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Report of the Oversight Assessment of the Operational Readiness Evaluation of the Cassini Project at the Los Alamos National Laboratory

November 1992

**U.S. Department of Energy
Assistant Secretary for Environment,
Safety, and Health**

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OFFICE OF ENVIRONMENT, SAFETY AND HEALTH

REPORT OF THE OVERSIGHT ASSESSMENT OF THE
OPERATIONAL READINESS EVALUATION OF THE
CASSINI PROJECT AT THE LOS ALAMOS NATIONAL LABORATORY

NOVEMBER 16 - 20, 1992

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Washington, D.C. 20585**

CONTENTS

EXECUTIVE SUMMARY	v
1.0 BACKGROUND	1
2.0 OVERSIGHT PLAN AND METHODOLOGY	2
3.0 REVIEW CRITERIA AND STANDARDS	2
4.0 RESOURCES AND ASSIGNMENTS	3
5.0 ASSESSMENT RESULTS	3
5.1 DP ORE Activities	3
5.2 DP ORE Effectiveness	4
6.0 CONCLUSION	7
APPENDIX A. TEAM BIOGRAPHIES	A - 1
APPENDIX B. EH FOLLOWUP ACTIONS	B - 1

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EXECUTIVE SUMMARY

This report presents the results of the Office of Environment, Safety and Health (EH) Oversight Assessment (OA) of the Defense Programs' (DP) Operational Readiness Evaluation (ORE) for the Cassini Project. The assessment was conducted by line management during the period November 16-20, 1992, at the Department of Energy's (DOE) Los Alamos Technical Area 55 (TA-55) Plutonium Processing Facility.

The EH OA was conducted concurrently with the DP ORE to determine the adequacy of the DP ORE evaluation of the contractor's Operational Readiness Review (ORR) for the Cassini Project production run. Specifically, the EH OA Team reviewed, observed, and evaluated the DP ORE to ensure that it was thorough, and adequately verified that the established programs and procedures are sufficient and are properly implemented to ensure worker safety.

The EH OA was carried out in accordance with the protocol and procedures of the "EH Program for Oversight Assessment of Operational Readiness Evaluations for Startups and Restarts," dated September 15, 1992.

The EH OA concluded that the DP ORE was technically adequate and thorough in worker safety areas and that the overall conclusions reached by the DP ORE Team, insofar as worker safety is concerned, are valid. The EH OA Team believes that the Cassini Project production run can begin safely, when the findings identified by the DP ORE Team are properly closed out. However, the DP ORE and EH OA Teams have identified several existing safety deficiencies that resulted in one overall DP ORE worker safety observation. The observation indicated that hazard recognition inspections and abatement of occupational safety deficiencies were not adequately conducted to ensure a workplace free from recognizable hazards. Resolution and corrective action to address the deficiencies cited in the DP observation should commence immediately.

1.0 BACKGROUND

The Los Alamos National Laboratory (LANL) has been tasked to fabricate and encapsulate plutonium-238 oxide pellets for radioisotope thermoelectric generators, in support of the National Aeronautics and Space Administration's (NASA) Cassini mission to Saturn. The facility and equipment to be utilized for the Cassini fuel production, which are active and operational, are currently used for other projects, except for the additional modifications to the facility and process changes that have been implemented to support the Cassini Project. These modifications include installation of: (1) an automated welding system; (2) gamma spectrometer; (3) a radiography system; (4) laser-dimensioning equipment; (5) an autogranulator;¹ (6) an ultrasonic inspection tool; and (7) a calorimeter.

The process involves the manufacture of clad plutonium-238 pellets from feed material received from the Savannah River Site. The plutonium feed material is received in a shipping container; then entered into the glovebox plutonium processing line.

The major steps in the process involve milling the fuel to normalize particle size; screening to get the desired particle size; seasoning/sintering the granules; final screening; mixing the granule fractions; hot pressing the fuel into pellets; processing the pellets; and cladding the pellets. The entire process takes place in the glovebox line with no breach of containment; it is similar to other plutonium processing work currently taking place in Los Alamos Technical Area (TA-55). The major difference is that the throughput may eventually be up to three times higher, and there is an increase in the administrative glovebox limit for plutonium-238 oxide. However, due to environmental permitting constraints, these increases in production may not take place for some time, if at all.

The contractor, LANL, performed an Operational Readiness Review (ORR) for the Cassini Project during the period January 1992 to September 1992. The LANL ORR resulted in 38 findings and 1 recommendation/observation. One finding called for an evaluation of the need to obtain approval from the Environmental Protection Agency (EPA) under the National Emission Standards for Hazardous Air Pollutants (NESHAPS) for the increases in radionuclide air emissions to be caused by Cassini production. Because the resolution of this finding could result in a lengthy project delay, a decision was made by the contractor to reduce the scope of the Cassini Project. Thus, the Cassini Project initially may not include an increase in the production rates over those historically done at TA-55; the autogranulator operation was also removed from the scope. To resolve this finding, an increase in production will not occur until the NESHAPS issue is satisfactorily resolved.

Although the planned production rate of the Cassini Project was reduced to preclude a noncompliance from NESHAPS, the contractor proceeded with the corrective actions for all of the other initial ORR findings, assuming the

¹ The autogranulator was not operable at the time of the reviews discussed in this report.

higher plutonium throughput. On October 14, 1992, LANL reported that all ORR findings had been corrected. Having completed its ORR, LANL indicated by memorandum from the ORR Team Leader to the Team Leader for the Office of Defense Programs' (DP) Operational Readiness Evaluation (ORE) that LANL was ready for the DP ORE to proceed.

2.0 OVERSIGHT PLAN AND METHODOLOGY

The Office of Environment, Safety and Health's (EH) oversight activities to assess the readiness of LANL to produce plutonium fuel pellets for the Cassini Project were based primarily on observations and review of activities of the DP ORE and observations of existing plant conditions.

The EH Oversight Assessment (OA) Team conducted facility walkthroughs, interviewed DP ORE Team members and facility employees, reviewed pertinent documentation, and attended the daily DP ORE Team meetings and the DP ORE closeout meeting. The EH OA primary focus was on worker safety; the EH OA Team, therefore, reviewed the operations, electrical safety, fire protection, and life safety areas.

The EH OA assessed the DP ORE plan to determine that the required orders and standards were included in the plan and that the DP ORE activities were adequate to assure readiness for safe operation. The plan review did not identify any deficiencies or discrepancies. The DP ORE plan included clearly defined criteria and lines of inquiry to ensure that worker safety issues were addressed.

The EH OA Team focused its efforts on observing the conduct of the DP ORE to ensure that the review fulfilled the objectives established in the DP ORE plan. This was accomplished by direct observation of the DP ORE field activities and by reviewing DP ORE findings and observations. EH OA Team members observed interviews conducted by DP ORE Team members, examined documents reviewed by the DP ORE Team, conducted joint observations of actual or simulated operations, and participated with DP ORE Team members in plant walkdowns. The EH OA Team members also independently reviewed selected topical areas to establish a level of confidence that commitments made by LANL and requirements imposed by Department of Energy (DOE) have been satisfied.

3.0 REVIEW CRITERIA AND STANDARDS

The criteria and standards used by the EH OA Team were based upon the protocol and procedures in the "EH Program for Oversight Assessment of Operational Readiness Evaluations for Startup and Restart," dated September 15, 1992, and included the following:

- a. Review of ORR plans and checklists for assessment of worker safety, fire protection, life safety, and electrical safety, including:
 - the LANL ORR plan, checklists, and report; and
 - the DOE DP ORE plan, checklists, and findings/observations.

- b. Verification of quality, depth, and formality of line management review of worker safety issues relative to:
 - DP ORE Team qualifications in worker safety matters;
 - the review process;
 - the development of findings and concerns; and
 - resolution of issues.
- c. Verification that corrective actions taken for worker safety concerns since previous TA-55 assessments were addressed in a timely and effective manner for:
 - LANL Tiger Team Assessment, November 1991 (particularly the Technical Safety Assessment of TA-55 and other plutonium and enriched operations).
- d. Verification that the DP ORE Team adequately reviewed programs, procedures, and implementation with DOE worker safety requirements; in particular, DOE 5483.1A and DOE 5480.7.

In conducting the OA of the TA-55 operations for the Cassini Project, EH considered the recommendations of the Defense Nuclear Facilities Safety Board related to performing readiness reviews.

4.0 RESOURCES AND ASSIGNMENTS

The EH OA Team consisted of two members: Ari Krasopoulos, EH-30.3, Team Leader, and Norman Klug, Senior Consultant. (Biographies of the EH Team members are included in Appendix A.)

5.0 ASSESSMENT RESULTS

5.1 DP ORE Activities

The DP ORE was carried out in general accord with the DP ORE plan for the Cassini review, dated May 1992, which had been approved by DP. The areas of concentration for the DP ORE were: (1) radiological protection; (2) modifications/Unreviewed Safety Question Determinations (USQDs); (3) conduct of operations; (4) issues management; (5) waste management; and (6) adequacy of the LANL ORR.

The DP ORE Team was composed of 11 members who were assigned review responsibilities in their specific areas of expertise. The DP ORE Team members included consultants and personnel from the Albuquerque Field Office, as well as personnel from Headquarters.

A review of the ORE Team members' resumes and experience profiles found that the DP ORE team members were all qualified by virtue of education, experience or both. For instance, the person who conducted the facility and operations review for worker safety has 14 years of experience in this field and, in the past, has participated in a number of DOE Albuquerque Field Office assessments, appraisals, and inspections. Similarly, the person who was

primarily responsible for conduct of operations has 30 years of experience in nuclear operations; 20 of which were in the U.S. Navy nuclear program, where he was a Chief Engineer.

The DP ORE Team worked together effectively. The DP ORE Team identified 6 findings and 27 observations. The DP ORE Team defined findings as issues that needed resolution prior to start of the production run. Observations were defined as issues needing prompt resolution, but not necessarily prior to start of the Cassini production run. The DP ORE Team concluded that the production run could commence when the six DP ORE findings are satisfactorily resolved and corrective actions are implemented.

The six DP ORE findings are summarized as follows: two involve the training and certification of the Cassini plutonium glovebox operators; two concern the modifications/USQDs associated with the increased production levels of the Cassini Project; and two deal with issues management.

With regard to the training findings, the DP ORE Team found that not all operators have been trained and certified in all prerequisite procedures and that the glovebox operators must be recertified no earlier than 3 months before production operations begin.

The two findings on issues management relate to the lack of LANL action plans to ensure timely resolution of three environmental issues and the lack of LANL reviews of the Tiger Team action plans to identify any issues that require closure prior to Cassini production operations.

With regard to the two findings on modifications/USQDs, the DP ORE Team found that the ORR documentation provided to them was inadequate, and the findings relate to the fact that the DP ORE could not judge the adequacy of the ORR in these areas. The DP ORE Team requested that LANL perform additional work in these areas, including a safety and risk assessment. When LANL completes this work, the cognizant DP ORE Team members will review the ORR's treatment of the modification/USQD findings and determine its adequacy. The results will be documented in a supplement to the DP ORE report.

The DP ORE Team concluded that the operational readiness for Cassini production operations would be satisfactory upon favorable resolution of the six findings. Final verification of the resolution of all findings, except for the two on modifications/USQDs, and all observations were delegated to the DOE Los Alamos Area Office (LAAO).

5.2 DP ORE Effectiveness

The EH OA Team conducted the OA in two phases. During the first phase, the EH OA Team reviewed the DP ORE plan and associated evaluation criteria and checklists. In the second phase, which included the site visit, the EH OA Team reviewed the qualifications of the DP ORE Team and observed the DP ORE Team's activities in the performance of the ORE. During this phase, the EH OA Team also conducted independent observations/evaluations of related facility conditions. The main focus of the EH OA was on the activities of the DP ORE Team in the areas of operational safety and worker safety.

The EH OA Team accompanied DP ORE Team members in several walkthroughs of the plutonium facility. Specifically, the EH OA Team members accompanied the DP ORE members who had responsibility for identifying workplace hazards during the facility walkthroughs, and also accompanied those DP ORE members who had responsibility for reviewing the operating procedures, the ventilation system, and the fire protection system during their walkthroughs.

The DP ORE facility walkthroughs to identify safety hazards were conducted by the person experienced in worker safety issues, who was also knowledgeable of the facility and its operations, having been there a number of times before. This person inspected all aspects of the proposed operations and identified a number of potentially unsafe conditions and noncompliances with Occupational Safety and Health Administration (OSHA) requirements. For instance, he questioned the adequacy of the hoisting mechanisms of the guillotine-type trapdoors inside the gloveboxes. In particular, he questioned the maintenance, inspection, and testing of the hoisting mechanism. Facility management could not demonstrate to his satisfaction that the trapdoor hoisting mechanism could not fail while the operator's hands were positioned under the trapdoor. Such an event could result in the loss of an extremity. Also questioned were some of the electrical light installations above the gloveboxes because of the potential for electric shock.

Overall, the inspection of the facility and operations by the DP ORE Team was thorough; however, there were some unsafe conditions that were not identified by the DP ORE Team, but were identified by the EH OA Team. For instance, it was observed that several emergency showers and eyewashes were in close proximity to energized electrical equipment, presenting an electric shock hazard to any user. In addition, the equipment was not electrically protected in accordance with the requirements of the National Electrical Code (NEC). The most common problem was the placement of electrically powered radiation monitoring equipment under or near the emergency showers. The NEC requires that an electrical outlet in close proximity to water sources have a ground fault circuit interrupting device. These deficiencies were brought to the attention of the DP/ORE Team Leader, who in turn requested corrective actions be made by the facility management.

The EH OA Team also observed that a few valves under the gloveboxes had lever actuators located in such a way as to be inadvertently opened by glovebox operators resting their feet. The importance and safety significance of these deficiencies were explained to the management of the facility, who committed to address them.

It is important to emphasize that the observations of workplace hazards identified by both the EH OA and DP ORE Teams were not generated as a result of the Cassini Project. Rather, these hazards are preexisting facility conditions.

The EH OA Team also observed several procedure walkthroughs conducted by the DP ORE Team. A number of major procedures were simulated by different TA-55 fuel fabrication operators at the direction of the DP ORE Team to evaluate the individual knowledge of the operators and their ability to follow procedures.

As observed by the EH OA Team, the operators were knowledgeable in the procedures and, in fact, had performed similar types of operations many times in the past. However, the DP ORE Team raised the issue that before the Cassini production run can begin, the contractor must ensure that all operators involved have been trained and certified in all prerequisite procedures listed in the training plans and also must ensure that recertification of the operators takes place 3 months or less from the time of restart.

The DP ORE evaluation of the procedures found them to be technically adequate; however, the DP ORE Team offered suggestions for streamlining and improving the procedure format for the benefit of the operators.

The DP ORE Team did not include a fire protection engineer to evaluate the fire protection systems of the facility in great depth. This was a deliberate decision on the part of DP, since they believed that the Cassini work would neither change the facility fire loading nor increase the ignition sources nor otherwise alter or affect the existing fire protection systems.

Both the EH OA Team and the DP ORE Team observed the facility fire protection systems and facility conditions regarding fire protection. It was observed that there were no unacceptable amounts of flammables and combustibles in the TA-55 facility, and the housekeeping conditions were good. All fire extinguishers at the facility had been inspected monthly. During this review, it was found that firehose stations throughout the facility have firehoses that have not been hydrotested since they were installed several years ago. The facility management was informed that hydrotesting of the fire hoses is required every 3 years. The facility management stated that the hoses are not to be used by anyone and that, if a fire occurs, the fire department will bring in their own hoses. The facility management was advised by the DP personnel to remove the hoses from the facility.

The DP ORE and EH OA Team members also observed the condition and system status of the fire protection water pumping system. The fire pump system consists of two fire pumping stations feeding the fire loop around the facility. Each fire pump station has an electric fire pump, a diesel fire pump, and an electric jockey pump to maintain system pressure. The fire pump system has adequate redundancy, and it was fully operational during the DP ORE.

The DP ORE Team observed the weekly surveillance conducted on the fire pumps, as well as the documentation for surveillances on glovebox fire detectors, TA-55 smoke detectors, and TA-55 fire pull-stations. No unacceptable conditions were identified.

The EH OA Team accompanied the DP ORE Team on a walkdown of the heating and ventilation (H&V) system surveillance procedure. The procedure was performed by a LANL technician using checkoff sheets for each area of the building where key equipment was located. While several minor deficiencies were noted, resulting in three observations, the overall conclusion was that the H&V system, a key to maintaining the facility safety envelope, was being operated and maintained properly.

The EH OA Team also reviewed the DP ORE Team's efforts to evaluate the contractor's USQD and issues management process. With regard to USQDs, the DP ORE Team was unable to evaluate the ORR efforts because of incomplete documentation. The DP ORE Team made this a finding that required closure prior to the start of the Cassini production run.

Concerning issue management, LANL staff responsible for tracking appraisal findings, both for the Laboratory as a whole and for TA-55, were interviewed by both EH OA and DP ORE Team members. The Tiger Team report and the LANL Action Plan were reviewed regarding TA-55 matters. These EH OA Team interviews, along with the emphasis placed by the DP ORE Team in this area, provide assurance that appraisal findings will be resolved prior to the start of the Cassini production run.

6.0 CONCLUSION

The EH OA concluded that the DP ORE was conducted in a technically sufficient manner and that the overall conclusions reached by the DP ORE, insofar as worker safety is concerned, are valid. The EH OA Team agrees with the DP ORE categorization of its findings and observations. The EH OA Team believes that the Cassini production run can safely commence when the findings identified by the DP ORE Team are properly closed out.

Regarding worker safety, the EH OA concluded that the start of the Cassini production run would not increase the workplace hazards from those existing as a result of present TA-55 operations. However, the DP ORE and EH OA have identified several existing safety deficiencies that resulted in one overall DP ORE worker safety observation. The observation indicated that hazard recognition inspections and abatement of occupational safety deficiencies were not adequately conducted to ensure a workplace free from recognizable hazards. EH will independently monitor the DP verification process for this worker safety observation, as well as the DP ORE findings of specific interest to EH (summarized in Appendix B).

APPENDIX A
TEAM BIOGRAPHIES

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NAME: Ari Krasopoulos

AREA OF RESP: Team Leader, Fire Protection, Worker Safety, Operations

ASSOCIATION: U.S. Department of Energy

EXPERIENCE: 25 Years

- o U.S. Department of Energy
 - Senior Site Safety Representative
- o U.S. Nuclear Regulatory Commission
 - Region Based Inspector, Region 1
 - Resident Inspector, Nine Mile Point 1 and 2
 - Region 1 Safety Officer
- o Burns and Roe, Inc.
 - Senior Mechanical Engineer: field assignment, Washington Public Power Supply System
 - Cognizant Engineer: Clinch River Breeder Reactor Project
 - Engineer/Designer: Three Mile Island Unit 2, King Khalid Military City
- o Ebasco Services, Inc.
 - Mechanical Designer: designed mechanical/piping system for Nuclear and Fossil Power Plants

EDUCATION: M.B.A., Economics and Finance, Fairleigh-Dickinson University
B.S., Engineering Technology, Fairleigh-Dickinson University

NAME: Norman P. Klug

AREA OF RESP: Operations/Issues Management/Operational Readiness Review Adequacy

ASSOCIATION: EG&G Idaho, Inc.

EXPERIENCE: 33 Years

- o EG&G Idaho, Inc.
 - Consultant to DOE/NE-70: assisted in preparation of Headquarters section of DOE Study on Strengthening Nuclear Safety Standards
 - DOE/EH-30 Operations Manager Assistant
- o U.S. Department of Energy
 - Deputy Director, Office of Light Water Reactor Safety and Technology, Office of Nuclear Energy
 - Senior Staff Member, Office of Nuclear Safety, Office of Environment, Safety and Health: Technical Safety Appraisal Team Leader
 - Director, Division of Operational Safety, Office of Nuclear Energy
 - Nuclear Engineer, Light Water Branch, Office of Nuclear Energy
 - Technical Consultant, Joint Committee on Atomic Energy, U.S. Congress
 - Technical Assistant to Director, Division of Reactor Development and Technology
 - Assistant Scientific Representative, Atomic Energy Commission (AEC), London Office
 - Technical Assistant to AEC Commissioner
 - Staff Member, Reactor Hazards Evaluation Branch, Division of Regulation

EDUCATION: M.S., Nuclear Engineering, University of Michigan
M.A., General Administration, University of Maryland
B.S., Chemical Engineering, University of Minnesota

OTHER: Member, American Nuclear Society
Department of Energy Senior Executive Service Candidate Development Program
Department of Energy Coordinator, Interagency Nuclear Safety Review Panel (INSRP)

APPENDIX B
EH Followup Actions-Cassini Project (TA-55)

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EH Followup Actions-Cassini Project (TA-55)

As a result of the EH OA of the DP ORE for the production operations of the TA-55 Plutonium Processing Facility in support of the Cassini Project, conducted November 16 to 20, 1992, EH will take the following actions to monitor and assess closure of specific environmental and safety issues discussed in the EH OA report.

1. Review resolution and corrective actions for DP Observation No. MD-3-O-1, which requires improvements to the existing processes for workplace hazard recognition and abatement of identified occupational safety deficiencies. (Issue EHOA-LANL-TA55-1)
2. Review resolution and corrective actions for DP Finding No. IM-1-F-1, which requires determination of necessary EPA approvals under NESHAPS for the increases in radionuclide air emissions to be created by Cassini Project production. (Issue EHOA-LANL-TA55-2)
3. Review resolution and corrective actions for DP Findings Nos. OR-1-F-1 and MD-2-F-1 addressing the need to provide objective evidence regarding the unreviewed safety question determination performed by LANL to evaluate the Cassini modifications and proposed process changes. (Issue EHOA-LANL-TA55-3)