Impact of Recovery Act Funding on Waste Disposal Operations at the Nevada National Security Site - 11120

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ABSTRACT

The U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Site Office Environmental Management Program is responsible for the disposal of onsite- and offsite-generated low-level radioactive waste and mixed low-level radioactive waste for the DOE at the Nevada National Security Site (NNSS), formerly the Nevada Test Site (NTS). Core elements of this mission are ensuring that disposal is performed in a manner that is safe and cost-effective while protecting workers, the public, and the environment.

Without efficient disposal capabilities for the large volumes of waste generated from the *American Recovery and Reinvestment Act* (ARRA) projects across the DOE complex, completion of these projects in a timely manner would not be achievable. The NNSS was called upon to support the increased volumes destined for disposal and, to date, has been successful in supporting the complex without any delays or cost increases involving disposal.

This paper will focus on the impact of ARRA funding to radioactive disposal operations at the NNSS. Topics to be covered include the following:

- Increase in shipments, volumes, and waste packages handled
- Impacts to disposal cell capacities
- Construction and implementation of a trailer staging area for transporters/generators for specific waste streams
- Implementation of a streamlined process for the acceptance and disposal of onsite-generated wastes
- Working with waste generators to level load shipments for receipt at the NNSS waste disposal facilities
- Increased receipt of cask/remote handled wastes
- Impacts due to acceptance of different waste packaging types from generators

INTRODUCTION

The U.S. Department of Energy (DOE), National Nuclear Security Administration Nevada Site Office (NNSA/NSO) directs the management and operation of the Nevada National Security Site (NNSS), which is located in Nye County in south-central Nevada (Fig. 1). The base camp for the NNSS is Mercury, Nevada, which is located approximately 105 kilometers (km) northwest of Las Vegas, Nevada. The

NNSS encompasses approximately 3,561 square kilometers (km^2). It is bordered on the southwest corner by the Yucca Mountain Project Area, on the west and north by the Nevada Test and Training Range (NTTR), on the east by an area used by both the NTTR and the Desert National Wildlife Range, and on the south by Bureau of Land Management lands. The combination of the NTTR and the NNSS represents one of the largest unpopulated and restricted access areas in the United States, comprising some 14,200 km^2.

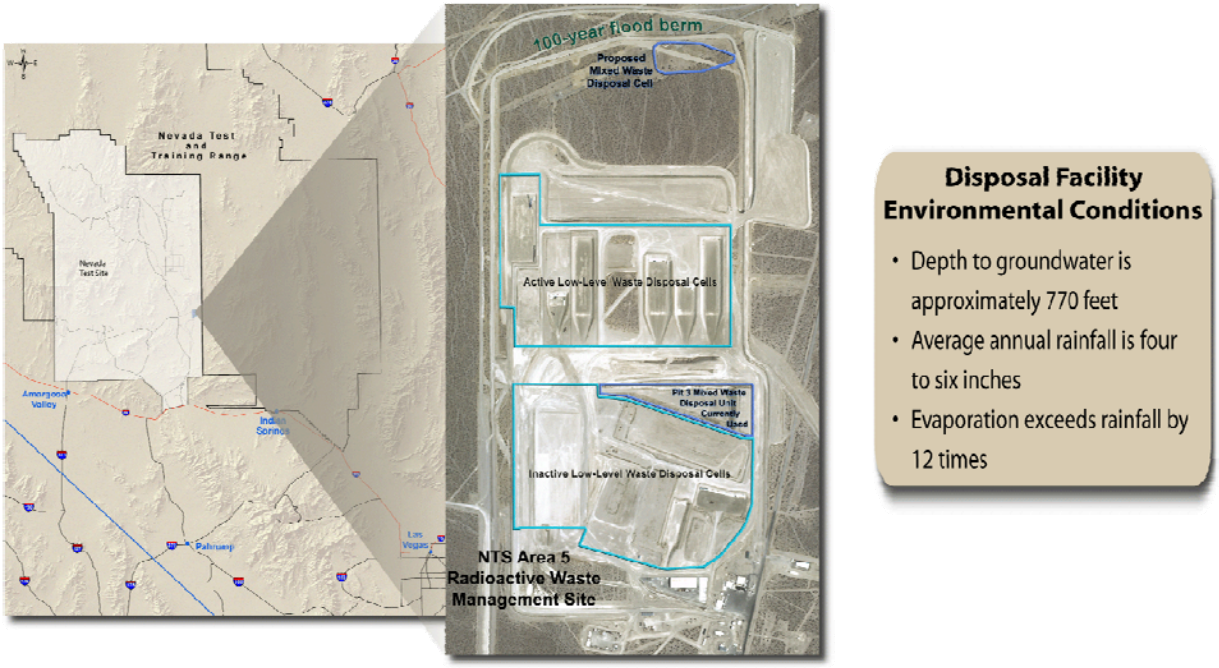

Fig. 1. NNSS and Area 5 Radioactive Waste Management Site location relative to Southern Nevada.

Among the major responsibilities of NNSA/NSO are the continued stewardship of the nation's nuclear weapons stockpile and the maintenance of a testing capability. Historically, the primary mission of the NNSS (formerly the Nevada Test Site) was to conduct nuclear weapons tests. Since the current moratorium on full-scale nuclear testing began in October 1992, this mission changed to maintaining a readiness to resume full-scale tests, if so directed in the future, and to support vital national security programs. Because of its favorable environment and infrastructure, NNSS also supports DOE environmental management [EM] (environmental restoration [ER], waste management, and environmental compliance); national security response (e.g., emergency response to weapons of mass destruction); and defense and civil technologies (e.g., conventional explosives testing, characterization of hazardous material spills, and emergency response training).

LOW-LEVEL AND MIXED LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT

The NNSS is a designated regional disposal facility for low-level (LLW) and mixed low-level (MLLW) radioactive waste for the DOE complex. The NNSS currently accepts waste from 24 generators with approved programs that certify waste to the NNSS Waste Acceptance Criteria [1]. These generators include DOE sites (EM, NNSA, Science, and Nuclear Energy Programs) as well as the Aberdeen Proving Ground (representing U.S. Department of Defense locations) and commercial firms (Nuclear Fuel Services, Perma-Fix, Duratek/EnergySolutions, Boeing, and General Atomics). The NNSA/NSO provides a comprehensive waste acceptance review and oversight function through the Radioactive Waste Acceptance Program (RWAP), and waste generator technical assistance support for both new and current generators. The NNSS Management & Operating Contractor, National Security Technologies, LLC

(NSTec), also has a Waste Generator Services organization that provides waste characterization and certification support to both onsite NNSS generators and to offsite locations.

The Area 5 Radioactive Waste Management Site (RWMS) is located approximately 19 km north of Mercury, Nevada, and covers 300 hectares. Historical disposal at the Area 5 RWMS has occurred in a 37-hectare portion of the site since the early 1960s. The current active and inactive disposal area includes 81 hectares with approximately 220 hectares of land available for future radioactive waste disposal cells. The site is currently used for disposal of onsite- and offsite-generated LLW and MLLW packaged in drums, soft-sided containers, large cargo containers, or boxes that are placed in excavated pits and trenches (disposal cells). Classified transuranic waste has also been placed in the Area 5 RWMS in trenches and Greater Confinement Disposal boreholes. The historical 37-hectare disposal area is expected to be filled and closed by 2011. New disposal cells are typically constructed to the north and west as needed to maintain an ongoing available capacity of approximately 140,000 cubic meters (m^3). Although the RWMS is currently planned to close after 2027, LLW and MLLW disposal services are expected to continue at the Area 5 RWMS until the needs of the DOE complex are met.

Disposal of onsite- and offsite-generated MLLW is ongoing in the *Resource Conservation and Recovery Act* (RCRA) permitted Pit 3 Mixed Waste Disposal Unit until November 30, 2010, or until 20,000 m^3 is reached, whichever comes first. Low-level waste containing regulated polychlorinated biphenyls (PCBs) in concentrations exceeding 50 parts per million is also disposed in Pit 3. Currently, a new fully RCRA-compliant and permitted MLLW disposal unit is under construction and anticipated to be fully operational before the current Mixed Waste Disposal Unit reaches its end date of service.

CHALLENGES ASSOCIATED WITH RECEIPT OF ARRA WASTE VOLUMES

During fiscal year (FY) 2009, the Area 5 RWMS received slightly more than 28,300 cubic meters(m^3) of waste. The preliminary forecast for FY 2010 initially indicated that the total volume would be approximately 45,300 m^3, an increase of 60 percent. The NNSA/NSO incentivized NSTec to increase its nominal capacity for waste receipt to 56,634 m^3 per year, an average of approximately 4,720 m^3 per month, without incurring any additional costs that would be passed back to the waste generators.

As the FY-10 progressed, the generators increased their monthly forecasts during the scheduled quarterly updates. By the second 2010 quarterly update, the total projected volume increased to almost 64,000 m^3, with monthly projections exceeding the nominal capacity limit for all six months in the latter half of the F-10 (ranging from 5,890 m^3 to 7,475 m^3 expected in any given month. The final volume received for FY 2010 was in excess of 66,460 m^3, and NSTec was able to accommodate this increase through a combination of advanced planning and generator communication and interaction, as described below.

Development of ARRA and Base Program Forecasts and Schedules

During FY 2010, the actual volumes of waste arriving at the NNSS varied considerably from month to month and did not always compare favorably with the volumes forecasted by the generator sites. To address this issue, the Radioactive Waste Programs (RWP) team increased the focus on proper planning and scheduling through evaluation of monthly generator shipment projections and regular teleconferences with the generator sites. Actual monthly volumes received often exceeded the planned nominal capacity— a result of efficiencies achieved through forward planning and frequent contact with the generating sites, including voluntary rescheduling by selected generators of shipments from their sites in order to avoid congestion on dates where high volumes had been projected in advance.

Volumes received were also closely tracked, and a monthly summary of actual vs. projected volumes for both baseline and ARRA-funded waste volumes was provided to NNSA/NSO and EM/Headquarters (HQ). Frequent evaluation of actual volumes received also provided additional insight into the projections

for future months. Because the ARRA-funded volumes were expected to be 60 percent of the total volumes received, additional emphasis was placed on frequent communication with those generators who had forecasted significant ARRA-funded volumes.

Implementation of Operational Enhancements

There were two major operational enhancements implemented by the RWP/Area 5 disposal operations teams. The first was the development and implementation of a trailer staging/drop area for any generator/transporter who met the specific criteria for the shipment to be non-hazardous and non-placarded waste, based on U.S. Department of Transportation regulations. Typically, these were bulk-type packages. The first specific preapproved waste stream was from the Berkeley Bevatron decontamination and decommissioning (D&D) project, which was to be certified by Perma-Fix and transported by CAST Transportation. The staging/drop area allowed the generator and transporter the flexibility to drop shipments/trailers at the designated area 7 days a week and 24 hours a day and to then pick up empty trailers for return to the generator site. This also enabled the transporter to bring additional shipments to Area 5 on days where total shipments receipts were lower, using local transport drivers from their North Las Vegas terminal facility. Using local drivers to bring dropped trailers into the disposal site also allowed the transport drivers arriving from Berkeley the capability to return to the generator site immediately. Use of the trailer staging/drop area was also approved for wastes from the Argonne National Laboratory Building 330 D&D Project and will remain an option for other generators and projects on a case-by-case approval basis.

The second enhancement was established for the acceptance of NNSS ER campaign waste by a dedicated team for an ARRA-funded onsite D&D project: the Reactor Maintenance, Assembly, and Disassembly (R-MAD) facility. The R-MAD ER Project, RWP, and Area 5 disposal operations teams developed and implemented a process to expedite the shipment and offloading process. The original projections for shipping the building debris from R-MAD were 10 to 12 intermodals per day; based on the amount of building debris, this extended the shipping schedule by 96 days. The D&D work was being completed in NNSS Area 25, and the waste had to be packaged and then transported to the Area 5 RWMS for disposal.

The round trip for each haul truck was estimated to be 3 hours, approximately 34 miles round trip. The roundtrip included the time to load the intermodals in Area 25, wait for radiological surveys and shipping documents, drive to the Area 5 RWMS, offload the intermodal, have radiological surveys performed, and then drive back to the job site and reload the empty. It was assumed that each truck would be able to make three trips per day in a 10-hour day. This put the project schedule out to mid-September to ship the 960 intermodals estimated to be generated for this project. Each day that shipping could be pulled forward resulted in a $12,000 savings for the project by eliminating the “landlord/infrastructure” costs associated with being in the field with the subcontractor. The following examples highlight team-implemented enhancements that moved the overall schedule forward by several weeks:

- A composite building debris profile allowed the shipping paperwork to be generated by the net weight of the debris and the radiological calculations to be based on pre-demolition radiological surveys.

- A special staging area and dedicated offloading team was created at the Area 5 RWMS to allow full intermodals to be dropped off and the empties picked up from the same area to be taken back to the job site. The Area 5 personnel then transported the full intermodals to the waste disposal cell and back to the staging area, which allowed them to free up the haul trucks to make the return trip back to the job site. This also allowed disposal of intermodal waste when time allowed and/or when offsite shipments were complete. This team was ARRA-funded by the ER Project.

- A microwave tower and transmitter were installed for the shipping paperwork to be transmitted in real time to Area 5. Outlying areas do not have consistent internet services available, and transfer of paperwork was essential.

- Switching from single flatbeds to tandem flatbed haul trucks allowed two intermodals to be transferred with each trip versus one on the singles. Overall, this reduced the amount of time that heavy trucks were required to travel on the site roads.

- Deviation from the NNSS Waste Acceptance Criteria (WAC) allowed metal being placed in intermodals to be cut to 6-foot-long pieces versus the 3-foot-long pieces in all directions, as specified in the WAC, due to the unique design of the intermodal interior, which facilitated offloading.

Figures 2 and 3 illustrate the offloading and placement of waste bags into the designated disposal cell.

Fig. 2. Picture of first R-MAD intermodal offload at Area 5, Disposal Cell 17.

Fig. 3. Cell 17 placement of R-MAD intermodal debris.

Shipment Scheduling and Tracking

Shipment projections were provided in advance by all generators on a monthly basis, and conference calls were conducted with generators to provide updated information regarding any changes to the monthly schedule or to request that specific generators re-direct specific shipments to different days to alleviate potential overcrowding at the disposal site. In cases where non-standard packaging was to be received, such as special cask shipments, generators were encouraged to schedule these shipments for arrival on midweek days because these were normally lower in terms of total shipments expected. Throughout this process, the NNSS found all generators to be both receptive and responsive to such requests.

Shipment tracking was accomplished by daily review of Hazardous Materials Tracking System (HAZTRAK) entries and frequent communication between RWP and disposal operations personnel. Reports of shipment and waste volumes actually received were provided on a weekly basis to NNSA/NSO and on a monthly basis to all generators to keep them informed as to the level of activity being experienced at the disposal site. Frequent and timely review of both forecast and monthly shipment projection data also allowed NSTec to plan effectively with regard to labor loading at the disposal site and the availability for specialized handling equipment, as required.

In addition to the weekly volume reports provided to NNSA/NSO, a monthly summary of actual volumes received vs. forecasted volumes (for both baseline and ARRA-funded wastes) was provided to NNSA/NSO and EM/HQ. This allowed additional reviews to be conducted for the purpose of trending

shipment volumes against both previous and upcoming volume projections. Use of this information in conjunction with the knowledge obtained during frequent generator communications resulted in establishment of greater confidence limits on the accuracy of future waste volume projections.

RECEIPT OF NON-STANDARD PACKAGING AND IMPACT CASKS, REMOTE-HANDLED WASTE, AND DIFFERENT PACKAGE TYPES

Fiscal year 2010 brought unique challenges to the Area 5 RWMS, with increased volumes that doubled in some areas of waste packaging and tripled in others. In a comparison of waste packages and types received in FY 2009 and FY 2010, the wastes increased in both volume and difficulty for offloading. In FY 2009, the majority of waste offloaded was straightforward and required minimal advance planning for an average size offloading crew. In FY 2010, the volumes of unique wastes received required specialized lift plans, equipment, and an increase in operating personnel due to the complexity of the work. For example, Area 5 received special casks requiring a crane for offloading as often as daily and, in some cases, twice per day. Also, the ARRA-funded projects in many cases were directed at more difficult waste streams and in demolition of buildings, which entailed considerable bulk-type waste that required special advance planning, lift plans, and shipment arrival scheduling.

Impacts due to Increases in Shipments, Packages, Volumes

Preliminary volume projections for FY 2010 were 47,238 m^3 of waste destined for Area 5 disposal. This was consistent with the volume received in FY 2009, which totaled 36,060 m^3 of waste. Disposal operations at the Area 5 RWMS are currently direct funded by DOE Programs (EM, NNSA, Science, Nuclear Energy). With the increased funding provided by ARRA to generator sites across the DOE complex, revised volume projections increased to more than 56,630 m^3, which was the annual volume for the budgeted capacity level. In addition, some forecasted LLW moved to ARRA-funding sources, and the overall final forecast for FY 2010 resulted in approximately 60 percent ARRA funded and 40 percent baseline funded.

Actual volumes received at Area 5 in FY 2010 totaled 66,460 m^3 of waste, of which 1,947 m^3 was MLLW. Of this total, 41,496 m^3 was attributed to ARRA (62.4 percent) and 24,965 m^3 attributed to normal baseline volumes (37.6 percent). This was an increase of 30,400 m^3 (84 percent) from the FY 2009 waste volumes received. In reality, the increase in volumes was not as much of a factor for the Area 5 disposal crew as were the increases in numbers of both shipments and packages handled. In FY 2009, Area 5 received 1,512 shipments and handled 7,605 waste packages. In FY 2010, the volumes increased to 3,408 shipments and 14,711 packages handled. This was an increase of 1,896 shipments (125 percent) and 7,106 waste packages (93 percent). In addition to the increased work load for the disposal teams, the increase in shipments and packages significantly increased the amount of waste soil covering operations performed, administrative work required to support shipments receipts, and records management. The labor crafts, administrative personnel, and professional staff performed at an excellent level to accomplish this increase in the scope of work.

Impacts to Disposal Cell Capacities

Typically, the RWP and Area 5 disposal operations teams attempt to maintain an ongoing available cell capacity of approximately 127,425 ft^3. Due to the receipt of 66,460 m^3 in FY 2010 along with the projected 56,630 m^3 of waste forecasted in FY 2011 and the closure of the current RCRA Permitted Cells 3 and Cells 6 (the asbestos-regulated disposal cell), an additional RCRA Permitted cell (Cell 18) was funded and constructed along with one additional classified LLW cell and a straight LLW cell, which will also be permitted for asbestos waste. This will maintain available cell capacity in excess of 127,425 m^3.

REFERENCES

1. U.S. DEPARTMENT OF ENERGY, NATIONAL NUCLEAR SECURITY ADMINISTRATION NEVADA SITE OFFICE, *Nevada Test Site Waste Acceptance Criteria*, DOE/NV-325-Rev. 8, Las Vegas, NV (2010). http://www.nv.energy.gov/library/publications/Environmental/DOENV_325.pdf

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