

March 13, 1998

MEMORANDUM FOR THE SECRETARY

FROM: Gregory H. Friedman
Principal Deputy Inspector General

SUBJECT: INFORMATION: Report on "Audit of Alternatives to Testing at the Tonopah Test Range"

BACKGROUND:

The Office of Inspector General has issued several recent reports concerning ways in which the Department could reduce the size of the complex to reflect current and future operating strategies. One report identified land that we believe the Department could dispose of allowing it to focus on the mission of the Department rather than land management (DOE/IG-0399). Another report identified leased administrative facilities, a significant amount of which were vacant (DOE/IG-0402). Finally, we analyzed operations at Mound and concluded that the remaining functions could be transferred to another operational facility with significant cost savings (DOE/IG-0408). We began an audit of operations at the Tonopah Test Range to determine if there were cost effective alternatives to continued operations.

The Atomic Energy Commission established the Tonopah Test Range (Tonopah) in 1957 for weapons program testing. During the 1980s, about 150 tests were done annually at Tonopah. Beginning in the 1990s, DOE's testing at Tonopah declined dramatically. Some types of tests were moved to other ranges. By 1996, only 19 tests were done at Tonopah, 3 of which were work-for-others. Therefore, the objective of this audit was to determine if there were viable, cost effective alternatives to testing at Tonopah.

DISCUSSION:

During the early 1990s, DOE's Albuquerque Operations Office (Albuquerque) and Sandia National Laboratories (Sandia), which operate Tonopah for DOE, explored the alternative of testing elsewhere. Some of the data gathered by Albuquerque and Sandia provided indications that testing at other ranges would be practical and economical. Our audit followed up on the Albuquerque/Sandia studies and also indicated that testing could be done elsewhere, at a potential cost savings of several million dollars annually. Therefore, we recommended that Albuquerque conduct a comprehensive study of all testing alternatives. We also recommended that, if the study found that it was not feasible or economical to move the testing elsewhere, Albuquerque reduce the cost at Tonopah to the minimum level necessary to support testing requirements.

Albuquerque agreed to implement the first recommendation but raised technical questions regarding issues such as environmental permits, scheduling flexibility, and cost components, which we believe warrant a more detailed examination as part of the recommended study. Albuquerque agreed to the second recommendation and stated that it and Sandia continued to actively pursue cost reductions at Tonopah.

Attachment

cc: Deputy Secretary
Under Secretary

U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL

AUDIT OF
ALTERNATIVES TO TESTING AT THE
TONOPAH TEST RANGE

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Report Number: DOE/IG-0418
Date of Issue: March 13, 1998

Western Regional Audit Office
Albuquerque, New Mexico 87185

AUDIT OF
ALTERNATIVES TO TESTING AT THE
TONOPAH TEST RANGE

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U.S. DEPARTMENT OF ENERGY
OFFICE OF INSPECTOR GENERAL
OFFICE OF AUDIT SERVICES

AUDIT OF
ALTERNATIVES TO TESTING AT THE
TONOPAH TEST RANGE

Audit Report Number:DOE/IG-0418

SUMMARY

Since the 1950s, the Department of Energy (DOE) and its predecessor agencies have done weapons program testing at the Tonopah Test Range (Tonopah). Beginning in the 1990s, DOE's testing at Tonopah declined dramatically. This decline was coincident with the signing of various international treaties, the end of the Cold War, and the movement of some types of tests to other ranges. As a result, Tonopah was left with some bomb and work-for-others testing. The objective of this audit was to determine if there were viable, cost effective alternatives to testing at Tonopah.

During the early 1990s, DOE's Albuquerque Operations Office (Albuquerque) and Sandia National Laboratories (Sandia), which operates Tonopah for DOE, explored the alternative of testing elsewhere. Some of the data gathered by Albuquerque and Sandia provided indications that testing at another range would be practical and economical. Our audit followed up on the Albuquerque/Sandia studies and also indicated that testing could be done elsewhere, at a potential cost savings of several million dollars annually. Therefore, we recommended that Albuquerque conduct a comprehensive study of all testing alternatives. Albuquerque agreed to implement this recommendation but raised technical questions regarding issues such as environmental permits, scheduling flexibility, and cost components, which we believe warrant a more detailed examination as part of the recommended study. We also recommended that, if the study found that it was not feasible or economical to move the testing elsewhere, Albuquerque reduce the cost of Tonopah to the minimum level necessary to support testing requirements. Albuquerque agreed to this recommendation and stated that it and Sandia continued to actively pursue cost reductions at Tonopah.

(signed)

Office of Inspector General

PART I

APPROACH AND OVERVIEW

INTRODUCTION

Tonopah was established in 1957 through a land permit from the Nellis Air Force Range (Nellis Range), Nevada. During the succeeding years, Sandia operated the range for DOE and conducted hundreds of tests annually. Beginning in the early 1990s, however, the number and types of tests at Tonopah declined coincident with various international events. These events included the signing of treaties such as the Intermediate Range Nuclear Force Treaty, the Strategic Arms Reduction Treaties, and the Comprehensive Test Ban Treaty. In addition, some types of tests were transferred to other ranges. Consequently, Tonopah is left with only a portion of DOE's bomb testing and some work-for-others testing. Therefore, the objective of this audit was to determine if there were viable, cost effective alternatives to testing at Tonopah.

SCOPE AND METHODOLOGY

We audited at Albuquerque, Sandia, and Tonopah from November 1996 through June 1997 and examined actual and estimated cost and utilization data for Fiscal Year (FY) 1993 through FY 1996.

Consistent with the audit objective, we:

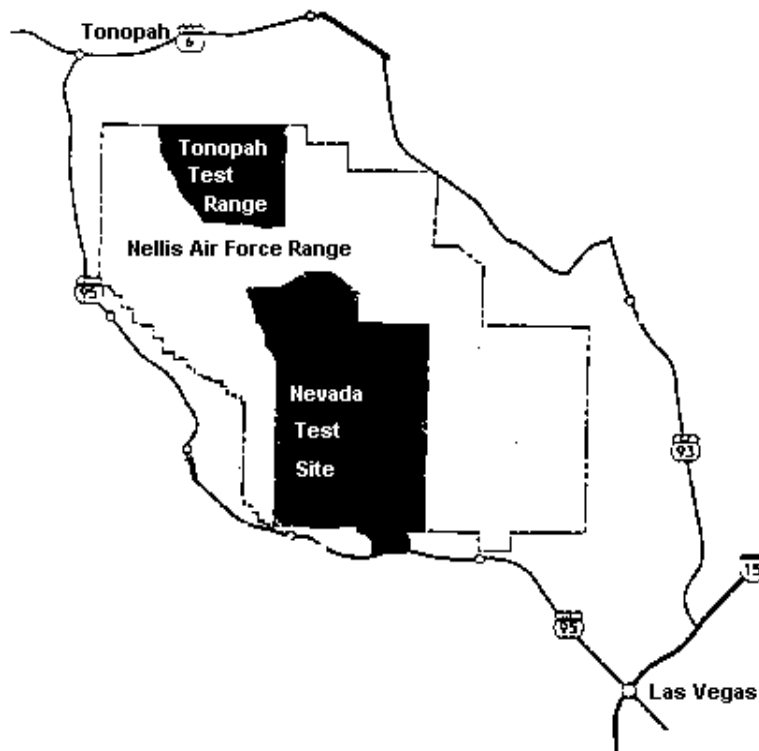
- reviewed laws and regulations, applicable DOE orders, policies and procedures, reports, and correspondence concerning the operation of Tonopah;
- reviewed Sandia's policies and procedures relating to the operation of Tonopah;
- interviewed DOE, Sandia, Tonopah, Nevada Test Site (NTS), and Department of Defense (DOD) personnel responsible for the operation and utilization of Tonopah and other ranges; and,
- reviewed cost estimates obtained from the Nevada Operations Office (Nevada); White Sands Missile Range, New Mexico (White Sands); Naval Air Warfare Center Weapons Division, China Lake, California (China Lake); Utah Testing and Training Range, Utah (Utah Range); Air Force Development Test Center, Eglin Air Force Base, Florida (Eglin); and Nellis Range.

The audit was performed in accordance with generally accepted Government Auditing Standards for performance audits and included tests of internal controls and compliance with laws and regulations to the extent necessary to satisfy the audit objective. Accordingly, we assessed Sandia's management and administrative controls relating to the operation of Tonopah. We did not rely extensively on computer processed data; therefore, we did not assess its reliability.

Because our review was limited, it would not necessarily have disclosed all internal control deficiencies that may have existed at the time of our audit.

BACKGROUND

Historical records show that the Atomic Energy Commission began its weapons testing program with Sandia in the late 1940s. Initial tests were conducted at Salton Sea in California and, later, at Yucca Flats within the NTS. Tonopah is a DOE facility operated by Sandia for DOE-funded weapons programs. The Tonopah site, located on the Nellis Range, is approximately 160 miles northwest of Las Vegas, Nevada, and about 32 miles southeast of the town of Tonopah, Nevada. The following map provides a perspective on the location of Tonopah, Nellis Range, and the NTS.



Part II of this report discusses DOE's cost of operating Tonopah to conduct a very few tests and the savings DOE could possibly realize by utilizing other testing alternatives. Three alternatives identified are testing at DOD ranges, at Tonopah with the Air Force conducting the tests, and at the NTS.

PART II

FINDING AND RECOMMENDATIONS

Alternatives to Testing at Tonopah

FINDING

Federal managers are to ensure that Government assets are used cost effectively. This audit and earlier Sandia studies showed that it may be possible and more cost effective to test at a location other than Tonopah. Sandia has continued to operate Tonopah because of concerns about giving up this asset and testing at other ranges. Preliminary estimates of the cost of other testing options, however, indicate savings of possibly as much as \$5.6 million annually.

REQUIREMENTS

It is a fundamental responsibility of Federal managers to cost effectively manage Government assets and achieve program results. These responsibilities are detailed in DOE orders. These orders state that Heads of Departmental Elements (such as Albuquerque) have the responsibility to: (1) maintain stewardship of Federal resources and ensure they are used efficiently and effectively to achieve intended program results and (2) take systematic and proactive measures to establish cost effective appropriate management controls. DOE also has issued an order that requires the effective management of the weapons complex and encourages the effective use of the capabilities and resources of the complex. From these orders, it follows that weapons testing should be cost effective.

TONOPAH AND OTHER OPTIONS

Information obtained during the audit indicates that other testing options are viable and cost effective. The number and types of DOE tests at Tonopah have decreased substantially as has the number of work-for-others tests. In addition, preliminary information indicates that the cost of operating Tonopah on a per test basis is many times higher than DOE's cost of testing at DOD ranges or using other testing options. Furthermore, Sandia's own studies indicated the viability of these other options. Our audit provided similar indications and also suggested the possibility of testing at the NTS.

Decrease in Number and Types of Tests

From inception until the mid-1960s, 150 or more tests were done annually at Tonopah. The testing increased during the Vietnam War and then returned to the 150 level at the end of the 1980s. Since then, testing has further declined. By 1996, for example, only 19 tests were done at Tonopah, 3 of which were work-for-others. DOE projections show that a further reduction in testing requirements is anticipated.

Not only has the number of tests declined, but the types of tests have decreased as well. From the earliest days, Tonopah was involved in a variety of tests including rockets, bombs, artillery, cruise missiles, and others. However, many of these types of tests have been moved elsewhere. In the 1980s, for instance, Sandia moved its cruise missile testing to the Utah Range. Other types of tests, such as rockets, have likewise been moved to DOD ranges. Thus, Tonopah is now left with only a portion of the bomb drop tests and some work-for-others tests.

Due to the reduction in testing, Sandia began exploring ways to reduce costs. Although Sandia was able to reduce the total cost of operating Tonopah, the average DOE cost per test in FY 1996 was \$563,000, a figure considerably higher than the cost of other testing options.

Sandia Studied Cost Reduction Options

Starting in 1992, Sandia examined various options to reduce costs. These options included (1) reducing the permanent staff at Tonopah to a minimal level and conducting testing in clusters and (2) turning Tonopah over to the Air Force and contracting with it for tests. For instance,

- In September 1992, a study concluded that the probable testing workload over the next 5 to 10 years did not justify the cost incurred by the present mode of operation. The study recommended operating Tonopah with minimal staffing and conducting tests on a campaign basis (that is, clustering of tests during a few periods of the year).
- In February and May 1994, studies recommended reducing staff size and negotiating with the Air Force to transfer testing equipment to it in exchange for an agreement to support testing at Tonopah.

From January 1994 to October 1995, Albuquerque and Sandia officials explored the possibility of conducting bomb drop tests at DOD ranges. Sandia testing personnel met with DOD range personnel on several occasions to provide detailed descriptions of its bomb testing requirements. Sandia personnel concluded that the Eglin Air Force Base could meet DOE's testing requirements. Further, Albuquerque sent a memorandum to Eglin requesting that DOE be allowed to conduct a bomb test on its range because it was no longer possible to maintain the full time operational capability of Tonopah. In September 1995, a meeting was held between Albuquerque, Sandia, and DOD officials to discuss the possibility of using either the Utah Range or Eglin as the site for bomb testing. The next month, DOD sent Sandia a letter stating the per test costs would be up to \$38,000 for the Utah Range and about \$15,000 for Eglin. The letter also recommended that DOE contact Eglin to finalize the negotiations. However, the negotiations never took place, even though the DOD costs were considerably less than the cost per test at Tonopah. In responding to a draft of this report, Albuquerque said that the decision was based on the need to construct a hard target. Estimated hard target construction costs at Eglin and the Utah Range varied from \$2.8 to \$3.7 million. However, we found that the savings resulting from using either of these ranges would have recovered the hard target construction costs in about one year.

Up to this point, these internal studies came to a similar conclusion: DOE's tests could be done using other testing options, which could result in considerable savings. Despite this conclusion, however, neither Albuquerque nor Sandia took action to achieve the savings other than pursuing cost reductions at Tonopah.

In August 1996, Sandia, at the Air Force's request, joined an ongoing Integrated Product Team (IPT) study of cost-cutting measures at the Nellis Range. Initial recommendations included sharing transportation, medical, and fire services; consolidating contracts; and moving Tonopah personnel into Air Force buildings. This study, however, did not explore the option of testing anywhere outside the Nellis Range.

Follow-up on Sandia's Studies

Since more than one study concluded that it would be practical and economical to move the remaining tests to DOD ranges, the Office of Inspector General (OIG) retraced the steps taken by Sandia to determine if testing at another range was still a viable option. In addition, we examined the options of returning Tonopah to the Air Force, which would conduct tests for DOE under contract, and using the NTS as the DOE testing site.

We found that Sandia had already examined the capabilities of different DOD ranges. In fact, two Sandia officials, including a former manager of Tonopah, agreed that DOD ranges have the technical capability to perform DOE's tests. In addition, Tonopah's testing personnel said that DOD ranges have qualified testing personnel and high quality testing equipment that is very similar to that used at Tonopah. Furthermore, personnel at three DOD ranges said that existing Environmental Impact Statements would allow them to perform all of the planned tests. If testing requirements included enriched uranium, a Utah Range environmental official stated that their current permit could be amended in three months or less. Finally, a significant number of DOE tests, including bomb tests, have been conducted at DOD ranges. Thus, we found no obvious reason why DOE could not test at DOD ranges.

The May 1994 Sandia study, cited previously, recommended turning equipment over to the Air Force in exchange for an agreement to support DOE's tests. The study pointed out that the Air Force had the capability and technical expertise to satisfy the current and anticipated DOE testing needs. To determine if this option was still viable, we contacted Nellis Range officials. Following our inquiry, Nellis Range officials observed a Tonopah bomb test and concluded that they could provide the necessary support. Consequently, we believe the capability exists for the Air Force to conduct DOE's tests at Tonopah.

Finally, with DOE and DOD assistance we identified various areas at the NTS that could be used for testing, including one that had been used in the past. NTS, which has a control center, also has some of the equipment needed for DOE's testing, as well as Sandia testing personnel on site. Therefore, the consolidation of testing organizations may result in better utilization of facilities, equipment, and personnel. While Albuquerque has expressed concerns regarding the cost of moving the bomb testing program to the NTS, neither Albuquerque nor Sandia has thoroughly examined this option.

Based on Sandia's testing requirements, six ranges provided us with the information we used to calculate an average cost per test. The following table summarizes the cost per test for each of the ranges contacted.

Estimated Average Cost Per Test at Other Ranges

Test Range	Estimated Average Cost Per Test
Eglin	\$ 23,800
China Lake	\$ 53,500
Utah Range	\$ 54,000
White Sands	\$124,500
Air Force Testing at Tonopah	\$193,300
Nevada Test Site	\$258,200

These costs, when compared to DOE's average cost per test, indicate that any of the above testing options would result in significant savings.

CONTINUED OPERATION OF TONOPAH

Albuquerque management does not want to discontinue operating Tonopah for the following reasons: (1) DOE will lose a strategic asset; (2) Tonopah provides testing flexibility and known testing priority; (3) environmental approvals may not be obtainable at other ranges; and (4) cost estimates for testing elsewhere may be understated.

Albuquerque contends that Tonopah is a strategic asset needed for testing the reliability of the stockpile because it has capabilities which cannot be easily duplicated elsewhere and without Tonopah, DOE would not have its own test range. However, we could not find a compelling reason for DOE to have its own range. All DOD test ranges examined in this audit are designated as strategic assets and are available for use by other Government agencies. Furthermore, our audit found that Tonopah's testing capabilities could be, and have been, duplicated elsewhere. In the past, for example, tests that were done at Tonopah were moved to DOD ranges, and studies have shown that the remaining tests could be done elsewhere. Also, a bomb drop test has been performed at the Utah range.

According to Albuquerque, Tonopah's flexibility accommodates last minute scheduling changes. The OIG agrees that Tonopah provides testing flexibility due to the small number of tests being conducted. Albuquerque also contends that testing at a DOD range raises the risk of delay or cancellation of DOE tests due to higher priority DOD tests. We found, however, that the development of nuclear weapons is a joint responsibility, and the DOE bomb tests have DOD's highest priority rating. In 15 years of cruise missile testing at the Utah Range, for instance, there has never been a test delayed due to a higher priority DOD project. Therefore, the risk of cancellation or delay at a DOD range appears to be remote.

Management also believes that the DOD ranges would not be able to obtain the necessary environmental approvals to perform DOE's tests, which could involve a combination of special nuclear material and insensitive high explosives. Albuquerque and Sandia, however, had already identified three ranges that could do these tests. In 1995, for example, Albuquerque determined that the tests could be done at the Utah Range and Eglin. Also, in 1997, Sandia found that China Lake could obtain the necessary environmental approvals in as little time as six months. Thus, the environmental approvals are either already in place or could be obtained.

There were also management concerns about the estimated costs used in our draft audit report. Management noted that the OIG did not fully consider start-up costs such as site preparation, training, equipment, and environmental compliance. We recognize that the cost estimates provided by officials from other ranges may not have been complete; however, the cost estimates were based on the best information available -- Sandia's Program Introduction Document. This document contained detailed testing and environmental requirements. Furthermore, the estimates provided by the DOD during this audit were in line with the estimates that the DOD provided to Sandia in FY 1995, after an extensive review.

Management also questioned the use of incremental DOD range costs in the report and pointed out that a new cost sharing arrangement may be needed if all tests were done on DOD ranges. We agree. However, the incremental cost basis is the only one available and the testing done by DOE is only a small fraction of the amount of testing done by DOD. Before a new cost sharing arrangement is enacted, a comprehensive study must be conducted of costs that DOE may incur if it did all of its testing elsewhere.

Albuquerque pointed out that it has reduced costs of operating Tonopah and has identified ways to reduce costs even further through participation in the IPT. For example, Sandia reduced Tonopah's overall operating costs from FY 1993 to FY 1996 by about \$7.7 million and projects that if all of the IPT recommendations are implemented, DOE's costs will decline to about \$6.2 million in FY 1998. Although its operating costs have been reduced, the number of tests conducted at Tonopah has continued to decline and only 11 tests are scheduled in FY 1998. Therefore, the cost per test in FY 1998 will be about \$564,000. This figure is considerably higher than the estimated cost at other ranges (see page 7 of the report).

POTENTIAL COST SAVINGS

There are many factors that affect the amount to be saved by moving testing elsewhere. The audit indicated, however, that if testing were done elsewhere, substantial savings could result. The greatest savings to taxpayers may be possible by closing the Tonopah operation and testing at a DOD range. After considering IPT recommendations already implemented, for example, there was a \$510,000 difference between the \$54,000 estimated cost per test at Utah Range and the projected FY 1998 cost of \$564,000 per test at Tonopah. Based on the number of tests planned for FY 1998, savings of as much as \$5.6 million may be achieved annually. Substantial savings to the taxpayer may also be possible by either having the Air Force conduct the testing for DOE at Tonopah or moving testing to the NTS. However, the precise amount to be saved can only be

determined through a comprehensive study that fully considers the technical questions raised in management's response to this report.

The OIG recognizes that all tests are not identical and there may be other cost effective alternatives not explored in this report. This report, however, indicates that substantial savings can be achieved by using other testing alternatives. Albuquerque should use this report as a starting point for a comprehensive study of all alternatives. This study should consider programmatic as well as economic factors and should take into account unique equipment and other requirements. The ultimate goal of the comprehensive study must be to find the most cost effective use of Government assets while still accomplishing DOE's testing mission.

RECOMMENDATIONS

We recommend that the Manager, Albuquerque Operations Office:

1. Conduct a comprehensive study to determine if it is feasible and economical to move the remaining DOE tests from Tonopah to another range or ranges. If it is feasible and economical, take the appropriate action, including negotiating any agreements (such as re-entry rights to Tonopah) which are necessary to protect DOE's interest.
2. If the study, conducted as a result of recommendation 1, shows that it is not feasible or economical to move the remaining tests, reduce costs at Tonopah to the minimum level necessary to support testing requirements.

PART III

MANAGEMENT AND AUDITOR COMMENTS

MANAGEMENT COMMENTS

The Albuquerque Operations Office partially concurred with recommendation 1 and said that Albuquerque and Sandia had been evaluating the feasibility and cost effectiveness of various test range options since 1992.

For instance, DOE Albuquerque and Nevada conducted a study of Tonopah in FY 1996 to determine if cost savings would be realized by combining service contracts at Tonopah and the NTS. The study concluded that retaining both service contracts provided the most cost effective method of operation.

DOE also participated with the DOD in a study to maximize efficiency at the Nellis Range Complex. The Nellis Range Complex Integrated Product Team was established in 1996 to look at developing a range complex (including the Nellis Range, Tonopah, and NTS) that was more efficient and effective by combining available resources. The year-long study, conducted by a team of approximately 15 personnel, was very comprehensive. The team had access to all range operations and made physical assessments of work areas through site visits. Moving the Tonopah/Sandia operation to other locations on the Nellis Range Complex was evaluated during the study. The study did not recommend Tonopah be combined with the other ranges. Some specific recommendations made that directly affected Tonopah were:

- Sharing of DOE/Sandia and Air Force excess capacity to reduce costs.
- Contracting with the Air Force for air transportation to and from Tonopah.
- Evaluating the cost reductions that are possible if there is a reversal of the host/tenant relationship at Tonopah.

Most recently, during negotiations on the Air Force testing Memorandum of Understanding, Albuquerque has obtained additional information on costs at the Utah Range.

Based upon the OIG recommendation, Albuquerque will conduct a cost and feasibility study that includes the results from the aforementioned DOE evaluations, as well as an assessment of the remaining test ranges identified by the OIG. At this writing, it is anticipated that the study will take 24 months to complete.

Albuquerque also concurred with recommendation 2 since it is actively pursuing cost reductions at Tonopah. Management said that maximizing efficiency at Tonopah is a priority for Albuquerque and Sandia and they will continue to reduce costs, as illustrated in the following examples.

- Sandia reduced the transportation costs to and from Tonopah by approximately \$1 million dollars annually by eliminating the contractor air service and replacing it with bus service.
- Sandia reduced the Operations and Maintenance (O&M) contract by approximately \$500,000 annually.
- A proposed move into Air Force facilities will result in an estimated cost reduction of at least \$500,000 annually. Albuquerque is currently reviewing a Memorandum of Understanding with the Air Force that, when approved, would allow Sandia to move most of the operations at Tonopah into Air Force facilities, generating the anticipated cost savings.
- Sandia announced on December 15, 1997, a reduction in force of seven positions at Tonopah. Many details about the reduction are currently being worked out. An estimate of the annual savings from this action is \$1,295,000.
- Sandia prepared a document that provides additional information about anticipated cost savings and the scope of the IPT study. The document concludes that by FY 2000, Tonopah will be operating at a cost to the DOE of \$4.455 million annually, as a result of implementing the cost saving activities recommended in the study report.

**Cost Saving Activities at Tonopah Test Range
(Current and Planned)**

Item	Annual Savings	Status
Transportation	\$1,000,000	Already implemented.
O&M Reductions	500,000	Already implemented.
Additional O&M Reductions	500,000	After move into Air Force facilities.
Reduction of Sandia Personnel	1,295,000	Already implemented.
Reduced Equipment Maintenance due to Upgrades	100,000	Planned
Reduce Security Personnel	400,000	Planned
Sharing of Test Support	750,000	Planned
Total Estimated Savings	\$4,545,000	

Cost Savings

Albuquerque does not concur with the estimated cost savings. DOE believes the DOD costs are seriously underestimated and the savings have been significantly overestimated within the report. The OIG's cost-based analysis did not consider important differences in capabilities that would have to be added to incremental costs, as well as start-up costs incurred to meet DOE's programmatic requirements. All costs for the sole benefit of the DOE test program or

those not presently borne in the overhead at a DOD range will be considered as incremental by DOD and charged to the DOE. These significant costs have been omitted in the audit report.

AUDITOR COMMENTS

Management's reaction to the two recommendations is considered responsive. Although management still questions the feasibility of testing at another range and the savings that may be achieved, a definitive position can only be established by conducting the comprehensive study -- an action that management has agreed to take.

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