

D4 Project Innovations and Challenges

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ABSTRACT

In 2005, the U.S. Department of Energy (DOE) launched the third generation of closure contracts, including the River Corridor Closure (RCC) Contract at the Hanford Site, which was awarded to Washington Closure Hanford (WCH). One portion of the WCH company structure is known as the D4 project, where D4 represents the deactivation, decommissioning, decontamination, and demolition of excess facilities. The RCC Contract scope requires that approximately 485 excess facilities undergo the D4 process. During 2005 and 2006, significant acceleration has been achieved in completing the D4 of these facilities. By the end of November 2006, more than 70 facilities had been completed, while only 22 were scheduled for completion. This acceleration has been achieved by implementing innovative work practices and refinement of techniques developed at other DOE such as Rocky Flats, Mound, and Savannah River. In addition, a number of unique equipment deployments have supported the acceleration.

While the RCC Project is moving along an accelerated path, there are a number of challenges ahead. The challenges discussed in this paper relate to project impacts that could result from the delayed release of excess facilities in the 300 and 100-K Areas and the potential for mitigation of these impacts.

INTRODUCTION

The Washington Closure Hanford (WCH) Deactivation, Decommissioning, Decontamination, and Demolition (D4) Project team achieved significant safe work acceleration during fiscal year 2006 by initiating innovations and applying lessons learned from previous D4 work at the Rocky Flats, Mound, and Savannah River sites.

The innovations included a significant streamlining of the facility characterization process, initiating a set of more robust work planning and work authorization procedures, using new applications for heavy equipment, and implementing a goal setting and rewards and recognition program for the workforce. These innovations resulted in significant schedule acceleration and cost reductions while achieving an overall improvement in the safety performance. The D4 Project worked all of FY 2006 with no lost workday injuries and only two recordable cases, and achieved a cost/schedule performance index of 1.76.

INNOVATIONS

Streamlining the facility characterization processes began during FY 2005 while the River Corridor Closure (RCC) Contract was transitioned from the previous contractor, Bechtel Hanford, Inc. Several process improvement workshops were conducted to remove unnecessary

steps and redundant work scope. The workshop defined that there were three sources of characterization data required. The first was the information needed to ensure worker safety was maintained throughout the D4 process. The second was to ensure that all environmental requirements were met during D4. The final data set was needed to ensure that the waste generated during D4 could be safely and compliantly placed in the proper waste disposal location. The result of the workshop was a characterization process that allowed the three streams of characterization data to be collected in parallel rather than in series and eliminated the duplication of sampling and data collection that had been experienced to satisfy the three areas of need. Prior to the workshop, the characterization process was on the critical path for the D4 of each facility. As a result of the workshop, sampling and analysis plans for the 300 Area were revised to reflect the new characterization regime.[1] Revision is underway of the sampling and analysis plans for the 100-N and 100-K Areas. The backlog of characterized facilities allowed acceleration of the D4 actions.



Fig. 1. At the end of CY2006, nearly all of the structures in the northern half of Hanford's 300 Area had been demolished.

The next innovation involved the use of specialized heavy equipment in demolition activities. Previously, much of the demolition work had relied on smaller equipment pieces, coupled with

craft labor using hand tools. The most significant instance was the use of the Komatsu 1250 in the demolition of the 1802N pipe trestle at the N Reactor facility.



Fig. 2. Demolition of the 1802N pipe trestle at Hanford's N Reactor facility

The original demolition plan was to use cutting torches and cranes to torch-cut the pipe into pieces and then rig the pieces to the ground using crane and rigging procedures. This plan was deemed to be less safe than using specialized heavy equipment (Komatsu 1250 with heavy shears). The use of the heavy equipment removed the workers from most of the hazards and also accelerated the demolition process by more than 2 months.

The third area of innovation revolved around improving the methods used to plan and authorize the D4 work. At the Rocky Flats and Mound sites, a planning process that used 90-day look-ahead schedules, coupled with weekly schedule reviews and a robust weekly planning processes, proved vital to schedule acceleration. These processes were implemented on the RCC Project as well. The work planning process was improved by implementing the Integrated Work Control Program (IWCP) that was also used at Mound and Rocky Flats. The IWCP process improved the preparation of the job hazards analysis by using additional worker involvement resulting in improved safety controls and provided a more disciplined approach to work release and resolution of issues that inevitably arise during work execution.

The final area of innovation was the implementation of a regime of goal setting and rewards for each work group. This concept, although not new, had not been used with this particular

workforce. Each work team was required to create short-term (typically 90-day) goals related to safety and project performance. The team was also encouraged to select the form of recognition that best suited their needs. An annual budget was established for each work team to use in its recognition program. This process, coupled with the annual project cash incentives for each worker, played a significant part in safe work acceleration.



Fig. 3. Washington Closure D4 Director John Fulton congratulates workers at a recognition barbeque for demolishing 50 Hanford buildings from Sept 2005 to Aug 2006.

CHALLENGES

Even though the RCC Project has experienced significant schedule acceleration during the first year, a number of project schedule challenges have arisen. The schedule challenges have come as the result of changes to the base plans in other portions of the Hanford Site, specifically in the 300 and 100-K Areas.

300 Area Delayed Release/Building Retention

The RCC Contract includes the deactivation, decommissioning, decontamination, and demolition (D4) of 210 buildings located in the 300 Area of the Hanford Site, followed by field remediation of waste sites and soil contamination areas in the affected areas. Thirteen facility complexes (29 buildings) in this area are occupied by the Pacific Northwest National Laboratory (PNNL) and have a delayed release to WCH for D4. The RCC Contract specifies a release date of October 1, 2009, for turnover of these facilities. However, the replacement laboratory facilities that will be used to relocate PNNL's activities and staff will not be ready for occupancy by the 2009 release date, requiring changes to the RCC Contract.

Several possible delay scenarios have been evaluated.[2] In one scenario, release of the PNNL facilities would be delayed by approximately 17 months, to February 2011. In addition to directly impacting the demolition schedule for the affected PNNL buildings, this scenario also

would cause a delay in demolition of approximately 45 additional buildings that provide utilities or services to the PNNL buildings. Waste sites associated with the delayed buildings would likewise be delayed. The overall duration of the RCC Contract may be extended by 17 months, causing increased time-related costs due to the “hotel load” of continuing to carry on project management, utilities, waste operations, surveillance and maintenance, and end state/final closure activities. Additional cost impacts due to escalation bring the total baseline impact of this scenario to approximately \$227 million.

WCH has evaluated an additional scenario where selected PNNL facilities (the 325, 331, 350, and 318 facility complexes) and several utility/service facilities would be retained as active buildings and removed from the WCH D4 scope while the remaining PNNL facilities are delayed to a February 2011 release date. This scenario reduces the immediate cost impact because of the reduction in demolition scope, but still carries a substantial “hotel load” impact and results in a net increase to the RCC target cost of \$53 million. Inclusion of additional costs for replacement of utilities to enable ongoing operation of the PNNL facilities (\$12 million) brings the total impact to \$65 million.

WCH and PNNL have cooperatively developed proposals for accelerating the transfer of most of the remaining “delayed release” PNNL buildings under the building retention scenario. In this mitigated case, PNNL would turn over seven of the nine delayed-release facilities ahead of the February 2011 date and WCH would be able to complete the remaining demolition and field remediation scope while achieving the original completion date for the RCC Contract. Elimination of the time-related “hotel load” costs enables this mitigation scenario to deliver a total reduction to the WCH target cost of \$81 million including \$12 million for utility replacement costs. The results of the preliminary mitigation study are being evaluated by the U.S. Department of Energy.

100-K Area Delayed Release Impacts

The RCC Project scope includes the D4 of 106 buildings located in the Hanford Site 100-K Area and placing the KE and KW Reactors into “interim safe storage” (ISS) status, followed by field remediation of waste sites and soil contamination sites in the affected areas. The reactor ISS activities are identified in the RCC Contract as having a delayed release to WCH pending completion of fuel and sludge handling activities by the Project Hanford Management Contractor, Fluor Hanford (FH). Necessary utilities and support facilities (75 of the 106 buildings in the 100-K Area) are also identified as having a delayed release to support the FH activities.

The RCC Contract specifies release dates of October 1, 2006, and December 1, 2007, for turnover of the KE and KW facilities, respectively. The contract specifies that the KE Reactor will be turned over to WCH after removal of the KE fuel storage basin by FH. However, the FH baseline for completion of sludge-handling activities will not support transfer of the reactors and associated facilities and waste sites on schedule and that changes to the WCH contract will be necessary.



Fig. 4. Hanford K West Reactor (bottom left) and K East Reactor during their operating years – 1954-1971

Several possible delay scenarios have been evaluated. In one scenario, FH would complete its current baseline scope and turn over the KE Reactor (after removal of the fuel storage basin) on July 31, 2009. The KW Reactor would be turned over on either August 30, 2010 (scenario 1a) or August 30, 2011 (scenario 1b), while the 100-K ancillary facilities are turned over on December 31, 2010. In these scenarios, substantial time-related costs (“hotel loads”) such as project management, utilities, surveillance and maintenance, waste operations, and end state/final closure would result because of the extended duration of the WCH contract. The impact of these scenarios on the WCH baseline is estimated to be 21 months and \$153 million for scenario 1a or 32 months and \$229 million for scenario 1b.

WCH prepared an alternate mitigation scenario in which the KE Reactor would be transferred to WCH on May 30, 2007, with the fuel storage basin intact and filled with water, with sludge and fuel removed by FH, but with the facility remaining as a Nuclear Hazard Category 2 facility. In this scenario, WCH would complete added scope for the removal of the fuel storage basin before resuming its existing scheduled ISS activities. In addition, WCH would be assigned responsibility for operation of utilities and ancillary facilities in the 100-K Area supporting FH’s

continued sludge-handling activities at the KW facility, starting September 30, 2007. For this scenario, WCH assumed that the KW facility would be turned over to WCH on its baseline (December 2007) date, with fuel and sludge having been removed by FH.

Preliminary results of the ongoing mitigation study indicate that the mitigation scenario would result in the addition of approximately \$71 million in new scope for fuel storage basin removal and \$9 million for operation of utilities and ancillary systems at 100-K. The scenario would result in a cost and schedule increase of \$72 million and 11 months to the WCH baseline (not including the \$80 million new scope), a savings of 10 to 21 months from the unmitigated scenarios.

SUMMARY

The RCC Project has experienced a very successful first year as evidenced by the greatly improved safety performance and an overall cost/schedule performance index of 1.23. However, there are significant schedule challenges looming on the horizon related to potential impacts in the 300 and 100-K Areas. Continued close cooperation among all of the parties involved (U.S. Department of Energy, WCH, FH, and PNNL) will be needed to minimize the potential cost and schedule impacts.

REFERENCES

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2. "Hanford facilities may find new use," November 15, 2006, Cary, Annette. *Tri-City Herald*, Tri-Cities, Washington.