

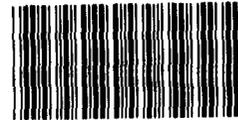
GAO

Report to the Chairman, Environment,
Energy, and Natural Resources
Subcommittee, Committee on
Government Operations, House of
Representatives

January 1992

NUCLEAR WASTE

Weak DOE Contract Management Invited TRUPACT-II Setbacks



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**Resources, Community, and
Economic Development Division**

B-245872

January 14, 1992

The Honorable Mike Synar
Chairman, Environment, Energy,
and Natural Resources Subcommittee
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

As requested by your office, this report discusses the results of our review of the Department of Energy's procurement of nuclear waste shipping containers for its Waste Isolation Pilot Plant in New Mexico.

Unless you publicly release its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to appropriate congressional committees, the Secretary of Energy, and other interested parties. We will also make copies available to others upon request.

Please call me at (202) 275-1441 if you have any questions. Major contributors to this report are listed in appendix II.

Sincerely yours,

Victor S. Rezendes
Director, Energy Issues

Executive Summary

Purpose

The Department of Energy (DOE) spent about \$3 million to purchase 24 defective shipping containers. These containers were intended to safely package and transport transuranic waste from nuclear facilities for storage at DOE's Waste Isolation Pilot Plant (WIPP) in New Mexico.¹ The containers were designed and built by Nuclear Packaging, Inc. (NuPac), under a subcontract with Westinghouse, DOE's managing contractor for WIPP. Concerned about the management of this subcontract, the Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, asked GAO to determine (1) what defects were found in the containers and why DOE purchased them, (2) if DOE's contracting strategy was effective, and (3) if oversight of the subcontract was adequate.

Background

In September 1987 Westinghouse awarded NuPac a \$3.5-million subcontract to (1) design, build, and test a prototype container, (2) obtain design approval from the Nuclear Regulatory Commission (NRC), (3) deliver three containers and one trailer to carry the containers by October 1, 1988, and (4) deliver three more containers and a trailer by November 1, 1988. Later, Westinghouse ordered 45 more containers and 15 trailers for \$10.6 million.

Results in Brief

While smoothing welded surfaces of metal walls on 24 containers, NuPac ground the walls too thin in spots to meet NRC's approved design. When NRC later disapproved the thin-walled containers, NuPac stopped production. Concerned that NuPac might declare bankruptcy and therefore jeopardize WIPP's opening on schedule, DOE allowed Westinghouse to enter into an agreement with NuPac to, among other things, build 15 NRC-approved containers and purchase the defective containers.

Ineffective contracting practices led to DOE's purchase of the defective containers. GAO identified the following contracting weaknesses:

- The contract type—firm-fixed-price—is typically used to purchase items made from accepted designs, such as off-the-shelf products. This contract type was inappropriate for designing, testing, and obtaining NRC's approval of a first-of-a-kind container because of the inherent uncertainty in these activities.

¹ Transuranic waste includes items such as rags, rubber gloves, and plastic bags radioactively contaminated by substances such as plutonium that must be safeguarded for thousands of years.

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- The contract allowed NuPac to build containers and made provision for Westinghouse to order more containers before NRC had approved the design and container fabrication methods.
 - Ambiguous contract terms on the ownership of certain production assets weakened the government's position in the event of unsatisfactory performance by NuPac.

Ineffective oversight by Westinghouse and DOE exacerbated the situation. Westinghouse allowed the production of the containers to continue after problems were found, even though the issue had not been resolved with NRC. Furthermore, DOE played no role in oversight of the fabrication of the containers until NRC had rejected the thin-walled containers.

The problems with the subcontract illustrate ineffective contracting practices and contractor-management problems that are systemic in DOE. Historically, DOE has given its contractors wide latitude but has performed little oversight. Although DOE is making changes to improve its contract-management approach, instituting effective, lasting changes will be difficult. GAO is reviewing DOE's contracting practices systemwide.

Principal Findings

Defective Containers Purchased

In September 1989 NRC found weld cracks in the wall seams of 12 containers. Later, while repairing welds and making welds on these and other containers, NuPac ground areas around some welds on 24 assembled and partially assembled containers to 38 to 58 percent of the minimum allowable wall thickness. NuPac, with Westinghouse's concurrence, accepted these fabrication variations because containers that had been successfully tested under accident conditions also had thin areas. Following a February 1990 inspection, however, NRC declared the 24 containers unacceptable because the thin metal did not meet the container design standards it had approved.

NuPac then stopped work and requested a \$4-million cash advance to finance renewed production. Westinghouse refused and by mid-1990 concluded that NuPac's financial condition was poor enough to threaten production of new containers. Also, ownership of critical container-fabrication drawings and tools was unclear. To avoid litigation over these assets and ensure timely fabrication of containers, Westinghouse

decided to retain NuPac. With DOE's encouragement, Westinghouse negotiated a settlement in which NuPac agreed to fabricate and deliver 15 NRC-approved containers and to transfer ownership of production assets, the defective containers, and 17 completed trailers to the government. Westinghouse in turn agreed to pay NuPac about \$5.6 million in addition to the \$8.4 million already paid to the subcontractor.

Procurement Strategy Was Inappropriate

In a 1988 review of Westinghouse's procurement activities, DOE found that many of the contractor's procurement decisions had been driven by WIPP's schedule. This was clearly the case on the container subcontract. The original 14-month performance period was too short to develop, test, and obtain NRC's approval of the design and to fabricate six containers by the proposed WIPP opening date. So little time was available because DOE had recently abandoned a 9-year effort to certify that its own single-walled container design was equivalent in safety to the double-walled container design required under NRC regulations.

The firm-fixed-price contract that Westinghouse awarded to NuPac was inappropriate for several reasons. First, the work was largely research and development. Addressing and resolving design, testing, and NRC-approval issues on the containers and trailers required numerous change orders over an additional year that increased the original contract cost by \$2.5 million. Federal procurement regulations state that, when performance uncertainties preclude accurate cost estimation, cost-reimbursable types of contracts are suitable.

Furthermore, despite the uncertainties associated with obtaining NRC's approval of the container design, the contract anticipated that Westinghouse would order more containers and that NuPac would begin to fabricate containers before NRC approved them. As a result, by the time that NRC became aware of the wall-thinning problem, Westinghouse had ordered 45 additional containers and NuPac had 24 containers in production. Had the contract required that NRC (1) approve the design before the first container was fabricated and (2) accept the first container before NuPac fabricated additional containers, Westinghouse would have had an adequate basis to purchase more containers.

Oversight of Subcontract Was Ineffective

Ineffective oversight by Westinghouse and DOE contributed to the production of defective containers. Westinghouse, for example, questioned, but then accepted, NuPac's decisions to build containers before NRC approved the container design and to accept the thin-walled containers.

Also, although DOE participated in container-testing activities, it was not actively involved in container fabrication until after NRC had rejected the defective containers.

DOE Policies Are a Major Contributing Cause

The rush to acquire NRC-approved containers and the resulting procurement and oversight problems are symptomatic of DOE's long-standing approach to managing its nuclear complex. DOE gives its contractors wide latitude and does little to hold them accountable. These contractors are generally not required to comply with federal procurement regulations. By way of illustration, DOE's contract with Westinghouse required the contractor only to make its "best efforts" to manage WIPP, and the contract's container-related performance requirements were vague. DOE's ability to hold Westinghouse accountable for the container subcontract was limited to factoring the company's performance on that subcontract into a larger evaluation of the contractor's management of WIPP. As a result, DOE reduced Westinghouse's management fee during fiscal year 1990 by about \$50,000 to \$82,000. The contractor's total award fee for the year was \$1.88 million.

On the basis of reviews by GAO and others over the last 10 years, GAO believes that correcting the problems identified with the award and oversight of the container subcontract requires action beyond the scope of the subcontract. GAO is addressing this larger issue in other audits, including a general management review of DOE's operations.

Recommendations

This report makes no recommendations.

Agency Comments

As agreed with the requester, GAO did not obtain written agency comments on this report. However, GAO discussed the facts in the report with officials of DOE, Westinghouse, and NuPac, who generally agreed with their accuracy. Their comments have been incorporated where appropriate.

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Abbreviations

ASTM	American Society of Testing and Materials
DEAR	Department of Energy Acquisition Regulation
DOE	Department of Energy
DOT	Department of Transportation
EEG	New Mexico Environmental Evaluation Group
ES&H	Environment, Safety, and Health
FAR	Federal Acquisition Regulation
GAO	General Accounting Office
M&O	Management and Operating Contract(or)
NRC	Nuclear Regulatory Commission
TRUPACT-II	Transuranic Packaging Transporter II
TRU	transuranic
WIPP	Waste Isolation Pilot Plant

Introduction

Transuranic (TRU) wastes have been generated by the federal government since the beginning of its nuclear weapons program in the 1940s. TRU wastes are discarded material (e.g., machinery, tools, filters, rubber gloves, paper, rags, glassware, sheet metal, and sludge from reprocessing of nuclear fuels) contaminated with man-made radioactive elements, such as plutonium and americium, having atomic numbers greater than uranium. Because TRU waste elements are toxic and remain radioactive for thousands of years, they must eventually be isolated from the accessible environment.

TRU wastes generated by the Department of Energy (DOE) are either buried in the soil or stored in a retrievable manner at its Idaho National Engineering Laboratory, Idaho; Hanford Reservation, Washington; and four other DOE sites. In addition, TRU wastes are generated and temporarily stored at other sites, including the Rocky Flats Plant in Colorado, DOE's largest TRU waste generator. Until recently, when it temporarily shut the facility down, DOE generated about half of all TRU wastes at Rocky Flats and then shipped the waste to Idaho for storage.

The search for a disposal site for TRU waste began in the 1950s. In November 1975 DOE selected locations in southeastern New Mexico and, shortly thereafter, settled on a site about 26 miles east of the city of Carlsbad, New Mexico. By legislation enacted in December 1979, the Congress authorized DOE to construct the Waste Isolation Pilot Plant (WIPP) to demonstrate the safe disposal of TRU waste in an underground repository. Since then, DOE has constructed the surface facilities required for full-scale TRU waste disposal operations, one of seven planned underground disposal areas, and four vertical shafts connecting the surface and underground facilities.

In 1983 DOE decided to ship 125,000 drums of TRU waste to be stored at WIPP during a 5-year period beginning in October 1988 to demonstrate safe, efficient waste storage operations. DOE later reduced the amount of waste to be shipped to WIPP during the 5-year period because of public concerns about the propriety of emplacing large amounts of waste in WIPP before compliance with the Environmental Protection Agency's standards for disposing of radioactive wastes in underground repositories had been determined.

DOE Must Meet Federal Requirements for Shipping TRU Waste to WIPP

Transporting TRU waste from DOE's facilities to WIPP requires shipping containers that will provide shielding from radiation and will reliably withstand transportation accidents without releasing radioactive materials. Accordingly, the containers must be designed and manufactured to meet federal standards. The Department of Transportation (DOT) regulates the transportation of hazardous materials, including radioactive materials. By agreement with the Nuclear Regulatory Commission (NRC), which regulates commercial nuclear activities, DOT requires that relatively hazardous, commercially owned radioactive materials be shipped in containers that have been manufactured in accordance with designs certified (approved) by NRC.

To obtain NRC's certification, an applicant must demonstrate the safety of the container design under both normal and hypothetical accident conditions. The demonstration is made either by physical testing (conducted on a sample container or scale model of the container) or by another method acceptable to NRC, such as computer modeling or design analysis. For normal transport conditions, NRC requires tests, modeling, or analyses that evaluate the container's ability to withstand hot and cold temperature extremes, typical transport vibrations, and free falls onto unyielding surfaces. Requirements for hypothetical accident conditions include tests, modeling, or analyses of the container's ability to withstand (1) a 30-foot free drop onto an unyielding surface, (2) a puncture test consisting of a free drop of 40 inches onto a 6-inch diameter steel pin, (3) exposure to 1,475 degrees Fahrenheit for 30 minutes, and (4) immersion in 3 feet of water for 8 hours without leaks. NRC also reviews an applicant's quality assurance program—its process for demonstrating that work results can be relied upon—to ensure that the program conforms to NRC's standards for the design, testing, fabrication, assembly, repair, modification, and use of containers.

DOE is exempted from DOT's requirements for certification of containers by NRC in two ways. First, DOT's regulations do not apply to DOE's "non-commercial" shipments, such as nuclear weapons packages, made in federally owned and operated trucks and rail cars. Second, a 1973 agreement between DOT and the Atomic Energy Commission—a predecessor to DOE and NRC that both operated nuclear facilities and regulated commercial nuclear power—permitted the Commission to self-certify the safety of its own "commercial," or non-weapons package, shipping containers. This agreement between DOE and DOT remains in effect. To certify its container designs, DOE must determine that the designs and manufacturing processes meet safety standards that are equivalent to NRC's standards.

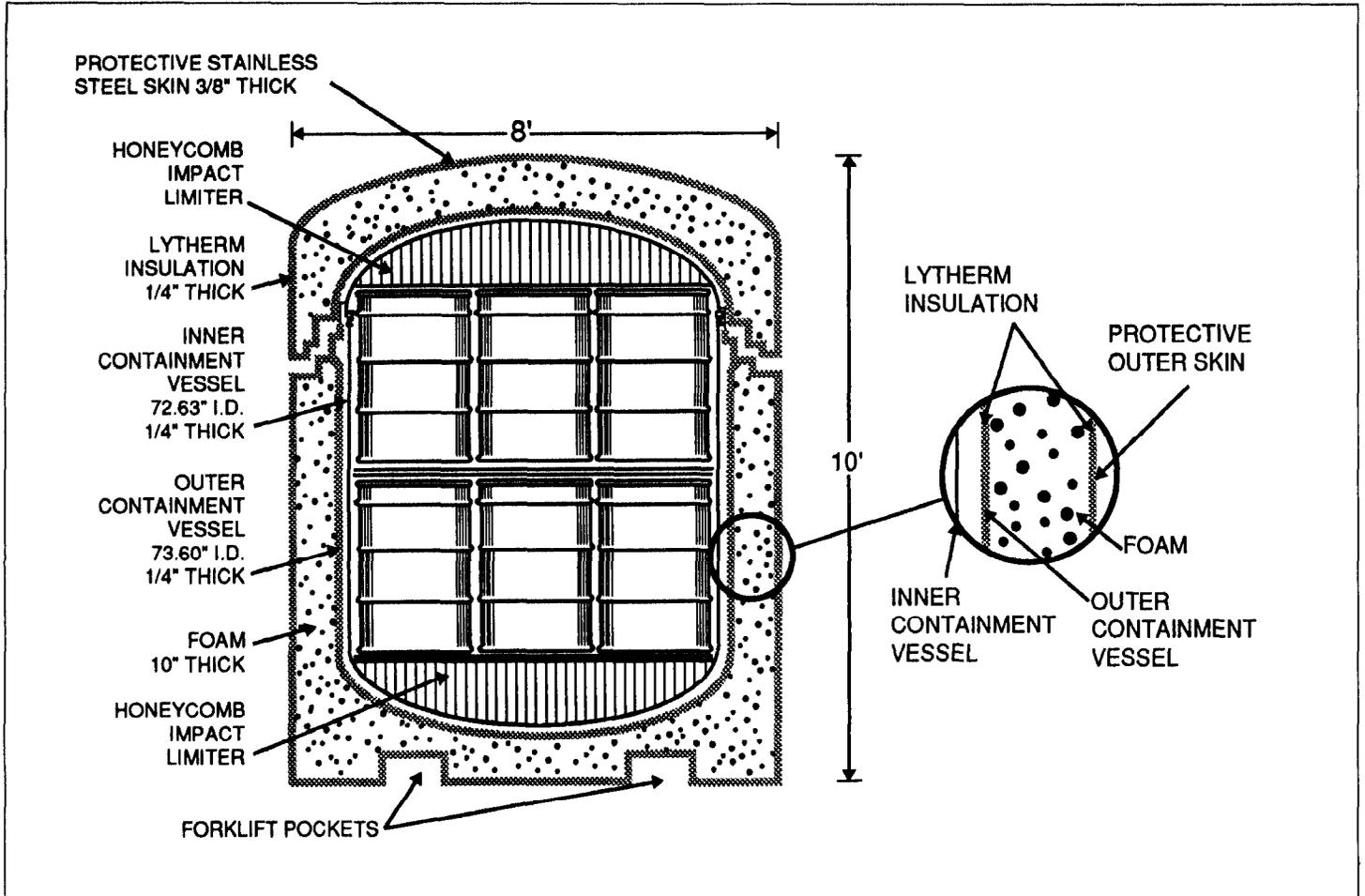
The TRUPACT-II Container

Although DOT permits DOE to self-certify its containers, DOE agreed, in an August 1987 agreement with the state of New Mexico, to obtain NRC's certification of a shipping container for TRU waste. This followed a 9-year effort by DOE to develop a shipping container that failed to meet NRC's container design standards.¹ DOE then assigned its management and operating (M&O) contractor for WIPP, Westinghouse Electric Corporation, to procure the containers. In September 1987 Westinghouse subcontracted with Nuclear Packaging, Inc. (NuPac), a subsidiary of Pacific Nuclear Systems, Inc., to provide six NRC-certified Transuranic Packaging Transporter II (TRUPACT-II) containers and two truck-trailers for hauling the containers; the price was \$3.5 million.

TRUPACT-II is a cylindrical container within a container (double containment) having a flat bottom and a domed lid. The container is about 10 feet high and about 8 feet wide. The inner containment vessel cavity, about 6 feet in diameter and 6 feet tall, can hold fourteen 55-gallon metal drums of TRU waste. Unlike conventional containers, which use bolted lids, the TRUPACT-II's inner and outer vessels have removable lids with O-ring seals. The lids rotate to close, much like a pressure cooker, with fingers and tabs that align when closed. The outer containment vessel is surrounded by approximately 10 inches of polyurethane foam that acts as both a thermal insulator and an energy-absorbing cushion. Surrounding the foam is a stainless steel shell that protects the vessel by absorbing impacts. This sandwichlike method of construction increases the package's strength and safety to withstand accidents associated with transport. Figure 1.1 shows the TRUPACT-II design.

¹ Chapter 3 discusses DOE's certification problems with the previous container design.

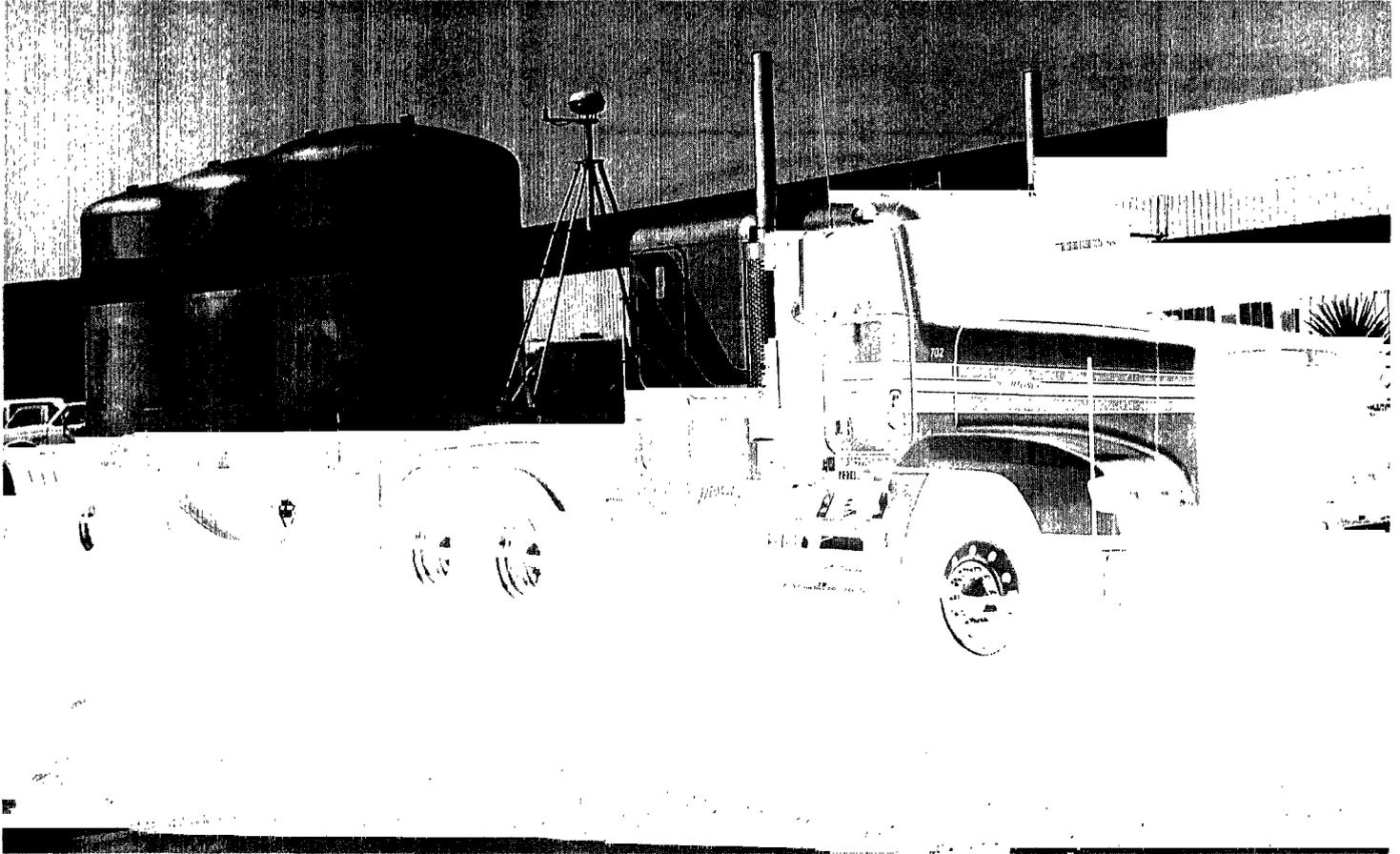
Figure 1.1: The Double-Containment TRUPACT-II Package



Source: DOE.

Three containers are to be carried by a tractor-trailer rig. (See figure 1.2.) The combined maximum weight of the truck, trailer, and three containers is about 80,000 pounds. Each container weighs about 19,250 pounds when loaded with the maximum allowable contents (payload) of 7,265 pounds.

Figure 1.2: Three TRUPACT-IIs Loaded on a Trailer



Source: DOE.

NuPac designed, fabricated, and evaluated the design of several TRUPACT-II containers, primarily through a physical test program. On the basis of the test results, NuPac obtained NRC's certification of the container design and fabricated several containers intended for use in shipping TRU waste. In attempting to repair cracks detected in welds on the walls of these containers, however, NuPac ground the container walls too thin and, therefore, NRC would not allow the containers to be used to ship TRU waste. NuPac then stopped producing containers pending resolution of the problem. Subsequently, Westinghouse, with DOE's approval, purchased the defective containers for DOE and modified the contract with NuPac to build 15 new certified containers.

Objectives, Scope, and Methodology

Concerned about DOE's purchase of defective TRUPACT-II containers and whether oversight weaknesses on DOE's part might have contributed to the problem, the Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, asked us to determine

- what defects were found in the containers and why DOE purchased them,
- the effectiveness of DOE's strategy for procuring the containers, and
- if oversight of the contract by Westinghouse and DOE was adequate.

We conducted our review at DOE headquarters, Washington, D.C.; the agency's Albuquerque Operations Office, Albuquerque, New Mexico; and its WIPP Project Office, Carlsbad, New Mexico. Also, we visited and obtained documents from Westinghouse and the TRUPACT-II assembly facility in Carlsbad; NuPac and Pacific Nuclear Systems, Inc., offices at Federal Way, Washington; NRC headquarters, Rockville, Maryland; the state of New Mexico's Environmental Evaluation Group, Carlsbad and Albuquerque; and Southwest Research Information Center, Albuquerque.

TRUPACT-II Defects and DOE's Purchase of Defective Containers

To determine what defects were found in the containers, we interviewed staff in NRC's Transportation Branch, Division of Safeguards and Transportation, Office of Nuclear Material Safety and Safeguards, and reviewed their files on the TRUPACT-II container. We also reviewed NRC's container regulations, correspondence on container certification processes, and reports on NuPac's quality assurance fabrication activities. We did not, however, independently evaluate NRC's nuclear waste shipping container certification or inspection processes. We also interviewed NuPac and Pacific Nuclear Systems, Inc., officials and obtained files, records, and correspondence from them concerning the TRUPACT-II fabrication problems and their quality assurance program.

In addition, we interviewed officials at Westinghouse's Waste Isolation Division at WIPP, DOE's WIPP Project Office and Albuquerque Operations Office, and the DOE headquarters Office of Environmental Restoration and Waste Management. During these interviews, we obtained supporting documentation on the container fabrication problems and copies of relevant DOE and Westinghouse audit reports.

To determine why DOE purchased the defective containers, we interviewed DOE, Westinghouse, and NuPac officials who provided us with documentation on (1) NuPac's financial condition, (2) alternatives to

continued production of the containers, and (3) corrective actions taken to prevent similar production problems. In addition, we reviewed TRUPACT-II contract cost and payment information that Westinghouse generated prior to August 1990; however, we did not verify the accuracy of this information.

Finally, we interviewed DOE officials at headquarters and at Albuquerque concerning DOE's disposition of the defective TRUPACT-II containers and the agency's present and future shipping container needs to support WIPP operations.

DOE's Procurement Strategy

To determine how DOE's procurement strategy affected the TRUPACT-II project's outcome, we reviewed appropriate sections of the Federal Acquisition Regulation, the Department of Energy Acquisition Regulation, and Westinghouse's Purchasing Policy and Procedures Manuals. We interviewed and obtained documents from Westinghouse and DOE personnel on the TRUPACT-II bid solicitation, contract award, and subsequent contract management activities. These documents included NuPac's TRUPACT-II bid proposal and Westinghouse's lists of potential subcontractors, subcontractor survey results, proposal evaluations, and justification for subcontractor selection. We also reviewed information on the pre-award conference between Westinghouse and the prospective bidders.

We reviewed Westinghouse's contract, as modified, with NuPac and DOE's contract with Westinghouse to manage and operate WIPP. Furthermore, we reviewed correspondence between Westinghouse and NuPac at various stages of contract performance and DOE documents pertaining to Westinghouse's procurement performance.

We also identified past GAO reports on DOE's and other agencies' procurement activities and examined Albuquerque Operations Office procurement reviews of Office contractors' purchasing systems. We did not, however, review the overall adequacy of DOE's or Westinghouse's internal controls over contracting activities or their contract reimbursement procedures.

DOE/Contractor Oversight

To evaluate the adequacy of DOE's oversight of contractors and subcontractors, we reviewed DOE regulations and guidance on quality assurance-related activities and project oversight requirements. We obtained and reviewed quality assurance and oversight documentation from DOE,

Westinghouse, NuPac, Pacific Nuclear, and NRC's public docket files on the TRUPACT-II certificate application. We also obtained copies of shipping container industry standards pertinent to the fabrication of the containers, particularly concerning the purchase of materials, material tolerances, welding, and weld repair. We discussed these issues with NRC, DOE, Westinghouse, and NuPac officials; however, we did not independently evaluate the acceptability of the repairs or the repair procedures.

Furthermore, we reviewed other documentation on Westinghouse's oversight of NuPac, including progress reports to DOE, where applicable, and the contractor's efforts to develop contingency plans in the event the TRUPACT-II containers were not supplied on schedule. Finally, we reviewed recent performance evaluation reports by DOE headquarters and the Albuquerque Operations Office on Westinghouse's management of WIPP.

We examined DOE's efforts to hold Westinghouse accountable for the cost of the defective containers. To do so, we reviewed DOE's award-fee determinations for Westinghouse over two semiannual periods in fiscal year 1990. We compared these actions to DOE's award-fee procedures and policies as established in the agency's regulations and contract with Westinghouse. We examined recent changes to DOE's award-fee regulations to determine what effect they would have had on DOE's award-fee determination.

Finally, to obtain a broader overview of DOE's general policies regarding the M&O contractors, we reviewed GAO and DOE's Office of Inspector General reports on DOE's contracting practices, the Secretary of Energy's Federal Managers' Financial Integrity Act Reports, Secretary of Energy notices and directives, and recent changes to DOE's acquisition regulations. We also used these reports where appropriate in chapter 5 to highlight systemic weaknesses in DOE's approach to managing the agency's nuclear facility M&O contractors.

We conducted our review between September 1990 and June 1991. As requested, we did not obtain written agency comments on this report from DOE, Westinghouse, or NuPac; however, we discussed the facts contained in the report with officials of these organizations and incorporated their comments in the report where appropriate. Our review was conducted in accordance with generally accepted government auditing standards.

DOE Purchased Defective Shipping Containers

NuPac, DOE's subcontractor, in the process of building 24 shipping containers for WIPP, ground the metal walls of the containers too thin in spots. Although NuPac attempted to demonstrate to NRC that the containers were safe for shipping TRU waste, NRC would not permit this use of the containers because of the thin spots. A contributing factor was that NuPac was using metal that was as thin as permissible in order to hold down the weight of the containers so that heavier payloads could be shipped in them.

Despite the defects in the shipping containers that rendered them unusable for their intended purpose, Westinghouse, with DOE's encouragement, agreed to purchase the 24 containers and parts at a cost of about \$3 million as part of an agreement with NuPac. In addition, NuPac transferred ownership of proprietary information and tools to the government and agreed to fabricate 15 NRC-approved containers. This agreement, a memorandum of understanding between Westinghouse and NuPac to modify the subcontract, was prompted by DOE's and Westinghouse's belief that NuPac was about to declare bankruptcy, and therefore production of shipping containers to meet WIPP's schedule for opening was threatened. DOE and Westinghouse were concerned that if NuPac defaulted on its obligations, it would have taken at least 14 months to hire another subcontractor to design and make the containers. Furthermore, DOE ownership and possession of critical fabrication information and equipment were unclear under the subcontract, and therefore DOE and Westinghouse feared that these items might become tied up in a bankruptcy proceeding.

Subsequent to the memorandum and several improvements in NuPac's container fabrication process, NuPac resumed container production. In August 1990 NRC concluded that NuPac's fabrication process met its requirements, and in September 1991 NuPac finished building 15 new containers. Nevertheless, questions about the disposition of the 24 defective containers and about a recent lawsuit that NuPac had filed against Westinghouse on the shipping container subcontract were unresolved at the completion of our review.

NRC Rejected the TRUPACT-II Containers Because Repairs Made Their Walls Excessively Thin

The problems that NRC found with the containers were with NuPac's quality control procedures and fabrication methods rather than with the container design. Ultimately, the regulatory agency refused to certify the first 24 containers that had been built because NuPac, when making repairs, had thinned the container walls to less than the thickness called for in the approved design.

In September 1989 NRC inspected NuPac's container fabrication process at the assembly facility and found several deficiencies in the process, particularly in the use of radiographic procedures.¹ Also, in reviewing radiographs of some of the welds on three containers selected for inspection, the inspectors found indications of cracks in welds on two of the containers.

NuPac subsequently improved its radiographic procedures and re-inspected all radiographs of the welds on 12 assembled containers. Through the use of the improved procedures and more sensitive film, NuPac discovered more than 70 indications of potential problems in welds affecting all 12 containers in production. Between September 1989 and February 1990, NuPac attempted to repair these welds by grinding them down, rewelding them, and grinding the welds flush with the container wall surfaces. At the same time, the company continued fabricating more containers.

At predesignated check points in the welding process, NuPac's quality control inspectors inspected the welds and noted that the metal surfaces around many of the welds had been ground down to thicknesses less than required by NuPac's fabrication specifications. The first such inspection occurred on December 20, 1989. The inspectors prepared "quality discrepancy reports" documenting the thin-walled areas. Upon further analysis, NuPac decided that the thinning would not affect the performance of the containers nor preclude their use for shipping TRU waste.

NRC conducted a second inspection at the assembly facility on February 13-14, 1990. It found that NuPac had made significant improvements to correct its previous quality assurance problems but, upon reviewing the quality discrepancy reports, noted that NuPac's grinding procedures had thinned portions of the metal along the inner and outer vessel container walls to thicknesses within a range of less than 0.10 inch to

¹ A radiograph is an image produced on a radiosensitive surface, such as photographic film, by radiation other than visible light, especially by X rays passed through an object.

about 0.15 inch. In contrast, the nominal wall thickness specified in the design drawings accompanying the certificate application approved by NRC was 0.25 inch and the minimum acceptable thickness was 0.24 inch. Thus, the metal thickness that NuPac had accepted for the questionable areas ranged between 38 percent and 58 percent below the minimum allowable thickness. The walls of 15 assembled and 9 partially assembled containers were ground too thin.

The minimum and maximum permissible thicknesses in the metal that NuPac had ordered for the containers contributed to the wall-thinning problem. NuPac had ordered metal for use in fabricating the walls of both test containers and production containers that was nominally 0.25-inch thick with a minimum tolerance of 0.235 inch—0.005 inch less than the standard tolerance as referenced by the industry—and a maximum tolerance of 0.26 inch. The standard maximum tolerance was 0.30 inch. The purpose of specifying tolerances that were at the thin end of the spectrum was to reduce the weight of each container and increase the allowable weight of the container payload. This practice, however, left NuPac with little margin for error in its weld-grinding operations.

NuPac Could Not Reverse NRC's Position That Containers Were Unacceptable

NuPac tried unsuccessfully to persuade NRC that the thinner walls did not make the containers unacceptable. It stopped work on all affected containers in production and, between February and May 1990, company officials met with NRC's staff to resolve the wall-thinning matter. NuPac's position was that the thinning did not affect the acceptability of the containers because thinning had also occurred on the test containers fabricated and used in obtaining NRC's certification of the design. In May 1990 NuPac also presented NRC with calculations showing that the thin-walled containers could withstand an internal pressure of 50 pounds per square inch, as required by the design certificate already approved by NRC, without releasing radiation. NuPac considered seeking an amendment to its design certificate that would make clear that containers fabricated in the same manner as the test containers would be acceptable.

In May 1990 NRC disagreed with NuPac's position and refused to certify the containers for shipping TRU waste. According to NRC, the specifications contained in the certified design, rather than the specifications to which test units were built, governed the allowable thicknesses of the container walls. The design drawings on which the certificate was issued showed a 0.25-inch nominal wall thickness. The drawings did not

directly state the tolerances for the selected metal; however, the drawings explicitly stated that accepted industry standard tolerances would apply. These tolerances were 0.24-0.30 inch. Therefore, according to NRC, the containers must be fabricated to these tolerances.

Because the walls on the containers already fabricated had areas that were much thinner than the minimum tolerance, NRC would not accept the containers in the absence of a new test program to demonstrate that the containers met the agency's standards. NRC told NuPac that a new test program was necessary to demonstrate the safety of the thin-walled containers (1) because the containers had been certified primarily on the basis of physical testing and (2) because the problem was random; that is, weak points in one container may not be representative of those in other containers. Accordingly, NRC's position was that all thin-walled containers might have to be tested to show that they would comply with NRC's standards.

Finally, NRC did not accept NuPac's pressure analysis. According to NRC, it had certified the container design primarily on the basis of tests that demonstrated the ability of the container to maintain its structural integrity upon impact, rather than analysis of the container's ability to withstand internal pressures.

Although NuPac did not agree with NRC's position, it decided that further attempts to repair the welds might damage the containers because heat from the rewelding process could warp the container walls and damage the foam lining between the outer containment vessel wall and the surrounding shell.

DOE Purchased the Defective Containers to Meet WIPP's Schedule

By April 1990 Westinghouse was aware that NuPac's financial condition might have deteriorated seriously enough to threaten the future production of TRUPACT-II containers. By late July 1990 Westinghouse had become convinced that, unless immediate action was taken, NuPac would default on its obligations. At that point Westinghouse sought DOE's intervention to reach a solution that would allow container production to continue. Because of uncertainty about ownership of key fabrication assets, the time that would be required to obtain a new subcontractor and container design, and the perceived need to have NRC-approved containers available for the scheduled opening of WIPP in January 1991, Westinghouse, with DOE's encouragement, decided to negotiate a settlement with NuPac that would require the subcontractor to fabricate 15 new containers.

Westinghouse Concludes That NuPac Is Nearly Bankrupt

In April 1990 Westinghouse received a report from its treasury services group suggesting that NuPac could be nearing bankruptcy. The report indicated that both Pacific Nuclear, NuPac's parent company, and NuPac were experiencing financial difficulties because of increased costs of the TRUPACT-II contract, losses experienced by other subsidiaries of Pacific Nuclear, the acquisition of additional companies with marginal financial performance, and a shareholder lawsuit.

On June 28, 1990, NuPac requested that Westinghouse provide a \$4-million advance against future production of the containers because the company's operating cash position had reached "critical proportions" as a result of the TRUPACT-II project. According to NuPac officials, the company had expected to lose money during the design and certification phase of the contract that would be offset by profits from production. Because NuPac had planned to complete the original subcontract requirements within 14 months, the company anticipated that its cash reserves would be adequate to carry the project between milestone payments. However, company officials claimed that unplanned research and development activities, which had expanded the scope of the test program, and a much longer than anticipated time to get the design certified had exhausted the company's cash reserves. According to Westinghouse correspondence, NuPac stated that it had incurred significant cost overruns in building the first 15 production containers but had not filed claims for these additional costs. NuPac also said that it had essentially exhausted other avenues of funding. When NuPac asked for the cash advance, it had projected a cash flow deficit of about \$3.5 million.

Westinghouse refused to advance NuPac the money on the basis that there was no guarantee that the advance would result in the delivery of certified containers.

By mid-July 1990 Westinghouse had provided information to DOE headquarters indicating that NuPac's financial situation was worsening. According to Westinghouse correspondence, as the end of July approached, Pacific Nuclear officers had informed Westinghouse officials that (1) the board of directors had authorized corporate officers to file for bankruptcy, (2) the company was meeting with bankruptcy attorneys, and (3) if an agreement with Westinghouse could not be reached on the subcontract, the company and its subsidiaries could not continue to operate after July 31, 1990. On the basis of this information, Westinghouse's corporate financial office advised Westinghouse officials at Carlsbad that NuPac was headed for bankruptcy. According to Westinghouse officials, they advised DOE of the impending bankruptcy and

requested the agency's assistance in reaching a solution to protect the government's interest in the subcontract.

DOE Decides on a Negotiated Settlement Over Termination of the Subcontract

With DOE's encouragement, Westinghouse modified NuPac's subcontract to keep the company solvent and fabricating new containers. Given the overriding objective of meeting the schedule for WIPP, DOE and Westinghouse did not want NuPac to seek bankruptcy protection. They reasoned that the resulting litigation might indefinitely tie up the fabrication drawings and equipment. Bankruptcy would also require starting the container procurement process all over again. According to Westinghouse officials, this could have caused a delay of at least 14 months in the delivery of containers and would have cost the government over \$3 million. Two alternatives for terminating the contract were considered but rejected, primarily because, it was decided, each would have caused unacceptable delays to the WIPP project schedule.

According to Westinghouse, one of the alternatives—holding NuPac to the contract terms—would have held NuPac responsible for not delivering the containers in accordance with the contract schedule. However, Westinghouse officials believed that pursuit of this alternative would have pushed NuPac into bankruptcy and could also have caused the bankruptcy of NuPac's parent company. In this event, DOE and Westinghouse were concerned that certain NuPac assets critical to fabricating the containers, such as special tools and fabrication drawings, might be (1) unavailable to the government until conclusion of a bankruptcy proceeding or (2) lost to the government because, as an unsecured creditor, DOE would have to share proportionately with other general creditors in the bankrupt company's assets. DOE and Westinghouse believed that the WIPP transportation program would be seriously delayed unless they obtained immediate possession of the tools and drawings.

The subcontract provisions were unclear about the government's ownership and possession rights to the tools and drawings. (See ch. 3 for details on these provisions.) As the Secretary of Energy recognized in a letter dated August 30, 1990, to the Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations:

The Government was not well positioned to receive containers on schedule under such a bankruptcy scenario. Most of the machine tools used to perform the subcontract were not owned by the prime contractor or the Government, nor was it clear that the Government,

through its prime contractor, owned certain important proprietary data, such as shop drawings, necessary for the production of the TRUPACT-II containers. Thus the Department did not have before it the option of insisting upon and receiving performance by the subcontractor of its obligations under its contract

According to DOE and Westinghouse officials, if NuPac declared bankruptcy, DOE would experience costly delays in obtaining an NRC-certified container for TRU waste shipments because they would have to obtain a new subcontractor to build a new container. Westinghouse officials also stated that further delays could be incurred in manufacturing or purchasing the fabrication equipment. Westinghouse and DOE officials thus found unacceptable the option of holding NuPac to the subcontract because it would delay container fabrication for an unknown but probably lengthy period. Without certified containers in which to ship TRU waste, WIPP would not open. According to a Westinghouse estimate, 13 months' delay in opening the WIPP facility could result in standby costs between \$120 and \$144 million.

DOE and Westinghouse rejected a second alternative—terminating NuPac's subcontract for default—because it also had the potential for delay. Under federal procurement regulations, a contract may be terminated for default either because of anticipatory repudiation (i.e., the contractor states that it will not or cannot perform its contractual duties) or nonperformance.

According to Westinghouse's analysis of the alternatives to bankruptcy, to terminate the subcontract for anticipatory repudiation, Westinghouse would have to determine that NuPac was failing to make progress to the extent that performance was endangered. Westinghouse believed that it could also seek a statement from NuPac that the subcontractor could not or would not fulfill the contract terms. Termination of the subcontract would be immediate upon NuPac's declaration or Westinghouse's unilateral determination that NuPac could not or would not perform the terms of the subcontract. Westinghouse officials initially favored this option because they were confident that NuPac's annual report, as well as previous statements by officials of NuPac and its parent company, constituted a declaration of NuPac's inability to fulfill the subcontract. However, according to Westinghouse, DOE headquarters officials did not approve of using this option because, in their view, NuPac would not agree that it was unable or unwilling to fulfill the subcontract terms. In fact, these officials thought that NuPac would likely sue Westinghouse on the grounds that the subcontract had been improperly terminated for

default and would attempt to bring the subcontract into a bankruptcy proceeding.

Consequently, Westinghouse set out to terminate the subcontract on the basis of nonperformance. To do so, Westinghouse believed it would have to demonstrate that NuPac had not fulfilled its contractual obligations after serving notice to NuPac of the impending termination and giving the subcontractor a reasonable period of time to remedy any performance deficiencies. Although Westinghouse officials were confident that they had solid evidence to justify terminating the subcontract on this basis, they were also concerned that NuPac would file for bankruptcy before they could initiate and complete the necessary legal requirements.

However, just as Westinghouse was preparing to serve NuPac with notice of its intent to terminate the subcontract for nonperformance, DOE's Director of the Office of Environmental Restoration and Waste Management intervened. In a telephone conversation with Pacific Nuclear's Chief Executive Officer, the DOE official suggested that the parties consider modifying the subcontract through a memorandum of understanding. The Pacific Nuclear official agreed. Westinghouse and NuPac negotiated the terms of the modification, and DOE approved the new agreement. According to DOE's Deputy General Counsel, DOE did not prepare a legal opinion on the implications of the memorandum of understanding, such as the government's ownership rights to the fabrication assets under the original subcontract. The official stated that, except for NuPac's impending bankruptcy, the proposed memorandum of understanding did not raise any significant legal issues.

The memorandum of understanding provided NuPac with funds to continue production and enable DOE to attempt to meet its January 1991 target for opening WIPP. The terms of the modification were spelled out in the memorandum of understanding between Westinghouse and NuPac, with DOE's approval, and in a subsequent change order to the subcontract. Under these terms, Westinghouse purchased from NuPac:

- All 24 assembled and partially assembled defective containers and the 17 completed trailers. The parties agreed that some materials and parts from the 24 defective containers could be used to produce 15 additional, NRC-approved containers.
- TRUPACT-II fabrication equipment for about \$579,000.
- Fifteen additional, NRC-approved containers at a price of not more than \$300,000 each. The cost of 5 trailers was included in the \$300,000 unit

price. The remaining 12 trailers were to be delivered at a unit price of about \$45,600. The maximum price per new container (\$300,000) would be reduced by any amounts that Westinghouse had previously paid NuPac for materials used in producing the additional containers.

In return, NuPac warranted that it was ready, willing, and able to perform the subcontract and that it had no plans to file bankruptcy. Also, by August 31, 1990, NuPac would deliver to the government any and all items (e.g., design and fabrication drawings, equipment, and tools) required for the design, certification, testing, inspection, fabrication, and use associated with the containers. Table 2.1 summarizes the total subcontract pricing and price adjustments effected to implement the memorandum of understanding.

Table 2.1: Adjustments to Subcontract Pricing Following Memorandum of Understanding

Total contract payments		
Actual contract payments to NuPac as of July 30, 1990		\$8,428,291
Design, certification and testing activities	\$2,947,056	
Waste characterization studies	468,186	
Container fabrication ^a	2,998,121	
Assembly facility mobilization	1,417,260	
Trailers	470,186	
Miscellaneous	127,482	
Additional payments authorized		5,626,286
Cost of 15 new containers and first 5 trailers	\$4,500,000	
Cost of 12 other trailers	546,936	
Fabrication equipment transferred to DOE	579,350	
Revised contract amount		\$14,054,577
Pricing adjustment		
Total contract price (including options exercised)		\$17,260,430
Less: price adjustment to reflect terms of memorandum of understanding		(3,205,853)
Revised contract amount		\$14,054,577

^aAs of July 30, 1990, Westinghouse had already paid NuPac about \$3 million for the 15 defective containers and parts of 9 other containers.

Source: GAO analysis of Westinghouse data on TRUPACT-II subcontract.

Wall-Thinning Problem Resolved, but Other Issues Remain Outstanding

Following negotiation of the memorandum of understanding, NuPac resumed production of 15 new containers and made several improvements to its container fabrication process. On the basis of an August 1990 inspection, NRC concluded that NuPac's container fabrication process met the regulatory agency's requirements, and by September 1991 NuPac completed the production of the 15 new containers. Nevertheless, the disposition of the 24 defective containers and a lawsuit that NuPac recently filed against Westinghouse on the TRUPACT-II subcontract were unresolved when we completed our review.

After NRC's February 1990 inspection, NuPac made numerous improvements in its quality assurance program that were designed to detect and eliminate welding and grinding problems. For example, it contracted with a new radiography firm that used more thorough radiographic procedures, hired a full-time quality assurance manager for the container assembly plant, and increased the number of fabrication inspections. Also, to avoid the occurrence of random thin spots on the walls of new containers, NuPac revised its design drawings and requested NRC's approval of them. The new drawings, which specified thicker metal for the container walls, also eliminated the requirement that the welds on the inner and outer containment vessel walls be ground smooth with the wall surfaces.

On August 21-22, 1990, NRC inspected NuPac's fabrication and quality assurance programs and found that the earlier container quality control problems had been corrected. Furthermore, on the basis of the revisions to NuPac's quality assurance program that the subcontractor had submitted to NRC and implemented during the spring and summer of 1990, NRC issued an amended certificate of compliance on September 14, 1990.

Following these events, a joint team of DOE headquarters, Albuquerque, and WIPP staff performed an audit of the TRUPACT-II design, manufacturing, and management from October 22, 1990, to January 12, 1991. The team reported in February 1991 that despite improvements in NuPac's quality assurance program, NuPac may again be building containers whose specifications deviate from the NRC-certified design. In the audit report, DOE found fabrication deviations in areas in which the design drawings did not specify tolerances. For example, NuPac had machined a part of the seal to a dimension different from that of the seal in the approved design. Consequently, DOE recommended that NuPac obtain NRC's approval of the deviations and concurrence with the acceptability of making future changes to areas in which design tolerances are not specified.

In April 1991 NuPac requested that NRC amend the design certificate for the TRUPACT-II container to authorize the fabrication deviations and allow for minor dimensional variations. In August 1991 NRC issued DOE a third revision to the TRUPACT-II certificate of compliance, noting that the fabrication deviations did not affect the ability of the shipping package to meet NRC's safety requirements. According to DOE officials, NRC's approval of the certificate amendment closed out the outstanding audit findings on the TRUPACT-II shipping containers. According to DOE officials, as of September 6, 1991, Westinghouse had accepted delivery of all 15 new containers that NuPac manufactured following the memorandum of understanding.

Questions remain, however, about the disposition of the defective containers and a lawsuit that NuPac recently filed against Westinghouse. In April 1991 a Westinghouse report to DOE identified alternative uses for the defective containers. Potential uses included conducting technical tests, making the containers available for training DOE and non-DOE employees in operations and maintenance, emergency response, and accident recovery; performing stress tests on the trailers; and using the containers for education and public affairs. In September 1991 Westinghouse released a revision to its April report. The revised report generally retained the above options in its recommendations, and advised against DOE's seeking certification of any of the first 24 thin-walled containers through a new test program because Westinghouse judged it to be technically infeasible.

After the close of our review, NuPac filed a lawsuit against Westinghouse on September 6, 1991, in the U.S. District Court in Albuquerque, New Mexico, seeking at least \$2.5 million in damages as a result of the TRUPACT-II subcontract. Among other things, NuPac alleged that during the contract bidding, Westinghouse had supplied it incorrect and incomplete information about the specifications of the containers and the characteristics of the waste they would carry. Also, NuPac alleged that Westinghouse failed to tell it that the performance period allowed under the contract was impossible to meet. A hearing date for the case has yet to be scheduled.

Conclusions

Westinghouse's and DOE's agreement with NuPac was driven primarily by the desire to avoid further delays in meeting the schedule for opening WIPP. Although the contract modification secured the necessary assets for the government to manufacture more containers, it also resulted in

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the acquisition of 24 assembled and partly assembled defective containers and related parts. Westinghouse's and DOE's options for resolving the subcontract were limited because of ambiguity regarding the ownership and possession of tools and drawings critical to the fabrication process. As a result, Westinghouse and DOE decided their best course of action was to resolve the ownership issue through the memorandum of understanding with NuPac.

Procurement Strategy Was Inappropriate for Task and Available Time

The procurement strategy for TRUPACT-II containers was driven by DOE's schedule for opening WIPP in October 1988. However, much of the responsibility for NuPac's failure to deliver the waste containers on schedule is the result of elements of the subcontract. First, Westinghouse's use of a firm-fixed-price type of subcontract was inappropriate because the significant research and development aspects of the scope of work were not amenable to accurately estimating costs. Resolving the many uncertainties associated with the design, testing, and certification of the container and hardware requirements for trailers resulted in missed milestones and contract costs much higher than specified in the original subcontract. Second, contract payments and options to purchase more containers were tied to calendar dates rather than to NuPac's progress in obtaining NRC's acceptance of the container design and fabrication methods. These contract terms caused the government to assume greater financial risk by making it attractive to Westinghouse to purchase additional containers before the first acceptable container had been made. Finally, the subcontract did not make it clear whether or not the government owned critical container-fabrication assets. As noted in chapter 2, the ownership problem contributed to DOE's decision to negotiate an agreement with NuPac that included the purchase of the defective containers.

In a 1989 review of Westinghouse's contracting activities for WIPP, DOE found that procurement decisions were being driven by the project's schedule instead of sound procurement practices. This clearly was the case for the container subcontract. The contract performance period was too short for the scope of work because DOE spent many years in an unsuccessful attempt to develop another container design. This effort left DOE with little time to procure TRUPACT-II containers by WIPP's scheduled opening.

Westinghouse Awarded TRUPACT-II Subcontract to NuPac

At a presolicitation conference in June 1987 attended by all six firms that were interested in bidding on the TRUPACT-II subcontract, DOE emphasized the necessity of designing, developing, and delivering containers on a "fast track" program to coincide with opening WIPP in October 1988. After the presolicitation conference, DOE and Westinghouse invited the firms to submit bids. On September 8, 1987, Westinghouse, with DOE's approval, awarded a subcontract to NuPac to design and manufacture TRU waste shipping containers. NuPac's proposal was judged to be the most competitive of the four bids eventually submitted.

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The subcontract required NuPac to

- provide an NRC-certified design and related supporting analyses;
- manufacture one full-scale demonstration container, test to the accident conditions of NRC's regulations, and document the results; and
- fabricate six containers and two trailers, deliver three containers and one trailer on October 1, 1988, and deliver the remainder on November 1, 1988.

For providing these services, NuPac was to be paid \$3.5 million in several installments, as shown in table 3.1.

Table 3.1: Schedule of Subcontract Payments

Milestone	Completion date	Payment	Percent of total
Initial design drawings and weight calculations	12/10/87	\$210,791	6
Final drawings and specifications for trailers and containers	03/10/88	351,319	10
Final safety report to NRC	04/21/88	210,791	6
Demonstration test report	06/09/88	351,319	10
Receipt of stainless steel plate, lids and bottoms, and foam	08/25/88	175,659	5
Fabrication of shells, machine seal rings, and installation of foam	09/22/88	281,055	8
Certificate of compliance obtained from NRC	09/22/88	702,637	20
First three containers and trailer delivered	10/01/88	702,637	20
Second three containers and trailer delivered	11/01/88	526,979	15
Total		\$3,513,187	100

Source: TRUPACT-II subcontract.

Other terms of the subcontract included pricing variations and purchase options. The subcontract stated that the \$3.5-million price would be reduced by specified amounts if the government provided certain certification and test activities. If testing was provided by the government, for example, the contract amount was to be reduced by \$287,385.¹ The subcontract also contained options for Westinghouse to order more containers and trailers, but they had to be exercised by certain dates. Specifically, in addition to the original six containers and two trailers, Westinghouse could order up to 30 additional "trailers' worth" of

¹ NuPac and Westinghouse subsequently agreed that another DOE contractor (Sandia National Laboratories of Albuquerque, New Mexico) would conduct the TRUPACT-II test program. This reduced the "demonstration test report" subcontract payment installment in table 3.1 to \$63,934.

TRUPACT-IIS, defined as three containers and one trailer, in increments and at the unit prices shown in table 3.2.

Table 3.2: Options for Additional Containers and Trailers

Additional units	Price with unbolted lid	Price with bolted lid	Date by which option must be exercised
3-10 trailers' worth	\$530,229	\$524,999	Apr. 1, 1988
11-20 trailers' worth	548,109	542,765	Apr. 1, 1989
21-30 trailers' worth	575,335	569,726	July 1, 1990

Source: TRUPACT-II subcontract.

If the first option was exercised by January 1, 1988, then all containers were to be made at DOE's Carlsbad container assembly facility. If the option was exercised after that date (but not after April 1, 1988), only the containers covered by the option would be made at DOE's facility—the first six containers would be made at NuPac's facility in the state of Washington. The date for exercising the second option was subsequently extended to December 1, 1989, or March 1, 1990, and the pricing per trailer's worth increased, ranging from \$789,694 to \$1,095,023, depending on the date exercised and the quantity ordered. Also, NuPac was to evaluate the feasibility of a bolted versus a nonbolted seal mechanism for the container's upper lid. Thus, the prices of the options were dependent on the selected design of the seal mechanism. Early in the subcontract, NuPac and Westinghouse selected the unbolted lid design having the O-ring sealing mechanism.

Contract Type and Terms Unsuitable for Scope of Work

A firm-fixed-price type of contract was inappropriate for the scope of work required under the subcontract because of the uncertainties about the analytical and/or testing requirements and the related costs that would be required to complete the container design and obtain NRC's certification of the design. In addition, important design and payload specifications were incomplete. For these reasons, contract performance was delayed and, beginning almost immediately after the subcontract was awarded, numerous change orders were approved that added new work and increased the contract cost. The TRUPACT-II subcontract also caused the government to assume greater financial risk in the project because contractual options for purchase of additional containers at specified prices were tied to calendar dates, rather than to NRC's certification of the container design or acceptance of a completely fabricated container.

As a result, it was attractive for Westinghouse to order 45 more containers and 15 more trailers before NuPac had produced a single acceptable container. Furthermore, the ambiguity in the subcontract on the question of ownership of critical fabrication assets eventually contributed to DOE's decision to negotiate the memorandum of understanding with NuPac that included the purchase of the defective containers.

**Firm-Fixed-Price Contract
Inappropriate for
Developmental Work**

The Federal Acquisition Regulation (FAR) states that a firm-fixed-price contract is suitable for acquiring commercial products that are reasonably defined or have detailed specifications. In contrast, a cost-reimbursable contract should be used when contract performance uncertainties preclude accurate cost estimation, such as in research and development projects. Selection of the appropriate contract type will result in "reasonable contractor risk and provide the contractor with the greatest incentive for efficient and economical performance." The FAR also states that firm-fixed-price contracts represent maximum risk to the contractor and minimum administrative burden to the contracting party.

DOE's acquisition regulation (DEAR) supplements the FAR when DOE's management and operating (M&O) contractors, such as Westinghouse, procure goods and services. DOE allows these contractors to use their own purchasing systems to buy goods and services for government use. However, DOE is responsible for periodically reviewing the contractors' purchasing activities and ensuring that they comply with DOE's requirements and policies.² Even though the FAR is generally not directly applicable to the M&O contractor purchasing activities, such contractor purchasing systems must still comply with the "federal norm"—those fundamental procurement principles embodied in federal law and regulations.

**Uncertain Testing and
Other Requirements
Delayed Production and
Raised Costs**

From the very beginning of the TRUPACT-II subcontract, numerous uncertainties existed that subsequently contributed to the delayed performance of the subcontract and increased the costs to Westinghouse. For example, three factors crucial to obtaining NRC container design certification—the requirements for physical testing of the containers, specifications for key container components, and information on the waste

² At the time of the TRUPACT-II procurement, M&O contractors were required to notify DOE in advance of all fixed-price subcontracts over \$25,000. At a minimum, the advance notices were to include the type of contract or reimbursement provisions and a description of the work.

contents to be shipped in them—were not established when NuPac began work. Furthermore, specifications for the trailers to be used to transport the containers had not been fully developed at the time of subcontract award and, as a result, the subcontract was eventually modified to add a costly trailer development, test, evaluation, and design modification program.

Testing Requirements Were
Uncertain

When the subcontract was awarded, tests and/or analyses, and their associated costs, that would be required to obtain NRC's certification of the shipping container design were uncertain. Because a more expansive test program than anticipated was subsequently required, the test program lasted over 9 months instead of the 8 weeks NuPac had planned. Therefore, NuPac did not submit its application for a design certificate to NRC until March 1989, 4 months after the original contract date for delivering the initial six certified containers to Westinghouse.

NuPac selected a strategy of certifying the container design primarily by means of testing a full-sized container.³ The company adopted this strategy because NRC's staff had said this was probably the quickest way to obtain the agency's certification. Until then, NuPac had used analytical methods, such as computer modeling, to demonstrate that its other container designs met NRC's standards. These methods, however, had not been sufficiently developed to apply them to the TRUPACT-II design in the relatively short contract performance period.

It took several months for NuPac and NRC to negotiate an agreement on the scope of the test program. Because the container design was unique and little precedent existed for testing such a design, NRC was cautious about NuPac's plans for demonstrating the container's safety. Accordingly, NRC suggested that NuPac perform more tests than Westinghouse or NuPac had initially anticipated. For example, it suggested that NuPac conduct additional tests to determine the positions in which a container would sustain the most damage from drops, falls, or punctures. NRC also suggested that NuPac use several test containers because the cumulative damage sustained by one test container, undergoing the entire series of tests, increased the likelihood that the container would fail.

³ NuPac's strategy for obtaining NRC's certification of the container design was based primarily on physical testing. However, some analysis was also used. For example, analysis was used to evaluate how much internal pressure the container could withstand.

In response to NRC's suggestions, Westinghouse and NuPac modified their contract to require fabrication of three, instead of one, test containers and to conduct additional tests. Furthermore, because of early test failures, NuPac made design changes to the container and repeated tests to demonstrate the suitability of these changes. For example, during the test program, the O-ring seal on the inner containment vessel of one test container became contaminated with debris. NuPac therefore installed a shield adjacent to the seal to eliminate this problem. This led NRC's staff to suggest, in accordance with the regulatory agency's practice, that NuPac repeat the entire series of tests using a container with the installed shield.

The cost of testing grew as the scope of the test program expanded. The subcontract specified that NuPac would receive \$1,850,152 for designing the containers and manufacturing and testing one full-size container. This amount included \$389,462 for "other testing as required."⁴ Even with this contingency clause, the costs allowed for testing were insufficient to cover actual costs of the test program. By March 1989, when NuPac had submitted its certificate application to NRC, Westinghouse had approved contract modifications that increased the cost of design and certification testing by \$1,378,607. (See table 3.3.)

⁴ Under the FAR, a contingency clause generally would be inappropriate in firm-fixed-price contracts because uncertainties about contract specifications could prevent the establishment of fair and reasonable estimates of resulting costs.

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Table 3.3: Increases in TRUPACT-II Design and Certification Testing Costs

Contract	Cost
Base contract	
Manufacture test unit	\$325,207
Design and certification testing	1,955,330
Subtotal	\$2,280,537
Less: Reduction for waiver of NRC licensing fee ^a	(143,000)
Reduction for test program provided by DOE	(287,385)
Subtotal, base contract	\$1,850,152
Change orders	
Add two test containers	\$330,684
Increased cost of test containers	97,716
Modification of test containers	174,144
Disassemble test container	19,727
O-ring chemical compatibility tests	158,220
Elevated seal temperature tests	37,759
One-half scale structural tests	14,780
Foam enhancement tests	111,479
Increased program support for test-container enhancements	272,036
Certification documentation/software revisions	162,062
Subtotal, change orders	\$1,378,607
Total	\$3,228,759

^aNRC waived its licensing fee for the shipping container that it normally charges commercial vendors because DOE, as a government agency, was named the certificate holder.

Source: GAO analysis of Westinghouse data on TRUPACT-II subcontract.

Specifications Were Incomplete

When the subcontract was awarded, NuPac had not determined many of the container’s design specifications and Westinghouse had not determined the container payload specifications. NuPac’s experience with its design of the O-ring lid closure mechanism illustrates the lack of final design specifications. Although NuPac believed that the closure mechanism would prevent the container contents from leaking, it did not fully test the mechanism until months after the contract was awarded. Also, NuPac had not determined the type of sealing materials to be used in the lid enclosure or the chemical compatibility of the materials with the waste contents. These issues, in addition to the debris problem discussed earlier, were resolved through additional testing.

In its bid for the container subcontract, NuPac stated that it expected the payload characteristics—such as mixed organic material, metals,

and solidified wastes—to be one of the key certification issues. The company also stated that it expected DOE and Westinghouse to provide this information. The subcontract required Westinghouse to provide NuPac with specifications on the types and mixtures of TRU waste by March 31, 1988; however, Westinghouse did not meet that date. Also, the analysis that Westinghouse eventually supplied was incomplete and not finalized until NuPac had tested the TRUPACT-II. Between May 1988 and December 1989, Westinghouse and NuPac modified the subcontract nine times to add tasks related to waste characterization. These change orders added \$540,145 to the contract cost. Among the additional costs were \$141,584 for travel by NuPac officials to attend waste characterization meetings and \$333,497 for waste characterization tests.

Because firm payload specifications had not been established when NuPac began the container testing and certification processes, NRC raised questions about the characteristics of the TRU wastes that would be shipped in the containers. According to NuPac officials, the lack of timely, complete information on these matters caused NRC to take a conservative approach to evaluating the design of the container, contributed to additional testing requirements, and limited the types of TRU waste that DOE could ship in the containers.

Trailer Requirements Had Not Been Fully Identified

The trailer program to support the shipping containers also illustrates the lack of clearly defined contract requirements at the time of subcontract award. Several contract modifications (not including the options exercised to buy more containers and trailers) for prototype trailers, trailer testing and evaluation, and trailer design improvements increased the original contract costs by about \$589,000. (See table 3.4.)

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Table 3.4: Increases in Trailer-Related Contract Costs

Contract	Cost
Base contract/options	
Design trailer & manufacture 2 production trailers	\$99,820
Exercise option to buy 8 more trailers (Jan. 1988)	269,264
Exercise option to buy 7 more trailers (Dec. 1989)	320,656
Subtotal, base contract/options	\$689,740
Additions	
Prototype units:	
Build 2 prototype trailers	\$67,316
Cost increase	14,284
Fabricate 2 additional trailers	128,161
Test and evaluate trailers	208,724
Modifications	29,688
Subtotal, prototype units	\$448,173
Incorporate design improvements to production trailers	140,603
Subtotal, additions	\$588,776
Total	\$1,278,516

Source: GAO analysis of Westinghouse data on TRUPACT-II subcontract.

The original contract provided \$99,820 for NuPac to design and manufacture two trailers to carry the six containers to be delivered by November 1, 1988. Westinghouse's decisions to buy 45 more containers and 15 more trailers increased the total cost of the 17 trailers to haul the 51 containers to about \$690,000.

In addition, Westinghouse purchased four prototype trailers at a cost of about \$448,000, or about 35 percent of all trailer-related costs. Two of these trailers ordered in February 1988 were to be built by April 1988. According to a Westinghouse contracting official, the trailers were to be used immediately for "public relations/training purposes" and eventually for spares. Westinghouse ordered two more prototype trailers in February 1989 to support a trailer evaluation and test program not included in the original contract.⁵ The contracting official said that these trailers were bought and tested to compare, among other things, trailers having spring-ride and air-ride suspension systems. In September 1989

⁵The trailers were not subject to NRC's certification requirements but were required to meet federal highway transport regulations.

and November 1989, the subcontract was modified to incorporate design improvements into the prototype trailers and, in December 1989 and January 1990, was again modified to add the improvements to the production trailers.

**Tying Contract Options to
Calendar Dates Increased
Financial Risk to
Government**

By exercising the two options that were tied to certain calendar dates, Westinghouse committed the government to purchasing 51 containers and 17 trailers before NuPac had produced one NRC-approved container. In January 1988—4 months after the contract was awarded—Westinghouse ordered 24 containers and 8 trailers at a cost of \$5.5 million. The price included over \$1.2 million for mobilizing the TRUPACT-II assembly facility in Carlsbad. In December 1989, while NuPac was attempting to repair the weld cracks detected as a result of NRC's inspection, Westinghouse, with DOE's authorization, ordered another 21 containers and 7 trailers at an additional cost of \$5.2 million.⁶ Had the first option and subsequent container order been tied to successful production of the first container, the worst that could have happened is that 6 containers and 2 production trailers, rather than all or parts of 24 defective containers and 17 production trailers, would have been fabricated.

Because of the developmental nature of the contract work, a cost-reimbursement type of contract would have been more appropriate for the design development and fabrication of the first TRUPACT-II container; after successful completion of these steps, a firm-fixed-price contract would have been appropriate for fabricating additional containers. Had Westinghouse followed this approach, we estimate that it could have avoided up to \$2.7 million of the \$3 million in total costs that it paid for 24 defective containers and component parts of containers fabricated by NuPac under the original subcontract and first contract option.

**Contract Terms Also
Confused Ownership of
Critical Fabrication Assets**

As noted in chapter 2, the government's ownership rights to certain NuPac assets, including proprietary data that were required to fabricate the TRUPACT-II containers, were not clearly specified in the original subcontract. For example, NuPac had used special machine tools in building the containers and prepared detailed drawings of its container fabrication process. On the one hand, these assets were not specified in

⁶ The period for exercising the second contract option expired on December 1, 1989. Westinghouse and NuPac, however, agreed to modify the subcontract 14 days after the option expired, thereby constructively exercising the second option. Under the terms of this modification, which it continued to refer to as option 2, Westinghouse ordered 7 additional trailers' worth of containers at a lower negotiated price of \$736,184 per unit.

the contract's list of deliverables. On the other hand, the subcontract included a provision that title to all drawings and special tools and fixtures evolving from the contract would pass to Westinghouse and DOE once Westinghouse paid for them. In addition to the delivery of two trailers' worth of NRC-certified shipping containers, Westinghouse's initial contract with NuPac contained a list of contract deliverables that included

- a finalized design plan and design basis layout drawings;
- design basis weight calculations;
- a quality assurance manual;
- reports on material/component traceability, weld procedures (including repairs), demonstration test plan, test procedures, and test data;
- final container and trailer drawings and specifications; and
- a design completion package, including final safety analysis report and certificate of compliance.

The list of deliverables did not itemize fabrication drawings or special tools associated with the manufacture of the containers. Also, Westinghouse did not clearly specify in the contract which items were "proprietary" except for including standard FAR and DEAR contract clauses in the subcontract.⁷ Thus, ownership of certain contract-related assets was unclear. Article IX of the subcontract, however, appears to indicate that the government already may have had ownership rights to these items, but makes no reference as to when they are to be delivered to DOE. The article states:

All design rights, drawings, special tooling and/or fixturing, all manufacturing rights, the Certificate of Compliance, etc. evolving from this Subcontract shall become the property of Westinghouse/DOE.

Also, a modification to the subcontract in May 1989 stated that title to the government for any material, fabrication, and contract deliverables passed to Westinghouse once it paid NuPac for them, provided that (1) Westinghouse would make further payments as the contract required with respect to such property and (2) NuPac could continue to use this property in carrying out its duties. Actual conveyance of the property to

⁷ Westinghouse included technical and proprietary data provisions normally appropriate for a cost-reimbursement type of contract rather than a firm-fixed-price contract. This again indicated the research and development nature of the contract. According to these provisions, the government would have unlimited rights to any technical data produced under the contract; insofar as any data were proprietary (for example, special processes or trade secrets), the government would have limited rights to these data up to 3 years after final payment.

Westinghouse and DOE was governed by the schedule for contract deliverables. For example, the design completion package was to be delivered at the time of contract closeout.

NuPac officials, however, told us that the fabrication drawings were NuPac proprietary data. They based this view on information in the company's August 8, 1987, proposal to Westinghouse and NuPac's previous experience related to this type of contract. According to these officials, the fabrication drawings, which contain much more detailed specifications on the containers than the design drawings, were never listed as a line item deliverable under the subcontract. Instead, the subcontract listed only general drawings. According to NuPac officials, the negotiation of the July 1990 agreement with Westinghouse provided a forum for resolving the drawing ownership issue.

Westinghouse could have prevented the uncertainty about ownership of contract-related assets had it included more specific provisions dealing with when title and possession to all technology and materials essential to fabrication of the containers would be transferred to the government.

DOE Finds Similar Problems Throughout WIPP Project

Westinghouse's use of a firm-fixed-price contract for the largely developmental tasks of designing, testing, certifying, and fabricating TRUPACT-II containers on a short schedule was not an isolated case. During 1988 DOE's Albuquerque contracting office reviewed Westinghouse's procurement activities for the WIPP project and found the following deficiencies in its management contractor's procurement practices:

- Purchasing policies and procedures did not include a discussion of all available contract types nor the basis for distinguishing when one type is more appropriate for use than another. This omission may have contributed to the contractor's "sparing use" of cost-reimbursement contracts or other types of contracts.
- In several procurements, the contract type and the project requirements did not match. The mismatches resulted in problems such as an increased administrative burden on Westinghouse's procurement personnel and a potential for increased risk to its contractors.
- For many of the procurement actions reviewed, the schedule for the WIPP project was the driving force behind Westinghouse's basic procurement actions and subsequent amendments to those actions. The contractor functioned in a reactive mode in an attempt to meet the scheduled date for opening WIPP. Such reactive procurement management indicated poor advance planning for procurement and resulted in

numerous modifications to almost all types of contracts and purchase orders.

In a July 1990 follow-up report on Westinghouse's procurement system, the Albuquerque contracting staff found that the contractor had made significant progress in correcting past deficiencies. On the basis of the review team's findings, Westinghouse was relieved of the requirement to notify DOE in advance of all fixed-price subcontracts over \$150,000. DOE noted that it was impressed with the contractor's progress in responding to previous findings and recommendations. However, it also observed that some additional work was still needed to reduce the number of modifications to Westinghouse's contracts and that many times "the most expedient [procurement] action is taken rather than the most appropriate." In this regard, the report stated that "Too often demands are made without adequate understanding of the position the purchasing personnel are placed in [in] terms of the law, regulation, or their personal integrity." DOE recommended that WIPP nonprocurement staff, including the upper management team, should receive fundamental procurement training.

Earlier Design Effort Reduced TRUPACT-II's Performance Time Frame

When Westinghouse awarded the TRUPACT-II contract, DOE wanted to meet its objective of beginning to ship TRU waste to WIPP for storage in October 1988. DOE was under considerable pressure from certain states, such as Colorado and Idaho, to open WIPP as soon as possible and to begin removing wastes from DOE's facilities in those states. However, compelling evidence was already available showing that the 13- to 14-month delivery schedule for the first six containers could not be met. Had DOE not spent 9 years supporting an earlier shipping container design that failed to meet NRC's basic safety requirements, it would have had ample time to develop an NRC-certified container by the October 1988 deadline. ▲

Too Little Time Was Available for Developing the Container

The original contract requirement for six containers and two trailers was to be completed in just under 14 months. When Westinghouse awarded the subcontract, there were two specific indications that the contract milestones were extremely optimistic. First, 3 months before the contract was awarded, a special DOE TRU waste management office had reviewed the TRUPACT-II procurement specifications and told DOE it

doubted that a subcontractor could deliver the initial order in a year.⁸ Second, following the pre-solicitation conference, two of the six prospective subcontractors declined to submit proposals for the project because, they said, the milestones were impossible to meet.

Also, historical information available at NRC indicated that it would take longer than 13 months to design, develop, test, certify, and fabricate a shipping container. For example, NuPac's most favorable experience on an earlier container design took about 31 months. NuPac had developed the container for DOE's use in shipping damaged, spent (used) nuclear fuel from the Three Mile Island nuclear power plant to DOE's Idaho National Engineering Laboratory. In that case, it took NRC 10 months to certify the container after it had received NuPac's application for a certificate. This process had been preceded, however, by 21 months of discussions between NuPac and NRC, as well as design analyses and preparation, before the application was submitted.

Moreover, NuPac, in its proposal to DOE during the TRUPACT-II contract competition, acknowledged that completing the contract within the schedule would be a formidable task. According to NuPac, the development schedule was "extremely tight" for developing and licensing such a container and there was ". . . no room for error and very little room for unresolved uncertainty." NuPac also noted that ". . . key licensing concerns are constantly changing and any 'hot' items which exist during the licensing of the TRUPACT-II will have to be clearly identified early on and carefully addressed."

DOE's Earlier Container Design Did Not Meet NRC's Standards

In the late 1970s DOE began to design a container for shipping its TRU waste that it intended to self-certify. However, to maximize the amount of TRU waste that the container would carry, the container was not designed to safety standards that were equivalent to NRC standards. Nevertheless, DOE continued to support the design in the face of strong public opposition until early in 1987 when it abandoned the design and agreed to obtain NRC's certification of a new container design. Because of its long-standing support of the earlier design, DOE had just over 1 year to acquire NRC-approved containers for use in shipping TRU waste to WIPP by the scheduled October 1988 opening date.

⁸ DOE established the Joint Integration Office in March 1985 to manage and coordinate the system-wide integration activities of the TRU waste management, transportation, interim waste operations, and WIPP programs. The office was composed of staff from DOE's Albuquerque Operations Office's Waste Management and Transportation Division, the WIPP Project Office, and contractor personnel from Westinghouse and Rockwell International.

In 1978 DOE began designing a shipping container, called TRUPACT-I, for TRU waste. The container was a single-walled design with features that permitted gases generated by waste materials in the container to vent into the atmosphere. DOE intended to self-certify that the container was designed to standards equivalent to NRC's standards. However, NRC's standards required that containers used to ship plutonium, one of the principal radioactive components of the TRU waste, have double-containment barriers. In December 1979 DOE asked NRC for an exemption from this requirement for the TRUPACT-I container, but NRC rejected the request.

Despite NRC's rejection of DOE's exemption request, DOE continued to support its proposed container design. DOE's position was that the container would be as safe as a double-walled container because the expected leakage rates of radiation were below allowable limits and the container was designed to absorb accident impacts. Furthermore, DOE favored the single-walled container because it would hold about 5,000 pounds more waste than a similarly designed double-walled container and would therefore reduce the number of trips required to ship TRU waste to WIPP.

In August 1981 DOE's Sandia National Laboratories hosted a peer review of the preliminary TRUPACT-I design. The peer review committee, in a June 1982 report, stated that the design could be self-certified only if NRC granted DOE an exemption from the double-containment standard. Furthermore, the committee urged DOE to immediately address the containment issue in considering design alternatives. New Mexico's Environmental Evaluation Group (EEG), which provides independent technical review of the WIPP project, questioned the safety of the container design. For example, EEG said that the single-containment design did not conform to NRC's double-containment standard.

In 1983 NRC amended its container design regulations to prohibit continuous venting of radioactive gases during shipment. Although DOE's container was designed to vent gases from the container, filters were to be used to reduce the amount of radioactivity that would be vented. DOE also maintained that the venting would not be "continuous" because the container would only occasionally vent gases to prevent excessive accumulations of hydrogen gas inside the container.

DOE issued a draft report in December 1984 analyzing the safety of the TRUPACT-I design. In DOE's view, the report provided adequate justification for the design. The report did not, however, satisfy the concerns of others about the safety of the container. For example, EEG issued a

report in June 1986 that was critical of the design and questioned DOE's ability to ever demonstrate that the design met NRC's safety standards. Public controversy over EEG's findings spurred DOE to agree with the state of New Mexico that DOE would obtain NRC's certification of a new, double-walled, unvented container design. In early June 1987 DOE abandoned the TRUPACT-I design.

Conclusions

A firm-fixed-price contract was inappropriate for the procurement of TRUPACT-II containers. Unlike off-the-shelf items, the containers had many uncertainties about their design that were unresolved when the contract was awarded. Furthermore, critical support items, such as waste characterization specifications and a trailer design, were not established until long after the contract had been awarded. As a result, the contract was replete with numerous modifications and significant cost escalation. Also, because Westinghouse included contract options linked to calendar dates instead of NRC's acceptance of the first container, 24 containers were being made before NRC approved a single container, and all 24 containers were found to be defective. Westinghouse would have been better off using a cost-reimbursable type of contract for the design development and initial fabrication of a certified container, followed by a firm-fixed-price contract for fabrication of additional containers, because fabrication of the second and additional containers would not have begun until the developmental stage had been successfully completed.

Westinghouse should have taken steps to eliminate the ownership issue in the original contract by wording the contract more precisely and itemizing the deliverables and delivery dates. However, had it used a cost-reimbursement contract for container design and development, all critical items to be produced would have been financed at government expense. This would have protected DOE's interests in the event of unsatisfactory performance or default by NuPac. Further, a cost-reimbursement type of contract would have been equally advantageous to NuPac because Westinghouse would have reimbursed NuPac as it incurred costs, rather than when it completed certain contract milestones.

Finally, had DOE earlier abandoned its efforts to build the previous container that did not meet NRC's standards, it would have had additional time prior to the scheduled opening of WIPP to formulate the specifications of, develop, and fabricate the TRUPACT-II containers. However, consistent with NRC historical information and NuPac's previous experience on container development, insufficient time was left to complete all

Chapter 3
Procurement Strategy Was Inappropriate for
Task and Available Time

these tasks by the October 1988 deadline once DOE had given up on its previous effort.

Oversight of the Contract Was Ineffective

A number of the problems that beset the TRUPACT-II container fabrication (see ch. 2) and NuPac's contract performance (see ch. 3) can be attributed to the limited, ineffective oversight exercised by Westinghouse and DOE. DOE has a long history of allowing its major contractors, such as Westinghouse, a great deal of autonomy over subcontractors (see ch. 5). In its dealings with NuPac, Westinghouse placed too much reliance on the subcontractor's experience and expertise. Westinghouse allowed uncertainties about some fabrication specifications to go unresolved, accepted NuPac's judgment that NRC would accept thin-walled containers, and continued to make payments to NuPac even after NRC found problems with the containers. DOE approved the inappropriate firm-fixed-price contract with NuPac, had little involvement with container fabrication matters until NRC rejected the containers, and allowed Westinghouse to order unneeded containers. Although the failure of the containers to get NRC acceptance was not a direct result of lack of oversight, both Westinghouse and DOE could have acted sooner to mitigate the situation and save the government money.

Westinghouse's Oversight Was Ineffective

Although Westinghouse conducted numerous inspections of NuPac's fabrication processes and questioned some of the subcontractor's fabrication requirements, it did not follow through with NRC to determine if these problems could affect NRC's approval of the containers. Even after NRC had initially questioned the acceptability of the containers, Westinghouse did not ensure that the container weld problems were satisfactorily resolved and made payments to NuPac both during and after the repair period. Following NRC's rejection of the defective containers, Westinghouse improved its oversight of the contract.

Westinghouse Did Not Follow Through on Fabrication Concerns

Westinghouse contracted with NuPac for the TRUPACT-II project because of the latter company's previous experience in obtaining NRC's certification of transportation containers. NuPac, however, normally subcontracted for the fabrication of the containers that it designed rather than building the containers itself. In fabricating the TRUPACT-II containers, NuPac actually performed most of these activities for the first time. In March and April of 1989, Westinghouse performed a review of NuPac's controls over the fabrication process and the container design. Westinghouse was concerned, among other things, that NuPac's late start in developing a quality assurance program could affect the delivery of acceptable containers and that NuPac was beginning to fabricate containers without having an NRC-approved design.

In response, NuPac informed Westinghouse that, from the beginning of the contract, it had intended to perform the contract requirements before the design was certified and that it “had assumed the business risk associated with this decision.”¹ According to NuPac officials, they had met with NRC several times on the container design and had informed NRC in writing that production of the containers had started.

Another Westinghouse initiative identified deficiencies in the technical design of the container. In July 1989 a Westinghouse quality assurance official realized that the design drawings did not specify the metal tolerances (the lower and upper limits of thickness) for the locking mechanism on the container lid. Because no such tolerances were specified, the lids when constructed might not close properly. Westinghouse resolved the issue by recommending that NuPac (1) identify in the container design drawings that the locking mechanism tolerances were not included, (2) explain why the tolerances were not included, (3) agree to use standard engineering practices to establish tolerances, and (4) establish a design review procedure for evaluating future tolerance deviations. However, Westinghouse did not question a similar lack of specified thickness tolerances on the design drawings for the container walls, lid, and bottom, even though it had reviewed and approved NuPac’s design drawings and specifications. The absence of specified tolerances for the wall thicknesses subsequently became a point of contention between NRC and NuPac after the grinding operations left the container walls too thin in spots.

Westinghouse Deferred to NuPac on the Wall-Thinning Issue

NRC’s first inspection of NuPac’s fabrication procedures caused the subcontractor to revise its process for reviewing welds and led to the discovery of weld cracks in all containers on the assembly line. From December 1989 to February 1990, NuPac repaired the welds on all affected containers and continued to fabricate new containers, but in the process it ground the walls too thin on all 24 assembled and partially assembled containers. At this critical juncture, Westinghouse did not take a proactive role to ensure that the weld cracks were repaired in a manner that would be acceptable to NRC. For example, Westinghouse did not insist that the proposed repair procedures be discussed with NRC before NuPac started repair work.

¹ The original contract milestones specified that fabrication would begin about 40 days before NRC certified the design.

According to NuPac officials, Westinghouse's representatives at the container assembly facility were routinely apprised of the wall-thinning deficiencies that NuPac's quality control inspectors detected. However, on the basis of NuPac's analysis of the effects of the thin walls, Westinghouse accepted NuPac's judgment that the thinner container walls were safe and that NRC would agree. Consequently, when NRC concluded, at the end of its February 1990 inspection, that the thin-walled containers might not be usable, all 24 units then in production were already beyond repair.

Westinghouse Paid NuPac Before Fabrication Problems Were Resolved

Westinghouse continued to pay NuPac for container-related production costs after NRC's September 1989 and February 1990 inspections, even though the weld problems had not been resolved to the regulatory agency's satisfaction. Following NRC's first inspection of the TRUPACT-II assembly facility and the subsequent discovery of defective weld indications, Westinghouse continued to make payments to NuPac based on the fabrication contract milestones. From September 29, 1989, until February 14, 1990 (the last day of the second NRC inspection), Westinghouse paid NuPac almost \$1.8 million in fabrication costs. Payments for the original 6 containers amounted to just over \$1 million, and payments for 18 of the 24 containers to be built under the first contract option amounted to about \$750,000.

Westinghouse continued to pay NuPac even after NRC raised the thin-wall problem following its second inspection. From February 16, 1990, when NRC advised NuPac that the use of the thin-walled containers might not be appropriate, until July 31, 1990, Westinghouse paid NuPac another \$360,000 in fabrication-related costs. Almost all of these costs were for 18 of 24 production units to be built under the first contract option.²

Westinghouse Improved Its Oversight of the Contract

In 1990 Westinghouse increased its oversight of the TRUPACT-II contract. For example, it established a senior management task force to scrutinize the fabrication process; placed a full-time, experienced quality assurance engineer at the fabrication plant to monitor the fabrication process; and began holding weekly progress meetings with NuPac's quality assurance managers. In addition, Westinghouse obtained corporate manufacturing expertise to help review design drawings and arranged for two individuals experienced in NRC's requirements to conduct a 3-day

² Westinghouse did not pay NuPac any costs related to the second contract option.

preliminary review of NuPac's revised fabrication processes before NRC's August 1990 container assembly inspection.

DOE's Oversight Was Ineffective

Before the fabrication problems arose, DOE performed limited oversight of Westinghouse's efforts to produce a container. For example, despite the unique design of the TRUPACT-II container and the associated need for testing and certification by NRC, DOE approved the award of a firm-fixed-price contract. Also, DOE's oversight of the contract was limited to participation in meetings on testing and design certification issues. DOE did not get involved with fabrication issues until after NRC had determined that the containers were defective. Finally, DOE allowed Westinghouse to order containers that DOE did not need because of the evolving nature of DOE's plans to operate WIPP over the next several years.

DOE Did Not Question Contract Type

In accordance with DOE requirements for advance review of contract procurements (see ch. 3), Westinghouse submitted the proposed TRUPACT-II contract to a DOE contract review board at the Albuquerque Operations Office. According to DOE officials, review boards generally take 5 days to 2 weeks to review a proposed contract. For the container contract, however, the review board completed its review in 3 hours, and DOE records of the meeting did not indicate whether DOE assessed the appropriateness of the proposed contract type during this quick review.

DOE Did Not Ensure Effective Communication Between NuPac and NRC

DOE did not oversee the fabrication of containers and intervened only after NuPac could not resolve the wall-thinning problem with NRC. DOE officials did attend early meetings between NuPac and NRC regarding the container design and test program. According to NRC officials, DOE's Project Manager for WIPP closely followed the progress of these discussions. After NRC certified the container design, however, DOE relied on Westinghouse to provide oversight of the container subcontractor.

For example, after NRC's first inspection of NuPac's fabrication of containers, DOE became aware of the defective welds but did not ensure that NuPac's proposed corrective actions would be acceptable to NRC. In fact, a DOE press release issued in December 1989 indicated that there were no serious problems with the weld defects and that NuPac should have no difficulty correcting them. DOE officials said that at that time they did not consider the problems serious enough to warrant their involvement.

In retrospect, according to officials in DOE's headquarters, DOE should have been more actively involved in ensuring that effective communications were taking place among officials of NRC, NuPac, Westinghouse, and DOE. In this way, DOE could have been alerted early to the potential problems and could have intervened sooner to help resolve them.

**DOE Allowed
Westinghouse to Order
Unneeded Containers**

In December 1989 DOE permitted Westinghouse to order 21 more containers and 7 trailers—increasing the number of containers ordered from 30 to 51—even though by that time DOE needed only 6 containers to carry out a more modest 5-year demonstration program at WIPP and NuPac had still not produced an NRC-accepted container.

DOE had planned to use 51 containers and 17 trailers to ship 125,000 drums of TRU waste to WIPP over its first 5 years of operation and, assuming that the facility was found suitable for permanent disposal of TRU waste, to ship the waste to WIPP over an additional 20 years of operations. However, in June 1989—2 months before NRC certified the container design—DOE reduced the amount of waste to be stored in WIPP during the first 3 years of the 5-year demonstration period to 22,900 drums. Then, in December 1989 DOE further reduced the number of drums to about 4,500 but did not instruct Westinghouse to stop ordering additional containers.

According to DOE officials, shipping 4,500 drums of waste to WIPP for the demonstration program will require six certified containers. In addition to the six containers, DOE maintains that it needs another nine containers to perform maintenance activities and transport waste between temporary storage sites, if needed. DOE officials say the extra containers could also be kept as spares until needed or be sold to other countries. Also, according to these officials, the United Kingdom has expressed interest in purchasing four certified containers and two trailers.

Continuing uncertainties about the kind of transuranic waste to be transported may cause further changes in the number and type of containers needed. According to the Chairman of DOE's WIPP Task Force, DOE is considering whether to design and manufacture a new kind of container—a "half pack"—for supercompacted waste from Rocky Flats. The optimal container design and payload configuration will be determined during the WIPP demonstration phase, as DOE plans to experiment with a variety of options for treating and transporting various waste forms. Depending on the outcome of the experiments, DOE may decide to

use the "half pact" container and would then need fewer TRUPACT-II containers should it decide to begin full-scale waste disposal operations at WIPP.

DOE Evaluated Its Oversight of the Contract

In September 1990 DOE headquarters contracted for an evaluation of the agency's oversight of NuPac's performance. According to the draft report on this evaluation, DOE headquarters, the Albuquerque Operations Office, and the WIPP Project Office all need to strengthen their oversight of the contract in several ways. For example, DOE headquarters needs to perform audits, monitor project activities, and increase its involvement in NRC's inspections of container fabrication activities. Also, DOE's Albuquerque Operations and WIPP Project Offices need to interact with NuPac's quality assurance program to ensure that program provisions are sound; review project activities, including the effectiveness of Westinghouse's controls; and advise headquarters of their oversight results.

Conclusions

Ineffective oversight by Westinghouse and DOE was not the immediate cause of the container wall thinning and the actions that DOE and Westinghouse took (see ch. 2) to resolve the problem. It did, however, contribute to this problem. Westinghouse, in acquiescing to NuPac's early-fabrication decision and acceptance of the thin-walled containers, contributed to the fabrication of 24 defective containers. Had Westinghouse, when it first became aware of the thin spots on container walls, stopped all production, withheld fabrication-related payments, and obtained NRC's opinion on the acceptability of the weld repairs, the excessive grinding on the walls of most of the 24 containers could have been prevented, and up to about \$2.1 million in subsequent payments to NuPac for the costs of fabricating the unusable containers could have been avoided.

Likewise, DOE should have assumed a more active role in overseeing its contractors and the fabrication aspects of the subcontract. After the defective welds were detected, DOE did not take a leadership role in fostering effective communications between NuPac, Westinghouse, and NRC. Finally, DOE's September 1990 and February 1991 independent reviews of the container fabrication process, although steps in the right direction, were too late to prevent fabrication of defective containers.

DOE's Approach to Managing Major Contractors Underlies Weaknesses in Container Acquisitions

The procurement and oversight problems associated with the TRUPACT-II project are symptomatic of conditions that have prevailed within DOE for more than 40 years. A major cause of these problems lies in DOE's long-standing approach to managing its nuclear complex. Specifically, DOE hires contractors to manage and operate its nuclear facilities but does not actively manage the contractors and hold them accountable for their performances. DOE did reduce Westinghouse's award fee for managing WIPP because of the container contract, but the amount of the fee reduction was limited by DOE's implementation of the provisions for determining award fees in its management and operating contract with Westinghouse. Furthermore, it is unlikely that DOE could have refused to pay Westinghouse for the defective containers because its contract lacked specificity concerning Westinghouse's obligation to deliver shipping containers.

DOE has acknowledged and begun to address systemic weaknesses in its management of contractors. However, correcting these weaknesses will be difficult and time-consuming and will require changing an institutional culture that has been in place for 40 years. GAO is addressing this issue on two fronts. One is a special audit effort to ensure that areas vulnerable to fraud, waste, abuse, and mismanagement are identified and that appropriate corrective actions are taken. The other is a general management review of DOE's operations, including DOE's efforts to improve its management of major contractors. The results of our review of the TRUPACT-II contract will feed into these broader efforts.

DOE Gives Wide Latitude to Management and Operating Contractors

DOE's "hands off" relationship with its nuclear facilities contractors has caused the agency to exercise insufficient oversight over its contractors and subcontractors, such as NuPac. This lack of oversight has led to many problems, particularly waste and inefficiency. DOE's relationship with its management and operating (M&O) contractors can be traced back to the unique contractual arrangements between government and industry during World War II. The Atomic Energy Act of 1946 created the Atomic Energy Commission and authorized the commission to continue operating the government's nuclear facilities under similar types of contracts, known today as M&O contracts.

On the basis of national security considerations, urgent military requirements, and the need for secrecy, the Atomic Energy Commission offered

special incentives to attract and retain industry and academic participation as M&O contractors. Incentives included

- government assumption of virtually all risk resulting from the contractor's work;
- a long-term partnership relationship premised on a shared identity of interest in the work being performed and contractors' awareness of their public responsibilities, including the cost-effective expenditure of government funds; and
- contractors' wide latitude and considerable independence in the management of the government's nuclear facilities, commonly referred to as the policy of "least interference."

In addition, the contractors were not required to follow federal procurement regulations and payment procedures and were authorized to use their own purchasing systems when procuring goods and services on behalf of the government.

DOE continues to rely on these underlying principles in managing and operating its nuclear facilities and maintains that this approach has resulted in a remarkable record of scientific and technical success. Nevertheless, in the last 10 years, our work and other studies have identified weaknesses in DOE's oversight of its M&O contractors and in M&O contractual provisions used to direct contractors' work and to hold the contractors accountable for poor performance. These weaknesses have directly contributed to numerous problems at DOE's nuclear facilities. For example:

- As a result of DOE's policy of "least interference" in its M&O contractors' procurement activities, DOE had little assurance that its contractors (1) adequately stressed competition in subcontracting, (2) were reasonably protected against kickbacks, and (3) were following federal payment procedures.¹
- DOE did not develop adequate guidance for, or oversee contractors' use of, authorized pools of research and development funds to undertake discretionary scientific research projects. As a result, a DOE M&O contractor for DOE's Los Alamos National Laboratory had inappropriately

¹ Energy Management: DOE Controls Over Contractor Expenditures Need Strengthening (GAO/RCED-87-166, Aug. 28, 1987).

used some of the \$280 million allocated to discretionary research and development during fiscal years 1984 to 1988.²

- DOE's process for awarding profit to the M&O contractor at the agency's Rocky Flats Plant, a weapons production facility with major environmental, safety, and health (ES&H) problems, downplayed these problems while emphasizing production. Only about 20 percent of the factors considered in determining the contractor's profit were related to ES&H issues, and the significance of these issues was either understated or not considered during the profit-determination process. We concluded that similar conditions could occur at other DOE facilities.³
- The M&O contractor at the Lawrence Livermore National Laboratory could not account for about \$45 million in government-owned property. However, DOE did not hold the contractor accountable because the contract did not contain the standard property-management clause necessary for accountability and because the contract indemnified the contractor for virtually all costs.⁴

DOE's Contracting Approach Underlies TRUPACT-II Contract Weaknesses

The procurement and oversight problems and the resulting waste and inefficiency in the TRUPACT-II contract were largely caused by DOE's contracting policy of least interference and contract provisions that allowed these contractors to earn profit with minimal risk. DOE had essentially left the oversight of the TRUPACT-II contract to Westinghouse and did not adequately supervise its M&O contractor's efforts to obtain the waste containers, despite the stated critical importance of the contract to opening WIPP. The net result was that DOE paid about \$14.1 million for 15 NRC-approved containers, 17 production trailers, 4 prototype trailers, and all or parts of 24 defective containers. Of that amount, about \$3.5 million was for the cost of the defective containers and excess trailers. However, DOE's M&O contract with Westinghouse left it with little recourse but to reimburse the contractor for the full \$14.1-million amount of the TRUPACT-II contract as modified by the July 1990 memorandum of understanding.

DOE's ability to hold Westinghouse accountable was limited by the lack of specific performance expectations in the M&O contract. DOE modified

² Energy Management: Better DOE Controls Needed Over Contractors' Discretionary R&D Funds (GAO/RCED-91-18, Dec. 5, 1990).

³ Nuclear Health and Safety: DOE's Award Fees at Rocky Flats Do Not Adequately Reflect ES&H Problems (GAO/RCED-90-47, Oct. 23, 1989).

⁴ Nuclear Security: DOE's Oversight of Livermore's Property Management System Is Inadequate (GAO/RCED-90-122, Apr. 18, 1990).

the contract to require Westinghouse to subcontract for delivery of NRC-certified shipping containers and to develop contingency plans in the event that the containers were not available as planned. DOE did not, however, set dates or time frames by which these tasks were to be accomplished or include other criteria for evaluating the contractor's performance.

The only recourse DOE had to hold Westinghouse accountable for its performance of the TRUPACT-II procurement was the profit provisions of the WIPP M&O contract. Specifically, through contract clauses in which Westinghouse is entitled to earn additional profit, called an "award fee," DOE, in two semiannual performance evaluations, criticized Westinghouse's management of the TRUPACT-II contract and reduced the amount of the contractor's award fee. Nevertheless, primarily because of DOE's implementation of the award-fee provisions in Westinghouse's contract with DOE, the reduction in the award fee was modest (DOE estimated the amount at between \$52,000 and \$82,000) compared with the cost to DOE of the defective containers and parts and the \$1.88-million fee awarded to Westinghouse. (See app. I for a discussion of DOE's evaluation of Westinghouse's performance.)

According to the FAR, under a cost-reimbursement type of contract such as Westinghouse's, the contractor is required only to make its "best efforts" to perform the work specified under the contract. Thus, in the absence of any specific contract provision concerning the timely delivery of acceptable shipping containers, it is doubtful that DOE could have withheld reimbursement to Westinghouse for the contractor's costs under the contract, including the amount that Westinghouse paid NuPac for the defective containers.

DOE Acknowledges Contracting Problems, but Solving Them Will Be Difficult

The Secretary of Energy has begun to identify and address a multitude of problems facing the DOE nuclear weapons complex, including DOE's long-standing approach to managing and overseeing its contractors. In this regard, the Secretary has identified DOE contract management as a key area in need of improvement and has begun implementing a number of corrective actions. However, correcting DOE's contract management problems will be a formidable and time-consuming task.

Secretary of Energy Takes Steps to Address Contracting Problems

In June 1989 the Secretary of Energy announced a 10-point plan for changing DOE's operating philosophy to "a new culture of accountability" at its production, research, and testing facilities. According to the Secretary, this is needed to reverse over 40 years of "cultural misdirection" that, in his view, resulted in the shutdown of the nuclear weapons complex. Also, in a December 1989 report required by the Federal Managers' Financial Integrity Act, the Secretary identified contract management as a material internal control weakness.⁵ The Secretary noted that DOE's M&O contracts were of particular concern because (1) corrective actions were required to ensure that contractor compensation rewards excellence and penalizes unsatisfactory performance, (2) cost allowability and performance expectations needed to be better defined to prevent situations in which DOE is responsible for a contractor's fraudulent or otherwise unacceptable action, (3) oversight of prime contractors and subcontractors needed improvement to ensure that their work is acceptable and complies with contract requirements, and (4) improvements were needed to implement federal policy requirements for major acquisitions.

The Secretary has proposed and begun to implement a number of actions to correct the above deficiencies, including

- restructuring the award-fee program to reward excellent performance and penalize poor performance;
- redefining allowability of contractors' costs, performance expectations, and performance criteria so that DOE is not responsible for costs related to contractors' fraudulent or otherwise unacceptable actions;
- improving DOE's oversight of contractors and subcontractors; and
- implementing federal procurement requirements for major systems acquisitions.

In 1989 DOE changed its award-fee structure to emphasize ES&H requirements and to increase for-profit contractors' accountability for all aspects of their operations. Under the new rules, at least 51 percent of the award fee that a contractor is eligible to receive must be based on the contractor's compliance with ES&H requirements. The rules also

⁵ The act requires that heads of executive agencies report to the Congress annually on the adequacy of their internal control systems. DOE classifies internal control weaknesses as material when they (1) significantly impair the fulfillment of the agency mission, (2) deprive the public of needed service, (3) violate statutes or regulatory requirements, (4) result in a conflict of interest, (5) create adverse publicity, (6) require the Secretary's personal attention, (7) endanger national security, or (8) cause harm.

authorized DOE to deny an award fee to a contractor if DOE finds any area of the contractor's performance unacceptable.

In addition, in June 1991 DOE implemented its plans to change contract provisions that would affect the types of costs for-profit M&O contractors may charge DOE. These changes, which DOE plans to incorporate in all new or renewed for-profit M&O contracts, would increase contractors' accountability for the costs of fines, penalties, and certain insurance costs. Also, as discussed in appendix I, contractors could earn larger award fees but would be at risk of losing greater amounts of their award fees because of poor performance.

Although the Secretary's contracting initiatives are positive, correcting contracting weaknesses will be a difficult task because the problems are deeply rooted in DOE's historic way of doing business. Thus, it will take time to identify and properly implement many of the changes needed to dismantle a 40-year corporate culture. The Secretary appears to have recognized this in his posture statement accompanying the fiscal year 1992 budget:

From the outset it was clear that instilling a new corporate culture would take time and that new challenges and changing circumstances would require revisions to planned timetables.

GAO's Initiatives to Monitor DOE's Progress

Recognizing the seriousness of contract management problems in DOE, we are increasing attention to this subject as part of a special effort to ensure that areas vulnerable to fraud, waste, abuse, and mismanagement are identified and appropriate corrective action are taken. We have recently completed evaluations of DOE's monitoring of its M&O contractors' subcontracting practices⁶ and use of support service contracts.⁷ In addition, we are evaluating DOE's management of the award-fee process and its contract auditing practices. Finally, we are undertaking a comprehensive management review of DOE's operations, including contracting activities. Our findings and conclusions on the TRUPACT-II project will be an integral part of both of these broader efforts.

⁶ Energy Management: DOE Actions to Improve Oversight of Contractors' Subcontracting Practices (GAO/RCED-92-28, Oct. 7, 1991).

⁷ Energy Management: Using DOE Employees Can Reduce Costs for Some Support Services (GAO/RCED-91-186, Aug. 16, 1991).

DOE Reduced Westinghouse's Award Fee

Westinghouse's performance is appraised, as is that of other management and operating contractors, in multiple areas. On the basis of its level of performance, Westinghouse can earn up to the entire amount of a maximum award fee. As discussed below, DOE's calculation of Westinghouse's award fee for the second half of fiscal year 1990 illustrates how Westinghouse's performance on the TRUPACT-II project influenced the amount of the award fee it earned.

In two semiannual performance evaluations, DOE criticized Westinghouse's management of the TRUPACT-II subcontract and reduced the amount of the fee awarded to the contractor. Nevertheless, primarily because of DOE's implementation of the award-fee provisions as incorporated in Westinghouse's contract with DOE, the reduction in the fee, estimated at between \$52,000 and \$82,000, was modest compared with about \$3 million that DOE spent on the defective containers and container parts.

DOE Criticized Westinghouse's Performance

In evaluating Westinghouse's performance for the 6-month periods of October 1989-March 1990 and April 1990-September 1990, DOE found deficiencies in the contractor's management and quality assurance oversight of the TRUPACT-II project. In the first evaluation, DOE recognized that quality assurance systems had detected the wall-thinning problems, but criticized the contractor for not maintaining closer oversight of the fabrication process.

In the second evaluation, DOE was more critical of Westinghouse's performance. DOE noted that 24 containers in various stages of completion had been fabricated in nonconformance with NRC's standards because of the wall-thinning problem. According to the evaluation, Westinghouse had jeopardized the WIPP transportation and waste disposal programs. DOE also noted that considerable resources had to be expended to recover from the problem.

DOE's Albuquerque office, with headquarters approval, reduced Westinghouse's award fee.¹ Although DOE could not provide us with the precise amount of the fee reduction for the two successive evaluation periods, a

¹ Unlike NuPac's contract, Westinghouse's management and operating contract with DOE is a cost-plus-award-fee contract. Under the contract, Westinghouse is paid a base fee every 6 months, is reimbursed for normal business costs, and is eligible to receive an award fee. DOE uses a pre-set formula to calculate the total available award fee that the contractor can earn. However, the total award fee that Westinghouse actually earns is based on DOE's semiannual evaluation of Westinghouse's performance.

DOE Albuquerque procurement official estimated that the reduction ranged from \$52,000 to \$82,000. During those same periods, Westinghouse earned an award fee of \$1.88 million for its performance out of a total maximum available award-fee pool of \$3.4 million.

DOE's Implementation of Award-Fee Provisions Limited Reduction in Fee

In large part, DOE's implementation of the award-fee provisions included in Westinghouse's management and operating contract limited its ability to reduce the contractor's award fee because of the contractor's management of the container subcontract. DOE has since made changes in its award-fee structure to increase contractors' accountability, but these changes have not been incorporated into Westinghouse's existing M&O contract with DOE. Had these changes been in effect in the earlier evaluation periods, it is unlikely that they would have made a difference in the amount of award-fee reductions. However, under other new management and operating contracting provisions that disallow certain costs, such as those incurred because of contractors' negligence, DOE might have been able to withhold reimbursement to Westinghouse for the costs of the defective TRUPACT-IIS, but only if it determined that the contractor was negligent.

Westinghouse's performance is appraised in multiple areas. On the basis of its level of performance, Westinghouse can earn up to the maximum award fee. As discussed below, DOE's calculation of Westinghouse's award fee for the second half of fiscal year 1990 illustrates how Westinghouse's performance on the TRUPACT-II project influenced the amount of the award fee it earned.

According to an established semiannual evaluation plan, DOE appraised Westinghouse's performance for the April-September 1990 period in six functional performance groups, such as "general management," and "resources and business management." Within these functional groups, the contractor's performance is further broken out into functional performance areas, such as "overall operations and activities." DOE evaluated Westinghouse's TRUPACT-II performance in (1) the overall operations and activities functional performance area, within the general management functional performance group, and (2) the contracts and procurement management functional performance area, within the resources and business management functional performance group.

For these functional performance groups, however, the TRUPACT-II project was only one of many projects on which Westinghouse's performance was evaluated. Westinghouse's performance within each of the major

functional performance groups was given one of five descriptive grades (ranging from "outstanding" to "unsatisfactory"), and each grade was accompanied by a numerical score (ranging from 100 to 0). As set forth in the rating plan, grades and scores were determined by comparing Westinghouse's deficiencies against its achievements in each group's functional performance areas. Under the plan, the contractor's accomplishments were classified as "achievements" or "significant achievements" and problems identified were classified as "deficiencies" or "significant deficiencies." According to Albuquerque Operations Office officials, such classifications are derived judgmentally.

How a performance deficiency is classified can significantly affect both the grade and the numerical score. For example, if no significant achievements and some deficiencies are noted within a given functional performance group, the final grade for the group should be "marginal" and should receive a score between 70 and 79. However, a contractor can offset its deficiencies by significant achievements in a functional group. For example, with several significant achievements and few deficiencies, a contractor can receive an "excellent" grade and a score of 87 to 95.

DOE's evaluation plan also includes pre-established relative weighting factors for each functional performance group. For example, DOE established a relative weighting of 30 percent to the "environment, safety, and health" functional performance group.² The "general management" group is composed of two categories: (1) "overall operations and activities" and (2) overall management of environment, safety and health, which were weighted at 10 and 15 percent, respectively. The "resources and business management" group was weighted 10 percent. Westinghouse's performance on the TRUPACT-II project was appraised within the general management and resources and business management groups.

Westinghouse's numerical scores for each functional performance group were multiplied by their relative weights and summed to arrive at an overall numerical score for the rating period. The overall score determined Westinghouse's award fee, calculated from the maximum available award fee of \$1.68 million, for the second half of fiscal year 1990.

² Other functional performance groups related to "environment, safety, and health" are also given significant weightings: the "overall management of environment, safety, and health" group is given a 15-percent weighting; the "waste management, operational surety, and environmental restoration" group is also given a 15-percent weighting.

For its performance on the TRUPACT-II project, Westinghouse received a "significant deficiency" in the general management group and a "deficiency" in the resources and business management group. In these two groups, Westinghouse received grades of "marginal" and respective scores of 79 and 77. For its performance on other projects, however, the contractor received scores ranging from 85 to 88. Accordingly, on the basis of the scores and the assigned weightings, Westinghouse earned an overall grade of "good" (a score of 84.75) and received an award fee of about \$967,000, or 58 percent of the maximum available award fee for the period from April through September 1990.

An award fee can be withheld in its entirety if the contractor's grade in any one functional performance group is "unacceptable." Also, DOE would probably not have refused to reimburse Westinghouse for the purchase of the defective containers because the contract requires DOE to reimburse the contractor for all allowable costs except in extreme cases such as fraud, theft, or gross negligence by corporate officials.

According to a DOE Albuquerque contracting official, had recent changes to the award fee structure been in place at the time of the evaluations, they would have made little actual difference in Westinghouse's award-fee calculation. Through a final rule published June 19, 1991, DOE amended its fee arrangements for future management and operating contracts. The amendments were intended to clarify contract performance responsibilities and to provide additional incentives to enhance contractors' accountability to DOE. Essentially, according to the DOE official, under the new award-fee rules, Westinghouse would have been eligible to earn a higher award fee but, at the same time, would have been at risk of losing a larger part of the available award fee.³ Under other provisions of the new rules, however, DOE would be able to withhold from Westinghouse payment of the cost of the defective TRUPACT-IIS only if it determined that the contractor was negligent or had engaged in willful misconduct.⁴ At the time of our review, neither of these provisions had been incorporated into Westinghouse's contract for WIPP.

³ Also, under the new rules, which did not apply to Westinghouse for the two fiscal year 1990 rating periods, for an overall "marginal" performance score, a contractor would be obliged to refund to the government up to 50 percent of its base fee.

⁴ The new rules stipulate that DOE contractors and/or subcontractors are liable for direct costs and expenses resulting from damage to, destruction of, or loss of government property as a direct result of contractor and/or subcontractor negligence or willful misconduct. These "avoidable" costs must be the result of circumstances clearly within the contractor's/subcontractor's control and from acts or omissions in which the exercise of reasonable care would have avoided the damage, destruction, or loss of the property.

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Energy Management: Using DOE Employees Can Reduce Costs for Some Support Services (GAO/RCED-91-186, Aug. 16, 1991).

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