



U.S. Department of Energy  
Office of Inspector General  
Office of Audit Services

# Audit Report

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## Management of Oak Ridge Radio Transition Projects

DOE/IG-0653

June 2004



## Department of Energy

Washington, DC 20585

June 30, 2004

MEMORANDUM FOR ADMINISTRATOR, NATIONAL NUCLEAR SECURITY  
ADMINISTRATION  
DIRECTOR, OFFICE OF SCIENCE

FROM:

  
Gregory H. Friedman  
Inspector General

SUBJECT:

INFORMATION: Audit Report on "Management of Oak Ridge  
Radio Transition Projects"

### BACKGROUND

Department of Energy sites rely heavily on radio communications to support or facilitate activities such as site emergency response, maintenance, physical security, and protection. The Oak Ridge Reservation, which consists of the Oak Ridge Operations Office, Oak Ridge National Laboratory, East Tennessee Technology Park, and the Y-12 National Security Complex, is dependent on radio communications to link these co-located but separately managed organizations. The Manager of the Oak Ridge Operations Office has been designated the lead Federal manager for radio communications on the Reservation and provides general direction regarding system plans, certification requests, and frequency authorizations for a variety of radio communications systems.

Problems with reservation-wide connectivity and aging systems, coupled with the need to comply with new Federal requirements for radio equipment, prompted the Oak Ridge Operations Office to develop plans to transition to the "Wide Area Radio System" in 1999. As originally conceived, the "Wide Area Radio System" was to provide coverage for the entire Reservation and all sites had agreed to support it. Implementation of this system, however, was delayed for several years. As a result of these delays, officials at the Y-12 National Security Complex initiated a separate, site specific radio system replacement. Because of the potential issues involved with integrating separate systems, we initiated this audit to determine whether the radio projects on the Oak Ridge Reservation were cost-effective and would provide sufficient capability to provide communication across the various organizations.

### RESULTS OF AUDIT

We found that planned radio transition projects at the Oak Ridge Reservation would cost more than necessary and that they would not provide several critical features. Specifically, the Oak Ridge Operations Office and the Y-12 Complex were developing separate radio transition projects which would not serve the needs of the entire Reservation, as originally envisioned. Development of two separate projects would:

- Cost the Department an estimated \$900,000 more than necessary in infrastructure costs and increase annual maintenance costs by about \$475,000 per year;



- Create gaps in radio coverage, preventing Y-12 protective forces from maintaining communications with the rest of the Reservation or its own dispatcher in the event of an emergency; and,
- Be inconsistent with Department of Commerce regulations that generally require Federal organizations located in proximity to one another to increase efficiency by sharing radio communications systems.

Y-12 initiated its separate system because it was unable to reach agreement with the Operations Office regarding an overall system deployment or capability approach, and the Site Office Manager decided to move forward with a Y-12 specific system based on the delayed implementation of the "Wide Area Radio System." Y-12, however, did not reconsider the implementation of its separate system once the "Wide Area Radio System" was funded and construction had begun. As a result, planned radio projects at the Oak Ridge Reservation will expend funds that could be better used for satisfying other critical mission needs.

The issues in this report highlight the difficulty Departmental components have in reaching agreement on issues that cross programmatic lines. The Office of Inspector General has reported similar coordination issues in several recent reports. These issues point to the need for increased cooperation between the Department's major programs and policy offices. In this report, we made several recommendations designed to improve coordination and help ensure that the radio system ultimately chosen for the Oak Ridge Reservation is the most beneficial to the Department as a whole.

#### MANAGEMENT REACTION

Management concurred with the report's finding and recommendations. Management generally agreed that a single radio system would better meet the needs of the Reservation and indicated that work had been suspended on the separate Y-12 system. In subsequent discussions with management, the National Nuclear Security Administration and the Office of Science committed to work together to identify a single radio system that meets the needs of the entire Oak Ridge Reservation in the most cost effective manner. Management's comments are included in Appendix 3.

#### Attachment

cc: Under Secretary for Energy, Science and Environment  
Assistant Secretary for Environmental Management  
Director, Office of Management, Budget and Evaluation/Chief Financial Officer  
Chief Information Officer

# REPORT ON MANAGEMENT OF OAK RIDGE RADIO TRANSITION PROJECTS

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## SYSTEM TRANSITION EFFORTS

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### Background

To satisfy requirements of the Telecommunications Act of 1992 and to facilitate performance of its duties as the designated lead organization for emergencies, the Oak Ridge Operations Office (Operations Office) developed a plan to install a Wide Area Radio System (WARS) to provide radio coverage to the entire Oak Ridge Reservation (Reservation). The Operations Office originally proposed the estimated \$6.2 million WARS in March 1999, but was unable to obtain funding until September 2003. In the interim, the Y-12 National Security Complex (Y-12) decided to proceed with a separate radio replacement system at a cost of about \$2.1 million. Separately, in September 2003, the Operations Office signed an interagency agreement with the U.S. Army Communications-Electronics Command (CECOM) to construct a WARS system to cover the remainder of the Reservation at a cost of \$4.5 million.

### Deployment of Multiple Systems

Development of two separate radio systems to service Y-12 and the remainder of the Oak Ridge Reservation will be more costly to construct and maintain than a single, integrated system. In addition, the deployment of separate systems would result in gaps in coverage and eliminate items needed to protect Y-12 from unplanned outages or equipment failures. Maintaining separate systems will also be inconsistent with statutory requirements regarding sharing of radio systems between co-located Federal organizations.

#### Infrastructure and Maintenance Costs

Constructing two separate radio systems at the Reservation will result in the expenditure of an estimated \$900,000 more than necessary in infrastructure costs and increase annual maintenance costs by about \$475,000. These costs include \$500,000 to develop a bridge between the two systems to permit communication with one another - something unnecessary under a single system. In addition, building two separate systems would result in an additional \$400,000 in construction costs when compared to the estimated cost of adding Y-12 coverage to WARS. The WARS and Y-12 systems are expected to cost \$4.5 million and \$2.1 million respectively, while an expanded version of WARS would cost \$6.2 million. In addition, Y-12's radio shop has budgeted approximately \$475,000 annually for maintenance on their system; a cost that could be eliminated if WARS were constructed as originally planned.

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### Coverage and Contingency

Under the current approach, off-site protective force response capability through radio communications would also be degraded or hindered at Y-12. For example, the limited coverage area provided by Y-12's planned system would not allow its site protective forces to maintain open communications with the Y-12 dispatcher in the event of a criminal pursuit. Such a level of communication during pursuit is required by Departmental directive should felony or misdemeanor suspects flee off-site.

We also found that maintaining separate systems would exacerbate the impact of failed equipment. Since the planned Y-12 system only utilizes one tower, a failure could result in Y-12 losing the ability to communicate with the rest of the Reservation and limiting the site to only 14 frequencies. Because Y-12 has over 1,900 users with over 2,000 radios, equipment failure could increase the potential for overloading certain channels and make communications impossible. Such weaknesses, however, would not be an issue with WARS as it uses a system that provides built in redundancies by broadcasting from three independent towers simultaneously. Furthermore, the Y-12 official responsible for radio systems could not provide a detailed analysis to demonstrate how the planned Y-12 system would provide a viable option for communicating between sites.

### Federal Sharing Requirements

The planned separate efforts of the Operations Office and Y-12 would not conform to requirements established by the Department of Commerce (Commerce) for promoting efficient use of radio frequencies at the Federal level. Specifically, agencies are required by Federal regulations (47 CFR 300) to share radio communication systems within a 30-kilometer radius unless they can demonstrate that a separate system is required to meet their needs. To that end, the Office of the Chief Information Officer, the only authorized interface with the Department of Commerce, recently denied a request to obtain a separate license for the Y-12 effort because it violated the sharing requirements.

### **Site Agreement on on Radio System Upgrades**

The initiation of plans for separate systems commenced because the Operations Office and Y-12 could not agree on an overall system deployment or capability approach. In particular, when

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the Operations Office had difficulty obtaining funding, Y-12 adopted a separate system approach. When funding was ultimately obtained for a reservation-wide system, Y-12 officials elected to proceed with a separate system. This decision was made despite analyses by the Operations Office demonstrating that separate systems would create coverage gaps and be more costly to maintain. Y-12 officials also believed that WARS had capabilities in excess of their needs and would ultimately have a higher cost for their site.

However, based on our review, we determined that WARS was designed to provide coverage needed for off-site communications for the entire Reservation, something the Y-12 system cannot provide, and be less costly than having two separate systems. In response to the results of this audit, Y-12 officials recently commissioned a study to determine how best to meet the site's radio communications needs. The results of the study questioned the technical merits and cost effectiveness of WARS.

## **Resource Demands**

If the separate development of both WARS and the Y-12 system continue, an opportunity would be missed to save about \$900,000 in system infrastructure costs and as much as \$475,000 per year in system maintenance that could be better used to assist in meeting other critical mission needs. Additionally, if this issue is not resolved and current plans are allowed to proceed, the entire Reservation may be unable to meet mandated deadlines for licensing issues and may miss opportunities for improving reservation-wide response capability and interoperability between sites.

## **RECOMMENDATIONS**

To ensure efficient use of Federal funds and that the radio communication needs of the Reservation are effectively met, we recommend that:

1. The Manager of the Y-12 Site Office suspend work on the Y-12 system; and
2. The Associate Administrator for Management, National Nuclear Security Administration, and the Deputy Director of Operations, Office of Science, re-evaluate system needs and come to an agreement regarding a radio system that meets the needs of the entire Oak Ridge Reservation.

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**MANAGEMENT REACTION**

Management generally concurred with the report's findings and recommendations and indicated that work on the Y-12 system had been suspended. In separate subsequent discussions with the Office of Science's Deputy Director of Operations and the National Nuclear Security Administration's Director of Policy and Internal Controls Management, both parties indicated that they would work together to implement a radio system configuration that would best meet the needs of the entire Reservation in the most cost effective manner and in compliance with Federal requirements.

**AUDITOR COMMENTS**

Management comments are responsive to our recommendations. Based on these comments, we made several changes to the body of this report. In particular, modifications were made to recommendation two to emphasize the need for cooperation in reaching an agreement on a single system to satisfy Reservation needs rather than directing the Department to implement a specific system.

# Appendix 1

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## **OBJECTIVE**

The objective of this audit was to determine whether the radio projects on the Oak Ridge Reservation were cost-effective and would provide sufficient capability to provide communications across the various organizations.

## **SCOPE**

The audit was performed between September 2003 and June 2004 at the following sites located in Oak Ridge, TN: Operations Office; Y-12 National Security Complex; Oak Ridge National Laboratory; and East Tennessee Technology Park. The audit examined radio systems planned by the Operations Office and Y-12.

## **METHODOLOGY**

To accomplish our objective, we:

- Reviewed Federal regulations such as the Commerce National Telecommunications and Information Administration (NTIA) Manual of Regulations, Departmental directives and guidance pertaining to communications needs;
- Reviewed relevant reports issued by the Office of Inspector General and the General Accounting Office;
- Held discussions with officials and staff at various sites; and,
- Assessed site radio system planning documentation.

The audit was conducted 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. Performance standards were not established for the area of radio communications and, therefore, we could not assess how they might have been used to measure performance. 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. We did not rely on computer-processed data to accomplish our audit objective. An exit conference was held with management on June 14, 2004.

## Appendix 2

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### RELATED GAO REPORTS

- *TELECOMMUNICATIONS: History and Current Issues Related to Radio Spectrum Management* (GAO-02-814T). The testimony described efforts by the NTIA to encourage efficient use of radio spectrum resources. Agencies are required to convert all land mobile radios to narrowband frequencies by a specified date (2008), but many agencies expressed their inability to meet the deadline.
- *TELECOMMUNICATIONS: Better Coordination and Enhanced Accountability Needed to Improve Spectrum Management* (GAO-02-906). The report was the primary basis for the testimony described above.
- *TELECOMMUNICATIONS: Comprehensive Review of U.S. Spectrum Management with Broad Stakeholder Involvement is Needed* (GAO-03-277). The report pointed out that the NTIA expressed difficulty in invoking its enforcement authority over agencies that do not meet mandated deadlines for narrowbanding and that the main enforcement tool available is to revoke frequency assignments from non-compliant agencies. It added that since this measure could interfere with the agencies' ability to carry out critical government functions, the NTIA finds it difficult to employ.



Department of Energy  
National Nuclear Security Administration  
Washington, DC 20585



May 25, 2004

MEMORANDUM FOR Rickey R. Hass  
Assistant Inspector General  
for Audit Operations

FROM: Michael C. Kane   
Associate Administrator  
for Management and Administration

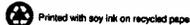
SUBJECT: Comments to Draft Report on Oak Ridge Radio  
Transition Projects (A04TG027)

The National Nuclear Security Administration (NNSA) appreciates the opportunity to have reviewed the Inspector General's (IG) draft report, "Management Controls Over Oak Ridge Radio Transition Projects." We understand that the IG conducted this audit because of the issues involved with integrating separate systems to determine whether the radio projects on the Oak Ridge Reservation are cost-effective and would provide sufficient capability to provide communications across the various organizations.

The Manager, Y-12 Site Office provided comments to the Director, Policy and Internal Controls Management on May 21, 2004. NNSA is providing the comments that were prepared by the Y-12 Site Manager. Please note that the Y-12 Site Office has suspended work on the current radio system, as recommended by the IG. However, NNSA agrees that the most prudent course of action for the radio system may be to expand the current Y-12 radio architecture as stated in the attached comments. (Under the authorities of the NNSA Implementation Act NNSA will consider the merits of unilateral actions to meet Y-12 requirements.)

Attachment

cc: Dr. Everet H. Beckner, Deputy Administrator for Defense Programs  
Dr. Raymond L. Orbach, Director, Office of Science  
William J. Brumley, Manager, Y-12 Site Office  
Robert Braden, Senior Procurement Executive, NA-63  
Karen Boardman, Director, Service Center



DOE F 1325 #  
(10/03)

United States Government

**Department of Energy**  
National Nuclear Security Administration

## memorandum

DATE: May 24, 2004

REPLY TO:  
ATTN OF: Y12-10:Gaines

SUBJECT: **OFFICE OF INSPECTOR GENERAL (OIG) DRAFT INSPECTION REPORT, "MANAGEMENT CONTROLS OVER OAK RIDGE RADIO TRANSITION PROJECTS"**

TO: Richard M. Speidel, Director, Policy and Internal Controls Management, NA-66, FORS

Below is the National Nuclear Security Administration's Y-12 Site Office (YSO) response to the subject draft inspection report. This response reflects information that was provided from a Bechtel Nevada Senior Radio Engineer under contract to the National Nuclear Security Administration, but was not available prior to the OIG's request to YSO to perform a factual accuracy review of the draft report prior to it being issued. Information provided by him is attached.

### **Management Reaction**

The chronology of events that has led to the current status of the Department of Energy (DOE) Oak Ridge Operations (ORO) plan to transition from the Y-12 National Security Complex (NSC) Radio Trunking System to a Wide Area Radio System (WARS) for the Oak Ridge Reservation (ORR) has been lengthy and arduous. Currently, the ORR consists of the Y-12 NSC, Oak Ridge National Laboratory, East Tennessee Technology Park, and DOE-ORO. While we agree with the overall finding that only one trunked radio system should be used to support the DOE ORR, we disagree that the DOE-ORO simulcast design is the most effective or the least costly technical approach for meeting the total needs of the ORR. The ORO proposed simulcast approach would be unique within the Department. In all other Department radio system upgrades associated with the forced narrowband transition, expansion and modification of the existing trunking system was the basic approach. I believe that the YSO currently proposed multicast system is superior based on operational and cost effectiveness.

As the Y-12 NSC is the only site on the ORR with an existing radio trunking system, it originally proposed an expansion of its existing trunking system with connectivity to all ORR sites to meet the upcoming narrowband requirements described in the Telecommunications Act of 1992. This decision was not meant to be divisive, but was made only in response to the lack of WARS funding and each facility's stated radio needs.

After meeting with BWXT Y-12 on March 30, 2004, it became apparent that the originally proposed Y-12 Trunking System would not be approved. Consequently, YSO engaged the services of the Senior Radio Engineer to review the merits of the both the Y-12 and ORO proposed systems and recommend the best course of action for YSO. However, the

Richard M. Speidel

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May 24, 2004

conclusions of that effort were not available to the IG auditors prior to the issuance of the subject draft report. His review revealed that a Y-12 NSC multicast system will provide the necessary interconnectivity and coverage for the entire ORR, but with an initial savings of approximately \$2.7 million versus the cost estimate for the ORO proposed WARS. The multicast system would include the capabilities of the ORO proposed simulcast system with a reduced total cost of ownership through less complex design and maintenance. Distributed management of the Y-12 NSC system will also allow for specific tailoring for each site as needs change.

While we appreciate the effort of the Office of Inspector General in performing the audit of this very technical endeavor, the conclusions of that effort do not address the current Y-12 proposed system; i.e., that the Y-12 Trunking System be expanded to accommodate the needs of the ORR. Based on the results of the Senior Radio Engineer's review, I believe that the current radio system architecture in-place at the Y-12 NSC, as well as the potential savings to the Government, justifies the continuation of the Y-12 NSC effort to provide required radio coverage to the entire ORR.

In support of the DOE Chief Informational Officer, we propose that a review be performed in by an independent technical expert in radio systems to confirm or reject our conclusion that the most prudent course of action for NNSA and the ORR. Until the results of that review are communicated, we recommend that ORO suspend work on the proposed systems. Work on the YSO system has already been suspended.

#### **RECOMMENDATIONS**

To ensure efficient use of Federal funds and that the radio communications needs of the Reservation are effectively met, we recommend that the Manager of the Oak Ridge Operations Office in conjunction with the Manager of the Y-12 Area Office:

1. Suspend current work on the Y-12 system; and,

#### **MANAGEMENT RESPONSE**

YSO has suspended current work on the Y-12 system.

1. Re-evaluate system needs, and if appropriate, expand WARS to provide for Y-12's communications needs.

#### **MANAGEMENT RESPONSE**

YSO acquired the services of a Bechtel Nevada Senior Radio Engineer under contract to NNSA to evaluate systems needs for the ORR. Based on the results of that review, YSO believes the most prudent course of action for NNSA and the ORR is to expand the current Y-12 radio architecture in place to provide radio coverage for the entire ORR under a multicast system.

# Appendix C

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Richard M. Speidel

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May 24, 2004

If additional information is needed, please contact me or Samuel Gaines (865-576-0401) of the Y-12 Site Office.

Sincerely,

  
William J. Brupley  
Manager  
Y-12 Site Office

Attachment:  
As Stated

cc w/attachments:  
S. L. Gaines, Y12-10, YSO  
D. R. Ruddy, 9106, MS 8001, BWXT Y-12

DOE F 1325.8

**United States Government**

**Department of Energy**  
**Oak Ridge Operations Office**

## Memorandum

DATE: May 13, 2004  
REPLY TO:  
ATTN OF: FM-733:Miller  
SUBJECT: **RESPONSE TO DRAFT INSPECTOR GENERAL REPORT**

TO: Rickey R. Hass, Assistant Inspector General for Audit Operations, Office of Inspector General, IG-32/FORS

This is in response to your April 28, 2004, memorandum with an attached draft report entitled "Management Controls Over Oak Ridge Radio Transition Projects." The attached response reflects the comments of the Oak Ridge Operations Office.

If you have any questions, please contact me at (865) 576-4446, or Jeanette Miller at (865) 576-2654.

  
Judith M. Penry  
Chief Financial Officer

Attachment

cc w/attachment:  
E. J. Hicks, AD-41  
M. L. Lewis, ME-100/FORS  
R. L. Orbach, SC-1/FORS  
J. B. Veneri, SC-67/GTN

Attachment

**OAK RIDGE OPERATIONS OFFICE COMMENTS**  
**IG DRAFT AUDIT REPORT**  
**“INTERNAL CONTROLS OVER OAK RIDGE**  
**RADIO TRANSITION PROJECTS”**

**Management Reaction (Summary)**

It is the position of the Oak Ridge Operations Office (ORO) that the audit results accurately address the necessity of implementing one radio system for the Oak Ridge Reservation, the deficiencies of the proposed second system, as well as the avoidable cost that would result from duplicating radio communication resources within the relatively limited area of the reservation. Although implied, but not stated in the second paragraph of the background, the ORO plan to transition to a Wide Area Radio System (WARS) was developed in cooperation with all sites on the reservation and approved; the Y-12 Site Office (YSO) had significant input into the planning and development process.

**Management Reaction (Recommendations)**

To ensure efficient use of Federal funds and that the radio communications needs of the reservation are effectively met, we recommend that the Manager of YSO:

1. Suspend work on the Y-12 system.

**Response:** Concur: ORO management agrees that plans for a second radio system should be terminated based on the probability of excessive cost to the Government and inefficient utilization of spectrum resources.

We further recommend that the Manager of ORO, in conjunction with the Manager of YSO:

2. Re-evaluate system needs and expand WARS as necessary to provide for YSO communications needs:

**Response:** Concur: ORO management has already included options in its contract with the vendor to add the necessary communications infrastructure to accommodate YSO communications needs.

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