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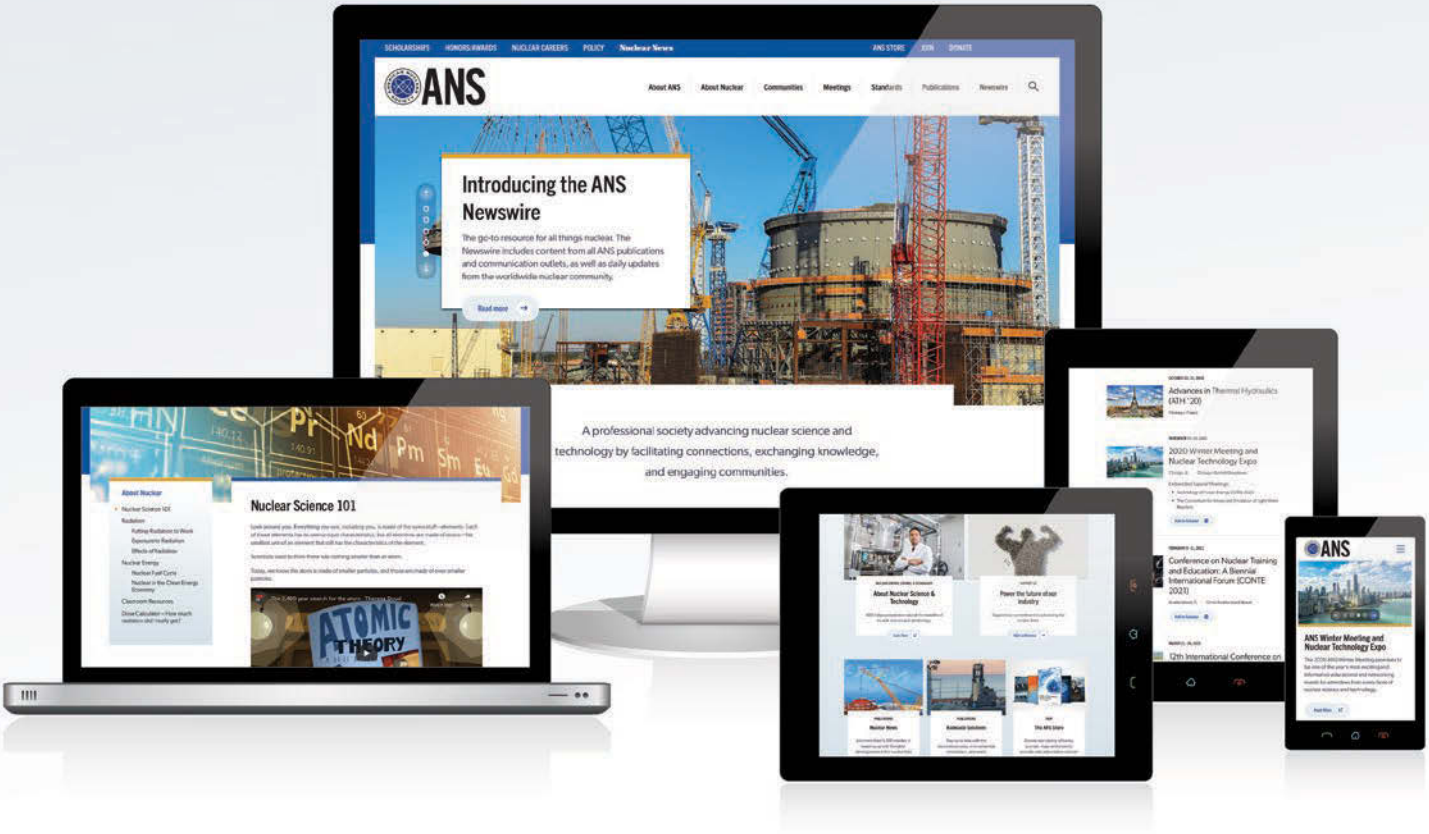

The new site enables ANS to deliver enhanced resources to the worldwide nuclear science and technology community and the general public.

Among the significant improvements include the introduction of **Newswire**, a new section that delivers the same high-quality, in-depth reporting that *Radwaste Solutions* magazine has provided for more than 25 years – on a daily basis. Newswire also combines the latest content from *Nuclear News*, *ANS News*, *Notes and Deadlines*, ANS Policy Wire, and Nuclear Cafe into one easy to access page.

An **About Nuclear** section also has been added, providing a library of resources to inform the public about the benefits of nuclear.

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(Photo: SCE)

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Editor's Note

Comments on this issue

Grace under pressure

The current COVID-19 health crisis is a grim reminder that our best-laid plans are no match for Mother Nature, who just laughs when we mark a date on a calendar and say, "We'll complete our mission by this day."

As both private companies and federal agencies shifted to essential, mission-critical operations in response to the pandemic, it became clear that some planned work was not going to be completed as originally scheduled. Yet, if one were to look at all that is being accomplished across the radwaste landscape, it would be difficult to tell that we were in the midst of a health emergency that has brought much of the global economy to a halt.

At the San Onofre Nuclear Generating Station in Southern California, for example, decommissioning milestones continue to be met. In July, the SONGS-1 reactor pressure vessel was moved offsite to its final resting place in Utah (see page 32). Then, on August 7, the 73rd and final multipurpose canister of San Onofre's spent nuclear fuel was placed in dry storage.

Meanwhile, at the Savannah River Site in South Carolina, the Department of Energy on August 17 approved the much-anticipated start-up of the Salt Waste Processing Facility, which will process and treat a majority of the site's radioactive salt waste. And in October, the DOE's Office of Environmental Management is planning to celebrate the completion of its Vision 2020 at the East Tennessee Technology Park in Oak Ridge, marking the world's first-ever decontamination and decommissioning of a uranium enrichment plant. These are just a few examples of the progress being made in the decommissioning and environmental remediation of nuclear sites.

It shouldn't come as a surprise that while the rest of the world struggles to find ways to move forward, the nuclear and radwaste industries continue to steadily carry out their work. Nuclear professionals are, after all, well versed in safety culture and adept at making risk-informed decisions. As American Nuclear Society President Mary Lou Dunzik-Gougar put it, "I think our safety culture is something that, if it could be bottled and put into the public water supply, would go a long way to controlling the spread of this virus."

That ability to judiciously make risk-informed decisions and adapt to changing conditions is exemplified by the work the DOE's Office of Legacy Management is doing to maintain safe conditions and meet its regulatory requirements at the 100 nuclear legacy sites it oversees. Beginning on page 50, you'll find an interview with Legacy Management Director Carmelo Melendez, who discusses some of the steps his office is taking to continue necessary environmental work while keeping workers safe in the face of COVID-19.

Nuclear's proficiency in risk-informed decision-making makes it well equipped to face a global pandemic.

You'll also find in this issue of *Radwaste Solutions* a short but informative article on how consulting engineers can help businesses meet nuclear's exacting safety and regulatory demands. While not related to the coronavirus pandemic, the article, "Working in Nuclear World" (page 56), nonetheless highlights some of the ways an adherence to safety and quality assurance can stave off costly and time-consuming problems down the road.

This is not to say, however, that the nuclear and radwaste industries have all the answers. Radwaste projects are complex and difficult undertakings, whether it is the decommissioning of a nuclear power plant such as San Onofre or the deactivation of an entire nuclear complex such as the Hanford Site in Washington. The management and operation of such megaprojects are well disposed to lessons learned from other, nonnuclear sectors.

In this issue you'll find some of the research the engineering company Jacobs is undertaking in absorbing D&D knowledge from the oil and gas industry, particularly in the decommissioning of offshore oil rigs, and transferring it to the nuclear sector. Through interviews with oil and gas professionals, the authors of "Tapping Nonnuclear Knowledge" (page 18) were able to cull some valuable insight into successfully managing large D&D projects, finding a number of good practices that can be applied to nuclear decommissioning.

With that, we hope you enjoy this issue of *Radwaste Solutions*. Our next issue will likely appear in your mailbox in March 2021. And while it is difficult to tell where the world will be at that point in containing this pandemic, we're certain that the critical work in meeting our radwaste responsibilities will continue apace.—*Tim Gregoire, Editor*

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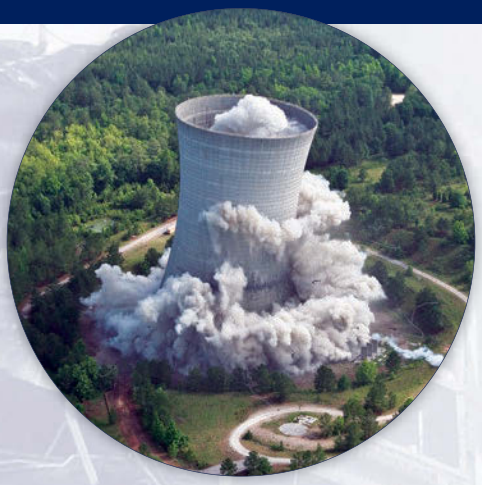

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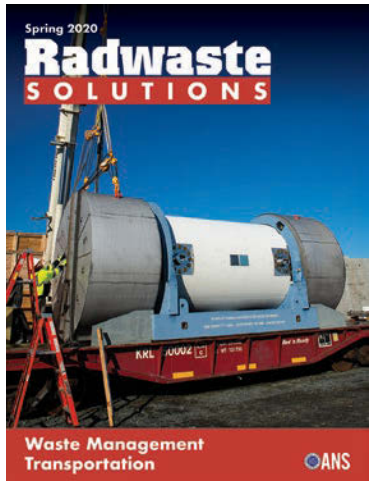

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DOE suspends Hanford tank cleanup contract award

The Department of Energy has suspended the award of a $13-billion tank closure contract at its Hanford Site, near Richland, Wash., it was reported in August. The 10-year contract was awarded on May 14 to Hanford Works Restoration, a joint venture of BWX Technologies and Fluor Corporation that also includes the small businesses DBD and INTERA.

According to an August 13 report by *Engineering News-Record*, the DOE, deciding that the procurement needs "corrective action," will extend for up to one year the existing contract held by Washington River Protection Solutions (WRPS). That contract was to transition to Hanford Works Restoration at the end of September. The DOE has not commented on what its corrective action will entail.

The May contract award was protested by two consortiums, one headed by Amentum and the other led by Jacobs. At the DOE's request, those protests were dismissed by the U.S. Government Accountability Office on July 23, as the department reconsiders the procurement, according to reports.

About 56 million gallons of mixed chemical and radioactive waste are stored in 177 underground tanks at Hanford. According to the DOE, the tank closure contractor is to provide services to "achieve significant reductions in risk and financial liability and provide the best overall solution to accelerate the closure of waste tanks." The contractor is responsible for overseeing the site's tank closure mission, which includes the operation and maintenance of the single-shell and double-shell tank farms, including volume management and secondary waste treatment facilities; the completion of construction, operations, and maintenance of equipment necessary to pretreat and feed low-level waste to Hanford's low-activity waste vitrification facility; and single-shell tank waste remediation and closure to support the environmental cleanup of the Hanford Site.

The DOE solicited bids for the tank closure contract using its new end-state contracting model. The DOE has transitioned to the new contract model in an effort to reduce risk and environmental liability as the department works to accelerate the cleanup and closure of the former plutonium production site.

● The Department of Energy's Office of Environmental Management has not followed best practices or DOE policy in pursuing alternatives for pretreating radioactive tank waste at the Hanford Site, according to a report released on May 12 by the Government Accountability Office. The DOE has spent over $400 million since 2013 looking into alternatives to pretreating Hanford's low-activity waste (LAW), yet the department has not properly defined a mission need or a life-cycle cost estimate for its preferred alternative, according to the report.

After technical issues with the Waste Treatment and Immobilization Plant's (WTP) pretreatment facility caused the DOE to suspend construction on the facility in 2012, the DOE's preferred alternative strategy for meeting its commitments and begin treating waste by 2023 has been to bypass the pretreatment facility and send separated LAW to the WTP's LAW vitrification facility, an approach the DOE is calling direct-feed low-activity waste (DFLAW).

In a May 2015 report, the GAO called attention to the DOE's shortcomings in defining a mission need statement or a life-cycle cost estimate for its DFLAW alternative. In that report, the GAO recommended that the DOE revise its analysis of waste treatment options to consider a variety of alternatives. In April 2019, the DOE initiated an analysis of alternatives, which it expects to complete in September.

As of February 2020, however, the DOE had not yet defined a mission need for its new analysis of alternatives and did not have a life-cycle cost estimate for its baseline alternative, the GAO said

The C Tank Farm at the Hanford Site near Richland, Wash. Photo: DOE

in its report. "Without these, decision-makers will not have the information they need to make the best decisions for pretreating high-level waste, and [the DOE] cannot assure decision-makers that alternative approaches meet mission needs," the report stated.

The GAO report also noted that between 2013 and 2018, the DOE spent $752 million on the WTP's pretreatment facility. More than half of that was spent on simply maintaining the partially constructed facility, the GAO noted, with the rest spent on resolving the facility's technical challenges. The GAO added that the DOE has yet to provide an updated cost estimate for completing the pretreatment facility.

While the DOE and its contractor Bechtel National consider the WTP's technical issues to be conceptually resolved, the GAO said, the department has yet to design, engineer, or test the solutions. The GAO also noted that the Defense Nuclear Facilities Safety Board, the independent agency that oversees safety at DOE sites, considers the technical challenges to be unresolved.

To date, more than $11 billion has been spent on the WTP, $3.8 billion of which has been spent on the plant's pretreatment facility. Under construction since 2000, the WTP is intended to vitrify Hanford's 56 million gallons of radioactive and chemical tank waste, stabilizing it for permanent disposal.

The full GAO report, *Hanford Waste Treatment Plant: DOE is Pursuing Pretreatment Alternatives, but its Strategy is Unclear While Costs Continue to Rise* (GAO-20-363), can be found online at gao.gov.

● Hanford's vitrified low-activity waste can be disposed of on-site, according to the Department of Energy's *Draft Waste Incidental to Reprocessing Evaluation for Vitrified Low Activity Waste Disposed Onsite at the Hanford Site, Washington*, which was released on May 26 with a notification in the *Federal Register*. In the draft evaluation, the DOE demonstrates that Hanford's radioactive tank waste, from which long-lived insoluble radionuclides and cesium have been removed before being turned to a glass form at the site's low-activity waste vitrification facility, can be considered waste that is incidental to the reprocessing of spent nuclear fuel. As such, the vitrified waste is not considered high-level radioactive waste and can be disposed of on-site as mixed low-level radioactive waste at Hanford's Integrated Disposal Facility.

The DOE is consulting with the Nuclear Regulatory Commission on the draft evaluation and is also inviting comments from the public until November 27. The draft waste incidental to reprocessing evaluation can be found on the Hanford website, at hanford.gov. Comments can be submitted by mail to Jennifer Colborn, U.S. Department of Energy, Office of River Protection, 2440 Stevens Dr., Richland, WA 99354; or by email to VLAWDraftWIR@rl.gov.

● As the Hanford Site continues a phased remobilization of site operations, the Department of Energy's Office of Environmental Management and its contractor CH2M HILL Plateau Remediation Company (CHPRC) recently began designing and constructing a full-scale, off-site mock-up to support the stabilization of three underground structures with engineered grout, the DOE announced on July 7.

Located near the former Plutonium Finishing Plant, the structures—the 216-Z-2 Crib, 216-Z-9 Crib, and 241-Z-361 Settling Tank—received liquid waste during Hanford's plutonium production operations and contain residual radioactive and chemical contamination. A 2019 report indicates that the structures are at risk of age-related failure.

Construction of the mock-up includes a conveyance system that will be used to move more than 4,500 cubic yards of engineered grout from trucks into the structures. The grout will be pumped through more than 1,500 feet of pipe, helping to keep workers out of high-contamination areas.

The DOE and CHPRC test a conveyance system that will pump engineered grout to three underground at-risk structures at the Hanford Site. Photo: DOE

According to CHPRC, which is managing the stabilization project, the 216-Z-2 Crib will be filled with about 75 cubic yards of grout; the 241-Z-361 Settling Tank will receive 125 cubic yards; and 4,000 cubic yards will be delivered to the 216-Z-9 Crib. The grout will stabilize the structures, while not precluding future remedial actions or final closure decisions.

A YouTube video showing the engineering walk-down of the stabilization project is available at youtu.be/dvzI2GdwpnU.

Interim storage

The Nuclear Regulatory Commission has extended, for a second time, the deadline for submitting comments on a draft environmental impact statement for Holtec International's application to construct and operate a consolidated interim storage facility for spent nuclear fuel and greater-than-Class C waste in southeastern New Mexico. As published in the June 24 *Federal Register*, the new deadline is September 22.

The NRC said that the reason for the new extension was the recent events associated with the COVID-19 public health emergency. The draft EIS was made public on March 20 with an initial deadline for comments of May 22. That date was extended on April 27 by the NRC an additional two months due to the COVID-19 health emergency.

In the draft EIS, the NRC staff concluded that the environmental impacts of the project would not preclude granting Holtec a license for the storage facility, called the HI-STORE CISF. If approved by the NRC, Holtec would be licensed for an initial phase (Phase 1) of the project to store 8,680 metric tons of spent fuel in 500 canisters for a 40-year license period. Holtec anticipates subsequently requesting amendments to the license to store an additional 5,000 metric tons of spent fuel for each of 19 expansion phases to be completed over the course of 20 years. If granted, the HI-STORE CISF could eventually store up to 10,000 canisters of spent fuel.

Comments can be submitted through the federal rulemaking website, at regulations.gov, with a search for Docket ID NRC–2018–0052. Comments can also be mailed to: Office of Administration, Mail Stop: TWFN–7–A60M, ATTN: Program Management, Announcements and Editing Staff, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001; or by

email to Holtec-CISFEIS@nrc.gov.

● The Nuclear Regulatory Commission likewise extended the deadline for public comments on a draft environmental impact statement for Interim Storage Partners' (ISP) license application to construct and operate a consolidated interim storage facility in Andrews County, Texas.

The NRC said the 60-day extension, to November 3, was also to allow more time for members of the public to develop and submit comments in light of the events associated with the COVID-19 health emergency. Notice of the extension of the public comment period was published in the July 22 *Federal Register*.

The NRC originally released its draft EIS for the ISP interim storage facility on May 8, with a deadline for comments of September 4. The draft EIS contains the NRC staff's preliminary analysis of the environmental impacts of the proposed facility, along with the staff's recommendation that a license be issued authorizing the facility to store up to 5,000 metric tons of spent fuel for a license period of 40 years. If licensed, ISP would expand the site to store up to 40,000 metric tons of spent fuel over eight phases.

ISP, a joint venture of Orano USA and Waste Control Specialists, submitted a revised application to the NRC in June 2018 to construct and operate the spent nuclear fuel storage facility at WCS's existing 14,000-acre waste repository site in west Texas. WCS first applied for a consolidated interim storage facility license in April 2016, but later asked that the licensing be suspended after the U.S. Department of Justice successfully sued to block the sale of WCS to Utah-based EnergySolutions.

Comments on the draft EIS can be submitted through the federal rulemaking website, at regulations.gov, with a search for Docket ID NRC–2016–0231.

Depleted uranium

The Department of Energy has signed an amendment to a 2016 sales agreement with Global Laser Enrichment (GLE) that will provide the company with access to large stockpiles of DOE-owned depleted uranium hexafluoride (DUF_6) tails as GLE looks to build its proposed uranium enrichment facility at the DOE's Paducah site in Kentucky. As announced on June 5, the amendment is one of the conditions of a 2019 agreement among Australia's Silex Systems Limited, Canada's Cameco Corporation, and GE Hitachi Nuclear Energy for the restructuring of GLE, the exclusive licensee of Silex's laser uranium enrichment technology.

Separately, the DOE announced on June 5 that it has issued a formal record of decision for the shipment and disposal of depleted uranium oxide from the former gaseous diffusion plants at the department's Paducah and Portsmouth, Ohio, sites to one or more disposal facilities in the western United States.

According to Silex, the availability of the DOE's DUF_6 inventories is critical to GLE's proposed Paducah Laser Enrichment Facility (PLEF), which would use Silex's laser enrichment technology to re-enrich the DOE's stockpiles of depleted uranium tails. GLE would sell the resulting natural grade uranium in the form of UF_6 on the global uranium market at a production rate of around 2,000 metric tons per year, equivalent to a uranium mine producing an annual output of around 5.2 million pounds of uranium oxide, Silex said. The production facility will also have the added value of producing uranium that has already been converted to UF_6.

Under the December 2019 restructuring agreement, which is pending regulatory approval, Silex and Cameco agreed to purchase GE Hitachi's 76 percent interest in GLE, with Silex acquiring a 51 percent interest in GLE and Cameco increasing its interest from 24 percent to 49 percent. Government approval of the transaction is expected by the end of the 2020 calendar year.

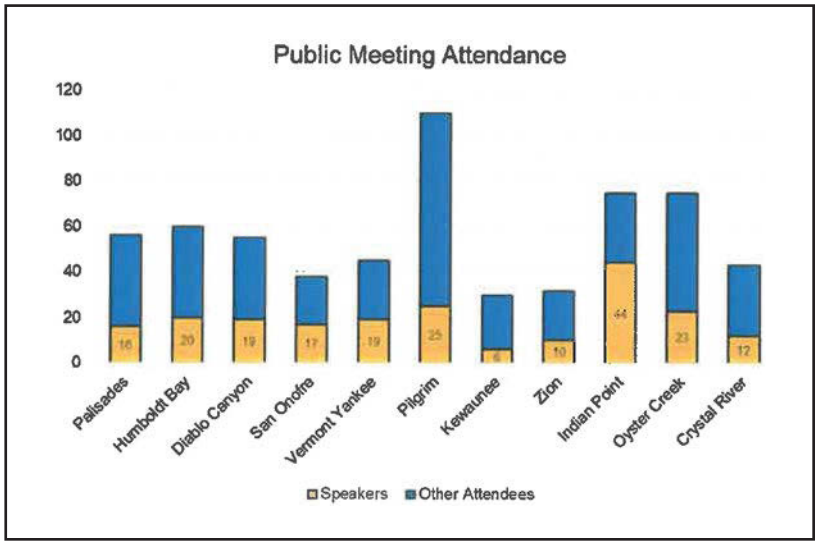
Silex said that it anticipates beginning commercial operations of PLEF later this decade, subject to technology readiness, regulatory approvals, and prevailing market conditions.

The DOE's record of decision on depleted uranium oxide, meanwhile, will implement the department's preferred alternative for its disposal, as documented in the *Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride*. Specifically, the DOE has decided to dispose of the material, if declared a waste, at one or more of the evaluated disposal sites: the EnergySolutions low-level radioactive waste disposal facility near Clive, Utah; the Waste Control Specialists (WCS) LLW disposal facility near Andrews, Texas; and the Nevada National Security Site LLW disposal facility in Nye County, Nevada. The DOE said that it will ship to the selected commercial sites only if the facility is authorized to receive DU oxide.

The DOE said that its near-term plan is to focus on DU oxide disposal at commercial sites and that it is planning a pilot project in the next year to ship several railcars containing cylinders of the material to either the EnergySolutions or WCS facilities. The DU oxide results from the conversion of DUF_6, a byproduct of the gaseous diffusion process that was used to enrich uranium. Conversion plants now operating at the Portsmouth and Paducah sites convert DUF_6 to DU oxide, a more stable form for possible reuse or disposal.

D&D

Based on insights gained from public meetings and webinars, as well as feedback from a 2019 questionnaire, the Nuclear Regulatory Commission is recommending that community advisory boards be formed to foster communication between local communities and licensees of nuclear power plants undergoing decontamination and decommissioning. The recommendation comes in a report the NRC submitted to Congress on July 1 identifying best practices for establishing local community advisory boards, also known as community engagement panels,



following the shutdown of nuclear power reactors.

Mandated by the Nuclear Energy Innovation and Modernization Act, the report includes the findings from 11 public meetings that the NRC's staff conducted from August through October 2019. During those meetings, the NRC gathered comments from host states, communities near nuclear power plants, and existing community advisory boards. The NRC also conducted two webinars and published a questionnaire in September 2019 to gather insight into the creation and operation of community advisory boards. Through its outreach efforts, the NRC received 1,235 oral and written comments from 216 commenters. In response to those comments, and to aid in the formation of community advisory boards, the NRC included the following best practices in its report to Congress:

1. Form advisory boards early in the decommissioning process.
2. Develop a charter or guiding document to formalize the board purpose, organizational structure, and general operations.
3. Consider local preferences for engagement and opening board meetings to the public whenever possible.
4. Maintain diversity in the membership of advisory boards.
5. Base the board meeting frequencies and discussion topics on the site status, ongoing activities, and level of stakeholder interest.
6. Assign specific funding sources to support board operations and activities.
7. Provide access to technical experts or specific training to better inform board discussions with the public.

A settlement agreement in the decommissioning of the Pilgrim nuclear power plant was signed by the state of Massachusetts and Holtec.

The full report, "Best Practices for Establishment and Operation of Local Community Advisory Boards Associated with Decommissioning Activities at Nuclear Power Plants," can be found at nrc.gov/docs/ML2011/ML20113E857.pdf.

● Massachusetts Attorney General Maura Healey announced on June 17 that the state has agreed to withdraw its petitions

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with the Nuclear Regulatory Commission against the transfer of Pilgrim's license to Holtec International for decommissioning. The settlement agreement, signed between Massachusetts and Holtec subsidiaries Holtec Pilgrim and Holtec Decommissioning International (HDI), also resolves two lawsuits the state filed to challenge the NRC's approval of the license transfer application, as well as several administrative challenges Holtec filed to contest conditions in the January 2020 state water permit for the plant.

In return, Holtec has agreed to provide additional decommissioning trust fund obligations along with stricter radiological cleanup limits and additional site monitoring and oversight.

Financially, Holtec is being required to maintain at least $193 million in Pilgrim's decommissioning trust fund throughout the cleanup process, up until the NRC approves the plant for partial site release. After that point, Holtec will need to maintain $38.4 million in funds until Pilgrim's spent nuclear fuel is removed from the site. According to the state, the $193 million will ensure funds are available to cover future cost increases and unforeseen contingencies such as project delays and newly discovered contamination, and the $38.4 million will ensure that funds are available to cover the costs to transport the spent fuel out of state and clean up Pilgrim's independent spent fuel storage installation. Holtec is also required to obtain $30 million in pollution liability insurance and secure performance bonds for certain contracts.

To satisfy cleanup requirements, the agreement calls for Holtec to work with the Massachusetts Department of Environmental Protection and Department of Public Health in complying with the state's cleanup standards regarding radiological and nonradiological hazardous materials. The agreement also includes emergency preparedness requirements, with Holtec obligated to provide information and funding to the Massachusetts Emergency Management Agency to perform certain emergency preparedness functions in line with site risks.

The NRC approved the sale and transfer of Pilgrim's license from plant owner Entergy to Holtec on August 22, 2019. A single-unit, 688-MWe boiling water reactor located in Plymouth, Mass., Pilgrim permanently ceased operations in May 2019. As part of the sale, Holtec Pilgrim assumed ownership of the site, real property, and spent nuclear fuel, while HDI is the license holder and decommissioning operator.

Massachusetts, along with the antinuclear group Pilgrim Watch, petitioned to block Pilgrim's license transfer, citing concerns with health, safety, and financial risks. NRC staff approved the license transfer while those petitions were still under consideration. Pilgrim Watch's challenges to the license transfer remain before the NRC.

● NextEra Energy is estimating that it will cost just over $1 billion to decommission its Duane Arnold Energy Center over a period of 60 years, including spent fuel management and site restoration costs, according to a post-shutdown decommissioning activities report (PSDAR) and a decommissioning cost estimate the company submitted to the Nuclear Regulatory Commission in April. The NRC, with publication in the June 19 *Federal Register*, is requesting comments on the Duane Arnold PSDAR until October 19.

NextEra permanently shut down the nuclear power plant, located near Palo, Iowa, on August 24. A single-unit, 622-MWe boiling water reactor, Duane Arnold began commercial operation in February 1975. Although the plant is licensed to operate until February 2034, NextEra announced in July 2018 its plans to cease operations at Duane Arnold well before then. NextEra, which shares ownership of the plant with Central Iowa Power Cooperative (20 percent) and Corn Belt Power Cooperative (10 percent), made the announcement after agreeing to end its power purchase agreement with utility Alliant Energy.

The Duane Arnold nuclear power plant was shut down in August. Photo: Wikimedia Commons/AsNuke

According to the PSDAR, NextEra intends to decommission Duane Arnold using the NRC's SAFSTOR method, in which the plant is maintained in a safe, stable condition for up to 60 years before decommissioning is completed. The current decommissioning schedule calls for the plant to be placed in a dormant state until 2073, followed by a seven-year dismantling and decontamination period. NextEra intends to complete the transfer of Duane Arnold's spent nuclear fuel to dry storage by August 2023.

NextEra is estimating that it will cost about $725 million to decommission Duane Arnold and terminate its NRC license. The company also estimates it will spend $259 million in spent fuel management costs and $38 million to restore the site and decommission the plant's independent spent fuel storage installation. According to NextEra's 2019 decommissioning funding status report to the NRC, Duane Arnold had about $472 million in its decommissioning trust fund at the end of 2018.

Comments on the PSDAR can be submitted through the federal rulemaking website, at regulations.gov, with a search for Docket ID NRC–2020–0148. Comments can also be mailed to: Office of Administration, Mail Stop: TWFN–7–A60M, ATTN: Program Management, Announcements and Editing Staff, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001.

● A five-year project to dismantle the Ulysse experimental nuclear reactor at the French Alternative Energies and Atomic Energy Commission's (CEA) Saclay nuclear research site near Paris has been completed, according to an Orano press release on June 22. Orano was contracted to decommission the low-power research and training reactor.

Ulysse mainly operated for teaching and continuing education purposes by the French National Institute for Nuclear Science and Technology until it was shut down in 2007. According to Orano, the completion of dismantling was in line with the schedule set in 2014 by the French Nuclear Safety Authority and now paves the way for the administrative decommissioning of the facility.

Following the selection of STMI (now Orano Dismantling and Services) by CEA in 2014, phase one of the reactor's decommissioning began in January 2015 with the dismantling of Ulysse's air and water networks, along with removal of the engineering works around the reactor core. Dismantling of the reactor's nuclear components, including the cutting of equipment and the concrete block shielding assembly in the reactor core,

Ulysse reactor before dismantling. Photo: Orano

was completed in 2019, while the final phase of cleanup and site verification was completed this year. According to Orano, decommissioning of the reactor generated 512 metric tons of conventional waste and 226 metric tons of very low-level waste.

Built in 1961, Ulysse operated at a thermal power of 100 kW and was moderated by water and reflected by graphite. An Argonaut-type reactor designed by Argonne National Laboratory (**Argo**nne **N**uclear **A**ssembly for **U**niversity **T**raining), Ulysse was powered using uranium fuel enriched between 20 and 90 percent.

Canada

Canada's Nuclear Waste Management Organization is getting ready to begin drilling the first borehole in South Bruce, Ontario, as the organization starts its evaluation of the site as a potential host for a deep geological repository for Canada's spent nuclear fuel. The NWMO said that it has begun important technical and environmental work to prepare the site for drilling, including an evaluation conducted by a biologist on July 6, assessing the location for potential habitat use by sensitive species.

The borehole drilling and testing work is part of the NWMO's site assessment program, as it seeks to understand the geosphere at the potential repository site. Located about 108 miles west of Toronto, South Bruce is one of two areas the NWMO is exploring as a potential repository site. The other area is around Ignace, in northwestern Ontario.

As part of its technical evaluation of the site, the NWMO will conduct borehole drilling, coring, and testing at South Bruce, and the organization is currently identifying local service providers and contractors in preparation for the drilling. In June, the NWMO announced that it has selected Ontario-based environmental and engineering company Geofirma Engineering to drill and test initial boreholes in South Bruce.

The organization said that it is also conducting a range of investigations to further confirm the suitability of the site and gain an understanding of local habitat use. The NWMO has contracted Tulloch's Environmental Practice to conduct a ground-nesting bird habitat assessment at the site as part of its investigation into habitat use.

Once preliminary work confirms the suitability of the planned location for the first borehole in South Bruce, the NWMO said, it expects to start borehole site construction in early fall and begin drilling and coring later in 2020.

United Kingdom

The global engineering company Jacobs, under a contract with Radioactive Waste Management Ltd. (RWM), will be studying the release of radioactivity from irradiated graphite taken from reactor core samples at the United Kingdom's

nuclear power plants. According to Jacobs, the research will support RWM, a subsidiary of the U.K. government's Nuclear Decommissioning Authority, in its analysis of graphite behavior and the options for graphite waste management in the future.

RWM commissioned Jacobs to measure and characterize releases of carbon-14 for comparison with releases from irradiated graphite in earlier reactor types, including the United Kingdom's first generation of Magnox civil nuclear power plants. Jacobs said that its research will have a significant bearing on the safe management and disposal of graphite waste arising from the decommissioning of Britain's fleet of graphite-moderated advanced gas-cooled reactors (AGR). The United Kingdom plans to close all 14 of its AGRs, located at seven plant sites, by the end of the decade.

The Jacobs contract has an initial duration of two years. Subject to experimental program results, it may be extended by an additional two years.

DOE updates

Demolition has begun on Building K-1600 at the East Tennessee Technology Park (ETTP), in Oak Ridge, Tenn., the Department of Energy's Oak Ridge Office of Environmental Management (OREM) reported on July 28. The project is being done by OREM and its contractor UCOR as they work to complete major cleanup at ETTP later this year—a goal known as Vision 2020.

According to OREM, it will mark the first time in history that a former uranium enrichment complex has been cleaned and removed. The cleanup schedule has been accelerated by four years, saving about $500 million in project costs, OREM added.

The 42,000-square-foot Building K-1600 sits in the middle of the Building K-25 footprint. Building K-1600 was used as a test and demonstration facility for uranium enrichment centrifuges. Centrus Energy Corporation leased the government-owned facility from 2002 until 2019, when the company no longer needed the facility after consolidating its centrifuge testing and demonstration activities at a different location in Oak Ridge.

ETTP's demolition and environmental cleanup is part of an effort to transform the former government-owned enrichment complex into a privately owned, multiuse industrial park. OREM has taken down facilities spanning nearly 13 million square feet, transferred more than 1,200 acres of land for economic development, and placed more than 3,000 acres in a conservation easement for community recreational use.

As demolition ends at ETTP, UCOR is transitioning crews to new deactivation and demolition projects at Oak Ridge National Laboratory and the Y-12 National Security Complex. These projects will eliminate deteriorating, high-risk facilities, enhance safety, and clear land for future national security and scientific research missions, OREM said.

● After more than a decade, cleanup work has resumed at the Energy Technology Engineering Center (ETEC), a former nuclear and liquid metals research site in Ventura County, Calif. The Department of Energy's Office of Environmental Management reported that the cleanup work had started up again on July 21 with the demolition of a guard station and a storage shed at the ETEC's Radioactive Materials Handling Facility (RMHF). The RMHF consists of 10 buildings built in 1959 that were used for the processing, packaging, and shipment of radioactive and mixed hazardous wastes.

The ETEC, located in Area IV of the Santa Susana Field Laboratory, served as a research facility from the 1950s until the end of active operations in 1988. Since the 1980s, more than 200 structures on the site have been demolished and removed, according to the DOE. After completing RMHF demolition, only eight DOE structures will remain.

Demolition of the RMHF is being conducted under a recently signed agreement between the DOE and the state of California. Removing the RMHF facilities will reduce the potential risk of release of hazardous substances due to wildfires or erosion from severe storms, according to the DOE.

The RMHF's demolition and removal of debris is expected to take about six months. The DOE said that activities are being conducted under safety practices that will protect workers from exposure to the coronavirus. Debris from the cleanup is being transported outside of California for disposal at licensed commercial disposal facilities. The DOE's contractor for the demolition job is North Wind.

As reported by the *Los Angeles Times* on August 13, NASA has nominated the Santa Susana Field site for official listing as a traditional cultural property in the National Register of Historic

Demolition begins on Building K-1600 at Oak Ridge's East Tennessee Technology Park. Photo: OREM

Workers from DOE contractor North Wind gather furnishings taken from buildings that are being demolished at the Energy Technology Engineering Center, part of the Santa Susana Field Laboratory in California. Photo: DOE

Places. The nomination drew criticism from local residents and activists, who claim that NASA is trying to avoid its cleanup responsibilities. NASA, along with the DOE and Boeing, is one of the three responsible parties tasked with cleaning up the site.

● An upgrade to modernize computer systems across the Savannah River Site's liquid waste facilities while maintaining cybersecurity industry standards was completed recently, the site's liquid waste contractor announced on June 25. The Savannah River Site is located in Aiken, S.C.

The contractor, Savannah River Remediation (SRR), noted that over a two-and-a-half-year period the liquid waste facilities' distributed control system (DCS) was upgraded to a newer platform and the computer hardware was refreshed. The DCS was designed specifically for the site, with automated control system software and physical control elements located throughout the liquid waste facilities. The facilities—the Defense Waste Processing Facility, the Saltstone Disposal Units, and the Tank Farms—use processing equipment and instrumentation that are monitored and controlled by human operators through the DCS. More than 100 DCS controllers throughout the facilities were replaced to be compatible with the new software and processing requirements. The new digital upgrades for each facility connect by a communications network to interface with the facility's equipment and instrumentation.

The DCS upgrade was an effort included in SRR's strategic plans to position the site's liquid waste system to operate safely at higher throughput rates necessary to support the near-term start of operations of the Salt Waste Processing Facility.

Nuclear material production operations at the Savannah River Site for national defense purposes resulted in the generation of liquid radioactive waste that is being stored, on an interim basis, in 49 underground waste storage tanks in the F- and H-Area Tank Farms. The Department of Energy built the Defense Waste Processing Facility to vitrify concentrated high-activity tank waste into a stable form and to store it for eventual permanent disposal. The Saltstone Disposal Units were constructed to immobilize and dispose of low-activity decontaminated salt waste. Radioactive liquid is stored in the Tank Farms in both solid and liquid forms.

● The HB Line at the Savannah River Site was placed in a safe shutdown status, the Department of Energy announced on June 24. The HB Line is located on top of the H Canyon chemical separations plant at the DOE's Savannah River Site and is the only chemical processing facility of its kind in the DOE complex. The reversible shutdown will save about $40 million a year starting in 2021, compared to 2016, when the facility's plutonium feedstock operation was at its peak.

In February 2018, the DOE sent a letter of direction to Savannah River Nuclear Solutions, the SRS management and operations contractor, to proceed with placing the HB Line in safe shutdown status while preserving its capabilities for future use. The principal scope of the shutdown involved three tasks: de-inventorying and flushing the facility's product and cold chemical lines, which included anion exchange column resin removal; dispositioning legacy plutonium and uranium materials stored and previously used at the facility; and laying up support systems no longer needed. Other work included reducing security for the facility; revising the facility's technical safety requirements to reduce its minimum staffing requirements; and assimilating the H Canyon and HB Line organizations, aimed at reducing the future overall facility cost through the reduction in expenses related to maintenance, surveillance, and utilities. ■

Savannah River Remediation recently upgraded control system hardware and software at its Defense Waste Processing Facility control room. Photo: SRR

TAPPING NONNUCLEAR KNOWLEDGE

A systematic analysis of drivers and barriers of cross-sectorial learning between nuclear and oil and gas decommissioning projects.

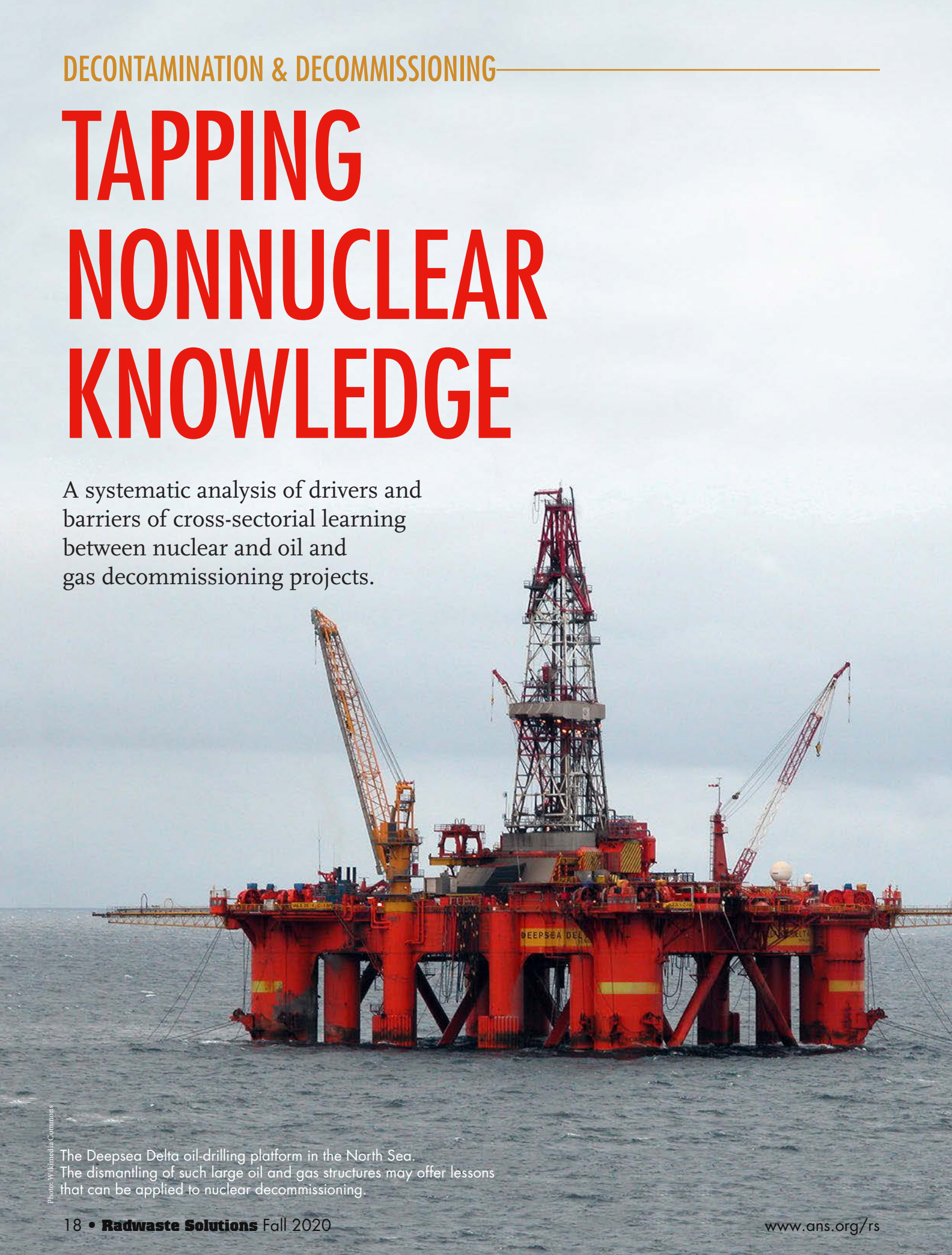


Photo: Wikimedia Commons

The Deepsea Delta oil-drilling platform in the North Sea. The dismantling of such large oil and gas structures may offer lessons that can be applied to nuclear decommissioning.

BY DILETTA COLETTE INVERNIZZI,
NICK HIGGINSON, RICHARD HOWELLS,
WILLEM VAN ES, AND IAN BEADLE

Within the energy sector, the management of projects and megaprojects has historically focused on the planning and delivery of the construction of infrastructure [1–3]. Therefore, policies are more oriented to support the construction of infrastructure rather than its decommissioning. Globally, however, a number of facilities have reached or will soon reach their end of life and need to be decommissioned.

These facilities span the energy sector, including nuclear power plants, oil and gas rigs, mines, dams, etc., whose decommissioning present unprecedented technical and socioeconomic challenges [4–7]. Moreover, the cost of decommissioning and waste management of this array of infrastructure is estimated to reach hundreds of billions of dollars and, for most of these projects, keeps increasing, with limited cross-sectorial knowledge-transfer to mitigate the spiraling increase of these figures.

Cross-sectorial knowledge-transfer is one way to tackle this matter and improve the planning and delivery of decommissioning projects. The aim of our research has been to build a roadmap that is designed to promote the sharing of good practices between projects both within the same industry and across different industrial sectors, focusing specifically on major decommissioning and waste-management challenges.

To reach this aim, our research leverages on the experience of senior industry practitioners and their involvement in the decommissioning and waste management of infrastructure in different sectors. More specifically, this research addresses the following questions:

- To what extent can lessons learned be transferred across industrial sectors?
- What are the challenges that hinder successful cross-sectorial knowledge-transfer?

Knowledge management and lessons learned

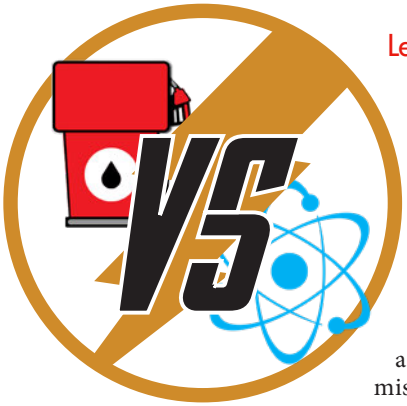
Our research revolves around the topics of project-based learning, information management, and knowledge management in temporary organizations [8–11], and it specifically focuses on nuclear decommissioning and waste management projects, i.e. a class of projects of such complexity, high level of innovation, and large budgets that they can be considered megaprojects [12].

An extensive body of literature has been published on the topic of project-based learning, knowledge management, and information management; these topics often overlapping each other. For instance, Carrillo et al. [13] aimed at improving lessons-learned practices in the construction industry by analyzing the responses to a survey of 41 large contractors in the United Kingdom, followed by interviews. This research identified a number of methods, tools, and processes used to collect lessons learned. Todorović et al. [8] gathered data from 103 project managers, demonstrating that a structured "project success analysis" can improve knowledge management in the project environment. Aeerts et al. [10] focused on project-based knowledge transfer within state-owned enterprises involved in large infrastructure projects, using comparative analysis of two large rail infrastructure projects as the unit of analysis, and concluded that knowledge transfer happens more at the individual level in informal ways.

Organizational learning has also been investigated by Koskinen [14], who argues that organizational learning occurs through problem solving, but that existing rules and norms reduce the need to explore new solutions, consequently hindering the addition of these solutions into new rules. On a similar note, Duffield and Whitty [15] discuss the issue of having "so many opinions, guides, and models on organizational lessons learned processes," and recognize that "people factors" are fundamental to the success of learning from experience. These authors also stress that an organizational learning culture is also needed to promote knowledge transfer, highlighting that the way that knowledge is captured needs to be related and relevant to its future use.

Indeed, within the project management literature, there is a general feeling that project reviews are beneficial, but they are not conducted in a consistent manner [16]. Not only are systematic "learning from expertise" processes rarely carried out, but also when "lessons learned" are collected, their sharing among projects and at a higher level within the organization is limited and follow-up actions are hardly implemented [15].

Recently, researchers have also focused on codifying lessons learned in the specific context of megaprojects. For instance, Sanz et al. [11], highlight that ITER, a first-of-a-kind international nuclear fusion research and engineering megaproject, needs a robust organizational framework to enhance the transfer of lessons learned and to prevent the project from being affected by poor documentation practices. Hou et al. [17] discuss the lessons from the cleanup and reuse of a large area of contaminated land for the London 2012 Olympic and Paralympic Games, identifying a number of challenges and lessons regarding remediation megaprojects.



Learning across projects: nuclear versus oil & gas decommissioning

Learning across projects is hindered by a number of factors, and it is particularly challenging in complex and multifaceted projects that are encountered in decommissioning and waste management. Moreover, the simple fact that the term "decommissioning" changes its meaning depending on the industrial context [18] might create additional confusion.

In the nuclear context, decommissioning is defined by the International Atomic Energy Agency (IAEA) as the "administrative and technical actions taken to allow the removal of some or all the regulatory controls from a facility . . ." [19]. However, the translation of this term to foreign languages is often incomplete. For example, "déclassement" in French refers to the downgrading of a nuclear facility and the reduction of its radiological hazards [20], while "smantellamento" in Italian is the direct translation of "dismantling." Moreover, in its broad definition, decommissioning is sometimes used to describe projects that involve the construction of facilities for waste management [4]. Conversely, in the oil and gas sector, decommissioning is referred to as the "last stage in the life of an offshore oil and gas structure when it no longer produces or serves a useful purpose" [19], but many other terms are used to delineate the situation when oil runs out and the end of life of the infrastructure, including "removal" and "disposal" [21].

The variety of definitions might themselves reinforce the widespread belief that decommissioning projects are "unique," thus the sharing and transfer of knowledge is extremely hard, if not impossible. While research focusing on the transfer of knowledge within a single industrial sector have been performed, research on cross-sectorial knowledge-transfer is still very limited.

In the nuclear decommissioning sector, exploratory analysis investigating the project characteristics that affect cost and scheduling, thus supporting project-based learning, have been published [22]. Similarly, in the oil and gas sector, Ahiaga-Dagbui et al. [6] discussed the costing and technological challenges of oil and gas decommissioning in the U.K. North Sea, concluding that an industry-wide decommissioning forum is needed to facilitate the sharing of experience. White and Adams [23] also highlight the importance of knowledge and information management, stressing the importance of performing a review of the incidents that occurred in the North Sea before the start of the oil and gas decommissioning project. Conversely, studies on cross-sectorial knowledge-transfer are sparser, and almost absent for nuclear and oil and gas decommissioning projects. Indeed, only recently, Invernizzi et al. [18] fostered the discussion about cross-sectorial learning between nuclear and oil and gas by summarizing what the separate decommissioning projects have in common, such as the fact they are characterized by high uncertainties (also caused by the limited information available on their design, construction, and operations), are affected by interdependences between facilities (e.g., pipelines), are at least partially funded by governments, and must comply with evolving regulations.

Far from being exhaustive, the literature presented above shows that research about the codification, storage, and transfer of lessons learned is a well-investigated topic, while the literature about cross-sectorial knowledge-transfer between projects in nuclear and oil and gas decommissioning is practically nonexistent. Consequently, the rest of this article aims to make explicit both the content of good practices and lessons learned that could be transferred across projects in different industries, as well as investigating the process(es) to improve knowledge sharing, developing practical recommendations on how to improve cross-sectorial learning at an organizational level.

Data collection through interviews

There are number of challenges that affect research about cross-sectorial learning between the nuclear and the oil and gas decommissioning industry. These challenges include the fact that these projects are complex (and often considered unique), and that most of the data and information about these projects is treated as sensitive and its sharing is limited even within the same organization. Moreover, organizations struggle to allocate time to do lessons learned exercises, as these are often seen as time-consuming and expensive, and able to offer only very limited benefits.

To address these challenges, we selected interviewing as a method to investigate to what extent lessons learned can be transferred across industrial sectors, and what are the drivers and barriers that affect cross-sectorial learning. Interviews were preferred to surveys, as they ensure the collection of high-quality information. In fact, the interviewees have the possibility to ask clarification questions themselves during the interviews, in this way lowering the degree of misunderstandings of questionnaire surveys [24].

Interviewees were selected through purposive sampling [25] as in similar studies, primarily according to their expertise in either the nuclear decommissioning industry, the oil and gas decommissioning industry, or both. Subjects were selected according to their current affiliation with the company, their level of experience and seniority, and their involvement in large-scale projects, which for complexity, size, and budget, can be considered megaprojects. In other words, more senior practitioners with experience in both the nuclear and oil and gas decommissioning industry were selected first.

Subjects were contacted via email and were sent the following list of questions as a basis for the dialogue:

1) To which extent do you think that the nuclear and oil and gas industry can learn from each other?
2) According to you, what are the main barriers to knowledge-transfer across projects, both within and across industries?
3) What, do you think, can and should be done to overcome these barriers?

The selected interview subjects were not asked to answer the questions in a written form but were able to read the questions in advance, and then decide whether to participate. The interviews were scheduled to last between 30 and 45 minutes. All interviewees were anonymized.

The authors sent 18 emails to invite the selected subjects to participate in this research. Ultimately, 12 interviews were scheduled. Subjects included seven directors (including the director of nuclear decommissioning services, key client account directors, and multi-million project directors), two operations

managers, two senior consultants, and one solution development and assurance manager. Nine of the subjects have more than 30 years of experience, and all have at least 15 years of experience. Ten subjects had extensive experience in nuclear decommissioning projects (10-plus years), including Sellafield and the Magnox fleet in the United Kingdom, Ignalina in Lithuania, Bohunice in Slovakia, Ispra in Italy, and Fukushima in Japan. Two of these subjects also had experience in oil and gas decommissioning projects. One subject had extensive experience only in oil and gas projects (30-plus years). The subjects' experience in oil and gas projects included decommissioning of the U.K.'s North West Hutton, Miller, Brent, and Beatrice gas and oilfields. Most subjects had at least some limited experience (less than three years) in other industrial sectors as well.

The interviewer, i.e., one of the authors, scheduled and performed all the interviews, taking extensive notes during each conversation. These notes were analyzed using directed content analysis, a research approach that allows the interpretation of information in a text through a systematic codification process, and involves identifications and classification of topics with the aim to extend conceptually a previous existing theory [26-27]. To perform the analysis, the authors followed the recommendations by McLellan-Lemal and Macqueen [28] and DeCuir-Gunby and McCulloch [29]. Discussion among coauthors and other colleagues supported the finalization of the coding and the clustering of the information collected.

Good practices, barriers, and suggestions

The main good practices that could and should be transferred to the nuclear decommissioning industry according the interview subjects are summarized in Table I, which also reports the number of subjects that mentioned each good practice, the knowledge-transfer "direction," and whether it is of interest mostly for project managers (PM) and/or for the policy environment (PE). The column titled "No." indicates the number of subjects that mentioned the corresponding good practice. Table I also highlights the lessons for nonnuclear industries.

Table I. Good practices to be transferred to and from the nuclear decommissioning industry.

Good practices		No.	Knowledge transfer "direction", as stressed by the subjects	PM	PE
Promote the adoption of:	Aligned incentives, ideally explicitly linked to the project deliverables	6/12	Oil and Gas ↔ Nuclear Decommissioning	X	
	A program-wide approach	5/12	Oil and Gas ↔ Nuclear Decommissioning	X	X
	Conventional approaches for conventional processes	4/12	Oil, Gas and Other Sectors → Nuclear Decommissioning	X	X
	Contracting agreements that hand over responsibility to the contractors	3/12	Oil and Gas ↔ Nuclear Decommissioning		X
Promote change of culture by:	Develop long-term plans to support a smooth transition from operations to decommissioning and reduce the fear of job loss when decommissioning approaches/while decommissioning progress	5/12	Oil and Gas ↔ Nuclear Decommissioning	X	
	Support innovation, also through better use of the supply chain	5/12	Oil, Gas and Other Sectors → Nuclear Decommissioning	X	X
	Increase the awareness of the value of the overall project, (also) as a function of cost and time to increase efficiency in the project delivery	5/12	Oil, Gas and Other Sectors → Nuclear Decommissioning	X	
	Increase focus in the preparation of the business case (and not only of the safety cases)	4/12	Oil, Gas and Other Sectors → Nuclear Decommissioning	X	
Streamline (and increase visibility of the links between):	Bureaucratic processes and procedures, and use a new set of procedures when decommissioning starts	7/12	Oil, Gas and Other Sectors → Nuclear Decommissioning	X	X
	Procurement processes, e.g., using standard formats, in order to divert efforts from tendering to problem-solving	4/12	Oil and Gas ↔ Nuclear Decommissioning	X	X
Avoid working in silo and remove (or lower) organizational barriers that hinder communication		7/12	Oil, Gas and Other Sectors → Nuclear Decommissioning	X	
Promote early planning including optioneering, and change control as soon as the project scope is defined		5/12	Oil and Gas → Nuclear Decommissioning	X	
Share of technology (e.g. underwater cutting)		3/12	Oil and Gas ↔ Nuclear Decommissioning		X
Timely assessment of the need for future work (so it's possible to highlight where intra-company collaboration is possible)		1/12	Oil and Gas ↔ Nuclear Decommissioning	X	X
Consider early decommissioning (avoid waiting decades before decommissioning) as often the 'hotel' costs of the facilities and increased risk from aging infrastructure may outweigh the benefits of waiting		1/12	Oil and Gas → Nuclear Decommissioning	X	X
Understand safety-related and environment-related project requirements		5/12	Nuclear Decommissioning → Oil, Gas and Other Sectors	X	
Promote continuous communication with regulatory authority and external stakeholders		3/12	Nuclear Decommissioning → Oil, Gas and Other Sectors	X	X
Use a waste-led decommissioning approach (understand waste routes, use the waste hierarchy)		1/12	Nuclear Decommissioning → Oil, Gas and Other Sectors	X	X
Promote the systematic use of assurance processes		1/12	Nuclear Decommissioning → Oil, Gas and Other Sectors	X	

The main challenges that hinder the transfer of lessons learned within projects in the nuclear decommissioning industry and from nonnuclear decommissioning projects to nuclear decommissioning projects according to the people interviewed are summarized in Table II.

Table II. Challenges that affect knowledge transfer to and within nuclear decommissioning projects.

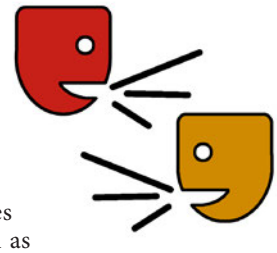
Main challenges that hinder knowledge transfer		Number of subjects that explicitly mentioned the challenges
A	Time constraints and time pressure	4/12
B	Fear to lose and actual risk to lose commercial/competitive advantage	3/12
C	Reluctance to share failures and mistakes	4/12
D	Limited understanding of the benefit of sharing knowledge and inability to articulate a vision map	4/12
E	Actual differences between projects and their complexity	1/12

The suggestions to promote the transfer of lessons learned that were highlighted by the subjects are listed in Table III, which also highlights whether these suggestions helped to improve the sharing of the content of lessons learned, or whether they aim at improving the process of storing, retrieving, and sharing lessons learned.

Table III. Suggestions to promote knowledge sharing.

Suggestions to promote the transfer of lessons learned in decommissioning projects, as highlighted by the subjects	Suggestions to improve the content or the process of lessons learned	Main challenge(s) addressed	Number of subjects that explicitly mentioned the good practice
Promote employees' intra- and inter-company mobility, including secondment	Content	A, B, C, D	6/12
Promote the participation to working groups, stakeholders meeting, external conferences, and engaging with external stakeholders, including regulatory authorities	Content	A, D	6/12
Organize informal intra-company talks to share project experience, from different background and addressing different topic (technical and not), and support informal opportunities for communication	Content	B, D	5/12
Adopt collaborative working practices (e.g., ISO 44001:2017 [30] or the ECITP Project Collaboration Toolkit [31])	Content and process	B, C	1/12
Enforce lessons learned exercises/post-project reviews as part of the project life cycle, not only at the technical level but involving PM and other functions (e.g., commercial)	Process	A, C, D	4/12
Adopt/improve (online/IT) systems to efficiently codify, store, retrieve, and transfer lessons learned	Process	A, B, C, E	3/12
Allocate staff to look after the system and the information collected (e.g., employ a "knowledge manager")	Process	A, E	2/12

Discussion



In an exploratory study like this, providing an ultimate response to the research questions is extremely difficult and it is affected by the advantages and disadvantages of the methodology adopted, as well as by the overall research context. Nonetheless, leveraging on the data and information collected from semi-structured interviews with experienced practitioners and the subsequent systematic analysis performed, it was concluded that a number of good practices could and should be transferred across industries. The transferrable lessons learned between the oil and gas and the nuclear industry were emphasized as particularly relevant.

Most of the good practices take the project management perspective, probably due primarily to the current or previous managerial role of most of the interview subjects. The most quoted good practice was, "avoid working in silos and remove (or lower) organizational barriers that hinder communication," which emphasize the importance of communication not only horizontally in the organization, but also vertically. One interviewee, for example, stated, "Avoid working in a silo, promote [the] cross-sharing of ideas among projects, 'relax' the organogram-based structure is what is needed!" While another interviewee explained, "Transfer [of] skills is easier if you don't compartmentalize."

The need to "promote the adoption of aligned incentives, ideally explicitly linked to the project deliverables" was also highlighted by many subjects. One interviewee said, "In oil and gas, you need to be aligned with the client. If you don't deliver, you won't have more work. In nuclear, this is not always the case." Another stressed, "It's people! Then process! Then technology. You need to incentivize people, both with fiscal incentives and not . . . incentives on the work done, incentives if someone shows that lessons learned and readopted have brought benefits into new projects." Several subjects also mentioned the importance of developing long-term plans to support a smooth transition from operations to decommissioning and reduce the fear of job loss as decommissioning approaches and progresses.

This links with the discussion surrounding the benefits of repurposing sites, facilities and buildings, and/or creating national centers of expertise closely linked with the end of life on infrastructure (e.g., the U.K. National Decommissioning Centre at the University of Aberdeen).

Other good practices were highlighted by a lower number of subjects, but this ranking should not be taken as a proxy for the relevance of the good practices.

From the interviews, it also emerged that there is a widespread belief that knowledge-transfer increases where the communication and collaboration across industries is favored and promoted by government, regulatory bodies, and/or managing organizations. This recently happened in the U.K., where the Nuclear Decommissioning Authority and the Oil and Gas Authority started promoting the transfer of learning across sectors [32].

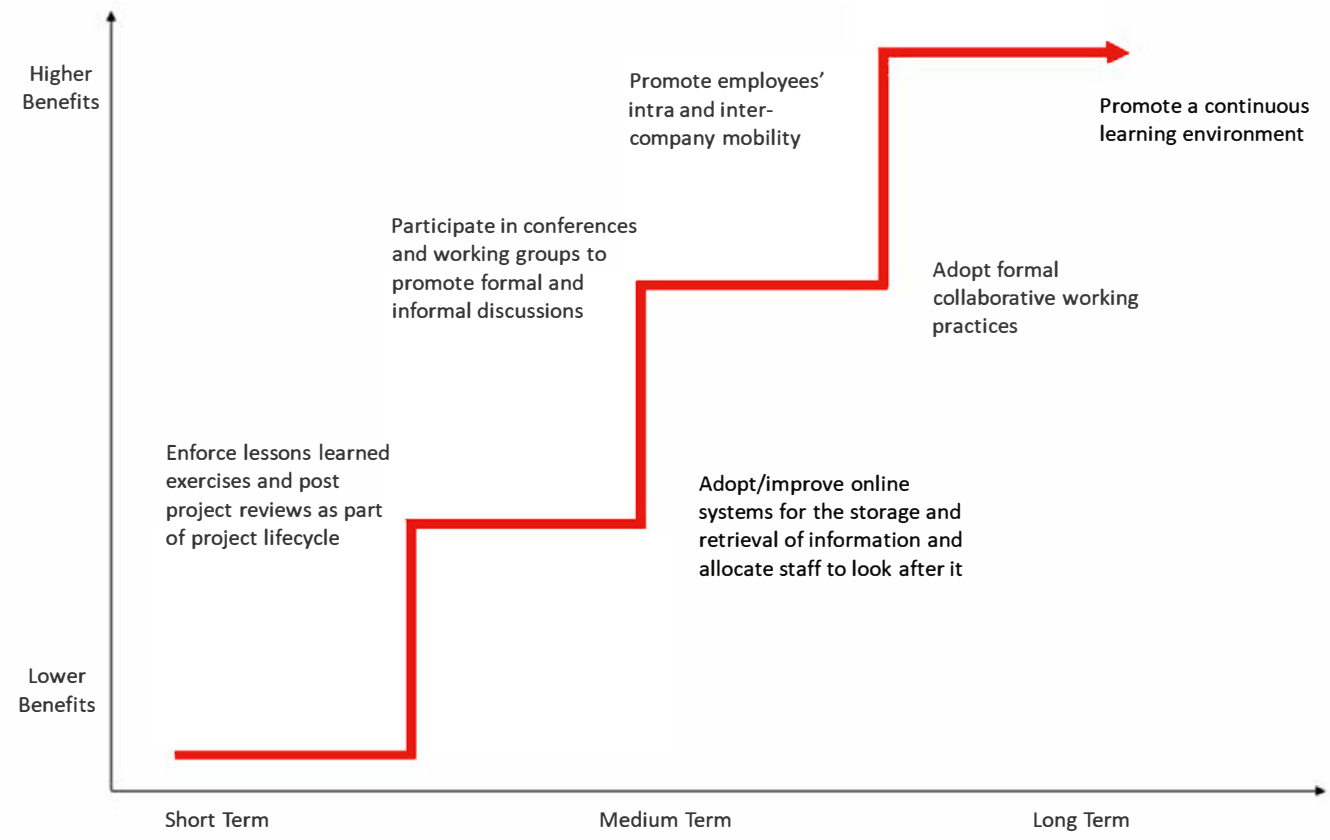


Fig. 1. A roadmap for the improvement of cross-sectorial transfer of lessons learned.

From the information collected and analyzed, we have created a tentative roadmap of initial improvement objectives at the organizational level to support the cross-sectorial knowledge-transfer (see Fig. 1). This roadmap is a simple representation of changes proposed to improve the process of sharing of good practices and lessons at the organizational level, and it is based on the findings from this research and of follow-up discussions among coauthors and colleagues.

The originality of this work lays in the formalization of (1.) the lessons that can be learned across different industrial sectors and that are applicable to nuclear decommissioning projects, (2.) the barriers that hinder knowledge transfer and (3.) of suggestions of how to tackle them. The contribution of the work is mostly practical, as it highlights good practices across industries that project managers and policy makers can reflect upon before starting the planning of nuclear decommissioning projects and megaprojects, or while overseeing their delivery.

The main limitation of this research is the low number of interview subjects, and the various responses received, which allows us to reach only partially generalizable conclusions. However, the seniority, experience, and knowledge of the subjects counterbalances the limited number of interviews conducted.

This work lays the path for future in-depth research through, for example, detailed cross-case comparison (as recently performed by McCauley, focusing on the decommissioning of oil and gas in Scotland and nuclear decommissioning in Germany [33]), or using soft system methodology [34].

Conclusions

Nuclear decommissioning and waste management projects are complex from the technical, social, economic, and environmental perspectives, requiring in-depth knowledge and expertise in a number of areas, including physics, chemistry, engineering, economics, management, etc. Therefore, the sharing of knowledge across nuclear decommissioning projects is challenging, and it is even more challenging to collect and transfer lessons learned from nonnuclear projects into nuclear ones, and vice versa. This research addresses this topic by leveraging on the experience of senior industry practitioners and their involvement in infrastructure projects of different industrial sectors, including nuclear decommissioning ones.

The results of this analysis include a list of good practices that could and should be transferred to nuclear decommissioning projects, as well as suggestions of how the knowledge-transfer process between projects in different sectors can be improved, both in the short and the long term.

In this way, this research provides practical guidance for project managers and policy makers on how to advance the planning and delivery of nuclear decommissioning projects with better performance, also suggesting a path for future research and improvements.

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A Minor Program With Major Rewards

THE UNIVERSITY OF TENNESSEE'S MINOR PROGRAM IN NUCLEAR DECOMMISSIONING LAYS THE FOUNDATION FOR CAREERS IN D&D.

By Wes Hines

The University of Tennessee's (UT) Nuclear Engineering Department recently developed an education program to offer an undergraduate minor in Nuclear Decommissioning and Environmental Management (NDEM). The minor is a partnership between UT's Nuclear Engineering and Civil and Environmental Engineering departments and was developed to provide Bachelor of Science graduates with a specialty that would prepare them for a successful career during a time of nuclear plant closings that potentially would reduce career opportunities in traditional nuclear engineering fields. The success of the program is greatly attributed to the partnerships formed with local industry.

In July 2015, I was asked to introduce a good friend and department board member, Dr. Eric Ablequist, at the Friday morning meeting of the East Tennessee

Photo courtesy of UT

Harold Connor discusses decommissioning topics with UT students pursuing an NDEM minor.

Economic Council. Ablequist is the executive vice president of Oak Ridge Associated Universities and was a primary author of MARSSIM, the Multi-Agency Radiation Survey and Site Investigation Manual. His presentation that day was titled "A decommissioning renaissance," and the subject hit home as a potential investment for our department. I learned that the Department of Energy's Office of Environmental Management budget (about $7.5 billion for fiscal year 2020) is about seven times that of the DOE Office of Nuclear Energy (under $1.6 billion for FY 2020), and the amount of decommissioning work throughout the country and world would require several generations to complete.

The decommissioning field seemed like an open opportunity for trained students to find challenging and productive careers upon graduation. I especially liked his last slide, which stated: "Nothing is certain but death and taxes . . . and DECOMMISSIONING."

Curriculum Development

Shortly after Ablequist's presentation, which sparked the idea of career opportunities in NDEM, the idea for a specialized education program materialized in a meeting between UT staff and executives at UCOR, a local DOE cleanup contractor for the East Tennessee Technology Park, Oak Ridge National Laboratory, and Y-12 National Security Complex.

Following that meeting, UCOR put together a list of foundational educational attributes required for a recent graduate to be successful in the decommissioning field. One topic identified was the planning and management of construction projects. It was this need that led to the integration of civil engineering courses into the NDEM curriculum.

The department embraced the new direction and felt that the integration of nuclear decommissioning into our educational offerings was not only supportive to national cleanup needs, but also very supportive of the nuclear power industry. Nuclear decommissioning costs are an important part of the total nuclear power life cycle costs, and if we cannot do a good job on the back end, utilities will not invest in new, safer, and more cost-effective nuclear plants. The University of Tennessee Nuclear Engineering (UTNE) department tag line is, "Study Nuclear Engineering and Save the World." Nuclear decommissioning has resonated with current students who are invested in making our planet a better place with sustainable, clean power.

"Decommissioning nuclear power plants efficiently and effectively enables the nuclear industry to remain a viable, sustainable energy solution," said Ken Rueter, president and chief executive officer of UCOR. "This specialized training is preparing students to participate in this fast-growing decommissioning industry valued at well over $100 billion in the next several decades."

Under Rueter's leadership, UCOR has developed methods to manage decommissioning costs, an essential step in making the next generation of advanced reactors more cost competitive as a carbon-free, sustainable energy source.

In 2015, the NDEM minor was developed through collaboration with industrial partners, and the university approved the program in 2016. The 15-credit-hour minor requires the student to complete three required courses:

- *CE 340: Construction Engineering and Management I*
  An introduction to construction management concepts, including developing an understanding of the goals and objectives of various construction stakeholders, delivery and procurement methods, types of construction contracts, planning, quality assurance and control, health and safety, estimating and scheduling.
- *NE 404: Nuclear Fuel Cycle*
  This course covers all relevant components of the commercial nuclear fuel cycle, including methods for mining and milling, physics of uranium enrichment, fuel fabrication, in-core management strategies, reactor physics, spent fuel storage, reprocessing, and disposal of high-level radioactive wastes.
- *NE 233/433: Principles of Health Physics*
  Students will gain an understanding of radiation quantities, limits and risk assessment, external and internal dosimetry, biological effects of radiation, radiation detection, radiation interactions and decay, applications.

Students can then select two electives from the following:

- *CE 441: Construction Engineering and Management II*
  Fundamental calculations and case studies associated with construction methods and equipment, including selection, productivity, and operations, are covered.
- *CE 581: Construction Estimating*
  This course offers comprehensive coverage of construction project cost estimation, including quantity take-off, associated market pricing conditions, and the techniques used for assessing cost of labor, material, and equipment.

■ *NE 406: Radiation Shielding*
Students will learn types of radiation sources, fundamentals of gamma ray and neutron attenuation, biological effects, approximate methods of shield design, and use of modern analysis tools.

■ *NE 542: Management of Radioactive Materials*
Technology for processing, treatment, handling, and storage of radioactive nuclides is covered, along with analytical and numerical methods for evaluating environmental impacts of radioactive materials. Licensing and regulation issues are also covered.

■ *NE 552: Radiological Assessment and Dosimetry*
This course covers the transport of radionuclides in environment, food chain pathways, internal dosimetry, and personnel dosimetry.

It is one thing to offer a specialized curriculum such as a minor; it is entirely another to get students interested in the subject and pursue the minor. To achieve that goal, it is necessary to show students that the minor will provide them with great career opportunities upon graduation. We knew that this was the heavy lift, would take several years, and would take strong partnerships to accomplish.

Partnerships

Very few impactful activities are performed by single entities. Vince Lombardi once said, "Individual commitment to a group effort—that is what makes a team work, a company work, a society work, a civilization work." As you will see, this program was envisioned, founded, and nurtured through collaboration and partnerships with local industry.

UCOR not only assisted with the curriculum development, but they also invested their time and resources by:

■ Providing graduate seminars that focus on the cleanup activities at East Tennessee Technology Park and, of course, industrial safety

■ Sponsoring college student society dinners and speaking to undergraduates on nuclear decommissioning and environmental management career opportunities

■ Hosting field trips to a work site, giving students firsthand experience on the types of work being conducted

■ Providing summer internship opportunities

■ Funding senior design projects

■ Through their major partner, AECOM, funding scholarships to reward and further engage NDEM students

AECOM representatives presented scholarships to four students pursuing UT's Nuclear Decommissioning and Environmental Management minor in 2019. Pictured, from left to right: Joe Aylor, AECOM business development director; Ashley Saunders, UCOR chief of staff; Ken Rueter, UCOR president and CEO; UT students Parth Patel, Assam Iysheh, John Wagner, and Joseph Galan; Wes Hines, Nuclear Engineering Department head; and Harold Connor, UCOR senior advisor to the office of the president.

Photo courtesy of UT

Roger Petrie of the East Tennessee Technology Park talks with students during a field trip to the Oak Ridge site.

Photo courtesy of UT

In parallel with developing the educational program, UTNE established a strong partnership with the Energy Technology and Environmental Business Association (ETEBA), a nonprofit trade association representing approximately 170 small, large, and mid-sized companies and affiliate members that provide environmental, technology, energy, engineering, construction, and related services to government and commercial clients.

ETEBA Executive Director Tim Griffin and ETEBA board member Chuck Bernhard were enthusiastic in partnering with us to grow the program, while helping meet the workforce needs of ETEBA members and providing opportunities for our students. ETEBA provided free entry to its annual conference, organized a student session for our students to present their work, hosted a career fair, and set up a career matchmaking functionality on their website. Additionally, ETEBA set up a fund to provide resources to support the NDEM program for student travel, senior design, student scholarships, and other educational needs. This win-win partnership has been extremely rewarding and has again assisted our students to become more aware of the career opportunities available in this area.

Results

The NDEM program enrollment has steadily grown. Last year, we graduated six nuclear engineering students with the NDEM minor, and this year we graduated an additional four. This coming fall we have 18 of our 200 undergraduate nuclear engineering students pursuing the NDEM minor, and we expect this number to continue to grow as stories of UT graduates getting exciting and meaningful jobs get back to the first-year and sophomore students. One of this year's graduates told me that he got his job at Oak Ridge's Y-12 site because they were impressed with his summer NDEM-related internship and minor.

Another student, recent graduate John Wagner, will be applying the knowledge from the minor to help decommission the San Onofre Nuclear Generating Station in Southern California. "I started my full-time position with EnergySolutions this week and can safely say the nuclear decommissioning minor was a big reason I was hired," he said. "The minor has enabled me to get my foot into the door of the growing nuclear decommissioning industry."

Through the strong industrial partnerships between the University of Tennessee, UCOR, AECOM, ETEBA, and several other local companies, the UT Nuclear Engineering and Civil and Environmental Engineering departments have developed an educational program in decommissioning. The partnerships have provided students with a vision of the "light at the end of the tunnel," resulting in continuous growth and career opportunities for graduates. The goal of diversifying our students' educational backgrounds is being met with the near-term results of "jobs at graduation." This is one step toward our long-term goal of improved decommissioning economics to support our nation.

Last year, U.S. Rep. Chuck Fleischmann (R., Tenn.), who heads the House Nuclear Cleanup Caucus, described the new degree as a great example of how UT is responding to the current nuclear industry workforce landscape. "As a proud University of Tennessee grad, I am happy that my alma mater leads the pack when it comes to preparing today's young people for careers in the nuclear industry," Fleischmann said.

Wes Hines is Postelle Professor, Chancellor's Professor, and head of the Department of Nuclear Engineering at the University of Tennessee–Knoxville.

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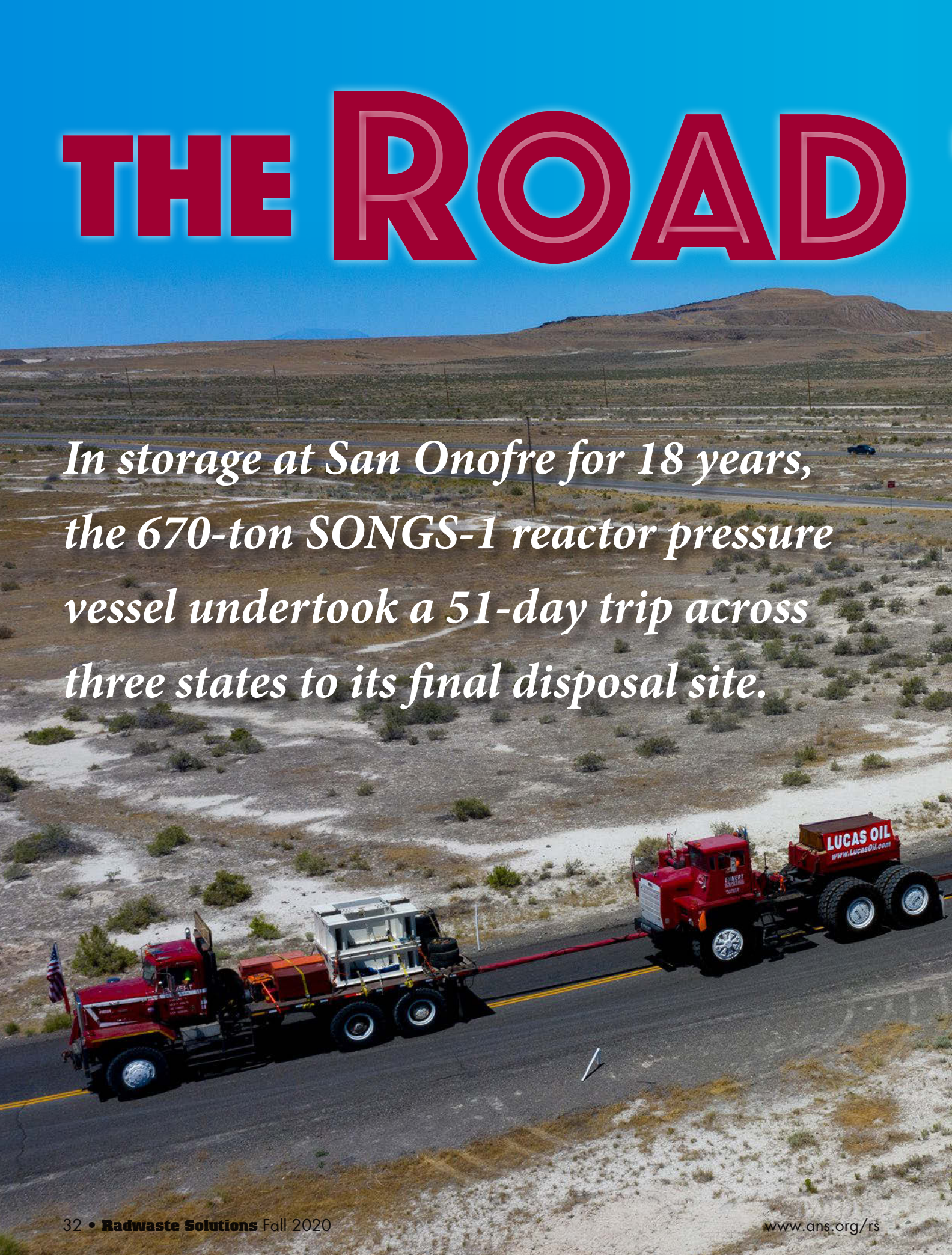
THE ROAD

In storage at San Onofre for 18 years, the 670-ton SONGS-1 reactor pressure vessel undertook a 51-day trip across three states to its final disposal site.



to Utah

Six large trucks were used to push and pull the SONGS-1 reactor pressure vessel 400 miles through Nevada and into Utah with a maximum speed of 10 miles per hour over a 10-day period.

Photo: EnergySolutions

The RPV is lowered into its storage container in October 2002 during the decommissioning of SONGS-1. The cylindrical container is made from 2-inch-thick carbon steel with 3-in.-thick top and bottom plates, along with a 3-in.-thick carbon steel liner for additional radiation shielding. The container is a Class A radioactive waste shipment that meets all regulations for disposal at EnergySolutions' Clive disposal facility.

Photo: SCE

Leaving San Onofre, the RPV is slowly transported on a Goldhofer vehicle up the site's road leading to a rail spur just north of the power plant. Once there, the RPV package was transferred to a heavy-load Schnabel railroad car for transport to Apex, Nev. Rail transport took four days covering 366 miles with a maximum speed of 15 mph.

Photo: SCE

July 14 marked a milestone in the decommissioning of the San Onofre Nuclear Generating Station (SONGS), as the Unit 1 reactor pressure vessel (RPV) completed a seven-week journey from Southern California to EnergySolutions' Clive disposal facility in Utah. The approximately 670-ton RPV package, containing the pressure vessel from the previously decommissioned SONGS-1, pieces of radioactive metal, and grout for radiation shielding, left San Onofre on May 24, traveling by rail to a location outside Las Vegas, where it was transferred to a platform trailer to be transported the remaining 400 miles to Clive, about 75 miles west of Salt Lake City.

"This project was a very complex undertaking that required approvals and/or coordination with over two dozen federal, state, and local agencies and government entities," said Todd Eiler, director of the EnergySolutions Projects Group, which handled the transport. "The coordinated effort with the rail lines and departments of transportation in California, Nevada, and Utah resulted in another safe and successful large component shipment managed by the EnergySolutions Projects Group."

"This project was a very complex undertaking that required approvals and/or coordination with over two dozen federal, state, and local agencies and government entities"
- Todd Eiler

The RPV package crosses the San Juan Creek Bridge in San Juan Capistrano, Calif., at night by rail. The 36-axle Schnabel car, the largest in the world, has a capacity to transport loads of up to 880 tons. "From start to finish, the project required detailed planning and coordination between the Southern California Edison SONGS oversight team and our contractors, and was done with safety as the top priority," stated Doug Bauder, SCE vice president and chief nuclear officer.

Photo: Mariusz Sulek

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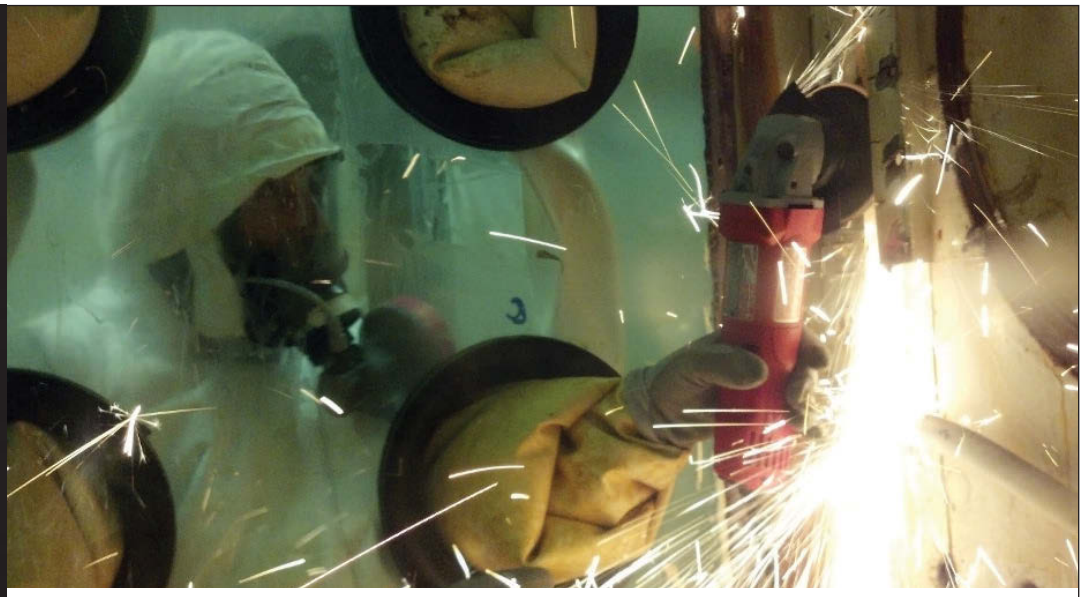

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(RIGHT) At 15.5 feet in diameter and 38.5 ft long, the RPV shipping container squeezes under a rail overpass. Extensive rail planning included machining the carbon steel sides of the shipping container to comply with extremely tight railroad bridge clearances, multiple 3-D laser surveys of the rail route, and third-party structural evaluations of dozens of railroad bridges and structures.

The Unit 1 RPV was transferred to its transport and disposal storage container in 2002, when SONGS-1 was undergoing decommissioning. SONGS-1 operated from 1968 to 1992, and active dismantlement of the Westinghouse three-loop pressurized water reactor began in 1999. The above-grade material from the Unit 1 site, the concrete and steel of the plant, was shipped off-site, much like what will happen with Units 2 and 3 in the coming years. Initially, the RPV was to be shipped by barge via the Panama Canal to the Barnwell radiological disposal facility in South Carolina. These initial plans, however, were rejected for various reasons, and the RPV had been in temporary storage on-site at San Onofre since then.

(BELOW) Once the RPV arrived in Nevada, crews prepared the shipment to be transferred to a hydraulic platform trailer for road transport. More than 20 companies were involved in the scoping, planning, and execution of the project to transport the SONGS-1 RPV to the Clive facility in Utah.

Photos: EnergySolutions

Photo: EnergySolutions

Tractor trucks pull the platform trailer with 384 trailer tires through the Nevada desert on its way to Utah. A spokesman for the Nevada Department of Transportation told *The San Diego Union-Tribune* that, with the RPV package weighing about 670 t, it was the heaviest load to ever traverse Nevada's roadways, the newspaper reported on July 20.

Photo: EnergySolutions

Removal of the Unit 1 RPV marks a milestone in the decommissioning of the San Onofre Nuclear Generating Station. The distinctive 200-ft-high twin domes that rise above Interstate 5 just south of San Clemente are scheduled to come down by 2028.

In December 2016, Southern California Edison (SCE) awarded a contract to SONGS Decommissioning Solutions, a joint venture of AECOM and EnergySolutions, to decommission and dismantle the SONGS plant. SCE decided to permanently shut down SONGS Units 2 and 3 in June 2013. Both units had been off line since January 2012 after premature wear was discovered in replacement steam generators in 2010 and 2011. SCE expects to complete the demolition of SONGS to approximately 3 feet below grade, with the exception of the on-site independent spent fuel storage installation and the plant's switchyard, by the end of 2028 at an estimated cost of about $4.4 billion, including used fuel management, radiological decommissioning, and site restoration costs.

Catching Quicksilver:

Mercury Remediation Process Optimization for Clayey Soil

By Michael Smith, Sven Bader, Thomas Koch, and Arthur Niemoller

The need for recovery and cleanup of mercury-contaminated soils and facilities is anticipated at several U.S. Department of Energy sites containing hazardous waste products, where mercury was used as a key element in the nuclear enrichment process [1]. For example, lithium enrichment processes (e.g., column exchange and electric exchange) at the Y-12 plant in Oak Ridge, Tenn., used large amounts of mercury [1].

Consequently, mercury contamination is a significant concern. As an effort to improve the environment, and because mercury is an extremely toxic element that presents a health hazard, it is beneficial to recover mercury from contaminated soil [1, 2].

A mercury treatment process currently implemented in France to clean up sandy-soil sites contaminated with mercury [3] is proposed for use at sites with clayey soil, such as at Oak Ridge [1, 4]. The University of North Carolina at Charlotte (UNC Charlotte), in collaboration with the nuclear fuel cycle company Orano, performed a preliminary evaluation to evaluate and optimize the mercury recovery process for clay-based soil [5]. Using a process successfully implemented in France on a sandy type of soil as a starting point, the impact of changing the soil type from a sand-based to a clay-based material was investigated, and then the steps of operation were evaluated to optimize the process (e.g., varying strainer size, water wash rates, equipment size, etc.).

This article provides an overview of the mercury recovery process evaluated for clayey soil, including experimental results and offers suggestions for process optimization. The objectives of our study were to 1) analyze the viability of using an existing mercury treatment process on clayey soil, 2) determine optimal process values with clayey soil (for screen size, water wash rates, and equipment size), and 3) perform process cost analysis.

The recovery process & results

The primary steps for the soil treatment used to recover mercury include: 1) drying, 2) crushing, 3) screening to sort large and small particles, 4) washing of large particles, and 5) a

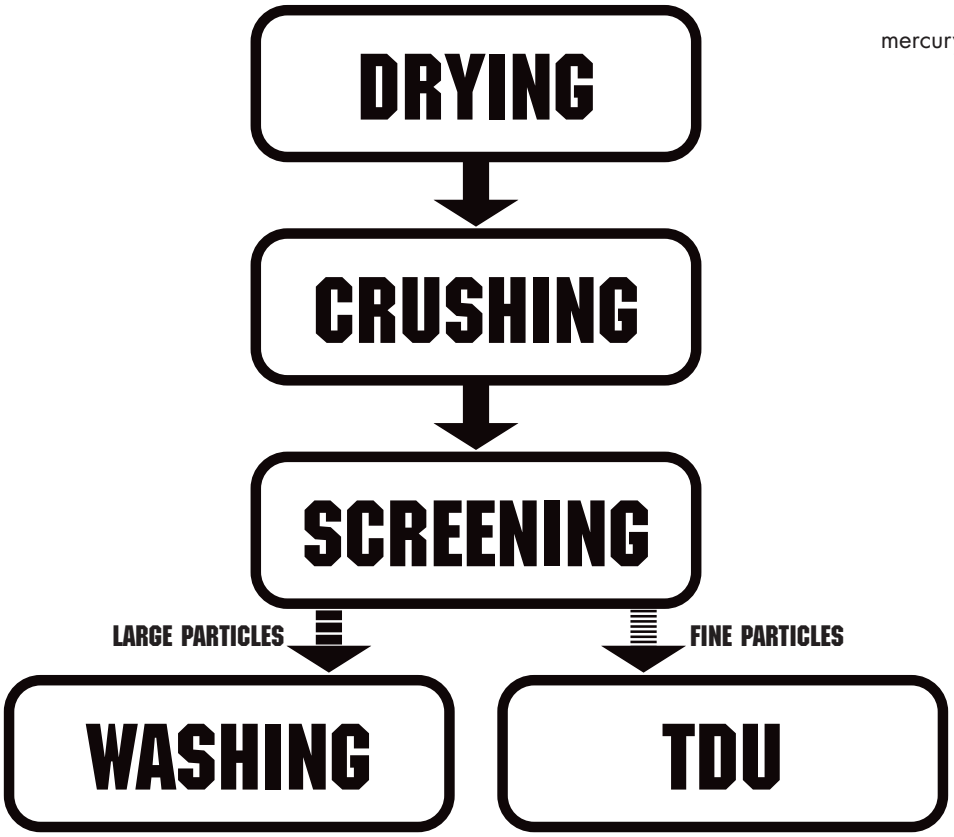
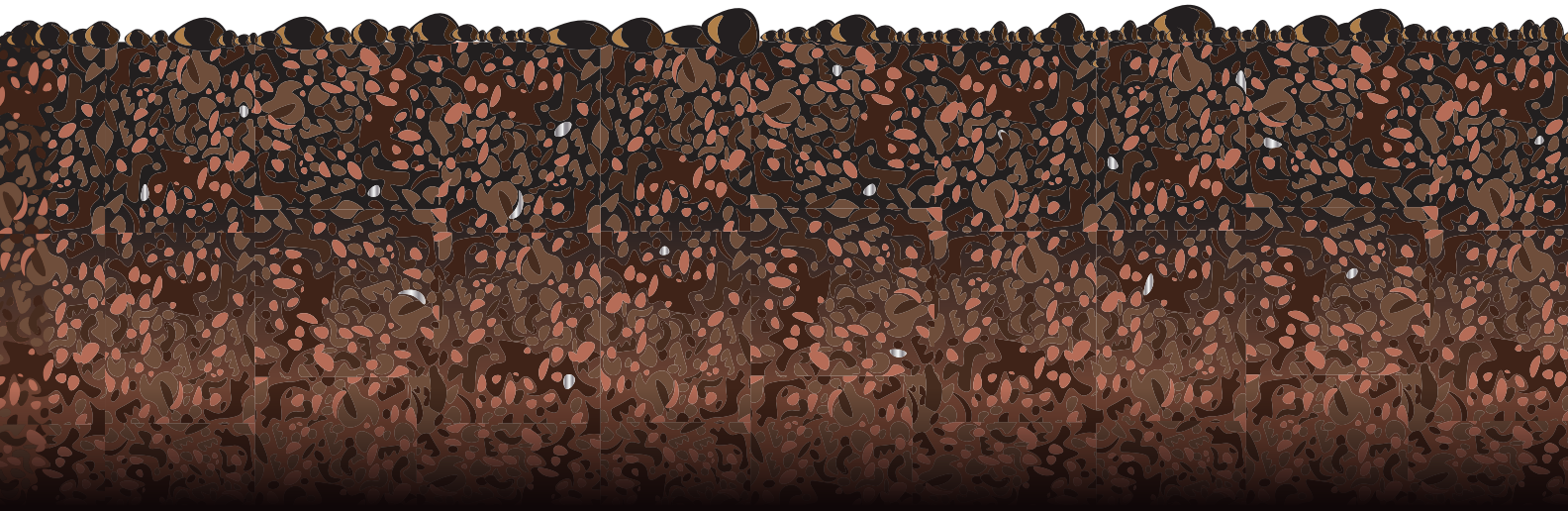


Fig. 1. Flowchart of mercury recovery process.

thermal desorption unit (TDU) process for small particles [3, 5], as shown in Fig. 1. The mercury-contaminated clay-based soil is dried, crushed, and screened through a strainer. The screening separates the soil into differently sized streams: small particles (called "fines"), which are transferred to the TDU, and large particles that are transferred to the washing unit.

The clayey soil samples used with our study were collected from sites in Greensboro, N.C., Oak Ridge, Tenn., and Savannah River, S.C., all at 1-foot depths. Proposed modifications to the mercury remediation process are identified and evaluated with the experimental results. The following items were evaluated:

- Crushing of clayey soils with both oven- and air-dried methods
- Optimum screen size
- Optimum water flow rate for washing
- TDU process designed for clayey soil



DRYING

The drying process consisted of oven- and air-drying soil samples prior to crushing and screening. The drying process was not originally part of the mercury recovery process used with sandy soil but was added to improve the crushing process, since crushing of saturated clay-based soil was ineffective. Drying is very dependent on temperature, weather conditions, the depth of soil to be dried, and the concentration of water in the soil. Air drying was the selected option, instead of oven drying, because air drying is passive and only requires that excavation stay ahead of the soil processing. The air-drying practice is commonly used in the clay-processing industry [5].

Soil samples before (left)) and after the drying process.

CRUSHING

To crush the sandy soil, a plate crusher system is typically used, where two large plates compress and move parallel to each other. However, this process will probably be less effective with clayey soil, as clay can clump in sizes equal to the distance between the two plates. The sandy-soil crushing process involves wetting the soil with water during excavation to reduce the hazard of airborne mercury in the dust. Airborne dust will likely be exacerbated with clayey soil, as the size difference between the soil types (0.002 millimeter for clay and 0.0625 mm to 2 mm for sand) causes the clay to be much lighter and could thus create more dust [5]. Because of its smaller size, which gives it more surface area per volume, clay also is able to absorb much more water than sand.

Clay must be dry for effective crushing. A successful crushing process of clayey soil is dependent on a thorough drying process. Because clay sticks together once it is wet, it becomes very difficult to break it down if the clay soil is not completely dry. To prevent an airborne hazard, the dry clay soil-crushing process needs to be enclosed.

After drying, the soil samples were placed into plastic sandwich bags to be crushed. The crushing was completed with a mallet in order to provide a best-case scenario for crushing, while still keeping rocks unbroken so they can be sent to the more economical washing process. The results still showed the presence of clay chunks. For this reason, an additional slurry process was proposed and investigated.

Crushed soil ready to be sorted.

SCREENING

Because the mercury recovery process (washing and TDU) depends on the particle size, a screening process is used after crushing to separate larger clay particles from smaller ones. For the larger particles, the mercury is only expected to be loosely tied to the surface of these particles since they are considered harder and less likely to have absorbed the mercury. Whereas for the smaller particles, the mercury could potentially have been absorbed into the softer, potentially sponge-like, structure of the particle.

Crushing directly impacts the optimal screen size. Washing is used with large particles and TDU is used with fine particles. If the crushing process is not thorough, more clay chunks will be present in the washing and TDU processes. An effective crushing process will minimize the amount of clay chunks and any rocks or stones present. The screening process was conducted once the crushing process was complete.

The screening process used sieves and a sieve shaker (Fig. 2). Humboldt sieve shakers were used for the screening process with this study. Various sieves were used on each run to determine which layers contained rocks and which still had clay chunks.

From left to right, Fig. 2 shows: the shaker bottom pan, 0.25-inch, 0.3125-in., 0.375-in., and 0.5-in. sieves. Run times for the shakers were investigated at two different intervals—1 minute and 10 seconds. No significant differences were observed in the results for these two run times. As it was able to capture approximately 87 percent of the fines, a 0.25-in. screen was used with this study.

Remaining fines would then be transferred to the washing process and TDU.

Fig. 2. Screening process with sieves [5].

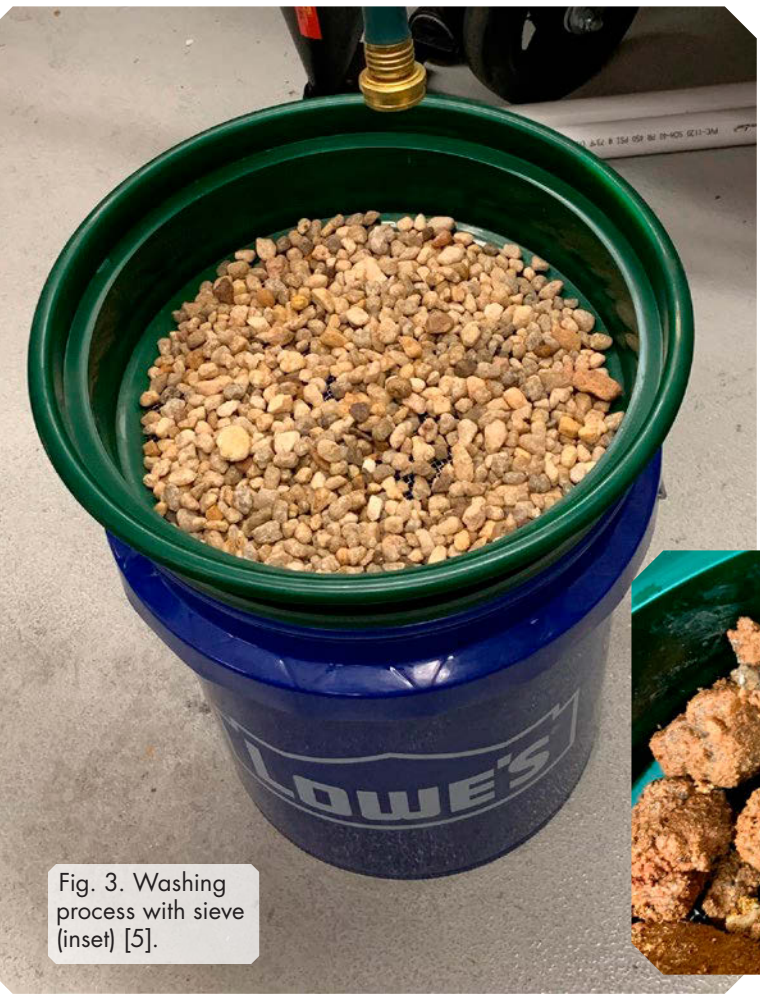


Fig. 3. Washing process with sieve (inset) [5].

WASHING

The washing process is used to recover mercury from large particles following the screening process. This process is less expensive than the TDU, so it is desirable that more material be treated with this method.

The washing process was tested by contaminating larger clayey soil particles with mercury surrogates of iron powder and gallium. The contaminated samples were washed with water at various flow rates for 30 seconds. Iron powder was collected with a magnet at the end of the experiment, and gallium was collected as a solid (at or below room temperature).

To collect the gallium, the clay was first skimmed from the washing bucket, and then hot water was used to transition the metal to a liquid phase. A whirlpool was then created in the bucket by moving it quickly in a circular motion. This acted as a centrifuge, pushing the dense gallium and rock to the outside while retaining sand closer to the center. Liquid gallium would bead up and could then be cooled down with cold water, forming a solid, which enabled easy removal.

Granted, this would not be directly applied to a water/mercury system, as mercury has a melting point (-39 °C) well below the temperature of water. Other separation

methods are readily available, however.

The clayey soil and surrogate were thoroughly mixed in a container for uniform distribution. The washing process (see Fig. 3) used a 3/4-in.-diameter hose for washing material in a sieve (with 1/4-in. screen openings and a diameter of 9.5 in.). Tests were performed using several different flow rates ranging from approximately 2 gallons per minute to 8.15 GPM. Higher flow rates were not used because they could cause excessive splashing and potential loss of materials.

Plots of flow rate versus percent surrogate recovered (for the three test conditions) are shown in Fig. 4. The optimal flow rate for peak efficiency with each test case was approximately 5 GPM (using a single 3/4-in. nozzle). However, losses above 6 GPM are likely a result of the surrogate splashing out of the container. Therefore, it is expected that the efficiency would continue to increase if the washing process was better contained.

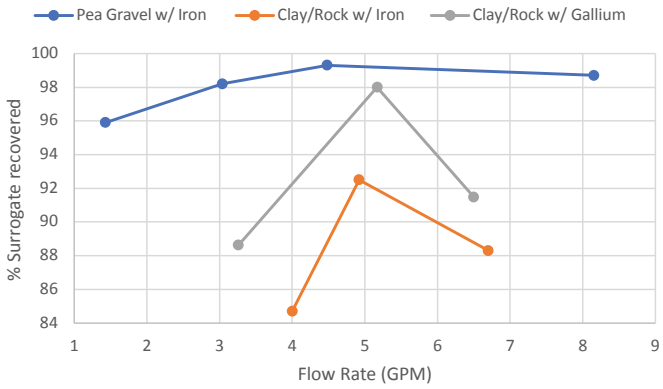


Fig. 4. Washing results for pea gravel with iron and clay/rock with iron and gallium [5].

THERMAL DESORPTION UNIT

The TDU is used to remove mercury from the small particles through a distillation process (Fig. 5). For this study, a heating mantle heated a flask containing a mixture of the soil and the mercury surrogate. A pair of thermometers recorded the soil and vapor temperatures, the cold finger condenser trapped and held the condensate where marked graduations showed the volume recovered, and the remaining gases exited through the two gas washers.

The TDU process consisted of removing mercury surrogates (glycerol and castor oil) from the Oak Ridge clayey soil using the distillation process. The surrogates were chosen based on safety, boiling points, and melting points. The TDU was designed using chemistry glassware in a distillation setup with an added Vigreux distilling column, a cold finger as the condenser, and double gas washers to remove any remaining condensable material before exiting the apparatus. Tests using the TDU were performed to determine how fast the TDU can distill out the surrogate at different soil sizes and at different soil-to-surrogate ratios. Because its boiling point is closer to the boiling point of mercury than that of glycerol, castor oil was the primary surrogate tested.

Slurry processing was developed to address the issues associated with clay chunks. The slurry process also offers greater potential for reducing the overall process cost. The soil is fully immersed in water to break down clumps. This process ideally allows for the clean clay/water slurry to be removed from the system, leaving behind contaminants in a mixture of sand, silt, and rock for processing. The process removes uncontaminated clay and reduces the total amount of soil that will need to be processed by the TDU. In addition, the process would eliminate the need for a previously suggested drying process and could greatly reduce the need for crushing.

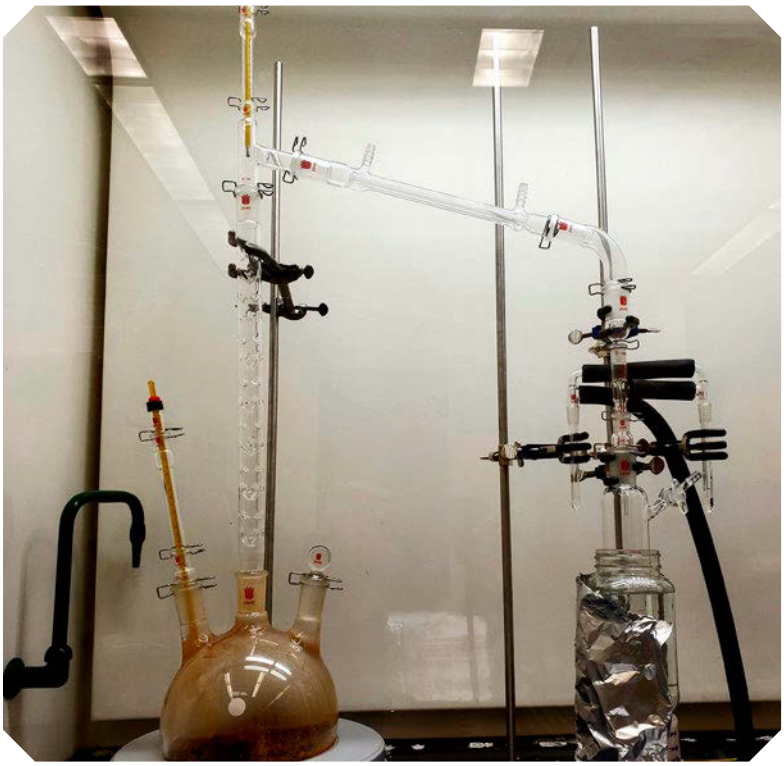


Fig. 5. TDU process test apparatus [5].

Three tests of the slurry process were conducted—one initial test as a proof of concept and two tests using iron-contaminated fines collected from the washing test. Observations of the slurry method were made while collecting gallium from contaminated fines after washing. The initial test used 250 grams of Oak Ridge soil placed in a 1-liter container and filled with water. The mixture was stirred and then the top was poured off. This was repeated until the water became mostly clear.

Testing with iron-contaminated soil was similar. The fines from washing were collected in a 5-gallon bucket. Water was added to the bucket and the top was poured off, ensuring only clay was poured off. A strong neodymium magnet was placed at the end of the bucket where clay and water were being poured off. No iron was picked up during slurry processing, meaning that all of the iron remained at the bottom of the bucket with the sand, silt, and other soil elements. In a larger operation, a surface pump would likely be used to remove clay and water from the top.

Thermal desorption was tested using castor oil as the mercury surrogate. The apparatus was used inside a fume hood, the heating mantle heated a flask filled with the soil and surrogate mixture, a pair of thermometers recorded the soil and vapor temperatures, the cold finger condenser trapped and held the condensate where marked graduations showed the

volume recovered, and the remaining gases exited through the two gas washers.

Fig. 6 shows a plot of the TDU process percentage of surrogate recovered to compare clayey soils (different size fines) with sand. Results are normalized to sand. It was able to remove 80–96 percent as compared with sand (around 50 percent recovered). The soil and vapor temperatures (330 °C limit) and the amount of surrogate recovered were similar for the sand and clayey soils (see Fig. 6). The thermal conductivity of dry to moist sand and dry to moist clay is similar in range and magnitude [5]. Therefore, because of these similarities between sand and clay, it is expected that the TDU process for clayey soil will roughly cost the same as the process for sandy soil.

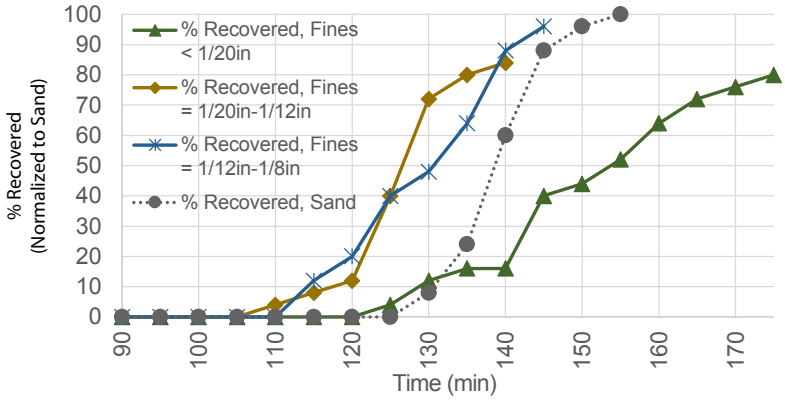


Fig. 6. TDU results with castor oil as surrogate [5].

Conclusions

We investigated a mercury recovery process to treat clay-based soils contaminated with mercury from nuclear enrichment, with experiments performed to evaluate the process steps for drying, crushing, screening, washing, and a TDU. Results from the testing support that it is possible to effectively remove mercury from contaminated clayey soil using a modified version of the mercury recovery process previously applied successfully with sandy soil. This process shows promise of being a viable method for mercury recovery.

During the crushing experiments, it was discovered that clay chunks were present in the process. These hardened clay chunks looked similar to small rocks. This is an important aspect to consider because clay chunks sent to the washing process, as opposed to the TDU process, could result in longer washing times for larger particles.

The screening process was analyzed using a sieve, and it was found that the optimal screen size directly relates to crushing effectiveness. A 0.25-in. screen was able to capture 87 percent of the fines analyzed. Any remaining fines would then be removed via the washing process and sent to the TDU.

Washing results showed that 5.3 GPM was the optimal flow rate for this test (with greater than 92 percent recovered). Higher flow rates showed lower effectiveness in washing, which could be attributed to excessive flow rates causing surrogates to splash out of the container. Improved containment could potentially allow higher flow rates to produce even greater effectiveness.

The experimental results suggest that the cost per ton of the washing process could be more expensive with clay-based soil than previously seen with sand-based soil because of the potential increase in time and flow rates required to break up clay chunks (as mercury could be trapped in the clay). Washing all the clay ensures that the mercury is removed from the larger particles. The increase in cost is highly dependent on the crushing processes and the amount of water content in the soil. In general, it appears that soil with a higher water content will intuitively require less time and lower flow rates for effective washing.

A proposed step of slurry processing provides the ability to remove almost all of the clay from the soil without losing the mercury (surrogate), resulting in less than 35 percent of the excavated soil requiring TDU treatment.

The TDU was effective at removing and recovering the mercury surrogate (castor oil) from clayey soil. More surrogate was removed as the temperature was increased, but to avoid equipment damage the maximum temperature was limited to 330 °C, so greater efficiency may be possible.

Future work would involve performing some initial soil testing at a contaminated site to evaluate the suitability of a acentrifuge for clay removal, validate cost estimates, verify the applicability of the conclusions of this research, and verify that levels of (aqueous) mercury in the clay/water slurry meet (with margin) regulatory limits.

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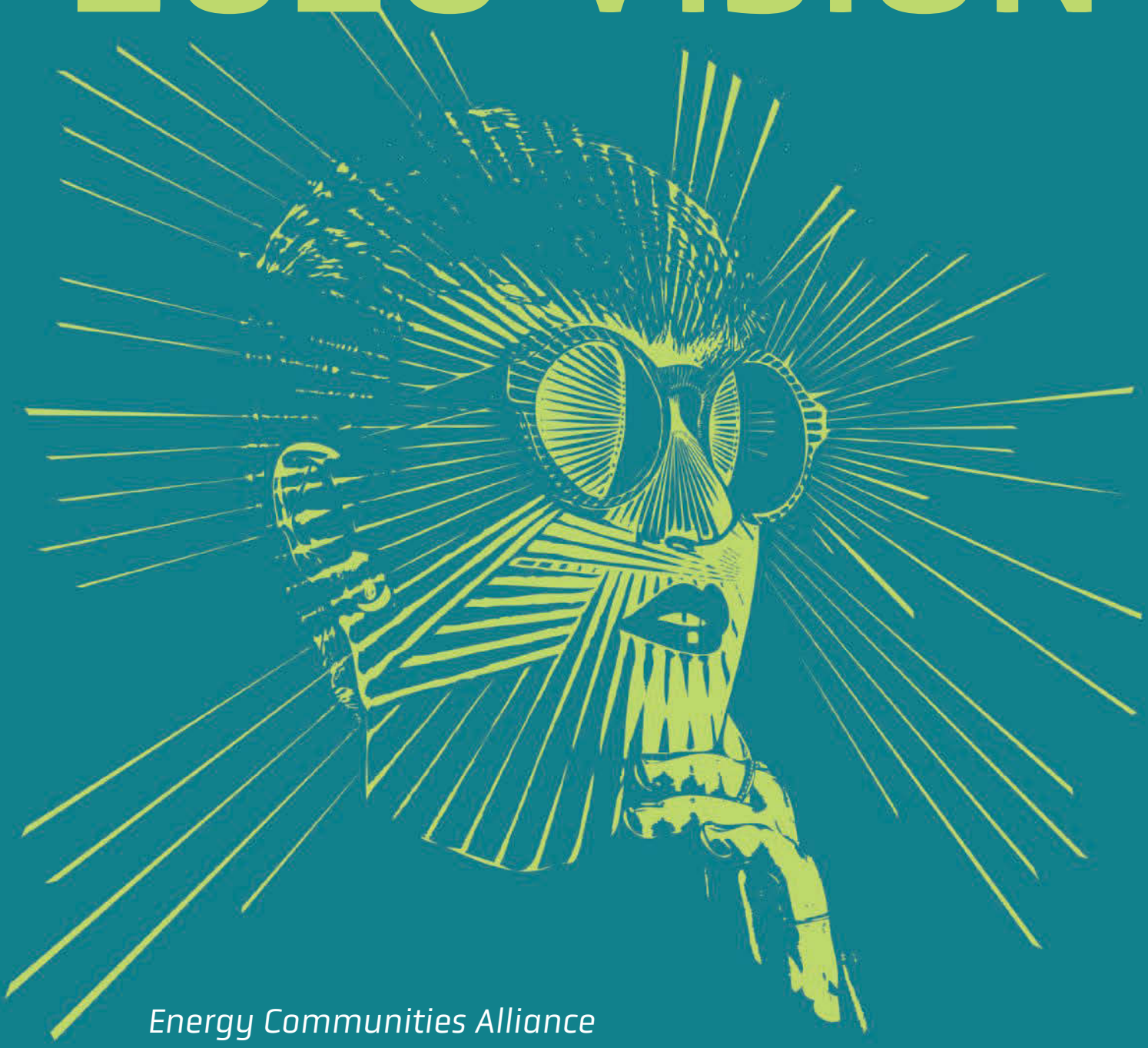
2020 VISION



Energy Communities Alliance conducted a survey of its members on the DOE Office of Environmental Management's recently released Strategic Vision.

By Mackenzie Kerr

On March 9, the Department of Energy's Office of Environmental Management (EM) released its first strategic plan in several years. Titled "A Time of Transition and Transformation: EM Vision 2020-2030," and called the Strategic Vision,[1] the document outlines the past accomplishments in cleaning up legacy nuclear waste and provides a broad overview of the initiatives that EM plans to put into motion over the next decade, "laying the groundwork for a long-term plan to realize meaningful impact on the environmental cleanup mission."[2]

Energy Communities Alliance (ECA), which promotes the interests of communities surrounding EM cleanup sites, recognizes and need and supports EM's initiative to create a comprehensive vision for the affected sites. However, while the large majority of EM site managers do work closely with local government officials, ECA members identified that EM lacked adequate outreach efforts to local government officials about the Strategic Vision, limiting input from those communities most directly impacted by DOE policies and deviations from long-standing and agreed-upon cleanup plans.

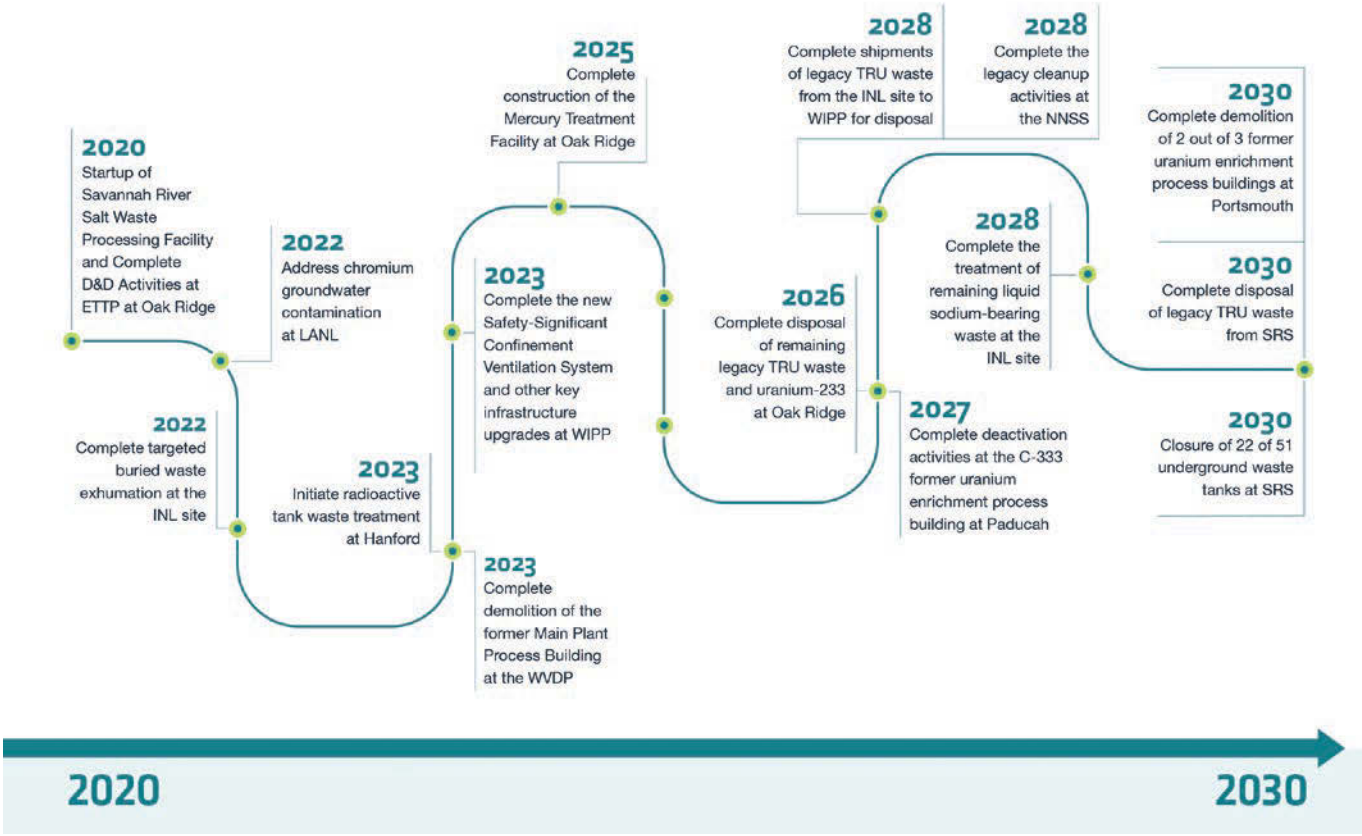
To help provide clarity on the local response to the Strategic Vision, ECA developed a survey to obtain feedback from local government representatives and community leaders. The questions asked the local officials about the EM Strategic Vision for their community, the positive aspects of the Strategic Vision, their involvement in the development of vision, and the viability of the vision under the fiscal year 2021 presidential budget request.

It is also pertinent to note that the DOE released its Strategic Vision just prior to the COVID-19 crisis. With the spread of the virus nationally, there have been widespread operational and economic impacts across the nuclear complex. With the COVID-19 pandemic continuing to unfold currently, ECA members are extremely concerned about the potential for severe and significant impacts to the EM program and the safety of the people that work at the sites. With circumstances constantly evolving within communities and at sites, it is more critical than ever for EM to focus and continue efforts to build and strengthen relationships with host communities.

1 https://www.energy.gov/em/mission/annual-priorities-strategic-vision

2 On May 1, 2019, the U.S. Government Accountability Office released a report titled "Department of Energy: Environmental Liability Continues to Grow, and Significant Management Challenges Remain for Cleanup Efforts." In its findings, the GAO concluded that the DOE's Office of Environmental Management has "not resolved long-standing management challenges," noting most significantly that EM does not have a program-wide cleanup strategy and relies primarily on individual sites to locally negotiate cleanup activities and establish priorities, which does not always balance overall risks and costs. The GAO recommended that DOE submit in EM's annually required Future-Years Defense Environmental Management Plan "all mandated requirements, as well as information on annual growth in environmental liability estimates by site, the key factors causing that growth, and an explanation of significant differences between environmental liability estimates and life-cycle cost estimates." This recommendation was to address concerns that "DOE is not consistently and comprehensively submitting complete information about the status of its cleanup." As the report explained, this has the potential to impact Congress and other stakeholders by failing to provide access to reliable information in order to make informed decisions. It was this recommendation that laid the basis for developing a Strategic Vision of cleanup activities and a projected timeline for each site. Ideally the vision would include: milestones to be met, whether milestones would be met, and if not, outlining the reasons and causes for missing milestones.

Decade Timeline



The footprint of the former K-25 building at Oak Ridge. Contaminated soil under a section of the footprint was recently removed as EM works to complete cleanup at the East Tennessee Technology Park this year. Photos courtesy of DOE

Survey overview

On a positive note, the majority of ECA members generally agreed with the overall vision at their sites and appreciated that EM is creating a strategic plan for the EM program. ECA has always promoted EM having a clear annual and overall vision document, and we appreciate that EM is moving in that direction. However, at the sites where EM has deviated from the long-agreed-upon cleanup process, EM took a shortcut and announced its objectives in the Strategic Vision instead of speaking with the community and trying to build support.

A significant issue identified by all ECA members (and conveyed to EM the day of the release of the Strategic Vision) is that EM lacked an adequate outreach effort to ECA members, including mayors, county executives, city and county councilors, city and county managers or other key local government officials about the Strategic Vision—especially lacking an effort at sites where there were changes to the long-standing and agreed-upon cleanup plans. Furthermore, the plan only generally identifies local governments (luckily, in the field, the large majority of EM site managers do work closely with local government officials). One ECA-member response stated, "There is reference to stakeholder engagement in the Strategic Vision. However, given the lack of input by stakeholders in the formulation of the document, it puts that priority into question."

The Strategic Vision highlights that EM success came from shrinking the EM footprint 90 percent over the past 25 years—a lot of that included community conveyance of land and creating open space in communities. Past EM plans stressed, within footprint reduction, community collaborative processes such as land conveyance for economic development and other productive reuses supported by the community. This Strategic Vision included footprint reduction (Priority No. 3 of EM's 2020 priorities) but did not include such community collaboration. This has created some concern, but ECA has been told that EM is open to input and understands that EM can succeed in its mission through land transfers to shrink the EM footprint, which will decrease EM's cost to maintain the land while putting the land and personal property back into productive use.

The purpose of the survey was to address the communication levels, site priorities, and relationships that exist between DOE-EM site and headquarter officials and local communities. The following are the ECA member survey questions and their summarized results.

Top: A team from the Savannah River Site remediated and closed over 90 acres of land contaminated by coal ash this year. The project was recognized by the DOE with the prestigious Project Management Excellence Award for being completed a year early and at a savings of more than $8 million.
Bottom: An aerial view of the Effluent Management Facility at Hanford's Waste Treatment Plant. Workers recently completed startup testing on the utility building that provides power to the facility.

Survey questions and summarized results

1. *Do you agree with the Strategic Vision for the site located in your community? If yes, what are the areas of agreement? Any other comments? If no, what issues do you think are missing from the Strategic Vision?*

   ECA found that the majority of respondents agreed with their site vision. Those that disagreed, however, outlined major concerns. Specifically, at the Hanford Site in Washington and the Portsmouth Site[3] in Ohio, communities were unsatisfied with the proposed course of action for their sites and each felt that their community priorities were not reflected in EM's Strategic Vision. Comments from other sites noted a "lack of clarity" on issues including remediation, transportation schedule for transuranic waste, and infrastructure revitalization as major deficiencies within the Strategic Vision. Further, none recognized issues outside the proverbial DOE fence, even though key issues related to the site occur in the community and state, including health and safety, labor force issues and training, infrastructure, small-business issues, economic development, and the transportation corridors between the sites.

2. *Are there any broader issues that should have been included in the Strategic Vision overall?*

   Except for the items noted in No. 1 above, many of the respondents did not feel any broader issues were missing in the Strategic Vision. Some community leaders raised DOE site resilience issues, including the concern of natural disasters, utility interconnectivity with the community, and site safety. Other sites raised questions over being a "de facto permanent storage location until a final nuclear waste repository moves forward." Safety and overall site operations in general should be included with a more detailed outlook.

3. *Did DOE staff contact you about the development of the Strategic Vision for your site? Did you meet or speak with DOE headquarters or site officials?*

   The results illustrated a clear lack of initiative to contact sites for the development of the Strategic Vision, as the majority of respondents said they were not contacted. Many of the communities also felt that the DOE changed the cleanup priorities without local government input. To have a cohesive working relationship, there must be a mutual understanding between communities and the DOE to treat one another as partners. Lack of communication erodes trust, complicates progress, and stymies future potential at each site. The lack of communication was surprising to many, since almost all sites have a direct working relationship with the site managers at the EM sites. ECA was also surprised that no one from DOE-EM headquarters reached out to ECA on the Strategic Vision prior to the release, as headquarters also does a good job of communicating with ECA staff and ECA leadership.

4. *Do you think this Strategic Vision is viable under the FY 2021 presidential budget request? Why or why not?*

   The overall majority did agree that the Strategic Vision is viable under the FY 2021 budget request. There were, however, two main concerns expressed across the sites: 1) this vision was written to justify the funding proposed for EM in the president's budget, and 2) the budget changes yearly, so the Strategic Vision will change yearly, especially depending on the vision of each administration, so it will be difficult to have a consistent outlook.

5. *Is the role of local governments effectively covered in the Strategic Vision? Explain.*

   Of the communities who responded, all sites said no, it was not effectively covered.

   ECA understands that the Strategic Vision put out by EM is a "living document" and that changes will be forthcoming; however, the initial lack of initiative taken by EM to contact sites even to create a baseline document is very concerning.

Conclusion

ECA's goal is to foster and encourage a strong working relationship between the DOE and local governments and their elected officials. These strong relationships include a necessary base of trust and communication to be fully operative and functional. All these components—trust, communication, input, and support—are pivotal toward the accomplishment of the shared goals of the interested parties. The communication pathways between the DOE and local communities impacted specifically by DOE activities must remain open and effective.

In the past there have been times when communication and outreach have not gone smoothly. ECA's role and purpose is to foster collaboration between the DOE and local communities. In 2016, ECA provided the DOE with a list of lessons learned deemed of primary importance that would enable the DOE to face the challenges and obstacles within the realm of budgeting, cleanup, and defense missions. The overarching recommendation: *Involve local governments in DOE decision-making.* Meaningful engagement needs to include working with communities and the U.S. Congress to ensure adequate cleanup funding and engaging those communities that are most directly impacted by the department's nuclear waste management and disposal policies.

ECA always appreciates the opportunity to work in conjunction with EM, and since the Vision was released, the DOE has committed to working with ECA moving forward. "EM leadership identified that it appreciates ECA input on issues and will work with us to ensure that local government input is provided to EM during the update to the Strategic Vision," said Seth Kirshenberg, executive director of ECA. ■

Mackenzie Kerr is program manager at Energy Communities Alliance, a nonprofit, membership organization of local governments adjacent to or impacted by Department of Energy activities. The organization brings together local government officials to share information, establish policy positions, and promote community interests to address an increasingly complex set of constituent, environmental, regulatory, and economic development needs.

3 It is ECA's understanding that both Hanford and Portsmouth will be reaching out to EM independently.

Carmelo Melendez:

Legacy Management in the Age of COVID-19

Coordinating with regulators and stakeholders, the DOE Office of Legacy Management has taken steps to continue critical work while protecting the safety of its workers and the public.

Photos courtesy of the DOE

(LEFT) At the Original Landfill stabilization project at the Rocky Flats Site in Colorado, workers drill into bedrock through the center of a concrete block placed on the landfill's west side earlier this year, preparing to install a stabilization anchor.

(BELOW) An equipment operator grades soil on top of a drainage ditch below anchor row three on the Rocky Flats landfill's east side.

"This pandemic highlighted the need to be able to respond quickly to changing conditions."

-Carmelo Melendez

Established in 2003, the Department of Energy's Office of Legacy Management (LM) is responsible for activities at 100 sites where the department's mission has ended and active environmental cleanup has been completed, including long-term surveillance and maintenance, records management, benefits continuity, property management, land-use planning, and community assistance and engagement. Since 2016, LM has been led by Carmelo Melendez, who was previously the director of the Office of Asset Management within the DOE Office of Management.

LM staff interviewed Director Melendez about the unprecedented response to the COVID-19 pandemic. He explained how the organization transitioned from a field-centric organization, with sites and offices spread across the country, to one primarily defined by teleworking, all while ensuring that sites remain protective of people and the environment. This interview initially appeared in the April-June 2020 *LM Program Update*.

Did you have any pandemic plans ready that could be used immediately when the COVID-19 pandemic started?

No, we didn't have any specific pandemic plans ready, but we had a Continuity of Operations plan, which we adapted as a guide on how to proceed. Our emergency operations plans had cursory information about pandemics and were a starting point in LM preparation. LM patterned most of our pandemic planning on the plan that DOE headquarters developed, which wasn't completed until mid-to-late March. The plans had to be revised to meet the needs of our organization in the ever-changing situation. Ultimately, we adapted our overall emergency operations plan and were quickly able to move the entire organization into minimum-safe operations across the country.

Photos courtesy of the DOE

How did you deal with physical rehabilitation work in the field? Did you stop work during the pandemic, or did you switch into minimal operation?

We invoked minimum safety operations, or MINSAFE, as soon as the emergency started. We coordinated with regulators and stakeholders as things developed in the first few days. We continued fieldwork at the Rocky Flats, Colo., and Weldon Spring, Mo., sites, as well as in some selected activities. Our work did not stop; we were just very judicious and made risk-based decisions on what to stop and what to continue. We reviewed long-term surveillance and maintenance [LTS&M] activities, and decisions were made on a case-by-case basis about which operations would stop. Our goal was to maintain good standing with all regulatory and compliance activities at our sites. This included continuing with projects that were critical to the safe, long-term management of our sites, particularly at our larger sites, where we have federal and contractor workers stationed.

LM is now responsible for 100 sites across the United States, from Alaska to Puerto Rico. We have delayed work at some sites, requiring workers to travel overnight to reach a site. In addition, in areas where COVID-19 levels are higher, it is not safe to send workers to a site, or people from outside of an area are asked by local authorities not to come to the area.

However, for more remote sites, LM has maintained contact with regulators and local stakeholders. For example, on March 31, a 6.5-magnitude earthquake occurred in Idaho near the Lowman site, where LM conducts LTS&M on a small uranium mill tailings cell. Fortunately, a local fire chief who is a point of contact for LM in case of an emergency at that site was able to visit and report back to LM that there was no visible damage.

This spring at the Weldon Spring Site in Missouri, U.S. Army Corps of Engineers contractors completed exterior wall structures and began siding installation on the site's new interpretive center.

How did the pandemic affect LM's overall work processes? Has telework been used, for example?

LM pivoted from an outside to an internal focus in response to the pandemic, to make sure the safety and health of our employees was our primary goal. Telework moved from voluntary to mandatory for most employees during MINSAFE. In fact, LM was uniquely ready for working remotely, because we are a regional organization maintaining sites across the country. We maintain excellent contact throughout the organization. Yet with COVID-19, we knew any activities that did not undermine our commitment to being protective of human health and the environment and that could be stopped in a controlled, safe way would have to be stopped during this pandemic, and any work that could be completed remotely would continue. When the pandemic first started, we had to have everyone fully embrace using technology and make sure we had the resources available to help people work remotely in the most efficient way possible.

Ironically, just prior to shifting to almost complete telework, LM performed a drill in which everyone worked from home for a day. After the drill, help was provided to staff who had trouble logging in remotely. We quickly realized how valuable this exercise was after nearly everyone was working on LM's computer network from home because of the pandemic.

At 16 sites, LM has solar-powered SOARS [System Operations and Analysis and Remote Sites] stations that transmit data using satellites. Among the types of data collected are pump control, flow rate, and in-line pressure for water treatment systems; meteorological data; and visual images from webcams. SOARS has allowed LM to operate some water treatment systems and monitor the condition of sites where we could not send staff during minimum-safe operations. However, the camera at the Bluewater mill tailings cells was not working prior to LM going into minimum-safe operations. The Bluewater site is in New Mexico, which has restricted workers from outside the state from traveling to the area to do work. While the SOARS stations have been valuable for some information during the pandemic, it is not ideal, because it is important to maintain the station with in-person staff.

Contractors also installed exterior siding and glass on the at the Weldon Spring Site interpretive center's southwest side.

Photos courtesy of the DOE

How is occupational health and safety currently regulated under the new conditions?

Because of the pandemic, we've had some reduction in requirements, such as keeping employees' training current in certain areas like the hazardous waste eight-hour refresher and radiological control certifications. These are just two examples of activities where we were allowed to push the refresher training further than the normal year.

Something that has become normal is working from home. With the majority of our workforce teleworking, we needed to help all of our employees set up their home offices in the best manner possible to provide a comfortable place to work. We sent out an ergonomic workstation self-assessment checklist, along with the link to an ergonomics video to give some modification guidelines. We also have an ergonomist on staff to answer questions from employees.

For the few employees still working at job sites, social distancing protocols were instituted into the ongoing construction projects, along with increased use of personal protective equipment and procedures to achieve social distancing. We've included contractual modifications to LM's support contractor and subcontractors. Access control points were enhanced with screening protocols for health status, recent exposure, and to assess employees' readiness for work.

Cleanings and disinfecting procedures were instituted for construction offices, equipment, and vehicles, and the number of persons in a vehicle and construction equipment were restricted. Additionally, if people had to travel to a job site, local hotel facilities were checked for COVID-19 response activities, such as restriction of social activities and distancing, enhanced cleaning, and reducing lodging to one person per room.

As we return to limited operations, LM is embracing some guidelines from the Occupational Safety and Health Administration to bring people safely back into the workforce. Meanwhile, employees have to accept that the world has changed, and management needs to prepare the workforce for how to safely return and social distance, as well as a myriad of other things that come with the controls necessary to reduce the risk of spreading the virus.

What experiences do you take away from the pandemic for your future work?

Semper Gumby! Always Flexible. 1) Have a good foundational continuity of operations plan. 2) Know what work activities must continue based on risk-based decisions with a safety consciousness. 3) Communicate internally and externally with employees and stakeholders.

For those involved in moving the organization to minimum-safe operations, it was too easy to assume that everyone in the organization understood what was going on. So, it's important to communicate often and cover the same topics multiple times to reassure employees that we can and will get through this together and for employees to understand how work conditions and requirements will change, as LM begins resuming work at more sites. Also, we continue to maintain close coordination with regulatory agencies. This pandemic highlighted the need to be able to respond quickly to changing conditions, and LM was able to gain concurrence from our regulatory agencies in quick order, due to the close relationships maintained through our daily execution of LTS&M activities.

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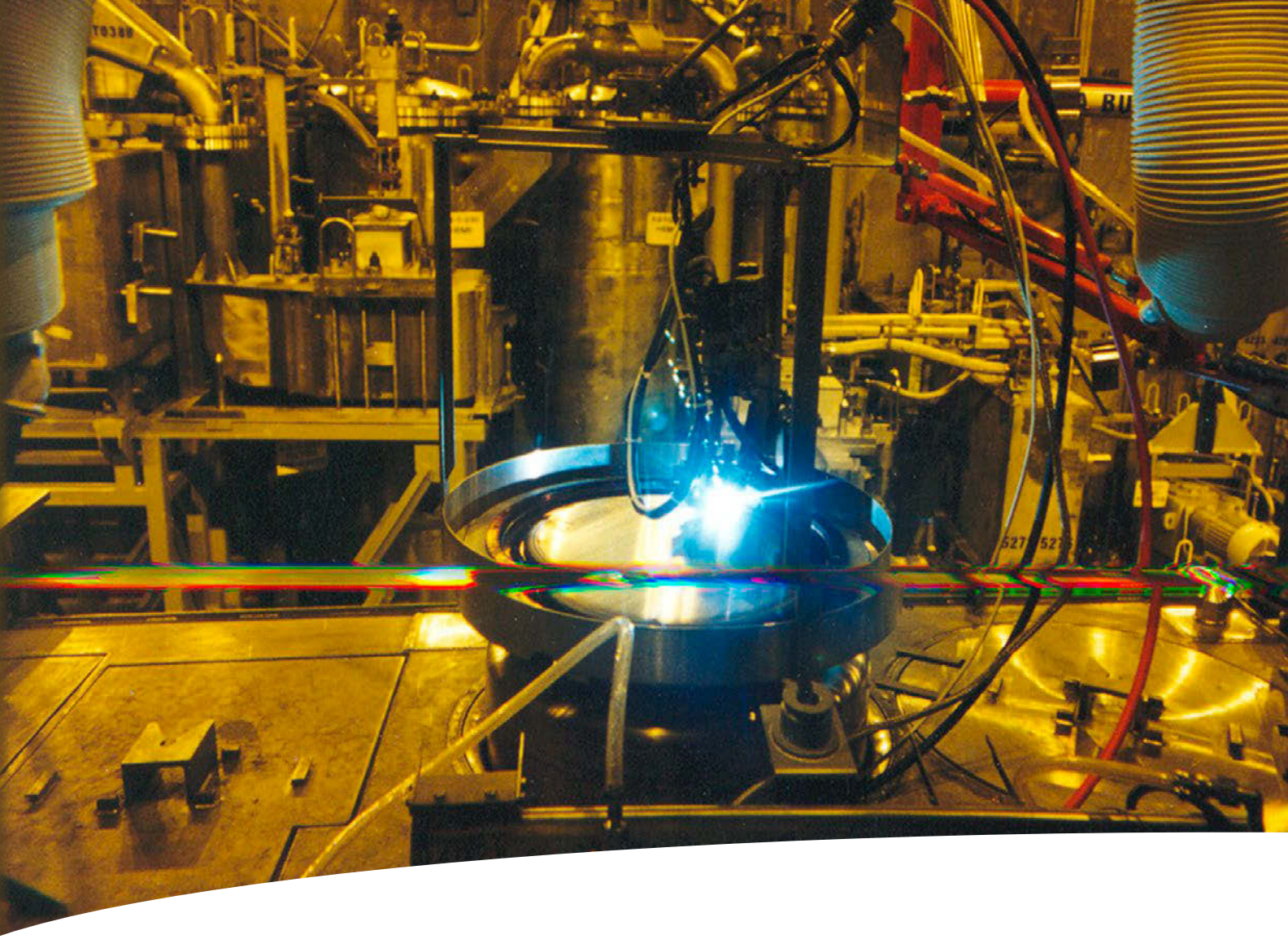
Working in Nuclear World

How consulting engineers can help navigate nuclear's exacting safety demands when undertaking radwaste projects.

By Tom Gilmartin

Here's a story about how it sometimes takes imagination to get results inside "Nuclear World," where radioactive materials are involved and safety standards are appropriately high. Solutions that work in that world might be considered impractical or costly outside, in "Normal World."



The story goes back to early in the nuclear age, in the 1950s, when a site at West Valley, N.Y., was used for a project to reprocess spent nuclear fuel from power plants and concentrate it for further use. The methodology tried at the time was unsuccessful and the project abandoned. Highly radioactive spent fuel was sealed up in 100-ton canisters constructed with steel, lead, and concrete, then stored safely away.

All but one canister, that is, which was apparently left partly filled and unsealed in the case that more fuel had to be disposed of. Wanting to clear up the site, the Department of Energy required the site operators to find a way to weld up the canister to seal away the radioactive material inside it.

While this might sound like a simple task in Normal World, the justifiably demanding standards required inside Nuclear World had to be complied with. Each weld would have to be done in a highly specific way, and the soundness of every step documented right down to the voltage used by the welders, so it could be demonstrated that safe measures had been taken and the welds were good.

Developing a new procedure for welding the single canister, and having that methodology accepted by the DOE's regulators, would have been significant in terms of cost and time. There was, however, a solution available: Apply the procedures that had been used when the other canisters were welded and sealed, which still met DOE requirements.

The problem was that this work had been carried out 25 years ago. It had been done using the information technology available at the time. Specifically, the once dominant but now defunct Microsoft Disc Operating System, or DOS. The records of each step taken, including every weld, had been stored in meticulous detail on paper tape, cards, and boards. Virtually none of the equipment and records had been touched for a quarter of a century, and the records had suffered some disorganization in the meantime.

Encorus Group, an engineering firm based in western New York with an NQA-1 program that consistently meets strict client audits, developed a solution to make this work. Partly, this came through understanding the DOE requirements that would apply to the project. This included knowledge of the unique aspects of Nuclear World and how difficult it would be to build up a DOE-acceptable procedure from a standing start.

The company saw that it would be faster and less costly—in the long run—to take the counterintuitive approach of dusting off the early-1990s technology and pressing it back into service.

In many projects related to nuclear energy and radioactive materials, getting approvals is at least half the effort, and in this case, it made sense to go with already-approved methodologies, even given the age of the equipment and records. Sealing the canister, however, involved a very 21st century twist: The canister welds were performed remotely by robots due to the extreme radiation hazard within the facility.

This project succeeded due to experience meeting the exacting requirements of the ASME's NQA-1 standard and then having the ability and the patience to work with 25-year-old systems to produce a workable result. This included applying current technology in some cases, such as new signal generators, to provide the data required to meet NQA-1 standards.

The result was that the canister was successfully welded shut in a way that met the requirements of the DOE, and it has been safely stored on the West Valley Demonstration Project property.

(LEFT) A spent fuel canister is remotely welded. While using modern robotics, the welds were performed based on procedures that had been approved in the 1990s and are still valid.

Photos courtesy of Encorus Group

(RIGHT) Workers move a vertical storage cask containing a canister of high-level radioactive waste at New York's West Valley Demonstration Project.

Photo: DOE

Factors for success in Nuclear World

Here are some suggestions on how owners of construction projects, contractors, and suppliers in Nuclear World can manage costs and timelines, inject predictability, and reduce their Advil consumption.

Buy in quantity to spread your costs

Due to the high hurdles involved in permitting products—even something as simple as a single bolt—it makes sense to buy more than one in order to spread the costs out over more materials. It won't be a flat cost comparison, as those bolts may come from different lots, and each needs to have a sample tested. And, it will be necessary to prove that bolts stored in inventory are those that have met the certification process.

To do: Get good at planning ahead to be sure that enough bolts (or pumps, valves, or any other parts for the project) that have been certified are available. It can also mean limiting the sizes and configurations of parts being used for easier inventory management.

Think defense in depth

One of the standards of nuclear design is the concept of "defense in depth." The NRC defines defense in depth as, "An approach to designing and operating nuclear facilities that prevents and mitigates accidents that release radiation or hazardous materials. The key is creating multiple independent and redundant layers of defense to compensate for potential human and mechanical failures so that no single layer, no matter how robust, is exclusively relied upon. Defense in depth includes the use of access controls, physical barriers, redundant and diverse key safety functions, and emergency response measures."

To do: Learn about nuclear safety strategies, including having relationships with companies and laboratories that understand how to apply defense in depth.

Factors for success in Nuclear World

(Above) A ventilation fan is delivered to the Waste Isolation Pilot Plant. Due to the often lengthy process of gaining approval for products used in nuclear facilities, it may be practical to limit choices of components such as this to models that have already been approved for use.

Understand commercial-grade dedication

Commercial-grade dedication (CGD), sometimes called commercial-grade item dedication, is a key aspect of working in Nuclear World. Being familiar with its processes is important to success in nuclear-related projects. The exacting demands of CGD are not going away, and it is a key part of making nuclear facilities safe, because the consequences of failure are so far-reaching.

To do: Know what tends to slow the CGD process down and what moves it ahead.

Be prepared to make revisions

Quality control professionals from regulatory agencies take their jobs very seriously—to the extent it is rare indeed for them to accept any report or other document on the first attempt. They will almost always request a second, third, or more attempt.

To do: Factor those rewrites into your costs and timelines.

Calibration matters, a lot

In testing, you will need objective proof that a test was done correctly. One of the keys to that is making sure that the equipment was operated by a fully qualified person, that it has been calibrated recently, and that the equipment used for the calibration was likewise calibrated.

To do: Gain excellent skills in keeping track of all the certifications, and have this done according to the relevant criteria.

Fewer companies able to do the work

No engineering firm will even be considered for work on nuclear sites unless it has a current and active NQA-1 program. This requires frequent internal and external audits to be sure that the firm's processes meet a daunting level of quality. Not many engineering firms are willing to make the investment in building this certification and maintaining it.

To do: Find out, through word of mouth and other methods such as online searches, which firms invest in NQA-1 programs and certifications.

Stay with the approved drawings

In Normal World, contractors have considerable flexibility about how they implement the ideas in the engineer's drawing. They might look at the drawing and wonder, "Why is it so complex? We can just run that cable in a straight line, no problem."

In Nuclear World, that variability is much like medieval European maps, which marked unknown areas with "Here be dragons." A contractor deviating from the approved drawings is walking straight into dragon country. Inspectors will just say, "You didn't build it according to the drawing. Rip it out and do it over."

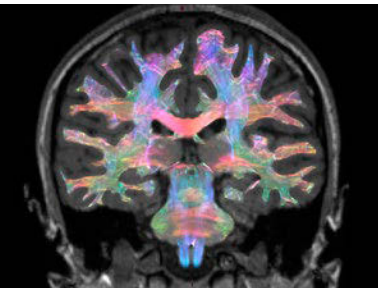
This is not always a case of just following the rules. The engineer who did the drawing may be aware of considerations and constraints that the contractor knows nothing about. Remember that safety and following procedure are important in Nuclear World. Cost is far less so.

To do: Understand the importance of following approved drawings and specifications. The result will be that your life will be much easier.

Tom Gilmartin, P.E., PMP, LEED AP, is the director of engineering design services at Encorus Group, based in Buffalo, N.Y.

ANS Virtual Winter Meeting

November 16-19, 2020 **answinter.org**



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Focused on the Future

While fewer hands were shaken at this year's waste management meeting, attendees nonetheless exchanged information on reducing long-term environmental liability.

The 2020 Waste Management Conference, held March 8–12 in Phoenix, Ariz., kicked off just days before the World Health Organization declared the spread of the novel coronavirus a pandemic. When the conference began, it was still unclear how extensive the coronavirus outbreak would be, and meeting organizers later learned that two attendees were tested for COVID-19, the disease caused by the virus, in the days following the meeting. Fortunately, neither of the attendees tested positive.

During the meeting's opening plenary session, with the pandemic unfolding, James Fiore, president of WM Symposia, began by thanking those in attendance and congratulating them for their commitment to the annual conference, which provides an open forum for discussing the management of radioactive waste and other topics. He noted that, regrettably, a number of conference regulars who have consistently attended the event for years chose to err on the side of caution and forego the trip to Phoenix this year.

The session's first keynote speaker, Michael Lempke, president of the Nuclear and Environmental Group at Huntington Ingalls Industries, spoke about his role as chairman of the Energy Facility Contractors Group (EFCOG) and the group's goals for expanding its contributions to the Department of Energy and the National Nuclear Security Administration. Comprising 114 member companies, EFCOG's stated objective is to further the missions of the DOE and the NNSA by sharing best practices and information to support management and operations. "I should state up front, for this group, we view environmental security as a key and essential piece of national security," Lempke told the audience.

Lempke

EFCOG has been working with the DOE for nearly 30 years, and Lempke said that the group's board is building on its foundation in two key ways. First, EFCOG is working to take "clear accountability for our part of the system as long-term, world-class strategic partners." EFCOG is doing this, he said, by employing a risk-management framework to identify strategic risks that, from the industry's standpoint, pose the greatest risks to the DOE's mission, and to determine the best mitigation actions for those risks. Lempke said that the EFCOG board had been planning to hold a closed meeting in Charlotte, N.C., in April for two days of facilitated sessions to finalize a list of risks and work on crafting mitigation strategies. That meeting, however, was canceled due to COVID-19.

One such strategic risk that EFCOG is looking at, Lempke said, is the waste management industry's ability to maintain a highly trained and committed workforce. Mitigating that risk would entail identifying what critical workforce skills are needed, determining the demand for those skills, establishing training and development programs to support a talent pipeline, and then being able to deploy those assets across the DOE complex. Lempke noted that some mitigation actions can be implemented by EFCOG member companies, while some would need to be implemented by national laboratories and plant personnel. Other actions would need to be

WM Symposia/Flash Gordon

2020 Waste Management Conference plenary speakers included (from left) Michael Lempke, of Huntington Ingalls Industries, William Magwood, of the NEA, and the DOE's William "Ike" White.

supported directly by the DOE, he said.

The second way in which EFCOG is contributing to the DOE mission is by establishing initiative-specific task teams. "We have done this successfully over the past six months and have delivered what I consider high-quality, quick-turn product at the request of senior DOE leadership in high-priority subject areas," Lempke said. Some of the subject areas where EFCOG task teams have recently provided services to the DOE include human capital management, supply chain, data quality, and risk communications. "This goes to the heart of what EFCOG has done for years—share lessons learned and work to improve safe operations across the [DOE] complex," he said.

Following Lempke, William Magwood, director general of the OECD Nuclear Energy Agency (NEA) and former commissioner of the Nuclear Regulatory Commission, began by noting that many of the issues in radioactive waste management are the same issues that existed when he began his career. "It shows that we really have to think strategically about what we're doing, because we have not made as much progress as one would have expected," he said.

Magwood

In highlighting the work of the NEA, Magwood pointed to the agency's new Committee on Decommissioning of Nuclear Installations and Legacy Management. Formed in 2018, it is the first committee the NEA has created in 25 years, he said. The formation of the committee was in response to the growing number of commercial nuclear power plants and facilities undergoing decommissioning and the need for a global understanding of legacy facilities.

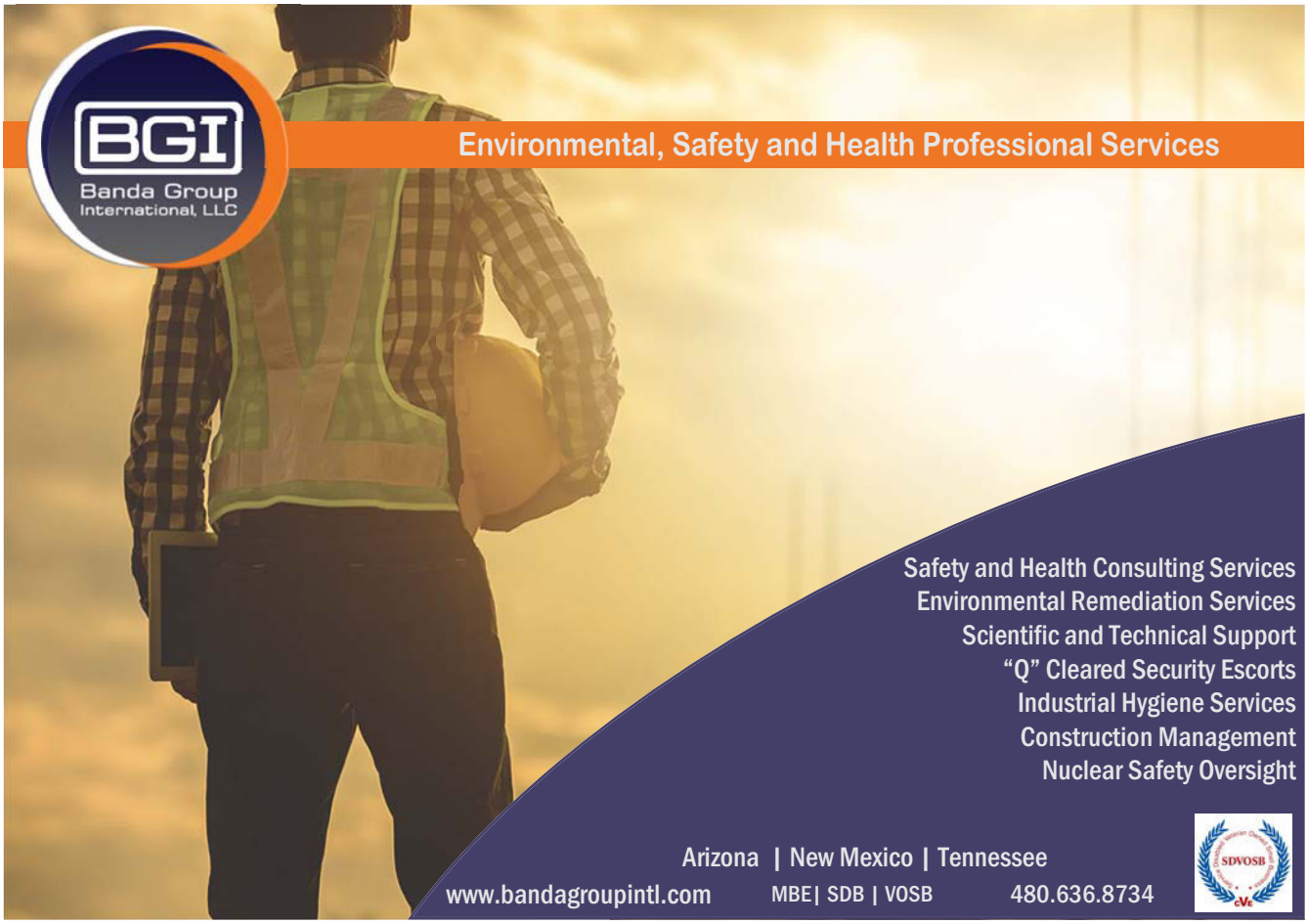
Magwood said that for commercial nuclear power plants, the deactivation and decommissioning challenges are fairly well understood. He noted, however, that out of the approximately 160 reactors that have been shut down around the world, only about 15 have been fully decommissioned, mainly in the United States. "We see that, when we look at these D&D activities, a lack of an integrated and optimized approach has really had a big impact on both the decommissioning of commercial facilities and on the legacy facilities," he said.

To improve decommissioning, Magwood said, the NEA has been having wide-ranging discussions that focus on what activities could be done earlier to facilitate D&D work being done today. In doing so, the NEA is asking what the industry could have been doing in the past to make current D&D work easier and if there's anything that can be done now to support future work.

Magwood pointed to the need to design nuclear facilities with disposal in mind, much in the same way that the automobile industry has begun thinking about building cars that are not only easier to put together, but are easy to take apart and recycle or dispose of. Eventually, Magwood said, regulators may have to become engaged and require reactor designers to take end of life and decommissioning into consideration before plants are built. "We can't just be interested in building facilities that work for us today, we have to be thinking about the long term," he said.

At the same time, there is a need for a more flexible but stable regulatory framework, Magwood said. An over-compliance to regulations is costing billions of dollars in unnecessary work, he said, adding that regulators will need to think smarter about hazards and ensure that costs are balanced with benefits. "If you focus on over-compliance, you are never going to get better," he said.

Finally, Magwood stressed the need for stakeholder involvement and public engagement in any decommissioning or



WM Symposia/Flash Gordon

Conference attendees, before social distancing became de rigueur, packed the "Hot Topics in DOE Environmental Management" session.

waste management project. "Ultimately, if you can't bring the public along in these conversations, you're not going to have a sustainable process and a sustainable project," he said.

The plenary's final speaker, William "Ike" White, DOE senior advisor for environmental management, said that 2020 will serve as a milestone year for the DOE and its Office of Environmental Management (EM), commencing a decade of cleanup progress. "For many, 2020 is an inflection point for sites across the EM program," he said. "It is a time to look ahead and contemplate the step change we will achieve in the decade ahead."

White used the plenary session to announce the DOE's release of its strategic vision for the coming decade, as contained in the report *A Time of Transition and Transformation: EM Vision 2020-2030*. The report highlights planned achievements for the next 10 years, including the progress that the DOE expects to make in treating radioactive tank waste and closing underground tanks at its Hanford, Savannah River, and Idaho sites. "This vision provides a vivid picture of what our sites will look like by 2030," White said.

White

To reach this vision, White said, the DOE, using an end-state contracting model, will be awarding billions of dollars in procurements at EM sites over the next few years, representing a significant opportunity for DOE contractors. "This contracting push will result in the widespread application of our end-state contracting model to get the best value, encourage innovation, and bring the best partners to the table," he said. The new contract model will provide EM the ability to group work into specific task orders, which will allow more clarity, shorter time horizons, and more accurate cost and schedule estimates, White said, adding that the contracts also will provide incentives to motivate contractors to improve their performance in meeting costs and schedules.

White also noted that by the end of the year, the DOE hopes to award a new EM-managed, stand-alone contract for the management and operation of the Savannah River National Laboratory. The site-wide contract, he said, will enhance the ability of the lab to pursue its continuing missions by focusing on research and development, increasing its ability to pursue more diversified projects, and attracting additional expertise through partnerships with academia.

Hot topics

The panel session "Hot Topics in DOE Environmental Management" is held every year at the Waste Management Conference and is always a popular meeting event. The session allows contractors to learn what sites and projects EM is prioritizing and where the department will likely be allocating funds.

Session cochair Martin Schneider, of Longenecker and Associates, who served as the panel moderator, noted that the intent of the session was to "drill down" on the strategic vision outlined by Ike White during the opening plenary session, as well as to serve as an "executive summary" of the overall conference.

Schneider began the interactive session by asking Michael Budney, site manager of the DOE's Savannah River Site, what the planned startup of the Salt Waste Processing Facility (SWPF) will mean to the site's mission. The DOE has said the SWPF, built to accelerate the treatment of Savannah River's radioactive liquid tank waste, was set to begin operation by this summer. Budney said that while the SWPF will quicken the cleanup

Budney

of the site's waste tanks and reduce life cycle costs, the facility also raises some operational challenges. "SWPF has this great capability, but it means we have to get the entire liquid waste [system] to operate at that same pace," he said, adding that operations will work 24/7. As part of liquid waste treatment operations at SRS, the facility will need to work in coordination with the Defense Waste Processing Facility and the Saltstone Disposal Facility at the site. Budney also noted that there will need to be coordination among the three major contractors that will be involved in the liquid waste management system: Parsons, Savannah River Remediation, and Savannah River Nuclear Solutions.

Betsy Connell, EM associate deputy assistant secretary for regulatory and policy affairs, added that as the DOE shifts to operations and begins making progress in treating tank waste at SRS and the Hanford and Idaho sites, it will demonstrate that the department is "able to make tangible and sustained progress toward addressing our largest environmental risk—tank waste." Connell said that progress made in treating tank waste could open new opportunities to advance site cleanup.

Connell

"We are challenging ourselves to think outside the box," she said, "and we hope that we can work with the regulators and the stakeholders to look at how we can get cleanup done efficiently, effectively, and in a way that is protective of human health and the environment." As an example, Connell said that EM is interested in looking at the work the Environmental Protection Agency is doing, through its Superfund Task Force, to reform its Superfund program. That reform work, she said, could reveal a number of opportunities for EM to streamline its cleanup work, such as using adaptive management and core-team approaches to managing projects.

Asked about the White House's proposed fiscal year 2021 budget reductions for Los Alamos National Laboratory and other DOE sites, Todd Shrader, EM principal deputy assistant secretary, said that while some budgets have been scaled back, there are sufficient carry-over funds to meet site cleanup milestones and commitments without affecting DOE and contractor workers. "We feel confident that although the [budget] request seems low, based on some previous years' money and carry-over [funds], we will be fine for completing all our consent agreements," he said.

Shrader

Dae Chung, EM associate deputy assistant secretary for corporate services, discussed the DOE's end-state contracting model and the possible impact on contractors. Chung, who was recently appointed to his current position, said that while he was not involved in the early development stages of the contracting strategy, there has been good communication between the DOE and its industry partners. "But, as with any new changes or modification to existing processes, there is perhaps a larger degree of uncertainty," he added. Chung warned that there may be unforeseen instances in the new contracting process that may prompt contractors to submit protests, which he said is completely acceptable and ensures that the DOE is following procurement rules and procedures.

Chung

Chung, however, said that the new contracting strategy will open new opportunities for the DOE and its contractors. "As we learn this process, I think there's going to be a significant payoff at the end of the day," he said.

Interpreting HLW

On December 10, 2019, the DOE published in the *Federal Register* a draft environmental assessment of the proposed disposal of 10,000 gallons of recycle wastewater from the Savannah River Site's Defense Waste Processing Facility (DWPF) . For the DOE, disposal of the SRS recycle wastewater at a commercial low-level radioactive waste disposal facility is a first step in determining whether and how to implement its revised interpretation of high-level radioactive waste, announced in October 2018, to a particular waste stream. The "DOE HLW Interpretation" panel session provided a status report on the draft environmental assessment, along with an overview of the DOE's interpretation of the statutory term "high-level radioactive waste."

"This initiative has been huge for us and a long time coming," said Theresa Kliczewski, environmental protection specialist with the DOE. Kliczewski pointed out that the DOE's clarification of the interpretation of HLW as set forth in the Nuclear Waste Policy Act has been in the works at the department for years. The DOE has said that the interpretation will allow radioactive waste to be managed based on its radiological characteristics rather than its origin.

After being extended for an additional 32 days, the comment period on the SRS recycle wastewater environmental assessment ended on February 10. Kliczewski said that, at the time, the DOE was still reviewing comments on the assessment but was close to issuing a final report (the final environmental assessment was relseased by the DOE on August 6). The department received 19 public comment "documents," she said, each containing multiple individual comments, which were submitted by state regulators, private industry, environmental groups, and the general public. Kliczewski noted that the environmental assessment is part of the regulatory review process under the National Environmental Policy Act and that the final report will not constitute a conclusive decision on the wastewater disposal.

Some of the technical aspects of disposing of the SRS recycle wastewater were discussed by Kent Rosenberger, engineering manager with Savannah River Remediation, the DOE's site liquid waste contractor. "This is all about evaluating options at the end of the [waste tank] life cycle," Rosenberger said, adding that a disposal path is needed for the wastewater once all of Savannah River's tank waste is processed and the tanks are closed. The goal, he said, is to transport the wastewater, which is generated from the DWPF waste vitrification operations, to an off-site commercial LLW facility, either in its liquid form or after it has been solidified.

Rick McCloud, president of the SRS Community Reuse Organization, which promotes the economic redevelopment of the Savannah River Site, gave the perspective of the Energy Communities Alliance (ECA) on the HLW interpretation. McCloud was speaking for Kara Colton of the ECA, who was unable to attend the meeting. ECA is a nonprofit, membership organization of local governments adjacent to or impacted by DOE sites.

McCloud, who noted that SRS has become a *de facto* HLW storage site in the absence of the Yucca Mountain repository, said that ECA supports the DOE's proposed HLW interpretation and wants to enhance stakeholder engagement in its implementation. He stressed that the interpretation is not a shift in U.S. policy, but is a clarification of regulations. McCloud added that the interpretation could speed up the remediation of DOE sites and result in savings of about $40 million a year in cleanup costs.

ECA has published two reports on the DOE's approach to interpreting HLW: *Waste Disposition: A New Approach to DOE's Waste Management Must be Pursued*, released in September 2017, and *Making Informed Decisions on DOE's Proposed High Level Waste Definition*, issued in October 2018. Both publications are available on the ECA website at energyca.org>.—*Tim Gregoire*

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84600 Testing Services—*also see Analysis; Maintenance Serv.; Nondestructive Testing* **100**

Thermoluminescent Dosimeter (TLD) Services—*see Health Physics Services*

Thermoluminescent Dosimeters—*see Monitors, Radiation, Personnel*

86130 Tools **100**

Trailers, Mobile—*see Health Physics Equipment (Decon Trailers)*

86250 Trailers, Spent-Fuel Transport **100**

86260 Trailers, Transport **100**

86300 Training—*also see Consultants; Health Physics Services; Training Centers; Training Materials* **100**

86400 Training Centers, Facilities—*also see Training; Training Materials* **101**

86500 Training Materials, Courseware—*also see Mockup Design; Training; Training Centers* **101**

Transfer Cars—*see Cars, Railroad*

87000 Transport Services **101**

87380 Tritium Handling Equipment **102**

Tritium Monitors—*see Monitors, Radiation, Area*

87395 Tritium Recycle & Extraction Equipment **102**

87400 Tritium Removal Equipment **102**

Turnstiles—*see Security Structures*

U

Underwater—*see Diving; Maint. & Repair; NDT; Solid Waste Red.; Video Serv.*

Uranium Mill Tailings Reclamation—*see Waste Management Services*

V

Vacuum Blasting—*see Cleaning Equipment*

90100 Vacuum Equipment & Accessories—*also see Cleaning Equip.; Filters* **102**

Valve & Actuator Repair—*see Maintenance & Repair Services*

Valve Grinders (In-Place)—*see Valve-Reseating Equipment*

90250 Valve Operators (Actuators) **102**

90280 Valve Packing Removal Equipment **102**

Valve Position Detectors—*see Detectors*

90320 Valve-Reseating Equipment, On-line **102**

90330 Valve Stem Gland Packing Systems, Live-Loaded **102**

Valve Tags—*see Tags*

Valve Testing—*see Maintenance Services; Test Equipment*

Valves, Backwater—*see Valves, Other*

Valves, Ball—*see Valves, Other*

Valves, Butterfly—*see Valves, Other*

90600 Valves, Check, Stop Check **102**

90800 Valves, Control **102**

Valves, Controlled-Closure—*see Valves, Check; Valves, Other (Line-Blind)*

Valves, Diaphragm—*see Valves, Other*

Valves, Excess-Flow—*see Valves, Other*

Valves, Fail-Safe—*see Valves, Other*

Valves, Feedwater Isolation—*see Valves, Other*

Valves, Filter, In-Line—*see Valves, Other*

Valves, Fire Deluge—*see Valves, Other*

Valves, Flow Monitoring/Alarm System—*see Valves, Other*

Valves, Flush Bottom Tank—*see Valves, Other*

91000 Valves, Gate **102**

Valves, Globe—*see Valves, Other*

Valves, Globe, Bellows—*see Valves, Other*

Valves, Instrumentation Manifold—*see Valves, Other*

Valves, Isolation Shutoff—*see Valves, Other*

Valves, Line-Blind—*see Valves, Other*

Valves, Main Steam Isolation—*see Valves, Other*

Valves, Miniature—*see Valves, Other*

Valves, Needle—*see Valves, Other*

91260 Valves, Other **102**

Valves, Packless—*see Valves, Other*

Valves, Plastic-Lined—*see Valves, Other*

Valves, Plug—*see Valves, Other*

91380 Valves, Pressure Seal **102**

Valves, Pump Recirculation—*see Valves, Other*

Valves, Quick-Opening & -Closing—*see Valves, Other*

Valves, Ram-Type—*see Valves, Other*

Valves, Relief, Safety—*see Valves, Other*

Valves, Slurry—*see Valves, Other*

Valves, Solenoid—*see Valves, Other*

Valves, Vacuum—*see Valves, Other*

92300 Vessels—*also see Respiratory Protection Equipment* **102**

Vests, Bullet-Resistant—*see Security Systems & Devices*

Video Displays—*see Computers; Data Readout Devices; Security Systems; Television Systems*

92800 Video Services **103**

W

Walk-Off Mats—*see Health Physics Equipment & Supplies*

Warning Signs, Signals—*see Health Physics Equipment; Lights*

Warning Systems—*see Alarm Systems; Emergency Warning Systems*

Warning Tape, Luminescent—*see Health Physics Equipment & Supplies; Tape*

Waste Evaporators—*see Radioactive Waste Treatment Equipment*

Waste Management Consultants—*see Consultants*

93040 Waste Management Services—*also see Analysis; Health Physics Services* **103**

Waste Monitors—*see Monitors, Radiation, Area & Special-Purpose*

Waste Storage Facilities, Radioactive, On-Site—*see Rad. Waste Handling & Treatment Equip.*

Waste Tracking & Accountability System—*see Radioactive Waste Handling Systems*

Waste Treatment Equipment—*see Radioactive Waste Handling & Treatment Equipment*

Water Analyzers—*see Analyzers*

93900 Welding Services—*also see Diving Services* **104**

Wet-Blasting—*see Cleaning Equipment; Decontamination Chemicals & Equipment*

Whole-Body Counting Services—*see Health Physics Services*

Whole-Body Monitors—*see Equipment Rental; Monitors, Radiation, Personnel*

Wind Monitoring—*see Environmental Monitoring Serv.*

Window Reducers—*see Solid Waste Reduction Equipment*

95750 Windows, Radiation-Shielding—*also see Maintenance & Repair Services; Shielding Materials* **104**

Wipe Test Counters—*see Counters, Detectors, Radiation*

95850 Wipers, Wiping Cloths—*also see Health Physics Equipment & Supplies* **104**

95900 Wire—*also see Cable* **104**

Wood Decontamination—*see Waste Management Services*

96200 Work Platforms 104

Over 40 Years of Nuclear HVAC Experience

SSM Industries has over 40 years experience designing, qualifying, fabricating and installing complete HVAC ductwork systems and equipment in DOE facilities and Nuclear Power Plants around the world.

Let us work with you on all of your HVAC needs. From custom retrofits to new plant build, we are the HVAC solution that you have been looking for.

HVAC SYSTEM COMPONENTS

Access Doors
Actuators: Electric & Pneumatic
Air Handling Units
Charcoal Adsorber Units
Dampers:
Backdraft
Balancing
Bubble-Tight
Control: Manual, Electric & Pneumatic
Diverter
Fire & Smoke
Guillotine
HELB
Isolation

HVAC SYSTEM COMPONENTS

Tornado
Variable Frequency Drives
Ductwork & Supports
Fans: Axial & Centrifugal
Filters & Filtration Units (incl. HEPA)
Flexible Connections
Grilles, Registers & Diffusers
Housings
Heat Exchangers
Cooling Coils
Louvers
Plenums
Sleeves

SPECIALTY FABRICATIONS

Angle Rings
Cable Trays & Covers
Control Cabinets
Doors: Access, Heavy-Duty & Blast
Equipment Bases
Filter Boxes
Fire Barriers
U. L.-Rated, 3 Hour
Glove Boxes
Sealed Enclosures
Seismic Supports
Cooling Coils
Heating Coils
Heat Exchangers
Tanks

QUALITY CERTIFICATIONS

NQA-1
ASME AG-1
10CFR50
Appendix B
ASME
AWS

SSM INDUSTRIES, INC.

For more information contact the SSM Power Division at (412) 777-5101 or visit us at www.ssmi.biz to learn how our experience can benefit your next project.

(412) 777-5101 • ssmi.biz

Product Listings

00300 **Abrasives**—*also see Cleaning Equipment*

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

EFCO USA, Inc., Charlotte, NC (LP)

00400 **Absorbers, Nuclear Radiation**—*also see Neutron Absorbers; Sorbents*

Hopewell Designs, Inc., Alpharetta, GA
METOIL, Praha, Czech Republic
voestalpine BOHLER Bleche GmbH & Co. KG, (Affl. of voestalpine High Performance Metals GmbH), Murzzuschlag, Austria

03000 **Air-Conditioning & Ventilation Equip.**—*also see Dampers; Filter 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

Artisan Industries Inc., Stoughton, MA (C, CO)
BHI Energy, Weymouth, MA (V, VP)
ECU Corporation, Cincinnati, OH (AC, AD, AF, AH, C, CO, DH, F, L, V, VP)
Frham Safety Products, Inc., Nashville, TN (AD, AF)
New York Blower Company, Willowbrook, IL (AH, F, V)
Paragon Energy Solutions, Fort Worth, TX (AC, AF, C, EC, F, V)
✦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**

Radiation Safety & Control Services, Inc., Seabrook, NH

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

Bertin Instruments, Montigny le Bretonneux, France (R)
CAEN SyS, Viareggio, LU, Italy (R)
FCI-Fluid Components International LLC, San Marcos, CA (FR, LE)
HukariAscendent Inc., Wheat Ridge, CO (C, F)
Intek, Inc., Westerville, OH (FR)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (C)
LabLogic Systems, Inc., Tampa, FL (R)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (R)
Mirion Technologies (Canberra) Inc., Meriden, CT (AS, C, FR, LE, LI, R, RT, V)
ORTEC, Oak Ridge, TN (R)
Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (R)
Premium Analyse, Norroy Le Veneur, France (R)
PSC Vodec, Nottingham, United Kingdom (AS, C, RV, V)
Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada (R)
Radex, Inc., Winterville, GA (R)
Radiation Safety & Control Services, Inc., Seabrook, NH (R)
Rockwell Automation, Inc., Milwaukee, WI (FR, LE, LI, P)
SOR Inc., Lenexa, KS (LE)

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)
Advanced Consulting Group, Inc., Chicago, IL (ST)
AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (EL, M, SC, W)
Analysis and Measurement Services Corp., Knoxville, TN (T)
Anamet, (a Div. of Acuren Inspection, 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, LLC, (ASP-LLC), Salt Lake City, UT (SC)
✦Attention IT, Inc., Knoxville, TN (E)
Attenuation Environmental Co., Seattle, WA (E, W)
G.D. Barri & Associates, Inc., Peoria, AZ (DE, E, FE, G, H, M, SE, SH, SC, ST)
Black & Veatch, Overland Park, KS (C, DE, E, EQ, G, H, SE, SH, SC, SI, ST, SS, T)
Boston Government Services, LLC (BGS), Oak Ridge, TN (DE, EQ, FE, FI, RS, ST, T)

This section contains an alphabetical listing of nuclear products, materials, and services, with the companies that supply these items. Exactly 165 categories are included (see "Index to Categories," pp. 66–69). Extensive cross references are not included in this section, but can be found in the Index to Categories.

The supplier listings in each category are based on annual updates made by the individual companies to their online verification forms. Nearly 350 companies are represented throughout these pages. Those companies whose names are preceded by a diamond (✦) have an advertisement in the 2020 *Radwaste Solutions* Buyers Guide. Companies highlighted in cyan have an advertisement within or near that category.

Anatomy of a *Radwaste Solutions* Buyers Guide listing

Category Number — 81710

Storage Systems, Spent-Fuel—*also see Containers; Racks* — Category name, *with cross-references to related categories*

Subcategories, with abbreviation
- D Dry
- W Wet

Supplier listings
- Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (D, W)
- Equipos Nuclear S.A., S.M.E, Madrid, Spain (D, W)
- ✦Holtec International, Camden, NJ (D, W)
- Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (D, W)
- ✦Major Tool & Machine, Inc., Indianapolis, IN (D, W)

Subcategories that the listed supplier serves

Denotes that the supplier is an advertiser in this issue

Advertiser whose ad appears within or near the category.

BWX Technologies, Inc., Lynchburg, VA (C, EL, E, FE, FM, FI, FP, M, SH, ST, T, V, W)
Cabrera Services Inc., East Hartford, CT (EL, E, H, M, RS)
CAEN SyS, Viareggio, LU, Italy (FP)
Canadian Nuclear Laboratories, Chalk River, Ontario, Canada (C, EL, FE, FM, FP, H, M, SC, V, W)
✦Container Technologies Industries, LLC, Helenwood, TN (M, RS, ST)
Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (DE, FI)
CS-2 Inc., Grand Island, NY (E, RS, SC, T, W)
Curie Environmental Services, Albuquerque, NM (W)
Curtiss-Wright, Enertech, Brea, CA (DE, RS, SE)
Decidia Research & Consulting, Sabadell, Barcelona, Spain (E, RS, SI)
The Delphi Groupe, Inc., Austin, TX (E, RS)
Dominion Engineering, Inc., Reston, VA (C, FM, FI, M, SE, ST, W)
Dufrane Nuclear Shielding Inc., Winsted, CT (SH, W)
Eberline Services, Albuquerque, NM (E, SC, W)
ECU Corporation, Cincinnati, OH (FI, SE)
Elcometer Inc., Warren, MI (E)
Elysium Industries USA, New York, NY (FP)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (C, DE, E, FE, FM, FI, SE, ST, T, V)
Enercon Services, Inc., Naperville, IL (DE, LP, L, M, SH, 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)
Fluor, Arlington, VA (DE, E, RS)
Fortum Power & Heat Oy, Nuclear Services, Espoo, Finland, Finland (E, FP, M, RS, SE, SH, ST, SS, T)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (FP)
Geovariances, Avon, France (E, G, GM, H, RS, SC)
GLSEQ, LLC, Huntsville, AL (EQ, SE)
G/O Corp., Abita Springs, LA (SH)
GoldSim Technology Group, Seattle, WA (RS)
✦Holtec International, Camden, NJ (EQ, SE, SH, ST, T, V)
HukariAscendent Inc., Wheat Ridge, CO (DE)
ILD, Inc., Baton Rouge, LA (SE, T, V)
Interdevelopment, Inc., Falls Church, VA (RS)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (EL, SH)
✦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., Tampa, FL (SH)
Lucideon, Durham, NC (C, DE, EL, FM, FI, M, T)
LUDECA, Inc., Doral, FL (V)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (M, W)
Mega-Tech Services, LLC, Mechanicsville, VA (RS)
Mirion Technologies (Canberra) Inc., Meriden, CT (EL, E, EQ, W)
✦NAC International Inc., Peachtree Corners, GA (FP, SH, ST, T)
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)
NovaTech, Lynchburg, VA (DE, EQ, FI, FP, LP)
O'Donnell Consulting Engineers, Inc., Bethel Park, PA (DE, EQ, FM, M, ST, T, V)
✦Orano Federal Services, Charlotte, NC (DE, EQ, FP, SE, SH, SC, SI)
ORTEC, Oak Ridge, TN (EL, E, SC, W)
Paragon Energy Solutions, Fort Worth, TX (SE)
PaR Systems, LLC, Shoreview, MN (EQ, 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)
Radiation Safety & Control Services, Inc., Seabrook, NH (EL, E, G, W)
REEL COH Inc., Boisbriand, Quebec, Canada (SE)
Remtech SA, Velizy, Villacoublay, France (E)
ReNuke, Knoxville, TN (SC, W)
R&G Laboratories, Inc., Tampa, FL (C, L)
SGS Herguth Laboratories, Inc., Vallejo, CA (C, FM, L, M)
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)
Talisman Div. of Enercon, Arlington, VA (DD, E, RS, SC, SI, W)
Teledyne Brown Engineering, Inc., Huntsville, AL (E, SC, W)
TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (SC)
Ulbrich Stainless Steels & Special Metals, Inc., North Haven, CT (FM)
Veolia Nuclear Solutions.Inc, Westminster, CO (DE, DD, E, EQ, FE, FI, G, SE, SH, SC, SI, ST, W)
Warrington, Inc., Pflugerville, TX (FP)
Westinghouse Electric Co. LLC, Cranberry Township, PA (EL, EQ, FM, FP, LP, L, M, RS, SE, SH, ST, T, V, W)
WMG, Inc., Peekskill, NY (EL, SH, SC, W)

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., (DynatrolÆ Div.), Houston, TX (D, V, W)
AVANTech, Inc., Richland, WA (DO, E, OX, SI, SO, W)
AVANTech, Inc., Knoxville, TN (DO, E, OX, SI, SO, W)
AVANTech, Inc., Columbia, SC (DO, E, OX, SI, SO, W)
Bertin Instruments, Montigny le Bretonneux, France (G, OX)
CAEN SyS, Viareggio, LU, Italy (CA, E, G, MP, PO, PM, PS, SL, TF, W)
Elcometer Inc., Warren, MI (V)
EnergySolutions LLC, Salt Lake City, UT (SL, W)
GLSEQ, LLC, Huntsville, AL (CG, OG, OX, PA, WG)
HI-Q Environmental Products Co., Inc., San Diego, CA (A)
LabLogic Systems, Inc., Tampa, FL (W)
Ludlum Measurements, Inc., Sweetwater, TX (PS)
Mirion Technologies (Canberra) Inc., Meriden, CT (A, CA, PO, PM, PS)
NUCON International, Inc., Columbus, OH (G)
ORTEC, Oak Ridge, TN (CA, E, MP, PO, PM, PS)
Radiation Safety & Control Services, Inc., Seabrook, NH (PO, PM)
Radiological Solutions, Inc., Rockdale, IL (W)
REEL COH Inc., Boisbriand, Quebec, Canada (G)
Sentry Equipment, Oconomowoc, WI (DO, H, OX, PA, SI, SO, ST, W)
Teledyne Brown Engineering, Inc., Huntsville, AL (OG, TO)
VTT Technical Research Centre of Finland, VTT, Finland (A, E, G, CG, MP, PA, PH, SI, SL, SO, TO, V, WG, W)
Warrington, Inc., Pflugerville, TX (PO, PM)

06790 Asbestos Abatement/Removal Products & Services

✦American DND Inc., Grand Island, NY
CS-2 Inc., Grand Island, NY
Enercon Services, Inc., Naperville, IL
Fluor, Arlington, VA
Fuel Tank Maintenance Co., LLC, Cookeville, TN
North Wind Group, Idaho Falls, ID
Tecnubel-Transnubel-ECS, Dessel, Belgium

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
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, 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

AVANTech, Inc., Richland, WA (C, DC, I, P)
AVANTech, Inc., Knoxville, TN (C, DC, I, P)
AVANTech, Inc., Columbia, SC (C, DC, I, P)
Cablelan Nuclear, Inc., Fort Myers, FL (C, DC, FI, FR, HT, I, P)
K&S Associates, Inc., Nashville, TN (C)
Lights Camera Action, LLC, Gilbert, AZ (RR, U)
Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (MI, PA, RR)
PaR Systems, LLC, Shoreview, MN (RR, UC)
✦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)
VTT Technical Research Centre of Finland, VTT, Finland (C, DC, FI, FR, HT, I, RR)
Western Sling and Supply Co., Sedalia, CO (P)

09730 Calciners—*also see Radioactive Waste Handling & Treatment Equipment*

ISO-PACIFIC Remediation Technologies, Inc., Richland, WA
✦Orano Federal Services, Charlotte, NC
✦Petersen Inc., Ogden, UT
Vigor (formerly Oregon Iron Works), Clackamas, OR
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

Beamex, Marietta, GA (E, ET, IC, P)
Biodex Medical Systems, Inc., Shirley, NY (D, R)
Canadian Nuclear Laboratories, Chalk River, Ontario, Canada (R)
North Wind Group, Idaho Falls, ID (R)
ORTEC, Oak Ridge, TN (R)

✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (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

Analysis and Measurement Services Corp., Knoxville, TN (E, ET, IC)
ANTECH Corp., Arvada, CO (R)
Applied Health Physics, LLC, Bethel Park, PA (R)
G.D. Barri & Associates, Inc., Peoria, AZ (IC)
Berkeley Nucleonics Corp., San Rafael, CA (ET, R)
Bertin Instruments, Montigny le Bretonneux, France (R)
Cabrera Services Inc., East Hartford, CT (R)
Curtiss-Wright, Enertech, Brea, CA (F, IC, PT)
Enercon Services, Inc., Naperville, IL (R)
EnergySolutions LLC, Salt Lake City, UT (IC, R)
Environmental Restoration Group, Inc., Albuquerque, NM (R)
FCI-Fluid Components International LLC, San Marcos, CA (F)
F&J SPECIALTY PRODUCTS, INC., Ocala, FL (F)
Health Physics Instruments, (Div. 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)
Kinectrics Inc., Toronto, Ontario, Canada (E, ET, IC)
K&S Associates, Inc., Nashville, TN (E, ET, PT, R)
Mirion Technologies (Canberra) Inc., Meriden, CT (R)
North Wind Group, Idaho Falls, ID (R)
Nuclear Technology Services, Inc., Roswell, GA (R)
NUCON International, Inc., Columbus, OH (E, ET, F, IC, PT, R, T)
ORTEC, Oak Ridge, TN (R)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (PT, R)
✦Precision Custom Components, LLC, York, PA (T)
Radiation Safety & Control Services, Inc., Seabrook, NH (R)
RSO, Inc./Radiation Service Organization, Laurel, MD (R)
Sentry Equipment, Oconomowoc, WI (F, IC, PT, R)
Southwest Research Institute, San Antonio, TX (E, ET, F, IC, PT, R, T)
Tecnubel-Transnubel-ECS, Dessel, Belgium (IC, R)
Warrington, Inc., Pflugerville, TX (R)

09950 **Cars, Railroad**

CH Cask-Handling
L Liners

AVANTech, Inc., Richland, WA (L)
AVANTech, Inc., Knoxville, TN (L)
AVANTech, Inc., Columbia, SC (L)
Dufrane Nuclear Shielding Inc., Winsted, CT (CH, L)
EnergySolutions LLC, Salt Lake City, UT (L)
Hilman Inc., Marlboro, NJ (CH)
I.C.E. Service Group, Inc., Ambridge, PA (CH, L)
✦Joseph Oat Corp., Camden, NJ (L)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CH)
✦Orano Federal Services, Charlotte, NC (CH, L)
✦PacTec, Inc., Clinton, LA (L)
REEL COH Inc., Boisbriand, Quebec, Canada (CH)
Vigor (formerly Oregon Iron Works), Clackamas, OR (CH, L)
Wheelift Transporters, Waverly, IA (CH)

10780 **Cleaning Equipment**—*also see Decon. Chem. & Equip.; Health Phys. Equip.*

A Abrasive
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

Alphasource, Inc., Philadelphia, PA (PC)
AVANTech, Inc., Richland, WA (CP, P, R, UW, V)
AVANTech, Inc., Knoxville, TN (CP, P, R, UW, V)
AVANTech, Inc., Columbia, SC (CP, P, R, UW, V)
BHI Energy, Weymouth, MA (A, PW, V, WJ)
Brokk AB, Skelleftea, Sweden (R)
Container Products Corp., Wilmington, NC (PW)
✦Container Technologies Industries, LLC, Helenwood, TN (A)
Desco Mfg. Co., Inc., Rancho Santa Margarita, CA (A, PC, PW, V)
Diakont, Carlsbad, CA (UW, V)
Dominion Engineering, Inc., Reston, VA (U)
EnergySolutions LLC, Salt Lake City, UT (CP, V)
Environmental Alternatives, Inc., Swanzey, NH (A, CP, CS, PC, R, S, TC, U, V, VB, WJ)
✦FLIR Systems, Inc., Elkridge, MD (R)
Frham Safety Products, Inc., Nashville, TN (V, VB)
G/O Corp., Abita Springs, LA (V)
Harrison Electropolishing, L.P., Houston, TX (CS, TC)
Heat Exchanger Products Corp. (HEPCO), Hingham, MA (TC)
ICM-International Climbing Machines, Ithaca, NY (R, VB)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (R)
Niagara Energy Products, Niagara Falls, Ontario, Canada (R)
NovaTech, Lynchburg, VA (A, R, UW, V)
PaR Systems, LLC, Shoreview, MN (R, WJ, WA)
✦Precision Custom Components, LLC, York, PA (A)
Remote Ocean Systems (ROS), San Diego, CA (R)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (A, PW, UW)
Wheelift Transporters, Waverly, IA (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)
G/O Corp., Abita Springs, LA (BS, C, CL, D, G, H, L, MG, SP, SC)
ISA Corp., Salem, OR (SC)
JSM Protective, Inc., Vero Beach, FL (C, D, G, H, L, SC)
Lancs Industries, Kirkland, WA (BS, D, G, SC)
Mohawk Safety, Manchester, CT (D, G, L, SC)

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Radiation Safety & Control Services, Inc., Seabrook, 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)
UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (BS, C, CL, D, DS, G, H, L, MG, SP, SC)
Vitto Corp., Kanagawa, Japan (G)
Western Sling and Supply Co., Sedalia, CO (C, CL, D, 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)
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)
ISA Corp., Salem, OR (F)
JSM Protective, Inc., Vero Beach, FL (C, FS, F, GW, GS, RW, SS, V)
Lancs Industries, Kirkland, WA (RW)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (RF)
Mohawk Safety, Manchester, CT (B, CL, GW, GS, HH, LC, SC, V)
Rich Industries Inc., New Philadelphia, OH (B, C, CL, F, HL, 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)
Western Sling and Supply Co., Sedalia, CO (B, C, CL, FS, F, GG, GW, GS, HH, HL, HP, HF, LC, MG, RW, 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

ABW Technologies, Arlington, WA (CR)
Alphasource, Inc., Philadelphia, PA (CS, CR, FT, LC, S)
AZZ Nuclear, Suwanee, GA (CR)
BHI Energy, Weymouth, MA (CS, S)
Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (C, CR)

Frham Safety Products, Inc., Nashville, TN (S)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (CS, CR, FT)
Hexion Inc., Columbus, OH (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)

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 Shielding Inc., Winsted, CT (H, T, TW)
Frham Safety Products, Inc., Nashville, TN (F, H)
PSC Vodec, Nottingham, United Kingdom (P)

11680 **Compactor Disks, for Drums**

S&G Enterprises, Inc., Germantown, WI

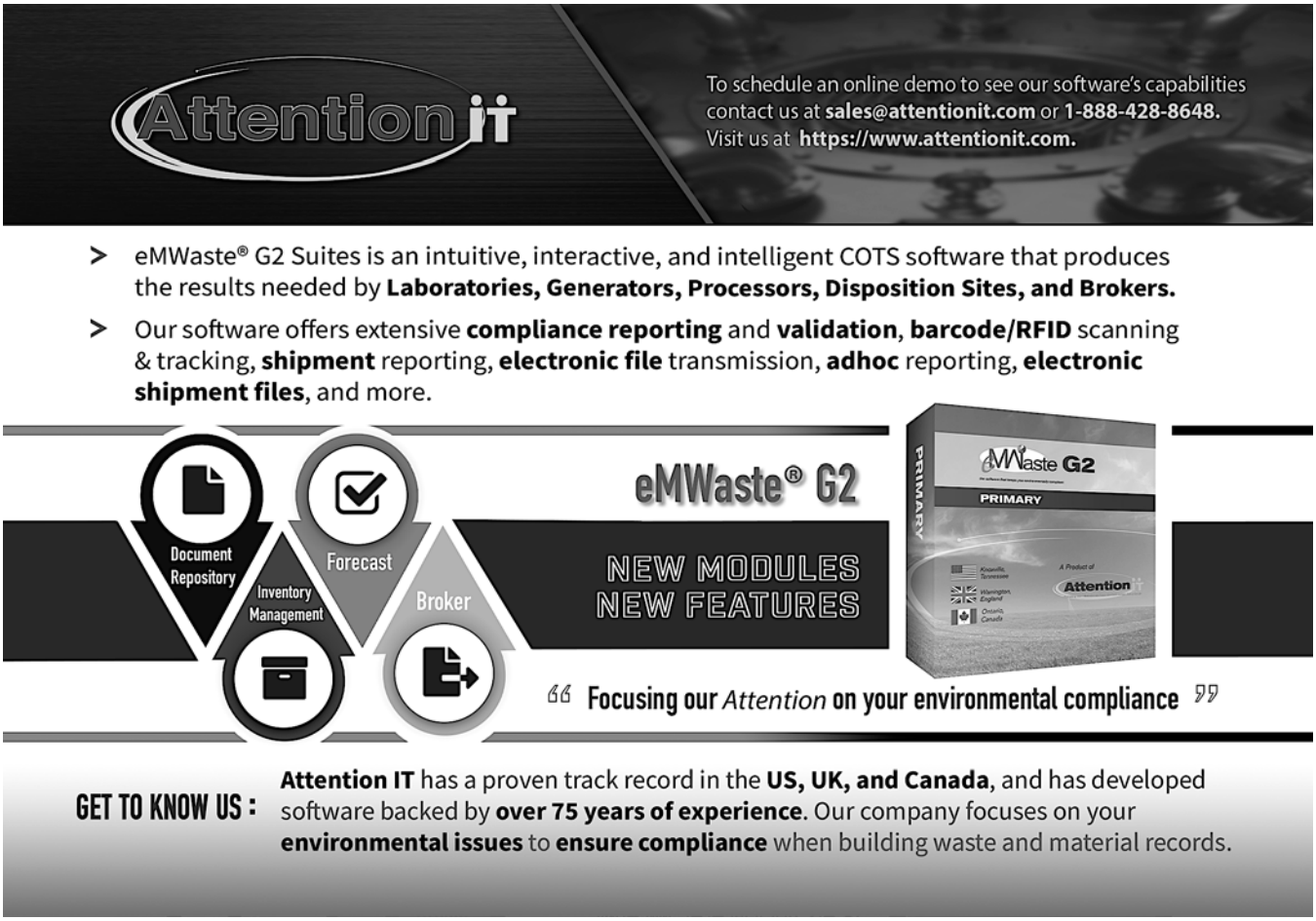
11700 **Compactors**—*also see Radioactive Waste Treatment Equipment; Solid Waste Reduction Equip.*

Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany
Container Products Corp., Wilmington, NC
Equipos Nuclear S.A., S.M.E, Maliaño (Cantabria), Spain
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 Nucleare S.p.A., Genova, Italy (P)
Applied Control Solutions, Cupertino, CA (SE)
✦Attention IT, Inc., Knoxville, TN (CF, DB)
AVANTech, Inc., Richland, WA (EA, WM, WC)
AVANTech, Inc., Knoxville, TN (EA, WM, WC)
AVANTech, Inc., Columbia, SC (EA, WM, WC)
✦Banda Group International, LLC, Chandler, AZ (CA)
Beamex, Marietta, GA (IN)
Bertin Instruments, Montigny le Bretonneux, France (D)
Boston Government Services, LLC (BGS), Oak Ridge, TN (CF, CP, CD, DB, DM, DD, EC, ET, E, EP, ER, EA, P, PD, PM, QA, R, RI, SE, SI, SM, SP, SN)
CAEN SyS, 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, Carlsbad, CA (CD)
Gallagher Bassett Services Inc., (WCD Group Div.), Batavia, IL (FS)
Geovariances, Avon, France (DM, RI, SP, WM)
I.C.E. Service Group, Inc., Ambridge, PA (WM)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (DM, EM, RC, SN)
Kinectrics Inc., Toronto, Ontario, Canada (D)
L3Harris, (Power Systems and Simulation), Montreal, Quebec, Canada (PD, QA)
Neptune and Company, Inc., Lakewood, CO (AI, CD, DB, EC, EM, ES, PM, QA, RI, SI, SP, TR, WM)
PaR Systems, LLC, Shoreview, MN (R, TE)
RadComm Systems, Oakville, Ontario, Canada (RC)
Radiation Safety & Control Services, Inc., Seabrook, NH (CP, DB, D, EM, WM, WC)
Rockwell Automation, Inc., Milwaukee, WI (EM, PD, SP, WM)
Sensor Networks, Inc., State College, PA (TE)
Southwest Research Institute, San Antonio, TX (AI, DB, ET, EA, ES, FS, RC, R, RI, SI, S, TE, WM)
✦SSM Industries, Inc., Pittsburgh, PA (EA)
Studsvik, Inc., Atlanta, GA (P, PD, PM, SI)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (CB, D, EP, RC)
TRAD Tests & Radiations, Labege, France (SI, SM, SP)
Vitto Corp., Kanagawa, Japan (WM)
Wheelift Transporters, Waverly, IA (PD)
Wälischmiller Engineering GmbH, Markdorf, Baden-Württemberg, Germany (TE)
WMG, Inc., Peekskill, NY (SN, WM)

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)
AVANTech, Inc., Richland, WA (A, CG, D, IO)
AVANTech, Inc., Knoxville, TN (A, CG, D, IO)
AVANTech, Inc., Columbia, SC (A, CG, D, IO)
Mirion Technologies (Canberra) Inc., Meriden, CT (D, MC, MN)
Rockwell Automation, Inc., Milwaukee, WI (IO)

13050 Concrete Breaking, Drilling, Sawing & Scabbling

C Contractors
E Equipment
R Equipment Rental

✦American DND Inc., Grand Island, NY (C, E, R)
BHI Energy, Weymouth, MA (C, E, R)
Brokk AB, Skelleftea, Sweden (E)
Brokk Inc., Santa Fe, NM (E, R)
✦Cutting Edge Services, a div. of In-Place Machining Co., Batavia, OH (C, E)
Dufrane Nuclear Shielding Inc., Winsted, CT (C)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (C)
Mega-Tech Services, LLC, Mechanicsville, VA (C)
New Millennium Nuclear Technologies International, Lakewood, CO (C)
Wheelift Transporters, Waverly, IA (C, E)

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13400 Connectors—*also see Feedthroughs*

DC Data Communications
E Electrical
EG Electrical, Glovebox
EQ Electrical, Quick Disconnect
FO Fiber Optic
T Thermocouple

Remote Ocean Systems (ROS), San Diego, CA (E)
Teledyne Brown Engineering, Inc., Huntsville, AL (E, EG, EQ, FO, T)
Western Sling and Supply Co., Sedalia, CO (E)

13600 Consoles, Control

AVANTech, Inc., Richland, WA
AVANTech, Inc., Knoxville, TN
AVANTech, Inc., Columbia, SC
Energy Steel, Lapeer, MI
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
CG Commercial Grade Dedication
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)
Dufrane Nuclear Shielding Inc., Winsted, CT (C, RB)
Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (A, SP, SS)
✦Joseph Oat Corp., Camden, NJ (SS)
Ulbrich Stainless Steels & Special Metals, Inc., North Haven, CT (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

✦Banda Group International, LLC, Chandler, AZ (CS)
Bluegrass Concrete Cutting, Inc., Greenville, AL (CS)
Boston Government Services, LLC (BGS), Oak Ridge, TN (AE, CE)
Day & Zimmermann, Charlotte, NC (CS)
Dufrane Nuclear Shielding Inc., Winsted, CT (CS, EC, ES)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (CE)
Haley & Aldrich, Inc., Portland, ME (CE, CS, EC)
Hilman Inc., Marlboro, NJ (EC)
HukariAscendent Inc., Wheat Ridge, CO (AE, EC)
Kinectrics Inc., Toronto, Ontario, Canada (CE)

Leak Testing Specialists, Inc., Orlando, FL (EC)
Manafort Brothers Inc., Plainville, CT (CS)
North Wind Group, Idaho Falls, ID (AE, CE, CS, EC)
✦Orano Federal Services, Charlotte, NC (AE)
Studsvik, Inc., Atlanta, GA (AE)
TRAD Tests & Radiations, Labege, France (CE)
Veolia Nuclear Solutions.Inc, Westminster, CO (AE, CE, 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)
Adam Brown Consulting, Inc., Cary, IL (AU, CO, DE, FP, MN, MA, OD, PE, PP, QA)
Advanced Consulting Group, Inc., Chicago, IL (DE, MN, PP)
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)
Ameriphysics, LLC, Knoxville, TN (DC, DE, RD, RE, WT)
Amphos 21 Consulting, Barcelona, Spain (DC, DE, E, WM)
Analysis and Measurement Services Corp., Knoxville, TN (ST)
Anamet, (a Div. of Acuren Inspection, Inc.), Hayward, CA (CO)
Anata Management Solutions, West Jordan, UT (AU, CM, FT, MA, PP, RC, ST, TA)
ANDRA, (Development, Industrial and International Div.), Chatenay Malabry, France (DC, PE)
Applied Control Solutions, Cupertino, CA (S)
Applied Health Physics, LLC, Bethel Park, PA (DC, DE, EP, E, MA, RD, RE, RC, TE, WM)
✦Attention IT, Inc., Knoxville, TN (MI, WM)
Attenuation Environmental Co., Seattle, WA (DE, E, RE, RC, WM)
AVANTech, Inc., Richland, WA (C, E, SH, WM, WT)
AVANTech, Inc., Knoxville, TN (C, E, SH, WM, WT)
AVANTech, Inc., Columbia, SC (C, E, SH, WM, WT)
AZZ Nuclear, Suwanee, GA (CO, CD, MN)
✦Banda Group International, LLC, Chandler, AZ (CM, DC, DE, ES, E, PP, QA, RC, WM)
G.D. Barri & Associates, Inc., Peoria, AZ (MN, PP, WM, WT)
✦Bechtel Nuclear, Security & Environmental, Reston, VA (CD, E, MI, PS, PP, QA, RC, S, SI)
BHI Energy, Weymouth, MA (AC, CO, CD, CC, DC, DE, EP, E, MN, MA, PP, QA, RD, RE, RC, RA, SH, TE, TA)
Black & Veatch, Overland Park, KS (AC, C, CD, CS, CC, CA, CE, DE, ES, EA, EP, E, EC, FP, FT, MN, MA, MI, N, P, PS, PP, QA, RE, RM, RC, RA, S, SE, SI, ST, TE, WM)
Boston Government Services, LLC (BGS), Oak Ridge, TN (CD, CS, CC, CE, DC, DE, FP, PP, QA, RC, RA, S, SH, SS, SY, ST, TE, TA)
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)
Canadian Nuclear Laboratories, Chalk River, Ontario, Canada (DC, DE, S, WM)
Chesapeake Nuclear Services, Inc., Annapolis, MD (DE, EP, E, RD, RE, SH, WM)
Cogentus, Washington, DC (DE, WM)
Comprehensive Decommissioning International, Camden, NJ (DC, DE, PP, RE, RC)
Computer Engineering Services, Inc., Chattanooga, TN (CS, RD, RC)
Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (CO, CD, CA, MI, PP, QA, RM, RC, RA, SY)
Container Products Corp., Wilmington, NC (DC)
Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (SH)
CS-2 Inc., Grand Island, NY (CA, DC, DE, E, PS, PP, QA, WM)
Curtiss-Wright, Enertech, Brea, CA (AC, CD, CA, EC, MN, P, PS, QA, RC, RA, SE, TE)
✦Cutting Edge Services, a div. of In-Place Machining Co., Batavia, OH (DE)
Day & Zimmermann, Charlotte, NC (PP, RD, RE)
Decidia Research & Consulting, Sabadell, Barcelona, Spain (AU, EA, E, PE, QA, RA, SI, WM)
The Delphi Groupe, Inc., Austin, TX (CM, CS, CC, CA, DC, DE, EP, E, FP, MA, PP, RD, RE, RM, RC, SH, SI, TE, WM)
DLE Technical Services, LLC, Palm City, FL (OD, PE, PP, QA, TE, TA)
Dominion Engineering, Inc., Reston, VA (C, CO, WM)
Dufrane Nuclear Shielding Inc., Winsted, CT (AU, CD, MN, PP, RD, RE, SH, WM, WT)
DW James Consulting, North Oaks, MN (DE, RE, SH, WM)
Eberline Services, Albuquerque, NM (DC, E, RD, RC, WM)
ECU Corporation, Cincinnati, OH (AC)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (C, DC, DE, E, P, PS, SE, SH, WM, WT)
Enercon Services, Inc., Naperville, IL (AC, AU, CM, CS, CC, CA, EA, EC, FT, LP, MN, MA, MI, M, N, OD, PH, PS, RE, RM, RO, SH, ST, TE, WM, WT)
✦Energy, Technology and Environmental Business Association, Oak Ridge, TN (WM)
Environmental Alternatives, Inc., Swanzey, NH (DC)
Environmental Restoration Group, Inc., Albuquerque, NM (DE, E, RA)
Equipos Nuclear S.A., S.M.E, Maliaño (Cantabria), Spain (P)

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Farouk D. Baxter, Consultant, Sudbury, MA (RC)
Firewater Associates, LLC, Maryville, TN (E, RC, WM)
Fluor, Arlington, VA (CA, CE, DE, ES, EA, EP, E, EC, FP, FT, LP, MN, MA, MI, M, N, OD, RA, SY, WM)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (CO, DC, DE, FP, FT, P, WT)
Gallagher Bassett Services Inc., (WCD Group Div.), Batavia, IL (E)
General Magnaplate, Arlington, TX (CO)
Geovariances, Avon, France (DC, DE, ES, E, RA, WM)
GLSEQ, LLC, Huntsville, AL (EC, SE)
GoldSim Technology Group, Seattle, WA (E, RC, RA, WM)
Thomas Gray & Associates, Inc., (Owner of Environmental Mgmt. & Controls, Inc.), Orange, CA (WM)
Harrison Electropolishing, L.P., Houston, TX (DC, MN, P)
Hexion Inc., Columbus, OH (CO)
✦Holtec International, Camden, NJ (CE, DE, FT, P, QA, RC, SE)
HukariAscendent Inc., Wheat Ridge, CO (CC, CE, DC, DE, EP, FP, MA, PS, QA, RD, RE, RM, RC, RA, SE, SH, SY, TE, TA, WM)
I.C.E. Service Group, Inc., Ambridge, PA (DE, E, PP, QA, RD, WM)
IEM, Research Triangle Park, NC (EP, PE, RA)
ILD, Inc., Baton Rouge, LA (P, ST)
Interdevelopment, Inc., Falls Church, VA (EA, PS, PP)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (CS, CE, DC, DE, RD, RE, SH)
✦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)
Klein Consulting LLC, Norwich, CT (AU, QA)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CH)
Leak Testing Specialists, Inc., Orlando, FL (QA)
Lucideon, Durham, NC (WM)
LUDECA, Inc., Doral, FL (EC)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (SH, WM)
Mega-Tech Services, LLC, Mechanicsville, VA (DC, MN)
METOIL, Praha, Czech Republic (C)
Met One Instruments, Inc., Grants Pass, OR (M)
Mirion Technologies (Canberra) Inc., Meriden, CT (CE, DC, DE, EP, E, MI, PP, RD, RE, RM, SI, WM)
✦NAC International Inc., Peachtree Corners, GA (CD, CE, EA, FT, RM, WM)
National Inspection & Consultants, Fort Myers, FL (CA, MN, MA, PS, PP, QA, RM, TE)
Navarro Research and Engineering, Inc., Oak Ridge, TN (CE, DC, DE, ES, EP, E, FP, QA, RD, RE, RM, RC, RA, WM, WT)
Neptune and Company, Inc., Lakewood, CO (CS, ES, EA, E, QA, RM, RC, RA, TA, WM)
North Wind Group, Idaho Falls, ID (DC, DE, E, RD, RE, WM, WT)
NovaTech, Lynchburg, VA (CC, CA, CH, P, PP, QA, ST)
Nuclear Systems Associates, Inc., Brea, CA (CD, MN, SY, ST, WM)
Nuclear Technology Services, Inc., Roswell, GA (RE)
NUCON International, Inc., Columbus, OH (AC, C, CD, WM, WT)
O'Donnell Consulting Engineers, Inc., Bethel Park, PA (CD, P, SE)
✦Orano Federal Services, Charlotte, NC (RE, SE, SH, SI, WM, WT)
Pacific Radiation, Altadena, CA (RE)
Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (DC, DE, WM)
PaR Systems, LLC, Shoreview, MN (CD, CH, SE, SY, WM)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (E, RE)
✦Precision Custom Components, LLC, York, PA (CD, P, SE)
Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (CC, CH, FT, MN, SH)
PTP Spent Fuel Services, LLC, Grand Island, NY (DE, FT, PP, WM)
RadComm Systems, Oakville, Ontario, Canada (RD)

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Radex, Inc., Winterville, GA (DC, DE, EP)
Radiac Research Corp., Brooklyn, NY (RD)
Radiation Safety & Control Services, Inc., Seabrook, 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)
Remtech Inc., The Villages, FL (M)
ReNuke, Knoxville, TN (CA, CE, DC, DE, E, FT, MN, OD, PE, PP, QA, RD, RE, RO, WM, WT)
✦Robatel Technologies, LLC, Roanoke, VA (FT, WM)
Rockwell Automation, Inc., Milwaukee, WI (CS)
Rogante Engineering Office, Civitanova Marche, Italy (AC, CO, DE, QA)
RSO, Inc./Radiation Service Organization, Laurel, MD (DC, DE, E, RD, WM)
SGS Herguth Laboratories, Inc., Vallejo, CA (MN)
J. L. Shepherd & Assoc., San Fernando, CA (SH)
Sidus Solutions LLC, San Diego, CA (CH, S, TE, WM)
Howard L. Sobel, P.E., Oceanside, NY (CA, MA, OD, PP, QA, RO, RC, WM)
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)
Studsvik, Inc., Atlanta, GA (C, E, P, PP, SS, ST)
Talisman Div. of Enercon, Arlington, VA (CE, DC, DE, EP, E, FT, MA, QA, RC, RA, S, SE, SI, TA, WM)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (CO, DC, DE, EP, FT, RE, SS, TE, WM)
✦3 Bears Technical Services, LLC, Hixson, TN (AU, CC, DC, DE, FP, PE, PP, QA, RE, WM)
See advertisement on page 36
TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (DC, DE, EA, RE)
Transco Products Inc., Streator, IL (RD)
TSSD Services, Inc., Oakland, ME (DC, DE, OD, PE, PP)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (CO, DE, MN)
Veolia Nuclear Solutions.Inc, Westminster, CO (AC, C, CD, CE, DC, DE, E, LP, P, QA, SE, SH, SS, SI, SY, ST)
Vitto Corp., Kanagawa, Japan (SH, WM)
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)
Wheelift Transporters, Waverly, IA (CH, WM)
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), (Radiological Services & Engineering Group), Grand Junction, CO (DC, DE, RD, RE, WM)

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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

ABW Technologies, Arlington, WA (B, CR, SF, CS, LI, OH, OL, TA, TB, TC)
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., Richland, WA (CR, CO, DL, G, HI, LI, IA, LS, OL, O, TA)
AVANTech, Inc., Knoxville, TN (CR, CO, DL, G, HI, LI, IA, LS, OL, O, TA)
AVANTech, Inc., Columbia, SC (CR, CO, DL, G, HI, LI, IA, LS, OH, OL, O, TA)
AZZ Nuclear, Suwanee, GA (CS)
Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (D)
Biodex 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 Products Corp., Wilmington, NC (B, IA, LS, OL, O, S, TA)
✦Container Technologies Industries, LLC, Helenwood, TN (B, CR, CO, G, HI, LI, IA, LS, OH, O, TA, TB, TC)
Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (CR, CO, DB, DL, D, GA, GS, G, HI, LI, IA, LS, OH, OL, O, TA, TB, TC)
Dufrane Nuclear Shielding Inc., Winsted, CT (CR, DL, D, GA, GS, HI, LI, LS, OH, OL, O, TA, TB)
Eastern Technologies, Inc., (OREX), Ashford, AL (LS)
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)
Equipos Nuclear S.A., S.M.E, Maliaño (Cantabria), Spain (CR, SF, CS)
Glidewell Specialties Foundry Co., Calera, AL (SF, CS, OL)
GNS Gesellschaft fur Nuklear-Service mbH, Essen, Germany (SF, CS)
Thomas Gray & Associates, Inc., (Owner of Environmental Mgmt. & Controls, Inc.), Orange, CA (DL, D, LS, O, TA)

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HubZone-Small Business

- IP-1, IP-2 Containers
- 7A Type A & Fissile Containers
- Overpacks, Pallets
- Racks, Frames
- Cradles, Cylinders
- Equipment Transport Containers
- Modified ISO
- Cask Containers

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✦Holtec International, Camden, NJ (CR, SF, CS, OH, OL, O, TA)
I.C.E. Service Group, Inc., Ambridge, PA (B, CR, CO, DB, DL, D, LI, IA, LS, O, SS, S, TA)
✦Joseph Oat Corp., Camden, NJ (CR, SF, CS, DL, D, GA, GS, G, LI, IA, LS, OH, OL, O, TA, TB)
See advertisement on Cover 3
Lancs Industries, Kirkland, WA (DL, SS)
Leak Testing Specialists, Inc., Orlando, FL (TB)
✦Major Tool & Machine, Inc., Indianapolis, IN (B, CR, SF, CS, CO, OH, OL, O, TA, TB)
See advertisement on page 7
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (CR, SF, CS, D, GA, GS, G, OH, OL)
Mohawk Safety, Manchester, CT (DL, D)
✦NAC International Inc., Peachtree Corners, GA (CR, SF, CS, OH, O, TB)
NFT, Golden, CO (O)
Niagara Energy Products, Niagara Falls, Ontario, Canada (CR, SF, CS, G)
NovaTech, Lynchburg, VA (CO)
✦Orano Federal Services, Charlotte, NC (CR, SF, CS, DL, LI, OH, OL, O, TA, TB)
Orano TN, Columbia, MD (CR, SF, CS, CO, OH, OL, O, TA, TB, TC)
Packaging Research and Design, Brandon, MS (SS)
✦PacTec, Inc., Clinton, LA (B, DL, G, LI, IA, LS, OH, OL, O, SS, S, TA)
✦Petersen Inc., Ogden, UT (B, CR, SF, CS, LS, OH, OL, O, TA, TB)
See advertisement on Cover 2
✦Precision Custom Components, LLC, York, PA (CR, SF, CS, OH, OL)
✦Premier Technology, Inc., Blackfoot, ID (CR, SF, CS, TA, TB)
PTP Spent Fuel Services, LLC, Grand Island, NY (CR, SF, CS, OH, OL)
Radiation Safety & Control Services, Inc., Seabrook, NH (GA, TA)
✦Reef Industries, Inc., Houston, TX (B, DL, LI, LS, OL, O, SS, TA)
Rich Industries Inc., New Philadelphia, OH (DL)
✦Robatel Technologies, LLC, Roanoke, VA (CR, CO, GA, GS, G, IA, LS, OL, TA, TB)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (CR, CS, OH, OL, O)
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)
J. L. Shepherd & Assoc., San Fernando, CA (GA, GS, O, TA)
Skolnik Industries, Chicago, IL (D, O, TA)
✦Strategic Packaging Systems, Madisonville, TN (B, CO, DL, IA, LS, O, SS, S)
Studsvik, Inc., Atlanta, GA (CR, LI, LS, S)
Talisman Div. of Enercon, Arlington, VA (CR, SF, CS, OH, OL)
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)
Wheelift Transporters, Waverly, IA (CS)
WMG, Inc., Peekskill, NY (CO, LI, IA, LS, OH, OL, TA, TB)

17650 Corrosion Inhibitors

Fuel Tank Maintenance Co., LLC, Cookeville, TN
Hexion Inc., Columbus, OH
Lights Camera Action, LLC, Gilbert, AZ
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)
Bertin Instruments, Montigny le Bretonneux, France (A, B, G, N, C, ER, GM, LB, P, PC, ST, SS)
Biodex Medical Systems, Inc., Shirley, NY (A, B, G, IC, P, WT)
CAEN SyS, 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)
EnergySolutions LLC, Salt Lake City, UT (A, B, G, N, ER, GM, G, IC, P, SL, SR)

Environmental Restoration Group, Inc., Albuquerque, NM (A, B, G, C, DT, ER, FS, GM, IC, P, PC, WT)
FCI-Fluid Components International LLC, San Marcos, CA (FL)
Gamma Products, Inc., Palos Hills, IL (LB, PC, WT)
Health Physics Instruments, (Div. 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)
Intek, Inc., Westerville, OH (FL)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (A, B, N, ST)
K&S Associates, Inc., Nashville, TN (WT)
LabLogic Systems, Inc., Tampa, FL (A, B, G, ER, GM, SL)
Mazur Instruments, Castle Rock, CO (A, B, G, GM, P, X)
Mirion Technologies (Canberra) Inc., Meriden, CT (A, B, G, N, C, DT, ER, FS, FL, GM, G, IC, IS, LB, M, P, PC, ST, SS, WT, X)
Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (G, N, C, IC, PC)
ORTEC, Oak Ridge, TN (A, B, G, N, C, DT, ER, FS, GM, G, IC, IS, LB, M, P, PC, ST, SS)
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)
Premium Analyse, Norroy Le Veneur, France (B, IC)
Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada (A, P, WT)
RadComm Systems, Oakville, Ontario, Canada (G, N, C, FS, P)
Radiation Safety & Control Services, Inc., Seabrook, NH (A, B, G, N, ER, GM, IC, LB, PC, SL, SS, WT)
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)
S.E. International, Inc., Summertown, TN (A, B, G, C, DT, ER, GM, P, ST, WT, X)
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)
Transco Products Inc., Streator, IL (G, C)
Vitto Corp., Kanagawa, Japan (G)
Warrington, Inc., Pflugerville, TX (A, B, G, C, GM, IC, P, PC, ST, WT, X)

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)
PaR Systems, LLC, Shoreview, MN (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)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (CO)
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)

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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

ECU Corporation, Cincinnati, OH (AF, B, HE, I, IA, T, V)
New York Blower Company, Willowbrook, IL (AF)
Senior Flexonics Pathway, New Braunfels, TX (AF, I, IA)
✦SSM Industries, Inc., Pittsburgh, PA (AF, B, F, HE, I, IA, T, V)

19700 Data Acquisition/Handling Systems—*also see Computers*

A Analog
D Digital

Alphasource, Inc., Philadelphia, PA (D)

19700 Data Acquisition/Handling Systems

AVANTech, Inc., Richland, WA (A, D)
AVANTech, Inc., Knoxville, TN (A, D)
AVANTech, Inc., Columbia, SC (A, D)
CAEN SyS, Viareggio, LU, Italy (A, D)
Met One Instruments, Inc., Grants Pass, OR (A, D)
Mirion Technologies (Canberra) Inc., Meriden, CT (A, D)
NovaTech, Lynchburg, VA (A, D)
ORTEC, Oak Ridge, TN (D)
Rockwell Automation, Inc., Milwaukee, WI (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

Mirion Technologies (Canberra) Inc., Meriden, CT (PD, P, V)

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)
✦Accelerated Decommissioning Partners - ADP, Dallas, TX (DC, DM, DS, E, RS, TR)
Advanced Consulting Group, Inc., Chicago, IL (DS, E)
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 page 5

American Integrated Services, Inc., Anaheim, CA (DC, DM, DS, TI)
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)
Artisan Industries Inc., Stoughton, MA (E)
Austin Master Services, LLC, Martins Ferry, PA (DC, DM, DS)
AVANTech, Inc., Richland, WA (DC, E)
AVANTech, Inc., Knoxville, TN (DC, E)
AVANTech, Inc., Columbia, SC (DC, E)
✦Bechtel Nuclear, Security & Environmental, Reston, VA (DC, DS)
BHI Energy, Weymouth, MA (DC, DM, DS, E, RS)
Black & Veatch, Overland Park, KS (DC, DS, E, RS, SS)
Bluegrass Concrete Cutting, Inc., Greenville, AL (DC, DM, DS)
Boston Government Services, LLC (BGS), Oak Ridge, TN (E)
Brokk Inc., Santa Fe, NM (DS)
BWX Technologies, Inc., Lynchburg, VA (DC, DM, DS)
Cabrera Services Inc., East Hartford, CT (DC, DM, DS, E, RS, TI, TR)
Chase Environmental Group, Inc., Troy, IL (DC, DS, E, RS)
Chesapeake Nuclear Services, Inc., Annapolis, MD (RS)
Comprehensive Decommissioning International, Camden, NJ (DC, DM, DS, E, RS, SS, TI, TR)

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Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (E, TI, TR)
CS-2 Inc., Grand Island, NY (E)
✦Cutting Edge Services, a div. of In-Place Machining Co., Batavia, OH (DS)
Day & Zimmermann, Charlotte, NC (DC, RS)
The Delphi Groupe, Inc., Austin, TX (DC)
Diakont, Carlsbad, CA (DC)
Dufrane Nuclear Shielding Inc., Winsted, CT (DC, DS, E, SS)
DW James Consulting, North Oaks, MN (E)
Eberline Services, Albuquerque, NM (RS)
E. H. Wachs, Lincolnshire, IL (DS, E)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (DC, DM, DS)
Enercon Services, Inc., Naperville, IL (DC, DS, 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)
Environmental Restoration Group, Inc., Albuquerque, NM (RS)
Fluor, Arlington, VA (DC, DM, DS, E)
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)
ICM-International Climbing Machines, Ithaca, NY (DC, RS)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (DC)
Kinectrics Inc., Toronto, Ontario, Canada (DC, E, RS)
Manafort Brothers Inc., Plainville, CT (DC, DM)
Mega-Tech Services, LLC, Mechanicsville, VA (E)
Merrick & Company, Greenwood Village, CO (E)
Mirion Technologies (Canberra) Inc., Meriden, CT (DC)
Navarro Research and Engineering, Inc., Oak Ridge, TN (DC, DM, DS, E, RS)
North Wind Group, Idaho Falls, ID (DC, DM, DS, E, RS, TI, TR)

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NovaTech, Lynchburg, VA (E)
Onet Technologies, (Sub. of Onet SA Marseille-France), Marseille, France (DC, DS)
Orano Decommissioning Services, Hudson, MA (DC, DM, DS, E, RS, TR)
✦Orano Federal Services, Charlotte, NC (DC, DM, DS, E, RS, SS, TI, TR)
Orano TN, Columbia, MD (TI, TR)
Pajarito Scientific Corp. (PSC), (Pajarito Scientific Security Corp.) (PSSC), Santa Fe, NM (RS)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (DC, DM, DS, RS)
PHDS Co., Knoxville, TN (RS)
Plant Decommissioning, Lake Villa, IL (DS, E)
PTP Spent Fuel Services, LLC, Grand Island, NY (DC, E, TI, TR)
Radiation Safety & Control Services, Inc., Seabrook, NH (DC, DM, DS, E, RS, SS, TI, TR)
ReNuke, Knoxville, TN (DC, E, RS, SS)
✦Robatel Technologies, LLC, Roanoke, VA (E)
RSO, Inc./Radiation Service Organization, Laurel, MD (DC, RS)
Studsvik, Inc., Atlanta, GA (E)
Tecnubel-Transnubel-ECS, Dessel, Belgium (DC, DS)
Teledyne Brown Engineering, Inc., Huntsville, AL (DC, DM, DS, E)
✦3 Bears Technical Services, LLC, Hixson, TN (DC, E)
TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (DC, DM, DS, E, RS, SS)
Transco Products Inc., Streator, IL (DS, RS)
TSSD Services, Inc., Oakland, ME (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)
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)
WMG, Inc., Peekskill, NY (DC, DS, E, RS)
Wolfgang Waelischmiller Solutions, München, Germany (DS)
✦Wood, (Environment & Infrastructure Solutions), (Radiological Services & Engineering Group), Grand Junction, CO (DC, DM, DS, E, RS)

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
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 Airworks™, Sophia, WV (U)
✦American DND Inc., Grand Island, NY (CS, HS, S, UW)
American Integrated Services, Inc., Anaheim, CA (AC, CS)
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)
BHI Energy, Weymouth, MA (AC, CS, D, E, HS, HW, S, SC, UW)
Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (CD, EP)
Biodex Medical Systems, Inc., Shirley, NY (CD)
Brokk Inc., Santa Fe, NM (CS)
Chase Environmental Group, Inc., Troy, IL (AC, CS, HS, HW, S)
Coastal Network, Inc., Charlottesville, VA (C, SC)
Container Products Corp., Wilmington, NC (E)
Curtiss-Wright EST Group, Hatfield, PA (E)
The Delphi Groupe, Inc., Austin, TX (S)
Diakont, Carlsbad, CA (E, S)
Dominion Engineering, Inc., Reston, VA (CD, U)
Enercon Services, Inc., Naperville, IL (S)
EnergySolutions LLC, Salt Lake City, UT (CS, S, SW)
Environmental Alternatives, Inc., Swanzey, NH (AC, CD, CS, CR, HW, S, U)
Foss Therapy Services, Inc., North Hollywood, CA (S)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (AC, CD, C, CS, CR, HS, HW, S, SC, UW)
Geovariances, Avon, France (S)
Graus Chemicals, LLC, Glendale, AZ (CD, C)
Harrison Electropolishing, L.P., Houston, TX (AC, EP, S)
Heat Exchanger Products Corp. (HEPCO), Hingham, MA (PS)
ICM-International Climbing Machines, Ithaca, NY (AC, S, VB)
Kinectrics Inc., Toronto, Ontario, Canada (CD, C, S)
Marshallton Research Laboratories, Inc., King, NC (C)
Materials and Chemistry Laboratory, Inc., (MCLinc), Oak Ridge, TN (CD)
Mega-Tech Services, LLC, Mechanicsville, VA (E)
Mirion Technologies (Canberra) Inc., Meriden, CT (S)
New Millennium Nuclear Technologies International, Lakewood, CO (CS)
North Wind Group, Idaho Falls, ID (CD)
Onet Technologies, (Sub. of Onet SA Marseille-France), Marseille, France (AC, CD, C, CS, CR, D, EP, E, HS, HW, IB, LD, PS, S, SW, SC, UW, U, VB, VF)
✦Orano Federal Services, Charlotte, NC (AC, CD, CS)
PaR Systems, LLC, Shoreview, MN (E, HW, LD, UW)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (S, SW)

Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (PS)
Radiological Solutions, Inc., Rockdale, IL (EP)
RSO, Inc./Radiation Service Organization, Laurel, MD (S)
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 (AC, E, HW, IB)
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)
Westinghouse Electric Co. LLC, Cranberry Township, PA (AC, CD, C, E, S, UW, U)
WMG, Inc., Peekskill, NY (S)

20700 Demolition and Dismantlement

ABZ, Inc., Chantilly, VA
American Integrated Services, Inc., Anaheim, CA
Bluegrass Concrete Cutting, Inc., Greenville, AL
BWX Technologies, Inc., Lynchburg, VA
Campoverde srl, Milano, Italy
Chase Environmental Group, Inc., Troy, IL
Comprehensive Decommissioning International, Camden, NJ
Manafort Brothers Inc., Plainville, CT
Navarro Research and Engineering, Inc., Oak Ridge, TN
North Wind Group, Idaho Falls, ID
PaR Systems, LLC, Shoreview, MN
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN
US Ecology, Inc., Livonia, MI
Westinghouse Electric Co. LLC, Cranberry Township, PA

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

Biodex Medical Systems, Inc., Shirley, NY (IC)
CAEN SyS, Viareggio, LU, Italy (BF, GM, HN, IC, PC, SL, ST, SS)
Health Physics Instruments, (Div. of Far West Technology, Inc.), Goleta, CA (BF, GM, HN, IC, PC, ST)
ORTEC, Oak Ridge, TN (PM, ST, SS)
PHDS Co., Knoxville, TN (SS)

21300 Detectors, Accelerator Beam

CAEN SyS, Viareggio, LU, Italy

21370 Detectors, Explosives—*also see Equipment Rental*

H Hand-Held
W Walk-Through

ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (H)

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

Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (B, G, IL, MS)
GLSEQ, LLC, Huntsville, AL (G)

22200 Detectors, Valve Position

Paragon Energy Solutions, Fort Worth, TX

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

AVANTech, Inc., Knoxville, TN
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., Richland, WA (D)
AVANTech, Inc., Knoxville, TN (D)
AVANTech, Inc., Columbia, SC (D)
CAEN SyS, Viareggio, LU, Italy (I)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (D)
Onet Technologies, (Sub. of Onet SA Marseille-France), Marseille, France (CB, D, I, M)
✦Underwater Construction Corp., Essex, CT (CB, D, EI, G, I, M, MJ, WD, WW)
See advertisement on Cover 4
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., Knoxville, TN
AVANTech, Inc., Columbia, SC
Equipos Nuclear S.A., S.M.E, Maliaño (Cantabria), 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., (DynatrolÆ Div.), Houston, TX
CAEN SyS, Viareggio, LU, Italy
ORTEC, Oak Ridge, TN
Rockwell Automation, Inc., Milwaukee, WI
SOR Inc., Lenexa, KS

✦ Denotes Advertiser

25250 Emergency Response Equipment

RD Radiation Detection/Survey Meters

AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (RD)
AVANTech, Inc., Richland, WA (RD)
AVANTech, Inc., Knoxville, TN (RD)
AVANTech, Inc., Columbia, SC (RD)
Bertin Instruments, Montigny le Bretonneux, France (RD)
BHI Energy, Weymouth, MA (RD)
CAEN SyS, Viareggio, LU, Italy (RD)
Chesapeake Nuclear Services, Inc., Annapolis, MD (RD)
Environmental Restoration Group, Inc., Albuquerque, NM (RD)
Frham Safety Products, Inc., Nashville, TN (RD)
H3D, Inc., Ann Arbor, MI (RD)
I.C.E. Service Group, Inc., Ambridge, PA (RD)
LabLogic Systems, Inc., Tampa, FL (RD)
North Wind Group, Idaho Falls, ID (RD)
ORTEC, Oak Ridge, TN (RD)
Radiation Safety & Control Services, Inc., Seabrook, NH (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)

BHI Energy, Weymouth, MA (SE, TC)
Genave Electronics, Rosemount, MN (SE, SM, SR, TA, V)
PSC Vodec, Nottingham, United Kingdom (V)
Radiation Safety & Control Services, Inc., Seabrook, NH (SE)
Westinghouse Electric Co. LLC, Cranberry Township, PA (SR)

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., Richland, WA (TS)
AVANTech, Inc., Knoxville, TN (TS)
AVANTech, Inc., Columbia, SC (TS)
✦Banda Group International, LLC, Chandler, AZ (TS)
BHI Energy, Weymouth, MA (C, FT, TS)
Boston Government Services, LLC (BGS), Oak Ridge, TN (TS)
CS-2 Inc., Grand Island, NY (A, E, FT, TS)
Curtiss-Wright, Enertech, Brea, CA (TS)
The Delphi Groupe, Inc., Austin, TX (A, E, FT, TS)
Excel Modular Scaffold and Leasing Corp., Hanover, MA (C, TS)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (C)
HukariAscendent Inc., Wheat Ridge, CO (TS)
I.C.E. Service Group, Inc., Ambridge, PA (TS)
Navarro Research and Engineering, Inc., Oak Ridge, TN (FT, TS)
NovaTech, Lynchburg, VA (TS)
Sonic Systems International, Inc., Houston, TX (E, TS)
TSSD Services, Inc., Oakland, ME (TS)
Westinghouse Electric Co. LLC, Cranberry Township, PA (TS)

25600 Encapsulation, Radioactive Source

AVANTech, Inc., Richland, WA
AVANTech, Inc., Knoxville, TN
AVANTech, Inc., Columbia, SC

BWX Technologies, Inc., Lynchburg, VA
Frontier Technology Corp., Xenia, OH
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA
Lucideon, Durham, NC
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada
New Millennium Nuclear Technologies International, Lakewood, CO

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
Bertin Instruments, Montigny le Bretonneux, France
Cabrera Services Inc., East Hartford, CT
CAEN SyS, Viareggio, LU, Italy
Elcometer Inc., Warren, MI
Environmental Restoration Group, Inc., Albuquerque, NM
Frham Safety Products, Inc., Nashville, TN
HI-Q Environmental Products Co., Inc., San Diego, CA
ISEC Monitoring Systems, Helsingborg, Sweden
JSM Protective, Inc., Vero Beach, FL
Met One Instruments, Inc., Grants Pass, OR
Mirion Technologies (Canberra) Inc., Meriden, CT
ORTEC, Oak Ridge, TN
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN
Radiological Solutions, Inc., Rockdale, IL
Remtech Inc., The Villages, FL
Rockwell Automation, Inc., Milwaukee, WI
Technical Associates, (US Nuclear Corp.), (Overhoff Technology Corp. Division), Canoga Park, CA

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
✦Banda Group International, LLC, Chandler, AZ
See advertisement on page 63
G.D. Barri & Associates, Inc., Peoria, AZ
BHI Energy, Weymouth, MA
Cabrera Services Inc., East Hartford, CT
Chase Environmental Group, Inc., Troy, IL
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY
Enercon Services, Inc., Naperville, IL
Environmental Restoration Group, Inc., Albuquerque, NM
Frham Safety Products, Inc., Nashville, TN
Mirion Technologies (Canberra) Inc., Meriden, CT
Navarro Research and Engineering, Inc., Oak Ridge, TN
New Millennium Nuclear Technologies International, Lakewood, CO
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN
RSO, Inc./Radiation Service Organization, Laurel, MD
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)
Artisan Industries Inc., Stoughton, MA (VA)
BAUER Equipment America, Conroe, TX (H, RV)
BHI Energy, Weymouth, MA (S)
Brokk Inc., Santa Fe, NM (RV)
Cabrera Services Inc., East Hartford, CT (IR, RL, RV)
Camfil USA, Washington, NC (VA, VS)
Curtiss-Wright, Enertech, Brea, CA (H)
Curtiss-Wright EST Group, Hatfield, PA (H)
EFCO USA, Inc., Charlotte, NC (VT)
Enercon Services, Inc., Naperville, IL (IR)
EnergySolutions LLC, Salt Lake City, UT (IR, RL)
Environmental Restoration Group, Inc., Albuquerque, NM (IR)
I.C.E. Service Group, Inc., Ambridge, PA (CN)
ICM-International Climbing Machines, Ithaca, NY (IR, RV, VI)
InterTest, Inc., Columbia, NJ (UC, VI)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (DE, DW, IR)
Lenox Instrument Co., Inc., Trevose, PA (VI)
Lights Camera Action, LLC, Gilbert, AZ (UC)
Mirion Technologies (Canberra) Inc., Meriden, CT (IR, RL, WB)
NUCON International, Inc., Columbus, OH (VS)
Onet Technologies, (Sub. of Onet SA Marseille-France), Marseille, France (RV, UC, VA)
ORTEC, Oak Ridge, TN (IR)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (IR)
Radiation Safety & Control Services, Inc., Seabrook, NH (IR)
RSO, Inc./Radiation Service Organization, Laurel, MD (IR)
Technical Associates, (US Nuclear Corp.), (Overhoff Technology Corp. Division), Canoga Park, CA (RL)
Tecnubel-Transnubel-ECS, Dessel, Belgium (RV)
Transco Products Inc., Streator, IL (IR)
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., Richland, WA
AVANTech, Inc., Knoxville, TN
AVANTech, Inc., Columbia, SC
BAUER Equipment America, Conroe, TX
Plant Decommissioning, Lake Villa, IL

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
Western Sling and Supply Co., Sedalia, CO

26900 Fasteners

B Bolts
CG Commercial Grade Dedication
N Nuts
QT Quick Throw
S Studs
TR Threaded Rod
W Washers

Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (B, N, S, TR, W)
Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (B, N, S, TR, W)
Tioga Pipe Supply Co., Inc., Philadelphia, PA (B, N, S, TR, W)

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

E Electrical
F Fiber Optic

GLSEQ, LLC, Huntsville, AL (E, F)
Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (E, F)

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

AMEASOL - American Measurement Solutions LLC, Santa Fe, NM

27180 Filter Housings

B Bag In/Bag Out
M Manual Changeout
R Remote Changeout
SA Side Access
W Walk-In

AVANTech, Inc., Columbia, SC (B, M, R)
ECU Corporation, Cincinnati, OH (B, M, SA, W)
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)
Artisan Industries Inc., Stoughton, MA (TF)
AVANTech, Inc., Richland, WA (C, DE, D, LO, SB, U, W, WP)
AVANTech, Inc., Knoxville, TN (C, DE, D, LO, SB, U, W, WP)
AVANTech, Inc., Columbia, SC (C, DE, D, LO, SB, U, W, WP)
BHI Energy, Weymouth, MA (A, C, HE)
CeraMem LLC, (Sub. of Alsys Group), Waltham, MA (U)
Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (SB, WS)
Dominion Engineering, Inc., Reston, VA (SU, WP)
EnergySolutions LLC, Salt Lake City, UT (DE, D, U, W, WP)
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)
NFT, Golden, CO (A, C, D, HE, SS, U, WP)
NUCON International, Inc., Columbus, OH (A, C, D, HE, WP)
✦PacTec, Inc., Clinton, LA (CL)
Paragon Energy Solutions, Fort Worth, TX (A, W)
Radiation Safety & Control Services, Inc., Seabrook, NH (A, C)
Radiological Solutions, Inc., Rockdale, IL (W, WP)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (HE)
Swagelok Company, Solon, OH (A, LO, W)
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., Peachtree Corners, GA (SE, SY)

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, Carlsbad, 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)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (SP)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CC, FT, R, RS, SP)
✦Major Tool & Machine, Inc., Indianapolis, IN (R)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (RS)
Merrick & Company, Greenwood Village, CO (IP, R, RS)
✦NAC International Inc., Peachtree Corners, GA (FT)
NovaTech, Lynchburg, VA (IP)
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)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (FT, R, SP)
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

✦ Denotes Advertiser

OG Off-Gas Treatment Systems
P Purifiers

ECU Corporation, Cincinnati, OH (A, 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)
✦SSM Industries, Inc., Pittsburgh, PA (A)

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)
✦Joseph Oat Corp., Camden, NJ (B, C)
✦Major Tool & Machine, Inc., Indianapolis, IN (B, C)
Merrick & Company, Greenwood Village, CO (D, GB, GR, G, P)
Mohawk Safety, Manchester, CT (B, C, D, GB, GR, G, P)
✦Orano Federal Services, Charlotte, NC (B, GB, GR)
✦Premier Technology, Inc., Blackfoot, ID (B, C, P)
✦Robatel Technologies, LLC, Roanoke, VA (B, C, D, GB, GR, P)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (B)
Teledyne Brown Engineering, Inc., Huntsville, AL (B, C)
Vigor (formerly Oregon Iron Works), Clackamas, OR (B, C)
Vitto Corp., Kanagawa, Japan (G)
✦Wagstaff Applied Technologies, Spokane, WA (B, C, D, GR, G)

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)
Bertin Instruments, Montigny le Bretonneux, France (DC, DH, DP, DO, DR)
BHI Energy, Weymouth, MA (DT, DO, DR, E, T)
Biodex Medical Systems, Inc., Shirley, NY (DC, DP, SW, SS)
Coastal Network, Inc., Charlottesville, VA (B, DM, DC, DV, DP, E, L, MT, P, S, SW, SS, TW, T, WT)
Dufrane Nuclear Shielding Inc., Winsted, CT (E)
Eastern Technologies, Inc., (OREX), Ashford, AL (B, DM, DV, MT, S, WT)
Environmental Alternatives, Inc., Swanzey, NH (DT, E)
Environmental Restoration Group, Inc., Albuquerque, NM (P, SS)
Fram 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)
HI-Q Environmental Products Co., Inc., San Diego, CA (P)
Hopewell Designs, Inc., Alpharetta, GA (DC)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (DR, SI)
JSM Protective, Inc., Vero Beach, FL (B, DM, S, TW, T, WT)
Lancs Industries, Kirkland, WA (B, E, L, S, SW, T)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (EM, E)
Mirion Technologies (Canberra) Inc., Meriden, CT (BM, DO, PR, PC, P, SI)
Mohawk Safety, Manchester, CT (B, DM, DS, MT, P, S, SW, SS, SF, TW)
North Wind Group, Idaho Falls, ID (DP)
Nuclear Technology Services, Inc., Roswell, GA (PR, P)
ORTEC, Oak Ridge, TN (BM, PC, P, SI)
✦PacTec, Inc., Clinton, LA (B, DM)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (HS)
Radiation Safety & Control Services, Inc., Seabrook, NH (DP, DO, DR)
✦Reef Industries, Inc., Houston, TX (DM, DS, SW, TW, T)
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)
S.E. International, Inc., Summertown, TN (DP)
J. L. Shepherd & Assoc., San Fernando, CA (E)
Tech Products, Inc., Staten Island, NY (SW)
Transco Products Inc., Streator, 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)
✦Uticom Systems Inc., Coatesville, PA (L, SW, TW)

37160 **Health Physics Equipment & Supplies, Disposable/Soluble**

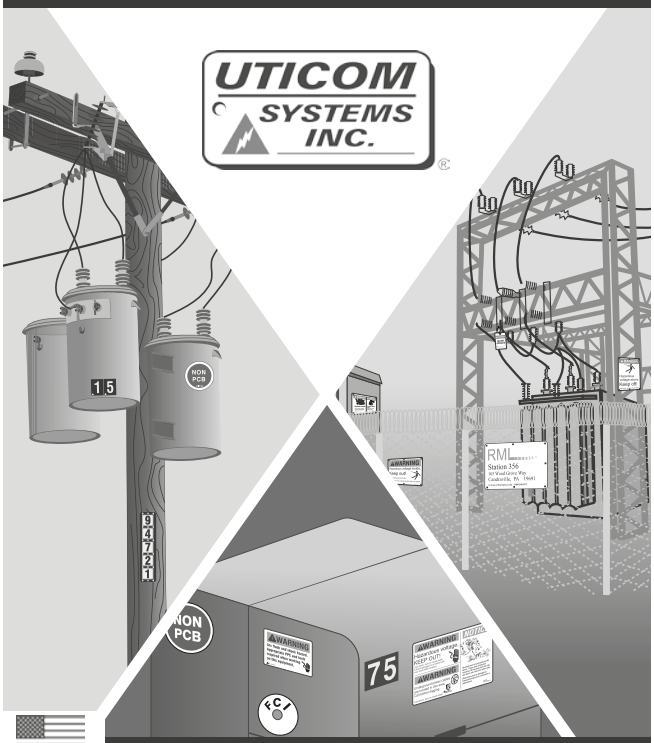
- EF Equipment & Floor Covers
- MW Mops, Wet
- W Wipers

Alphasource, Inc., Philadelphia, PA (EF, MW, W)
Eastern Technologies, Inc., (OREX), Ashford, AL (EF, MW, W)
Fram 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)
Radiation Safety & Control Services, Inc., Seabrook, 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

COMPLIANT GRAPHICS FOR HARSH ENVIRONMENTS



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ANS Career Center

FOR RADWASTE PROFESSIONALS AND ORGANIZATIONS

ANS.org/career

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 Radioimmunassay 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

Ameriphysics, LLC, Knoxville, TN (RE, RI, RC, TH)
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)
✦Banda Group International, LLC, Chandler, AZ (IH, Q, S)
Beamex, Marietta, GA (C)
Berkeley Nucleonics Corp., San Rafael, CA (C)
Bertin Instruments, Montigny le Bretonneux, France (C)
BHI Energy, Weymouth, MA (D, EI, IH, I, PW, Q, RS, RE, RC, RT, S, TH, TM)
Cabrera Services Inc., East Hartford, CT (BI, BA, C, D, EI, IH, Q, RS, RE, S, TH, TM)
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)
Day & Zimmermann, Charlotte, NC (RE, S, TH)
Decidia Research & Consulting, Sabadell, Barcelona, Spain (EI)
The Delphi Groupe, Inc., Austin, TX (HC, IH, I, PW, Q, RS, RE, RC, TH, TM)
Dufrane Nuclear Shielding Inc., Winsted, CT (RE)
DW James Consulting, North Oaks, MN (RE)
Eastern Technologies, Inc., (OREX), Ashford, AL (LW, RT)
Eberline Services, Albuquerque, NM (BI, L, RS, RC)
Enercon Services, Inc., Naperville, IL (C, D, IR, IT, RE, RF, S, TH, TM)
EnergySolutions LLC, Salt Lake City, UT (RE, S)
Environmental Restoration Group, Inc., Albuquerque, NM (S, TH)
Gallagher Bassett Services Inc., (WCD Group Div.), Batavia, IL (IH)
Health Physics Instruments, (Div. 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)
ICM-International Climbing Machines, Ithaca, NY (S)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (IR)
Kinectrics Inc., Toronto, Ontario, Canada (D, L, RS, RE, TM, U)
K&S Associates, Inc., Nashville, TN (BT, C)
Mirion Technologies (Canberra) Inc., Meriden, CT (C, EI, I, L, RS, RE, TH, WB)
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)
Nuclear Technology Services, Inc., Roswell, GA (BI, C, L, RS, RE, TH, U)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (C)
PHDS Co., Knoxville, TN (RS, RE)
Radiological Solutions, Inc., Rockdale, IL (PW, RC)
ReNuke, Knoxville, TN (PW, RE, S)
RSO, Inc./Radiation Service Organization, Laurel, MD (BI, C, D, I, L, RI, S, TH, U)
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)
Technical Management Services, Inc., New Hartford, CT (TH)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (WB)
Teledyne Brown Engineering, Inc., Huntsville, AL (BI, L, RS)
TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (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), (Radiological Services & Engineering Group), Grand Junction, CO (EI, RE, S)

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

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)
ECU Corporation, Cincinnati, OH (C, P, S)
EFCO USA, Inc., Charlotte, NC (RF)
Energy Steel, Lapeer, MI (C, P, S)
Heat Exchanger Products Corp. (HEPCO), Hingham, MA (P)
✦Joseph Oat Corp., Camden, NJ (C, S)
Paragon Energy Solutions, Fort Worth, TX (P, S)
Radiological Solutions, Inc., Rockdale, IL (C)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (P)
Ulbrich Stainless Steels & Special Metals, Inc., North Haven, CT (P)
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

✦ Denotes Advertiser

CAEN SyS, Viareggio, LU, Italy (H, RT)
Diakont, Carlsbad, CA (CS, H, RT, S)
General Plastics MFG. Co., Tacoma, WA (CS)
InterTest, Inc., Columbia, NJ (RT)
ISEC Monitoring Systems, Helsingborg, Sweden (CS, H, RT)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (RT, S)
Merrick & Company, Greenwood Village, CO (CS)
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., (DynatrolÆ Div.), Houston, TX (L)
Curtiss-Wright, Enertech, Brea, CA (F, LF, L, P, T)
FCI-Fluid Components International LLC, San Marcos, CA (F, L, T)
Intek, Inc., Westerville, OH (F)
LUDECA, Inc., Doral, FL (V)
Paragon Energy Solutions, Fort Worth, TX (F, L, P, T)
Rockwell Automation, Inc., Milwaukee, WI (F, L, P, T)
Westinghouse Electric Co. LLC, Cranberry Township, PA (F, L, P, T, V)

40700 Information Services

International Atomic Energy Agency, Vienna, Austria
Nuclear News Magazine, La Grange Park, IL
Radwaste Solutions Magazine, La Grange Park, IL

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

ABW Technologies, Arlington, WA (ND, W)
Adam Brown Consulting, Inc., Cary, IL (Q, SI, ST)
AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (IS, ND, VR, U)
American Crane & Equipment Corp., Douglassville, PA (C)
Analysis and Measurement Services Corp., Knoxville, TN (IS)
Anamet, (a Div. of Acuren Inspection, Inc.), Hayward, CA (MS)
Anata Management Solutions, West Jordan, UT (Q, SI)
AZZ Nuclear, Suwanee, GA (W)
✦Banda Group International, LLC, Chandler, AZ (SI)
G.D. Barri & Associates, Inc., Peoria, AZ (Q)
Black & Veatch, Overland Park, KS (C, D, DS, P, PS, Q, SI, TP, W)
Boston Government Services, LLC (BGS), Oak Ridge, TN (Q, W)

BWX Technologies, Inc., Lynchburg, VA (FI, MS, ND)
CAEN SyS, Viareggio, LU, Italy (ND)
Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (Q)
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 (VR, W)
The Delphi Groupe, Inc., Austin, TX (Q, SI)
Diakont, Carlsbad, CA (FI, ND, P, ST, TP, VR, W, U)
Enercon Services, Inc., Naperville, IL (SI)
✦FLIR Systems, Inc., Elkridge, MD (VR)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (IS, ND, P, TP, W)
Gallagher Bassett Services Inc., (WCD Group Div.), Batavia, IL (SI)
Genave Electronics, Rosemount, MN (S)
ICM-International Climbing Machines, Ithaca, NY (ND, VR)
ISEC Monitoring Systems, Helsingborg, Sweden (VR)
✦Joseph Oat Corp., Camden, NJ (ND, PS, Q, TP, W)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (C)
Lenox Instrument Co., Inc., Trevose, PA (ND, VR)
Materials and Chemistry Laboratory, Inc., (MCLinc), Oak Ridge, TN (ND)
Mirion Technologies (Canberra) Inc., Meriden, CT (ND)
National Inspection & Consultants, Fort Myers, FL (IS, ND, Q)
NovaTech, Lynchburg, VA (ND, VR, U)
NUCON International, Inc., Columbus, OH (IS)
O'Donnell Consulting Engineers, Inc., Bethel Park, PA (ND, W)
PaR Systems, LLC, Shoreview, MN (C, EE)
✦Precision Custom Components, LLC, York, PA (D, ND, Q, W)
Radiation Safety & Control Services, Inc., Seabrook, NH (IS, P, PS, ST, TP)
Rockwell Automation, Inc., Milwaukee, WI (EM)
Rogante Engineering Office, Civitanova Marche, Italy (ND)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (ND, PS, VR)
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, TP)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (EM, EE, P, PS)
✦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.Inc, Westminster, CO (TP, VR, U)
Westinghouse Electric Co. LLC, Cranberry Township, PA (CR, FI, IS, IA, ND, Q, VR)
Zetec, Inc., Snoqualmie, WA (IS, ND)

41000 Instrument Services—*also see Calibration Services; Health Physics Services*

Analysis and Measurement Services Corp., Knoxville, TN
Applied Health Physics, LLC, Bethel Park, PA
Berkeley Nucleonics Corp., San Rafael, CA
Curtiss-Wright, Enertech, Brea, CA
Enercon Services, Inc., Naperville, IL
EnergySolutions LLC, Salt Lake City, UT
Equipos Nuclear S.A., S.M.E, Maliaño (Cantabria), Spain
HI-Q Environmental Products Co., Inc., San Diego, CA
Mirion Technologies (Canberra) Inc., Meriden, CT
NUCON International, Inc., Columbus, OH
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN
Radiation Safety & Control Services, Inc., Seabrook, NH
Rockwell Automation, Inc., Milwaukee, WI
VTT Technical Research Centre of Finland, VTT, Finland
Warrington, Inc., Pflugerville, TX

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, Viareggio, LU, Italy (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)
Transco Products Inc., Streator, IL (MR)

41700 Ion-Exchange Systems, Materials & Services

AVANTech, Inc., Richland, WA
AVANTech, Inc., Knoxville, TN
AVANTech, Inc., Columbia, SC
Veolia Nuclear Solutions.Inc, 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)
Eberline Services, Albuquerque, NM (A, E)
EnergySolutions LLC, Salt Lake City, UT (A)
Kinectrics Inc., Toronto, Ontario, Canada (A)
Teledyne Brown Engineering, Inc., Huntsville, AL (A, 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, Carlsbad, CA (HC, P, U)
Lights Camera Action, LLC, Gilbert, AZ (C, P, RF, U)
Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (P, U)
Nuclear Systems Associates, Inc., Brea, CA (E, HC)
✦Premier Technology, Inc., Blackfoot, ID (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)
Western Sling and Supply Co., Sedalia, CO (PB)

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)

Adam Brown Consulting, Inc., Cary, IL (PS)
Alphasource, Inc., Philadelphia, PA (OM, PI, PR, RS)
AVANTech, Inc., Richland, WA (TC)
AVANTech, Inc., Knoxville, TN (TC)
AVANTech, Inc., Columbia, SC (TC)
AZZ Nuclear, Suwanee, GA (PR, RI, VR)
Berkeley Nucleonics Corp., San Rafael, CA (RM)
BHI Energy, Weymouth, MA (BM, E, G, H, OM, PR, PM, PU, RF, RE, RA, VR, VO, VT)
Curtiss-Wright, Enertech, Brea, CA (EJ, HX, HV, H, MS, PU, S)
Curtiss-Wright Nuclear Div., Brea, CA (VR)
Diakont, Carlsbad, CA (CH, DG, FT, RF, RE, VA)
Dufrane Nuclear Shielding Inc., Winsted, CT (C, CN, G, RS, RW, TR)
ECU Corporation, Cincinnati, OH (HX, HV)
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, (Div. of Far West Technology, Inc.), Goleta, CA (RM)
Heat Exchanger Products Corp. (HEPCO), Hingham, MA (HX, MS)
ISEC Monitoring Systems, Helsingborg, Sweden (RE)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (RM)
Kinectrics Inc., Toronto, Ontario, Canada (C, LC, OM, RS, RO, SC)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (CH, FT)

K&S Associates, Inc., Nashville, TN (RM)
LUDECA, Inc., Doral, FL (RA, RO)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (RS, RW)
National Electric Coil, Columbus, OH (DG, E, MO, PA)
North Wind Group, Idaho Falls, ID (CT, G)
Paragon Energy Solutions, Fort Worth, TX (CO, E, HX, HV, PM, PU)
PaR Systems, LLC, Shoreview, MN (CH, FT, RF, RE, SF, TC)
Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (RS, RF)
✦Premier Technology, Inc., Blackfoot, ID (HX, SF)
✦Robatel Technologies, LLC, Roanoke, VA (RS)
Schutte and Koerting, Trevose, PA (VA, VR, VO)
Sensor Networks, Inc., State College, PA (LP, RE)
Tecnubel-Transnubel-ECS, Dessel, Belgium (SF, TC)
Transco Products Inc., Streator, IL (RM, RS, RE)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (CO, G, PI, PL, PA, PC, RF, RE, SC, S, SF, SN, TC, TR, TS, U, WI)
US Ecology, Inc., Livonia, MI (TC)
Veolia Nuclear Solutions.Inc, Westminster, CO (RE)

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

Encorus Group, (dba RJR Engineering, P.C.), Springville, NY
PaR Systems, LLC, Shoreview, MN
Plant Decommissioning, Lake Villa, IL
✦Robatel Technologies, LLC, Roanoke, VA
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada
Sensor Networks, Inc., State College, PA
Tecnubel-Transnubel-ECS, Dessel, Belgium
Wälischmiller Engineering GmbH, Markdorf, Baden-Württemberg, Germany

47620 Mapping Services

A Automated
C Conventional

Rockwell Automation, Inc., Milwaukee, WI (A)
Transco Products Inc., Streator, 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

Remtech Inc., The Villages, FL (A, T)

53950 Mockup Design & Fabrication—*also see Training Materials*

CR Control Room
E Equipment
LR Local & Remote Control Panels

AVANTech, Inc., Richland, WA (LR)
AVANTech, Inc., Knoxville, TN (LR)
AVANTech, Inc., Columbia, SC (LR)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (CR, E, LR)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (LR)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (CR, LR)
NovaTech, Lynchburg, VA (LR)
PaR Systems, LLC, Shoreview, MN (E)
Plant Decommissioning, Lake Villa, IL (E)
✦Precision Custom Components, LLC, York, PA (E)
✦Premier Technology, Inc., Blackfoot, ID (E)
Radiological Solutions, Inc., Rockdale, IL (E)
Studsvik, Inc., Atlanta, GA (E)
Transco Products Inc., Streator, IL (E)
Veolia Nuclear Solutions.Inc, Westminster, CO (CR, LR)
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)

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

Analysis and Measurement Services Corp., Knoxville, TN (N, T)
Automation Products, Inc., (DynatrolÆ Div.), Houston, TX (IL)
AVANTech, Inc., Richland, WA (SW, WC)
AVANTech, Inc., Knoxville, TN (SW, WC)
AVANTech, Inc., Columbia, SC (SW, WC)
Bertin Instruments, Montigny le Bretonneux, France (G)
Curtiss-Wright, Enertech, Brea, CA (AI, CV, T, V)
Dominion Engineering, Inc., Reston, VA (F)
FCI-Fluid Components International LLC, San Marcos, CA (AI, G)
GLSEQ, LLC, Huntsville, AL (G)
Intek, Inc., Westerville, OH (AI)
JSM Protective, Inc., Vero Beach, FL (T)
LUDECA, Inc., Doral, FL (MC, V)
Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (F, LP, N, T)
NovaTech, Lynchburg, VA (LP, N)
NUCON International, Inc., Columbus, OH (FE)
Radiological Solutions, Inc., Rockdale, IL (CO, WC)
Sentry Equipment, Oconomowoc, WI (WC)
Sidus Solutions LLC, San Diego, CA (CW, SW)
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)
AVANTech, Inc., Richland, WA (LE)
AVANTech, Inc., Knoxville, TN (LE)
AVANTech, Inc., Columbia, SC (LE)
Bertin Instruments, Montigny le Bretonneux, France (AA, AP, AF, CW, DB, F, GE, G, LE, PS, R, S, T, TR, TP, U)
Biodex Medical Systems, Inc., Shirley, NY (PS)
CAEN SyS, Viareggio, LU, Italy (AF, B, CW, DB, FA, F, FC, GE, G, LE, MA, MV, OS, P, PL, PS, S, T, U)
Chase Environmental Group, Inc., Troy, IL (S)
Coastal Network, Inc., Charlottesville, VA (AP, PS)
Enercon Services, Inc., Naperville, IL (PS, S)
Environmental Restoration Group, Inc., Albuquerque, NM (AF, F, R)
F&J SPECIALTY PRODUCTS, INC., Ocala, FL (AP, R)
Health Physics Instruments, (Div. 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)
JSM Protective, Inc., Vero Beach, FL (PS)
LabLogic Systems, Inc., Tampa, FL (PS)
Ludlum Measurements, Inc., Sweetwater, TX (TP)
Mirion Technologies (Canberra) Inc., Meriden, CT (AA, AP, CW, DB, FC, GE, LE, R, S, T)
ORTEC, Oak Ridge, TN (AP, B, CW, DB, FA, F, FC, 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)
RadComm Systems, Oakville, Ontario, Canada (FA, GE, G, S)
Radiation Safety & Control Services, Inc., Seabrook, 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)
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)
Transco Products Inc., Streator, IL (MA, PS, U)
UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (M, S)
Warrington, Inc., Pflugerville, TX (AA, PS, 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)
Bertin Instruments, Montigny le Bretonneux, France (D, HF, WB)

✦ Denotes Advertiser

Biodex Medical Systems, Inc., Shirley, NY (PI)
CAEN SyS, Viareggio, LU, Italy (D, HF, WB, WM)
Coastal Network, Inc., Charlottesville, VA (PI)
Ludlum Measurements, Inc., Sweetwater, TX (D, HF)
Mirion Technologies (Canberra) Inc., Meriden, CT (AL, WB)
ORTEC, Oak Ridge, TN (D, HF, WB)
PSC Vodec, Nottingham, United Kingdom (AL)
RadComm Systems, Oakville, Ontario, Canada (AL, D)
Rexon Components, Inc., Beachwood, OH (D, HF, TL)
RSO, Inc./Radiation Service Organization, Laurel, MD (PI, TL)
S.E. International, Inc., Summertown, TN (PI)
Technical Associates, (US Nuclear Corp.), (Overhoff Technology Corp. Division), Canoga Park, CA (AL, D, HF, PI, 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

Dufrane Nuclear Shielding Inc., Winsted, CT (BA, BC, BN, E, MS)
✦Holtec International, Camden, NJ (E)
Hopewell Designs, Inc., Alpharetta, GA (IM, MS)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (E, P)
NovaTech, Lynchburg, VA (E, MM)
✦Robatel Technologies, LLC, Roanoke, VA (E, IM, MS, PL)
Vitto Corp., Kanagawa, Japan (BA, BC, CE, BN, OB, BP, MM)
voestalpine BOHLER Bleche GmbH & Co. KG, (Affl. of voestalpine High Performance Metals GmbH), Murzzuschlag, Austria (MM, 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

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 (E, S, U)
Cygnus Instruments Inc., Jacksonville, FL (E, U, UW)
Diakont, Carlsbad, CA (EC, U)
Elcometer Inc., Warren, 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)
ICM-International Climbing Machines, Ithaca, NY (S)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (R, RT)
✦Joseph Oat Corp., Camden, NJ (EC, DP)
✦Major Tool & Machine, Inc., Indianapolis, IN (DP, FP, MP, R, U)
NovaTech, Lynchburg, VA (DP, U, UW)
NUCON International, Inc., Columbus, OH (S)
✦Orano Federal Services, 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)
Rogante Engineering Office, Civitanova Marche, Italy (R, RS)
Senior Flexonics Pathway, New Braunfels, TX (DP, MP, R)
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, S, U)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (E, DP, FP, MP)
✦Underwater Construction Corp., Essex, CT (U)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (AC, E, S, U, UW)
Westinghouse Electric Co. LLC, Cranberry Township, PA (EC, E, DP, FP, FL, I, MP, R, S, U)
Wolfgang Waelischmiller Solutions, München, Germany (RT)
Zetec, Inc., Snoqualmie, WA (EC, E, FL, S, U)

58000 Particle-Measuring Instruments

CAEN SyS, Viareggio, LU, Italy
HI-Q Environmental Products Co., Inc., San Diego, CA
ORTEC, Oak Ridge, TN
VTT Technical Research Centre of Finland, VTT, Finland

59800 Pipe—*also see Cleaning Equip.*

CS Carbon Steel, Seamless
CM Chrome Moly
CG Commercial Grade Dedication
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)
AVANTech, Inc., Richland, WA (S)
AVANTech, Inc., Knoxville, TN (S)
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)
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)
✦Joseph Oat Corp., Camden, NJ (SL, S, SS)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (L)
Seafab Metals Co., (Div. of The Doe Run Co.), Casa Grande, AZ (L)
Swagelok Company, Solon, OH (SS)
Tioga Pipe Supply Co., Inc., Philadelphia, PA (CS, CM, CO, NC, SL, S, SS, T, TS, Z, ZS)
Vitto Corp., Kanagawa, Japan (L, NC)

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
EJ Expansion Joints
F Fittings
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)
E. H. Wachs, Lincolnshire, IL (BP, BV, CP, CT, CI, PO, W)
Magnatech LLC, East Granby, CT (IT, PO)
Swagelok Company, Solon, OH (IT, PO)
Tioga Pipe Supply Co., Inc., Philadelphia, PA (B, BT, BP, BV, CP, T, W)
Western Sling and Supply Co., Sedalia, CO (BP, CP)

60100 Pipe Hangers and Supports

Energy and Process Corp., (A Ferguson Sub.), Tucker, GA
Rolls-Royce, (Civil Nuclear), Peterborough, 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)
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, RP, RV, RO, SH, ST)
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, Maliaño (Cantabria), Spain (CT, FH, RP, RV)
Heat Exchanger Products Corp. (HEPCO), Hingham, MA (CT)
Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (HL, I, MS, P, RP, RV, RO, SL, SH, ST)
Westinghouse Electric Co. LLC, Cranberry Township, PA (CR, MS)

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)

AVANTech, Inc., Richland, WA (AC, DC, I, U)
AVANTech, Inc., Knoxville, TN (AC, DC, I, U)
AVANTech, Inc., Columbia, SC (AC, DC, I, U)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (U)
ORTEC, Oak Ridge, TN (I)
Paragon Energy 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
✦Reef Industries, Inc., Houston, TX
Rich Industries Inc., New Philadelphia, OH
✦Strategic Packaging Systems, Madisonville, TN

64700 Pumps, Centrifugal

CW Condensate & Circulating Water
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

Hayward Tyler, Colchester, VT (CW, E3, HD, NR, N2, PC, RF, SW, SN, SC)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (NR)
Paragon Energy Solutions, Fort Worth, TX (CW, E3, HD, NR, N2, PC, RF, SW, SN, SC)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (E3)
Sulzer Pumps (US) Inc., Houston, TX (CW, E3, HD, N2, PC, RF, SW, SN)
Teikoku USA, Inc., (Chempump Div.), Warminster, PA (CW, E3, HD, NR, N2, PC, RF, SW, SN, SC)

64750 Pumps, Other

A Air-Operated
CL Cleanup
CA Containment Air/Gas Sampling
DH Diaphragm, Hydraulically Actuated
FP Fire Protection
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

AVANTech, Inc., Richland, WA (A, CL, MP, PD, SL, V)
AVANTech, Inc., Knoxville, TN (A, CL, MP, PD, SL, V)
AVANTech, Inc., Columbia, SC (A, CL, MP, PD, SL, V)
Hayward Tyler, Colchester, VT (HP, SL, SP)
ORTEC, Oak Ridge, TN (V)
Radiological Solutions, Inc., Rockdale, IL (HP, MP, PD)
Schutte and Koerting, Trevose, PA (HP, J, SL, V)
Teikoku USA, Inc., (Chempump Div.), Warminster, PA (MP, PD, SR)

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66280 Racks, Fuel Storage—*also see Storage Systems, Spent-Fuel*

C Conventional
HD High-Density

✦Holtec International, Camden, NJ (C, HD)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (HD)
✦Major Tool & Machine, Inc., Indianapolis, IN (C, HD)
PaR Systems, LLC, Shoreview, MN (C, HD)
✦Precision Custom Components, LLC, York, PA (C, 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)

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

Applied Health Physics, LLC, Bethel Park, PA (SS, TC)
Applied Science Professionals, LLC, (ASP-LLC), Salt Lake City, UT (TC)
ARS International, LLC, Port Allen, LA (SS, TC)
Beamex, Marietta, GA (TC)
Bertin Instruments, Montigny le Bretonneux, France (M, TC)
BHI Energy, Weymouth, MA (A, DR, D, M, MO, SS, TC)
Cabrera Services Inc., East Hartford, CT (SS, TC)
Chase Environmental Group, Inc., Troy, IL (SS)
Eberline Services, Albuquerque, NM (SS)
Enercon Services, Inc., Naperville, IL (TC)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (TC)
Mirion Technologies (Canberra) Inc., Meriden, CT (A, DR, D, MO, SS, TC)
Nuclear Technology Services, Inc., Roswell, GA (TC)
Pace National Center for Testing & Innovation, Mt. Juliet, TN (SS, TC)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (TC)
Radiation Safety & Control Services, Inc., Seabrook, NH (TC)
Radiological Solutions, Inc., Rockdale, IL (TC)
RSO, Inc./Radiation Service Organization, Laurel, MD (SS)
Technical Associates, (US Nuclear Corp.), (Overhoff Technology Corp. Division), Canoga Park, CA (A, D, MO, TC)
VTT Technical Research Centre of Finland, VTT, Finland (TC)
✦Wood, (Environment & Infrastructure Solutions), (Radiological Services & Engineering Group), Grand Junction, CO (MO)

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
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)

✦Accelerated Decommissioning Partners - ADP, Dallas, TX (ST, SF)
AeroGo, Inc., Seattle, WA (CA, CO, CN, CS, DC, DR, DW, E, F, I, SC, SH, ST, SF)
AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (DR, R)
American Crane & Equipment Corp., Douglassville, PA (R, ST, SF, WT)
Artisan Industries Inc., Stoughton, MA (S)
AVANTech, Inc., Richland, WA (CN, L, LV, S, SF)
AVANTech, Inc., Knoxville, TN (CN, L, LV, S, SF)
AVANTech, Inc., Columbia, SC (CN, E, L, LV, P, S, SF)
Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (CO, DC, L, P, S, SF)
Boston Government Services, LLC (BGS), Oak Ridge, TN (WT)
Brokk AB, Skelleftea, Sweden (R)
Brokk Inc., Santa Fe, NM (R)
Container Products Corp., Wilmington, NC (CO, SS, SF)
Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (P, ST, SF)
Deep Isolation, Berkeley, CA (ST)
Diakont, Carlsbad, CA (R)
Dominion Engineering, Inc., Reston, VA (R)
Dufrane Nuclear Shielding 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)
✦FLIR Systems, Inc., Elkridge, MD (R)
Foss Therapy Services, Inc., North Hollywood, CA (ST, SF)
GNS Gesellschaft fur Nuklear-Service mbH, Essen, Germany (CO, CN, P, WT)
✦Holtec International, Camden, NJ (ST, SF)
Hopewell Designs, Inc., Alpharetta, GA (P)
I.C.E. Service Group, Inc., Ambridge, PA (P)
✦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)
Mirion Technologies (Canberra) Inc., Meriden, CT (WT)
✦NAC International Inc., Peachtree Corners, GA (ST)
NovaTech, Lynchburg, VA (DC, DR, DW, P, R)
Orano Decommissioning Services, Hudson, MA (ST, SF)
✦Orano Federal Services, Charlotte, NC (CA, E, F, L, LV, P, R, SH, ST, SF)
Orano TN, Columbia, MD (ST, SF)
✦PacTec, Inc., Clinton, LA (L, P, SC, SF)
PaR Systems, LLC, Shoreview, MN (DC, DR, DW, P, R)
✦Perma-Fix Environmental Services, Inc., Oak Ridge, TN (SH, S, SS, ST, SF, WT)
✦Petersen Inc., Ogden, UT (CA, CS, F, SC, SH)
✦Premier Technology, Inc., Blackfoot, ID (P)
PTP Spent Fuel Services, LLC, Grand Island, NY (ST, SF)
Radiological Solutions, Inc., Rockdale, IL (S)
✦Reef Industries, Inc., Houston, TX (P, SF)
✦Robatel Technologies, LLC, Roanoke, VA (CA, P, R, S, SS, SF)
S&G Enterprises, Inc., Germantown, WI (CO, CS, SH)
Skolnik Industries, Chicago, IL (P, SC)
✦Strategic Packaging Systems, Madisonville, TN (P)

See advertisement on page 9

UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (SC, SS)
Veolia Nuclear Solutions.Inc, Westminster, CO (DC, F, R)
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)
Wheelift Transporters, Waverly, IA (R, ST)
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), (Radiological Services & Engineering Group), Grand Junction, CO (SS)

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, Marietta, GA (CS)
Curie Environmental Services, Albuquerque, NM (RE)
Frontier Technology Corp., Xenia, OH (RM, SS)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (RS)
Nuclear Technology Services, Inc., Roswell, GA (CS, F, RS)
Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada (SS)
Radiation Safety & Control Services, Inc., Seabrook, 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)
Black & Veatch, Overland Park, KS (CM, DS, DC, T)
Boston Government Services, LLC (BGS), Oak Ridge, TN (CM, DS, DC)
The Delphi Groupe, Inc., Austin, TX (CM, HP, T)
Enercon Services, Inc., Naperville, IL (CM, DS, DC)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (HP)
Mirion Technologies (Canberra) Inc., Meriden, CT (HP)
North Wind Group, Idaho Falls, ID (CM, HP)
PTI Systems, (Div. of Pro-Tem, Inc.), League City, TX (HP)
WMG, Inc., Peekskill, NY (T)

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71500 Refrigeration—*also see Cooling Systems, Body*

ECU Corporation, Cincinnati, 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

Advanced Consulting Group, Inc., Chicago, IL (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, Carlsbad, CA (AI, EE, RC, RH, RP)
E. H. Wachs, Lincolnshire, IL (RC)
✦FLIR Systems, Inc., Elkridge, MD (RO)
Hilman Inc., Marlboro, NJ (RH)
✦Holtec International, Camden, NJ (RC, RH, RP)
ICM-International Climbing Machines, Ithaca, NY (RC, RO)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (AI, RC)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (RH, RP, RO)
KUKA Systems UK Ltd, West Midlands, United Kingdom (RH, RO)
Merrick & Company, Greenwood Village, CO (AI, RH, RP, RO)
NovaTech, Lynchburg, VA (EE, RC, RH, RP, RO)
Nuclear Systems Associates, Inc., Brea, CA (EE, RC, RH, RP, RO)
PaR Systems, LLC, Shoreview, MN (AI, EE, RC, RH, RP, RO, TM)
✦Robatel Technologies, LLC, Roanoke, VA (RC, RH, RP)
Rockwell Automation, Inc., Milwaukee, WI (RC, RP, RO)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (RH)
Sensor Networks, Inc., State College, PA (EE)
Sidus Solutions LLC, San Diego, CA (RP)
Southwest Research Institute, San Antonio, TX (EE, RC, RH, RP, RO)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (RH, RP, RO)
Tecnubel-Transnubel-ECS, Dessel, Belgium (RO)
✦Underwater Construction Corp., Essex, CT (RC, RH, RP, RO)
Veolia Nuclear Solutions.Inc, Westminster, CO (EE, 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
BF Borescopes, Flexible
BR Borescopes, Rigid
I Infrared
M Monocular Scopes, Viewing/ALARA
P Periscopes
RR Radiation-Resistant
S Submersible
T Telescopes

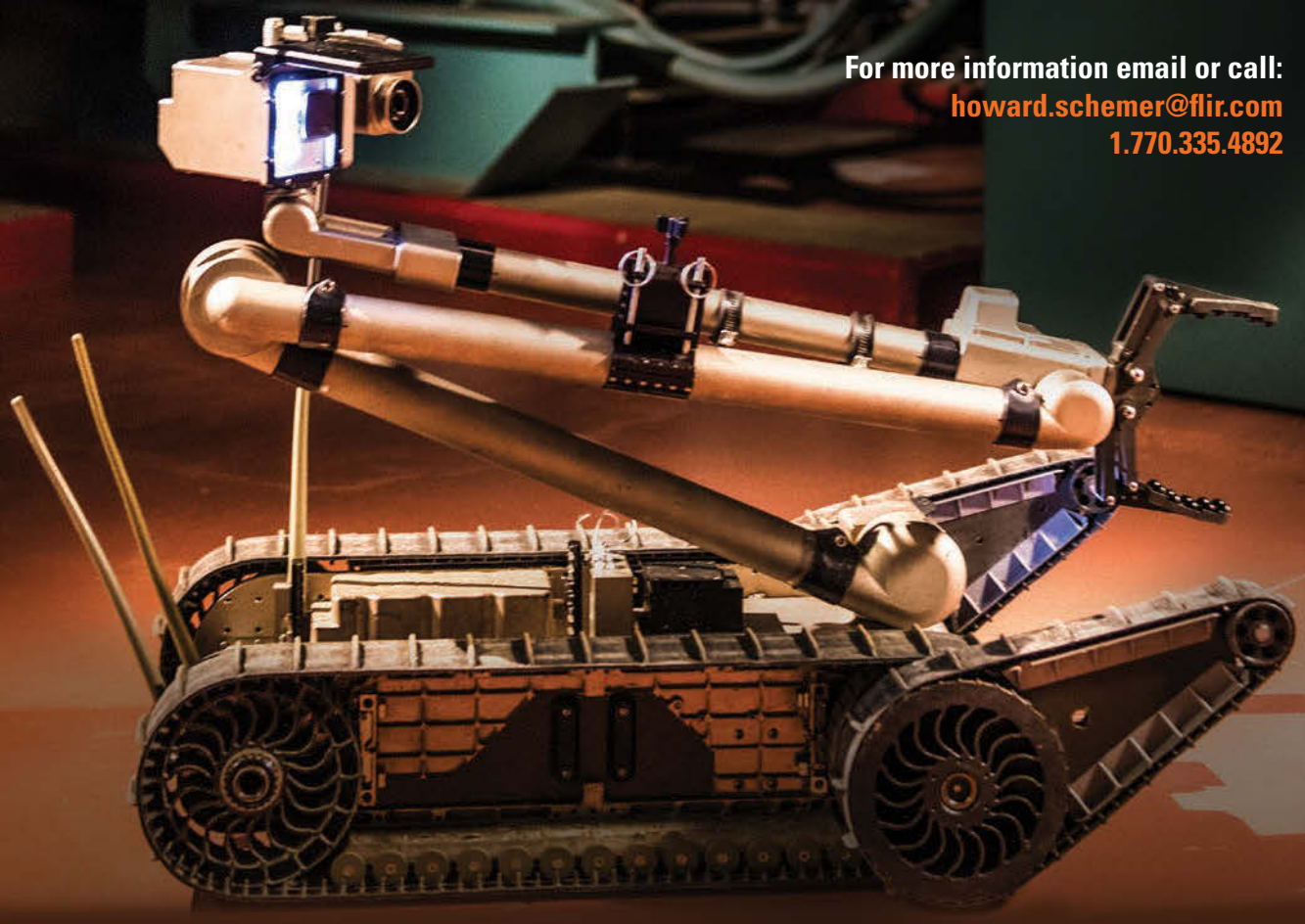
Alphasource, Inc., Philadelphia, PA (BF, BR)
Coastal Network, Inc., Charlottesville, VA (M)
Diakont, Carlsbad, CA (RR, S)
Hopewell Designs, Inc., Alpharetta, GA (BF, BR)
ISEC Monitoring Systems, Helsingborg, Sweden (RR)

FLIR

ROBOTS REDUCE DOSE

Robots perform remote inspections, investigations, sampling, monitoring, and moving/manipulating materials often times **without** human-entry.

For more information email or call:
howard.schemer@flir.com
1.770.335.4892



ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (S)
Lights Camera Action, LLC, Gilbert, AZ (RR, S)
Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (RR, S)
Remote Ocean Systems (ROS), San Diego, CA (RR, S)
Sensor Networks, Inc., State College, PA (S)
Sidus Solutions LLC, San Diego, CA (I, S)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (S)
✦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

Frham Safety Products, Inc., Nashville, TN (AP, C, RL, R, RX, SC)
JSM Protective, Inc., Vero Beach, FL (R, RX, RP)
Lancs Industries, Kirkland, WA (RL)
NUCON International, Inc., Columbus, OH (AP, FT)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (V)
UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (C, RC, RD, RL, R, RX, SC, SS)

73570 Rigging Specialists

Dufrane Nuclear Shielding Inc., Winsted, CT
Wheelift Transporters, Waverly, IA

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

AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (N)
AVANTech, Inc., Richland, WA (S)
AVANTech, Inc., Knoxville, TN (S)
AVANTech, Inc., Columbia, SC (S)
Brokk AB, Skelleftea, Sweden (RV)
Brokk Inc., Santa Fe, NM (CA)
Kinectrics Inc., Toronto, Ontario, Canada (CA, N)
KUKA Systems UK Ltd, West Midlands, United Kingdom (N)
PaR Systems, LLC, Shoreview, MN (CA, N, S)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (N)
Southwest Research Institute, San Antonio, TX (N, RV, S)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (RV, S)
Tecnubel-Transnubel-ECS, Dessel, Belgium (N)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (N, RV, S)
Veolia Nuclear Solutions.Inc, Westminster, CO (N, 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., Richland, WA (L, W)
AVANTech, Inc., Knoxville, TN (L, W)
AVANTech, Inc., Columbia, SC (L, W)
CAEN SyS, Viareggio, LU, Italy (AS, I, L, RT, SS, W)
F&J SPECIALTY PRODUCTS, INC., Ocala, FL (A, AP, I)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (M)
Radiological Solutions, Inc., Rockdale, IL (L)
Sentry Equipment, Oconomowoc, WI (AS, L, W)
Staplex - Air Sampler Div., Brooklyn, NY (A, AP)

74320 Sampling Systems Services—*also see Radiation Monitoring Services*

Encorus Group, (dba RJR Engineering, P.C.), Springville, NY
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA
Sentry Equipment, Oconomowoc, WI

74350 Scaffolding—*also see Shoring; Training*

C Conventional
M Modular
SP Scaffold Plank
S Suspended Type
T Tube & Clamp Type

ABW Technologies, Arlington, WA (C, M, SP, S)
BHI Energy, Weymouth, MA (C, M, SP)
Excel Modular Scaffold and Leasing Corp., Hanover, MA (C, M, SP, S, T)
Great Northern Lumber Co., Chicago, IL (SP)
UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (C, M, SP, S, T)
Western Sling and Supply Co., Sedalia, CO (SP)

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

Adam Brown Consulting, Inc., Cary, IL (P)
Alphasource, Inc., Philadelphia, PA (I)
Cross Manufacturing Company (1938) Ltd., Bath, United Kingdom (MS, M, SS)
Curtiss-Wright EST Group, Hatfield, PA (P)
Energy Steel, Lapeer, MI (FG, MS, MP, M)
GLSEQ, LLC, Huntsville, AL (P)
Mirion Technologies (IST) Corp., (Sensing Systems Div.), Horseheads, NY (CM, P)
NovaTech, Lynchburg, VA (CM, ES, I)
Paragon Energy Solutions, Fort Worth, TX (MS)
Pave Technology Co., Dayton, OH (P)
Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (ES, GR, I, IP, NI, P, RC)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (MP, P, RC)
Senior Flexonics Pathway, New Braunfels, TX (P)
Westinghouse Electric Co. LLC, Cranberry Township, PA (I, MS, MP, RC)

75600 Security Services—*also see Consultants; Training*

A Analysis
C Cybersecurity
D Drug Testing
E Engineering
G Guards
SI Screening & Investigation

BHI Energy, Weymouth, MA (SI)
Black & Veatch, Overland Park, KS (A)
Boston Government Services, LLC (BGS), Oak Ridge, TN (A, E)
Merrick & Company, Greenwood Village, CO (E)
VTT Technical Research Centre of Finland, VTT, Finland (A, E, SI)

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 Shielding 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)
AVANTech, Inc., Richland, WA (VS)
AVANTech, Inc., Knoxville, TN (VS)

AVANTech, Inc., Columbia, SC (VS)
Bertin Instruments, Montigny le Bretonneux, France (PA, VA)
Diakont, Carlsbad, CA (FI, VS, VT)
Enercon Services, Inc., Naperville, IL (FI, ID, PA, VA, VS)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (AI, AO, C, FI, HS, VS)
ISEC Monitoring Systems, Helsingborg, Sweden (VS)
ORTEC, Oak Ridge, TN (HS)
Sidus Solutions LLC, San Diego, CA (AI, AO, FI, HS, ID, NV, VS, VT, WI)
Talisman Div. of Enercon, Arlington, VA (AO, ID)
✦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

GLSEQ, LLC, Huntsville, AL
Kinectrics Inc., Toronto, Ontario, Canada
Paragon Energy Solutions, Fort Worth, TX
Pylon Electronics Inc., (Div. of Autrex) (Instrumentation Dept.), Ottawa, Ontario, Canada

77600 Servomechanisms

NovaTech, Lynchburg, VA
Wolfgang Waelischmiller Solutions, München, Germany

77750 Shielding Design, Radiation—*also see Analysis; Consultants*

BHI Energy, Weymouth, MA
Black & Veatch, Overland Park, KS
BWX Technologies, Inc., Lynchburg, VA
Dufrane Nuclear Shielding Inc., Winsted, CT
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY
Enercon Services, Inc., Naperville, IL
Hopewell Designs, Inc., Alpharetta, GA
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA
✦Joseph Oat Corp., Camden, NJ
Kinectrics Inc., Toronto, Ontario, Canada
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada
Mirion Technologies (Canberra) Inc., Meriden, CT
NovaTech, Lynchburg, VA
Southwest Research Institute, San Antonio, TX
Veolia Nuclear Solutions.Inc, 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 Acryllic 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., Knoxville, TN (WP)
AVANTech, Inc., Columbia, SC (LL, WP)
Biodex Medical Systems, Inc., Shirley, NY (AS, BM, BL, LL, TA)
Dufrane Nuclear Shielding 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)
Frontier Technology Corp., Xenia, OH (GN, TN)
Gamma Products, Inc., Palos Hills, IL (LL)
Lancs Industries, Kirkland, WA (B, BR, BL, CU, FS, GN, LF, PW, P, TA, WS)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (AS, A, B, CB, BH, BM, BR, BL, CM, CL, CA, CS, CW, CU, GN, G, LF, LP, LL, PW, P, PB, RF, TA, WP)
✦NAC International Inc., Peachtree Corners, GA (BM, BR, CM, CC, CS, GN, IV, TN)
NFT, Golden, CO (LL)
ORTEC, Oak Ridge, TN (LL)
Preferred Engineering Corp., (Sub. of Preferred Utilities Mfg. Corp.), Danbury, CT (RF)
✦Premier Technology, Inc., Blackfoot, ID (BL, CM, G, LL)
✦Reef Industries, Inc., Houston, TX (CW, P, RF)
Rich Industries Inc., New Philadelphia, OH (AS, CW, CU, P)
✦Robatel Technologies, LLC, Roanoke, VA (A, BM, BR, BL, CM, CL, GN, IV, TN)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (LL)
RSO, Inc./Radiation Service Organization, Laurel, MD (BL, LL)
Transco Products Inc., Streator, IL (PW, WP)
Ulbrich Stainless Steels & Special Metals, Inc., North Haven, CT (TA)
Vitto Corp., Kanagawa, Japan (CM)
✦Wagstaff Applied Technologies, Spokane, WA (BL, CM, CL, CW, CR, CU, IV, PW)

77900 Shoring—*also see Scaffolding*

Excel Modular Scaffold and Leasing Corp., Hanover, 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

Advanced Consulting Group, Inc., Chicago, IL (U)
AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (U)
✦American DND Inc., Grand Island, NY (C, P)
Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (C)
EnergySolutions LLC, Salt Lake City, UT (U, VL)
✦Holtec International, Camden, NJ (U)
KUKA Systems UK Ltd, West Midlands, United Kingdom (P)
✦Major Tool & Machine, Inc., Indianapolis, IN (C)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (C)
✦Orano Federal Services, Charlotte, NC (C)
✦PacTec, Inc., Clinton, LA (C, P)
PaR Systems, LLC, Shoreview, MN (U)
Plant Decommissioning, Lake Villa, IL (U)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (C, P)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (C, U)
✦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., Richland, WA (LR)
AVANTech, Inc., Knoxville, TN (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)
Nochar, Inc., Indianapolis, IN (LR)
NUCON International, Inc., Columbus, OH (LR)
RSO, Inc./Radiation Service Organization, Laurel, MD (ES)
UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (ES, LR)
Western Sling and Supply Co., Sedalia, CO (ES)

79700 Sources, Radioactive—*also see Radioisotopes; Testing Services*

General Plastics MFG. Co., Tacoma, WA
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain

81680 Storage Services

E Equipment
SF Spent Fuel

Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (SF)
Enercon Services, Inc., Naperville, IL (SF)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (E)
Orano TN, Columbia, MD (SF)
✦Petersen Inc., Ogden, UT (E)
PTP Spent Fuel Services, LLC, Grand Island, NY (E, SF)
UniTech Services Group, Inc., (Sub. of UniFirst Corp.), Longmeadow, MA (E)

81710 Storage Systems, Spent-Fuel—*also see Containers; Racks*

D Dry
W Wet

Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (D, W)
Equipos Nuclear S.A., S.M.E, Maliaño (Cantabria), Spain (D, W)

✦Holtec International, Camden, NJ (D, W)
Konecranes Nuclear Equipment & Services LLC, New Berlin, WI (D, W)
✦Major Tool & Machine, Inc., Indianapolis, IN (D, W)
Mega-Tech Services, LLC, Mechanicsville, VA (D)
✦NAC International Inc., Peachtree Corners, GA (D)
Orano TN, Columbia, MD (D)
PaR Systems, LLC, Shoreview, MN (W)
✦Precision Custom Components, LLC, York, PA (D, W)
✦Premier Technology, Inc., Blackfoot, ID (D)
PTP Spent Fuel Services, LLC, Grand Island, NY (D, W)
✦Reef Industries, Inc., Houston, TX (D)
✦Robatel Technologies, LLC, Roanoke, VA (D)
Vigor (formerly Oregon Iron Works), Clackamas, OR (D, W)
Vitto Corp., Kanagawa, Japan (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., Vero Beach, FL
Mohawk Safety, Manchester, CT
RSO, Inc./Radiation Service Organization, Laurel, MD
✦Uticom Systems Inc., Coatesville, PA

83120 Tags, Valve

Mohawk Safety, Manchester, CT
✦Uticom Systems Inc., Coatesville, PA

83150 Tanks, Storage—*also see Diaphrams; Inspection Services*

AL	Aluminum
GF	Glass Fiber
P	Plastic
RC	Rubber, Collapsible
S	Steel
SS	Steel, Stainless

ABW Technologies, Arlington, WA (AL, S, SS)
Aerofin, (Sub. of Ampco-Pittsburgh Corp.), Lynchburg, VA (S, SS)
AVANTech, Inc., Richland, WA (S, SS)
AVANTech, Inc., Knoxville, TN (S, SS)
AVANTech, Inc., Columbia, SC (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 and Process Corp., (A Ferguson Sub.), Tucker, GA (AL, S, SS)
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)
Paragon Energy Solutions, Fort Worth, TX (S, SS)
✦Petersen Inc., Ogden, UT (AL)
✦Precision Custom Components, LLC, York, PA (S, SS)
✦Premier Technology, Inc., Blackfoot, ID (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)
Vitto Corp., Kanagawa, Japan (AL)
✦Wagstaff Applied Technologies, Spokane, WA (AL, S, SS)

83210 Tape

C	Cloth, Nuclear
E	Electrical Splicing Tape
F	Foam
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., Vero Beach, FL (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)

AVANTech, Inc., Richland, WA (C)
AVANTech, Inc., Knoxville, TN (C)
AVANTech, Inc., Columbia, SC (C)
AZZ Nuclear, Suwanee, GA (W)
ISEC Monitoring Systems, Helsingborg, Sweden (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)

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Remote Ocean Systems (ROS), San Diego, CA (M, PI, U)
Sensor Networks, Inc., State College, 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)

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)
EFCO USA, Inc., Charlotte, NC (P, S, V)
Elcometer Inc., Warren, MI (CP, CT, C, EC)
Gallagher Bassett Services Inc., (WCD Group Div.), Batavia, IL (E)
GLSEQ, LLC, Huntsville, AL (IC, RT)
Heat Exchanger Products Corp. (HEPCO), Hingham, MA (VL)
InterTest, Inc., Columbia, NJ (A, CT, EC, II, ND, P, U, UC)
Mohawk Safety, Manchester, CT (HE)
NovaTech, Lynchburg, VA (A)
PaR Systems, LLC, Shoreview, MN (A, ND, U)
Rockwell Automation, Inc., Milwaukee, WI (A, EM, ES, E)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (HE)
Sensor Networks, Inc., State College, PA (ND)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (EM, HE, ND, VM, VS)
TRILLIUM Valves USA, Ipswich, MA (V, VM, 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, (a Div. of Acuren Inspection, Inc.), Hayward, CA (C, I, M, PL)
ARS International, LLC, Port Allen, LA (EQ, LS, TC)
AVANTech, Inc., Richland, WA (ES, LF, LR, LL, M, ND, P)
AVANTech, Inc., Knoxville, TN (ES, LF, LR, LL, M, ND, P)
AVANTech, Inc., Columbia, SC (ES, LF, LR, LL, M, ND, P)
BWX Technologies, Inc., Lynchburg, VA (C, EQ, FM, LD, LS, M, ND, SP, U)
Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (LS, LR, LL, TC)
Diakont, Carlsbad, CA (CD, WT)
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)
Intek, Inc., Westerville, OH (FL)
InterTest, Inc., Columbia, NJ (C, I, 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, Durham, NC (C, CD, FM, M)
Materials and Chemistry Laboratory, Inc., (MCLinc), Oak Ridge, TN (C, FM, PL, QS)
NovaTech, Lynchburg, VA (FL)
Rockwell Automation, Inc., Milwaukee, WI (FL, IC)
Rogante Engineering Office, Civitanova Marche, Italy (C, M, ND, U)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (P)
RSO, Inc./Radiation Service Organization, Laurel, MD (LS)
Southwest Research Institute, San Antonio, TX (C, CD, ES, EQ, FR, FL, FM, M, ND, S, ST, TC, V, WT)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (EM, EQ, FM, ND)
Teledyne Brown Engineering, Inc., Huntsville, AL (LS)
Ulbrich Stainless Steels & Special Metals, Inc., North Haven, CT (AI, CD, M)
Underwater Engineering Services, Inc., (Nuclear Services Div.), Fort Pierce, FL (C, CD, ND, QS, U)
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)
Desco Mfg. Co., Inc., Rancho Santa Margarita, CA (C, E, P, VA)
Diakont, Carlsbad, CA (C)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (C)
General Plastics MFG. Co., Tacoma, WA (C)
Lights Camera Action, LLC, Gilbert, AZ (E)
NovaTech, Lynchburg, VA (C)
PaR Systems, LLC, Shoreview, MN (C, E)
✦Petersen Inc., Ogden, UT (C)
Plant Decommissioning, Lake Villa, IL (C, E, H, P)
Sensor Networks, Inc., State College, PA (C)

86250 Trailers, Spent-Fuel Transport

Tri-State Motor Transit Co., Glendale, AZ

86260 Trailers, Transport

Tri-State Motor Transit Co., Glendale, AZ
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

Advanced Consulting Group, Inc., Chicago, IL (EM, ES, MN, PM)
AMEASOL - American Measurement Solutions LLC, Santa Fe, NM (EQ)
American Crane & Equipment Corp., Douglassville, PA (CS)
Ameriphysics, LLC, Knoxville, TN (D, PM, RS, RT, WM, WP)
Analysis and Measurement Services Corp., Knoxville, TN (TE, TI)

Applied Health Physics, LLC, Bethel Park, PA (AC, AE, EP, L, RM, RP, RT, SE, WM)
Applied Science Professionals, LLC, (ASP-LLC), Salt Lake City, UT (RM, RP, RT)
✦Argonne National Laboratory, (Decommissioning Training), (EOF Div.), Argonne, IL (MN)
AVANTech, Inc., Richland, WA (TE, WM, WC)
AVANTech, Inc., Knoxville, TN (TE, WM, WC)
AVANTech, Inc., Columbia, SC (TE, WM, WC)
✦Banda Group International, LLC, Chandler, AZ (AC, AE, CM, EP, QA, RS, RT, TB)
BHI Energy, Weymouth, MA (CH, CM, CS, EP, EM, EE, ME, ES, EQ, HV, I, M, PM, QA, RM, RP, RC, RS, SE, S, TE, TI, TL, TM, WM, WC)
Black & Veatch, Overland Park, KS (CM, EM, EE, ME, ES, PM, RP, TB)
Boston Government Services, LLC (BGS), Oak Ridge, TN (AC, AE, CP, EM, LD, QA, SE)
Cabrera Services Inc., East Hartford, CT (D, EP, EM, OS, PM, QA, RM, RP, RC, WM, WP, WC)
Chase Environmental Group, Inc., Troy, IL (RP)
Chesapeake Nuclear Services, Inc., Annapolis, MD (RP, RC)
Curtiss-Wright, Enertech, Brea, CA (EQ, I, M, QA, TM)
Decidia Research & Consulting, Sabadell, Barcelona, Spain (AE, C, SE, WM)
The Delphi Groupe, Inc., Austin, TX (AC, AE, CH, EP, EL, FP, PM, QA, RM, RP, RC, RS, TL, WM, WC)
DLE Technical Services, LLC, Palm City, FL (AC, AE, LD, MN, QA, RT)
DW James Consulting, North Oaks, MN (WM, WP)
Eberline Services, Albuquerque, NM (RM, RP, RC, WM)
EFCO USA, Inc., Charlotte, NC (M)
Enercon Services, Inc., Naperville, IL (CH, EM, I, M, MN, RM, RP, RC, RA, RS, 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., Hanover, MA (S)
Gallagher Bassett Services Inc., (WCD Group Div.), Batavia, IL (AE, CM, EL, SE)
GLSEQ, LLC, Huntsville, AL (EQ, SQ)
Thomas Gray & Associates, Inc., (Owner of Environmental Mgmt. & Controls, Inc.), Orange, CA (WM)
HukariAscendent Inc., Wheat Ridge, CO (EP, EM, EE, ME, ES, FP, I, L, M, PM, QA, RM, RP, WM)
IEM, Research Triangle Park, NC (EP, PM)
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)
METOIL, Praha, Czech Republic (RC)
Mirion Technologies (Canberra) Inc., Meriden, CT (NT, QA, RM, RP, RC, WM)
✦NAC International Inc., Peachtree Corners, 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)
NovaTech, Lynchburg, VA (ME, TM)
Nuclear Technology Services, Inc., Roswell, GA (RP, RC)
NUCON International, Inc., Columbus, OH (AT, NT)
ORTEC, Oak Ridge, TN (RP, RC)
Radiation Safety & Control Services, Inc., Seabrook, 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)
SGS Herguth Laboratories, Inc., Vallejo, CA (M, NT, TL)
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)
Talisman Div. of Enercon, Arlington, VA (D, EL, FD, L, SP)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (EQ, HV, LD, L, MN, OS)
Teletrix, Pittsburgh, PA (SR)
TLG Services, Inc., (Affl. of Entergy Corp.), Bridgewater, CT (D)
Transco Products Inc., Streator, IL (SR)
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)
Zetec, Inc., Snoqualmie, WA (NT)

86400 **Training Centers, Facilities**—*also see Training; Training Materials*

Radiation Safety & Control Services, Inc., Seabrook, NH
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

Boston Government Services, LLC (BGS), Oak Ridge, TN (AV, CA, DV)
Curtiss-Wright, Enertech, Brea, CA (M)
International Atomic Energy Agency, Vienna, Austria (T)
NovaTech, Lynchburg, VA (M, T)
Technical Management Services, Inc., New Hartford, CT (T)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (M)
Transco Products Inc., Streator, IL (DV, M)
WMG, Inc., Peekskill, NY (CA, T)

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

✦Accelerated Decommissioning Partners - ADP, Dallas, TX (DC, HL, LL)
AeroGo, Inc., Seattle, WA (HC, TP, TT)
Austin Master Services, LLC, Martins Ferry, PA (IR, TP)
AVANTech, Inc., Richland, WA (L)
AVANTech, Inc., Knoxville, TN (L)
AVANTech, Inc., Columbia, SC (L)
Chase Environmental Group, Inc., Troy, IL (C, LL)
Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (L, HL, LL)
Dufrane Nuclear Shielding Inc., Winsted, CT (C, IR)
EnergySolutions LLC, Salt Lake City, UT (C, HC, IR, HL, LL)
GNS Gesellschaft fur Nuklear-Service mbH, Essen, Germany (DC, HL)
Hilman Inc., 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)
Miller Transfer, Rootstown, OH (C, DC, HC, LL)
✦NAC International Inc., Peachtree Corners, GA (C, DC, HL)
North Wind Group, Idaho Falls, ID (C, IR)
Orano Decommissioning Services, Hudson, MA (DC, HL, LL)

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Lawrence E. Boing
Facility Decommissioning
TC Director
Phone 630-252-6729
Fax 630-252-7577
email: lboing@anl.gov

Argonne National Laboratory
EOF Division – Special Projects
9700 South Cass Avenue
Argonne, IL 60439

See website for latest information - www.dd.anl.gov/ddtraining/

✦Orano Federal Services, Charlotte, NC (DC, IR, L, HL, LL, TP, TT)
Orano TN, Columbia, MD (C, DC, IR, HL, LL)
✦Precision Custom Components, LLC, York, PA (HC)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (DC, HL, LL)
RSO, Inc./Radiation Service Organization, Laurel, MD (LL, TP)
Studsvik, Inc., Atlanta, GA (HC, IR, LL)
Tri-State Motor Transit Co., Glendale, AZ (C, DC, HC, HL, LL)
US Ecology, Inc., Livonia, MI (LL)
Waste Control Specialists LLC, Andrews, TX (DC, LL)
Wheelift Transporters, Waverly, IA (DC, HC)

87380 Tritium Handling Equipment

Kinectrics Inc., Toronto, Ontario, Canada
✦Major Tool & Machine, Inc., Indianapolis, IN
NUCON International, Inc., Columbus, OH
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada
Veolia Nuclear Solutions.Inc, Westminster, CO
✦Wagstaff Applied Technologies, Spokane, WA

87395 Tritium Recycle & Extraction Equipment

✦Major Tool & Machine, Inc., Indianapolis, IN
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada
Veolia Nuclear Solutions.Inc, Westminster, CO

87400 Tritium Removal Equipment

ISO-PACIFIC Remediation Technologies, Inc., Richland, WA
NUCON International, Inc., Columbus, OH
✦Orano Federal Services, Charlotte, NC
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada
Veolia Nuclear Solutions.Inc, Westminster, CO

90100 Vacuum Equipment & Accessories—*also see Cleaning Equip.; Filters*

Coastal Network, Inc., Charlottesville, VA
Desco Mfg. Co., Inc., Rancho Santa Margarita, CA
E. H. Wachs, Lincolnshire, IL
HI-Q Environmental Products Co., Inc., San Diego, CA
NFT, Golden, CO
NovaTech, Lynchburg, VA
Pave Technology Co., Dayton, OH
Schutte and Koerting, Trevose, PA
✦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

BHI Energy, Weymouth, MA (A, M)
Conval, Inc., Enfield, CT (A, ES, EH, H, MN, M)
Day & Zimmermann, Charlotte, NC (A, ES, EH, EX, H, MN, M)
E. H. Wachs, Lincolnshire, IL (A, H, M)
Paragon Energy Solutions, Fort Worth, TX (A, ES, H, M)
PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (A, ES, MN)
✦SSM Industries, Inc., Pittsburgh, PA (A, ES, EH, MN, M)

90280 Valve Packing Removal Equipment

Day & Zimmermann, Charlotte, NC

90320 Valve-Reseating Equipment, On-line

Day & Zimmermann, Charlotte, NC
EFCO USA, Inc., Charlotte, NC

90330 Valve Stem Gland Packing Systems, Live-Loaded

Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL
Day & Zimmermann, Charlotte, NC

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

Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (B, PO, SL, ST, SA)
Conval, Inc., Enfield, CT (B, PO, SL)
Day & Zimmermann, Charlotte, NC (AC, B, CC, NS, PO, SL, ST, SA, TD)
Paragon Energy Solutions, Fort Worth, TX (B, ST, SA, TD)
PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (B)
Schutte and Koerting, Trevose, PA (ST)
TRILLIUM Valves USA, Ipswich, MA (AC, CC, NS, PO, SL, ST)

90800 Valves, Control

F Flow
FA Flow, Acoustic Emission
I Intelligent
P Pressure
T Temperature
V Vacuum

Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (F, P)
Day & Zimmermann, Charlotte, NC (F, FA, I, P, T, V)
Paragon Energy Solutions, Fort Worth, TX (F)
PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (F)
Schutte and Koerting, Trevose, PA (F)
TRILLIUM Valves USA, Ipswich, MA (F, P, T)

91000 Valves, Gate

B Bellows Seal
JA Jacketed Alloy
K Knife
PS Parallel Slide Type
W Wedge Type

Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (PS, W)
Conval, Inc., Enfield, CT (B, W)
Day & Zimmermann, Charlotte, NC (B, JA, K, PS, W)
Paragon Energy Solutions, Fort Worth, TX (PS, W)
TRILLIUM Valves USA, Ipswich, MA (PS)

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., Richland, WA (BW, B, BF, D, SO, V)
AVANTech, Inc., Knoxville, TN (BW, B, BF, D, SO, V)
AVANTech, Inc., Columbia, SC (BW, B, BF, D, SO, V)
BHI Energy, Weymouth, MA (BF, G, MS)
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, Enertech, Brea, CA (BF, D, EF, FS, FI, G, GB, IM, IS, MS, N, P, PG, PU, Q, RS, SL, SO, V)
Day & Zimmermann, Charlotte, NC (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)
Dragon Valves, Inc., Norwalk, CA (EF, N, P)
Intek, Inc., Westerville, OH (FM)
Paragon Energy Solutions, Fort Worth, TX (B, BF, D, FI, G, IM, M, N, PR)
PBM, Inc. Valve Solutions, (Ball Valve Div.), Irwin, PA (D, FS, FB, IM, IS)
Schutte and Koerting, Trevose, PA (G, PG, PR, Q)
TRILLIUM Valves USA, Ipswich, MA (BF, FS, FI, G, IS, MS)

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, Enertech, Brea, CA (G, GL, PC, TD, W)
Day & Zimmermann, Charlotte, NC (BL, G, GL, PC, SC, TD, W)
Schutte and Koerting, Trevose, PA (G, GL, SC)
TRILLIUM Valves USA, Ipswich, MA (G, GL, SC, W)

92300 Vessels—*also see Respiratory Protection Equipment*

F Flasks, Water, Valve-Operating
P Pressure
PR Pressure, Reactor

ABW Technologies, Arlington, WA (P, PR)
Aerofin, (Sub. of Ampco-Pittsburgh Corp.), Lynchburg, VA (P)
AVANTech, Inc., Richland, WA (F, P)

AVANTech, Inc., Knoxville, TN (F, P)
AVANTech, Inc., Columbia, SC (F, P)
BWX Technologies, Inc., Lynchburg, VA (P, PR)
Consolidated Power Supply, (Div. of Consolidated Pipe & Supply Co., Inc.), Birmingham, AL (P, PR)
Day & Zimmermann, Charlotte, NC (F, P, PR)
Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (P, PR)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (P)
✦Holtec International, Camden, NJ (F, P, PR)
✦Joseph Oat Corp., Camden, NJ (P, PR)
✦Major Tool & Machine, Inc., Indianapolis, IN (P, PR)
✦Petersen Inc., Ogden, UT (P)
✦Precision Custom Components, LLC, York, PA (F, P, PR)
✦Premier Technology, Inc., Blackfoot, ID (PR)
Teledyne Brown Engineering, Inc., Huntsville, AL (P)
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)

92800 **Video Services**

I Inspection
PP Plant Photodocumentation
R Remote
U Underwater

InterTest, Inc., Columbia, NJ (I, PP, R, U)
ISEC Monitoring Systems, Helsingborg, Sweden (I, PP, R)
Lenox Instrument Co., Inc., Trevose, PA (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

✦Accelerated Decommissioning Partners - ADP, Dallas, TX (P, LL, HL)
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)
Ameriphysics, LLC, Knoxville, TN (DL, ER, MD, LL, HL, SS, WC, WS)
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, NR, LL)
Austin Master Services, LLC, Martins Ferry, PA (DL, OF, S, SR)
AVANTech, Inc., Richland, WA (DM, DW, DR, DL, ER, FP, LW, MW, MD, M, OF, LL, HL, RD, RP, RR, S, VR)
AVANTech, Inc., Knoxville, TN (DM, DW, DR, DL, ER, FP, LW, MW, MD, M, OF, LL, HL, RD, RP, RR, S, VR)
AVANTech, Inc., Columbia, SC (DM, DW, DR, DL, ER, FP, LW, MW, MD, M, OF, LL, HL, RD, RP, RR, S, VR)
✦Banda Group International, LLC, Chandler, AZ (ER, M, VR, WC, WS)
BHI Energy, Weymouth, MA (ER, FP, MW, M, P, RC, SR, T, VR, WC, WD)
Bilfinger Noell GmbH, (Dept. BEV), Wuerzburg, Germany (IL, P, LL, HL, S, VR)
BWX Technologies, Inc., Lynchburg, VA (MW, MD, P, LL, HL)
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, Viareggio, LU, Italy (M, WC)
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)

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Croft Associates Ltd, Abingdon, Oxfordshire, United Kingdom (DL, IL, LW, P, 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)
Decidia Research & Consulting, Sabadell, Barcelona, Spain (ER)
Deep Isolation, Berkeley, CA (IL, MD, OF, ON, P, HL, T)
The Delphi Groupe, Inc., Austin, TX (I, IL, M, NR, ON, P, HL, S, VR)
Dominion Engineering, Inc., Reston, VA (DR, LW)
DW James Consulting, North Oaks, MN (WC)
Eberline Services, Albuquerque, NM (ER, MW, NR, LL, T, VR, WC)
Encorus Group, (dba RJR Engineering, P.C.), Springville, NY (ER, FP)
Enercon Services, Inc., Naperville, IL (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)
Fluor, Arlington, VA (ER, T, UT, WC)
Foss Therapy Services, Inc., North Hollywood, CA (DL, ON, P, LL, HL)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (DM, DW, ER, LC, NR)
Gallagher Bassett Services Inc., (WCD Group Div.), Batavia, IL (ER)
Geovariances, Avon, France (SR, WC)
GNS Gesellschaft fur Nuklear-Service mbH, Essen, Germany (LL, HL)
Thomas Gray & Associates, Inc., (Owner of Environmental Mgmt. & Controls, Inc.), Orange, CA (DL, MS, NR, P, SS, S, VR)
✦Holtec International, Camden, NJ (DL, ER, FP, ON, P, VR)
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)
ISEC Monitoring Systems, Helsingborg, Sweden (M)
ISO-PACIFIC Remediation Technologies, Inc., Richland, WA (DR, DL)
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, Durham, NC (LL, S)
Mirion Technologies (Canberra) Inc., Meriden, CT (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)
NFT, Golden, CO (MW, P, LL, HL, T, VR, WC)
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)
Onet Technologies, (Sub. of Onet SA Marseille-France), Marseille, France (ER, ON, VR, WC)
Orano Decommissioning Services, Hudson, MA (P, LL, HL)
✦Orano Federal Services, Charlotte, NC (DR, DL, ER, FP, LW, P, LL, HL, T, V, VR, WC, WS)
Orano TN, Columbia, MD (FP, OF, ON, P, LL, HL)
Pace National Center for Testing & Innovation, Mt. Juliet, TN (LL, HL)
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, LW, MW, MD, MS, M, OF, ON, P, LL, HL, 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)
PTP Spent Fuel Services, LLC, Grand Island, NY (FP, LL, HL)
Radiac Research Corp., Brooklyn, NY (DL, LW, MD, MS, ON, P, LL, HL)
Radiation Safety & Control Services, Inc., Seabrook, NH (DL, MD, P, LL, HL, SR, WC)
Radiological Solutions, Inc., Rockdale, IL (RR, WS)
✦Reef Industries, Inc., Houston, TX (P, LL)
ReNuke, Knoxville, TN (DR, ER, ON, P, LL, RC, WC, WS)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (DR, P, LL, HL, V, VR)
RSO, Inc./Radiation Service Organization, Laurel, MD (DL, ER, MD, M, P, LL, SS, SR, VR, WS)
J. L. Shepherd & Assoc., San Fernando, CA (SS)
Sidus Solutions LLC, San Diego, CA (M)
Sonic Systems International, Inc., Houston, TX (FP)
Southwest Research Institute, San Antonio, TX (SS, WC, WS)
Studsvik, Inc., Atlanta, GA (ER, HL)
Tecnatom, S.A., San Sebastian De Los Reyes, Madrid, Spain (ER, I, IL, LW, MW, MD, MS, M, P, LL, HL, RD, RP, SM, SS, S, V, VR, WC, WS)
Tecnubel-Transnubel-ECS, Dessel, Belgium (FP, MW, P)
Teledyne Brown Engineering, Inc., Huntsville, AL (WC)
✦3 Bears Technical Services, LLC, Hixson, TN (T, WC)
Transco Products Inc., Streator, IL (M)
✦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)
Veolia Nuclear Solutions.Inc, Westminster, CO (DM, DR, ER, MW, MD, OF, ON, HL, S, VR)
Warrington, Inc., Pflugerville, TX (LC)
Waste Control Specialists LLC, Andrews, TX (LC, MW, NR, P, LL, SS, S, T, UT)
Westinghouse Electric Co. LLC, Cranberry Township, PA (FP, IL, M, HL, RD, RR, VR, WC)
WMG, Inc., Peekskill, NY (FP, IL, LL, WC)
✦Wood, (Environment & Infrastructure Solutions), (Radiological Services & Engineering Group), Grand Junction, CO (ER, SR, UT, VR, WC)

93900 **Welding Services**—*also see Diving Services*

A	Arc
AT	Automatic Tube & Pipe
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

ABW Technologies, Arlington, WA (A, AT, C, EM, S)
AVANTech, Inc., Richland, WA (A, AT, C, UM)
AVANTech, Inc., Knoxville, TN (A, AT, C, UM)
AVANTech, Inc., Columbia, SC (A, AT, C, UM)
AZZ Nuclear, Suwanee, GA (A, AT, C, P, RM, S, WO, WC)
BHI Energy, Weymouth, MA (A, WO)
Diakont, Carlsbad, CA (RM)
Energy and Process Corp., (A Ferguson Sub.), Tucker, GA (WO)
Fuel Tank Maintenance Co., LLC, Cookeville, TN (A, AT, C, DB, EM, EB, EX, P, S, WO, WC)
✦Joseph Oat Corp., Camden, NJ (C)
✦Major Tool & Machine, Inc., Indianapolis, IN (A, C, LB, P, S, WO)
Niagara Energy Products, Niagara Falls, Ontario, Canada (A, AT, P, S, WO)
PaR Systems, LLC, Shoreview, MN (RM)
✦Precision Custom Components, LLC, York, PA (A, P, RM, S, WO)
✦Premier Technology, Inc., Blackfoot, ID (A, AT, C, S, 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 Shielding Inc., Winsted, CT (LG, LP)
MarShield Radiation Shielding, (Div. of Mars Metal Co.), Burlington, Ontario, Canada (LG, LP)
✦Premier Technology, Inc., Blackfoot, ID (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)
Frham Safety Products, Inc., Nashville, TN (LF)
JSM Protective, Inc., Vero Beach, FL (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*

CG	Commercial Grade Dedication
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

Arcos Industries LLC, Mt. Carmel, PA (NM)
RSCC Wire & Cable LLC, East Granby, CT (IS, SW, IT, MS, T)
Ulbrich Stainless Steels & Special Metals, Inc., North Haven, CT (CG, NM, RF, SU)

96200 **Work Platforms**

C	Cask Servicing
M	Mobile
S	Stationary

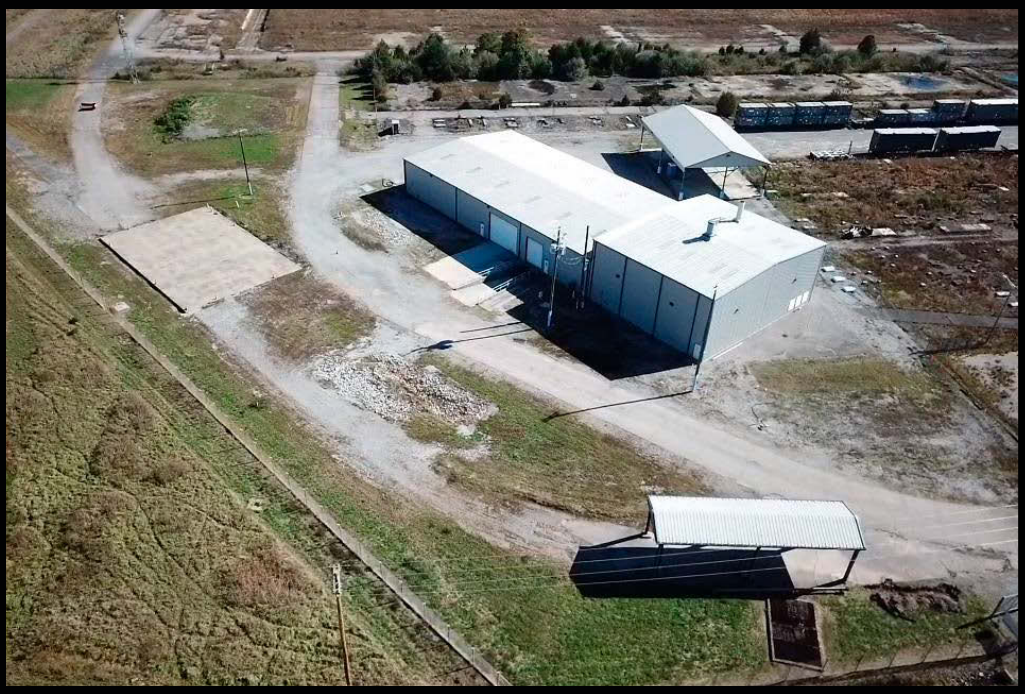
Dufrane Nuclear Shielding Inc., Winsted, CT (C, M, S)
NovaTech, Lynchburg, VA (C, S)
✦Petersen Inc., Ogden, UT (S)
Plant Decommissioning, Lake Villa, IL (C, M, S)
Rolls-Royce, (Civil Nuclear), Peterborough, Ontario, Canada (M)

PermaFix®
environmental services

Oak Ridge Environmental Waste Operations Center (EWOC)

FULLY LICENSED, MULTI-DISCIPLINARY PROCESSING CENTER

OPEN FOR BUSINESS: GOVERNMENT, COMMERCIAL, NUCLEAR POWER CLIENTS



17.4K
SQ.FT. OF INDOOR PROCESSING SPACE

8.7
ACRE SITE DEDICATED TO SUPPORTING LOW-LEVEL RADIOACTIVE WASTE

3
OUTDOOR LICENSED RADIOACTIVE MATERIALS STORAGE AREAS

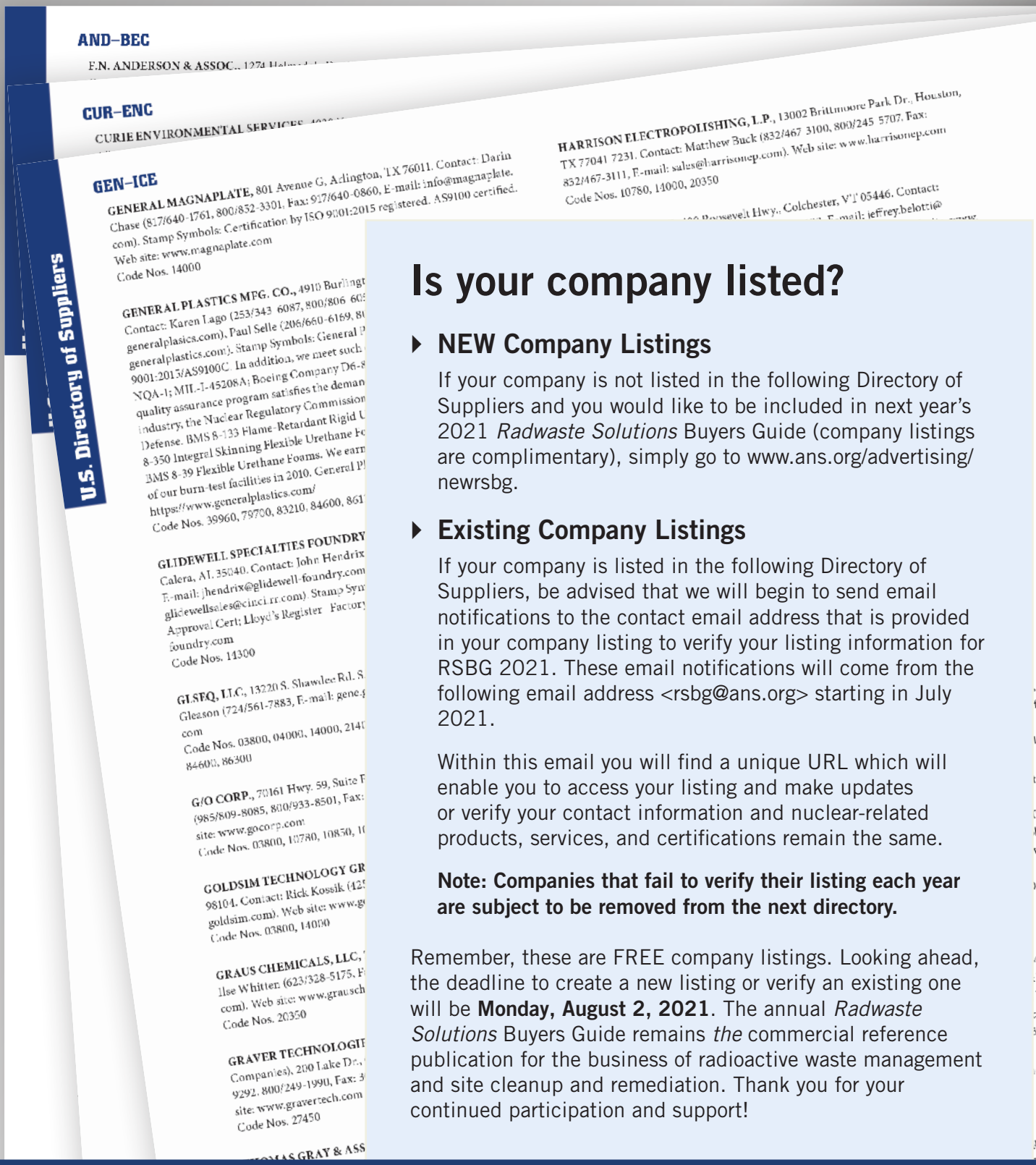
Bulk Survey for Release (BSFR) – Full Capability to Receive Rad Contaminated Waste for:
- Non-destructive assay of potentially contaminated items and packages
- Sort/Seg for removal of confirmed contaminated or non-compliant items
- Authority to release to authorized and approved TN disposal facility

Receipt, Testing, Decontamination, Storage and Disposal of Large Components
- Size reduction, decontamination and consolidation of rad contaminated equipment/items
- Systems operability testing
- Storage of rad contaminated items

Multi-Modal Trans-Load Operations
- Receive, re-package and transport for disposal via rail or truck
- Receive, process, package and transport large volume debris/equipment
- Package development/testing

Process for Disposal Operations
- Mechanical cutting/sizing, volume reduction
- Classified component sanitization (pending)
- Hg treatment (pending)

PERMA-FIX.COM | B. MICHAEL EISENHOWER, GENERAL MANAGER
865.712.5701 MEISENHOWER@PERMA-FIX.COM



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 2021 *Radwaste Solutions* Buyers Guide (company listings are complimentary), simply go to www.ans.org/advertising/newrsbg.

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 2021. These email notifications will come from the following email address <rsbg@ans.org> starting in July 2021.

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 2, 2021**. 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!

The Radwaste 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 350 companies will be listed throughout 165 categories that relate directly to the business of radioactive waste management and site cleanup and remediation.

U.S. Directory of Suppliers

ABW TECHNOLOGIES, 6720 191st Pl. N.E., Arlington, WA 98223. Contact: Mateo Moore (360/399-9199, E-mail: mateo.moore@abwtec.com). Web site: www.abwtec.com
Code Nos. 11400, 14300, 40900, 74350, 83150, 92300, 93900

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

✦**ACCELERATED DECOMMISSIONING PARTNERS - ADP,** 17101 Preston Rd., Suite 115, Dallas, TX 75248. Contact: Curtis Roberts (202/374-8766, E-mail: curtis.roberts@orano.group). Web site: https://www.adpnuclear.com/
Code Nos. 20300, 68000, 87000, 93040
(See advertisement on page 83)

ADAM BROWN CONSULTING, INC., 7061 Meadow Ln., Cary, IL 60013. Contact: Adam KP Brown (847/287-2616, E-mail: akpbrown@aol.com).
Code Nos. 14000, 40900, 47400, 75190

ADVANCED CONSULTING GROUP, INC., Executive Towers, Suite 603, 5901 N. Cicero Ave., Chicago, IL 60646. Contact: Tom Litka (773/481-9500, Fax: 773/481-9981, E-mail: advcnsgrp@aol.com).
Code Nos. 03800, 14000, 20300, 72300, 79360, 86300

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

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 Arrowest 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 AIRWORKS™, 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. 20350

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 page 5)

AMERICAN INTEGRATED SERVICES, INC., 2550 E. Miraloma Way, Suite 150, 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. 14000, 37200, 86300, 93040

ANALYSIS AND MEASUREMENT SERVICES CORP., AMS Technology Center, 9119 Cross Park Dr., Knoxville, TN 37923. Contact: H. M. Hashemian (865/691-1756, Fax: 865/691-9344, E-mail: info@ams-corp.com). Web site: www.ams-corp.com
Code Nos. 03800, 09800, 14000, 40900, 41000, 54750, 86300

ANAMET, (a Div. of Acuren Inspection, 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), Dilip Bhandarkar (510/887-8811, 800/377-7768, Fax: 510/887-8427, E-mail: dilip@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

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., 7985 Vance Dr., Suite 307, Arvada, CO 80003. Contact: Richard Creed (312/833-8334, E-mail: rich.creed55@gmail.com). Web site: www.antech-inc.com
Code Nos. 09800

APPLIED CONTROL SOLUTIONS, 10029 Oakleaf Pl., Cupertino, CA 95014. Contact: Joe Weiss (408/253-7934, Fax: 408/253-7974, E-mail: joe.weiss@realtimeacs.com). Web site: www.realtimeacs.com
Code Nos. 12800, 14000

APPLIED HEALTH PHYSICS, LLC, 2986 Industrial Blvd., Bethel Park, PA 15102. Contact: Alan Riddle (412/835-9555, 800/332-6648, Fax: 412/835-9559, E-mail: ariddle.ahp@gmail.com). 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

✦ Denotes Advertiser

APPLIED SCIENCE PROFESSIONALS, LLC, (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

ARCOS INDUSTRIES LLC, 394 Arcos Dr., Mt. Carmel, PA 17851. Contact: Beth Haupt (570/339-5200, 800/233-8460, Fax: 570/339-5206, E-mail: arcos@arcos.us). Stamp Symbols: N-Stamp #QSC-448, ISO 2001:2015. Web site: www.arcos.us
Code Nos. 95900

✦**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 101)

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

ARS INTERNATIONAL, LLC, 2609 N. River Rd., Port Allen, LA 70767. Contact: Kelly Ausbrooks (225/381-2991, 800/401-4277, Fax: 225/381-2996, E-mail: kausbrooks@amrad.com). Web site: www.amrad.com
Code Nos. 26100, 37200, 67380, 84600, 93040

ARTISAN INDUSTRIES INC., 44 Campanelli Pkwy., Stoughton, MA 02072-3704. Contact: Perry Alasti (781/893-6800 x239, Fax: 781/647-0143, E-mail: palasti@artisanind.com). Stamp Symbols: U, U2, R, NPT. Web site: www.artisanind.com
Code Nos. 03000, 20300, 26230, 27450, 68000

✦**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
(See advertisement on page 74)

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., (DynatrolÆ Div.), 3030 Maxroy St., Houston, TX 77008-6294. Contact: Factory 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*

AVANTECH, INC., 2155 Robertson Dr., Richland, WA 99354. Contact: Fred Yapuncich (509/943-6706, Fax: 509/943-1835, E-mail: fyapuncich@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. 04000, 08800, 09950, 10780, 12800, 12900, 13600, 14000, 14300, 19700, 20300, 22700, 25250, 25400, 25600, 26240, 27450, 41700, 47400, 53950, 54750, 55040, 59800, 63400, 64750, 68000, 73620, 74150, 75850, 79370, 83150, 83600, 84600, 86300, 87000, 91260, 92300, 93040, 93900

AVANTECH, INC., 2680 Westcott Blvd., Knoxville, TN 37931-3111. Contact: Larry Beets (865/539-9000, Fax: 865/539-9001, E-mail: lbeets@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. 04000, 08800, 09950, 10780, 12800, 12900, 13600, 14000, 14300, 19700, 20300, 22410, 22700, 24170, 25250, 25400, 25600, 26240, 27450, 41700, 47400, 53950, 54750, 55040, 59800, 63400, 64750, 68000, 73620, 74150, 75850, 77800, 79370, 83150, 83600, 84600, 86300, 87000, 91260, 92300, 93040, 93900

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. 04000, 08800, 09950, 10780, 12800, 12900, 13600, 14000, 14300, 19700, 20300, 22410, 22700, 24170, 25250, 25400, 25600, 26240, 27180, 27450, 41700, 47400, 53950, 54750, 55040, 59800, 63400, 64750, 68000, 73620, 74150, 75850, 77800, 79370, 83150, 83600, 84600, 86300, 87000, 91260, 92300, 93040, 93900

AZZ NUCLEAR, 560 Horizon Dr., Suite 100, Suwanee, GA 30024. Contact: 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

✦**BANDA GROUP INTERNATIONAL, LLC,** 1799 E. Queen Creen Rd., Suite 1, Chandler, AZ 85286. Contact: Vickie Maranville (505/850-4530, Fax: 505/212-0393, E-mail: vickiem@bandagroupintl.com). Web site: www.bandagroupintl.com
Code Nos. 12800, 13850, 14000, 25400, 26100, 37200, 40900, 86300, 93040
(See advertisement on page 63)

G.D. BARRI & ASSOCIATES, INC., 6860 W. Peoria Ave., Peoria, AZ 85345. Contact: Leslie Manley (623/773-0410, Fax: 623/773-2924, E-mail: leslie.manley@gdbarri.com). Web site: www.gdbarri.com
Code Nos. 03800, 09800, 14000, 26100, 40900

BAUER EQUIPMENT AMERICA, 680 Conroe Park West Dr., Conroe, TX 77303. Contact: 713/691-3000, E-mail: info@bauer-equipment.com. Web site: bauer-equipment.com/en/
Code Nos. 26230, 26240

BEAMEX, 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: Tim Carraway (703/429-6275, Fax: 240/379-2258, E-mail: tacarraw@bechtel.com). Web site: www.bechtel.com
Code Nos. 14000, 20300
(See advertisement on page 82)

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, 26080, 37200, 41000, 47400, 84150

BHI ENERGY, 97 Libbey Industrial Pkwy., 4th Floor, Weymouth, MA 02189. Contact: Varesha Mauney (508/591-1149, 800/225-0385 x1149, E-mail: marketing@bhienergy.com), Butch Smith (803/226-0330, E-mail: butch.smith@bhienergy.com). Web site: www.bhienergy.com
Code Nos. 03000, 10780, 11400, 13050, 14000, 20300, 20350, 25250, 25300, 25400, 26100, 26230, 27450, 37130, 37200, 47400, 67380, 74350, 75600, 77750, 86300, 90250, 91260, 93040, 93900*

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@biodex.com). Web site: www.biodex.com/nuclearmedicine
Code Nos. 09750, 14300, 17950, 20350, 21270, 37130, 55040, 55060, 77800*

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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 9001:2015; Quality System also complies to the requirements of NRC 10CFR50, App. B. Web site: www.birns.com
Code Nos. 45550

BLACK & VEATCH, 11401 Lamar Ave., Overland Park, KS 66211. Contact: Mark Gake (913/458-7909, Fax: 913/458-2934, E-mail: gakema@bv.com), Matthew Lee (913/458-7484, Fax: 913/458-2934, E-mail: leemc@bv.com). Stamp Symbols: N Construction of Class 1, 2, 3; Piping Systems, 2, 3 & MC Vessels; 2, 3 Storage Tanks; NA 1, 2, 3 CS & MC Field Installation, NPT, Classes 1, 2, 3, CS, MC; R Certification. Web site: www.bv.com
Code Nos. 03800, 14000, 20300, 40900, 71190, 75600, 77750, 86300

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: HubZone Certified Small Business; Self Certified Small Business. Web site: www.bluegrasscompanies.com
Code Nos. 13850, 20300, 20700

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, 40900, 68000, 71190, 75600, 86300, 86500

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*

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, 14000, 20300, 20700, 25600, 37600, 40900, 56600, 77750, 84600, 92300, 93040

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. 08800

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@cabreraservices.com). Web site: www.cabreraservices.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, ASME Section IX. Web site: www.camfil.com
Code Nos. 26230, 36000, 91260

CERAMEM LLC, (Sub. of Alsys Group), 12 Clematis Ave., Waltham, MA 02453. Contact: Kevin Donahue (857/504-2250, E-mail: kevin.donahue@alsys-group.com). Web site: www.alsys-group.com
Code Nos. 27450

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, 86300, 87000, 93040

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

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

COMPREHENSIVE DECOMMISSIONING INTERNATIONAL, 1 Holtec Blvd., Camden, NJ 08104. Contact: Corey E. DeWitt (856/797-0900 x3681, E-mail: c.dewitt@cdi-decom.com). Web site: www.cdi-decom.com
Code Nos. 14000, 20300, 20700

COMPUTER ENGINEERING SERVICES, INC., 240 Forest Ave., Suite 102, P.O. Box 4332, Chattanooga, TN 37405-0332. Contact: Ben Martin (423/265-0607, Fax: 423/266-5923, E-mail: bmartin@ces-chatt.com).
Code Nos. 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, 26900, 27450, 37600, 40900, 41200, 56600, 59800, 61570, 90330, 90600, 90800, 91000, 91260, 91380, 92300*

CONTAINER PRODUCTS CORP., P.O. Box 3767, 112 N. College Dr., Wilmington, NC 28406. Contact: Katie Fletcher (910/392-6100, 800/635-5647, Fax: 910/392-6778, E-mail: sales@c-p-c.com). Stamp Symbols: CE, GOST-R, NQA1, PE. Web site: www.c-p-c.net
Code Nos. 10780, 11700, 14000, 14300, 20350, 68000*

✦**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). Web site: www.containertechnologies.com
Code Nos. 03800, 10780, 13700, 14300, 75700, 83150
(See advertisement on page 79)

CONVAL, INC., 96 Phoenix Ave., Enfield, CT 06082. Contact: Don Bowers (860/749-0761, Fax: 860/763-3557, E-mail: dbowers@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@cscs-i.com). Web site: www.cscs-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, E-mail: jsinkiewicz@curtisswright.com). Stamp Symbols: N, Classes 1, 2, 3 Valves, NPT, Classes 1, 2, 3, Valves & Appurteances & 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: Fritz Sutor (215/721-1100, 800/355-7044, Fax: 215/721-1101, E-mail: fsutor@curtisswright.com), Dave Kronen (215/721-1100, 800/355-7044, Fax: 215/721-1101, E-mail: est-sales@curtisswright.com). Stamp Symbols: NUPIC Listed; ISO-9001 Certified. ANSI N45.2, NQA-1, 10CFR50 App. B. Web site: cw-estgroup.com
Code Nos. 20350, 26230, 40900, 56600, 61570, 75190, 86130, 93040*

CURTISS-WRIGHT NUCLEAR DIV., 2950 E. Birch St., Brea, CA 92821. Contact: Jenn Sinkiewicz (714/528-2301, E-mail: jsinkiewicz@curtisswright.com). Web site: www.cwnuclear.com
Code Nos. 47400

✦**CUTTING EDGE SERVICES, A DIV. OF IN-PLACE MACHINING CO.,** 1535 Old SR 74, Batavia, OH 45103. Contact: Tim Beckman (513/388-0199, Fax: 513/732-1248, E-mail: tbeckman@cuttingedgeservices.com). Web site: www.cuttingedgeservices.com
Code Nos. 13050, 14000, 20300*
(See advertisement on page 75)

CYGNUS INSTRUMENTS INC., 6900 Philips Hwy., Suite 8, Jacksonville, FL 32216. Contact: Rod Sanders (410/267-9771, E-mail: sales@cygnusinstruments.com). Stamp Symbols: Certification by CSA Class 1, Div. 1, Group A, B, C, D; ISO 9001. Web site: www.cygnusinstruments.com
Code Nos. 56600

DAY & ZIMMERMANN, 2801 Yorkmont Rd., Suite 310, Charlotte, NC 28208. Contact: Joe Bugica (980/287-2608, E-mail: joe.bugica@dayzim.com). Web site: www.dayzim.com
Code Nos. 13850, 14000, 20300, 37200, 90250, 90280, 90320, 90330, 90600, 90800, 91000, 91260, 91380, 92300

DEEP ISOLATION, 2120 University Ave., Berkeley, CA 94704. Contact: 415/915-6505, E-mail: info@deepisolation.com. Web site: www.deepisolation.com
Code Nos. 68000, 93040

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

DESCO MFG. CO., INC., 23031 Arroyo Vista, Rancho Santa Margarita, CA 92688. Contact: Tom Sistrunk (949/858-7400, 800/337-2648, Fax: 949/858-9141, E-mail: tsistrunk@descomfg.com). Web site: www.descomfg.com
Code Nos. 10780, 86130, 90100*

DIAKONT, 3193 Lionshead Ave., Carlsbad, CA 92010. Contact: Brandon Slater (858/551-5551, Fax: 858/504-7065, E-mail: sales@diakont.us.com). Web site: www.diakont.com
Code Nos. 10780, 12800, 20300, 20350, 30500, 39960, 40900, 45550, 47400, 56600, 68000, 72300, 73300, 75850, 84600, 86130, 93900*

DLE TECHNICAL SERVICES, LLC, 4634 S.W. Long Bay Dr., Palm City, FL 34990. Contact: Rob De La Espriella (772/341-1093, E-mail: rob.dle@dle-services.com). Web site: www.dle-services.com
Code Nos. 14000, 86300*

DOMINION ENGINEERING, INC., 12100 Sunrise Valley, Suite 220, Reston, VA 20191. Contact: Dale Vines (225/305-3428, E-mail: dvines@domeng.com). Web site: www.domeng.com
Code Nos. 03800, 10780, 14000, 20350, 27450, 54750, 68000, 93040

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-Stamped Valves sold through our Value Added Partner - Paragon Energy Solutions. Web site: www.dragonvalves.com
Code Nos. 91260

DUFRANE NUCLEAR SHIELDING 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), P.O. Box 409, Ashford, AL 36312-0409. 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*

EBERLINE SERVICES, 8429 Washington Pl. N.E., Suite B, Albuquerque, NM 87113. Contact: Paul Fensterer (505/508-1666, E-mail: pfensterer@eberlineservices.com). Stamp Symbols: DOE, USACE, NAVFAC, USAF. Web site: www.eberlineservices.com
Code Nos. 03800, 14000, 20300, 37200, 44000, 67380, 86300, 93040

ECU CORPORATION, 11500 Goldcoast Dr., Cincinnati, OH 45249. Contact: Michael J. Fox (513/898-9294, Fax: 513/898-9312, E-mail: mfox@ecucorp.com). Stamp Symbols: UL508A Listed Industrial Panels, ASME AG-1 HVAC Equipment, 10CFR50 App.B QA program. Web site: www.ecucorp.com
Code Nos. 03000, 03800, 14000, 19450, 27180, 32250, 37600, 47400, 71500

EFCO USA, INC., 11600 Goodrich Dr., Charlotte, NC 28273. Contact: Christian Mossberg (704/943-1027, 800/EFCO-USA, E-mail: sales@efcousa.com). Web site: www.efcousa.com
Code Nos. 00300, 26230, 37600, 84150, 86300, 90320*

E. H. WACHS, 600 Knightsbridge Pkwy., Lincolnshire, IL 60069. Contact: Ron Rohrbacher (847/537-8800, 800/323-8185, Fax: 847/520-1147, E-mail: ron.rohrbacher@itw-ocw.com). Web site: www.ehwachs.com
Code Nos. 20300, 59850, 72300, 90100, 90250*

ELCOMETER INC., 6900 Miller Dr., Warren, MI 48092. Contact: Sunny Nietubicz (248/650-0500, 800/521-0635, Fax: 248/650-0501, E-mail: sales@elcometerusa.com). Stamp Symbols: Certification by ISO 9001:2015, ISO/IEC 17025:2017. Web site: www.elcometerusa.com
Code Nos. 03800, 04000, 26080, 56600, 84150*

ELYSIUM INDUSTRIES USA, 300 Park Ave., 12th Floor, New York, NY 10022. Contact: Carl Perez (646/706-3698, E-mail: c.perez@elysium-v.com). Web site: www.elysiumindustries.com
Code Nos. 03800

ENCORUS GROUP, (dba RJR Engineering, P.C.), 23 Mechanic St., P.O. Box 344, Springville, NY 14141. Contact: Kevin Opp (716/592-3980, Fax: 716/592-4216, E-mail: kopp@encorus.com). Stamp Symbols: NQA-1. Web site: www.encorus.com
Code Nos. 03800, 13850, 14000, 20300, 26100, 47600, 53950, 74320, 77750, 86130, 93040

ENERCON SERVICES, INC., 2056 Westings Ave., Suite 140, Naperville, IL 60563. Contact: Russell Lee (630/864-3640, E-mail: rlee@enercon.com). Stamp Symbols: Certification by Safeguards. Web site: www.enercon.com
Code Nos. 03800, 06790, 09800, 14000, 20300, 20350, 26100, 26230, 37200, 40900, 41000, 55040, 67380, 71190, 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, 60100, 61570, 83150, 92300, 93900

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

ENERGY STEEL, 3123 John Conley Dr., Lapeer, MI 48446-2987. Contact: Bill Davidson (949/2462640, E-mail: bdavidson@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*

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✦**ENERGY, TECHNOLOGY AND ENVIRONMENTAL BUSINESS ASSOCIATION,** P.O. Box 5483, Oak Ridge, TN 37831. Contact: Terri Reedy (865/643-2302, E-mail: terri@eteba.org). Web site: www.eteba.org
Code Nos. 14000, 86300, 93040
(See advertisement on page 25)

ENVIRONMENTAL ALTERNATIVES, INC., 33 Whittemore Farm Rd., Swanzey, NH 03446. 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

ENVIRONMENTAL RESTORATION GROUP, INC., 8809 Washington St. N.E., Suite 150, Albuquerque, NM 87113. Contact: Chuck Farr (505/298-4224, Fax: 505/797-1404, E-mail: chuckfarr@ergoffice.com). Web site: www.ergoffice.com
Code Nos. 09800, 14000, 17950, 20300, 25250, 26080, 26100, 26230, 37130, 37200, 55040

EXCEL MODULAR SCAFFOLD AND LEASING CORP., 720 Washington St., Unit-5, Hanover, MA 02339. Contact: Jim Elkins (760/598-0050, 877/598-6091, Fax: 760/759-5311, E-mail: jim.elkins@excelscaffold.com). Web site: www.excelscaffold.com
Code Nos. 25400, 74350, 77900, 86300*

FAROUK D. BAXTER, CONSULTANT, 23 Pilgrims Path, Sudbury, MA 01776. Contact: Farouk Baxter (978/443-2914, E-mail: faroukbax@gmail.com). Web site: Baxter, Farouk D., Consultant
Code Nos. 14000

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/nuclear
Code Nos. 03200, 09800, 17950, 32250, 40050, 54750*

FIREWATER ASSOCIATES, LLC, 113 E. Harper Ave., Maryville, TN 37804. Contact: Renee Echols (865/233-5049, E-mail: rechols@firewaterllc.com). Web site: www.firewaterllc.com
Code Nos. 14000

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*

✦**FLIR SYSTEMS, INC.,** 7055 Troy Hill Dr., Suite 300, Elkridge, MD 21075. Contact: Howard Schemer (770/335-4892, E-mail: howard.schemer@flir.com). Web site: www.flir.com
Code Nos. 10780, 40900, 68000, 72300
(See advertisement on page 95)

FLUOR, 2300 Clarendon Blvd., Suite 1110, Arlington, VA 22201-3383. Contact: Jody Redeker (703/387-4845, E-mail: jody.redeker@fluor.com), Justin Garrison (864/281-4637, E-mail: justin.garrison@fluor.com). Stamp Symbols: Certification by ISO 9000/9001/9002. Web site: www.fluor.com/government
Code Nos. 03800, 06790, 14000, 20300, 93040

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. 20350, 68000, 77800, 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*

FRONTIER TECHNOLOGY CORP., 1641 Burnett Dr., Xenia, OH 45385. Contact: Treva Janzow (937/376-5691, Fax: 937/376-5692, E-mail: t.janzow@frontier-cf252.com). Web site: www.frontiertechcorp-cf252.com
Code Nos. 25600, 68950, 77800*

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

GALLAGHER BASSETT SERVICES INC., (WCD Group Div.), 1550 Hubbard Ave., Batavia, IL 60046. Contact: Jay Jaros (630/593-6073, E-mail: jay_jaros@gbtpa.com). Web site: https://www.wcdgroup.com/
Code Nos. 12800, 14000, 37200, 40900, 84150, 86300, 93040

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*

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 MAGNAPLATE, 801 Avenue G, Arlington, TX 76011. Contact: Darin Chase (817/640-1761, 800/852-3301, Fax: 917/640-0860, E-mail: info@magnaplate.com). Stamp Symbols: Certification by ISO 9001:2015 registered. AS9100 certified. Web site: www.magnaplate.com
Code Nos. 14000

GENERAL PLASTICS MFG. CO., 4910 Burlington Way, Tacoma, WA 98409. Contact: Karen Lago (253/343-6087, 800/806-6051, E-mail: karen_lago@generalplasics.com), Paul Selle (206/660-6169, 800/806-6051, E-mail: paul_selle@generalplastics.com). Stamp Symbols: General Plastics is certified to ISO 9001:2015/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. Shawdee 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, 255 S. King St., Suite 800, Seattle, WA 98104. 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: Lois Windham (713/208-9292, 800/249-1990, Fax: 302/731-1707, E-mail: lwindham@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

GREAT NORTHERN LUMBER CO., P.O. Box 43144, Chicago, IL 60643. Contact: Celeste Burke (708/388-1818, Fax: 708/388-0887, E-mail: cburke@greatnorthernlumber.com). Web site: www.greatnorthernlumber.com
Code Nos. 74350

HALEY & ALDRICH, INC., 75 Washington Ave., Suite 1A, Portland, ME 04101. Contact: Nadia Glucksberg (207/482-4623, Fax: 207/482-4673, E-mail: nglucksberg@haleyaldrich.com). Web site: www.haleyaldrich.com
Code Nos. 13850

HARRISON ELECTROPOLISHING, L.P., 13002 Brittmoore Park Dr., Houston, TX 77041-7231. Contact: Matthew Buck (832/467-3100, 800/245-5707, Fax: 832/467-3111, E-mail: sales@harrisonep.com). Web site: www.harrisonep.com
Code Nos. 10780, 14000, 20350

HAYWARD TYLER, 480 Roosevelt Hwy., Colchester, VT 05446. Contact: Jeff Belotti (802/655-4444 x141, Fax: 802/655-4682, E-mail: jeffrey.belotti@haywardtyler.com). Stamp Symbols: N, NA, NPT, Classes 1, 2 & 3. Web site: www.haywardtyler.com
Code Nos. 64700, 64750*

HEALTH PHYSICS INSTRUMENTS, (Div. 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, 37200, 47400, 55040

HEAT EXCHANGER PRODUCTS CORP. (HEPCO), 55 Industrial Park Rd., Hingham, MA 02043. Contact: Tracy Hennigan Bonnyman (781/749-0220, 800/472-8484, Fax: 781/740-8738, E-mail: hepco@heatexchangerproducts.com). Web site: www.heatexchangerproducts.com
Code Nos. 10780, 20350, 37600, 47400, 61570, 84150

HEXION INC., 180 E. Broad St., Columbus, OH 43215. Contact: Product Information (614/986-2497, 888/443-9466, Fax: 877/443-9466, E-mail: service@hexion.com). Web site: www.hexion.com
Code Nos. 11400, 14000, 17650

HILMAN INC., 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, 13850, 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 9001:2015 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.holtecinternational.com
Code Nos. 03800, 14000, 14300, 30500, 55490, 66280, 68000, 72300, 79360, 81710, 83150, 92300, 93040*
(See advertisement on page 98)

✦ Denotes Advertiser

HOPEWELL DESIGNS, INC., 5940 Gateway Dr., Alpharetta, GA 30004. Contact: Kevin Klem (770/667-5770, Fax: 770/667-7539, E-mail: kevin.klem@hopewelldesigns.com), Ryan Howell (770/667-5770, Fax: 770/667-7539, E-mail: ryan.howell@hopewelldesigns.com). Web site: www.hopewelldesigns.com
Code Nos. 00400, 09800, 20300, 37130, 37160, 37200, 55490, 68000, 73300, 77750*

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

HUKARIASCENDENT INC., 4251 Kipling St., Unit 400, Wheat Ridge, CO 80033. Contact: Ken Hukari (303/384-9079, 866/487-7628, Fax: 303/277-1458, E-mail: ken@hukari.com). Web site: www.hukari.com
Code Nos. 03200, 03800, 13850, 14000, 25400, 86300

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. 09950, 12800, 14000, 14300, 20300, 25250, 25400, 26230, 68000, 87000, 93040*

ICM-INTERNATIONAL CLIMBING MACHINES, 630B Elmira Rd., Ithaca, NY 14850-8745. Contact: Samuel J. Maggio (607/288-4001, Fax: 607/288-4004, E-mail: info@icm.cc). Web site: www.icm.cc
Code Nos. 10780, 20300, 20350, 26230, 37200, 40900, 56600, 72300*

IEM, P.O. Box 110265, Research Triangle Park, NC 27709. Contact: Gary Scronce (225/952-8259, E-mail: gary.scronce@iem.com). Web site: www.iem.com
Code Nos. 14000, 86300

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

INTEK, INC., 751 Intek Way, Westerville, OH 43082. Contact: Tony Bonina (614/895-0301, 800/743-6822, Fax: 614/895-0319, E-mail: tbonina@intekflow.com). Stamp Symbols: Certification by ISO 9001-2015. Web site: intekflow.com
Code Nos. 03200, 17950, 40050, 54750, 84600, 91260

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

INTERTEST, INC., 303 State Rt. 94, Columbia, NJ 07832. Contact: Thomas F. Daly (908/496-8008, 800/535-3626, Fax: 908/496-8004, E-mail: bginfo@intertest.com). Web site: www.intertest.com
Code Nos. 26230, 39960, 84150, 84600, 92800

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

ISA CORP., 3787 Fairview Industrial Dr. S., Salem, OR 97302. Contact: Brian Clarke (503/983-7090, E-mail: brianclarke@isacorporation.net).
Code Nos. 10850, 10900

ISO-PACIFIC REMEDIATION TECHNOLOGIES, INC., 2920 George Washington Way, Suite 101, Richland, WA 99354. Contact: Lori Dillon (509/375-0100, E-mail: lori.dillon@isopacific.net). Web site: www.isopacific.net
Code Nos. 03200, 03800, 09730, 10780, 12800, 14000, 17950, 18600, 20300, 21370, 22700, 25600, 26230, 30500, 37130, 37200, 39960, 47400, 53950, 56600, 63400, 64700, 66280, 67380, 68950, 71190, 72300, 73300, 74150, 74320, 77750, 79700, 87400, 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 Cover 3)

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., 4940 Corsica Sq., Vero Beach, FL 32967. Contact: Jeannette McLean (910/619-3141, Fax: 888/457-7682, E-mail: jmclean@jsmonline.com). Stamp Symbols: Woman Owned Small Business; ANS Member; SAM Registered. Web site: www.jsmonline.com
Code Nos. 10850, 10900, 26080, 37130, 54750, 55040, 73550, 83110, 83210, 95850

KLEIN CONSULTING LLC, 172 Broad St., Norwich, CT 06360. Contact: Ralph L. Klein (860/886-6396, Fax: 860/885-6277, E-mail: ralph.klein@kleinconsultllc.com). Web site: www.kleinconsultllc.com
Code Nos. 14000

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*

K&S ASSOCIATES, INC., 1926 Elm Tree Dr., Nashville, TN 37210. Contact: Peter Gordon (615/883-9760, 800/522-2325, Fax: 615/871-0856, E-mail: pgordon@kslab.com). Web site: www.kslab.com
Code Nos. 08800, 09800, 17950, 37200, 47400

LABLOGIC SYSTEMS, INC., 1911 N. U.S. Hwy. 301, Suite 140, Tampa, FL 33619. Contact: Ashvin Boodhun (813/626-6848, 800/875-4687, Fax: 813/620-3708, E-mail: aboodhun@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*

LEAK TESTING SPECIALISTS, INC., 5810 Hoffner Ave., Suite 805, Orlando, FL 32822. Contact: Melissa Ramos (407/737-6415, Fax: 407/737-6416, E-mail: melissa.ramos@leaktestingspec.com). Web site: leaktestingspec.com
Code Nos. 13850, 14000, 14300

LENOX INSTRUMENT CO., INC., 265 Andrews Rd., Trevose, 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, 4721 Emperor Blvd., Carlisle Place, Suite 150, Durham, NC 27703. Contact: Mary Beth Sprott (919/504-4600, E-mail: marybeth.sprott@lucideon.com). Web site: www.lucideon.com/nuclear
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, 55040, 55060*

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*

✦**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 Transporation Containments. Stamps N, N3, NA, NPT, NS, U, U2 and R. Audited and compliant to NQA-1. Certifications to ISO 9001:2015, AS9100(D), 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 7)

MANAFORT BROTHERS INC., 414 New Britain Ave., Plainville, CT 06062. Contact: Vince Mondo (860/793-6451, Fax: 860/747-5229, E-mail: vmondo@manafort.com). Web site: www.manafort.com
Code Nos. 13850, 20300, 20700

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

MATERIALS AND CHEMISTRY LABORATORY, INC., (MCLinc), 161 Mitchell Rd., Oak Ridge, TN 37830. Contact: Barry Stephenson (865/276-6910, Fax: 865/276-6915, E-mail: bstephenson@mcl-inc.com). Stamp Symbols: ISO/IEC 17025:2005 (DOECAP-AP) AIHA Accredited (IHLAP) Radioactive Materials License. Web site: www.mcl-inc.com
Code Nos. 20350, 40900, 84600

MAZUR INSTRUMENTS, 200 S. Wilcox St. #448, Castle Rock, CO 80104. Contact: Vince Mazur (303/325-7463, Fax: 303/496-6000, E-mail: vince.mazur@mazurinstruments.com). Web site: www.mazurinstruments.com
Code Nos. 17950

MEGA-TECH SERVICES, LLC, 11118 Manor View Dr., Mechanicsville, VA 23116. Contact: John Bowen (804/789-1577, Fax: 804/789-1578, E-mail: jbowen@mega-techservices.biz). Web site: www.mega-techservices.biz
Code Nos. 03800, 13050, 14000, 20300, 20350, 81710

MERRICK & COMPANY, 5970 Greenwood Plaza Blvd., Greenwood Village, CO 80111. Contact: Tony Wampler (719/322-6220, 800/544-1714, Fax: 303/751-2581, E-mail: tony.wampler@merrick.com). Stamp Symbols: ASME NQA-1. Web site: www.merrick.com
Code Nos. 20300, 30500, 36000, 39960, 68000, 72300, 75600

MET ONE INSTRUMENTS, INC., 1600 N.W. Washington 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

MILLER TRANSFER, P.O. Box 453, Rootstown, OH 44614. Contact: David Cochran (330/414-0288, 800/669-6877, E-mail: dcochran@millertransfer.com). Stamp Symbols: Hazmat Certification, SC&RA, CTPAT, PIP-PEN, ISO, FastExpress, Smartway, UIIA, TAT-Truckers Against Trafficking. Web site: www.millertransfer.com
Code Nos. 87000

MIRION TECHNOLOGIES (CANBERRA) INC., 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.mirion.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

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*

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, 14300, 26600, 27450, 36000, 37130, 37160, 83110, 83120, 84150, 95850*

✦**NAC INTERNATIONAL INC.,** 3930 E. Jones Bridge Rd., Suite 200, Peachtree Corners, GA 30092. Contact: George Vaughan (678/328-1222, 800/241-0507, Fax: 678/328-1422, E-mail: gvaughan@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 78)

NATIONAL ELECTRIC COIL, 800 King Ave., Columbus, OH 43212. Contact: Steve Jeney (614/488-1151, Fax: 614/488-8892, E-mail: sendinfo@national-electric-coil.com). Web site: www.national-electric-coil.com
Code Nos. 47400

NATIONAL INSPECTION & CONSULTANTS, 9911 Bavaria Rd., Fort Myers, FL 33913. Contact: Michael D. Vigne (239/939-4313, Fax: 239/334-8777, E-mail: michael.vigne@iss-na.com). Stamp Symbols: Certification by ISO 17025, ISO9001 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, 20700, 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; DABT. Web site: www.neptuneinc.org
Code Nos. 03800, 12800, 14000, 86300, 93040

NEW MILLENNIUM NUCLEAR TECHNOLOGIES INTERNATIONAL, 575 Union Blvd., #102, Lakewood, CO 80228. Contact: Sue Aggarwal (303/984-5788, E-mail: saggarwal@nmnuclear.com). Stamp Symbols: Certification by ISO 9001. Web site: www.nmnuclear.com
Code Nos. 13050, 20350, 25600, 26100, 93040

NEW YORK BLOWER COMPANY, 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. 03000, 19450*

NFT, 400 Corporate Cir., Unit M, Golden, CO 80401. Contact: Terry Wickland (303/384-9785, Fax: 303/384-9579, E-mail: twickland@nftinc.com). Web site: www.nftinc.com
Code Nos. 14300, 27450, 77800, 90100, 93040

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

NOVATECH, 220 Jefferson Ridge Pkwy., Lynchburg, VA 24501. Contact: Mitch Saville (434/239-1979, Fax: 434/239-6232, E-mail: mitch@novatechusa.com). Stamp Symbols: Certification by Professional Engineer - Virginia. Web site: www.novatechusa.com
Code Nos. 03800, 10780, 14000, 14300, 19700, 20300, 25400, 30500, 40900, 53950, 54750, 55490, 56600, 68000, 72300, 75190, 77600, 77750, 84150, 84600, 86130, 86300, 86500, 90100, 96200

NUCLEAR NEWS MAGAZINE, 555 N. Kensington Ave., La Grange Park, IL 60526. Contact: Rick Michal (708/579-8216, 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 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

NUCLEAR TECHNOLOGY SERVICES, INC., 635 Hembree Pkwy., Roswell, GA 30076. Contact: Dr. Hermon Rao (770/663-0711, Fax: 770/663-0547, E-mail: hermonrao2@aol.com). Web site: www.ntsincorg.com
Code Nos. 09800, 14000, 37130, 37200, 67380, 68950, 86300

NUCON INTERNATIONAL, INC., 7000 Huntley Rd., P.O. Box 29151, Columbus, OH 43229. Contact: Robert Sommer (614/846-5710 x125, 800/992-5192, Fax: 614/431-0858, E-mail: sales@nucon-int.com), Eric Banks (614/846-5710 x126, 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*

O'DONNELL CONSULTING ENGINEERS, INC., 2940 S. Park Rd., Bethel Park, PA 15102. Contact: Dr. William J. O'Donnell (412/835-5007, Fax: 412/835-5017, E-mail: wo@odonnellconsulting.com). Web site: www.odonnellconsulting.com
Code Nos. 03800, 14000, 40900

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 DECOMMISSIONING SERVICES, One Cabot Rd., Suite 220, Hudson, MA 01749. Contact: Fred Bailly (443/315-7724, E-mail: frederic.bailly@orano.group). Web site: https://www.orano.group/en/expertise/range-of-services/dismantling-of-nuclear-facilities
Code Nos. 20300, 68000, 87000, 93040

✦**ORANO FEDERAL SERVICES,** 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
(See advertisement on page 84)

ORANO TN, 7160 Riverwood Dr., Columbia, MD 21046. Contact: Roger Maggi (434/841-1859, E-mail: roger.maggi@orano.group). Web site: https://www.orano.group/en/expertise/range-of-services/transporting-and-storing-nuclear-material
Code Nos. 14300, 20300, 68000, 81680, 81710, 87000, 93040

ORTEC, 801 S. Illinois Ave., Oak Ridge, TN 37831. Contact: Lena Russell (865/483-2173, 800/251-9750, Fax: 865/483-0396, E-mail: lena.russell@ametek.com). Web site: www.ortec-online.com
Code Nos. 03200, 03800, 04000, 09750, 09800, 17950, 19700, 21270, 25000, 25250, 26080, 26230, 37130, 55040, 55060, 58000, 63400, 64750, 75850, 77800, 86300*

PACE NATIONAL CENTER FOR TESTING & INNOVATION, 12065 Lebanon Rd., Mt. Juliet, TN 37122. Contact: Ron Eidson (615/773-5922, 800/767-5859, E-mail: reidson@pacenational.com). Web site: www.pacenational.com
Code Nos. 67380, 93040

PACIFIC RADIATION, 2945 Stonehill Dr., Altadena, CA 91001. Contact: Dr. Dan Gollnick (626/798-8100, E-mail: dr_dan@pacificrad.com). Web site: www.pacificrad.com
Code Nos. 14000

✦ Denotes Advertiser

PACKAGING RESEARCH AND DESIGN, P.O. Box 149, Brandon, MS 39042. Contact: Damon Hawk (601/856-9791, 800/833-9364, Fax: 601/853-1202, E-mail: damon@packagingreaearch.com). Web site: packagingresearch.com
Code Nos. 14300

✦**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, 68000, 79360
(See advertisement on page 80)

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

PARAGON ENERGY SOLUTIONS, 7410 Pebble Dr., Fort Worth, TX 76118. Contact: John Portillo (817/239-1693, 800/448-4124, E-mail: jportillo@paragones.com). Stamp Symbols: 10CFR50 Appendix B, NQA-1, ASME III N, NS, NPT. Web site: www.paragones.com
Code Nos. 03000, 03800, 22200, 27450, 37600, 40050, 47400, 63400, 64700, 75190, 76400, 83150, 90250, 90600, 90800, 91000, 91260

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, 08800, 10780, 12800, 14000, 18590, 18600, 20350, 20700, 30500, 39650, 40900, 47400, 47600, 53950, 56600, 66280, 68000, 72300, 73620, 79360, 81710, 84150, 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

✦**PERMA-FIX ENVIRONMENTAL SERVICES, INC.,** 1093 Commerce Park Dr., Suite 300, Oak Ridge, TN 37830. Contact: George Taylor (865/342-7613, 800/905-0501, E-mail: gtaylor@perma-fix.com), Jessie McDonough (865/251-2078, 800/905-0501, Fax: 865/251-0355, E-mail: jmcdonough@perma-fix.com). Web site: www.perma-fix.com
Code Nos. 09750, 09800, 14000, 17950, 20300, 20350, 20700, 26080, 26100, 26230, 37130, 37200, 41000, 67380, 68000, 93040
(See advertisement on page 105)

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: Sally McQuaid (352/395-1352, Fax: 352/372-8963, E-mail: smcquaid@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 9001-2018; AS9100D; 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, 20300, 21270, 37200

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

✦**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 103)

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

✦**PREMIER TECHNOLOGY, INC.,** 1858 W. Bridge St., Blackfoot, ID 83221. Contact: Blaine Blackwell (208/785-2274, Fax: 208/782-9001, E-mail: bblackwell@ptius.net), Gery Robertson (208/785-2274, E-mail: grobertson@ptius.net). Stamp Symbols: ASME Section VIII, U, R, & S; ASME Section III, NA, NS, NPT; ASME NQA-1 Certificate. Web site: www.ptius.net
Code Nos. 14300, 36000, 45550, 47400, 53950, 68000, 77800, 81710, 83150, 92300, 93900, 95750
(See advertisement on page 31)

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*

RADEX, INC., 136 Meadow Ln., Winterville, GA 30683. Contact: Jim Kitchens (706/742-8954, E-mail: jlkitch@bellsouth.net).
Code Nos. 03200, 14000

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 SAFETY & CONTROL SERVICES, INC., 93 Ledge Rd., Seabrook, NH 03874. 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*

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, 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 93)

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

REMTECH INC., 333 Colony Blvd., #122, The Villages, FL 32162. Contact: Tom Schreiber (303/772-6825, E-mail: sales@remtechinc.com). Web site: www.remtechinc.com
Code Nos. 14000, 26080, 51730

RENUKE, 704 S. Illinois Ave., Suite C-202, Knoxville, TN 37830. Contact: Mark Kirshe (410/991-7628, E-mail: mark@renuke.com). Web site: renuke.com
Code Nos. 03800, 14000, 20300, 37200, 93040

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*

✦**ROBATEL TECHNOLOGIES, LLC,** 5115 Bernard Dr., Suite 304, Roanoke, VA 24018. Contact: Jared Bower (540/989-2878, 855/819-1874, E-mail: info@robateltech.com). Stamp Symbols: NQA-1, 10 CFR Part 71. Web site: www.robateltech.com
Code Nos. 14000, 14300, 20300, 36000, 47400, 47600, 55490, 68000, 72300, 77800, 81710, 83150
(See advertisement on page 81)

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

RSCC WIRE & CABLE LLC, 20 Bradley Park Rd., East Granby, CT 06026. Contact: Sarah Regan (860/653-8472, 800/327-7625, Fax: 860/653-8301, E-mail: sarah.regan@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

SCHNEIDER ELECTRIC GUTOR TECHNOLOGIES, 10900 Equity Dr., Houston, TX 77041. Contact: Michael May (865/230-3582, E-mail: michael.may@se.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., Trevose, PA 19053. Contact: 215/639-0900, 800/752-8558, Fax: 215/639-1597, E-mail: sales@s-k.com. Stamp Symbols: ASME BPVC 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

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*

SENIOR FLEXONICS PATHWAY, 2400 Longhorn Industrial Dr., New Braunfels, TX 78130. Contact: Eric Davis (830/629-8080, 800/847-5746, Fax: 830/629-6899, E-mail: edavis@sfpathway.com). Stamp Symbols: NPT, Classes 1, 2, 3, MC & TP. ASME U Stamp. ASME N #N-2978. Div. 1 Class 1,2,3 MC. Div. 3 Class TP, Repairs/Alterations. Certification Natl. Board R Stamp #4935. Web site: www.sfpathway.com
Code Nos. 19450, 56600, 75190

SENSOR NETWORKS, INC., 366 Walker Dr., Suite 200, State College, PA 16801. Contact: Jeff Drost (814/466-7207, Fax: 814/466-7209, E-mail: drost@sensornetworksinc.com). Web site: 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 9001:2015 certified. Web site: www.sentry-equip.com
Code Nos. 04000, 09800, 17650, 54750, 74150, 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*

SGS HERGUTH LABORATORIES, INC., 101 Corporate Pl., Vallejo, CA 94590. Contact: Linda Perry (707/554-4611, 800/645-5227, Fax: 707/554-0109, E-mail: linda.perry@sgs.com). Web site: www.sgs.com/herguth
Code Nos. 03800, 14000, 86300*

J. L. SHEPHERD & ASSOC., 1010 Arroyo Ave., San Fernando, CA 91340-1822. Contact: Mary Shepherd (818/898-2361, Fax: 818/361-8095, E-mail: sales@jlshepherd.com). Stamp Symbols: Certification by USNRC-QA Program-10CFR71, Subpart H, ANSI/ASME NQA-1. Web site: www.jlshepherd.com
Code Nos. 14000, 14300, 37130, 93040*

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), Jackie Broussard (619/275-5533, Fax: 619/275-5544, E-mail: jackie_broussard@sidus-solutions.com). Stamp Symbols: SDVOSB #: 222120 DVBE: 35907. Web site: www.sidus-solutions.com
Code Nos. 08800, 14000, 45550, 54750, 72300, 73300, 75850, 83600, 92800, 93040*

SKOLNIK INDUSTRIES, 4900 S. Kilbourn Ave., 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: hlsobelpe@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*

SOR INC., 14685 W. 105th St., Lenexa, KS 66215. Contact: Dianne Lopez (913/888-2630, 800/676-6794, Fax: 913/888-0767, E-mail: dlopez@sorinc.com). Stamp Symbols: NUPIC Audit Report. TSSA Canadian Classes 2, 3 and Category F. Registered to ISO 9001:2008. Web site: www.sorinc.com
Code Nos. 03200, 25000

✦ Denotes Advertiser

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, 10 CFR Part 50 App. B, 10 CFR 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

✦**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 70)

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*

✦**STRATEGIC PACKAGING SYSTEMS,** 276 Warren St., P.O. Box 1116, Madisonville, TN 37354. Contact: Rebekah Moreland (423/545-9505, 877/859-4262, Fax: 423/545-9525, E-mail: r.moreland@spsonline.biz). Web site: www.spsonline.biz
Code Nos. 14300, 64300, 68000
(See advertisement on page 9)

STUDSVIK, INC., 5605 Glenridge Dr. N.E., Suite 670, Atlanta, GA 30342. Contact: Bob Manseill (E-mail: bob.manseill@studsvik.com). Web site: https://www.studsvik.com/our-solutions/waste_mgmt_tech/
Code Nos. 12800, 13850, 14000, 14300, 20300, 53950, 87000, 93040

SULZER PUMPS (US) INC., 1255 Enclave Pkwy., Houston, TX 77077. Contact: Bo Fortner (346/207-9580, E-mail: newsales@sulzer.com). Web site: www.sulzer.com
Code Nos. 64700

SWAGELOK COMPANY, 29500 Solon Rd., Solon, OH 44139-2710. Contact: Please contact your local Swagleok Sales and Service Center (https://www.swagelok.com/en/locate-a-sales-service-center). Stamp Symbols: ASME NPT Certificate for Class 1, 2, and 3 parts, and as a Material Organization manufacturing and supplying material such as fittings. Web site: www.swagelok.com
Code Nos. 27450, 59800, 59850*

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. 92800*

TALISMAN DIV. OF ENERCON, 1100 N. Glebe Rd., Suite 1010, Arlington, VA 22203. Contact: Thomas Magette (202/471-4244, E-mail: tmagette@enercon.com). Web site: www.enercon.com
Code Nos. 03800, 14000, 14300, 75850, 86300

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*

TEIKOKU USA, INC., (Chempump Div.), 959 Mearns Rd., Warminster, PA 18974. Contact: Jim McDaniel (267/486-1010, Fax: 267/486-1037, E-mail: jmcdaniel@teikokupumps.com). Stamp Symbols: ASME N, NPT, Classes 1, 2, 3; CAN3-Z299-3. Web site: www.chempump.com
Code Nos. 64700, 64750*

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*

✦**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 99)

✦**3 BEARS TECHNICAL SERVICES, LLC,** 1961 Northpoint Blvd., Suite 250, Hixson, TN 37343. Contact: Richard Sain (865/806-1224, E-mail: rsain@3bears.me). Web site: www.3bears.me
Code Nos. 14000, 20300, 93040
(See advertisement on page 36)

TIOGA PIPE SUPPLY CO., INC., 2450 Wheatsheaf 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., 1215 E. 12th St., Streator, IL 61364. 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

TRILLIUM VALVES USA, 29 Old Right Rd., Ipswich, MA 01938-1119. Contact: Julia Henning (978/744-5690, Fax: 978/741-3626, E-mail: julia.henning@trilliumflow.com). Stamp Symbols: N, NPT, NV, ASME III, Class 1, 2, & 3; Certification by ISO 9001. Web site: www.trilliumflow.com
Code Nos. 84150, 90600, 90800, 91000, 91260, 91380*

TRI-STATE MOTOR TRANSIT CO., 17235 N. 75th Ave., Suite D175, Glendale, AZ 85308. Contact: Leslie Martin (417/621-2224, 800/234-8768, Fax: 417/621-2016, E-mail: leslie.martin@roadmastergroup.com). Web site: https://tristatesecured.com/
Code Nos. 86250, 86260, 87000

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

ULBRICH STAINLESS STEELS & SPECIAL METALS, INC., 153 Washington Ave., North Haven, CT 06473-1710. Contact: Chris Tobias (203/239-4481, 800/243-1676, Fax: 203/239-7479, E-mail: info@ulbrich.com). Web site: https://www.ulbrich.com
Code Nos. 03800, 13700, 37600, 77800, 84600, 95900*

✦**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*
(See advertisement on Cover 4)

UNDERWATER ENGINEERING SERVICES, INC., (Nuclear Services Div.), 3306 Enterprise Rd., Unit 103, Fort Pierce, FL 34982-8435. Contact: Robert Walcheski (772/337-3116, 877/348-3837, Fax: 772/337-0294, E-mail: rwalcheski@uesi.com), Al Rogers (772/337-3116, 877/348-3837, Fax: 772/337-0294, E-mail: arogers@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*

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

✦**UTICOM SYSTEMS INC.,** 109 Independence Way, Coatesville, PA 19320. Contact: Danielle Wentz (610/857-2655, 800/548-5321, Fax: 610/857-2986, E-mail: marketing@uticom.net). Stamp Symbols: IEEE-323; US RegGuide 1-38, ANSI N45-2. Certified incinerable. Web site: www.uticom.net
Code Nos. 37130, 83110, 83120*
(See advertisement on page 88)

VEOLIA NUCLEAR SOLUTIONS.INC, 1333 W. 120th Ave., Suite 313, Westminster, CO 80234. Contact: Marc Rood (E-mail: marc.rood@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

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

✦**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 87)

WARRINGTON, INC., P.O. Box 2267, Pflugerville, TX 78691-2267. Contact: Gary Stafford (512/251-7771, E-mail: support@warringtonusa.com). Web site: www.warringtonusa.com
Code Nos. 03800, 04000, 09800, 17950, 41000, 55040, 93040*

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

WESTERN SLING AND SUPPLY CO., P.O. Box 208, 5453 N. Peterson Rd., Sedalia, CO 80135. Contact: Bob Truitt (303/688-0978, 800/748-2651, Fax: 303/688-5905, E-mail: bob.truitt@westernsling.com). Web site: www.westernsling.com
Code Nos. 08800, 10850, 10900, 13400, 26600, 45550, 59850, 74350, 79370*

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.westinghousenuclear.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*

WHEELIFT TRANSPORTERS, 1801 E. Bremer, Waverly, IA 50677. Contact: Thomas Phillips (319/610-8761, E-mail: thomas.phillips@doerfer.com). Web site: www.wheelift.com
Code Nos. 09950, 10780, 12800, 13050, 14000, 14300, 68000, 73570, 87000

WMG, INC., 16 Bank St., Peekskill, NY 10566. Contact: Jeff Nelson (914/736-7100, Fax: 914/736-7170, E-mail: jnelson@wmginc.com), Mark Trager (914/736-7100, Fax: 914/736-7170, E-mail: mtrager@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: Jaclyn Russell (480/557-0263, Fax: 520/829-3550, E-mail: jaclyn@wmarizona.org). Web site: www.wmsym.org
Code Nos. 86300
(See advertisement on page 13)

✦**WOOD,** (Environment & Infrastructure Solutions), (Radiological Services & Engineering Group), 2275-A Logos Ct., Grand Junction, CO 81505. Contact: Jeffrey Lively (970/243-2861, E-mail: jeffrey.lively@woodplc.com). Web site: www.woodplc.com
Code Nos. 14000, 20300, 37200, 67380, 68000, 93040
(See advertisement on page 77)

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*

ZETEC, INC., 8226 Bracken Pl. S.E., Suite 100, Snoqualmie, WA 98065. Contact: Customer Service (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

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Non-U.S. Directory of Suppliers

Austria

INTERNATIONAL ATOMIC ENERGY AGENCY, Vienna International Centre, 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

VOESTALPINE BOHLER BLECHE GMBH & CO. KG, (Affl. of voestalpine High Performance Metals GmbH), Bohler-Gasse 1, 8680 Murzzuschlag, Austria. Contact: Ingo Siller (+43 3852 555 26252, Fax: +43 3852 3723, E-mail: ingo.siller@voestalpine.com). Stamp Symbols: EN 9100-2018 including ISO 9001-2015. Web site: www.voestalpine.com/bohler-bleche
Code Nos. 00400, 55490*

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

Canada

CANADIAN NUCLEAR LABORATORIES, 286 Plant Rd., Chalk River, Ontario K0J 1P0, Canada. Contact: Denys Elliot (613/584-3311 x45262, E-mail: denys.elliot@cnl.ca). Web site: www.cnl.ca/en/home/default.aspx
Code Nos. 03800, 09750, 14000, 17950

KINECTRICS INC., 800 Kipling Ave., Unit 2, Toronto, Ontario M8Z 5G5, Canada. Contact: 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

L3HARRIS, (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@L3Harris.com). Stamp Symbols: ISO 9001:2015, ISO 9001:2015, ISO 9001:2015, ISO 45001 2018, ISO/IEC 27001:2013, Tickit Plus, Cyber Essentials Plus. Web site: www.L3Harris.com/mapps
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MARSHIELD RADIATION SHIELDING, (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). Stamp Symbols: ISO9001:2015, CSA-N299.3:16. Web site: www.marshield.com
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NIAGARA ENERGY PRODUCTS, 4749 Buttrey St., Niagara Falls, Ontario L2E 7K7, Canada. Contact: Monika Virag (905/371-2500 x238, E-mail: mvirag@niagaraenergyproducts.com). Stamp Symbols: Certified Nuclear Manufacturing Company (TSSA-CSA N285.0); Certified Fusion Welding Company (CWB-CSA W47.1); Certified Quality Management System (CSA - Z299.2). Web site: www.niagaraenergyproducts.com
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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
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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
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2021 EDITORIAL TOPICS

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- Waste Management
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FALL
- Decontamination & Decommissioning
- Environmental Remediation
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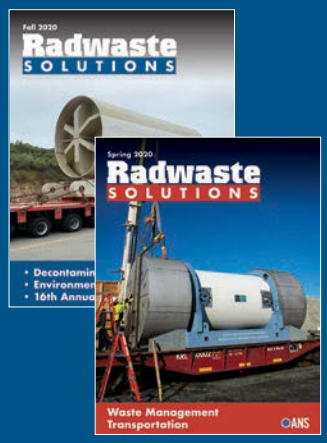

Moving Up

People in the news

Waste Management Symposia (WMS) has appointed **Susan Walter** as its new managing director. Walter is a veteran of the nuclear industry with more than 30 years' experience in environmental, waste management, and risk analysis disciplines. A scientist by education and experience, she is also the founder of a woman-owned small business. Walter has served as the deputy chair of WMS's Program Advisory Committee for the past two years. WMS, based in Phoenix, Ariz., hosts an annual international conference on the management of radioactive waste and related topics. Walter replaces **Bob Weiler**, who served as the interim WMS managing director since May.

Walter

EnergySolutions has brought **Jeff Richardson** on board as the company's chief operating officer. Richardson previously served as senior vice president of nuclear projects for Ontario Power Generation, where he was responsible for the company's $12.8-billion nuclear megaproject. He has more than 25 years of nuclear industry experience, having started with Entergy Operations and later moving into Entergy Nuclear, where he was responsible for developing and managing complex, multidiscipline projects. Richardson will be responsible for company-wide strategic initiatives and execution for both the D&D and Waste Management divisions. He will report directly to Kenneth Robuck, EnergySolutions president and chief executive officer, and will work out of the company's Charlotte, N.C., office.

Richardson

Joseph L. Brennan has been appointed chief financial officer of Fluor Corporation, following the retirement of **D. Michael Steuert**. Brennan has worked at Fluor since 1991 and has served as senior vice president/operations controller since June. Previous roles include segment controller of energy and chemicals from 2016 to 2020 and general manager of Fluor's Southern California operations from 2013 to 2016.

Brennan

ANS

American Nuclear Society members **Mark T. Peters**, **Kenneth W. Robuck**, and **Thomas R. White** were reelected to the Nuclear Energy Institute's board of directors during the organization's board meeting on May 20. Peters, ANS Fellow and member since 2007, is director of Idaho National Laboratory. He also serves as a senior advisor to the Department of Energy on nuclear energy technologies, research and development programs, and nuclear waste policy. Robuck, ANS member since 2006, is president and chief executive officer of EnergySolutions. White, ANS member since 2013, is chairman, president, and chief executive officer of Sargent & Lundy.

DOE

The Department of Energy recently named **Steve Binkley**, former deputy director for Science Programs, to the new position of principal deputy director in the Office of Science. **Harriet Kung**, formerly head of the office's Basic Energy Sciences program, has stepped into Binkley's previous role.

NRC

Robert J. Feitel was sworn in on May 28 by Nuclear Regulatory Commission Chairman Kristine Svinicki as the agency's new inspector general. Feitel replaces Hubert T. Bell, who retired in 2019. ■

Feitel

It's Business

Industry News

Business developments

NAC International announced on July 22 that it has signed a long-term cooperation and licensing agreement with **Deep Isolation**, a global nuclear waste storage and disposal market company based in Berkeley, Calif. The deal is to design, manufacture, and supply the canisters that will be used to safely store and/or dispose of nuclear waste in deep horizontal boreholes. NAC will engineer, license, and deliver the canisters and other equipment associated with the handling and transferring of high-level waste, spent nuclear fuel, and other nuclear waste from existing storage areas to a Deep Isolation repository. Deep Isolation has developed a solution that applies horizontal drilling technology to dispose of nuclear waste deep underground. The long-term agreement includes a significant in-kind commitment by NAC for its services and builds on the short-term memorandum of understanding the two companies signed last year.

NAC International also announced that, on July 24, it received certification for the OPTIMUS-L version of its OPTIMUS transport package system from the Canadian Nuclear Safety Commission (CNSC). The OPTIMUS-L package is designed for contact-handled transuranic waste, intermediate-level waste, low-enriched uranium fuel wastes, and other contents typically shipped as Type A(F) or Type B. NAC is also currently seeking CNSC certification for its OPTIMUS-H package, which is capable of shipping low-level waste such as remote-handled TRU waste, spent nuclear fuel, and other intermediate- and high-level waste. CNSC certification allows for the use of OPTIMUS to transport nuclear materials and waste in support of NAC customer projects in Canada.

Dallas-based **Jacobs** has been selected by **LLW Repository** (LLWR) to provide multidisciplinary technical services at the United Kingdom's national disposal facility for low-level radioactive waste as the sole service provider for the repository infrastructure framework. The new four-year framework, which was announced on July 1, covers a wide range of services to help LLWR manage the repository, in West Cumbria, on behalf of the U.K. government's Nuclear Decommissioning Authority. Jacobs's support includes developing strategies for appropriate storage solutions, control and electronic systems enhancement, and other technical services, all underpinned by core engineering design, construction, and program/project management capabilities.

Environmental Management

The Department of Energy's Office of Environmental Management (EM) on July 1 awarded a set of indefinite delivery/indefinite quantity contracts to provide nationwide deactivation, decommissioning, and removal (DD&R) services to help address excess facilities. The contracts will use firm fixed-price and cost reimbursement task orders to conduct DD&R of excess legacy facilities across the EM complex. This support will also be available to the National Nuclear Security Administration, the Office of Naval Reactors, and the Office of Science, as well as other DOE offices or other federal agencies that may request EM assistance in accomplishing their DD&R requirements. This multiple-award contract has a 10-year ordering period and a maximum ordering value of $3 billion.

The contracts were awarded to the following companies:

- **Aptim Federal Services** (Alexandria, Va.)
- **Atkins Nuclear Secured** (Oak Ridge, Tenn.)
- **BWXT Field Services** (Lynchburg, Va.)
- **D2R Services** (Aiken, S.C.)
- **Fluor Federal** (Greenville, S.C.)
- **Jacobs Technology** (Tullahoma, Tenn.)
- **Nationwide Remediation** Partners (Newport News, Va.)
- **Orano Federal Services** (Charlotte, N.C.)
- **Westinghouse Government Services** (Hopkins, S.C.)

Oak Ridge, Tenn.–based **Navarro Research** and Engineering was awarded a $350-million contract for the cleanup of the Nevada National Security Site, the Department of Energy announced on June 17. The new 10-year environmental program services contract replaces the current NNSS cleanup contract, also held by Navarro Research and Engineering, which expired on July 31. In awarding the contract, the DOE's Office of Environmental Management (EM) used the department's new end-state contracting model, which the DOE said will reduce risk and environmental liability by giving EM the flexibility to task its contractors using a risk-based approach to better define discrete scopes of work for site closure or end states. Navarro is a small, woman-owned contractor, and the contract was awarded under a small business set-aside competition.

Cleanup services to be provided under the indefinite delivery/indefinite quantity contract will include, but are not limited to, groundwater characterization and monitoring, radioactive waste acceptance program management, soils and industrial sites close-out/post-closure monitoring, decontamination and demolition, and program management support. The services will be provided at NNSS, as well as the Nevada Test and Training Range and the Tonopah Test Range. ■

Calendar

Meetings of Interest

September

Sept. 9–11—**2020 RadWaste Summit**, Virtual meeting. -radwastesummit.com

Sept. 16—**National Cleanup Workshop**, Virtual meeting. cleanupworkshop.com

Sept. 22–23—**Decommissioning Strategy Forum**, Virtual meeting. decommissioningstrategy.com

October

Oct. 4–8—**Women in Nuclear Global Conference**, Niagara Falls, Ontario, Canada. win-global.org/activities/annual

Oct. 13–15—**ETEBA Business Opportunities & Technical Conference**, Virtual meeting. eteba.org/botc

Oct. 19–23—**International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry**, Vienna, Austria. iaea.org/events

Oct. 26–30—**NuMat 2020: The Nuclear Materials Conference**, Ghent, Belgium. elsevier.com/events/conferences/the-nuclear-materials-conference

November

Nov. 9–13—**International Conference on Radiation Safety: Improving Radiation Protection in Practice**, Vienna, Austria. iaea.org/events/international-conference-on-radiation-safety-2020

Nov 15–19—**2020 ANS Virtual Winter Meeting**, Virtual meeting. answinter.org

Nov. 24–26—**9th International Conference on Nuclear Decommissioning (ICOND 2020)**, Aachen, Germany. icond.de/welcome.html

January

Jan. 18–22—**15th International Congress of the International Radiation Protection Association (IRPA15)**, Seoul, South Korea. irpa2020.org/

Jan. 28–30—**11th International Conference on Future Environment and Energy (ICFEE 2021)**, Tokyo, Japan. icfee.org/

February

Feb. 8–11—**Conference on Nuclear Training and Education: A Biennial International Forum (CONTE 2021)**, Amelia Island, Fla., ans.org/meetings/view-331/

March

Mar. 7–11—**WM Symposia 2021**, Phoenix, Ariz. wmsym.org/

Mar. 16–18—**The Society for Radiological Protection Annual Conference**, Bournemouth, UK. srp-uk.org/events/2020AnnualConference

Mar. 17–19—**15th International Symposium "Conditioning of Radioactive Operational & Decommissioning Wastes" (KONTEC 2021)**, Dresden, Germany. kontec-symposium.com/

Mar. 21–26—**12th International Conference on Methods and Applications of Radioanalytical Chemistry (MARC XII)**, Kailua-Kona, Hawaii. marcconference.org/

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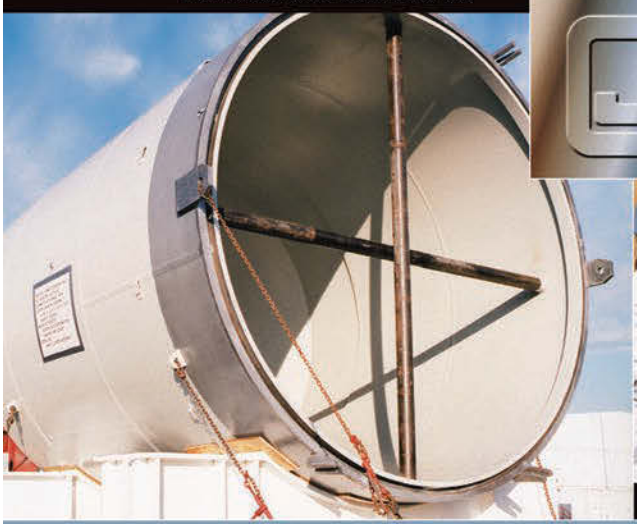

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