

The Positive Impacts of American Reinvestment and Recovery Act (ARRA) Funding to the Waste Management Program on Hanford's Plateau Remediation Project

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788



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ABSTRACT

In April 2009, the Department of Energy (DOE) Richland Operations Office (RL) was allocated \$1.6 billion (B) in ARRA funding to be applied to cleanup projects at the Hanford Site. DOE-RL selected projects to receive ARRA funding based on three criteria: creating/saving jobs, reducing the footprint of the Hanford Site, and reducing life-cycle costs for cleanup. They further selected projects that were currently covered under regulatory documents and existing prime contracts, which allowed work to proceed quickly. CH2M HILL Plateau Remediation Company (CHPRC) is a prime contractor to the DOE focused on the environmental cleanup of the DOE Hanford Site Central Plateau. CHPRC was slated to receive \$1.36B in ARRA funding. As of January, 2010, CHPRC has awarded over \$200 million (M) in subcontracts (64% to small businesses), created more than 1,100 jobs, and touched more than 2,300 lives – all in support of long-term objectives for remediation of the Central Plateau, on or ahead of schedule. ARRA funding is being used to accelerate and augment cleanup activities already underway under the baseline Plateau Remediation Contract (PRC). This paper details challenges and accomplishments using ARRA funding to meet DOE-RL objectives of creating/saving jobs, expediting cleanup, and reducing lifecycle costs for cleanup during the first months of implementation.

INTRODUCTION

The PRC scope of work is large. Specifically, the CHPRC Waste and Fuels Management Project (W&FMP) must support all projects on the Hanford Site to complete the treatment and disposal of legacy and newly generated waste streams; transuranic (TRU) waste disposition; groundwater cleanup; the management of used nuclear fuels; the disposition of nuclear materials; the packaging and transport of debris from non-reactor nuclear facility decommissioning and demolition; treatment, storage, and disposal facility operations and maintenance; and environmental remediation activities funded through DOE's Office of Environmental Management (EM). CHPRC has teamed with and is mentoring several small businesses on the PRC, with major support in the W&FMP being provided by such companies as:

- Materials and Energy Corporation (a subsidiary of Perma-Fix Environmental Services, Incorporated) for waste support services and nuclear facility operations
- Cavanagh Services Group for waste transportation, logistics, and shipping
- EnRep for training and procedure development support

This mentoring relationship has been vital to the success of these businesses with the challenges that ARRA implementation brings.

Under the entire PRC scope, CHPRC manages more than 800 facilities and 1,400 waste sites across the 586-square-mile Hanford Site. The baseline scope of this \$4.5B, 10-year PRC contract includes:

- 100K Area remediation (2 reactor complexes, 35m³ of highly radioactive material, 89 facilities to demolish, 109 waste sites)
- Plutonium Finishing Plant (PFP) closure (46 facilities to demolish, 232 glove boxes, special nuclear material and fuel)
- Groundwater/vadose zone remediation (12 plumes with 10 major contaminants encompassing approximately 100 square miles)
- Facility, waste site, and canyon remediation (more than 800 facilities and over 1,400 waste sites)
- The treatment and disposal of more than 15,000 legacy containers of radioactive waste, retrieval of 5,400m³ of TRU waste, treatment of more than 490M liters of liquid waste annually, management of 2,300 metric tons of used fuel, and interim storage of 1,936 cesium and strontium capsules
- Placing the Fast Flux Test Facility into minimum surveillance and maintenance condition (Cold and Dark)

Based largely on the number of “shovel-ready” projects on the PRC and successes accelerating the baseline schedule during the first half of FY09, CHPRC received Recovery Act funding in the amount of \$1.36B. Projects that had been unfunded or delayed or projects that were awaiting funding were reviewed with the DOE to determine 1) appropriate funding allocations, and 2) the impact on DOE-stated objectives and the overarching long-term goal to reduce the Hanford Central Plateau footprint to approximately 10 square miles by 2015. This review resulted in the development of specific priorities under ARRA, which include:

- Incorporating 2,000+ new employees into the PRC workforce (300+ in W&FMP)
- Shrinking the footprint on the Plateau
- Reducing risks and mortgage costs
- Managing waste disposition in real time
- Spending wisely, getting results, and providing defensible metrics that prove progress

ARRA funding is being used to train and field additional waste management personnel to expedite waste retrieval and legacy waste disposition, accelerate facility decontamination and decommissioning (D&D) schedules, and expand both on-site and off-site waste treatment capabilities to accomplish overall cleanup and reduce lifecycle costs on the Hanford Central Plateau. Figure 1 highlights the distribution of ARRA funding to accomplish these goals.

To ensure our ability to implement ARRA activities, DOE-RL and CHPRC held several pre-planning sessions. For example, plans to

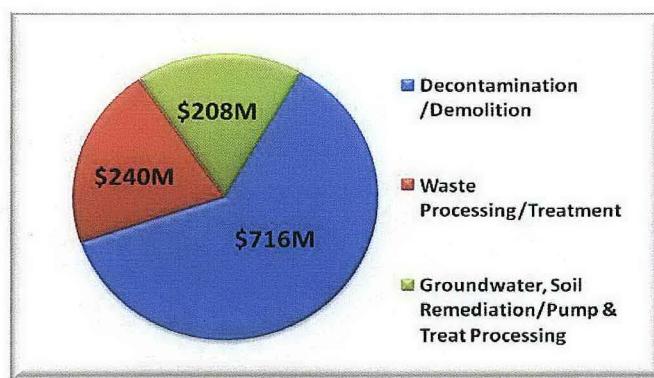


Figure 1. \$1.36B - ARRA Funding Allocations at the PRC

increase on-site and off-site treatment and disposal capacities were viewed as key to supporting increased waste volumes resulting from ARRA work. These plans included:

- Adding two more TRU repackaging process lines and qualified crews at T Plant to triple throughput at the facility. These process lines became fully operational November 31, 2009.
- Adding an access ramp at the on-site Environmental Restoration Disposal Facility (ERDF) dedicated to ARRA projects. This ramp began accepting ARRA waste shipments October 1, 2009.
- Discussing with a nearby, off-site commercial treatment provider (Perma-Fix Northwest [PFNW]) increased waste quantities, higher activity wastes, and a broader range of constituents. PFNW amended their Resource Conservation and Recovery Act (RCRA) permit, applied for and received approval of a license to treat Toxic Substance Control Act (TSCA) wastes in July 2009, and is working to increase radioactive materials license limits to treat higher activity wastes.

These early planning sessions were vital to our ability to implement ARRA work in a timely, effective, and safe manner.

MEETING THE CHALLENGES OF ARRA IMPLEMENTATION

Managing the Workforce

The ARRA-funded scope presented numerous challenges, chief among them being the recruiting and training of the workforce required to complete the ARRA scope. More than 2,000 new-hires were required project wide, over 300 in the W&FMP workforce. Along with obtaining resources came ensuring the infrastructure was in place to accommodate new employees to allow safe and compliant accomplishment of work; as well as fielding skilled labor such as Nuclear Chemical Operators, D&D workers, Waste Management representatives, Radiological Control Technicians (RCTs), Certified Shippers, and waste management, operations, and transportation personnel.

This was a human-capital-intensive effort, and competition for resources across the Hanford Site and throughout the DOE complex created a “seller’s” market for nuclear industry employees. With each major Hanford contractor conducting massive local recruiting efforts, the local population of skilled, experienced workers was quickly absorbed into the Hanford workforce. In addition, there were numerous movements of personnel among prime contractors as it became evident that certain skills were in high demand and the scopes of work required adjustments of skill sets among contractors. For example, on the PRC the availability of a sufficient number of qualified RCTs to support D&D field work teams remains an issue that requires careful management until newly hired RCTs are fully trained and in the field in March 2010.

As the local population of experienced workers dwindled, nationwide searches were intensified. Hanford’s remote location, intense hiring activities at other DOE sites, and the nation-wide general economic downturn made it increasingly difficult to attract skilled workers to the Site. For example, skilled workers at Savannah River, Oak Ridge, or other DOE sites were largely able to find employment at those sites as they began hiring for ARRA work. Those who were willing to relocate experienced difficulty selling homes, were put off by cost-of-living differentials, or were unwilling to relocate to Hanford. This has proven especially true for potential new hires from the eastern United States. Those who were willing and able to relocate often made unreasonable salary demands with the knowledge that an industry-wide shortage

drove value. Concurrently, numerous commercial nuclear power plants were in outages at the height of ARRA hiring activities, which further reduced the availability of skilled workers in the field.

CHPRC, in concert with other Hanford contractors, held several “job fairs” and received over 13,600 applications to support the execution of Recovery Act work scope. From this population, CHPRC and its sub-contractors have hired more than 2,000 personnel. A large portion of them are young and inexperienced. This influx of personnel, who were often unfamiliar with nuclear facility operations or conduct of operations at DOE facilities, drove an intense review of training requirements, resources, and methods to ensure safe and compliant operations during this time of the rapid growth. To heighten safety awareness, several new programs were implemented to supplement existing safety programs and ensure that all employees maintain the highest level of safety awareness and focus. For example, CHPRC launched a new employee-owned “no name, no blame” safety-observation program called Workers Observing Workers (WOW). The program was developed by employees at all organizational levels and includes intensified training and communications that drives safety throughout the PRC. This high level of worker involvement has been instrumental in increasing safety and productivity.

In addition, CHPRC worked with the training provider to develop a comprehensive safety and field work training program for the new workforce that included general training, facility-specific training (including mockups as shown in Figure 2), on-the-job training, hands-on mentoring processes, and gradual, focused integration with the workforce. Training schedules were examined and modified to provide block sessions for various disciplines and ensure critical skills were available to support both Recovery Act and ongoing projects. These training sessions were aimed first and foremost at indoctrinating our safety culture into all work activities. Skills targeted to receive block training included those for RCTs, Nuclear Chemical Operators (NCOs), Shippers, Waste Management representatives, and D&D workers. This process, while straining the available resources for implementation, provided a concentrated return on investment when the new workers were ready to deploy to job-specific activities and training in the field in only two short months. Once on Site, the new workers were further integrated into work teams comprising both experienced and new workers. The experienced workers became the mentors and day-to-day teachers of the new people providing the most valuable commodity – experience. This process provided qualified and certified workers on task in as little as three months. Under normal processes NCO training and qualification can take as long as one year.

The effort to accommodate new workers at the Hanford Site required rapid expansion of the Site infrastructure. The PRC Engineering, Procurement, and Construction, Safety, and Security teams worked with local transportation departments and subcontractors to bring approximately 140 facilities to the Plateau. Mobile offices, conference rooms, restrooms, and construction offices began appearing on Site in July, 2009. They first appeared at the PFP, where Recovery Act funding supports accelerated efforts to prepare for final demolition by the end of FY13. The heightened activity brought new challenges, as the newly transitioned Mission Support



Figure 2. T Plant is currently running two mockup repackaging lines for training, allowing workers to gain practical experience in a controlled environment.

Contractor, Mission Support Alliance (MSA), was called upon to provide computers, office furniture, phones, and other articles to support the influx of new employees site-wide. Coordinating these efforts internally, with other Site contractors, and with the MSA tested Site capabilities; yet by October 1, 2009, the facilities were in place to house new PRC employees. Additional efforts were also taken to obtain a more stable and reliable supply of RCTs by applying a new concept, “if you pass, you play.” Obtaining RCTs who could handle the technically demanding workload was becoming too much of a burden to existing resources; as many people could interview well, but could not handle the intense technical-based training. Early results showed losses of nearly 20% of the student population. CHPRC Radiological Program and Operations management developed a process in which announcements were made for needed RCT positions; but in order to enter into the interview process, candidates had to declare readiness to sit for the DOE Radiological Control base qualification test, sit for a proctored exam, and pass the exam with an 80% minimum score to be considered for employment. The applicants received all the necessary information to prepare for the exam. Results have been very encouraging. Three waves of personnel have been hired for RCT positions and the fall-out rate for the qualification and certification process is now negligible. Each core exam group has included well over 100 people, with final hiring of around 30 to 40 people per group. The last group was 120 people tested, with 42 hired as of December 28, 2009.

Initiating ARRA Work

As with any ramp-up effort of this magnitude, there was a time lag between initiating Recovery Act work and fielding additional, fully trained Recovery Act workers. This placed a significant burden on existing workers, as they were tasked with increased workloads due to ARRA work scope and with mentoring new employees as they were fielded. The increased workload drove intense reviews of safety instructions, work packages, and procedures; as well as employee programs to mitigate increased job stresses. In spite of this additional burden on PRC resources, all ARRA FY09 milestones were completed either on or ahead of schedule. Milestone accomplishments included:

- Contracting the construction of groundwater extraction wells to support groundwater cleanup – As of October 1, 2009, the drilling program had 230 wells under contract. Once completed they will support the monitoring, extraction, and remediation of groundwater at numerous sites on the Plateau.
- Initiating the decommissioning of the PFP – As of December 18, 2009, 22 additional glove boxes and hoods had been removed from the facility, as a part of activities aimed at accelerated demolition of the facility by the close of FY13.
- Characterizing and initiating remediation of the 13.7-square-mile BC Control Area – A Bell 412 helicopter, known as Rad Copter 1, completed an aerial radiological survey of ground contamination in the BC Control Area and West Lake on September 29, 2009. Detectors and electronics on the aircraft recorded the type and location of contamination to focus cleanup efforts on several areas of shallow soil contamination. The surveys were required before cleanup of the contaminated soil began in October.
- Demolishing tanks and decommissioning ancillary facilities at U Canyon Facility – Using Recovery Act funding, workers finished demolishing 15 above-ground tanks at the 211-U and 211-UA tank farms and disposed of them at ERDF. The work was completed by the end of July.

- Completing the demolition of former fuel storage areas N, P, and R in the Outer Zones – Workers met interim ARRA milestones that included the demolition of above- and below-ground structures at N, P, and R Areas and the Outer Zones, allowing accelerated removal of facilities in these areas.
- Completing the characterization of waste sites at 200 North Area of Central Plateau – Activities included characterizing contaminated soil from nine waste sites in preparation for remediation and ultimate disposal at ERDF.
- Initiating remediation of K Area waste sites – On September 9, 2009 workers finished demolition of the K East Basin, meeting an important milestone in the regulatory agreement governing Hanford cleanup. Removing the facility has allowed workers to access and begin remediation of the soil underneath the basin that had been contaminated by leaks of water from the basin.

In general, FY09 accomplishments and the newly qualified ARRA staff prepare the way for accelerated cleanup activities to be completed in whole or in part using ARRA funding. Specific activities include:

- Complete D&D of 50 facilities; including nuclear, radiological, and industrial facilities totaling 297,344ft²
- De-inventory 860,906ft² of facilities (cleared of waste or material inventory)
- Reduce the Hanford Site footprint by 20,973 acres
- Install 344 groundwater wells/boreholes
- Remediate 64 waste sites
- Treat 1,900m³ of mixed low-level waste
- Decommission 350 groundwater wells/boreholes
- Process 2,000m³ of contact-handled TRU waste
- Prepare PFP for D&D (Remove 174 glove boxes, 650m³ of low level waste and 405m³ of TRU waste)
- Prepare U Plant Canyon for demolition

Enhancing Safety and Supporting Accelerated Cleanup through Waste Management Innovation

As D&D and other cleanup activities are accelerated, waste volumes correspondingly increase. Early in the planning for ARRA work scopes, it was recognized that projected waste volumes for disposal at ERDF would easily outstrip capacity. Annual volume projections under normal activities on Site would average nearly 750,000 tons of contaminated soil and debris from restoration work. Early projections based on the ARRA-proposed scopes would increase that volume by nearly 150%. Clearly, new approaches would be needed to address these volumes and allow the newly hired workers to achieve the goals outlined in the ARRA plans for the PRC. Several measures are underway to provide efficient tools for managing these wastes safely and efficiently. These measures have application across the DOE complex and include:

- Glove Box Decontamination Processes – Effective application of glove box decontamination techniques has enabled us to reclassify all glove boxes removed from the PFP to date as LLW. Specific processes such as chemical wiping using proprietary

RADPRO® decontamination agents, in combination with standard mechanical methods, minimize the need for size reduction and the generation of TRU waste. Current rates of success have eliminated any TRU glove boxes, thus far; while allowing decommissioning to accelerate in this area, with nearly 45 glove boxes completed to date, verses the planned 22 under the original baseline. As the glove boxes are reclassified as LLW, the need for size reduction either to segregate residual TRU hot spots or to package the entire glove box in a standard waste box for disposal at the Waste Isolation Pilot Plant (WIPP) is eliminated. Entire glove boxes are packaged and transported using modified IP-II container designs (side-load, end-load, and top-load designs). Glove boxes are removed in whole, loaded, braced, and transported directly to the disposal facility for stabilization in the trench. No further processing or need for storage of the waste is required; and all costs, risks, and inherent inefficiencies associated with the traditional cut, load, and hold for future processing are avoided.

- Point-of-Generation Waste Management: “Handle once” – This philosophy stipulates that at the point of generation, waste will be packaged, classified, and characterized in full compliance with its disposition pathway (i.e., treatment or disposal). This has proven effective in minimizing multiple handling of wastes on larger scales to enhance safety, compliance, and efficiency and ensure a consistent approach to waste management while facilitating communications between generators, treatment providers, and disposal facilities. One example of its application is in the BC Control Area where field characterization (using Rad Copter 1, mentioned above) and sampling were conducted that allowed us to pre-plan packaging, transport, and disposal. No interim steps are necessary and waste management and transportation personnel have been able to develop a standardized approach to waste profiling, confirmation, packaging, and final disposal before any waste has been generated. In short, it makes the project a dig, load, and dump operation. No waste stockpiling is required awaiting characterization or confirmation. This approach has been implemented across the PRC for the many waste sites now under remediation. Projections are that the BC control area will be completed in around eighteen months, versus the original thirty-six month plan; and we can now dig every day that weather permits. Soil stabilization costs are minimized and expensive equipment and crews remain productive on actual remediation. This same process is being used for building demolition activities, though added diligence is required up front to clearly understand all the potential waste constituents. The goal is to remove and package all extraneous wastes (asbestos, polychlorinated biphenyls [PCBs], and anti-freeze, for example) in advance and send them directly to treatment. Once this is completed, the building is a shell that can be approached as simply as a soil remediation site. Standard approaches for packaging and transport, coupled with standardized profiling and characterization, create a simple approach for demolition crews that is more efficient and safer. If it fits in this package, you are OK. No extra work required.

- Enhanced Tools for Waste Management – Several enhancements are being implemented to provide efficient tools for managing increased volumes of wastes from accelerated cleanup on the Plateau. These include bigger, faster waste transportation tools such as very large containers to transport remote-handled large equipment items; the use of “super dump” trucks (see Figure 3) that allow increased volumes and efficiencies for on-site disposal; and increased rail shipments to off-site facilities using modified “beer can” express and “Super A” transport packages. The “super dump” is used as the

work horse in efforts to accelerate waste site remediation under ARRA. Typically, roll-on/roll-off cans are used to transport soil remediation site wastes to disposal. While very effective and able to handle sizeable loads, the can requires a great deal of handling. The typical process from the disposal facility staging queue, to the remediation site staging queue, for load out, then transport preparation, and return to the disposal facility can involve as many as eight individual handling activities. The “super dump” works extremely well on such sites in that most of the activities can be completed as a direct-haul function. That is, drive, load, cover, drive, and dump at the disposal facility. Coupled with the aforementioned site characterization improvements and the handle-once philosophy, the “super dump” is a far more efficient tool for moving soils than the typical can, in that more loads can be moved per day with less equipment and fewer personnel. The “super dump” also has a 20% better payload capacity than the standard 20-yard can. In combination with the added ARRA-dedicated access ramp at ERDF, these packaging and transportation tools ensure that the large volumes of waste generated under ARRA activities are dispositioned in a timely and efficient manner.

- Commercial Processing – In order to accelerate both legacy and retrieved TRU waste treatment and disposition under ARRA we investigated options for expanding off-site commercial treatment capabilities. CHPRC worked with off-site TSD personnel at PFNW to obtain approval of modifications to their Resource Conservation and Recovery Act (RCRA) permit and a new Toxic Substance Control Act (TSCA) permit to allow treatment of some of the more difficult-to-treat wastes; such as PCBs, oils, and other wastes resident in our legacy waste streams. Additional permit and license modifications that provide increased capacities are underway. Hanford is fortunate to have the large, fully operational PFNW commercial facility virtually co-located with the Site. With ready highway and rail access, it is estimated that cost avoidance to the government of nearly 50% can be achieved, with waste processing being accomplished more quickly. It also eliminates the need for large and costly on-site facilities to manage these wastes. As commercial capabilities expand to accept rail shipments and very large equipment items, we are able to quickly disposition these items without substantial on-site storage, monitoring, or processing. This allows the direct packaging (in modified or custom designed type A packages) of large waste components for direct transfer to treatment



Figure 3. The “super dump” truck is an effective tool for transporting large volumes of waste from ARRA remediation activities to disposal.

facilities and avoids risks and costs of transferring the waste to on-site storage facilities requiring legacy waste management for many years to come. First-time shipments of very large equipment items in specifically designed waste packages from the Plateau were accomplished in FY09 to demonstrate efficacy. Another 230m³ are planned in FY10.

SUMMARY

Successes executing ARRA scope on the PRC can be directly attributed to several factors:

- Up-front planning well in advance of funding releases allowed the DOE and CHPRC to clearly plan and commence execution of an approach that is achievable and sustainable. Clear priority definitions by DOE-RL to support its 2015 vision were invaluable to setting the plan for the vision to be achieved. Close coordination and communication between each party allowed for timely development of the required proposal documents to meet expectations, as well as timely release of funding to commence activities as early as possible. In addition, a clear advantage was gained in that early, real, and demonstrable progress has been achieved with the ability to sustain the momentum.
- A commitment between the DOE-RL and its prime contractors to setting and accomplishing ambitious goals cannot be understated. A clear recognition early on that this opportunity was good for the Hanford Site and the community was appropriately tempered by a realization that we all needed to understand that expectations were, and will remain, high for demonstrable progress. This commitment was also embraced by regulatory, community, and Tribal leadership in Washington to advance clean-up efforts and to set a standard for performance under the ARRA.
- Continual and open communications between all affected organizations and employees and a dedicated commitment to our most important resource for success – people – cannot be overlooked. By setting the stage early for personnel recruiting, training, and deployment, ARRA work scopes were commenced quickly and effectively. Further, by using the experience and training of the current workforce to mentor and guide new employees, the work has begun without safety issues or non-compliances, and remains intensely focused on not allowing new workers to place themselves into situations that could lead to significant issues.
- The PRC workforce and their dedication to cleaning up the Hanford Plateau coupled with the willingness to introduce and incorporate new approaches at the Site to make clean up more effective, safer, and efficient has already paid large dividends in demonstrable progress. Use of tools, like “super dumps,” has sped up remediation work while reducing the risk for workers and the environment through simply less handling of wastes. A commitment to point-of-generation waste management again leads to efficiency while reducing risk to workers and the environment through multiple handling evolutions.

While it is early in the PRC under ARRA funding, a continued emphasis on the foundations laid for this challenge of planning, communication, people, and innovation, will sustain progress and ensure a successful implementation of the DOE’s 2015 vision for the Hanford Site