Gunter (866/766-4833, Fax: 866/491-9913, E-mail: rjgunter@chpconsultants.com). Stamp Symbols: NVLAP Radiation Dosimetry. Instrumentation upgrades to record survey meter response. Certified Health Physicist. Web site: www.chpconsultants.com, www.chpdosimetry.com, www.counts.pro

Code Nos. 03800, 09750, 09800, 14000, 17950, 20300, 21270, 25250, 25400, 26080, 26100, 26240, 37130, 37200, 41000, 47400, 55040, 55060, 58000, 79700, 84600, 86300, 93040

COASTAL NETWORK, INC., 600 Plantation Ct., Charlottesville, VA 22903-7657. Contact: Michael O. Moyles (434/978-1204, Fax: 434/978-4775, E-mail: coanetinc@aol.com). Web site: www.nuclearsupply.com
Code Nos. 10850, 10900, 14300, 20350, 37130, 47630, 55040, 55060, 73300, 83110, 83210, 90100, 95850*

COGENTUS, 1101 30th St. N.W., Washington, DC 20009. Contact: Ian Seed (202/697-9230, E-mail: iseed@cogentus.co.uk). Web site: www.cogentus.co.uk
Code Nos. 12800, 14000

CONSOLIDATED POWER SUPPLY, (Div. of Consolidated Pipe & Supply Co., Inc.), 3556 Mary Taylor Rd., Birmingham, AL 35235-3235. Contact: Ray Troxell (205/655-5515, 800/264-5515, Fax: 205/655-5511, E-mail: sales@consolidatedpower.com). Stamp Symbols: ASME (MS), QSC 515, Classes 1, 2, 3, MC, NF. ASME N-3341. Web site: www.consolidatedpower.com
Code Nos. 06950, 11400, 12800, 13700, 14000, 14300, 27450, 37600, 40900, 41200, 56600, 59800, 61570, 90330, 90600, 90800, 91000, 91260, 91380, 92300*

◆ **CONTAINER TECHNOLOGIES INDUSTRIES, LLC**, 375 Marcum Pkwy., Helenwood, TN 37755-5085. Contact: General (423/569-2800, Fax: 423/569-2806, E-mail: sales@ctifab.com), Doug Michlink (423/569-2800 x36, E-mail: dmichlink@ctifab.com). Web site: www.containertechnologies.com
Code Nos. 03800, 10780, 13700, 14300, 14300, 75700, 83150
(See advertisement on page 69)

CONVAL, INC., 96 Phoenix Ave., Enfield, CT 06082. Contact: Mike Hendrick (860/749-0761, Fax: 860/763-3557, E-mail: mhendrick@conval.com). Stamp Symbols: Certification by ISO 9001. ASME N Stamp Section III, Class 1, 2 and 3; NPT Stamp; European PED; Indian IBR. Web site: www.conval.com
Code Nos. 90250, 90600, 91000, 91260, 91380*

CORROSION CONTROL SERVICES, INC., (CCSI Engineered Diaphragm Div.), 324 Scott St., P.O. Box 3708, Davenport, IA 52808. Contact: Ron Frantz (563/324-9076, Fax: 563/324-9077, E-mail: ronfrantz@hotmail.com). Web site: www.corrosioncontrolservice.com
Code Nos. 22430, 40900, 83150

CS-2 INC., P.O. Box 553, Grand Island, NY 14072. Contact: Bill Schaab (716/699-5515, 866/699-5515, Fax: 716/773-5515, E-mail: cs2@cs-i.com). Web site: www.cs-i.com
Code Nos. 03800, 06790, 14000, 20300, 25400, 40900, 93040*

CURIE ENVIRONMENTAL SERVICES, 4020 Vassar Dr. N.E., Suite D, Albuquerque, NM 87107. Contact: Scott Logan (505/888-9392, E-mail: scott.logan@curieservices.com). Web site: www.curieservices.com
Code Nos. 03800, 68950, 93040

CURTISS-WRIGHT ENERTECH, 2950 E. Birch St., Brea, CA 92821. Contact: Jenn Sinkiewicz (714/528-2301, Fax: 714/528-0128). Stamp Symbols: N, Classes 1, 2, 3 Valves, NPT, Classes 1, 2, 3, Valves & Appurtenances & Component Supports; NV Classes 1, 2, 3; NU; NA. Web site: www.cwnuclear.com
Code Nos. 03800, 09800, 14000, 25400, 26230, 37600, 39650, 40050, 40900, 41000, 47400, 54750, 56600, 86300, 86500, 91260, 91380*

◆ **CURTISS-WRIGHT EST GROUP**, 2701 Township Line Rd., Hatfield, PA 19440. Contact: Drew Bergman (215/721-1100, 800/355-7044, Fax: 215/721-1101, E-mail: est-info@curtisswright.com), Mark Schmidley (215/721-1100, 800/355-7044, Fax: 215/721-1101, E-mail: mschmidley@curtisswright.com). Stamp Symbols: NUPIC Listed; ISO-9001 Certified. ANSI N45.2, NQA-1, 10CFR50 App. B. Web site: cw-estgroup.com
Code Nos. 10780, 20350, 26230, 40900, 56600, 59850, 61570, 75190, 86130, 93040*
(See advertisement on page 74)

CUTTING EDGE SERVICES CORP., 1535 Old SR 74, Batavia, OH 45103. Contact: Tim Beckman (513/388-0199, Fax: 513/732-1248, E-mail: beckman@cuttingedgeservices.com). Web site: www.cuttingedgeservices.com
Code Nos. 13050, 14000, 20300*

CUTTING TECHNOLOGIES (CTI), 101 Washington Ave., Gloucester City, NJ 08030. Contact: Jay Faith (856/456-2255, Fax: 856/456-8070, E-mail: sales@cuttingtechnologies.com). Web site: www.cuttingtechnologies.com
Code Nos. 13050, 20300, 22700, 36900, 39960, 55040, 56600

DCS SYSTEMS, INC., 12 Oakwood Rd., Simsbury, CT 06070-2123. Contact: George D. Dooley (860/651-0218, Fax: 860/651-0219, E-mail: gdooley@dcssystem.com).
Code Nos. 03800, 14000, 25400, 40900, 86300

THE DELPHI GROUPE, INC., 2211 S. Interstate Hwy. 35, Suite 400, Austin, TX 78741. Contact: R. D. Gauny (512/462-1181, Fax: 512/462-1187, E-mail: rdgauny@delphigroupe.com). Web site: www.delphigroupe.com
Code Nos. 03800, 14000, 20300, 20350, 25400, 37200, 40900, 71190, 86300, 93040

DIAKONT, 3853 Calle Fortunada, San Diego, CA 92123. Contact: Aaron Huber (858/551-5551, Fax: 858/504-7065, E-mail: support@diakont.us.com). Web site: www.diakont.com
Code Nos. 12800, 30500, 39960, 45550, 47400, 61570, 68000, 72300, 75850, 84600, 86130, 93900*

DONLEY TECHNOLOGY, P.O. Box 152, Colonial Beach, VA 22443. Contact: Elizabeth Donley (804/224-9427, E-mail: donleytech@donleytech.com). Web site: www.donleytech.com
Code Nos. 86300, 86500

DP ENGINEERING LTD. CO., 6100 Western Pl., Suite 500, Fort Worth, TX 76107. Contact: Leo Zimmerman (817/763-8274, E-mail: leozimmerman@dpengineering.com). Web site: www.dpengineering.com
Code Nos. 03800, 13850, 14000, 20300

DRAGON VALVES, INC., 13457 Excelsior Dr., Norwalk, CA 90650. Contact: C. R. Bond (562/921-6605, 800/966-4007, Fax: 562/921-0200, E-mail: info@dragonvalves.com). Stamp Symbols: N-1033, Classes 1, 2, 3. Web site: www.dragonvalves.com
Code Nos. 91260

DUBOSE NATIONAL ENERGY SERVICES, 900 Industrial Dr., Clinton, NC 28328. Contact: Garry Snyder (910/590-2151, Fax: 910/590-3555, E-mail: garry.snyder@dubosenes.com). Stamp Symbols: ASME NA, ASME NS, ASME NPT. Web site: www.dubosenes.com
Code Nos. 13700, 26900, 56600, 59800, 59850, 60100, 61570, 91260, 92300, 93900, 95900, 96200*

DUFRANE NUCLEAR INC., 150 Price Rd., Winsted Industrial Pk., Winsted, CT 06098. Contact: Dan Brooks (860/379-2318, Fax: 860/379-2325, E-mail: dbrooks@dufrane.com), Tim Tarbox (479/886-0345, Fax: 860/379-2325, E-mail: tarbox@dufrane.com). Stamp Symbols: ISO 9001 (2008) Certification; NQA - 1 Compliant. Web site: www.dufrane.com
Code Nos. 03800, 09950, 11650, 13050, 13700, 13850, 14000, 14300, 20300, 37130, 37200, 47400, 55490, 68000, 73570, 75700, 77750, 77800, 87000, 95750, 96200*

DW JAMES CONSULTING, 855 Village Center Dr., #330, North Oaks, MN 55127. Contact: Tom Kalinowski (651/482-7556, Fax: 651/482-7556, E-mail: tkalinowski@dwjames.com). Web site: www.dwjames.com
Code Nos. 14000, 20300, 37200, 68000, 86300, 93040

EASTERN TECHNOLOGIES, INC., (OREX), 215 Second Ave., P.O. Box 409, Ashford, AL 36312. Contact: Doug Kay (817/559-0506, Fax: 334/899-2310, E-mail: dkay@orex.com), Benji McWaters (334/899-4351, 800/467-0547, Fax: 334/899-2310, E-mail: bmcwaters@orex.com). Web site: www.orex.com
Code Nos. 10850, 10900, 14300, 37130, 37160, 37200, 95850*

E. H. WACHS, 600 Knightsbridge Pkwy., Lincolnshire, IL 60069. Contact: Keith Polifka (847/537-8800, 800/323-8185, Fax: 847/520-1147, E-mail: keith.polifka@itw-ocw.com). Web site: www.ehwachs.com
Code Nos. 20300, 59850, 72300, 90100, 90250*

ELCOMETER INC., 1893 Rochester Industrial Dr., Rochester Hills, MI 48309. Contact: Sunny Nietubicz (248/650-0500, 800/521-0635, Fax: 248/650-0501, E-mail: sales@elcometerusa.com). Stamp Symbols: Certification by ISO 9001:2008. Web site: www.elcometerusa.com
Code Nos. 03800, 04000, 26080, 56600, 84150*

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ELLIS & WATTS GLOBAL INDUSTRIES, INC., 4400 Glen Willow Lake Ln., Batavia, OH 45103-2320. Contact: Jacob Bolden (513/943-3327, E-mail: jbolden@elliswatts.com). Stamp Symbols: U, UM, N, NA, NPT, NS, NQA-1, AG-1, CE. Web site: www.elliswatts.com
Code Nos. 03000, 14300, 19450, 27450, 32250, 37600, 71500, 73550, 92300*

ENCORUS GROUP, (dba RJR Engineering, P.C.), 23 Mechanic St., P.O. Box 344, Springville, NY 14141. Contact: Tara Lowry (716/592-3980, Fax: 716/592-4216, E-mail: tlowry@encorus.com). Stamp Symbols: NQA-1. Web site: www.encorus.com
Code Nos. 03800, 13850, 14000, 20300, 26100, 47600, 53950, 74320, 77750, 84600, 86130, 93040

ENDEAVOR ROBOTICS, 19 Alpha Rd., Suite 101, Chelmsford, MA 01824-4237. Contact: Kamila Blain (978/769-9372, E-mail: kblain@endeavorrobotics.com). Web site: www.endeavorrobotics.com
Code Nos. 40900, 72300

ENECON CORP., 6 Platinum Ct., Medford, NY 11763. Contact: Mike Tedesco (516/349-0022, 888/436-3266, Fax: 516/349-5522, E-mail: info@enecon.com). Stamp Symbols: U.S. Military Specification DOD-C-24176/QPL-24176; Nuclear Irradiation, Decontamination & DBA Testing; Canadian Electrical Association No. 511G530 - Reduction of Cavitation Erosion Damage/87 - Rated Best Coating Services Group (CSG) Torus Liner Performance (Nuclear) Evaluation; CeramAlloy CL+ (No. 3168) - Highest Rating; Other Tests/Approvals/Commendations: U.S. Coast Guard, U.S. Navy, ABS, U.S.D.A., NSF. Web site: www.enecon.com
Code Nos. 11400, 14000, 17650, 47400*

ENERCON SERVICES, INC., 500 Townpark Ln. #275, Kennesaw, GA 30144-5509. Contact: Jim Gannon (770/919-1930, Fax: 770/919-1932, E-mail: jgannon@enercon.com). Stamp Symbols: Certification by Safeguards. Web site: www.enercon.com
Code Nos. 03800, 06790, 09800, 13850, 14000, 20300, 20350, 25400, 26100, 26230, 37200, 40900, 41000, 55040, 67380, 71190, 75600, 75850, 77750, 81680, 86300, 93040

ENERGY AND PROCESS CORP., (A Ferguson Sub.), 2146 Flintstone Dr., Bldg. B, Tucker, GA 30084. Contact: Mark Capallo (770/934-3101, 800/241-9460, Fax: 770/938-8903, E-mail: mark.capallo@energyandprocess.com). Stamp Symbols: QSC-332, MO, Classes 1, 2, 3, MC. Web site: www.energyandprocess.com
Code Nos. 13700, 14300, 26900, 56600, 59800, 61570

◆ **ENERGYSOLUTIONS LLC**, 299 S. Main St., Suite 1700, Salt Lake City, UT 84111. Contact: Mark Walker (801/649-2000, Fax: 801/321-0453, E-mail: mwalker@energysolutions.com). Stamp Symbols: ASME NQA-1-Quality Assurance Requirements for Nuclear Facility Applications-2000, ASME AG-1-Code on Nuclear Air and Gas Treatment, ASME Boiler and Pressure Vessel Code, ICBO-Uniform Building Code (UBC)-1997, ASME B31.1-Power Plant Piping, ASME B31.3-Chemical Plant and Petroleum Refinery Piping, AISC Manual of Steel Construction-Allowable Stress Design, ASCE 4-Seismic Analysis of Safety-Related Nuclear Structures and Commentary, ASCE 7-Minimum Design Loads for Building and Other Structures, NFPA 70-National Electric Code (NEC), AWS D1.1-Structural Welding Code-Steel, AWS D1.2-Structural Welding Code-Aluminum, AWS D1.3- Structural Welding Code-Sheet Steel, AWS D1.6-Structural Welding Code-Stainless Steel, WRC 107-Local Stresses in Spherical and Cylindrical shells due to external loadings, WRC 297-Local Stresses in Cylindrical shells due to external loadings. Web site: www.energysolutions.com
Code Nos. 03800, 04000, 09800, 09950, 10780, 10850, 14300, 17950, 20300, 20350, 26230, 27450, 30040, 30500, 37200, 41000, 44000, 68000, 77800, 79360, 86300, 87000, 93040

(See advertisement on page 1)

ENERGY STEEL, 3123 John Conley Dr., Lapeer, MI 48446-2987. Contact: Frank Helin (810/538-4987, E-mail: fhelin@energysteel.com). Stamp Symbols: Certifications of Authorization: ASME Section III N, NPT, NA, NS, ASME VIII U/NBIC NR & R, 10CFR50 App. B/NQA-1 N45.2/NCA/W 3800/NCA/WA 4000, Canadian Standard Z-299. Web site: www.energysteel.com
Code Nos. 03800, 13600, 14300, 20300, 37600, 59800, 61570, 75190, 83150*

◆ **ENERGY, TECHNOLOGY AND ENVIRONMENTAL BUSINESS ASSOCIATION**, P.O. Box 5483, Oak Ridge, TN 37831. Contact: Adrienne Diffin (865/805-8364, 877/693-8322, E-mail: adrienne@eteba.org). Web site: www.eteba.org
Code Nos. 14000, 86300, 93040

(See advertisement on page 126)

ENVIRONMENTAL ALTERNATIVES, INC., 33 Whittemore Farm Rd., Swanzey, NH 03431. Contact: Randy Martin (603/352-3888, Fax: 603/352-3899, E-mail: rmartin@eai-inc.com). Web site: www.eai-inc.com
Code Nos. 10780, 14000, 20300, 20350, 37130, 68000, 93040

EPICOR, INC., 1414 E. Linden Ave., P.O. Box 1608, Linden, NJ 07036. Contact: Rose Bussicculo (908/925-0800, Fax: 908/925-7795, E-mail: epicorinc@aol.com). Stamp Symbols: Certification by ISO 9001:2015. Web site: www.epicorinc.com
Code Nos. 14000, 27450, 41700*

EXCEL MODULAR SCAFFOLD AND LEASING CORP., 97 Libbey Industrial Pkwy., 4th Floor, Weymouth, MA 02189. Contact: Jim Elkins (800/225-0385 x1369, 800/652-7712, Fax: 508/830-0997, E-mail: jim.elkins@excelscaffold.com). Web site: www.excelscaffold.com
Code Nos. 25400, 74350, 77900, 86300*

EXCHANGEMONITOR PUBLICATIONS & FORUMS, (RadWaste Monitor, RadWaste Summit, Weapons Complex Monitor, Decommissioning Strategy Forum), 9211 Corporate Blvd., 4th Floor, Rockville, MD 20850. Contact: Kristy Keller (301/354-1779, 888/707-5814, Fax: 301/309-3847, E-mail: kkeller@accessintel.com). Web site: www.exchangemonitor.com
Code Nos. 12800, 14000, 20300, 93040

FCI-FLUID COMPONENTS INTERNATIONAL LLC, 1755 La Costa Meadows Dr., San Marcos, CA 92078-5115. Contact: Randy Brown (760/744-6950, 800/854-1993, Fax: 760/736-6250, E-mail: fcimarcom@fluidcomponents.com). Stamp Symbols: Nuclear Safety Class 1E Supplier Since 1978; Qualified to IEEE 323, IEEE 344; EMC and Electrical Safety per USNRC RG 1.180, EN 61000-6-4/2, EN 610101-1; ISO 9001 Certified, NUPIC Approved, HAF 604 Certified; QA in Accordance with 10CFR50 App. B, ANSI N45.2, ASME NQA-1; Item Dedication Program; ASME Section III, Class 1, 2, 3 (N-Stamp) Instruments. Web site: www.fluidcomponents.com
Code Nos. 03200, 09800, 17950, 32250, 40050, 54750*

FEMTO-TECH, INC., 25 Eagle Ct., P.O. Box 8257, Carlisle, OH 45005. Contact: Rick Straub (937/746-4427, Fax: 937/746-9134, E-mail: femtotch@aol.com). Web site: www.femto-tech.com
Code Nos. 55040

FIRE & PUMP SERVICE GROUP, 1512 Kona Dr., Rancho Dominguez, CA 90220. Contact: Brandon Troc (310/223-3990, E-mail: brandont@fireandpumpservice.com). Stamp Symbols: ASME NQA-1:2008, 2009a.
Code Nos. 03200, 12800, 13700, 13850, 14000, 26900, 59800, 91260

F&J SPECIALTY PRODUCTS, INC., 404 Cypress Rd., Ocala, FL 34472. Contact: Sales Coordinator (352/680-1177/1178, 800/832-5037, Fax: 352/680-1454, E-mail: fandj@fjspecialty.com). Web site: www.fjspecialty.com
Code Nos. 09800, 27450, 55040, 74150*

FLOWERVE FLOW CONTROL DIV., (Div. of Flowserve Corp.), 1900 S. Saunders St., Raleigh, NC 27603. Contact: Floyd Bensinger (919/831-3200, Fax: 919/831-3369, E-mail: fbensinger@flowserve.com). Stamp Symbols: N, NPT, Classes 1, 2, 3. Web site: www.flowserve.com
Code Nos. 90600, 90800, 91000, 91260, 91380*

FOCUS LEARNING CORP., 1880 Santa Barbara Ave., Suite 120, San Luis Obispo, CA 93401-4477. Contact: Gary Sprague (805/543-4895, 800/458-5116, Fax: 805/543-4897, E-mail: info@focuslearning.com). Web site: www.focuslearning.com
Code Nos. 14000, 86500

FOSS THERAPY SERVICES, INC., 5938 Satsuma Ave., North Hollywood, CA 91601. Contact: Joseph Shepherd (626/818-3880, Fax: 253/830-7843, E-mail: ftsinc12@gmail.com). Web site: www.fosstherapyservices.net
Code Nos. 09800, 14000, 14300, 20300, 20350, 26240, 37200, 47400, 53950, 68000, 68950, 77800, 86300, 93040*

FRHAM SAFETY PRODUCTS, INC., P.O. Box 101177, 318 Hill Ave., Nashville, TN 37224. Contact: Fred Nance (615/254-0841, Fax: 615/726-2514, E-mail: fnance@frhamsafety.com), Trip McGarity (803/366-5131, Fax: 803/366-2005, E-mail: trip@frhamsafety.com). Web site: www.frhamsafety.com
Code Nos. 03000, 10780, 10850, 10900, 11400, 11650, 25250, 26080, 26100, 26600, 27450, 37130, 37160, 73550, 79370, 83210, 95850*

FUEL TANK MAINTENANCE CO., LLC, 240 Mill Dr., Cookeville, TN 38501. Contact: Jerry Hahn (615/355-5636, 800/742-2417, Fax: 615/355-6926, E-mail: jthahnjr@hotmail.com). Stamp Symbols: SSPC, QP1, QP2; NACE Level 1, Level 2. 10CFR 50 Appendix B and NQA-1 Certifications. Web site: www.fueltankmaintenance.com
Code Nos. 03800, 06790, 11400, 13050, 14000, 17650, 20300, 20350, 25400, 30500, 40900, 47400, 56600, 75700, 75850, 83150, 84600, 92300, 93040, 93900

GAMMA PRODUCTS, INC., 7730 W. 114th Pl., Palos Hills, IL 60465. Contact: Blake Meier (708/974-4100, Fax: 708/974-0071, E-mail: sales@gammaproducts.com). Web site: www.gammaproducts.com
Code Nos. 17950, 77800*

THE GEL GROUP, INC., (GEL Engineering, LLC), (GEL Laboratories, LLC), (GEL Geophysics, LLC), (Cape Fear Analytical, Inc.), 2040 Savage Rd., Charleston, SC 29407. Contact: Robert Wills (843/556-8171, E-mail: robert.wills@gel.com). Web site: www.gel.com
Code Nos. 03800, 04000, 14000, 26100, 37200, 74150, 74320, 86300, 93040

GENAVE ELECTRONICS, 2520 151st Ct. W., Rosemount, MN 55068. Contact: Jim Edwards (952/236-6540, E-mail: support@genave.com). Web site: www.genave.com
Code Nos. 25300, 40900

GENERAL PLASTICS MFG. CO., 4910 Burlington Way, Tacoma, WA 98409. Contact: Kris Hsin (253/343-6087, 800/806-6051, E-mail: marketing@generalplastics.com), Rick Brown (253/473-5000, 800/806-6051, E-mail: rick_brown@generalplastics.com). Stamp Symbols: General Plastics is certified to ISO 9001:2008/AS9100C. In addition, we meet such exacting quality systems as: NQA-1; MIL-I-45208A; Boeing Company D6-82479; General Plastics' extensive quality assurance program satisfies the demanding requirements of the aerospace industry, the Nuclear Regulatory Commission and the U.S. Department of Defense. BMS 8-133 Flame-Retardant Rigid Urethane Foams (core materials); BMS 8-350 Integral Skinning Flexible Urethane Foam and Paint for Molded Products; BMS 8-39 Flexible Urethane Foams. We earned Federal Aviation Agency approval of our burn-test facilities in 2010. General Plastics is ITAR-compliant. Web site: https://www.generalplastics.com/
Code Nos. 39960, 79700, 83210, 84600, 86130

GLIDEWELL SPECIALTIES FOUNDRY CO., P.O. Box 1089, 600 Foundry Rd., Calera, AL 35040. Contact: John Hendrix (205/668-1881 x3011, Fax: 205/668-1972, E-mail: jhendrix@glidewell-foundry.com), Mark Fields (937/287-1845, E-mail: glidewellsales@cinci.rr.com). Stamp Symbols: ISO 9000; Bureau Veritas Factory Approval Cert; Lloyd's Register Factory Approval. Web site: www.glidewell-foundry.com
Code Nos. 14300

GLSEQ, LLC, 13220 S. Shawnee Rd. S.E., Huntsville, AL 35803. Contact: Gene Gleason (724/561-7883, E-mail: gene.gleason@glseq.com). Web site: www.glseq.com
Code Nos. 03800, 04000, 14000, 21400, 26910, 47400, 54750, 75190, 76400, 84150, 84600, 86300

G/O CORP., 70161 Hwy. 59, Suite E, Abita Springs, LA 70420. Contact: Ty Finley (985/809-8085, 800/933-8501, Fax: 985/809-7440, E-mail: sales@gocorp.com). Web site: www.gocorp.com
Code Nos. 03800, 10780, 10850, 10900, 27450, 37130, 37160*

GOLDSIM TECHNOLOGY GROUP, 22500 S.E. 64th Pl., Suite 240, Issaquah, WA 98027-8111. Contact: Rick Kossik (425/295-6985, Fax: 425/642-8073, E-mail: rkossik@goldsim.com). Web site: www.goldsim.com
Code Nos. 03800, 14000

GRAUS CHEMICALS, LLC, 7800 N. 55th Ave., 102, Glendale, AZ 85301. Contact: Ilse Whitten (623/328-5175, Fax: 623/398-8945, E-mail: iwhitten@grauschemicals.com). Web site: www.grauschemicals.com
Code Nos. 20350

GRAVER TECHNOLOGIES INC., (A member of The Marmon Group of Companies), 200 Lake Dr., Glasgow, DE 19702. Contact: Charles Kozora (302/824-3141, 800/249-1990, Fax: 302/731-1707, E-mail: ckozora@gravertech.com). Web site: www.gravertech.com
Code Nos. 27450

THOMAS GRAY & ASSOCIATES, INC., (Owner of Environmental Mgmt. & Controls, Inc.), 1205 W. Barkley Ave., Orange, CA 92868. Contact: Richard E. Gallego (714/997-8090, Fax: 714/997-3561, E-mail: rich@tgainc.com). Web site: www.tgainc.com
Code Nos. 14000, 14300, 86300, 93040

GSE SYSTEMS INC., 1332 Londontown Blvd., Suite 200, Sykesville, MD 21784. Contact: Deanne Bellin (410/970-7800, Fax: 410/970-7999, E-mail: info@gses.com). Web site: www.gses.com
Code Nos. 12800, 14000, 25400, 86300, 86400, 86500

HAWKS, GIFFELS & PULLIN (HGP), INC., P.O. Box 3709, Suite 127, Greenville, SC 29608-3709. Contact: Fred Giffels (864/370-0213, E-mail: fgiffels@hgp-inc.com). Web site: www.hgp-inc.com
Code Nos. 03800, 12800, 14000, 71190

HEALTH PHYSICS INSTRUMENTS, (Division of Far West Technology, Inc.), 330 S. Kellogg Ave., Suite D, Goleta, CA 93117. Contact: John Handloser (805/964-3615, Fax: 805/964-3162, E-mail: info@fwt.com), Deborah Thiele (805/964-3615, Fax: 805/964-3162, E-mail: info@fwt.com). Web site: www.fwt.com
Code Nos. 09800, 17950, 21270, 37130, 37200, 47400, 55040

HEXION INC., 180 E. Broad St., Columbus, OH 43215. Contact: Product Information (614/225-4000, Fax: 614/986-2496, E-mail: 4information@mentive.com). Web site: www.hexion.com
Code Nos. 11400, 14000, 17650

HILMAN ROLLERS, 12 Timber Ln., Marlboro, NJ 07746. Contact: Samantha Reidy (732/462-6277, 888/276-5548, Fax: 732/462-6355, E-mail: sales@hilmanrollers.com). Web site: www.hilmanrollers.com
Code Nos. 09950, 72300, 87000

HI-Q ENVIRONMENTAL PRODUCTS CO., INC., 7386 Trade St., San Diego, CA 92121. Contact: Marc A. Held (858/549-2820, Fax: 858/549-9657, E-mail: info@hi-q.net). Stamp Symbols: ISO 9001:2008 Certified. Web site: www.hi-q.net
Code Nos. 04000, 09800, 26080, 27450, 37130, 37200, 41000, 55040, 58000, 90100*

◆ **HOLTEC INTERNATIONAL**, Krishna P. Singh Technology Campus, 1 Holtec Blvd., Camden, NJ 08104. Contact: Joy Russell (856/797-0900 x3655, Fax: 856/797-0909, E-mail: j.russell@holtec.com), Dr. Rick Springman (856/797-0900 x3716, Fax: 856/797-0909, E-mail: r.springman@holtec.com). Stamp Symbols: ASME Stamps: N, NPT, N3, U, R, NR, NB, NS. ISO 9001:2008. Web site: www.holtecenternational.com
Code Nos. 03800, 14000, 14300, 30500, 55490, 66280, 68000, 72300, 79360, 81710, 83150, 92300, 93040*

(See advertisement on page 90)

HOOVER CONTAINER SOLUTIONS, (Formerly Tech Oil Products Inc.), 4308 W. Admiral Doyle Dr., New Iberia, LA 70560. Contact: Brad Landry (337/492-5535, Fax: 337/367-9956, E-mail: blandry@hooversolutions.com). Web site: www.enviro-pak.net
Code Nos. 11680, 11700, 14000, 68000, 93040

HOPEWELL DESIGNS, INC., 5940 Gateway Dr., Alpharetta, GA 30004. Contact: Robert O. Rushton (770/667-5770, Fax: 770/667-7539, E-mail: robert.rushton@hopewelldesigns.com), Joy Garrett (770/667-5770, Fax: 770/667-7539, E-mail: joy.garrett@hopewelldesigns.com). Web site: www.hopewelldesigns.com
Code Nos. 00400, 09800, 20300, 37130, 37160, 37200, 55490, 68000, 73300, 77750*

HOT CELL SERVICES CORP., P.O. Box 5729, Kent, WA 98064-5729. Contact: Gaby Wijaya (253/854-4945, 800/562-2439, Fax: 253/854-4947, E-mail: hotcell@hotcell.com). Stamp Symbols: ASME NQA-1. Web site: www.hotcell.com
Code Nos. 77750, 95750*

H3D, INC., 812 Avis, Ann Arbor, MI 48108. Contact: Y. Andy Boucher (734/661-6416, E-mail: andy@h3dgamma.com). Web site: h3dgamma.com
Code Nos. 17950, 20300, 25250, 55040

STAN A. HUBER CONSULTANTS, INC., 200 N. Cedar Rd., New Lenox, IL 60451-0468. Contact: Glenn A. Huber (815/485-6161, 800/383-0468, Fax: 815/485-4433, E-mail: glennhuber@sahci.com). Web site: www.sahci.com
Code Nos. 09800, 14000, 37200, 71190, 86300, 93040

◆ Denotes Advertiser

◆ **I.C.E. SERVICE GROUP, INC.**, 192 Ohio River Blvd., Suite 100, Ambridge, PA 15056. Contact: Dennis Morgan, II (412/916-5710, Fax: 724/266-7583, E-mail: dmorgan@iceservicegroup.com). Stamp Symbols: NQA-1. Web site: www.iceservicegroup.com
Code Nos. 12800, 14000, 14300, 20300, 26230, 87000, 93040*
(See advertisement on page 7)

ILD, INC., 7353 Highland Rd., Suite B-378, Baton Rouge, LA 70808. Contact: Jack Little (225/769-2780 x111, Fax: 225/769-2751, E-mail: jack@ildpower.com). Web site: www.ildpower.com
Code Nos. 03800, 14000

INROADS INTERNATIONAL LLC, 125 Shangri-La Dr., Monroeville, PA 15146. Contact: Frank Bursic (412/638-5057, E-mail: frank.bursic@inroadsinternationalllc.com). Web site: www.inroadsinternationalllc.com
Code Nos. 14000, 20350, 77800, 84150, 91260, 92300, 93040, 93900

INTEGRA SERVICES TECHNOLOGIES INC., 3238 E. Pasadena Fwy., Pasadena, TX 77503. Contact: Debbie Jackson (713/920-2400, 800/779-2658, Fax: 713/920-2313, E-mail: info@integratechnologies.com). Web site: www.integratechnologies.com
Code Nos. 14000, 22700, 26230, 56600

INTERDEVELOPMENT, INC., 3701 S. George Mason Dr., Unit 1917N, Falls Church, VA 22041-3712. Contact: M.K. Luddemann-Faris (202/508-1459, Fax: 202/331-3759, E-mail: interdevelopment@starpower.net). Web site: www.interdevelopment.com
Code Nos. 03800, 14000

INTOMES TECHNICAL SERVICES, INC., 56 Waverly St., Suite 9, Springville, NY 14141. Contact: William J. Potts (716/592-7425, Fax: 716/592-7420, E-mail: bill@intomes.com). Stamp Symbols: NQA-1. Web site: www.intomes.com
Code Nos. 03800, 13850, 14000, 18600, 20300, 47600, 86130, 86300, 93040

INUKTUN INCOMMAND ROBOTICS, LLC, (Sub. of Inuktun Services Ltd.), 5041 Spencer Hwy., Suite 601, Pasadena, TX 77505. Contact: Wade Leach (832/878-6073, 844/468-5886, Fax: 844/468-5886, E-mail: wleach@inuktun.com). Web site: www.incommandrobotics.com
Code Nos. 26230, 26240, 40900, 47600, 56600, 68000, 72300, 73300, 79360, 84150, 93900

IONEX RESEARCH CORP., P.O. Box 70, 1301 Eastwind Dr., Lafayette, CO 80026. Contact: D. W. Porrey (303/666-5550, Fax: 303/666-5560, E-mail: dporrey@ionex.us). Stamp Symbols: QA Program in accordance with NQA-1. Web site: www.ionex.us
Code Nos. 27450, 32250

JACOBS, (CH2M HILL, Inc.), (CH2M HILL Nuclear Business Group), (CH2M HILL International Nuclear Services, Ltd.), (CH2M HILL Constructors, Inc.), (Jacobs), (Jacobs Engineering), 9189 S. Jamaica St., Englewood, CO 80112. Contact: Katie Warner (720/286-1547, E-mail: katelyn.warner@jacobs.com). Stamp Symbols: American Society of Mechanical Engineers Nuclear Quality Assurance (ASME) NQA-1. Web site: www.ch2m.com
Code Nos. 20700

JAMES FISHER TECHNOLOGIES, 5821 Langely Ave., Loveland, CO 80538. Contact: Scott Adams (720/408-0100, Fax: 720/408-0200, E-mail: scott.adams@jftechgroup.com). Web site: www.jftechgroup.com
Code Nos. 03000, 03200, 03800, 04000, 09750, 09800, 12800, 13050, 13400, 14000, 17950, 20300, 20700, 26230, 30500, 36000, 37130, 40900, 47400, 47600, 53950, 55040, 55060, 56600, 68000, 73620, 79360, 93040*

◆ **JOSEPH OAT CORP.**, 2500 Broadway, Drawer 10, Camden, NJ 08104. Contact: Crystal Harrington (856/541-2900, Fax: 856/541-0864, E-mail: c.harrington@josephoat.com). Stamp Symbols: N, NPT, NA, Classes 1, 2, 3, MC, U, S; N Classes 1, 2, 3, MC Vessels + Piping Systems. +2, 3 Storage Tanks, NPT Class 1, 2, 3 & MC, NA Class 1, 2, 3 U&S, 10CFR50 Appendix B, 10CFR71 Subpart H, 10CFR72 Subpart G, NQA-1 Program, Certification by ISO 9001. Web site: www.josephoat.com
Code Nos. 03800, 09950, 13700, 14000, 14300, 27450, 36000, 37600, 40900, 56600, 59800, 68000, 77750, 78700, 83150, 92300, 93900*
(See advertisement on page 71)

JRM CHEMICAL INC., 4881 Neo Pkwy., Cleveland, OH 44128. Contact: Dave Czehut (216/475-8488, 800/962-4010, Fax: 216/475-6517, E-mail: jrm@en.com). Web site: www.soilmoist.com
Code Nos. 79370*

JSM PROTECTIVE, INC., 8345 Vintage Club Cir., Wilmington, NC 28411. Contact: Jeannette McLean (910/619-3141, Fax: 888/457-7682, E-mail: jmclean@jmonline.com). Stamp Symbols: Woman Owned Small Business; ANS Member; SAM Registered. Web site: www.jmonline.com
Code Nos. 10850, 10900, 26080, 37130, 54750, 55040, 73550, 83110, 83210, 95850*

KONECRANES NUCLEAR EQUIPMENT & SERVICES LLC, 5300 S. Emmer Dr., New Berlin, WI 53151. Contact: Steve Lawrence (262/364-5700, E-mail: steve.lawrence@konecranes.com). Stamp Symbols: Quality Compliant to ISO 9001, 10CFR50 App. B & NQA-1. Web site: www.konecranes.com
Code Nos. 09950, 13600, 14000, 18590, 18600, 30500, 40900, 47400, 68000, 72300, 81680, 81710, 86300, 87000*

LABLOGIC SYSTEMS, INC., East Pointe Park, 1040 E. Brandon Blvd., Brandon, FL 33511-5509. Contact: Ashvin Boodhun (813/626-6848, 800/875-4687, Fax: 813/620-3708, E-mail: ahoodhun@lablogic.com). Web site: www.lablogic.com
Code Nos. 03200, 03800, 04000, 17950, 25250, 55040

LANCS INDUSTRIES, 12704 N.E. 124th St., Suite 36, Kirkland, WA 98034. Contact: Lewis E. Byrd (425/823-6634, Fax: 425/820-6784, E-mail: sales@lancsindustries.com). Stamp Symbols: Certification by SEG. Web site: www.lancsindustries.com
Code Nos. 10850, 10900, 14300, 27450, 37130, 68000, 73550, 77800, 83210, 86300, 93040*

LANDSTAR, 1543 Production Dr., Burlington, KY 41005. Contact: Brandon Coburn (859/525-7120, 800/872-9625, Fax: 859/283-6988, E-mail: brandon.coburn@landstarmail.com). Web site: www.bbtransportation.com
Code Nos. 14300

LASER SAFETY SOLUTIONS, 42179 W. Santa Fe St., Maricopa, AZ 85138. Contact: Ken Barat (925/698-5661, E-mail: lasersafetysolutions@gmail.com). Stamp Symbols: CLSO, LIA Fellow, SPIE Senior Member, IEEE Senior Member. Web site: lasersafetysolutions.org
Code Nos. 14000

LEMO USA, INC., (Sub. of LEMO SA), P.O. Box 2408, Rohnert Park, CA 94927-2408. Contact: Julie Carlson (707/206-3776, 800/444-5366, Fax: 707/206-3774, E-mail: jcarlson@lemo.com). Stamp Symbols: Certification by ISO 9001 and ISO 13485. Web site: www.lemo.com
Code Nos. 95900*

LENOX INSTRUMENT CO., INC., 265 Andrews Rd., Trevoise, PA 19053. Contact: Bill Lang (215/322-9990, 800/356-1104, Fax: 215/322-6126, E-mail: bill@lenoxinst.com). Web site: www.lenoxinst.com
Code Nos. 26230, 40900, 92800

LIGHTS CAMERA ACTION, LLC, 757 N. Golden Key St., Suite B, Gilbert, AZ 85233-3811. Contact: Walt Ahland (480/345-0642, 877/345-0642, Fax: 480/345-0644, E-mail: wahland@lights-camera-action.net). Web site: www.lights-camera-action.net
Code Nos. 08800, 17650, 26230, 45550, 73300, 83600, 86130

LUCIDEON, 79 TW Alexander Dr., 4401 Research Commons, Suite 101, Research Triangle Park, NC 27709. Contact: MaryBeth Sprott (919/504-4600, E-mail: marybeth.sprott@lucideon.com). Web site: www.lucideon.com
Code Nos. 03800, 14000, 25600, 84600, 93040

LUDECA, INC., 1425 N.W. 88th Ave., Doral, FL 33172. Contact: Ron Lambert (305/591-8935, Fax: 305/591-1537, E-mail: sales@ludeca.com). Web site: www.ludeca.com
Code Nos. 03800, 14000, 40050, 47400, 54750

LUDLUM MEASUREMENTS, INC., 501 Oak St., P.O. Box 810, Sweetwater, TX 79556-0810. Contact: Allan Hartfield (325/235-5494, 800/622-0828, Fax: 325/235-4672, E-mail: ahartfield@ludlums.com). Web site: www.ludlums.com
Code Nos. 04000, 55060*

A. C. MACRIS, CONSULTANTS, P.O. Box 535, Mystic, CT 06355. Contact: A. C. Macris (860/572-0043, E-mail: acmpc@acmacris.com). Web site: www.themacrisgroup.com
Code Nos. 14000, 53950, 86300, 86500

MAGNATECH LLC, 6 Kripes Rd., P.O. Box 260, East Granby, CT 06026-0260. Contact: J. G. Emmerson (860/653-2573 x10, Fax: 860/653-0486, E-mail: info@magnatechllc.com). Web site: www.magnatechllc.com
Code Nos. 59850, 83600

MAGNETROL INTERNATIONAL, 705 Enterprise St., Aurora, IL 60504. Contact: M.D. Tikalsky (630/969-4000, 800/624-8765, Fax: 630/969-9489, E-mail: mtikalsky@magnetrol.com). Stamp Symbols: Certification by 10CFR50 App. B. Web site: www.magnetrol.com
Code Nos. 03200, 40050

◆ **MAJOR TOOL & MACHINE, INC.**, 1458 E. 19th St., Indianapolis, IN 46218. Contact: Joel Manship (317/917-2619, Fax: 317/634-9420, E-mail: jmanship@majortool.com). Stamp Symbols: N-Class 1, 2, 3 & MC Vessels; Class 1, 2 & 3 Piping Systems; Class 2 & 3 Storage Tanks, Class CS Core Support Structures and Class TP Transport Packaging; NPT - Class 1, 2, 3, CS, MC & TP. Fabrication without design responsibility. N3 - Construction of Class TC Transportation Containments. Stamps N, N3, NPT, NS, U, U2 and R. Audited and compliant to NQA-1. Certifications to ISO 9001:2000, AS9100, NADCAP. Web site: www.majortool.com
Code Nos. 14300, 30500, 36000, 56600, 66280, 68000, 79360, 81710, 83150, 87380, 87395, 92300, 93900*
(See advertisement on page 5)

MARSHALLTON RESEARCH LABORATORIES, INC., P.O. Box 930, King, NC 27021. Contact: Amy Leadford (336/983-2131, Fax: 336/983-0096, E-mail: info@marshalltonlabs.com). Web site: www.marshalltonlabs.com
Code Nos. 20350

MASTER-LEE ENGINEERED PRODUCTS INC., 5631 Route 981, Latrobe, PA 15650. Contact: John Buchta (724/805-4905, 800/537-6007, Fax: 724/532-5501, E-mail: buchta-jp@masterlee.com). Web site: www.masterlee.com
Code Nos. 10780, 26230, 30500, 45550, 61570, 72300, 90100, 92800*

MAYCO INDUSTRIES, 18 W. Oxmoor Rd., Birmingham, AL 35209. Contact: Mike Ward (205/942-4242, 800/749-6061, Fax: 205/945-8704, E-mail: mike@maycoindustries.com). Stamp Symbols: 10 CFR. Web site: www.maycoindustries.com
Code Nos. 14300, 77800, 93040, 95750

MERRICK & COMPANY, 5970 Greenwood Plaza Blvd., Greenwood Village, CO 80111. Contact: Robert Trout (303/521-9811, 800/544-1714, Fax: 303/751-2581, E-mail: bob.trout@merrick.com). Stamp Symbols: ISO 9001:2008; ASME NQA-1. Web site: www.merrick.com
Code Nos. 03800, 13850, 14000, 20300, 30500, 36000, 39960, 47620, 53950, 68000, 72300, 75600, 77750

MET ONE INSTRUMENTS, INC., 1600 N.W. Washingt Blvd., Grants Pass, OR 97526. Contact: David I. Katz (215/579-4292, E-mail: dkatz@metone.com). Web site: www.metone.com
Code Nos. 14000, 19700, 26080

MINCO PRODUCTS, INC., 7300 Commerce Ln., Minneapolis, MN 55432-3177. Contact: Sales Department (763/571-3121, Fax: 763/571-0927, E-mail: sales@minco.com). Web site: www.minco.com
Code Nos. 40050, 51730, 54750*

MIRION TECHNOLOGIES (IST) CORP., (Sensing Systems Div.), 315 Daniel Zenker Dr., 300 IST Center, Horseheads, NY 14845. Contact: Tim Pelot (607/562-4530, Fax: 607/562-4482, E-mail: tpelot@mirion.com). Stamp Symbols: N Classes 1, 2, 3 & MC Vessels, Class 1, 2, 3 Valve Parts & Appurt., Class 1, 2, 3, Valves, Class MC Penetrations & Assem. Web site: www.mirion.com
Code Nos. 08800, 17950, 26910, 45550, 54750, 73300, 75190, 83600*

MITSUBISHI HEAVY INDUSTRIES AMERICA, INC., 20 Greenway Plaza, Suite 600, Houston, TX 77046. Contact: Shintaro Honjo (713/351-6424, E-mail: shintaro_honjo@mhihq.com). Web site: www.mitsubishitoday.com
Code Nos. 13850, 73620

◆ **MOHAWK SAFETY**, 5 Glen Rd., Manchester, CT 06040-6707. Contact: James W. Francoline (860/643-5107, 800/394-6853, Fax: 860/646-6209, E-mail: jfrancoline@mohawksafety.com). Web site: www.mohawksafety.com
Code Nos. 10850, 10900, 26600, 27450, 37130, 37160, 83110, 83120, 84150, 95850*
(See advertisement on page 80)

MOMENTIVE PERFORMANCE MATERIALS INC., 260 Hudson River Rd., Waterford, NY 12188. Contact: Product Information (614/986-2495, 800/295-2392, Fax: 614/986-2496, E-mail: commercial.services@momentive.com). Web site: www.momentive.com
Code Nos. 11400, 14000, 17650

MPR ASSOCIATES, INC., 320 King St., Alexandria, VA 22314-3230. Contact: Paul Gallagher (703/519-0200, Fax: 703/519-0224, E-mail: pgallagher@mpr.com). Web site: www.mpr.com
Code Nos. 03800, 14000, 54750, 86300

M2 POLYMER TECHNOLOGIES, INC., P.O. Box 365, West Dundee, IL 60118. Contact: Martin Matushek (847/836-1393, Fax: 847/836-6483, E-mail: info@m2polymer.com). Web site: www.m2polymer.com
Code Nos. 20350, 68000, 79360, 79370*

◆ **NAC INTERNATIONAL INC.**, 3930 E. Jones Bridge Rd., Suite 200, Norcross, GA 30092. Contact: Doug Jacobs (678/328-1257, 800/241-0507, Fax: 678/328-1457, E-mail: djacobs@nacintl.com), Juan Subiry (678/328-1282, 800/241-0507, Fax: 678/328-1482, E-mail: jsubiry@nacintl.com). Web site: www.nacintl.com
Code Nos. 03800, 14000, 14300, 30040, 30500, 68000, 77800, 81710, 86300, 87000
(See advertisement on page 94)

NATIONAL INSPECTION & CONSULTANTS, 9911 Bavaria Rd., Fort Myers, FL 33913. Contact: David J. Vigne (239/939-4313, Fax: 239/334-8777, E-mail: dave.vigne@nicinc.com). Stamp Symbols: Certification by ISO 9001 and AS9100, Nadcap & FAA Repair Station. Web site: www.nicinc.com
Code Nos. 14000, 40900, 86300

NAVARRO RESEARCH AND ENGINEERING, INC., 1020 Commerce Park Dr., Oak Ridge, TN 37830. Contact: JoEllen Kuszmaul (865/220-9650, 866/681-5265, Fax: 865/220-9651, E-mail: kuszmaul@navarro-inc.com). Web site: www.navarro-inc.com
Code Nos. 03800, 14000, 20300, 25400, 26100, 37200, 93040

NEPTUNE AND COMPANY, INC., 1435 Garrison St., Suite 201, Lakewood, CO 80215. Contact: Paul Black (303/956-9867, Fax: 720/746-1802, E-mail: pblack@neptuneinc.org). Stamp Symbols: GoldSim certified programmers and trainers. Web site: www.neptuneancco.com
Code Nos. 03800, 12800, 14000, 86300, 93040

NEWAGE INDUSTRIES, INC., 145 James Way, Southampton, PA 18966. Contact: Customer Support (215/526-2300, 800/50-NEWAGE, Fax: 215/526-2190, E-mail: psales@newageindustries.com). Web site: www.newageindustries.com
Code Nos. 37130

NEW MILLENNIUM NUCLEAR TECHNOLOGIES INTERNATIONAL, 575 Union Blvd., #102, Lakewood, CO 80228. Contact: Sue Aggarwal (303/984-5788, E-mail: saggarwal@nmmnuclear.com). Stamp Symbols: Certification by ISO 9001. Web site: www.nmmnuclear.com
Code Nos. 13050, 20350, 25600, 26100, 93040

NEW YORK BLOWER CO., 7660 Quincy St., Willowbrook, IL 60527. Contact: Margaret Wood (630/794-5700, 800/208-7918, Fax: 630/794-5776, E-mail: mwood@nyb.com). Web site: www.nyb.com
Code Nos. 19450*

NOCHAR, INC., 8650 Commerce Pk., Suite K, Indianapolis, IN 46268. Contact: Dennis Campbell (317/613-3046, Fax: 317/613-3052, E-mail: nochar@nochar.com). Stamp Symbols: SEG Certified Incinerable; NTS, WIPP, Envirocare approved. Web site: www.nochar.com
Code Nos. 79370*

NORTH WIND GROUP, 1425 Higham St., Idaho Falls, ID 83402. Contact: Brady Bigelow (303/263-9201, Fax: 208/528-8714, E-mail: bbigelow@northwindgrp.com). Web site: www.northwindgrp.com
Code Nos. 03800, 06790, 09750, 09800, 13850, 14000, 20300, 20350, 20700, 22410, 25250, 37130, 37200, 47400, 71190, 86300, 87000, 93040

NUCLEAR NEWS MAGAZINE, 555 N. Kensington Ave., La Grange Park, IL 60526. Contact: Betsy Tompkins (708/579-8241, E-mail: nucnews@ans.org), Jeff Mosses (708/579-8225, 800/NUC-NEWS, E-mail: nucnews1@ans.org). Web site: www.ans.org/nn
Code Nos. 40700

NUCLEAR PLANT JOURNAL, 3051 Oak Grove Rd., Suite 107, Downers Grove, IL 60515. Contact: Newal K. Agnihotri (630/858-6161 x102, Fax: 630/852-8787, E-mail: newal@goinfo.com). Web site: www.nuclearplantjournal.com
Code Nos. 86300*

◆ Denotes Advertiser

NUCLEAR SYSTEMS ASSOCIATES, INC., 2701 Saturn St., Brea, CA 92821. Contact: Charles Divona (949/499-9980, E-mail: nuclearsystems@cox.net). Web site: www.nuclearsystems.com
Code Nos. 14000, 30500, 45550, 72300

NUCON INTERNATIONAL, INC., 7000 Huntley Rd., P.O. Box 29151, Columbus, OH 43229. Contact: Curtis E. Graves (614/846-5710 x115, 800/992-5192, Fax: 614/431-0858, E-mail: sales@nucon-int.com), Robert Sommer (614/846-5710 x125, 800/992-5192, Fax: 614/431-0858, E-mail: sales@nucon-int.com). Web site: www.nucon-int.com
Code Nos. 04000, 09800, 14000, 26230, 27450, 32250, 40900, 41000, 54750, 56600, 73550, 79370, 86300, 87380, 87400*

NV5 GLOBAL, 1835 Terminal Dr., Suite 200, Richland, WA 99354. Contact: Stephen Bump (509/942-3639, Fax: 509/946-4412, E-mail: sbump@moellerinc.com). Web site: www.nv5.com
Code Nos. 03800, 06790, 13850, 14000, 20300, 37200, 40900, 67380, 84150, 86300

NWT CORP., 7015 Realm Dr., San Jose, CA 95119-1387. Contact: S. G. Sawochka (408/281-1100, Fax: 408/578-0790, E-mail: sawochka@nwtcorp.com). Web site: www.nwtcorp.com
Code Nos. 03800, 09800, 14000, 54750, 86300

OFF-SITE SOURCE RECOVERY PROGRAM, P.O. Box 1663, MS E539, Los Alamos, NM 87545. Contact: Becky Coel-Roback (505/667-7920, 877/676-1749, Fax: 505/665-7913, E-mail: osrp@lanl.gov). Web site: osrp.lanl.gov
Code Nos. 93040

ORANO, 10101 David Taylor Dr., Suite 200, Charlotte, NC 28262. Contact: Lynn Butler (704/805-2845, E-mail: lynn.butler@orano.group). Web site: www.orano.group/en
Code Nos. 03800, 09730, 09950, 13850, 14000, 14300, 20300, 20350, 36000, 56600, 68000, 79360, 87000, 87400, 93040

ORTEC, 801 S. Illinois Ave., Oak Ridge, TN 37831. Contact: Susie Brockman (865/483-2124, 800/251-9750, Fax: 865/483-0396, E-mail: susie.brockman@ametec.com). Web site: www.ortec-online.com
Code Nos. 03200, 04000, 12900, 17950, 19700, 26080, 26230, 37130, 55040, 55060, 58000, 77800, 86300*

OTEK CORP., 4016 E. Tennessee, Tucson, AZ 85714. Contact: Dawn Thibodeau (520/748-7900, Fax: 520/790-2808, E-mail: sales@otekcorp.com). Stamp Symbols: Otek is a direct supplier to the nuclear industry under 10CFR50 Appendix B and 10CFR21. We design, manufacture and warranty a complete line of electronic instruments that are 100% FFF compatible to replace most obsolete analog and digital meters commonly found in nuclear I&C rooms and simulators. Web site: www.otekcorp.com
Code Nos. 03200, 17950, 19700

PACE NATIONAL CENTER FOR TESTING & INNOVATION, 12065 Lebanon Rd., Mt. Juliet, TN 37122. Contact: Donna Eidson (615/773-5923, 800/767-5859, E-mail: deidson@pacenational.com). Web site: www.pacenational.com
Code Nos. 03800, 67380, 93040

◆ **PACTEC, INC.**, P.O. Box 8069, Clinton, LA 70722. Contact: Bill Smart (225/683-8602, 877/554-2541, Fax: 225/683-8711, E-mail: billsmart@pactecinc.com), Trey Castleberry (225/683-8602, 877/554-2541, Fax: 225/683-8711, E-mail: treycastleberry@pactecinc.com). Web site: www.pactecinc.com
Code Nos. 09950, 14300, 22410, 27450, 37130, 37160, 64300, 68000, 79360, 83150, 93040

(See advertisement on page 86)

PAJARITO SCIENTIFIC CORP. (PSC), (Pajarito Scientific Security Corp.) (PSSC), 2976 Rodeo Park Dr. E., Santa Fe, NM 87505. Contact: Michael Pitts (505/455-8558, Fax: 505/424-1109, E-mail: mpitts@pscnda.com). Web site: www.pajaritoscientific.com
Code Nos. 03200, 14000, 17950, 20300, 55040, 93040

PAR SYSTEMS, LLC, 707 County Rd. E West, Shoreview, MN 55126-7007. Contact: Rob Owen (651/484-7261, 800/464-1320, Fax: 651/483-2689, E-mail: rowen@par.com). Stamp Symbols: ISO 9001:2008; AS9001-2009 Revision C; NQA-1; GMP1; NOG-1; CMAA; ASME; NRSC. Web site: www.par.com
Code Nos. 03800, 10780, 12800, 14000, 18600, 20350, 20700, 30500, 39650, 40900, 47400, 47600, 53950, 56600, 66280, 68000, 72300, 73620, 79360, 81710, 84150, 84600, 86130, 93900

PAVE TECHNOLOGY CO., 2751 Thunderhawk Ct., Dayton, OH 45414-3451. Contact: Walter Wood (937/890-1100 x103, Fax: 937/890-5165, E-mail: help@pavetechnologyco.com). Stamp Symbols: Certification by ISO 9001:2015. ASME NQA-1a-2009 CGD. L2 helium leak test trained. Web site: www.pavetechnologyco.com
Code Nos. 75190, 90100*

PBM, INC. VALVE SOLUTIONS, (Ball Valve Div.), 1070 Sandy Hill Rd., Irwin, PA 15642-9409. Contact: Melissa Kopcho (724/863-0550, 800/967-4PBM, Fax: 724/864-9255, E-mail: mkopcho@pbmvalve.com). Web site: www.pbmvalve.com
Code Nos. 90250, 90600, 90800, 91260

PERKINS SPECIALIZED TRANSPORTATION CONTRACTING (PERKINS STC), 1800 Riverview Dr., Northfield, MN 55057. Contact: Ron Donahoo (507/301-0701, E-mail: rdonahoo@perkinsstc.com). Web site: www.perkinsstc.com
Code Nos. 86250, 86260

PERMA-FIX ENVIRONMENTAL SERVICES, INC., 1093 Commerce Park Dr., Suite 300, Oak Ridge, TN 37830. Contact: Hope O'Dell (865/342-7668, Fax: 865/539-9868, E-mail: hodell@perma-fix.com), Autumn Bogus (865/251-2088, Fax: 865/251-0355, E-mail: abogus@perma-fix.com). Web site: www.perma-fix.com
Code Nos. 09800, 14000, 17950, 26080, 26100, 26230, 37200, 93040

PERMA-FIX ENVIRONMENTAL SERVICES INC., (Perma-Fix Northwest Richland) (Wholly Owned Sub. of Perma-Fix Environmental Services, Inc.), 2025 Battelle Blvd., Richland, WA 99354. Contact: Richard Grondin (509/375-5160, Fax: 509/375-0613, E-mail: rgrondin@perma-fix.com). Web site: www.perma-fix.com
Code Nos. 93040

PERMA-FIX ENVIRONMENTAL SERVICES INC., (Perma-Fix of Florida) (A Wholly Owned Sub. of Perma-Fix Environmental Services, Inc.), 1940 N.W. 67th Pl., Gainesville, FL 32653. Contact: Raymond Whittle (352/373-6066, 800/365-6066, Fax: 352/372-8963, E-mail: rwhittle@perma-fix.com). Web site: www.perma-fix.com
Code Nos. 93040

♦ **PETERSEN INC.**, 1527 N. 2000 W., Ogden, UT 84404. Contact: Rob Despain (801/732-2000, 800/410-6789, Fax: 801/732-2098, E-mail: sales@peterseninc.com). Stamp Symbols: Facilities in Utah and Idaho. ASME VIII Div. 1 U, U2, S, Stamp; National Board Inspection Code R Stamp; ASME NQA-1; NRC Subpart H of 10 CFR Part 71; ASME B31.1 and B31.3; API 1104; AWS D1.1, D1.2, D1.3, D1.6; ISO 9001-2015; AISC. Web site: www.peterseninc.com
Code Nos. 09730, 14300, 68000, 81680, 83150, 86130, 92300, 96200*

(See advertisement on Cover 2)

PHDS CO., 3011 Amherst Rd., Knoxville, TN 37921. Contact: Ethan Hull (865/481-3725, E-mail: ethanhull@phdsco.com). Web site: www.phdsco.com
Code Nos. 17950, 21270

PHILOTECHNICS, LTD., 201 Renovare Blvd., Oak Ridge, TN 37830. Contact: Meghan Turvey (865/285-3064, 888/RADWASTE, Fax: 865/220-0686, E-mail: mgturvey@philotechnics.com). Web site: www.philotechnics.com
Code Nos. 14000, 14300, 20300, 37200, 79370, 87000, 93040

PLANT DECOMMISSIONING, 266 Park Ave., Lake Villa, IL 60046. Contact: Russ Valin (847/265-8800, Fax: 847/265-6556, E-mail: sales@plantdecommissioning.com). Web site: plantdecommissioning.com
Code Nos. 20300, 26240, 47600, 53950, 79360, 86130, 96200

POLESTAR TECHNICAL SERVICES, 601 Williams Blvd., Suite 4, Richland, WA 99354. Contact: 509/946-8279. Web site: www.polestartechnicalservices.com
Code Nos. 14000, 20300, 86300

CONSTANTINE N. POLITES & CO., 833 Guenther Ave., Yeadon, PA 19050-3506. Contact: Constantine N. Polites (610/543 4336, Fax: 610/543-4336, E-mail: polites@scaffolding.com). Web site: www.scaffolding.com
Code Nos. 74350

♦ **PRECISION CUSTOM COMPONENTS, LLC**, 500 Lincoln St., P.O. Box 15101, York, PA 17405-7101. Contact: James C. Stouch, P.E. (717/848-1126 x2362, Fax: 717/843-5733, E-mail: jstouch@pcc-york.com), Brian Hunt (717/848-1126 x2592, Fax: 717/843-5733, E-mail: bhunt@pcc-york.com). Stamp Symbols: ASME Sect. III (N, NS, NA, NPT Stamps); ASME Sect. VIII Div. 1, 2 and 3 (U, U2, U3 Stamps); MIL-Q-9858 with QRC82. Web site: www.pcc-york.com
Code Nos. 03800, 09800, 10780, 14000, 14300, 30500, 40900, 53950, 56600, 66280, 81710, 83150, 87000, 92300, 93900

(See advertisement on page 95)

PREFERRED ENGINEERING CORP., (Sub. of Preferred Utilities Mfg. Corp.), 31-35 South St., Danbury, CT 06810. Contact: Ivan Cabrera (203/743-6741, Fax: 203/798-7313, E-mail: icabrera@preferred-mfg.com). Web site: www.preferredengineering.com
Code Nos. 03800, 14000, 20350, 30500, 47400, 61570, 75190, 77800

PRICEWATERHOUSECOOPERS ADVISORY, (Capital Projects & Infrastructure), 100 E. Pratt St., Baltimore, MD 21202. Contact: Tom Magette (410/659-8808, E-mail: thomas.e.magette@pwc.com). Web site: pwc.com/us/capitalprojects
Code Nos. 14000

PROJECT ASSISTANCE CORP. (PAC), P.O. Box 1728, Lafayette, CA 94549. Contact: Leigh A. Gouveia (925/943-5750, Fax: 925/943-5753, E-mail: leigh.gouveia@pacpeople.com). Stamp Symbols: NQA-1. Web site: www.pacpeople.com
Code Nos. 03800, 14000, 20300, 25400, 40900, 56600, 71190, 84600, 86300, 93040*

PRYSMIAN GROUP, (ULTROL® 60+), 1600 W. Main St., Willimantic, CT 06226-1128. Contact: Heidi Field (860/465-8726, 800/237-6419 x8726, Fax: 860/465-8869, E-mail: hfield@generalcable.com). Web site: www.generalcable.com
Code Nos. 08800, 95900*

PTI SYSTEMS, (Div. of Pro-Tem, Inc.), 2525 South Shore Blvd., Suite 401, League City, TX 77573. Contact: Eddie Selden (281/334-5547, 800/322-4861, Fax: 281/334-6608, E-mail: eselden@pti-sys.com). Web site: www.pti-sys.com
Code Nos. 71190*

PTP SPENT FUEL SERVICES, LLC, P.O. Box 553, Grand Island, NY 14072. Contact: Bill Schaab (716/699-5515, 866/699-5515, Fax: 716/773-5515, E-mail: ptp@ptpsfs.com). Web site: www.ptpsfs.com
Code Nos. 14000, 14300, 18600, 20300, 30500, 68000, 81680, 81710, 93040*

QAL-TEK ASSOCIATES, LLC, 3998 Commerce Cir., Idaho Falls, ID 83401. Contact: Ron Ulbrich (208/523-5557, 888/523-5557, Fax: 208/524-8470, E-mail: rulbrich@qaltek.com). Web site: www.qaltek.com
Code Nos. 03800, 12800, 14000, 17950, 20300, 21270, 25250, 37130, 37200, 47400, 55040, 55060, 68000, 71190, 86300, 93040

RADIAC RESEARCH CORP., 261 Kent Ave., Brooklyn, NY 11249. Contact: John V. Tekin, Jr. (718/963-2233 x201, Fax: 718/228-4220, E-mail: jtekin@radiacenv.com), Joseph Spektor (718/963-2233 x205, Fax: 718/228-7029, E-mail: jspektor@radiacenv.com). Web site: www.radiacenv.com
Code Nos. 14000, 93040

RADIATION PROTECTION PRODUCTS, INC., P.O. Box 862, 1000 Superior Blvd., Suite 310, Wayzata, MN 55391. Contact: Scott Valene (952/476-4400, 888/RING-RPP, Fax: 866/554-8445, E-mail: scottv@rppinc.com). Web site: www.rppinc.com
Code Nos. 77750, 77800, 95750*

RADIATION PROTECTION SYSTEMS, INC., 60 Leonard Dr., P.O. Box 890, Groton, CT 06340. Contact: John Kremer (860/445-0334, 888/637-7779, Fax: 860/446-1876, E-mail: jkremer@radprosys.com), Don Pratt (860/445-0334 x227, 888/637-7779 x227, Fax: 860/446-1876, E-mail: dpratt@radprosys.com). Web site: www.radprosys.com
Code Nos. 03000, 03800, 09750, 09800, 10780, 12800, 14000, 17950, 20300, 21270, 25350, 25400, 26080, 26100, 26230, 27180, 27450, 30500, 36000, 37130, 37200, 47400, 55040, 73550, 77800, 79360, 86300, 93040*

RADIATION SAFETY ASSOC., INC., 19 Pendleton Dr., P.O. Box 107, Hebron, CT 06248-0107. Contact: Paul Steinmeyer (860/228-0487, Fax: 860/228-4402, E-mail: prstein@radpro.com). Web site: www.radpro.com
Code Nos. 09800, 14000, 17950, 20300, 20350, 26230, 37200, 44000, 55040, 67380, 77750, 84600, 86300, 93040*

♦ **RADIATION SAFETY & CONTROL SERVICES, INC.**, 91 Portsmouth Ave., Stratham, NH 03885. Contact: Jennifer Collins (603/778-2871 x222, 800/525-8339, Fax: 603/778-6879, E-mail: jacollins@radsafety.com). Web site: www.radsafety.com
Code Nos. 03180, 03200, 03800, 04000, 09800, 10850, 12800, 14000, 14300, 17950, 20300, 25250, 25300, 26230, 27450, 37130, 37160, 40900, 41000, 55040, 67380, 68950, 86300, 86400, 93040*

(See advertisement on page 73)

RADIOLOGICAL SOLUTIONS, INC., 1840 Moen Ave., Suite A, Rockdale, IL 60436. Contact: Richard Kohlmann (815/207-4300, Fax: 815/207-4333, E-mail: rkohlmann@radiologicalsolutions.com). Web site: www.radiologicalsolutions.com
Code Nos. 04000, 14000, 20350, 26080, 27180, 27450, 37200, 37600, 53950, 54750, 55040, 64750, 67380, 68000, 74150, 86300, 93040

RADWASTE SOLUTIONS MAGAZINE, 555 N. Kensington Ave., La Grange Park, IL 60526. Contact: Tim Gregoire (414/530-2455, E-mail: editor@radwastesolutions.org), Jeff Mosses (708/579-8225, 800/682-6397, Fax: 708/352-6464, E-mail: radwastemag@ans.org). Web site: www.ans.org/rs
Code Nos. 40700

◆ **REEF INDUSTRIES, INC.**, 9209 Almeda Genoa Rd., Houston, TX 77075.
Contact: Ray Channell (713/507-4251, 800/231-6074, Fax: 713/507-4295, E-mail: rchannell@reefindustries.com). Stamp Symbols: Meets NFPA 701 Large Scale Test and Certified Incinerable. Web site: www.reefindustries.com
Code Nos. 08800, 11400, 14300, 37130, 64300, 68000, 77800, 81710, 83210, 93040*
(See advertisement on page 85)

REI NUCLEAR, LLC, 1230 Veterans Rd., Columbia, SC 29209. Contact: Mike Anderson (803/851-4700, Fax: 803/851-4701, E-mail: manderson@reinuclear.com). Web site: www.reinuclear.com
Code Nos. 03800, 14000, 14300, 20300, 22700, 53950

REMOTE OCEAN SYSTEMS (ROS), 5618 Copley Dr., San Diego, CA 92111.
Contact: Norman Ruppen (858/565-8500, Fax: 858/565-8808, E-mail: sales@rosys.com). Stamp Symbols: ISO 9001. Web site: www.rosys.com
Code Nos. 08800, 10780, 13400, 13600, 39960, 45550, 73300, 83600

RESEARCH PRODUCTS INTERNATIONAL CORP., 410 N. Business Center Dr., Mt. Prospect, IL 60056. Contact: Stella Jelinek (847/635-7330, 800/323-9814, Fax: 847/635-1177, E-mail: service@rpcorp.com). Web site: www.rpcorp.com
Code Nos. 17950, 26080, 36000, 37130, 77800

REXON COMPONENTS, INC., 24500 Highpoint Rd., Beachwood, OH 44122.
Contact: Dr. M.R. Farukhi (216/292-7373, Fax: 216/292-7714, E-mail: sales@rexon.com). Web site: www.rexon.com
Code Nos. 17950, 37130, 55040, 55060*

R&G LABORATORIES, INC., 217 Hobbs St., Suite 105, Tampa, FL 33619.
Contact: Cheryl Huff (813/643-3513, 866/854-1177, Fax: 813/793-4429, E-mail: cheryl@randglabs.com). Stamp Symbols: 10CFR50 App. B QA/QC program, and ISO 17025. Web site: www.randglabs.com
Code Nos. 03800

RICH INDUSTRIES INC., 2384 Brightwood Rd. S.E., New Philadelphia, OH 44663-6772. Contact: David Patterson (330/339-4113, Fax: 330/339-1166, E-mail: davepatterson@richindustriesinc.com). Web site: www.richindustriesinc.com
Code Nos. 10850, 10900, 14300, 37130, 64300, 77800, 78700, 83210*

RIVER TECHNOLOGIES, LLC, 2107 Graves Mill Rd., Suite A, Forest, VA 24551-4293. Contact: Robert Kozma (434/525-4734, Fax: 434/525-7058, E-mail: robert@rivertechnologies.biz). Web site: www.rivertechnologies.biz
Code Nos. 03000, 10780*

◆ **ROBATEL TECHNOLOGIES LLC**, 5115 Bernard Dr., Suite 304, Roanoke, VA 24018. Contact: Dominique Sanchette (E-mail: dsanchette@robateletech.com), Donna Martin (E-mail: dmartin@robateletech.com). Stamp Symbols: NQA-1, Part 71, 10CFR50 Part B. Web site: www.robateletech.com
Code Nos. 14000, 14300, 20300, 36000, 47400, 47600, 55490, 68000, 72300, 77800, 81710, 83150
(See advertisement on page 72)

ROCKWELL AUTOMATION, INC., 1201 S. Second St., Milwaukee, WI 53204-2496. Contact: Product Information (414/382-2000, 888/382-1583, Fax: 414/382-4444, E-mail: webmaster@rockwellautomation.com). Web site: www.rockwellautomation.com
Code Nos. 03200, 12800, 12900, 14000, 19700, 25000, 26080, 40050, 40900, 41000, 47620, 63400, 72300, 84150, 84600

ROLLS-ROYCE, 6546 Pound Rd., Williamson, NY 14589. Contact: Bradley Delacroix (315/589-4000, E-mail: bradley.delacroix@rolls-roycenuclear.com). Stamp Symbols: NS, U, NPT ASME Section III (including NQA-1) ASME Section VIII. Web site: www.rolls-royce.com/nuclear
Code Nos. 12900, 13850, 14000, 26910, 41000, 41200, 47400, 53950, 56600, 61570, 72300, 73300, 83600, 84600, 92300, 92800*

◆ Denotes Advertiser

RSCC WIRE & CABLE LLC, 20 Bradley Park Rd., East Granby, CT 06026.
Contact: Carol Grosso (860/653-8315, 800/327-7625, Fax: 860/653-8301, E-mail: carol.grosso@r-scc.com). Web site: www.r-scc.com
Code Nos. 08800, 95900

RSO, INC./RADIATION SERVICE ORGANIZATION, 5204/5206 Minnick Rd., Laurel, MD 20707. Contact: David Wellner (301/953-2482, 888/723-5463, Fax: 301/498-3017, E-mail: radmaterials@rsoinc.com), Steve McDaniel (301/953-2482, 888/RAD-LINE, Fax: 301/498-3017, E-mail: sales@rsoinc.com). Web site: www.rsoinc.com
Code Nos. 09800, 10850, 14000, 14300, 17950, 20300, 20350, 26100, 26230, 37130, 37200, 55040, 55060, 67380, 77800, 79370, 83110, 83210, 84600, 86300, 87000, 93040

RTCA-RADON TESTING CORP. OF AMERICA, INC., 2 Hayes St., Elmsford, NY 10523. Contact: Nancy Bredhoff (914/345-3380, 800/457-2366, Fax: 914/345-8546, E-mail: info@rtca.com). Stamp Symbols: Certification by NRSB, NYSDOH ELAP. Web site: www.rtca.com
Code Nos. 55040

RUSSTECH LANGUAGE SERVICES, INC., 1338 Vickers Rd., Tallahassee, FL 32303. Contact: Kimberly Williams (850/562-9811, Fax: 866/434-9815, E-mail: kwilliams@russtechinc.com). Web site: https://www.russtechinc.com
Code Nos. 40700, 86900

SARCOS CORP., 360 Wakara Way, Salt Lake City, UT 84108-1214. Contact: Fraser M. Smith (801/231-3297, 888/927-7296, Fax: 801/582-0748, E-mail: info@sarcos.com). Web site: www.sarcos.com
Code Nos. 12800, 72300

SARGENT & LUNDY LLC, 55 E. Monroe St., Chicago, IL 60603-5780. Contact: Mike Launi (312/269-6113, E-mail: clauni@sargentlundy.com). Stamp Symbols: ISO 9001:2015. Web site: www.sargentlundy.com
Code Nos. 03800, 13850, 14000, 20300, 26100, 37200, 40900, 56600, 67380, 68000, 71190, 75600, 77750, 81680, 81710, 86300, 86500, 93040

SCHNEIDER ELECTRIC GUTOR TECHNOLOGIES, 12121 Wickchester Ln., Suite 400, Houston, TX 77079. Contact: Michael May (865/230-3582, E-mail: michael.may@schneider-electric.com). Stamp Symbols: Approved 10CFR50 App. B and NQA-1 Quality Program. ISO 9001/2008 Certification by Bureau Veritas NQA-1 Dedication of Firmware for Safety Class Applications. Web site: www.gutor.com
Code Nos. 63400*

SCHUTTE AND KOERTING, 2510 Metropolitan Dr., Trevese, PA 19053.
Contact: Caroline Nelson (215/639-0900, 800/752-8558, Fax: 215/639-1597, E-mail: sales@s-k.com). Stamp Symbols: ASME UPV Section VIII. Web site: www.s-k.com
Code Nos. 47400, 64750, 90100, 90600, 90800, 91260, 91380*

SEAFAB METALS CO., (Div. of The Doe Run Co.), 1112 N. VIP Blvd., Casa Grande, AZ 85122. Contact: Jami Clay (520/421-3051, 800/426-7082, Fax: 520/421-3222, E-mail: jclay@seafab.com). Web site: www.seafab.com
Code Nos. 14300, 59800

◆ **SECUR**, 409 Broad St., Suite 250, Sewickley, PA 15143. Contact: Danielle Scherer (412/506-8250 x104, 888/484-4031, Fax: 412/535-7393, E-mail: danielle.scherer@securllc.com), Ken Grumski (412/506-8250 x102, 888/484-4031, Fax: 412/535-7393, E-mail: ken@securllc.com). Stamp Symbols: Women Business Enterprise Certification from the Utility Supplier Diversity Program of the California Public Utilities Commission; ANSI/ASME NQA.1 Lead Auditor on staff; Radiation Worker Training. Web site: www.securllc.com
Code Nos. 03800, 09950, 14000, 14300, 20300, 68000, 87000, 93040*
(See advertisement on page 67)

S.E. INTERNATIONAL, INC., 436 Farm Rd., P.O. Box 39, Summertown, TN 38483-0039. Contact: Beth Cramer (931/964-3561, 800/293-5759, Fax: 931/964-3564, E-mail: radiationinfo@seintl.com). Web site: www.seintl.com
Code Nos. 17950, 37130, 55040, 55060*

SENSOR NETWORKS, INC., (formerly Prevision Systems LLC), 176-500 Technology Dr., Boalsburg, PA 16827. Web site: www.sensornetworksinc.com
Code Nos. 12800, 47400, 47600, 72300, 73300, 83600, 84150, 86130*

SENTRY EQUIPMENT, 966 Blue Ribbon Cir. N., Oconomowoc, WI 53066.
Contact: Erik Bleske (262/567-7256, Fax: 262/567-4523, E-mail: marketing@sentry-equip.com). Stamp Symbols: U, ASME - Section VIII, Div. 1. ISO 9001:2008 certified. Web site: www.sentry-equip.com
Code Nos. 04000, 09800, 17650, 74320*

S&G ENTERPRISES, INC., N115 W19000 Edison Dr., Germantown, WI 53022-3024. Contact: Mark J. Griffith (262/251-8300, 888/726-3528, Fax: 262/251-1616, E-mail: info@ramflat.com). Web site: www.ramflat.com
Code Nos. 11680, 11700, 68000

SHIPSROCK CONSULTING, LLC, 1636R Drift Rd., Westport, MA 02790. Contact: Russell Mellor (860/573-5521, Fax: 877/861-4904, E-mail: mellor.russ@gmail.com).
Code Nos. 03800, 14000, 14300, 17950, 20300, 20700, 86300

SIDUS SOLUTIONS LLC, 7352 Trade St., San Diego, CA 92121. Contact: Leonard Pool (619/275-5533 x306, Fax: 619/275-5544, E-mail: l.pool@sidus-solutions.com), Larry Hagstrom (619/275-5533 x302, Fax: 619/275-5544, E-mail: l.hagstrom@sidus-solutions.com). Web site: www.sidus-solutions.com
Code Nos. 08800, 14000, 45550, 54750, 72300, 73300, 75850, 83600, 92800, 93040*

SIEMENS PLM SOFTWARE, 60 Broadhollow Rd., Melville, NY 11747. Contact: 631/549-2300, E-mail: info@cd-adapco.com. Web site: siemens.com/mdx
Code Nos. 03800, 12800, 14000

SIEMENS POWER GENERATION SERVICES, 4400 Alafaya Trl., Orlando, FL 32826-2399. Contact: Product Information (407/736-2000, Fax: 407/736-3131, E-mail: support.energy@siemens.com). Stamp Symbols: Certification by ISO 9000/ISO 9001. Web site: www.usa.siemens/energy
Code Nos. 14000, 19700, 26100, 37130, 37200, 55060, 86300

SIEMENS PROCESS INDUSTRIES AND DRIVES, (Industry Automation Div.), (Process Instrumentation & Analytics), 155 Plant Ave., Hauppauge, NY 11788. Contact: Product Information (631/231-3600, 800/275-8479 or 800/241-4453, Fax: 631/231-3334, E-mail: helpline.sii@siemens.com). Web site: www.usa.siemens.com/industry
Code Nos. 03200, 09800, 17950, 40050, 84150, 84600*

SKOLNIK INDUSTRIES, 4900 S. Kilbourn Ave., Apt. 2302, Chicago, IL 60632. Contact: Dean Ricker (773/735-0700, Fax: 773/735-7257, E-mail: dean@skolnik.com). Web site: www.skolnik.com
Code Nos. 14300, 68000

HOWARD L. SOBEL, P.E., 3061 David Ct., Oceanside, NY 11572. Contact: Howard L. Sobel (516/536-0199, Fax: 516/536-7691, E-mail: hlsobelp@aol.com).
Code Nos. 03800, 14000, 37200, 40900, 86300

SONIC SYSTEMS INTERNATIONAL, INC., 1880 S. Dairy Ashford, Suite 207, Houston, TX 77077. Contact: Haley Littleton (281/531-7611, 800/417-4490, Fax: 281/531-6621, E-mail: hlittleton@ssi-group.net). Web site: www.ssi-group.net
Code Nos. 25400, 30500, 37200, 40900, 56600, 86300, 92800, 93040*

SOURIAU, 209 Blue Ridge Dr., Greer, SC 29651. Contact: Chris Eason (864/354-8067, E-mail: ceason@souriau.com). Web site: www.souriau.com/nuclear/
Code Nos. 13400, 26910

SOUTHWEST MICROWAVE, INC., (Security Systems Div.), 9055 S. McKemy St., Tempe, AZ 85284-2946. Contact: Tom Wallace (480/783-0201, Fax: 480/783-0401, E-mail: infossd@southwestmicrowave.com). Web site: www.southwestmicrowave.com/ssd
Code Nos. 03180, 03200, 14000, 75850

SOUTHWEST RESEARCH INSTITUTE, Attn: Business Inquiries, P.O. Drawer 28510, San Antonio, TX 78228-0510. Contact: Business Inquiries (210/522-2122, Fax: 210/522-3496, E-mail: ask@swri.org). Stamp Symbols: SNT-TC-1A, ISO-9001, ISO-17025, ISO-17020, NELAC, 10CFR50 App. B (part 21), NQA-1, 10CFR71 Subpart H. Web site: www.swri.org
Code Nos. 03800, 09800, 11400, 12800, 14000, 37200, 40900, 56600, 72300, 73620, 77750, 84600, 86300, 93040

THE SPENCER TURBINE CO., 600 Day Hill Rd., Windsor, CT 06095-4706. Contact: J. C. Cayne (860/688-8361, 800/232-4321, Fax: 860/688-0098, E-mail: marketing@spencer-air.com). Stamp Symbols: N, NPT, Classes 1, 2, 3. Web site: www.spencerturbine.com
Code Nos. 03000, 10780, 68000, 90100

◆ **SSM INDUSTRIES, INC.**, 3401 Grand Ave., Pittsburgh, PA 15225-1507. Contact: Matt Gorman (412/777-5101, Fax: 412/771-5382, E-mail: mgorman@ssmi.biz). Web site: www.ssmi.biz
Code Nos. 03000, 03800, 12800, 19450, 27180, 32250, 83150, 90250

(See advertisement on page 60)

STANDISH TECHNOLOGIES INTERNATIONAL, 1005 Ashby C, Deerfield Beach, FL 33442. Contact: Neil Passman (786/664-6776, Fax: 954/697-0311, E-mail: neilp@standtech.com). Web site: www.standtech.com
Code Nos. 37200

STAPLEX - AIR SAMPLER DIV., 777 Fifth Ave., Brooklyn, NY 11232-1626. Contact: Phil Reed (718/768-3333, 800/221-0822, Fax: 718/965-0750, E-mail: info@staplex.com). Web site: www.staplex.com
Code Nos. 55040, 74150*

STEELE BODY COOLING VESTS, P.O. Box 7304, 26112 Iowa Ave. N.E., Kingston, WA 98346. Contact: Lynn Steele (360/297-4555, 888/783-3538, Fax: 360/297-2816, E-mail: steelevest@gmail.com). Web site: www.steelevest.com
Code Nos. 10850, 10900, 37130*

STOLLER NEWPORT NEWS NUCLEAR (SN3), (A sub. of Huntington Ingalls Industries), 105 Technology Dr., Suite 190, Broomfield, CO 80021. Contact: Geoff Asmus (303/546-4300, 800/841-5599, Fax: 303/443-1408, E-mail: gasmus@hii-sn3.com). Web site: www.stoller.com
Code Nos. 03800, 14000, 14300, 20300, 26100, 37200, 40700, 47620, 67380, 93040

STRATEGIC PACKAGING SYSTEMS, 276 Warren St., P.O. Box 1116, Madisonville, TN 37354. Contact: Elisha Davis (423/545-9505, Fax: 423/545-9525, E-mail: elisha.davis@sponline.biz). Web site: www.sponline.biz
Code Nos. 14300, 64300, 68000

STUDSVIK, INC., 5605 Glenridge Dr., Suite 705, Atlanta, GA 30342. Web site: https://www.studsvik.com/our-solutions/consultancy--engineering/engineering/
Code Nos. 12800, 13850, 14000, 14300, 20300, 53950, 68000, 87000, 93040

STUDSVIK SCANDPOWER, 101 N. 3rd St., Suite 202, Wilmington, NC 28401. Contact: W. A. "Art" Wharton (857/279-2248, E-mail: art.wharton@studsvik.com). Stamp Symbols: NQA-1. Web site: www.studsvik.com/sp
Code Nos. 14000, 30040

SYMPHOTIC TII CORP., 880 Calle Plano, Unit K, Camarillo, CA 93012. Contact: J. Roberts (805/484-6639, Fax: 805/484-9012, E-mail: info@symphotic.com). Web site: www.symphotic.com
Code Nos. 73300, 73620, 92800*

SYSTEM ONE, 210 Sixth Ave., Suite 3100, Pittsburgh, PA 15222. Contact: Mark Fenske (412/995-1900, 877/505-SYS1(7971), Fax: 412/995-1901, E-mail: marketing@systemone.com). Web site: www.systemone.com
Code Nos. 09800, 14000, 25400, 40900, 44000, 56600, 84150, 84600, 86300, 86400

TAG TECHNICAL SOLUTIONS, LLC, 12104 Brookstone Dr., Knoxville, TN 37934. Contact: Barbara Strand (865/712-1806, E-mail: barb@strand.com). Web site: www.tagtechnicalsolutions.com
Code Nos. 14300

TECHNICAL ASSOCIATES, (US Nuclear Corp), (Overhoff Technology Corp. Division), 7051 Eton Ave., Canoga Park, CA 91303. Contact: Wanda Magill (818/883-7043, Fax: 818/883-6103, E-mail: wanda@tech-associates.com), Robert Goldstein (818/883-7043, Fax: 818/883-6103, E-mail: rgoldsteinta@gmail.com). Stamp Symbols: ISO 9001, CE Mark. Web site: www.tech-associates.com
Code Nos. 17950, 26080, 26230, 55040, 55060, 67380*

TECHNICAL MANAGEMENT SERVICES, INC., P.O. Box 226, New Hartford, CT 06057. Contact: Robin Rivard (860/738-2440, Fax: 860/738-9322, E-mail: rrivard@tmscourses.com). Web site: www.tmscourses.com
Code Nos. 37200, 86400, 86500

TECH PRODUCTS, INC., 105 Willow Ave., Staten Island, NY 10305. Contact: Daniel D. O'Connor (718/442-4900, 800/221-1311, Fax: 718/442-2124, E-mail: doconnor@techproducts.com). Web site: www.techproducts.com
Code Nos. 37130, 47630*

TELEDYNE BROWN ENGINEERING, INC., 300 Sparkman Dr., Huntsville, AL 35805. Contact: Jessica Sanders (256/726-1385, E-mail: jessica.sanders@tbe.com). Stamp Symbols: NQA-1; 10CFR50 App. B; QA Criteria for Nuclear Power Plants, Fuel Reprocessing Plants; N Stamp, Nuclear Components, N-2983 NPT Stamp, Nuclear Partials, N-2984 U Stamp, Pressure Vessels, 33,360 and 41,018 UM Stamp, Miniature Vessels, 41,355 and 41,356 R Stamp, Repairs, R-2240 NS Certificate, Nuclear Supports SEI CMMI Maturity Level 3 Appraised AS9100C, Third-Party Registered (Aerospace) NASA SSP 41173 Space Station QA ISO 9001:2008, Third-Party Registered. Web site: www.tbe.com
Code Nos. 03800, 04000, 13400, 20300, 20350, 36000, 37200, 44000, 84600, 92300, 93040

TELETRIX, 2000 Golden Mile Hwy., Suite C, Pittsburgh, PA 15239. Contact: Michael Podobnik (412/798-3636, Fax: 412/798-3633, E-mail: info@teletrix.com). Web site: teletrix.com
Code Nos. 86300*

TERAHERTZ TECHNOLOGIES, INC., 169 Clear Rd., Oriskany, NY 13424. Contact: Donald Biron (315/736-3642, Fax: 315/736-4078, E-mail: sales@terahertztechnologies.com). Web site: www.terahertztechnologies.com
Code Nos. 12900, 19700, 75850, 84150

TFE, INC., 1114 Ridgecrest Ave., North Augusta, SC 29841. Contact: Laura McKie (803/279-0331, E-mail: lmckie@tfeinc.net). Web site: www.tfeinc.net
Code Nos. 03800, 12800, 13850, 14000, 20300, 37200, 40900, 71190, 86300, 87000, 93040

◆ **THERMO FISHER SCIENTIFIC**, One Thermo Fisher Way, Oakwood Village, OH 44146. Contact: Rich Palatine (770/703-9933, 800/274-4212, E-mail: rich.palatine@thermofisher.com). Web site: www.thermofisher.com/radiationmeasurement
Code Nos. 03200, 03800, 04000, 09750, 09800, 10850, 10900, 12800, 17950, 19700, 20000, 25250, 25350, 26080, 26230, 36000, 37130, 37200, 44000, 47400, 55040, 55060, 58000, 73300, 74150, 75850

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◆ **THERMO SCIENTIFIC - CIDTEC CAMERAS & IMAGERS**, (Part of Thermo Fisher Scientific), 101 Commerce Blvd., Liverpool, NY 13088. Contact: Tony Chapman (315/451-9410, 800/888-8761, Fax: 315/451-9421, E-mail: sales.cidtec@thermofisher.com). Web site: www.thermofisher.com/cidtec
Code Nos. 40900, 73300, 75850, 83600, 92800*

(See advertisement on page 91)

TIOGA PIPE SUPPLY CO., INC., 2450 Wheatshaf Ln., Philadelphia, PA 19137. Contact: Jeff Shaw (215/831-0700, 800/523-3678, Fax: 215/533-1645, E-mail: jshaw@tiogapipe.com). Stamp Symbols: ASME QSC 467; Classes 1, 2, 3 MC. Certification by ISO 9001-2015, 10CFR50, App. B., NQA-1, MIL-I-45208A Level 1. Web site: www.tiogapipe.com
Code Nos. 26900, 59800, 59850

TLG SERVICES, INC., (Affl. of Entergy Corp.), 148 New Milford Rd. E., Bridgewater, CT 06752-1123. Contact: Caren Vickery (860/355-2300, Fax: 860/355-2705, E-mail: vickery@tlgservices.com), Lori A. Glander (860/355-2300, Fax: 860/355-2705, E-mail: glander@tlgservices.com). Web site: www.tlgservices.com
Code Nos. 03800, 14000, 20300, 37200, 86300

TRANSCO PRODUCTS INC., 200 N. LaSalle St., Suite 1550, Chicago, IL 60601. Contact: Ed Wolbert (312/896-8501, E-mail: edwolbert@transcoproducts.com). Code Nos. 14000, 17950, 20300, 26230, 37130, 41200, 47400, 47620, 53950, 55040, 77800, 86300, 86500, 93040

TRANSPORT PLANNING & SERVICES INT'L. INC., P.O. Box 184, Mullica Hill, NJ 08062. Web site: www.transportplanning.com
Code Nos. 14300

TRI TOOL INC., 3041 Sunrise Blvd., Rancho Cordova, CA 95742-6502. Contact: Bill Atkinson (916/288-6100, 800/345-5015, Fax: 916/288-6160, E-mail: b.atkinson@tritool.com). Web site: www.tritool.com
Code Nos. 14000, 26230, 26240, 47400, 59850, 68000, 72300, 86300, 93900*

TSSD SERVICES, INC., 79 Aviator Pl., Oakland, ME 04963. Contact: Jennifer Wood (877/965-8773 x2, Fax: 207/221-1306, E-mail: jwood@tssdservices.com). Web site: www.tssdservices.com
Code Nos. 14000, 20300, 25400

UNDERWATER CONSTRUCTION CORP., 110 Plains Rd., P.O. Box 699, Essex, CT 06426. Contact: Philip McDermott (860/767-8256, 800/USA-DIVE, Fax: 860/767-0612, E-mail: pmcdermott@uccdive.com). Web site: www.uccdive.com
Code Nos. 20300, 22700, 40900, 56600, 66280, 72300, 90100, 92800, 93040*

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UNDERWATER ENGINEERING SERVICES, INC., (Nuclear Services Div.), 3306 Enterprise Rd., Unit 103, Fort Pierce, FL 34982-8435. Contact: Charlie Vallance (772/337-3116, 877/348-3837, Fax: 772/429-9990, E-mail: cvallance@uesi.com), Rex Wamsher (772/337-3116, 877/348-3837, Fax: 772/429-9990, E-mail: rwamsher@uesi.com). Stamp Symbols: ADCI Certified Commercial Divers, ANSI N45.2.6 Certified Inspections, ASNT SNT-TC-1A, CP-189; Certified NDE (ASME XI exams), ASME IX, XI, II Certified Welding, Coatings and Corrosion Engineers. Web site: www.uesi.com
Code Nos. 10780, 11400, 14000, 20300, 20350, 22700, 26230, 27450, 40900, 47400, 56600, 73300, 73620, 79360, 83600, 84600, 86300, 92800, 93040, 93900*

◆ **UNITECH SERVICES GROUP, INC.**, (Sub. of UniFirst Corp.), 138 Longmeadow St., Suite 202, Longmeadow, MA 01106. Contact: Gregg Johnstone (413/543-6911 x146, 800/344-3824, Fax: 413/543-2975, E-mail: gjohnstone@unitechus.com). Web site: www.unitechus.com
Code Nos. 10850, 10900, 14300, 20300, 20350, 26230, 26600, 37130, 37160, 37200, 45550, 47630, 55040, 55060, 68000, 73550, 74350, 79370, 81680, 83210, 86260, 93040, 95850*

(See advertisement on pages 64 and 75)

US ECOLOGY, INC., 17440 College Pkwy., Suite 300, Livonia, MI 48152. Contact: Dave Crumrine (734/521-8032, 800/592-5489, Fax: 734/521-8141, E-mail: dave.crumrine@usecology.com). Web site: www.usecology.com
Code Nos. 20300, 20350, 20700, 47400, 87000, 93040

UTICOM SYSTEMS, INC., 109 Independence Way, Coatesville, PA 19320. Contact: Bob Thompson (610/857-2655, 800/548-5321, Fax: 610/857-2986, E-mail: graphics@uticom.net), Trever McLaughlin (610/857-2655, 800/548-5321, Fax: 610/857-2986, E-mail: trever@uticom.net). Stamp Symbols: IEEE-323; US RegGuide 1-38, ANSI N45-2. Certified incinerable. Web site: www.uticom.net
Code Nos. 00300*

VALCOR ENGINEERING CORP., (Valcor Nuclear)(Valcor), 2 Lawrence Rd., Springfield, NJ 07081. Contact: Steve Gatcomb (973/467-8400, Fax: 973/218-1819, E-mail: nuclear@valcor.com), Thien Nguyen (973/467-8400, Fax: 973/218-1819, E-mail: tnguyen@valcor.com). Stamp Symbols: N Stamp, NPT Stamp, ASME Sec III Classes 1, 2, 3. Certification by ANSI N45.2 App. B 10CFR50; ISO 9001. Web site: www.valcor.com
Code Nos. 47400, 75190, 84150, 90250, 90600, 90800, 91000, 91260*

VEOLIA NUCLEAR SOLUTIONS, 1333 W. 120th Ave., Suite 313, Westminster, CO 80234. Contact: Charles Melcher (E-mail: charles.melcher@veolia.com). Stamp Symbols: NQA-1 2008/2009 Addendum; ISO 9001. Web site: www.nuclearsolutions.veolia.com
Code Nos. 03800, 13850, 14000, 40900, 41700, 47400, 53950, 68000, 72300, 73620, 77750, 87380, 87395, 87400, 93040

(Alaron Nuclear Services, Kurion), 2138 State Rt. 18, Wampum, PA 16157. Contact: Jeffrey Stahl (724/535-5777, E-mail: jeffrey.stahl@veolia.com). Web site: www.nuclearsolutions.veolia.com
Code Nos. 10780, 14000, 20300, 20350, 25600, 47400, 68000, 73620, 79360, 81680, 84600, 93040*

◆ **VIGOR (FORMERLY OREGON IRON WORKS)**, 9700 SE Lawnfield Rd., Clackamas, OR 97015. Contact: Brian Akin (503/799-4831, E-mail: sales@vigor.net), Nicole Coons (503/653-6300, E-mail: sales@vigor.net). Stamp Symbols: ASME N, NA, NS, NPT, U, U2. Web site: vigor.net
Code Nos. 03000, 09730, 09950, 14300, 22430, 24170, 30500, 36000, 37600, 66280, 68000, 78700, 81710, 83150, 92300

(See advertisement on page 79)

◆ **WAGSTAFF APPLIED TECHNOLOGIES**, 3910 N. Flora Rd., Spokane, WA 99216. Contact: Dan Payne (509/321-3184, Fax: 509/924-0241, E-mail: dan.payne@wagstaff.com). Stamp Symbols: ASME U-Stamp, ASME NQA-1 2008 w/2009 addenda. Web site: www.wagstaffat.com
Code Nos. 14300, 36000, 37600, 53950, 66280, 68000, 77800, 79360, 81710, 83150, 87380, 92300, 93900

(See advertisement on page 78)

WALLACE CRANES, 71 N. Bacton Hill Rd., Malvern, PA 19355-1005. Contact: Bart J. Sunderland (610/647-1400 x300, 800/553-5438 x300, Fax: 610/644-9043, E-mail: barts@wallacecranes.com). Web site: www.wallacecranes.com
Code Nos. 18600

WASTE CONTROL SPECIALISTS LLC, 9998 W. State Hwy. 176, Andrews, TX 79714. Contact: Steve Ferguson (513/560-1744, E-mail: sferguson@wcstexas.com), Dan Burns (214/662-5422, E-mail: dburns@wcstexas.com). Web site: www.wcstexas.com
Code Nos. 87000, 93040*

WASTE CONTROL SYSTEMS, INC., 2835 Merrymans Mill Rd., Phoenix, MD 21131-1631. Contact: William Fannon (410/252-9360, 877/252-9360, Fax: 410/252-9362, E-mail: wpf@wastecontrol.com). Web site: www.wastecontrol.com
Code Nos. 11700, 14300, 68000

WATERS EQUIPMENT, 966 Blue Ribbon Cir. N., Oconomowoc, WI 53066. Contact: Erik Bleske (262/354-6243, E-mail: marketing@sentry-equip.com). Stamp Symbols: U, ASME - Section VIII, Div. 1 ISO 9001:2008 Certified. Web site: www.waterequipment.com
Code Nos. 04000, 54750, 74150

WATERWORKS AMERICA, INC., Crown Centre 6th Floor, 5005 Rockside Rd., Independence, OH 44131. Contact: Lynn Altmayer (440/526-4815, E-mail: saltmayer@lwater.com). Web site: www.lwater.com
Code Nos. 93040

WD ASSOCIATES, INC., P.O. Box 187, Whiteford, MD 21160-0187. Contact: Frederic Lake (623/249-0871, Fax: 410/452-0062, E-mail: fdlake@teamwd.com). Web site: www.teamwd.com
Code Nos. 03800, 14000, 86500

WEED INSTRUMENT CO., INC., (d/b/a Ultra Electronics, Nuclear Sensors & Process Instrumentation), P.O. Box 300, Round Rock, TX 78680. Contact: Jessica Harper (512/987-4587, E-mail: jessica.harper@ultra-nspi.com). Stamp Symbols: IEEE 323, IEEE 344, ASME Code N Stamp, ASME Code NPT Stamp, ASME Code NS Stamp. Web site: ultra-nspi.com
Code Nos. 26970, 40050

WESCHLER INSTRUMENTS, (Div. of Hughes Corp.), 16900 Foltz Pkwy., Cleveland, OH 44149-5500. Contact: Gerald Lucak (440/238-2550, 800/557-0064, Fax: 440/238-0660, E-mail: sales@weschler.com). Web site: www.weschler.com
Code Nos. 20000, 25000, 40050, 54750

◆ **WESTINGHOUSE ELECTRIC CO. LLC**, 1000 Westinghouse Dr., Cranberry Township, PA 16066. Contact: Keith Mahosky (724/814-9698, E-mail: mahoskkj@westinghouse.com). Stamp Symbols: ASME N, NPT and NA. Certification by ISO 9001. Web site: www.westinghouse.com
Code Nos. 03800, 14000, 14300, 20300, 20350, 20700, 25300, 25400, 30500, 37200, 40050, 40900, 53950, 54750, 55490, 56600, 61570, 66280, 68000, 75190, 77750, 79360, 81710, 84150, 84600, 86300, 92300, 93040, 93900*
(See advertisement on Cover 4)

WHELEN ENGINEERING CO., INC., (Mass Notification Products), 51 Winthrop Rd., Chester, CT 06412-0684. Contact: Chris Schaefer (860/526-9504, 800/637-4736, Fax: 860/526-4784, E-mail: iow-sales@whelen.com). Web site: www.whelen.com
Code Nos. 03200, 11650, 25300, 25350

WHITING CORP., 26000 S. Whiting Way, Monee, IL 60449-8160. Contact: Dave Weber (800/255-8594, Fax: 708/587-2001, E-mail: dweber@whitingcorp.com). Stamp Symbols: 10CFR50 Appendix B, ISO 9001:2015. Web site: www.whitingcorp.com
Code Nos. 03800, 09730, 68000, 87000*

WILLIAMS INDUSTRIAL SERVICES GROUP, LLC, (Williams Plant Services, LLC), (Williams Specialty Services, LLC), 100 Crescent Centre Pkwy., Suite 1240, Tucker, GA 30084. Contact: Loren Monty (770/879-4463, 866/851-4078, Fax: 855/814-7885, E-mail: lmonty@wisgrp.com). Stamp Symbols: ASME R Certification - Repair Vessels & Heat Exchangers; ASME A Certification - Assembly of Power Boilers. Web site: www.wisgrp.com
Code Nos. 06790, 11400, 20300, 20700, 25400, 47400, 83110

WMG, INC., 16 Bank St., Peekskill, NY 10566. Contact: Dan Davis (914/736-7100, E-mail: ddavis@wmginc.com), Mark Ping (803/542-0221, E-mail: mping@wmginc.com). Stamp Symbols: Approved 10CFR50 App. B QA Program, including NQA-1, Part II, Subpart 2.7. NUPIC audited and approved. Web site: www.wmginc.com
Code Nos. 03800, 12800, 14000, 14300, 20300, 20350, 37200, 68000, 71190, 77750, 79360, 86300, 86500, 93040*

◆ **WM SYMPOSIA**, P.O. Box 27646, Tempe, AZ 85285. Contact: Gary Benda (480/557-0263, Fax: 520/829-3550, E-mail: gbenda@wmarizona.org). Web site: www.wmsym.org
Code Nos. 86300

(See advertisement on page 53)

◆ **WOOD**, (Environment & Infrastructure Solutions, Inc.), (Radiological Services & Engineering Group), 2275-A Logos Ct., Grand Junction, CO 81505. Contact: Steve Rima (970/208-8396, Fax: 970/256-7356, E-mail: steve.rima@woodplc.com). Web site: www.woodplc.com
Code Nos. 14000, 20300, 37200, 67380, 68000, 93040
(See advertisement on page 97)

WORLEYPARSONS, 2675 Morgantown Rd., Reading, PA 19607. Contact: Curt Jurgens (610/855-3132, Fax: 610/855-2602, E-mail: curtis.jurgens@worleyparsons.com), Bruno Bombay (610/855-2232, Fax: 610/855-2602, E-mail: bruno.bombay@worleyparsons.com). Web site: www.worleyparsons.com
Code Nos. 03800, 13850, 14000, 20300, 37200

WORTHINGTON INDUSTRIES, 200 Old Wilson Bridge Rd., Columbus, OH 43085. Contact: 800/338-8265. Stamp Symbols: Certifications include ISO 9001:2015 and NQA-1, Lloyds Register Quality Assurance programs and ASME Section VIII, Div. 1 U & P stamps, plus National Boiler & Pressure Vessel Inspectors R stamp for pressure vessels. Web site: www.worthingtonindustries.com
Code Nos. 03800, 14300, 40900, 47400, 56600, 59850, 68000, 77800, 83150, 92300*

WYNSOR, 221 25th St., Ogden, UT 84401. Contact: Lea Ann Rodriquez (888/996-7671, Fax: 888/996-7672, E-mail: la@wysor.com). Web site: www.wysor.com
Code Nos. 12800, 14000, 20300, 20350, 37200, 86300, 93040

WYSSMONT CO., 1470 Bergen Blvd., Fort Lee, NJ 07024-2197. Contact: J. Bevacqua (201/947-4600, Fax: 201/947-0324, E-mail: sales@wyssmont.com). Web site: www.wyssmont.com
Code Nos. 09730, 24170*

ZACHRY NUCLEAR ENGINEERING, INC., 14 Lords Hill Rd., Stonington, CT 06378. Contact: Bob Atkisson (860/405-3066, Fax: 860/535-9200, E-mail: atkissonr@zachrygroup.com). Web site: www.zachrygroup.com
Code Nos. 03800, 12800, 13850, 14000, 20300, 25400, 40900, 67380, 75600*

ZETEC, INC., 8226 Bracken Pl. S.E., Suite 100, Snoqualmie, WA 98065. Contact: Customer Services (425/974-2700, 800/643-1771, Fax: 425/974-2701, E-mail: customerservice@zetec.com). Web site: www.zetec.com
Code Nos. 40900, 56600, 86300

Non-U.S. Directory of Suppliers

Austria

INTERNATIONAL ATOMIC ENERGY AGENCY, Wagramer Strasse 5, P.O. Box 100, 1400 Vienna, Austria. Contact: Sophy LeMasurier (+43 1 26000 22417, Fax: +43 1 2600 22417, E-mail: sales.publications@iaea.org). Web site: www.iaea.org
Code Nos. 40700, 86500

Belgium

TECNUBEL-TRANSNUBEL-ECS, Zandbergen 1, 2480 Dessel, Belgium. Contact: Guido Mulier (+32 14 34 6911, Fax: +32 14 32 0090, E-mail: guido.mulier@tecnubel.be), Xavier Bairiot (+32 14 33 11 13, E-mail: xavier.bairiot@transnubel.be). Stamp Symbols: Certification by ISO 9001; VCA; ISO 14000; CEFRI; EDF/UTO. Web site: www.tecnubel.be
Code Nos. 06790, 09800, 20300, 20350, 26230, 47400, 47600, 72300, 73620, 93040

SA TRANSRAD NV, Zoning Industriel - Site IRE, Avenue de l'Esperance, 1, 6220 Fleurus, Belgium. Contact: Gérald Ledoux (+32 71 82 97 58, Fax: +32 71 82 97 68, E-mail: gledoux@transrad.be), Gilles Degauque (+32 71 82 97 61, Fax: +32 71 82 97 68, E-mail: gdegauque@transrad.be). Web site: www.transrad.be
Code Nos. 26230, 86260, 87000

Brazil

NUCLEBRAS EQUIPAMENTOS PESADOS S/A-NUCLEP, Av. Gen. Euclides De Oliveira Figueiredo, 200, Itaguaí - RJ 23825-410, Brazil. Contact: Ricardo Antunes Correa (+55 21 3781-4666, Fax: +55 21 3781-4668, E-mail: ricardoac@nuclep.gov.br). Stamp Symbols: ASME Stamps: U, U-2, R, ASME NPT, NS, NA; Classes 1,2,3, CS & MC. NB Authorization to Register. Certification ISO 9001:2008 BV Certification. CNEN-NN-1.16. Web site: www.nuclep.gov.br
Code Nos. 09730, 14300, 56600, 66280, 83150, 86300, 86400, 92300, 93900

Canada

BUBBLE TECHNOLOGY INDUSTRIES INC., 31278 Hwy. 17, P.O. Box 100, Chalk River, Ontario K0J 1J0, Canada. Contact: Rob Noulty (613/589-2456, Fax: 613/589-2763, E-mail: noultyr@bubbletech.ca). Stamp Symbols: ISO 9001:2015; BTI performs certain radiochemical analyses and survey meter calibrations in accordance with the ISO/IEC 17025:2005 International Standard, General requirements for the competence of testing and calibration laboratories. Please note that BTI is not accredited by a third party. Compliance is confirmed through an internal audit program that meets the requirements of ISO 9001:2015 and ISO/IEC 17025:2005. Web site: www.bubbletech.ca
Code Nos. 17950, 25250, 26080, 26100, 37130, 37200, 55040, 67380, 93040

◆ Denotes Advertiser

CANADIAN NUCLEAR LABORATORIES, 286 Plant Rd., Chalk River, Ontario K0J1P0, Canada. Contact: Denys Elliot (613/584-3311 x45262, E-mail: denys.elliott@cnl.ca). Web site: www.cnl.ca/en/home/default.aspx
Code Nos. 03800, 09750, 17950

INUKTUN SERVICES LTD., 2569 Kenworth Rd., Suite C, Nanaimo, BC V9T 3M4, Canada. Contact: Jeff Christopherson (250/729-8080, 877/468-5886, Fax: 250/729-8077, E-mail: sales@inuktun.com). Web site: www.inuktun.com
Code Nos. 10780, 26230, 45550, 47600, 68000, 73300, 73620, 83600, 84150

KINECTRICS INC., 800 Kipling Ave., Unit 2, Toronto, Ontario M8Z 5G5, Canada. Contact: Cheryl Tasker-Shaw (416/207-6000, Fax: 416/207-6532, E-mail: cheryl.tasker-shaw@kinectrics.com), Lori Mignone (416/207-6000, Fax: 416/207-6532, E-mail: lori.mignone@kinectrics.com). Web site: www.kinectrics.com
Code Nos. 03800, 09800, 12800, 13850, 14000, 20300, 20350, 37200, 44000, 47400, 73620, 76400, 77750, 79370, 84600, 86300, 87000, 87380, 93040

L3 MAPPS, (Power Systems and Simulation), 8565 Cote-de-Liesse, Montreal, Quebec H4T 1G5, Canada. Contact: Sean Bradley (514/787-4999, Fax: 514/788-1442, E-mail: sean.bradley@L3T.com). Web site: www.L3T.com/mapps
Code Nos. 12800, 37200, 71190, 86300, 86500

MARSHIELD, (Div. of Mars Metal Co.), 4140 Morris Dr., Burlington, Ontario L7L 5L6, Canada. Contact: Kevin Milne (905/637-3862, 800/381-5335, Fax: 905/637-8841, E-mail: kmilne@marsmetal.com). Web site: www.marshield.com
Code Nos. 14000, 14300, 47400, 59800, 77750, 77800, 95750

NUVIA DYNAMICS INC., (formerly PICO Envirotec Inc.), 222 Snidercroft Rd., Concord (Toronto), Ontario L4K 2K1, Canada. Contact: Ralph Bose (905/760-9712, Fax: 905/760-9513, E-mail: ralph.bose@nuvia-dynamics.com). Web site: www.nuvia-dynamics.com
Code Nos. 03180, 03200, 04000, 08800, 09750, 12800, 17950, 21270, 25000, 25250, 26080, 26230, 36000, 37130, 39960, 41000, 44000, 47400, 47600, 55040, 55060, 56600, 58000, 68000, 71190, 72300, 74150, 75850, 77750, 77800, 84150, 86130, 86500*

PROMATION NUCLEAR, 2767 Brighton Rd., Oakville L6H 6J4, Canada. Contact: Anna Masarik (905/625-6093, E-mail: masarik.a@promation.com).
Code Nos. 03800, 06950, 08800, 10780, 14000, 14300, 27180, 53950, 68000, 72300, 73620, 81680, 83150, 86130, 92300

PYLON ELECTRONICS INC., (Div. of Autrex) (Instrumentation Dept.), 147 Colonnade Rd., Ottawa, Ontario K2E 7L9, Canada. Contact: Lise Leveille (613/226-7920, 800/896-4439, Fax: 613/226-8195, E-mail: instrument@pylonelectronics.com). Web site: www.pylonelectronics-radon.com
Code Nos. 03200, 17950, 55040, 68950, 76400

REEL COH INC., 801 Curé-Boivin Blvd., Boisbriand, Quebec J7G 2J2, Canada. Contact: Clement Larouche (450/430-6500, 800/363-6501, Fax: 450/430-6611, E-mail: clarouche@reelcoh.com). Web site: www.reel-coh.com
Code Nos. 03800, 04000, 09950

SNC-LAVALIN, 2251 Speakman Dr., Mississauga, Ontario L5K 1B2, Canada. Contact: 905/823-9040, E-mail: nuclear@snc-lavalin.com. Web site: www.snc-lavalin.com/nuclear
Code Nos. 03800, 10780, 13850, 14000, 14300, 17950, 20300, 20350, 30500, 40900, 56600, 67380, 68000, 72300, 75190, 81710, 86300, 87400

TYNE ENGINEERING INC., 730 Darlene Ct., Burlington, Ontario L7L 5V1, Canada. Contact: Vince Robinson (289/288-0490, Fax: 289/288-0493, E-mail: vince.r@tyne-engineering.com). Stamp Symbols: ASME VIII, III, B31.1, B31.3; ISO 9001. Web site: www.tyne-engineering.com
Code Nos. 03200, 03800, 04000, 08800, 09750, 12800, 14000, 17950, 20300, 21270, 21400, 25000, 26080, 32250, 36000, 37200, 37600, 41015, 47400, 53950, 55040, 59850, 60100, 67380, 81680, 84600, 87380, 87395, 87400, 93040

Czech Republic

METOIL, Milady Horakove 116/109, 16000 Praha, Czech Republic. Contact: Igor Voinov (+420774136322, E-mail: voinov@reocol.com). Web site: www.metoil.com
Code Nos. 00400, 14000, 68000, 79370, 86300

SKODA JS A.S., Orlik 266/15, Bolevec, 31600 Plzen, Czech Republic. Contact: David Pavlis (+420 378 042 640, Fax: +420 377 520 600, E-mail: info@skoda-js.cz). Stamp Symbols: ASME Code S. III; N, NPT, NS. Classes 1, 2, 3, & CS, MC (N, NPT) 1, 2, 3 & MC (NS) Certification by ISO 9001:2000, ISO 14001, AD-Merkblatt HP0. Web site: www.skoda-js.cz
Code Nos. 14300, 30500, 40900, 56600, 66280, 81710, 92300

Finland

FORTUM POWER & HEAT OY, NUCLEAR SERVICES, Keilaniementie 1, POB 100, 00048 Espoo, Finland, Finland. Contact: Miko Olkkonen (+358405187535, +358405187535, E-mail: miko.olkkonen@fortum.com). Stamp Symbols: Certification by Quality System, ISO-9001:2000. Web site: www.fortum.com
Code Nos. 03800, 14000, 68000, 86300, 93040

VTT TECHNICAL RESEARCH CENTRE OF FINLAND, P.O. Box 1000, Tietotie 3, Espoo, FI-02044 VTT, Finland. Contact: Erika Holt (+358 20 722 4567, E-mail: erika.holt@vtt.fi), Matti Paljakka (+358 20 722 6423, E-mail: matti.paljakka@vtt.fi). Web site: https://www.vttresearch.com/nuclear
Code Nos. 03800, 04000, 08800, 11400, 12800, 14000, 14300, 20300, 26100, 41000, 44000, 53950, 56600, 58000, 67380, 68000, 68950, 72300, 75600, 86300

France

ANDRA, (Development, Industrial and International Div.), Parc de la Croix Blanche, 1/7 rue Jean Monnet, 92298 Chateaufort Cedex, France. Contact: Richard Poisson (+33 1 46 11 81 27, Fax: +33 1 46 11 82 68, E-mail: richard.poisson@andra.fr). Web site: www.andra.fr
Code Nos. 14000

CEVIDRA, 45 Boulevard Marcel Pagnol, 06130 Grasse, France. Contact: Stéphane Destaing (+33493705831, Fax: +33493772462, E-mail: contact@cevidra.com). Stamp Symbols: ANSM Certified (French National Agency for Medicines and Health Products Safety). Web site: www.cevidra.com/fr/
Code Nos. 20350

CYCLIFE, (Brand of EDF Group), 18, rue du Capitaine Guynemer, 92938 Paris la Défense Cedex, France. Contact: Brassart Ioanna (+33 0044763237357, E-mail: ioanna.brassart@edf.fr). Web site: https://www.cyclife-edf.com/
Code Nos. 03800, 14000, 20300, 20350, 86300, 93040

GETINGE-LA CALHENE, (Sub. of Getinge Group), 1 rue du Comte de Donegal, 41100 Vendome, France. Contact: Christophe Selliez Vandernotte (+33254734747, Fax: +33254734748, E-mail: christophe.selliez@getinge.com). Stamp Symbols: ISO 9001, ISO 14001, CEFRI. Web site: www.getinge.com/nuclear
Code Nos. 10850, 72300, 79360

ONET TECHNOLOGIES, (Sub. of Onet Technologies), 36, boulevard de l'Océan, CS 20280, 13258 Marseille Cedex 9, France. Contact: Albane Lavocat (+33 491 238 615, Fax: +33 491 291 858, E-mail: alavocat@onet.fr). Stamp Symbols: Certification by ISO 9001/14001/OHSAS 18001/CEFRI. Web site: www.onet-technologies.com
Code Nos. 14000, 20300

PHOTONIS, Avenue Roger Roncier, BP 520, 19106 Brive la Gaillarde Cedex, France. Contact: David Dupuy (+33 555 863 795, Fax: +33 555 863 786, E-mail: d.dupuy@photonis.com), Bernard Cantonnet (+33 555 863 735, Fax: +33 555 863 786, E-mail: b.cantonnet@fr.photonis.com). Web site: www.photonis.com/nuclear
Code Nos. 17950*

PREMIUM ANALYSE, 9 Rue de la Fontaine Chaudron, 57140 Norroy Le Veneur, France. Contact: Steve Phillips (+33 640 89 2443, Fax: +33 387 51 3174, E-mail: steve@premium-analyse.com). Web site: www.premium-analyse.com
Code Nos. 03200, 17950, 55040

REMTECH SA, 2-4 Ave de l'Europe, BP 101, 78143 Velizy, Villacoublay Cedex, France. Contact: Sohna Konate (+33 1 39 46 59 58, Fax: +33 1 39 46 63 10, E-mail: sales@remtechinc.com). Web site: www.remtechinc.com
Code Nos. 03800

SAPHYMO - BERTIN INSTRUMENTS, 10 Avenue Ampère, 78180 Montigny le Bretonneux, France. Contact: Irfan Hasan (+33 (0)6 89 34 75 96, E-mail: radioactivite@saphymo.com). Stamp Symbols: Certification by ISO 9001. Web site: www.bertin-instruments.com
Code Nos. 03200, 04000, 09800, 12800, 17950, 25250, 26080, 37130, 37200, 54750, 55040, 55060, 67380, 75850*

Germany

BIG ENTSORGUNGSTECHNOLOGIEN GMBH, Im Farchet 13 1/2, 83646 Bad Toelz, Germany. Contact: Hubert Strobel (+49 8041 78 77 30, Fax: +49 8041 1822, E-mail: hubert.strobel@big-pressen.de). Stamp Symbols: ISO 9001:2015, CNNC-130029600. Web site: www.big-pressen.de/english/p-kontaminierte.php?prod=yes
Code Nos. 24170, 79360

BILFINGER NOELL GMBH, (Dept. BEV), Alfred-Nobel-Strasse 20, 97080 Wuerzburg, Germany. Contact: Wolfgang Mützel (+49 931 903 1702, Fax: +49 931 903 1018, E-mail: wolfgang.muettel@bilfinger.com). Stamp Symbols: Qualification according to EN ISO 9001:2000; Qualification according to ISO 14001:2004; Qualification according to KTA 1401 and AVS D 100/50. Web site: www.noell.bilfinger.com
Code Nos. 11700, 14300, 20350, 68000, 72300, 83150, 93040*

LINN HIGH THERM GMBH, Heinrich-Hertz-Platz 1, 92275 Eschenfelden, Germany. Contact: Horst Linn (+49 9665 91400, E-mail: info@linn.de). Stamp Symbols: Certification by DIN EN ISO 9001:2008. Web site: www.linn.de
Code Nos. 24170, 68000*

WÄLISCHMILLER ENGINEERING GMBH, Schiessstattweg 16, 88677 Markdorf, Baden-Württemberg, Germany. Contact: Jean-Michel Wagner (+49754495140, Fax: +497544951499, E-mail: jean-michel.wagner@hwm.com). Stamp Symbols: ISO 9001, ISO 14001, KTA 1401, ATEX, DIN 18800-7, ISO 3834-2. Web site: www.hwm.com
Code Nos. 10780, 12800, 47600, 68000, 72300, 73620*

WOLFGANG WÄLISCHMILLER SOLUTIONS, Neureutherstr. 1, 80799 München, Germany. Contact: Wolfgang Walischmiller (E-mail: ww@wswsol.net). Web site: wwsol.net
Code Nos. 14000, 20300, 56600, 68000, 72300, 75850, 77600

Italy

ANSALDO NUCLEARE S.P.A., Corso F.M. Perrone, 25, 16152 Genova, Italy. Contact: Gianfranco Saiu (+39 010 655 8591, Fax: +39 010 655 8532, E-mail: gianfranco.saiu@ann.ansaldoenergia.com). Stamp Symbols: ASME Certificate of Authorization N Stamp, Section III, Div. 1 Components. NBBI, The National Board of Boiler & Pressure Vessel Inspectors, Certif. of Auth. NB. Certification by ISO 9001:2008. Certification by ISO 14001:2004. Web site: www.ansaldoenergia.com
Code Nos. 03800, 12800, 14300, 20300, 20350*

CAEN SYS SRL, Via Vetraia 11, 55049 Viareggio, LU, Italy. Contact: Giuliano Mini (+390584388398, Fax: +390584388959, E-mail: g.mini@caensys.com). Web site: www.caensys.com
Code Nos. 03200, 03800, 04000, 12800, 17950, 19700, 21270, 21300, 22700, 25000, 25250, 26080, 39960, 40900, 41015, 55040, 55060, 58000, 74150, 93040*

Italy

CAMPOVERDE SRL, Via Quintiliano 30, 20138 Milano, Italy. Contact: Federico Gianni (+39 0258039052, E-mail: federico.gianni@campoverde-group.com). Code Nos. 09800, 12800, 14000, 14300, 20700, 37200, 87000, 93040

Spain

EQUIPOS NUCLEAR S.A., S.M.E, Av. de Burgos 8B, 17°, 28036 Madrid, Spain. Contact: María Vega (+34 942 200 142, Fax: +34 942 200 148, E-mail: vega@ensa.es), Rubén Moreno (+34 942 200 142, Fax: +34 942 200 148, E-mail: moreno.ruben@ensa.es). Stamp Symbols: ASME Code for Nuclear Vessels, Classes 1, 2 & 3: N, NPT, NA, N3, NS, S, U, U2. AD-MERKBLATT HPO; Certification by ISO 9001, ISO 14001, ISO 3834, OSHAS 18001, ISO 17025. Web site: www.ensa.es Code Nos. 11700, 14000, 24170, 41000, 61570*

Sweden

BROKK AB, P.O. Box 730, 93127 Skelleftea, Sweden. Contact: Tony Marlow (505/466-3614, 800/621-7856, E-mail: tmarlow@brokkinc.com). Web site: www.brokk.com Code Nos. 10780, 13050, 68000, 72300, 73620*

Switzerland

LEMO S.A., P.O. Box 194, Chemin des Champs-Courbes 28, 1024 Ecublens, Switzerland. Contact: Serge Buechli (+41 21 695 16 00, 800/444-5366, E-mail: sbuechli@lemo.com). Stamp Symbols: Certification by ISO 9001. Web site: www.lemo.com Code Nos. 08800, 13400

United Kingdom

AUGEAN PLC, 4 Rudgate Court, Walton, Wetherby LS23 7BF, United Kingdom. Contact: Joseph Hunter (+44 01937844980, E-mail: josephhunter@augeanplc.com). Stamp Symbols: ISO 9001, ISO 14001, OHSAS 18001. Web site: www.augeanplc.com Code Nos. 93040

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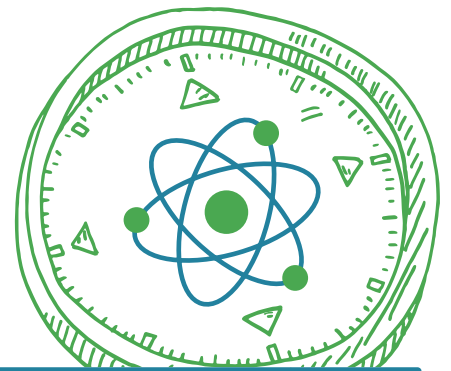
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William A. Fox III has been named executive vice president of SNC-Lavalin's Canadian Nuclear business unit, based in Mississauga, Ontario. He also holds the title of president and chief executive officer of Candu Energy, a member of the SNC-Lavalin Group. Fox has 39 years of experience in the energy and nuclear power industries, having served as a senior executive with BWX Technologies, Chicago Bridge & Iron, Areva NP, and Duke Energy. He has also worked with the Department of Energy on national security, environmental, and energy programs.

Joseph Zwetolitz has been appointed vice president of nuclear operations at Day & Zimmermann. Over a 30-plus year career, he has worked for a number of large original equipment manufacturer and services companies, including Areva, where he served as senior vice president of nuclear services. Prior to joining Day & Zimmermann, Zwetolitz served as chief executive officer of ENEXIO, a private equity-owned, global supplier of power plant cooling solutions and services.



Zwetolitz

Sharon Brady has been appointed chief operating officer of SN3, part of Huntington Ingalls Industries' Technical Solutions division. Brady has been with SN3 since 2001, serving in various corporate and government contract positions. She most recently served as director of business services for Savannah River National Laboratory, where she was responsible for laboratory finance, contracts, procurement, project controls, asset management, procedures, and training.



Brady

Chris Roscetti has been appointed technical director of the Defense Nuclear Facilities Safety Board. Roscetti's prior executive experience at the board includes serving as the associate technical director for nuclear programs and analysis and deputy general manager. Prior to joining the DNFSB, he served as a submarine officer in the U.S. Navy.

The Electric Power Research Institute has announced the election of four members to its board of directors and the appointment of two external directors.

Paula Gold-Williams, president and chief executive officer of CPS Energy, and **John McAvoey**, chairman and CEO of Consolidated Edison and its principal subsidiary, Consolidated Edison Company of New York, were elected to four-year terms, as were interim board members **Stanley W. Connally Jr.**, chairman, president, and CEO of Gulf Power Company, and **Douglas F. Esamann**, vice president of energy solutions for Duke Energy. EPRI's new external directors, also appointed to four-year terms, are **Colette Honorable**, a partner with the Reed Smith law firm and a former commissioner on the Federal Energy Regulatory Commission, and **Dennis McGinn**, former assistant secretary of the Navy and retired vice admiral.

DOE

Anne Marie White was sworn in as the assistant secretary of energy for environmental management (EM) at the Department of Energy on March 29, having been confirmed by the Senate the previous week. White has more than 25 years



White

of experience in the nuclear field, mainly focused on project and program management. She has extensive field experience at a number of the EM sites for which she now has responsibility. She is also the founder of Bastet Technical Services LLC, which has provided consulting services on a broad array of nuclear issues, including radioactive waste management, high-level waste policy, environmental restoration, and preparation of environmental compliance documentation.

Vahid Majidi has been named director of Savannah River National Laboratory and executive vice president of Savannah River Nuclear Solutions, replacing **Terry Michalske**, who recently announced his decision to step down. From December 2013 to April 2017, Majidi served as the deputy assistant secretary of defense for nuclear matters at the Department of Defense. Most recently, he was senior vice president for strategic initiatives at Stinger Ghaffarian Technologies.



Majidi

The Department of Energy's Office of Nuclear Energy has announced the appointment of 13 nuclear science, business, and industry leaders to the DOE's Nuclear Energy Advisory Committee. Joining NEAC's 12 returning members are **Lisa Marie Cheney**, president, Innovative Business Group; **David Blee**, president and chief executive officer, U.S. Nuclear Industry Council; **Eric Anderson**, executive director, J.P. Morgan; **Jay Faison**, founder and CEO, ClearPath Foundation; **Brien Sheahan**, chairman and CEO, Illinois Commerce Commission; **John Bear**, CEO, Midcontinent Independent System Operator; **Seungjin Kim**, head of the School of Nuclear Engineering, Purdue University; **Sean McGarvey**, president, North America's Building Trades Unions; **Ralph DiSibio**, Kurion; **Caroline Cochran**, cofounder and chief operating officer, Oklo Inc.; **John Hopkins**, chairman and CEO, NuScale Power; **Peter Lyons**, former assistant secretary for nuclear energy at the DOE; and **Stephen Kuczynski**, chairman, president, and CEO, Southern Nuclear Operating Company.

David J. Dean has been named associate laboratory director for physical sciences at Oak Ridge National Laboratory, succeeding **Michelle Buchanan**, who became



Dean

ORNL's deputy for science and technology last October. Dean was previously director of the lab's Physics Division and also led its isotopes program. He has also served as director of institutional planning, during which time he helped prepare ORNL's first laboratory plan for the Office of Science, and as senior advisor to the undersecretary for science at the Department of Energy.

NRC

The Nuclear Regulatory Commission recently announced a number of senior



Brown

management appointments. **Frederick D. Brown** has been named director of the Office of New Reactors. Previously the deputy executive director for materials, waste, research, state, tribal, compliance, administration, and

human capital programs, Brown had been serving as the Office of New Reactors' acting director. **Raymond Furstenu** has become director of the Office of Nuclear Regulatory Research, following the retirement of **Mike Weber**. Furstenu previously



Furstenu

served as associate principal deputy assistant secretary in the Department of Energy's Office of Nuclear Energy. **Ho K. Nieh** has become director of the Office of Nuclear Reactor Regulation. He served as director of the Division of Nuclear Safety Technology and Regulation at the OECD Nuclear Energy Agency. **Catherine L. Scott** has been appointed director of the Office of Commission Appellate Adjudication. She most recently served in the NRC's Office of the General Counsel as assistant general counsel for operating reactors.

Utilities

Brad Sawatzke has been named chief executive officer of Energy Northwest,

after previously being named interim CEO. Sawatzke joined the company in 2010 as vice president of nuclear generation and chief nuclear officer, and in



Sawatzke

2014 he was appointed chief operating officer and CNO. Prior to joining Energy Northwest, he was director of site operations at Xcel Energy's Prairie Island plant. **Grover Hettel**, vice president for nuclear operations, has been selected to replace Sawatzke as CNO, and **Bob Schuetz**, Columbia generating station's general manager, has been promoted to Hettel's former position and will also continue to serve as plant general manager.

Exelon Corporation recently announced a number of personnel changes. **Joseph Nigro**, Constellation chief executive officer, has been promoted to Exelon senior executive vice president and chief financial officer, succeeding **Jack Thayer**, who becomes senior executive vice president and chief transformation officer; **Anne Pramaggiore**, ComEd president and CEO, has been promoted to senior

executive vice president and CEO of Exelon Utilities; **Joseph Dominguez**, executive vice president of governmental and regulatory affairs and public policy, has been promoted to CEO of ComEd, effective August 1; **Terence Donnelly**, ComEd executive vice president and chief operating officer, has been named president of ComEd; **James McHugh**, senior vice president of wholesale trading for Constellation, has been named CEO of Constellation and executive vice president of Exelon; **Kathleen L. Barrón**, Exelon senior vice president of federal regulatory affairs and wholesale market policy, has been promoted to senior vice president of governmental and regulatory affairs and public policy; and **John Barnes**, COO for Exelon Power, has been promoted to Exelon Generation senior vice president and president of Exelon Power, effective July 2.

David A. Christian, executive vice president and chief innovation officer of Dominion Energy, has retired. **Mark O. Webb**, previously senior vice president of corporate affairs and chief legal officer, has become senior vice president of corporate affairs and chief innovation officer. In addition, **Emil Avram**, director of engineering services in the company's Gas Infrastructure Group, has been promoted to vice president of innovation. ■

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Business developments

Westinghouse Electric Company announced on August 1 that it has completed its previously announced sale to **Brookfield Business Partners** and has emerged from Chapter 11 bankruptcy. In March, the U.S. Bankruptcy Court for the Southern District of New York approved Westinghouse's reorganization plan, clearing the way for the company's acquisition by Brookfield. Westinghouse filed for Chapter 11 bankruptcy protection in March 2017 as a result of losses from the Summer and Vogtle nuclear projects, and Brookfield agreed in January 2018 to purchase Westinghouse from its Japanese parent company Toshiba for approximately \$4.6 billion. According to Westinghouse, the company's creditor constituencies overwhelmingly supported the reorganization plan.

Toshiba also announced in April that it has completed the sale of its holdings in **Toshiba Nuclear Energy Holdings (US)**, the indirect holding company of Westinghouse, to Brookfield affiliate **Brookfield WEC Holdings**. The sale is independent of Brookfield's acquisition of Westinghouse and certain of its affiliates. Having received regulatory approvals, Toshiba said that procedures for the sale of Toshiba Nuclear Energy Holdings (US) have been completed and the company will continue to pursue approvals for the sale of the company's U.K. shares. Toshiba announced in January that it was selling its stakes in Westinghouse-related assets held by Toshiba Nuclear Energy Holdings (US) and Toshiba Nuclear Energy Holdings (UK).

Virginia Gov. Ralph Northam announced in April that the global nuclear company **Framatome** will relocate its North American corporate headquarters from Charlotte, N.C., to Lynchburg, Va.

The move will make Lynchburg the central hub for Framatome's 2,300 North American employees, more than half of which are in central Virginia. With this move, the company will preferentially hire into its Lynchburg offices, where employment is expected to grow, the governor's office said. Framatome is one of the largest employers in the Lynchburg region, with three locations.

Used fuel

Orano TN, Orano's used nuclear fuel management services subsidiary, announced in June that it has expanded its reactor pool cleanout products and services portfolio through a recent specialized equipment purchase and teaming agreement with **Babcock Services Inc.** (BSI). According to Orano TN, the specialty equipment for reactor component volume reduction and processing enhances the company's spent fuel pool cleanout services, and includes a compactor/shear for control rod blades and fuel channels, a velocity limiter shear, a satellite roller ball punch, and a mobile rod cutter. Combined with Orano TN's Type B transport cask, the equipment provides customers with a turnkey solution for reactor pool services to remove used fuel and obsolete radioactive components into secure on-site dry storage, the company said.

Orano TN was selected by the Omaha Public Power District for the final offload of the spent fuel pool at the closed Fort Calhoun nuclear power plant in Nebraska, Orano announced in May. Orano TN will offload 944 used fuel assemblies and control components from Fort Calhoun's spent fuel pool into the company's NUHOMS 32PT dry storage canisters, which will be placed inside 30 NUHOMS horizontal storage modules at the on-site independent spent

fuel storage installation. According to Orano TN, the NUHOMS 32PT system is already in use at Fort Calhoun and is licensed for on-site storage and off-site transportation. The value of the contract was not disclosed.

On June 6, **Holtec International** announced that it has signed a contract with CNNC Everclean for the turnkey supply of seven used nuclear fuel transport cask packages. Holtec is to deliver its latest model transport cask, the HI-STAR 100MB, and associated ancillaries by November 2020. According to Holtec, the HI-STAR 100MB transports both containerized and "bare basket" used fuel, and is designed to transport the whole spectrum of pressurized water reactor fuel, both damaged and intact. The value of the contract was not disclosed.

Orano announced in May that it has signed a contract with the Ukrainian utility Energoatom to assess the feasibility of the reprocessing of used fuel assemblies from Ukraine's VVER-1000 nuclear reactors in Orano's nuclear fuel reprocessing facility at La Hague, France. The contract, the value of which was not disclosed, was signed in the presence of Oleksander Shavlakov, first vice president of Energoatom, and Pascal Aubret, senior executive vice president of Orano's Recycling Business Unit. In a statement, Aubret said, "This contract marks an important step for Orano and constitutes a real success for us. It will pave the way for treatment of Ukrainian used fuel by the French recycling sector."

In June, **Orano** announced that it has signed two new contracts with Japan Nuclear Fuel Limited (JNFL) for the support of the J-MOX mixed-oxide fuel fabrication plant, currently under construction at the Rokkasho-Mura site in northern Japan. Under the first contract, 20 experts from Orano Melox and Orano Projets, Orano's

engineering subsidiary, will provide until April 2019 a technical review of J-MOX's key equipment, with a focus on maintainability, operation, and product quality. Under the second contract, Orano Melox experts will provide experiential maintenance feedback on some Melox equipment, similar to those planned for J-MOX. According to Orano, other contracts will follow to accompany the different steps of J-MOX's construction in order to support JNFL for the startup phase and to improve its expected operational performance. The value of the contracts, which follow a December 2017 support services agreement between Orano and JNFL, were not disclosed.

DOE

The Department of Energy announced in April that it is extending for 12 months the current contract with **Savannah River Nuclear Solutions** (SRNS) at the Savannah River Site for an undisclosed sum. The current contract with SRNS ended on July 31. According to the DOE, the extension will enable the department's Savannah River Operations Office to continue critical requirements for management and operations at Savannah River while the DOE promotes the award of a new contract.

Federal regulations allow for the DOE to forgo full and open contract competition when there is only one responsible vendor and no other supplies or services will satisfy agency requirements within the time allowed.

Battelle Energy Alliance (BEA) has been awarded a five-year contract extension worth approximately \$5 billion by the Department of Energy's Office of Nuclear Energy for the management of Idaho National Laboratory, it was announced on June 6 by **BWX Technologies** (BWXT), a partner in the BEA joint venture. Led by Battelle, BEA partners also include **AECOM** and the **Electric Power Research Institute**. The DOE originally awarded BEA the management contract in November 2004, and with this most recent extension, BEA will operate and manage INL through September 30, 2024. According to BWXT, the DOE officially approved the contract modification that enabled the contract extension in April.

The joint venture **Triad National Security LLC**, which was awarded the management and operating (M&O) contract for the Los Alamos National Laboratory (LANL), announced on July 9 that the National Nuclear Security Administration (NNSA) has initiated the management

transition process at LANL. According to Triad, the launch of transition activities is an important milestone in the process of shifting operational responsibilities to the laboratory's new management team. Triad is a joint venture of **Battelle**, **Texas A&M University Systems**, and the **University of California**. The Triad team includes two integrated subcontractors, **Huntington Ingalls Industries** and **Fluor Federal Services**, and three small business subcontractors, **Longenecker & Associates**, **Merrick-Strategic Management Solutions**, and **TechSource**.

The contract includes a five-year base with five one-year options, for a total of 10 years if all options are exercised. The estimated value of the contract is \$2.5 billion annually. The current M&O contract for LANL, which is held by Los Alamos National Security, expires on September 30. Triad will assume full M&O responsibility for the laboratory on November 1, following the four-month transition period, which is intended to ensure the continuity of safe and secure operations at the laboratory.

The Department of Energy announced in April that it has awarded two indefinite delivery/indefinite quantity, multiple-award contracts for the disposal of low-level and mixed low-level radioactive





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waste to Utah-based **EnergySolutions** and **Waste Control Specialists** (WCS) of Andrews, Texas. The contracts are intended to establish a vehicle to allow DOE sites to place timely, competitive, and cost-effective task orders for the permanent disposal of Class A, B, and C LLW and MLLW; nuclear by-product material; technologically enhanced naturally occurring radioactive material; and certain sealed sources. Task orders placed under the contracts may be for the disposal of multiple waste types originating from all DOE facilities or derived from DOE cleanup and remediation activities. EnergySolutions and WCS will fairly compete for future task orders that will have fixed-price unit rates with economic price adjustments for appropriate taxes and fees, the DOE said.

In June, the Department of Energy announced that it has awarded a number of contracts through its Office of Environmental Management (EM). The DOE awarded a \$136.6-million contract to **Enterprise Technical Assistance Services** (E-TAS) of Oak Ridge, Tenn., for technical support services to the DOE's Portsmouth/Paducah Project Office (PPPO). The contract has a base performance period of three years, including a 60-day transition period, with an additional option period of two years. Under the contract, E-TAS will provide technical and administrative support to PPPO, along with various technical engineering functions, information technology infrastructure, safeguards and security, and general administrative support for the PPPO sites. PPPO is the lead DOE project office for the cleanup activities at the Portsmouth Gaseous Diffusion Plant site in Ohio and the Paducah Gaseous Diffusion Plant site in Kentucky, as well as operation of the Depleted Uranium Hexafluoride Conversion Project at Portsmouth and Paducah.

The DOE also awarded a 12-month time and materials contract worth an estimated \$5.2 million to **Cyber Security Professionals** of Fairfax, Va., for cybersecurity services. The company will support EM in managing various aspects of its information security program in the areas of cybersecurity and information protection at EM's Washington, D.C., headquarters, as well as its Consolidated Business Center and field site facilities.

Finally, the DOE awarded a 12-month, time and materials contract worth an estimated \$3.5 million to **Edgewater Federal Solutions** of Jjamsville, Md., for information technology support services. Under the contract, Edgewater will provide EM with expert advice, assistance, and cost-effective solutions to respond rapidly to critical IT management issues with results based on current market and

technical research, hands-on experience, and IT best practices.

United Kingdom

The project, engineering, and technical services company **Wood** announced in April that it has secured a contract to provide the United Kingdom's Nuclear Decommissioning Authority (NDA) with specialist technical assistance. According to Wood, the new multi-supplier framework contract will see Wood's independent nuclear assurance team providing support for the NDA's work in the areas of site decommissioning and remediation, integrated waste management, spent fuels, and nuclear materials. The contract is for two years with the potential for a two-year extension, and covers independent peer review of technical documents, plans, programs of work, and projects; assistance with technology management; and various technical and strategic assessments. The value of the contract was not disclosed.

The United Kingdom's **Cavendish Nuclear** announced in May that it has secured a design and engineering services framework contract worth up to £15 million (about \$20 million) from Dounreay Site Restoration Ltd. Under the four-year contract, Cavendish Nuclear will provide a range of design and engineering services in support of projects at the Dounreay site, Britain's former center of fast reactor research and development. This includes design services, engineering validation, environmental restoration, construction management, commissioning support services, software modeling, and waste strategy documentation. Dounreay Site Restoration is the site license company responsible for the decommissioning and cleanup of the Dounreay Site.

Wood announced on July 10 that it has won a framework contract worth up to a possible \$4 million to provide design and engineering services to the Dounreay nuclear site. According to Wood, the framework will help deliver the overarching decommissioning program overseen by Dounreay Site Restoration Limited, the site license company. As the prime contractor, Wood, along with its partners Orano, GDES, and Aquila, will provide services that include design, engineering validation, environmental cases and restoration, seismic, construction management, commissioning support, software modeling, waste strategy documents, and technical support, including the provision of specialist staff. The four-year contract, with two potential one-year extensions, was effective immediately. ■

September

Sept. 4–6 **RadWaste Summit**, Henderson, Nev. Organized by RadWaste Monitor. Contact: Kristy Keller, Exchange-Monitor Publications & Forums, phone 301/354-1779; email kkeller@exchangemonitor.com; Web www.radwastesummit.com.

Sept. 5–6 **Workshop on Non-Destructive Evaluation (NDE) for Materials Characterization**, Charlotte, N.C. Sponsored by the Electric Power Research Institute. Contact: Maria Guimaraes, EPRI, phone 704/595-2708; email mguimaraes@epri.com; Web www.epri.com.

Sept. 16–21 **Probabilistic Safety Assessment and Management Conference (PSAM 14)**, Los Angeles, Calif. Sponsored by the B. John Garrick Institute for the Advancement of the Risk Sciences and cosponsored by ANS. Contact: David Johnson, ABS Consulting, phone 714/734-2507; email djohnson@absconsulting.com; Web www.psam14.org.

Sept. 17–21 **62nd IAEA General Conference**, Vienna, Austria. Organized by the International Atomic Energy Agency. Contact: IAEA, phone +43 1 2600 0; fax +43 1 2600 7; email gc-contact-point@iaea.org; Web www.iaea.org/about/policy/gc/gc62.

Sept. 18–19 **IAEA Scientific Forum 2018**, Vienna, Austria. Organized by the International Atomic Energy Agency. Contact: IAEA, phone +43 1 2600 0; fax +43 1 2600 7; email gc-contact-point@iaea.org; Web www.iaea.org/about/policy/gc/gc62/events/scientific-forum/programme.

Sept. 23–27 **Advances in Nuclear Nonproliferation Technology and Policy Conference**, Wilmington, N.C. Sponsored by the ANS Nuclear Nonproliferation Policy and Fuel Cycle and Waste Management Divisions. Contact: John Mattingly, North Carolina State University, phone 919/515-0224; email jkmattin@ncsu.edu; Web <http://nnp.ans.org>.

Sept. 30–Oct. 3 **Applicability of Radiation-Response Models to Low Dose Protection Standards**, Pasco, Wash. Sponsored by the ANS Nuclear Installation Safety Division and the Eastern Washington local section. Contact: Alan Waltar, phone 509/548-5272; email alan.waltar@gmail.com; Web www.anseasternwashington.org/lowdose-2018.html.

Sept. 30–Oct. 5 **Pacific Basin Nuclear Conference (PBNC 2018)**, San Francisco, Calif. Sponsored by the ANS Operations

and Power and Fuel Cycle and Waste Management Divisions. Contact: Don Eggett, Eggett Consulting LLC 2, phone 815/370-4846; email don.eggett@gmail.com; or Mimi Limbach, Potomac Communications Group, 202/466-7391; email mlimbach@pcgpr.com; Web <http://pbnc.ans.org>.

October

Oct. 1–2 **Nuclear Decommissioning and Used Fuel Strategy Summit**, Charlotte, N.C. Organized by Nuclear Energy Insider. Contact: Charlotte Howlett, Nuclear Energy Insider, phone +44 0 20 7375 7182; email chowlett@nuclearenergyinsider.com; Web www.nuclearenergyinsider.com/nuclear-decommissioning-used-fuel/.

Oct. 1–5 **International Symposium on Communicat-ing Nuclear and Radiological Emergencies to the Public**, Vienna, Austria. Organized by the International Atomic Energy Agency. Contact: IAEA, phone +43 1 2600 0; fax +43 1 2600 7; email form@iaea.org/contact/official-mail; Web www.iaea.org/events/cnrep2018.

Oct. 2–4 **19th Annual ETEBA Business Opportunities Conference**, Knoxville, Tenn. Sponsored by the Energy, Technology, and Environmental Business Association. Contact: ETEBA, phone 877/693-8322, email info@eteba.org; Web www.eteba.org.

Oct. 14–18 **Nuclear Materials Conference (Nu-Mat2018)**, Seattle, Wash. Organized by Elsevier. Contact: Janet Seabrook, Elsevier, phone +44 0 1392 285868; email jm.seabrook@elsevier.com; Web www.elsevier.com/events/conferences/the-nuclear-materials-conference.

Oct. 22–24 **International Conference on Dismantling Challenges: Industrial Reality, Prospects and Feedback Experience**, Avignon, France. Organized by the French Nuclear Energy Society (SFEN). Contact: SFEN, phone +33 1 53 58 32 12; email dem2018@sfen.org; Web www.sfen-dem2018.org/.

Oct. 24–26 **International Symposium on Cement-based Materials for Nuclear Wastes**, Avignon, France. Organized by the French Commission for Atomic and Alternative Energies and the French Nuclear Energy Society (SFEN). Contact: Patricia Hamel-Bloch, SFEN, email patricia.hamel-bloch@sfen.org; Web www.sfen-nuwcem2018.org/.

Oct. 28–31 **International Uranium Fuel Seminar**, Boston, Mass. Sponsored by the Nuclear Energy Institute.

Contact: NEI, phone 202/739-8000; fax 202/785-4019; email conferences@nei.org; Web www.nei.org/conferences.

November

Nov. 6–8 **7th International Conference on Nuclear Decommissioning (ICOND 2018)**, Aachen, Germany. Sponsored by the Aachen Institute for Nuclear Training GmbH. Contact: John Kettler, AINT, phone +49 2402 127505 111; email contact@nuclear-training.de; Web www.icond.de/.

Nov. 11–15 **2018 ANS Winter Meeting and Nuclear Technology Expo**, Orlando, Fla. Sponsored by the American Nuclear Society. Contact: email meetings@ans.org; Web www.ans.org/meetings/c_1.

Nov. 11–15 **Embedded Topical: International Topical Meeting on Advances in Thermal Hydraulics—2018**, Orlando, Fla. Sponsored by the ANS Thermal Hydraulics Division. Contact: John Luxat, McMaster University, phone 905/525-9140; email luxatj@mcmaster.ca; Web www.ans.org/meetings/c_1.

Nov. 12–15 **Embedded Topical: 23rd Topical Meeting on the Technology of Fusion Energy (TOFE)**, Orlando, Fla. Sponsored by the ANS Fusion Energy Division. Contact: Leigh Winfrey, University of Florida, phone 352/273-0297; email winfrey@mse.ufl.edu; Web www.ans.org/meetings/c_1.

Nov. 14–15 **Division of Spent Fuel Management Regulatory Conference 2018 (DSFM REG CON)**, Rockville,

Md. Hosted by the Nuclear Regulatory Commission's Office of Nuclear Material Safety and Safeguards, Division of Spent Fuel Management. Contact: Haile Lindsay, NRC, phone 301/415-0616; email haile.lindsay@nrc.gov; Web www.nrc.gov/public-involve/conference-symposia/dsfm.html.

Nov. 28–30 **Ministerial Conference on Nuclear Science and Technology: Addressing Current and Emerging Development Challenges**, Vienna, Austria. Sponsored by the International Atomic Energy Agency. Contact: Martina Neuhold, IAEA, phone +43 1 2600 21314; fax +43 1 2600 7; email m.neuhold@iaea.org; Web www.iaea.org.

December

Dec. 3–7 **International Conference on the Security of Radioactive Material: The Way Forward for Prevention and Detection**, Vienna, Austria. Sponsored by the International Atomic Energy Agency. Contact: Martina Khaelss, IAEA, phone +43 1 2600 21315; email m.khaelss@iaea.org; Web www.iaea.org/events/security-of-radioactive-material-conference-2018.

January

Jan. 22–24 **INMM Spent Fuel Management Seminar-XXXIV**, Alexandria, Va. Sponsored by the Institute of Nuclear Materials Management. Contact: INMM, phone 856/380-6813; fax 856/439-0525; email inmm@inmm.org; Web www.inmm.org.

2018 Business Opportunities & Technical Conference (BOTC) A Nuclear Opportunities Week Event

Register Today: www.eteba.org/conference-2018

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ETEBA BOTC 2018

OCTOBER 2-4

In Our 19th Year the Energy, Technology and Environmental Business Association is Proud to Host a Conference Filled with Business Opportunities. This Year's Conference will Feature 7 Business Opportunity Panels Including:

- Update on Opportunities with DOE EM, NNSA and Recently Awarded Contracts
- Opportunities in the Canadian Nuclear Market
- Technology Transfer, Entrepreneurial Opportunities, and Venture Capital/ Investment Environment
- Opportunities with the National Aeronautics and Space Administration (NASA)
- Opportunities at the Hanford Site
- Opportunities in the U.S. Power Sector
- Opportunities on the Oak Ridge Reservation

In addition to the Opportunities Panels, ETEBA will also host 8 Technical Sessions and 2 Workshops.

Other Activities Include:

- Networking with Industry Leaders
- Supporting Student Initiatives (Golf Tournament & Internship/ Job Fair)
- Enjoying Lively Receptions and Exhibitor Traffic

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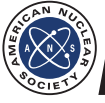


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ANS

IHLRWM 2019

April 14-18, 2019 | Knoxville, TN
International High-Level Radioactive Waste Management

CALL FOR PAPERS

SUBJECT CATEGORIES

Site Selection/Characterization and Assessment of Geological Disposal Systems

- Consent-versus Science-Based Siting
- Selection Criteria: Deep Borehole, Crystalline Rock, etc.
- Site Characterization: In situ Property Measurements of Subsurface Properties
- Post Closure Assessment: Definition, Preparation, Documentation of a Safety Case
- Regulatory and Policy Issues: Licensing and Certification, Regulatory Review, Institutional Frameworks, QA/QC, Safety Margins

Storage & Transportation of Used Nuclear Fuel and High-Level Waste

- High Burn-up and Mixed Oxide Spent Nuclear Fuel
- Dry and Wet Storage
- Cask Integrity Analysis and Testing
- Transportation and Storage (issues with regional versus centralized storage)
- Issues Associated with Direct Disposal of Storage Canisters

Barrier System Performance, Design, and Modeling

- Waste Form Performance (Used Fuel, HLW glass, and Ceramics)
- Engineered Barrier Performance
- Modeling Near-field and Far-field Processes: (hydrologic, chemical, thermal, and mechanical processes)
- Interfaces between Barrier Subsystems
- Studies of Engineer Barrier Components in Underground Research Facilities

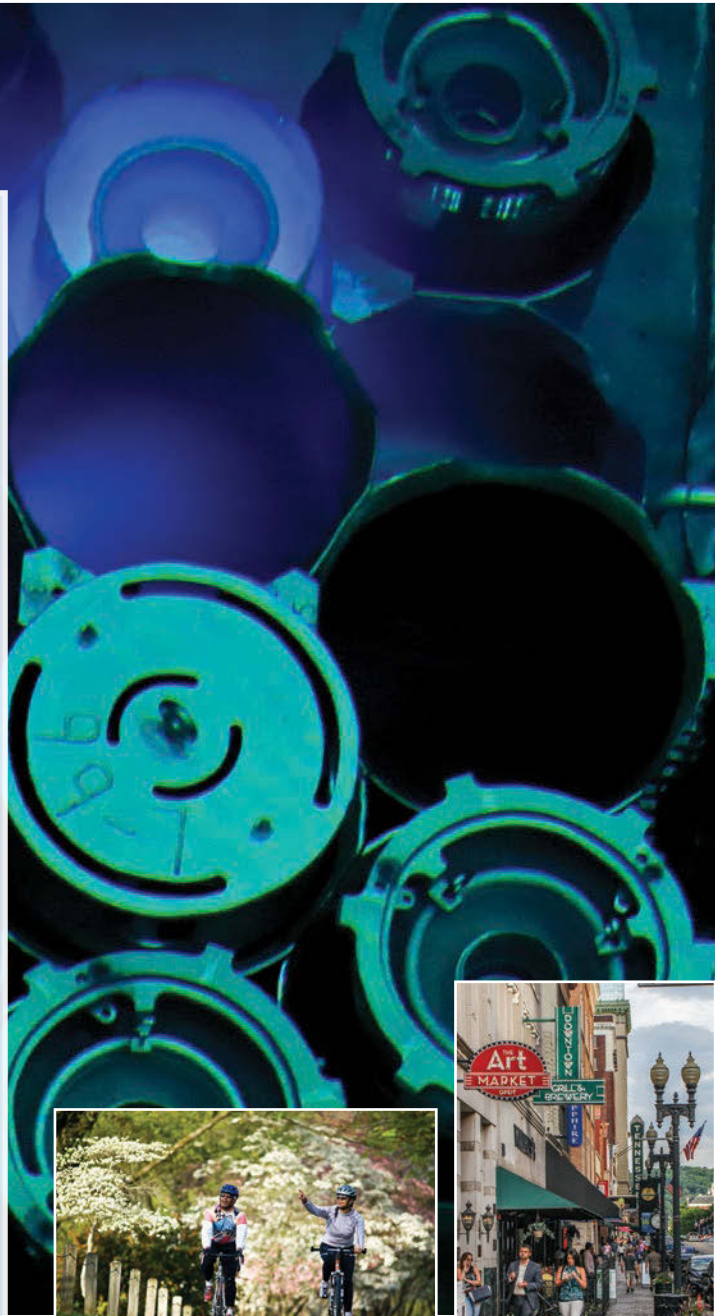
Biosphere Processes

- Natural Analogues
- Defining Generic and Site-Specific Biosphere Characteristics
- Estimating Impact of Environment
- Pathway Analysis and Dose Modeling
- Exposure Scenarios

ABSTRACT DEADLINE: Friday, October 5, 2018

Anticipated deadline extension of November 9

SUBMIT A PAPER: ans.org/meetings/ihlrwm



WONDERING WHAT TO DO IN KNOXVILLE?

visitknoxville.com/things-to-do

outdoorknoxville.com

CONFERENCE WEBSITE: ihlrwm.ans.org

February

Feb. 5–7 **Conference on Nuclear Training and Education (CONTE 2019)**, St. Augustine, Fla. Sponsored by the ANS Education, Training and Workforce Development Division. Contact: Russ Godwin, Southern Company, email frgodwin@southernco.com; Web <http://conte.ans.org/>.

Feb. 12–14 **Nuclear Deterrence Summit**, Arlington, Va. Organized by ExchangeMonitor Publications & Forums. Contact: Sarah Plombon, ExchangeMonitor, phone 301/354-1520; email spombon@exchangemonitor.com; Web www.deterrencesummit.com.

Feb. 17–20 **HPS 52nd Midyear Meeting**, San Diego, Calif. Sponsored by the Health Physics Society. Contact: HPS, phone 703/790-1745; email hps@burkinc.com; Web www.hps.org.

And coming up (ANS meetings) . . .

International High-Level Radioactive Waste Management 2019 (IHLRWM 2019), Apr. 14–18, 2019, Knoxville, Tenn.

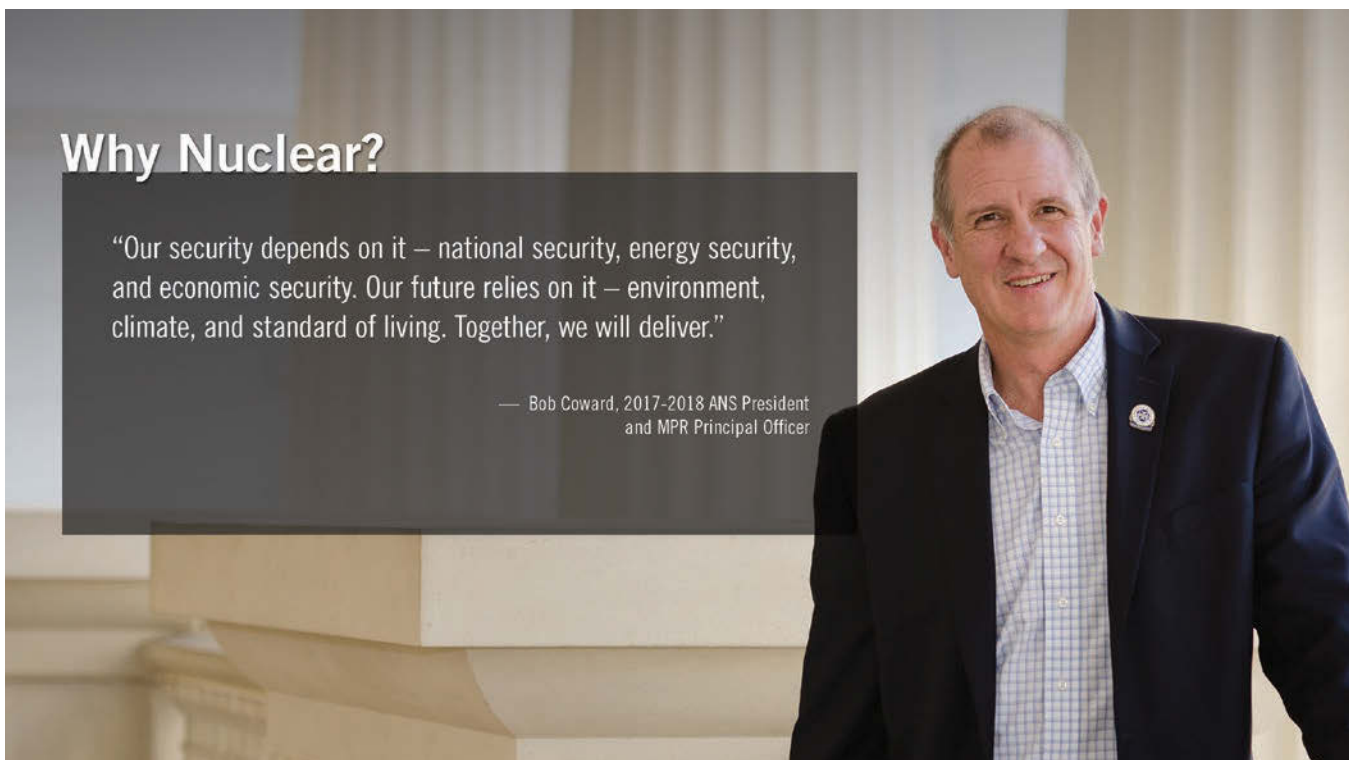
2019 International Topical Meeting on Probabilistic Safety Assessment and Analysis (PSA 2019), Apr. 28–May 3, 2019, Charleston, S.C.

2019 ANS Annual Meeting, June 9–13, 2019, Minneapolis, Minn.

Global/Top Fuel 2019, Sept. 22–27, 2019, Seattle, Wash.

2019 ANS Winter Meeting and Nuclear Technology Expo, Nov. 17–21, 2019, Washington, D.C.

2020 ANS Annual Meeting, June 7–11, 2020, Phoenix, Ariz. ■



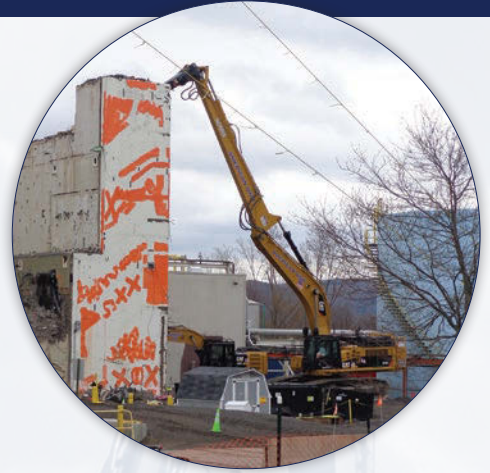
Why Nuclear?

“Our security depends on it – national security, energy security, and economic security. Our future relies on it – environment, climate, and standard of living. Together, we will deliver.”

— Bob Coward, 2017-2018 ANS President and MPR Principal Officer



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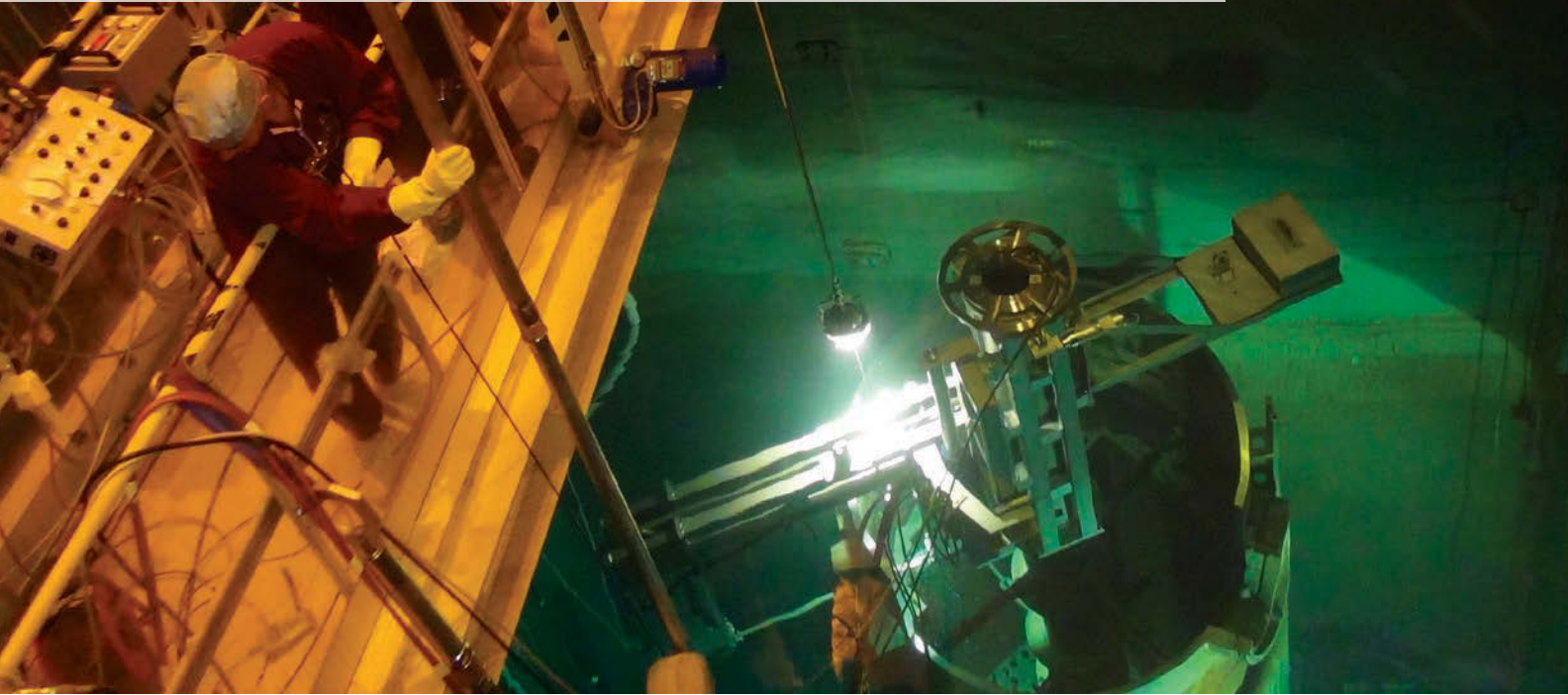
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