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NUCLEAR AND WORKER SAFETY

Limited Information Exists on Costs and Reasons for Work Stoppages at DOE's Hanford Site



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Highlights of [GAO-09-451](#), a report to congressional requesters

Why GAO Did This Study

The Department of Energy's (DOE) Hanford Site in Washington State stores 56 million gallons of untreated radioactive and hazardous wastes resulting from decades of nuclear weapons production. DOE is constructing facilities at the site to treat these wastes before permanent disposal. As part of meeting health, safety, and other standards, work at the site has sometimes been suspended to address safety or construction quality issues. This report discusses (1) work stoppages from January 2000 through December 2008 and what is known about them, (2) the types of costs associated with work stoppages and who paid for them, and (3) whether more effective regulation or oversight could have prevented the work stoppages. GAO interviewed knowledgeable DOE and contractor officials about these events. When documentation was available, GAO obtained DOE and contractor accident and safety incident reports, internal DOE and independent external evaluations, and costs.

What GAO Recommends

GAO is recommending that the Secretary of Energy (1) establish criteria for when DOE should direct contractors to track and report reasons for and costs of work stoppages and (2) specify the types of costs to be tracked. In commenting on a draft of the report, DOE generally agreed with GAO's recommendations but plans to implement them only within Environmental Management.

View [GAO-09-451](#) or key components. For more information, contact Gene Aloise at (202) 512-3841 or aloise@gao.gov.

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What GAO Found

DOE officials reported that from January 2000 through December 2008, activities to manage hazardous wastes stored in underground tanks and to construct a waste treatment facility have been suspended at least 31 times to address safety concerns or construction quality issues. Federal regulations governing contracts do not require contractors to formally report work stoppages and the reasons for them, and DOE does not routinely collect information on them. As a result, supporting documentation on work stoppages was limited. DOE reported that work stoppages varied widely in duration, with some incidents lasting a few hours, and others lasting 2 years or more. Officials reported that about half the work stoppages resulted from concerns about worker or nuclear safety and included proactive safety "pauses," which typically were brief and taken to address an unsafe condition that could potentially harm workers. The remainder of the work stoppages occurred to address concerns about construction quality at the waste treatment plant.

Under the terms of the cost-reimbursement contracts for managing the tanks and constructing the waste treatment plant, DOE generally pays all costs associated with temporary work stoppages and does not require the contractor to separately track these costs, although DOE and the contractors do track some costs under certain circumstances. For example, the costs for cleaning up, investigating, and implementing corrective actions were collected for a July 2007 hazardous waste spill at one of the tank farms; these costs totaled over \$8 million. The contractors, too, can face financial consequences, such as reduction in earned fee or fines and penalties assessed by DOE or outside regulators. For example, DOE may withhold payment of a performance award, called a fee, from contractors for failure to meet specified performance objectives or to comply with applicable environmental, safety, and health requirements.

For the majority of DOE's reported work stoppages, supporting documentation was not available to evaluate whether better oversight or regulation could have prevented them. For 2 of 31 work stoppages where some information was available—specifically, accident investigations or prior GAO work—inadequate oversight contributed to the work stoppages. For example, the accident investigation report for the tank farm spill found that oversight and design reviews by DOE's Office of River Protection failed to identify deficiencies in the tanks' pump system design, which did not meet nuclear technical safety requirements. Similarly, in 2006, GAO found that DOE's failure to effectively implement nuclear safety requirements contributed substantially to schedule delays and cost growth at Hanford's waste treatment plant. With regard to regulations, however, officials from DOE, the Defense Nuclear Facilities Safety Board, and DOE's Office of Inspector General said they did not believe that insufficient regulation was a factor in these events.

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Abbreviations

CH2M Hill	CH2M Hill Hanford Group
DOE	Department of Energy

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United States Government Accountability Office
Washington, DC 20548

May 7, 2009

The Honorable Henry A. Waxman
Chairman
The Honorable John D. Dingell
Chairman Emeritus
The Honorable Joe Barton
Ranking Member
Committee on Energy and Commerce
House of Representatives

The Honorable Bart Stupak
Chairman
The Honorable Greg Walden
Ranking Member
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
House of Representatives

The Honorable Jay Inslee
House of Representatives

The Department of Energy (DOE) is responsible for one of the world's largest environmental cleanup programs—the treatment and permanent disposal of wastes created by the production of materials for the nation's nuclear weapons program. At the production sites, more than 5 decades of nuclear weapons production left a legacy of chemical, hazardous, and radioactive waste. DOE's Hanford Site in southeastern Washington State stores the majority of the untreated nuclear waste—about 56 million gallons held in 177 large underground storage tanks clustered in areas known as tank farms.¹ DOE has estimated that it will take tens of billions of dollars and decades to treat and permanently dispose of this waste.

¹Of the 177 underground storage tanks at Hanford, 149 have only a single carbon-steel shell. At more than 40 years old, 67, or almost half, of these single-shell tanks have leaked or are presumed to have leaked waste into the soil below. Newer double-shell tanks were built starting in the late 1960s. For more information on the underground tanks and stabilization activities, see GAO, *Nuclear Waste: DOE Lacks Critical Information Needed to Assess Its Tank Management Strategy at Hanford*, [GAO-08-793](#) (Washington, D.C.: June 30, 2008).

DOE's Office of River Protection oversees activities at the tank farms but relies on contractors to carry out the work. At the Hanford Site, one contractor, CH2M Hill Hanford Group (CH2M Hill) is responsible for managing and operating the tank farms, which includes maintaining safe storage of the waste and preparing it for eventual retrieval.² A second contractor, Bechtel National Inc. (Bechtel), is responsible for carrying out a multibillion dollar construction project for new facilities, known as the waste treatment plant, to treat the tank waste and prepare it for permanent disposal.³ DOE spends about \$1 billion annually on these two contracts alone. In carrying out these activities, DOE and its contractors must comply with health and safety standards to protect workers, the public, and the environment.

As part of meeting health and safety standards, work activities have, at times, been suspended⁴ over the past several years to address concerns with worker safety or nuclear safety at the tank farms and during the design and construction of waste treatment facilities. Such suspensions vary in duration and allow for additional worker training or corrective actions. In this report, we refer to these suspensions as work stoppages. To provide a better understanding of these occurrences and potential financial consequences, this report discusses (1) work stoppages from January 2000 through December 2008 at DOE's Hanford Site tank farms and waste treatment plant and what is known about their nature, duration, and scope; (2) the types of costs associated with work stoppages and what

²CH2M Hill managed and operated the tank farms from October 1, 1999, through September 30, 2008. As part of its overall strategy for cleanup at the Hanford site, DOE awarded a new contract for the management and operation of the tank farms. Since October 1, 2008, Washington River Protection Solutions LLC has managed and operated the tank farms. For the purposes of this report, we refer to CH2M Hill as the tank farms' contractor, since it was the contractor when all of the reported work stoppages occurred.

³The waste treatment plant under construction consists of a pretreatment facility that separates waste into high-level waste (containing highly radioactive elements, such as strontium-90, cesium-137, technetium-99, and iodine-129) and low-activity waste. The plant will also include two other facilities to treat the separated portions of the waste, one analytical laboratory, and a variety of supporting facilities. In April 2006, we reported that since the construction contract was awarded in 2000, the project's estimated cost had increased more than 150 percent, to about \$11 billion, and the completion date had been extended from 2011 to 2017 or later. See GAO, *Hanford Waste Treatment Plant: Contractor and DOE Management Problems Have Led to Higher Costs, Construction Delays, and Safety Concerns*, GAO-06-602T (Washington, D.C.: Apr. 6, 2006).

⁴Under the contracts for the tank farms and the waste treatment plant, either DOE or the contractor can suspend work for various reasons, including responding to concerns about worker and nuclear safety.

portions were paid by the government and by the contractor; and (3) whether more effective regulation or oversight might have prevented the work stoppages.

In conducting our work, we obtained a listing of work stoppages at the tank farms and waste treatment plant from officials at DOE's Office of River Protection. We attempted to independently verify any work stoppages that occurred at the tank farms or waste treatment plant by reviewing accident investigation reports and existing DOE reporting systems for events that could have resulted in a temporary work stoppage. Of the 31 work stoppages reported, only 3 had any supporting documentation. For those 3 work stoppages, we reviewed and analyzed the documents provided to obtain a more thorough understanding of the events, causes, and corrective actions and whether DOE regulation or oversight was a contributing factor. We also interviewed DOE officials with the Office of River Protection, as well as DOE headquarters officials with the Offices of Environmental Management; Health, Safety, and Security; and General Counsel. We interviewed officials with regulatory and oversight entities, including the Defense Nuclear Facilities Safety Board, the Occupational Safety and Health Administration, and the Nuclear Regulatory Commission. Further, we met with union representatives at the Hanford Site to obtain union perspectives on work stoppages and safety. A more detailed description of our scope and methodology appears in appendix I. We conducted this performance audit from June 2008 to April 2009, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

Since plutonium production ended at the Hanford Site in the late 1980s, DOE has focused on cleaning up the radioactive and hazardous waste accumulated at the site. It has established an approach for stabilizing, treating, and disposing of the site's tank wastes. Its planned cleanup process involves removing, or retrieving, waste from the tanks; treating the waste on site; and ultimately disposing of the lower-activity radioactive waste on site and sending the highly radioactive waste to a geologic repository for permanent disposal. As cleanup has unfolded, however, the schedule has slipped, and the costs have mounted. According to DOE's latest estimate in June 2008, treatment of the waste is not expected to begin until late 2019 and could continue until 2050 or longer. The following

two figures show a tank farm and construction of waste treatment plant facilities at the Hanford Site.

Figure 1: Double-Shell Waste Tanks under Construction and Completed Tank Farm at DOE's Hanford Site



Source: DOE.

Figure 2: Waste Treatment Plant Primary Facilities under Construction as of November 2008



Source: DOE.

Most of the cleanup activities at Hanford, including the emptying of the underground tanks, are carried out under the Hanford Federal Facility Agreement and Consent Order among DOE, Washington State's Department of Ecology, and the federal Environmental Protection Agency. Commonly called the Tri-Party Agreement, this accord lays out legally binding milestones for completing the major steps of Hanford's waste treatment and cleanup processes. The agreement was signed in May 1989 and has been amended a number of times since then. A variety of local and regional stakeholders, including county and local governmental agencies, citizen and advisory groups, and Native American tribes, also have long-standing interests in Hanford cleanup issues.

Two primary contractors are carrying out these cleanup activities; one is responsible for managing and operating the tank farms, and the other for constructing the facilities to treat the tank waste and prepare it for permanent disposal. During our review, these contractors were CH2M Hill and Bechtel, respectively. Both contracts are cost-reimbursement

contracts, which means that DOE pays all allowable costs.⁵ In addition, the contractors can also earn a fee, or profit, by meeting specified performance objectives or measures. Applicable DOE orders and regulations are incorporated into these contracts, either as distinct contract clauses or by reference. For example, contractors are required to use an accounting system that provides consistency in how costs are accumulated and reported so that comparable financial transactions are treated alike. Such a system is to include consistent practices for determining how various administrative costs are assessed or how indirect costs for labor are calculated. Contractors also are required to implement an integrated safety management system, a set of standardized practices that allow the contractor to identify hazards associated with a specific scope of work, to establish controls to ensure that work is performed safely, and to provide feedback that supports continuous improvement. The system, which allows contractors to stop work when conditions are unsafe, is intended to instill in everyone working at the site a sense of responsibility for safety. This policy is reinforced by labor agreements between the contractor and its workforce that explicitly allow work stoppages as needed for safety and security reasons.

With few exceptions, DOE's sites and facilities are not regulated by the Nuclear Regulatory Commission or by the Occupational Safety and Health Administration. Instead, DOE provides internal oversight at several different levels. DOE's Office of River Protection oversees the contractors directly. In addition, the Office of Environmental Management provides funding and program direction. DOE's Office of Enforcement⁶ and other oversight groups within the Office of Health, Safety, and Security oversee contractors' activities to ensure nuclear and worker safety. Finally, the Defense Nuclear Facilities Safety Board, an independent oversight organization created by Congress in 1988, provides advice and recommendations to the Secretary of Energy to help ensure adequate protection of public health and safety.

⁵A cost is only allowable when it meets the following requirements: reasonableness, allocability, generally accepted accounting principles or other appropriate practices, the terms of the contract, and Federal Acquisition Regulation, part 31.2. For the purposes of this report, we will refer to costs that meet all these requirements as "allowable costs."

⁶DOE's Office of Enforcement is responsible for identifying violations of the nuclear safety rules and assessing civil penalties against contractors. This enforcement program, originally established in 1995, now also includes enforcement of rules that have been issued for security and safeguarding of classified information and for worker or industrial health and safety.

DOE Officials Reported Varied Reasons for Work Stoppages at Tank Farms and the Waste Treatment Plant, but Supporting Documentation Is Limited

DOE officials reported that from January 2000 through December 2008, work on the Hanford tank farms and the waste treatment plant temporarily stopped at least 31 times to address various safety or construction concerns. These work stoppages ranged in duration from a few hours to more than 2 years, yet little supporting documentation of these occurrences exists.

Work Was Stopped to Address Safety or Construction Concerns

DOE reported that of the 31 work stoppages, 12 occurred at the tank farms and 19 at the waste treatment plant. Sixteen of the work stoppages reportedly resulted from concerns about safety. A complete listing of these work stoppages is included in appendix II. These work stoppages were initiated to respond directly to an event in which property was damaged or a person injured, or they addressed an unsafe condition with the potential to harm workers in the future. Four of these work stoppages were relatively brief, lasting less than 2 days, and were characterized by DOE and officials as proactive safety “pauses.” For example, in October 2007, after a series of slips, trips, or falls during routine activities, contractor managers stopped work at the waste treatment plant site for 1 hour to refresh workers’ understanding of workplace hazards.

The following two examples, for which supporting documentation was available, illustrate the types of work stoppages occurring at the Hanford Site because of safety concerns:

- *Controlling worker exposure to tank farm vapors.* Beginning in 2002, as activities to transfer waste from leak-prone, single-shell tanks to more secure double-shell tanks disturbed tank contents, the number of incidents increased in which workers complained of illnesses, coughing, and skin irritation after exposure to the tank vapors. The Hanford underground storage tanks contain a complex variety of radioactive elements and chemicals that have been extensively mixed and commingled over the years, and DOE is uncertain of the specific proportions of chemicals contained in any one tank. These constituents generate numerous gases, such as ammonia, hydrogen, and volatile organic compounds, which are purposely vented to release pressure on the tanks, although some gases

also escape through leaks. During the 1990s, the tank farm contractor evaluated potential hazards and determined that if workers around the tanks used respirators, they would be sufficiently protected from harmful gases. DOE reported in 2004, however, that disturbing the tank waste during transfers had changed the concentration of gases released in the tanks and that no standards for human exposure to some of these chemicals existed. To protect workers' health, in 2004 the tank farm contractor equipped workers with tanks of air like those used by firefighters. Work at the tank farms stopped intermittently for about 2 weeks as a result, in part because the contractor had to locate and procure sufficient self-contained air and equipment for all workers.

- *Accidental spill of radioactive and chemical wastes at tank S-102.* In July 2007, as waste was being pumped out of a single-shell to a double-shell tank, about 85 gallons of waste was spilled. DOE has been gradually emptying waste from Hanford's single-shell tanks into double-shell tanks in preparation for treatment and permanent disposal, but because the tank waste contains sludge and solids, waste removal has been challenging. Because the tanks were not designed with specific waste retrieval features, waste must be retrieved through openings, called risers, in the tops of the tanks; technicians must insert specially designed pumps into the tanks to pump the waste up about 45 to 60 feet to ground level. DOE has used a variety of technologies to loosen the solids, including sprays of acid or water to help break up the waste and a vacuum-like system to suck up and remove waste through the risers at the top. On July 27, 2007, during retrieval of radioactive mixed waste from a 758,000-gallon single-shell tank, a pump failed, spilling 85 gallons of highly radioactive waste to the ground. At least two workers were exposed to chemical vapors, and later several workers reported health effects they believed to be related to the spill. Retrieval operations for all single-shell tanks were suspended after the accident, and DOE did not resume operations until June 2008, a delay of 1 year, while the contractor cleaned up the spill and DOE and the contractor investigated the accident to evaluate the cause, the contractor's response, and appropriate corrective action.

DOE officials reported that the remaining 15 work stoppages resulted from concerns about construction quality and involved rework to address nuclear safety or technical requirements that had not been fully met, such as defective design, parts fabrication and installation, or faulty construction. For example:

- *Outdated ground-motion studies supporting seismic design of the waste treatment plant.* In 2002, the Defense Nuclear Facilities Safety Board began expressing concerns that the seismic standards used to design the

waste treatment facilities were not based on the most current ground-motion studies and computer models or on the geologic conditions present directly beneath the construction site. After more than 2 years of analysis and discussion, DOE contracted for an initial seismic analysis, which confirmed the Defense Nuclear Facilities Safety Board's concerns that the seismic criteria were not sufficiently conservative for the largest treatment facilities—the pretreatment facility and the high-level waste facility. Revising the seismic criteria caused Bechtel to recalculate thousands of engineering estimates and to rework thousands of design drawings to ensure that tanks, piping, cables, and other equipment in these facilities were adequately anchored. Bechtel determined that the portions of the building structures already constructed were sufficiently robust to meet the new seismic requirements. By December 2005, however, Bechtel estimated that engineering rework and other changes to tanks and other equipment resulting from the more conservative seismic requirement would increase project costs substantially and add as much as 26 months to the schedule. Ultimately, work on the two facilities was suspended for 2 years, from August 2005 until August 2007. About 900 workers were laid off as a result.

Information on Work Stoppages Is Not Consistently Collected

DOE does not routinely collect or formally report information about work stoppages, in part because federal regulations governing contracts do not require contractors to track work stoppages and the reasons for them.⁷ While federal acquisition regulations do require that contractors implement a reliable cost-accounting system, the regulations do not require contractors to centrally collect information on the specific circumstances surrounding a work stoppage. Without a centralized system for collecting explanatory data on work stoppages, the majority of information DOE reported to us is based on contractors' and DOE officials' recollections of those events or on officials' review of detailed logs maintained at each of the facilities.

Officials expressed concern that systematically monitoring all work stoppages could send the message that work stoppages should be avoided, possibly hampering effective implementation of DOE's integrated safety management policy. This policy explicitly encourages any employee to "stop work" to address conditions that raise safety concerns. Officials said they believe that work stoppages help bolster workplace safety and

⁷DOE officials said that while DOE does not formally collect or report information on work stoppages, officials are aware of these events, which are identified in daily and weekly reports submitted by DOE staff monitoring the worksite.

construction quality because work can be halted and corrective action taken before someone is seriously injured, property is seriously damaged, or poor workmanship has compromised the quality and functionality of a facility. Officials said that systematically monitoring all types of work stoppages could ultimately discourage workers from halting activities when unsafe conditions or construction problems emerge in the workplace.

DOE Generally Pays Costs Associated with Work Stoppages

Under the terms of the cost-reimbursement contracts for the tank farms and the waste treatment plant, DOE generally pays the costs for corrective action or construction rework associated with temporary work stoppages and does not require the contractor to separately track these costs.

Costs Associated with Work Stoppages Can Include Corrective Action and Lost Productivity

Various categories of costs can be associated with work stoppages, with some easier to measure or separately identify than others. The category of costs related to correcting a problem that precipitates a work stoppage, such as the cost of investigating and cleaning up a hazardous waste spill or the cost of rework to address improper construction, is usually more easily measured. In contrast, lost productivity—expenditures for labor during periods workers were not fully engaged in productive work or the difference between the value of work that should have been accomplished against the value of work that was accomplished—is more difficult to quantify.

Most of the work stoppages reported by DOE officials involved some corrective action or construction rework to address the problem precipitating the work stoppage. These are costs that tend to be easier to separately identify and track, and DOE has directed contractors to do so in certain instances, as it did for the July 2007 tank waste spill. For the work stoppages at the tank farms, corrective actions encompassed such activities as investigating and cleaning up the July 2007 spill, monitoring and testing vapors escaping from the tanks to determine the constituents, and training contractor employees on required new procedures or processes. For the work stoppages at the waste treatment plant, corrective actions at times involved retraining workers or developing new procedures to prevent future problems, although many of the work stoppages at the waste treatment plant involved construction rework. Construction rework can include obtaining new parts to replace substandard parts or labor and materials to undo installations or construction, followed by proper installation or construction—pouring

new concrete, for example, or engineering and design work to address nuclear safety issues.

The cost of lost productivity associated with a work stoppage can be more difficult to measure or separately identify, although under a cost-reimbursement contract, the government would generally absorb the cost. While no generally accepted means of measuring lost productivity exists, two methods have been commonly used. The first, a measure of the cost of idleness, or doing nothing, calculates the expense incurred for labor and overhead during periods that no productive work is taking place. These were the types of costs associated with a July 2004 suspension, or “stand-down,” of operations at the Los Alamos National Laboratory, where a pattern of mishaps led the contractor to stop most work at the facility for many months to address safety and security concerns. Laboratory activities resumed in stages, returning to full operations in May 2005. Although officials with both the National Nuclear Security Administration, which oversees the laboratory, and the Los Alamos contractor, tried to measure lost productivity at the laboratory, each developed widely differing estimates—of \$370 million and \$121 million, respectively—partly because of difficulties measuring labor costs.⁸ According to DOE officials, when work stopped at the Hanford Site tank farms, CH2M Hill reassigned workers to other productive activities. Therefore, according to DOE officials, no costs of idleness were incurred as a result of those work stoppages. We were unable to verify, however, that tank farm workers had been reassigned to other productive work after the S-102 tank waste spill or during other tank farm work stoppages. During the period that work stopped on the pretreatment and high-level waste facilities of the waste treatment plant, in contrast, the contractor substantially reduced its workforce. According to Bechtel officials and documents, about 900 of 1,200 construction workers were laid off during the work stoppage, and the remaining workers were employed on the other facilities under construction.

An alternative means of measuring lost productivity associated with suspension of work activities is to measure the value of work planned that should have been accomplished but was not. This method concentrates on the work that was not done, as opposed to the cost of paying workers to

⁸In a 2005 report on this stand-down of operations, we recommended that DOE require contractors to improve their ability to track such costs. See GAO, *Stand-Down of Los Alamos National Laboratory: Total Costs Uncertain; Almost All Mission-Critical Programs Were Affected but Have Recovered*, [GAO-06-83](#) (Washington, D.C.: Nov. 18, 2005).

do little or nothing. This method of measuring lost productivity is typically undertaken as part of a formal earned value management system, a project management approach that combines the technical scope of work with schedule and cost elements to establish an “earned value” for a specific set of tasks. If the earned value of work accomplished during a given period is less than the earned value of work planned for that period, then a loss in productivity has occurred, and the cost is equal to the difference in value between planned and finished work.⁹ DOE officials were unable to provide this measure for the three work stoppages that had supporting documentation, partly because the analyses of productivity under earned value management techniques did not disaggregate activities in a manner that could capture the three work stoppages. For example, with regard to the tank farms, DOE measures the overall progress made on waste stabilization and retrieval for all 177 storage tanks in aggregate but does not measure the direct impact of setbacks at any one storage tank, such as the spill at tank S-102.

Contractors Are Not Ordinarily Required to Track Work Stoppage Costs Separately

The contracts for the tank farms and the waste treatment plant do not generally require the contractors to separately track costs associated with work stoppages. Contractors must use an accounting system adequate to allow DOE to track costs incurred against the budget in accordance with federal cost-accounting standards. These standards permit a contractor to establish and use its own cost-accounting system, as long as the system provides an accurate breakdown of work performed and the accumulated costs and allows comparisons against the budget for that work. For the tank farm and waste treatment plant contracts, the contractors must completely define a project by identifying discrete physical work activities, essentially the steps necessary to carry out the project. This “work breakdown structure” is the basis for tracking costs and schedule progress. Corrective action and rework associated with work stoppages are generally not explicitly identified as part of a project’s work breakdown structure, although these costs are generally allowable and contractors do not have to account for them separately.

⁹For further information on earned value management systems, see GAO, *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs*, [GAO-09-3SP](#) (Washington, D.C.: Mar. 2, 2009).

Despite the lack of a requirement to track costs associated with work stoppages, DOE and contractors sometimes do track these costs separately, as in the following three circumstances:

- DOE can request the contractor to separately track costs associated with corrective action when DOE officials believe it is warranted. DOE specifically asked CH2M Hill to separately track costs associated with addressing the July 2007 tank spill because of the potential impacts on tank farm operations, workers, and the environment and because of heightened public and media attention to the event.
- Contractors may voluntarily track selected costs associated with a work stoppage if they believe that a prolonged suspension of work will alter a project's cost and schedule. Contractors may want to collect this information for internal management purposes or to request an adjustment of contract terms in the future. For example, Bechtel estimated costs for both redesign work and lost productivity resulting from a change in seismic standards for the waste treatment plant.
- DOE may require a contractor to track particular costs associated with investigating an incident that it believes may violate DOE nuclear safety requirements or the Atomic Energy Act of 1954, as amended (these violations are referred to as Price-Anderson Amendment Act violations). DOE's Office of Enforcement notifies the contractor in a "segregation letter" that an investigation of the potential violation will be initiated and that the contractor must segregate, or separately identify, any costs incurred in connection with the investigation. These are not costs of corrective action or rework. The costs incurred in connection with the investigation are generally not allowable. Not all such investigations involve a work stoppage, however.

Of the 31 work stoppages reported to us by DOE officials, costs are available only for the July 2007 spill at the tank farm, since DOE specifically required the contractor to separately identify and report those costs. The costs of that incident totaled \$8.1 million and included expenditures for cleaning up contamination resulting from the spill, investigating the causes of the accident, investigating health effects of the accident on workers, administrative support, and oversight of remediation activities. These were all considered allowable costs, and DOE has reimbursed the contractor for them. Although a subsequent investigation took place to determine whether nuclear safety rules had been violated, the costs to participate in that investigation (\$52,913) were segregated as directed by DOE's Office of Enforcement and were not billed to the government.

Although DOE officials said that none of the reported work stoppages involved lost-productivity costs, the work stoppage to address the tank spill could well contribute to delays and rising costs for tank waste retrieval activities over the long run. Given that DOE was emptying only about one tank per year when we reported on Hanford tanks in June 2008,¹⁰ the 1-year suspension of waste retrieval activities, without additional steps to recover lost time, may contribute to delayed project completion. Many factors already contribute to delays in emptying the tanks. DOE has acknowledged that it will not meet the milestones agreed to with Washington State and the Environmental Protection Agency in the Tri-Party Agreement. We found that DOE's own internal schedule for tank waste retrieval, approved in mid-2007, reflects time frames almost 2 decades later than those in the agreement. Ultimately, delays contribute to higher costs because of ongoing costs to monitor the waste until it is retrieved, treated, and permanently disposed of, and estimated costs for tank waste retrieval and closure have been growing. DOE estimated in 2003 that waste retrieval and closure costs from 2007 onward—in addition to the \$236 million already spent to empty the first seven tanks—would be about \$4.3 billion. By 2006, this estimate had grown to \$7.6 billion. Because of limitations in DOE's reporting systems, however, we were unable to determine the specific effect of the tank spill on overall tank retrieval costs beyond the \$8.1 million in corrective action costs.

In addition, although specific costs were not available for the 2-year suspension of construction activities at two of the facilities in the waste treatment plant, we have previously reported on some of the potential impacts. In an April 2006 testimony,¹¹ we reported on the many technical challenges Bechtel had encountered during design and construction of the waste treatment plant. These ongoing technical challenges included changing seismic standards that resulted in substantial reengineering of the design for the pretreatment and high-level waste facilities, problems at the pretreatment plant with “pulse jet mixers” needed to keep waste constituents uniformly mixed while in various tanks, and the potential buildup of flammable hydrogen gas in the waste treatment plant tanks and pipes. In December 2005, Bechtel estimated that these technical problems could collectively add nearly \$1.4 billion to the project's estimated cost.

¹⁰[GAO-08-793](#).

¹¹[GAO-06-602T](#).

DOE Generally Pays All Costs, but Contractors Can Face Some Financial Consequences

Under the cost-reimbursement contracts for the tank farms and the waste treatment plant, costs associated with work stoppages, such as the costs of corrective action or construction rework, generally are allowable costs. As such, DOE generally pays these costs, regardless of whether they are separately identified or whether they are included in the overall costs of work performed.

Even though the contractors are being reimbursed for the costs associated with work stoppages, they can experience financial consequences, either through loss of performance fee or fines and penalties assessed by DOE or its regulators. For example, DOE may withhold payment of a performance award, called a fee, from contractors for failure to meet specified performance objectives or measures or to comply with applicable environmental, safety, and health requirements. The tank farm and waste treatment plant contractors both lost performance fee because of work stoppages as follows:

- For the July 2007 spill at the tank farms, under CH2M Hill’s “conditional payment of fee” provision, DOE reduced by \$500,000 the performance fee the contractor could have earned for the year. In its memo to the contractor, DOE stated that the event and the contractor’s associated response were not consistent with the minimum requirement for protecting the safety and health of workers, public health, and the environment. Nevertheless, DOE did allow CH2M Hill to earn up to \$250,000, or half the reduction amount, provided the contractor fully implement the corrective action plan developed after the accident investigation, with verification of these actions by DOE personnel.
- Bechtel also lost performance fee because of design and construction deficiencies at the waste treatment plant facilities and the 2-year delay on construction of the pretreatment and high-level waste facilities. Overall, DOE withheld \$500,000 in Bechtel’s potential performance fee for failure to meet construction milestones. In addition, DOE withheld \$300,000 under the “conditional payment of fee” provision in the contract after a number of serious safety events and near misses on the project.

Furthermore, in addition to having potential fee reduced for safety violations and work stoppages, DOE and other federal and state regulators may also assess fines or civil penalties against contractors for violating nuclear safety rules and other legal or regulatory requirements. These fines and penalties are one of the categories of costs that are specifically not allowed under cost-reimbursement contracts, and these costs are borne solely by the contractor. For example, DOE’s Office of Enforcement

can assess civil penalties for violations of nuclear safety and worker safety and health rules. Both contractors were assessed fines or civil penalties for the events associated with their work stoppages.

- Fines and penalties assessed against CH2M Hill for the July 2007 tank spill totaled over \$800,000 and included (1) civil penalties of \$302,500 assessed by DOE's Office of Enforcement for violation of nuclear safety rules, such as long-standing problems in ensuring engineering quality and deficiencies in recognizing and responding to the spill; (2) a Washington State Department of Ecology fine of \$500,000 for inadequacies in design of the waste retrieval system and inadequate engineering reviews; and (3) a fine of \$30,800 from the Environmental Protection Agency for delays in notification of the event. The contractor was required to notify the agency within 15 minutes of the spill but instead took almost 12 hours.
- From March 2006 through December 2008, DOE's Office of Enforcement issued three separate notices of violation to Bechtel, with civil penalties totaling \$748,000. These violations of nuclear safety rules were associated with procurement and design deficiencies of specific components at the waste treatment plant. In its December 2008 letter to the contractor, DOE stated that significant deficiencies in Bechtel's quality-assurance system represented weaknesses that had also been found in the two earlier enforcement actions.

Inadequate Oversight Cited as Contributing to Some Work Stoppages

For the majority of DOE's reported work stoppages, no supporting documentation was available to evaluate whether better oversight or regulation could have prevented them. For two incidents for which documentation was available—internal investigations and prior GAO work—a lack of oversight contributed to both. These two work stoppages occurred at the tank farms and the waste treatment plant, and both resulted from engineering-design problems. In a third case—efforts to address potentially hazardous vapors venting from underground waste storage tanks—DOE's efforts to enforce worker protections were found to have been inadequate, although this lack of oversight does not appear to have directly caused the work stoppage associated with the vapors problem.

Insufficient oversight was a factor in these three events as follows:

- *Accidental spill of radioactive and chemical wastes at tank S-102.* Specifically, the accident investigation report for the tank farm spill found that oversight and design reviews by DOE's Office of River Protection failed to identify deficiencies in CH2M Hill's tank pump system, which did

not meet nuclear safety technical requirements. The Office of River Protection failed to determine that this pump system did not have a needed backflow device to prevent excessive pressure in one of the hoses serving a tank, ultimately causing it to fail and release waste, which then overflowed from the top of this tank and spilled to the ground. In addition, the investigation found that CH2M Hill failed to respond to the accident in a timely manner and failed to ensure that nuclear safety requirements had been met.

- *Outdated ground-motion studies supporting seismic design of the waste treatment plant.* Lax oversight was also a factor in a second event at the waste treatment plant. GAO in 2006 found that DOE's failure to effectively implement nuclear safety requirements, including requirements that all waste treatment plant facilities would survive a potential earthquake, contributed substantially to delays and growing costs at the plant. The Defense Nuclear Facilities Safety Board first expressed concerns with the seismic design in 2002, believing that the seismic standards followed had not been based on then-current ground-motion studies and computer models or on geologic conditions directly below the waste treatment plant site. It took DOE 2 years to confirm that the designs for two of the facilities at the site—the pretreatment and the high-level waste facilities—were not sufficiently conservative. Revising the seismic criteria required Bechtel to recalculate thousands of design drawings and engineering estimates to ensure that key components of these facilities would be adequately anchored. Work was halted at the two facilities for 2 years as a result.
- *Controlling worker exposure to tank farm vapors.* In 2004, DOE's then Office of Independent Oversight and Performance Assurance (today reorganized as DOE's Office of Health, Safety, and Security) investigated vapor exposures at the Hanford tank farms and the adequacy of worker safety and health programs at the site, including the adequacy of DOE oversight. Investigators were unable to determine whether any workers had been exposed to hazardous vapors in excess of regulatory limits but found several weaknesses in the industrial hygiene (worker safety) program at the site, in particular, hazard controls and DOE oversight. According to the investigation, the Office of River Protection had not effectively overseen the contractor's worker safety program; had failed to provide the necessary expertise, time, and resources to adequately perform its management oversight responsibilities at the tank farms; and had failed to ensure corrective action for identified problems. After the investigation, DOE stepped up its monitoring efforts at the tank farms, and the contractor provided tank farm workers with supplied air, an action

that slowed or halted work at the tank farms for about 2 weeks while supplied air equipment was secured and workers were trained to use it.

With regard to regulations, however, officials we interviewed from DOE, the Defense Nuclear Facilities Safety Board, and the Office of Inspector General said they did not believe that insufficient regulation was a factor in these two events. Officials from the Nuclear Regulatory Commission declined to comment on the sufficiency of regulations.

Conclusions

The final cost to the American public of cleaning up the Hanford Site is expected to reach tens of billions of dollars. Consequently, factors that can potentially escalate costs—including work stoppages—matter to taxpayers, DOE, and Congress. Depending on what causes a work stoppage and how long it lasts, some stoppages could increase already substantial cleanup costs. Although prudent oversight would seem to call for DOE to understand the reasons for work stoppages and the effects of these work stoppages on costs, neither law nor regulation requires that this information be systematically recorded and reported. DOE and other stakeholders have expressed reservations that collecting information on work stoppages could send a message that work stoppages should be minimized, thus discouraging managers or workers from reporting potential safety or construction quality issues. We recognize that the opportunity for any manager or worker to call a work stoppage when worker safety or construction quality is at stake is an integral part of DOE's safety and construction management strategies and should not be stifled. Yet DOE has also recognized the importance of cost information and in one recent case—the 2007 tank waste spill—required the contractor to separately track detailed cost information. In addition, we previously recommended that DOE require contractors to track the costs associated with future work stoppages, similar to the one at Los Alamos National Laboratory in 2004, and DOE agreed with this recommendation. While acknowledging these competing pressures, we believe that systematically collecting cost information on selected work stoppages can increase transparency and yet balance worker and public safety.

Recommendations for Executive Action

To provide a more thorough and consistent understanding of the potential effect of work stoppages on project costs, we recommend that the Secretary of Energy take the following two actions: (1) establish criteria for when DOE should direct contractors to track and report to DOE the reasons for and costs associated with work stoppages, ensuring that these

criteria fully recognize the importance of worker and nuclear safety, and (2) specify the types of costs to be tracked.

Agency Comments and Our Evaluation

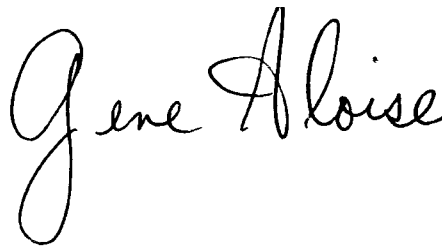
We provided a draft of this report to the Secretary of Energy for review and comment. In written comments, the Chief Operations Officer for Environmental Management generally agreed with our recommendations, stating that they will be accepted for implementation within the Environmental Management program. The comments (which are reproduced in app. III) were silent on whether the recommendations will be implemented in other DOE programs.

In its comments, DOE expressed concern that readers of appendix II could misconstrue the information in the column labeled “Duration” as representing a delay in the entire listed project, not simply the time required to resolve the specific issue in question; DOE maintains that during this time, workers were shifted to other work activities. We found, however, that some of the short work stoppages, which DOE termed “safety pauses,” were specifically called to allow the contractor to refresh workers’ understanding of workplace hazards; in these cases, which were essentially training exercises, workers were not reassigned to other work activities. Other work stoppages may have led to workers’ assignment to other activities, but we were unable to verify to what extent reassignment occurred because the documentation available on work stoppages was limited. Finally, during the 2-year delay due to seismic concerns in waste treatment plant construction, work on two facilities—the pretreatment plant and high-level waste facility—was ultimately suspended from August 2005 until August 2007, and about 900 workers were laid off, not reassigned. We added a footnote to table 1 to clarify the “Duration” column.

Regarding our discussion of the role of oversight in several work stoppages, DOE acknowledged that inadequate oversight was a factor in the cited work stoppages and stated that the Office of Environmental Management has implemented corrective actions to address these contributing factors. Evaluating these actions and the resulting outcomes, if any, however, was beyond the scope of our report. We incorporated other technical comments in our report as appropriate.

As agreed with our offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Secretary of Energy and interested congressional committees. The report also will be available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staffs have any questions about this report, please contact me at (202) 512-3841 or aloisee@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix IV.

A handwritten signature in black ink that reads "Gene Aloise". The signature is written in a cursive style with a large, looping initial "G".

Gene Aloise
Director, Natural Resources and Environment

Appendix I: Scope and Methodology

To determine the number of times work was suspended at the Hanford site, we obtained from the Department of Energy's (DOE) Office of River Protection officials a listing of work stoppages occurring from January 2000 through December 2008 at either the waste treatment plant or the tank farms. We did not review other work stoppages that may have occurred elsewhere at the Hanford Site during this period.

We sought to independently verify the 31 work stoppages identified by DOE and to uncover additional information about them, including the nature of the event and the duration and the scope of each, by reviewing the following:

- DOE's Occurrence Reporting and Processing System, a database of reportable accidents and other incidents affecting worker, public, and environmental safety;
- DOE's database of investigation reports on accidents causing serious injury to workers or serious damage to the facility or the environment;
- DOE citations issued against contractors for violating nuclear safety regulations;¹
- Defense Nuclear Facilities Safety Board reports addressing Hanford Site safety problems; and
- Bechtel National Inc. and CH2M Hill Hanford Group Problem Evaluation Requests, internal reports of incidents or accidents involving safety issues.

We were unable to independently verify DOE's list of work stoppages from these sources, however, because in most cases, the reporting systems did not indicate whether safety incidents had halted work or, if so, for how long. In addition, these reporting systems focus on safety incidents and do not specifically address construction rework and design problems, which represent about half the work stoppages reported by DOE.

Of the 31 work stoppages reported, however, we were able to obtain additional information from other sources for three specific events. These were (1) ongoing problems protecting workers from potentially harmful vapors venting from the tank farms, (2) a radioactive waste spill from tank

¹DOE is authorized under 42 U.S.C. § 2282a to impose civil monetary penalties for violations of DOE nuclear safety regulations.

S-102 in July 2007, and (3) the seismic redesign from August 2005 to August 2007 of the waste treatment plant pretreatment and high-level waste facilities. To obtain a more thorough understanding of these three work stoppages, what caused them, and how problems were corrected, we reviewed DOE, contractor, and Office of the Inspector General evaluations of these events, including official accident reports, external independent investigations, and our 2006 testimony on cost and schedule problems at the Hanford waste treatment plant.²

To determine the types of costs associated with work stoppages, we reviewed Federal Acquisition Regulation reporting requirements for cost-reimbursement contracts and Defense Contract Audit Agency guidance on auditing incurred costs. To gain a better understanding of the costs associated with lost productivity resulting from a work stoppage, we reviewed cost-estimating guidance from the Association for the Advancement of Cost Engineering International and earned value management guidance by GAO and by the National Research Council. To develop an understanding of the costs paid by the government, compared with those absorbed by the contractor, we reviewed Bechtel National Inc. and CH2M Hill Hanford Group requests to DOE for equitable adjustments to their respective contracts to recover lost productivity and other costs linked to work stoppages. We reviewed the Atomic Energy Act of 1954, as amended, and the letters sent from DOE to contractors requesting that they segregate costs incurred in connection with investigations of potential violations of the law and DOE nuclear safety requirements. We reviewed assessments by Washington State, DOE, and federal regulators fining Bechtel and CH2M Hill Hanford Group for safety violations and other problems at the Hanford Site since 2000. Finally, we interviewed contractor and Office of River Protection finance officials to determine cost-accounting requirements and practices.

To determine whether more-effective regulation or oversight might have prevented the work stoppages, we relied primarily on Office of River Protection and Bechtel officials' assessments of these events because supporting documentation was generally unavailable. For 3 of the 31 work stoppages, we reviewed numerous internal DOE, external independent, and contractor evaluations to assess whether lack of oversight was a contributing factor. To gain further perspective on how lack of oversight or regulations might have played a role in these work stoppages, we

²[GAO-06-602T](#).

interviewed DOE headquarters officials with the Offices of Environmental Management; Health, Safety, and Security; and General Counsel. We interviewed officials with regulatory and oversight entities, including the Defense Nuclear Facilities Safety Board, the Occupational Safety and Health Administration, and the Nuclear Regulatory Commission. We also interviewed union representatives at the Hanford Site to obtain the union's and workers' perspectives on work stoppages and safety.

We conducted this performance audit from June 2008 to April 2009, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Work Stoppages Identified by the Office of River Protection

We obtained and reviewed information on 31 work stoppages that occurred at the Hanford Site from January 2000 to December 2008; these are summarized in table 1.

Table 1: Summary of Work Stoppages at the Hanford Site, January 2000 to December 2008 (in order of duration)

	Date of occurrence	Duration ^a	Reason for work stoppage	Type of event ^b	Location
1.	Oct. 2007	1 hour	Sitewide safety pause	A	Waste treatment plant
2.	Oct. 2007	½ day	Safety pause	A	Tank farms
3.	Mar. 2007	½ day	Safety pause to address newly implemented improvements to safety statistics and management program	A	Tank farms
4.	Oct. 2004	6 hours	Injury to worker exiting heavy equipment at the integrated disposal facility	C	Tank farms
5.	Oct. 2006	1 day	Forklift collision with a vehicle	C	Tank farms
6.	Sept. 2005	1 ½ days	Sitewide pause to address hazardous energy use	A	Waste treatment plant
7.	June 2003	2 days	Personnel contaminated by radiation exposure during removal of a waste transfer line jumper assembly	C	Tank farms
8.	June 2008	2 days	Changed workers' protective equipment from self-contained tank air to respirators with contaminant-filtering cartridges	A	Tank farms
9.	June 2008	2 days	Radiation contamination spread to the back area of a facility that evaporates water contained in tank waste, to reduce the volume of that waste. As a result, the Office of River Protection issued a new order outlining additional work controls for the area.	A	Tank farms
10.	July 2004	1 week	A nuclear chemical operator exceeded the maximum extremity and skin radiation exposure level during removal of an instrument used to measure temperature in the tanks	C	Tank farms
11.	June 2002	1 month	Damage to a crane due to operator error requiring repair; delayed use of site cranes; required alternate crane configuration, causing inefficiencies	C	Waste treatment plant
12.	Jan. 2007	1 month	Hazardous air sample identified during welding operations	A	Waste treatment plant
13.	Not available	1 ½ months	Repeated violations of a safety procedure, called a lock-out, tag-out, to ensure that dangerous machines are properly shut off and not started up again before completion of maintenance or servicing. Procedure requires that a tag be affixed to the locked device, indicating that it should not be turned on.	A	Tank farms
14.	Oct. 2002	3 months	Reinspection and reinforcement of undersized structural steel welds at the low-activity waste facility	B	Waste treatment plant

	Date of occurrence	Duration^a	Reason for work stoppage	Type of event^b	Location
15.	Feb. 2005	4 months	Welding manual rewritten to comply with requirements of the authorization basis for waste treatment plant	B	Waste treatment plant
16.	May 2005	6 months	Redesign of structural steel fabrication drawings	B	Waste treatment plant
17.	Oct. 2005	6 months	Laboratory testing showed that recently poured concrete was not meeting the necessary strength requirements of either 4,000 or 5,000 pounds of pressure per square inch. The contractor found that the concrete plant supplying the aggregate had changed the grind of its constituents during the winter months, weakening the concrete.	B	Waste treatment plant
18.	Apr. 2005	6 months	Faulty fabrication of leak detection box	B	Waste treatment plant
19.	Oct. 2007	6 months	Contractor procured from suppliers piping that had not received the required 100 percent radiographic testing to identify hidden flaws in welds. These pipes were to be installed in heavily shielded concrete cells (called black cells) that would not be physically accessible following the completion of construction because of high radiation exposure.	B	Waste treatment plant
20.	July 2002	7 months	"Cold joint" formed in concrete at the low-activity waste facility because pouring was interrupted, creating a weak area that could allow water to enter	B	Waste treatment plant
21.	Sept. 2004	9 months	Process tanks intended for installation in black cells did not receive the required 100 percent radiographic testing to identify hidden flaws. Three tanks had already been installed and had to be examined and repaired in place at the pretreatment and high-level waste facilities as a result.	B	Waste treatment plant
22.	Mar. 2007	10 months	Repairs to degraded air compressors and equipment	B	Waste treatment plant
23.	June 2005	1 year	Delay covering coaxial transfer pipe with soil because it did not meet sloping requirements and had to be reconfigured	B	Waste treatment plant
24.	July 2007	1 year	Suspension of work in S-102 and C-108 tanks to address radioactive waste spill; C-104 activities also suspended	C	Tank farms
25.	Jan. 2006	1 ½ years	Rework to reapply appropriate fire protection coating onto structural steel	B	Waste treatment plant
26.	Feb. 2006	2 years	Requirements were not met to ensure that commercially procured components for the facility were suitable for nuclear use. As a result, the contractor halted activities until fully developing and implementing a new procurement program to ensure those requirements could be met.	B	Waste treatment plant

	Date of occurrence	Duration^a	Reason for work stoppage	Type of event^b	Location
27.	Aug. 2005	2 years	Seismic ground-motion review including soil sampling, data analysis, and development of appropriate design criteria and implementation of changes	B	Waste treatment plant
28.	Oct. 2005	2 ¼ years	Revised requirements to ensure that design of joggle boxes had adequate shielding from radiation hazards. Joggle boxes are used to ensure that structural penetrations at 90-degree angles (such as walls or floors) are designed in such a way that radiation is blocked from leaving one room and entering another.	B	Waste treatment plant
29.	July 2003	Unknown	Rework to address construction equipment and temporary power installations that did not comply with electrical codes	B	Waste treatment plant
30.	Feb. 2008	Unknown	Failed battery in a respirator halted work inside high-contamination area	A	Tank farms
31.	2004	Intermittent during 2-week period	Protection of workers exposed to potentially hazardous vapors escaping from underground tanks	C	Tank farms

Source: GAO summary of DOE Office of River Protection information.

^aTime spans in this column represent the time needed to resolve the issue described. Workers may have been reassigned to other activities during these times, but we were unable to verify the extent to which reassignment occurred.

^bLetters in this column denote the following: A, pause in work activity to address unsafe situation or prevent recurrence of unsafe incident; B, delay of activity to perform rework or to address faulty workmanship, poor installation, or quality assurance issues, including compliance with nuclear safety management requirements identified in 10 C.F.R. part 830; C, suspension of activity to address workplace accident, physical damage, or injury.

Appendix III: Comments from the Department of Energy



Department of Energy
Washington, DC 20585

APR 24 2009

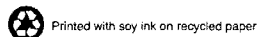
Mr. Gene Aloise
Director
Natural Resources and Environment
Government Accountability Office
441 G Street, N.W.
Washington, DC 20548

The Environmental Management (EM) Program has reviewed the Government Accountability Office (GAO) draft report entitled *Nuclear and Worker Safety: Limited Information Exists on Costs and Reasons for Work Stoppages at DOE's Hanford Site*, GAO-09-451, which was provided to the Secretary of Energy on March 27, 2009. The recommendations included: 1) establish criteria for when Department of Energy (DOE) should direct contractors to track and report the reasons for and costs associated with work stoppages, and 2) specify the types of costs to be tracked. EM accepts these recommendations for implementation within the EM program.

However, there is a significant likelihood for misrepresentation in Appendix II. The table lists the "Duration" it took to resolve the "Reason for the work stoppage" issue. As stated throughout the body of the report, when there was a work stoppage, whether due to a safety concern or a quality concern, the workers were shifted to other work activities until the issue was resolved. Thus, it is imperative to ensure that the reader of Table 1 understands that when an issue resulted in work stoppage, it did not affect the work on the entire project area and workers affected by the work stoppage in the specific area were shifted to other work activities. Therefore, it is essential that the following clarification be made to Table 1, Appendix II: 1) revise the column which reads "Duration" to "Issue Resolution Duration", and 2) add to the title – "The "Issue Resolution Duration" is the time to resolve the issue for the "Reason for the work stoppage" and during this period workers were assigned to other work activities".

Page 17 of the report identifies inadequate oversight as factors in several work stoppages. EM acknowledges that inadequate oversight was a factor in the cited work stoppages; however EM has implemented corrective actions to address these contributing factors. Additionally, EM has established a number of processes that promote enhanced DOE engagement in oversight of design and engineering activities. These include use of technology readiness assessments, external technical reviews, and establishment of a Technical Authority Board.

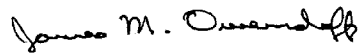
Further, on page 6, the 3rd paragraph indicates the work stoppages result from safety or construction concerns. Thus, in the 3rd sentence, "accident" should be replaced with "event or issue".



**Appendix III: Comments from the Department
of Energy**

Thank you for the opportunity to provide comments on the draft report. If you have any further questions, please contact Mr. Dae Chung, Deputy Assistant Secretary for Safety Management and Operations, at (202) 586-5151.

Sincerely,



James M. Owendoff
Chief Operations Officer for
Environmental Management

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Gene Aloise, (202) 512-3841, or aloisee@gao.gov

Staff Acknowledgments

In addition to the individual named above, Janet Frisch, Assistant Director; Carole Blackwell; Ellen W. Chu; Brenna McKay; Mehrzad Nadji; Timothy M. Persons, Chief Scientist; Jeanette Soares; Ginny Vanderlinde; and William T. Woods made key contributions to this report.

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