

Downgrade of the 9204-2 Facility at Y-12 National Security Complex

Meredith J. Manning

Consolidated Nuclear Security, LLC
Y-12 National Security Complex
PO Box 2009, Oak Ridge, TN 37831-8010
Meredith.Manning@cns.doe.gov

ABSTRACT

This paper describes the downgrade of nuclear operations carried out in the 9204-2 facility at the Y-12 National Security Complex. Downgrading the 9204-2 Facility to non-nuclear status presented a unique challenge as an adjacent facility, 9204-2E, conducted nuclear operations in 9204-2 and analyzed those operations in the safety basis for the 9204-2 Facility. This paper discusses the methodologies used to downgrade the 9204-2 Facility and determine the final hazard categorization.

10 CFR 830, Subpart B, requires the preparation of a Documented Safety Analysis for DOE Nuclear Facilities classified as Hazard Category 3 or greater. DOE-STD-1027-92, Change Notice 1 provides a methodology for determining a facility's Hazard Categorization. For a building to be below Hazard Category 3, it is necessary that (1) the sum of ratios against radiological materials be less than 1 against Hazard Category 3 threshold quantities and (2) the potential for criticality be precluded by nature of process or segmentation. Facilities that meet these criteria are not subjected to 10 CFR 830, Subpart B. This paper discusses how Y-12 applied the guidance outlined in DOE-STD-1027-92, Change Notice 1, to downgrade 9204-2 from Hazard Category 2 to less than Hazard Category 3.

METHODOLOGY

Overview of the 9204-2 and 9204-2E Facilities

This section provides a brief summary of the 9204-2 and 9204-2E Facilities, including the layout of the facilities, a high level summary of past and current operations, and an overview of the safety basis for the facilities.

Layout of the Facilities

Figure 1 illustrates the arrangement of the 9204-2 Facility and the 9204-2E Facility. Buildings 9204-2 and 9204-2E share a section of wall where Building 9204-2E extends over the road. While the two facilities do share this small section of wall, Buildings 9204-2 and 9204-2E were determined to be two separate facilities.

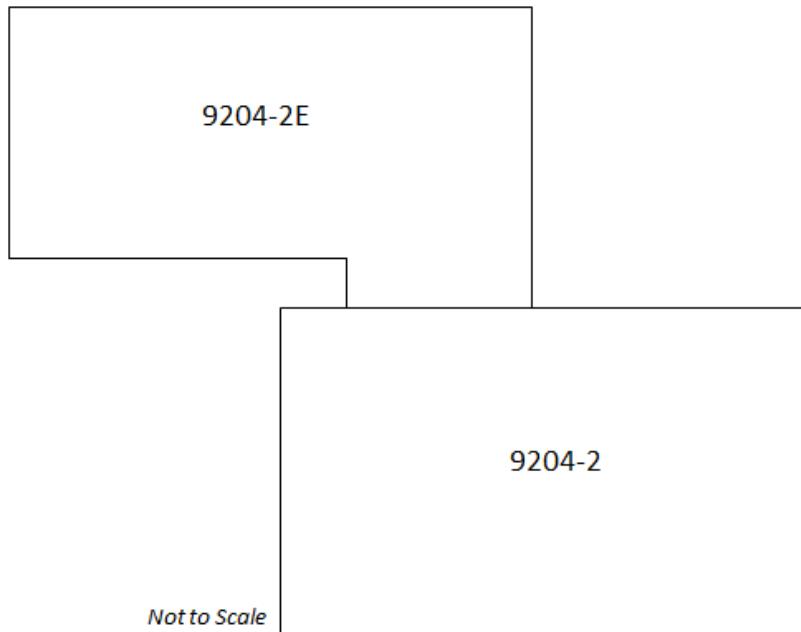


Figure 1. Layout of the 9204-2E and 9204-2 Facilities.

Operations

Operations in the 9204-2 Facility include chemical forming, machining, inspection and storage operations pertaining to the processing of special materials, while operations in the 9204-2E facility include weapon component assembly; disassembly; material testing (e.g. vibration testing, dimensional inspection, and radiography operations); and storage.

Safety Basis

A number of the operations conducted in Building 9204-2E (1) involve quantities of nuclear material that exceed the Hazard Category 2 threshold quantities per DOE-STD-1027-92 and (2) do not preclude the potential for a nuclear criticality accident. As such, Building 9204-2E is a Hazard Category 2 nuclear facility. Historically, there were some Building 9204-2E operations conducted in the Oven Room within Building 9204-2 that are currently analyzed in the Safety Analysis Report (SAR) and Technical Safety Requirements (TSR) for Building 9204-2E. The Oven Room is currently considered a part of the Building 9204-2E Material Access Area (MAA), and is only accessible from 9204-2E via a pedestrian tunnel. The operations in question involve non-fissile materials and do not have the potential to affect the nuclear materials/operations in Building 9204-2E. The remaining operations conducted in 9204-2 are analyzed in the SAR and TSR for Building 9204-2.

Operational Changes to Downgrade 9204-2

In order to ensure the criteria outlined in DOE-STD-1027-92 for classification of a facility below Hazard Category 3 are met, a number of operational changes had to take place within Building 9204-2. These operational changes are outlined as follows:

- 1) Fissile material storage or activities are no longer permitted in the Oven Room within Building 9204-2. Criticality Safety Approvals/Evaluations previously associated with fissile materials storage or activities within the Oven Room are canceled and the Building 9204-2 Criticality Control Review is revised to remove any nuclear criticality controls associated with Building 9204-2E operations in the Oven Room within Building 9204-2.
- 2) The Oven Room is no longer part of the 9204-2E MAA. Pedestrian access to the Oven Room in Building 9204-2 through the tunnel is permanently closed off. The Oven Room is now considered a Material Balance Area (MBA) completely within the footprint of Building 9204-2. A separate Hazard Material Identification Document was written to document the materials that may be present in the Oven Room.
- 3) Radiological material inventories in the Oven Room, which is located in Building 9204-2 but which will continue to be associated with Building 9204-2E operations, are being restricted such that the sum of ratios for the materials in Building 9204-2 against the Hazard Category 3 threshold quantities will be maintained less than 1. This change allows Building 9204-2 to be below a Hazard Category 3 facility. The facility classification for Building 9204-2 was revised, and as such, DOE-STD-3009-94 no longer applies to the operations in Building 9204-2.
- 4) There are a number of structures, systems, and components associated with the Oven Room which will no longer be considered safety significant in the Building 9204-2E safety basis:
 - a) Wet-Pipe Fire Suppression Sprinkler System
With the prohibition of fissile material activities in the 9204-2 Oven Room, the wet-pipe sprinkler system that services the Oven Room will no longer be credited as safety significant in the 9204-2E safety basis. The wet-pipe sprinkler systems that service additional areas of 9204-2E will remain credited.
 - b) High-Temperature Cut-Off Systems for the Large and Small Webber Environmental Chambers
The Large and Small Webber Environmental Chambers were historically used to perform quality evaluation of materials. A high-temperature cut-off system was required to ensure that the temperature within the chamber did not exceed the temperature at which certain special materials could be adversely affected.

These ovens have been permanently removed from service. With downgrade of operations in 9204-2 to non-nuclear status, the high-temperature cut-off system will no longer be credited as safety-significant.

c) Low-Temperature Oven Heating Systems

The low-temperature oven heating systems were configured to prevent excessive temperatures when heating special materials, even if a control system failure occurred. Previously credited as a safety significant design feature for safety, the downgrade of operations in the Oven Room results in the removal of this safety significant control from the 9204-2E TSR.

d) Building 9204-2 Facility Structure

The Building 9204-2 Facility Structure was previously credited for reducing the frequency of a significant release of hazardous materials from the Facility due to a natural phenomena event. Upon removing all fissile material storage and activities from the 9204-2 Oven Room, this control is no longer credited as safety significant.

e) Building 9204-2 Criticality Accident Alarm System (CAAS) Detection Stations A and B

While a CAAS is no longer necessary in 9204-2 to alert the local worker of a criticality that occurs within Building 9204-2, CAAS annunciation coverage is still required in Building 9204-2 due to the proximity of material activities in Building 9204-2E. Physical modifications were made to tie annunciation in Building 9204-2 to the 9204-2E detector stations. Only Building 9204-2E Detector stations will be credited for detection, but corresponding annunciation will occur in both buildings.

5) There are two specific administrative controls associated with the Oven Room that are no longer credited as SACs in the Building 9204-2E safety basis:

a) Specific hazardous materials and canned subassemblies are to be stored only in areas protected by credited fire suppression systems.

b) Workers shall not load canned subassemblies or other analyzed containers that contain specific hazardous materials into ovens not approved for heating this materials.

6) All changes in Building 9204-2 are subject to the configuration management program and procedural requirements to assess their potential impact to the Building 9204-2E SAR and TSR. Approval of categorical exclusions for certain changes in Building 9204-2 is being requested.

Facility Classification in Light of Operational Changes

DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE O 480.23, Nuclear Safety Analysis Reports*, Change Notice 1, provides the basis for determining the final hazard categorization of activities in Building 9204-2. For Building 9204-2 to be considered below Hazard Category 3, it is necessary that the sum of ratios for radiological materials be less than 1 against Category 3 threshold quantities and that the potential for criticality be precluded.

With the prohibition of fissile material storage or activities in the Oven Room within Building 9204-2, all fissile materials are now excluded from on-going operations in Building 9204-2. Therefore, the potential for criticality is precluded.

A new sum of ratios evaluation was completed, and it was determined that the sum of ratios for radiological materials in 9204-2 was less than 1 against Hazard Category 3 threshold quantities.

Based on this sum of ratios evaluation and recognition that a criticality is not credible, the nuclear activities in Building 9204-2 are Below Hazard Category 3; therefore, Building 9204-2 is now classified as not nuclear.

RESULTS

The revised facility classification document and the safety basis supplement outlining the operational changes in 9204-2 have been issued. Upon receipt of a safety evaluation report from NPO, the facility to no longer be subject to 10 CFR 830, Subpart B, "Safety Basis Requirements." As a result of the downgrade of the 9204-2 Facility safety and security risks are reduced, which are significant benefits to the Y-12 Complex as 9204-2 is a continually aging facility.

DISCLAIMER

This work of authorship and those incorporated herein were prepared by Consolidated Nuclear Security, LLC (CNS) as accounts of work sponsored by an agency of the United States Government under Contract DE-NA0001942. Neither the United States Government nor any agency thereof, nor CNS, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility to any non-governmental recipient hereof for the accuracy, completeness, use made, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency or contractor thereof. The views and opinions of authors expressed herein do not necessarily state

or reflect those of the United States Government or any agency or contractor (other than the authors) thereof.

COPYRIGHT NOTICE

This document has been authored by Consolidated Nuclear Security, LLC, a contractor of the U.S. Government under contract DE-NA0001942, or a subcontractor thereof. Accordingly, the U.S. Government retains a paid-up, nonexclusive, irrevocable, worldwide license to publish or reproduce the published form of this contribution, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, or allow others to do so, for U.S. Government purposes.