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CORRESPONDENCE CONTROL  
Department of Energy  
ROCKY FLATS PROJECT OFFICE  
12101 AIRPORT WAY, UNIT A  
BROOMFIELD, COLORADO 80021-2583

JUN 23 2005

05-DOE-00381

DIST.	LTR	ENC
BERARDINI, J.H.	X	
BOGNAR, E.S.	X	
BROOKS, L.	X	
CARPENTER, M.	X	
CIUCCI, J.A.		
CROCKETT, G. A.	X	
DECK, C. A.	X	
DEGENHART, K. R.	X	
DEL VECCHIO, D.		
FERRERA, D. W.	X	
GIACOMINI, J. J.		
GILPIN, H.		
LINDSAY, D. C.	X	
LONG, J. W.		
NESTA, S.	X	
SHELTON, D. C.	X	

Mr. Steven H. Gunderson  
RFCA Coordinator  
Colorado Department of Public Health and Environment (CDPHE)  
4300 Cherry Creek Drive South  
Denver, CO 80222-1530

Dear Mr. Gunderson:

TUOR, N. R.	X	
WARD, D.	X	
WIEMELT, K.	X	
ZAHM, C.	X	

Please find enclosed a completed Rocky Flats Cleanup Agreement Type 2 Closeout Report for B991 cluster for your review and approval.

Questions may be directed to Gary Morgan, of our staff, at (303) 966-6003.

Sincerely,

John J. Rampe, Director  
RFPO Closure Project Management

Enclosures

cc w/o Enc:  
F. Lockhart, OOM  
G. Morgan, PS  
S. Nesta, K-H RISS Env  
C. Freiboth, K-H RISS D&D  
K. Wiemelt, K-H RISS D&D  
M. Aguilar, EPA Region VIII  
RFCLOG

COR. CONTROL	X	
ADMIN. RECORD	X	

Reviewed for Addressee  
Corres. Control RFP

6-28-05   
Date By

cc w/ Enc:  
Administrative Record

Ref. Ltr. #

ADMIN RECORD

DOE ORDER #  
5400.1

IA-A-003012

1/23

## STATE OF COLORADO

Bill Owens, Governor  
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Laboratory Services Division  
Denver, Colorado 80246-1530 8100 Lowry Blvd.  
Phone (303) 692-2000 Denver, Colorado 80230-6928  
TDD Line (303) 691-7700 (303) 692-3090  
Located in Glendale, Colorado  
<http://www.cdphe.state.co.us>



Colorado Department  
of Public Health  
and Environment

October 17, 2003

Mr. Joseph A. Legare, Assistant Manager  
Environment and Stewardship  
U.S. Department of Energy, RFFO  
10808 Highway 93, Unit A  
Golden, CO 80403-8200

Post-It® Fax Note	7671	Date	10/17/2003	# of pages	2
To	S. Nesta	From	J. Hindman		
Co./Dept.	K-H- RISS	Co.	CDPHE		
Phone #	303-966-6386	Phone #	303-692-3345		
Fax #	303-966-6027	Fax #	303-759-5355		

**RE: Notification by Rocky Flats Environmental Technology Site (RFETS) to invoke the Rocky Flats Cleanup Agreement Standard Operating Protocol (RSOP) for Facility Component Removal, Size Reduction, and Decontamination Activities for Buildings 984, 991, and 998, Including Closure of Permitted Hazardous/Mixed Waste Container Storage Units 984.1 and 991.1 – Concurrence**

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division (the "Division") has reviewed the October 6, 2003 letter from the U.S. Department of Energy, Rocky Flats Field Office (DOE-RFFO) and the accompanying notification package. The letter and notification package were received by the Division on October 8, 2003, notifying us of your intent to utilize the *RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities* (the "Component RSOP") for internal facility component removal/size reduction and decontamination activities; for the closure of permitted Hazardous/Mixed Waste Container Storage Unit 984.1 located in Building 984; and for the closure of permitted Hazardous/Mixed Waste Container Storage Unit 991.1 located in Buildings 991, 998 and Corridor A which connects these two buildings. The notification states that RFETS plans to remove internal facility components and decontaminate beryllium and radioactive contamination prior to demolition. Additionally, the notification states that RFETS intends to close Units 984.1 and 991.1 by application of the Clean Closure Option #1 method from Section 5.1.1 of the Component RSOP. Clean Closure Option #1 is applicable to units with a complete, detailed operating history which documents that hazardous/mixed wastes were either never spilled in the unit or any spills were verified as being adequately cleaned up. A visual inspection of the unit must also be conducted to verify the absence of any hazardous/mixed waste stains or residuals. During October 15-16, 2003, Division representative James Hindman reviewed the operating record for these units and conducted a visual inspection which verified the absence of any hazardous/mixed waste stains or residuals.

RFETS Component RSOP Notification for Closure of Units 984.1 and 991.1  
October 17, 2003  
Page 2 of 2

We formally agree that Units 984.1 and 991.1 are hereby administratively closed and that the component removal/size reduction and decontamination activities described in the notification may proceed utilizing the Component RSOP. The consultative process must continue to be utilized to keep us informed of the decommissioning strategy, planning, and activities for this project. If you have any questions regarding this correspondence, please contact me at (303) 692-3367 or ~~James F. [unclear]~~ at (303) 692-3345.

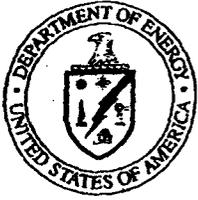
Sincerely,



Steven H. Gunderson  
RFCA Project Coordinator

cc: S. Tower, DOE-RFFO  
K. Wiemelt, K-H RISS  
S. Nesta, K-H RISS  
D. Shelton, Kaiser-Hill  
T. Rehder, EPA Region VIII  
D. Miller, AGO  
D. Kruchek, CDPHE  
J. Schieffelin, CDPHE  
S. Tarlton, CDPHE  
RFETS Administrative Records, Building T130G





**Department of Energy**

ROCKY FLATS FIELD OFFICE  
10808 HIGHWAY 93, UNIT A  
GOLDEN, COLORADO 80403-8200

FEB 10 2004

04-DOE-00113

Mr. Steven H. Gunderson  
RFCA Project Coordinator  
Colorado Department of Public Health and Environment  
4300 Cherry Creek Drive South  
Denver, CO 80222-1530

Dear Mr. Gunderson:

Please find the Facility Disposition RSOP (Rocky Flats Cleanup Agreement Standard Operating Protocol) notification letter for Building 991 [FEG-004-04] demolition, a type 2 facility, based upon the Pre-Demolition Survey Report (PDSR). Note that the 998 tunnel, Corridor B, and Room 402, also identified as Type 2 facilities were previously submitted in an earlier notification.

Questions can be directed to Gary P. Morgan, AMP at (303) 966-6003.

Sincerely,

A handwritten signature in cursive script that reads "Joseph A. Legare".

Joseph A. Legare, Assistant Manager  
for Environment and Stewardship

Enclosures

cc w/o Encl:

C. Freiboth, K-H, RISS D&D  
S. Nesta, K-H, RISS Env  
D. Parsons, K-H, RISS D&D  
T. Rehder, EPA Region VIII  
Administrative Record

**CERCLA ADMINISTRATIVE RECORD INDEX AND CONTACT RECORDS**

- 4/17/2002 Contact Record between V. Guthrie, K-H, and D. Kruchek, CDPHE; Proposed characterization for the Building 991 Complex
- 2/4/2003 DOE submits the RLCR (Rev.1, 1/14/2003) to CDPHE for approval.
- 3/12/2003 Contact Record between K. Wiemelt, K-H, and D. Kruchek, CDPHE; request approval for conducting utility disconnects at the 991 tunnel prior to RLCR approval.
- 3/21/2003 CDPHE grants partial approval of the RLCR.
- 8/4/2003 DOE submits RSOP for Component Removal Notification for Building 991 Tunnel, including vaults 996, 997, and 999.
- 7/31/2003 Contact record between K. Wiemelt, K-H and D. Kruchek, CDPHE; discusses RSOP for Component Removal Notification for Building 991 Tunnel and requests verbal approval to begin removal.
- 8/8/2003 CDPHE grants written approval to begin activities under the RSOP for Component Removal Notification for Building 991 Tunnel.
- 9/5/2003 DOE submits RSOP Notification of Component Removal, Size Reduction and Decontamination Activities for Building 991 and 998, and RCRA Closure for Units 991.1 and 984.1.
- 9/10/2003 DOE submits to CDPHE the PDSR for Building 991 west tunnel, plenum building 985, and vaults 996, 997, and 999 for approval.
- 9/16/2003 CDPHE approves the PDSR for Building 991 west tunnel, plenum building 985, and vaults 996, 997, and 999.
- 9/19/2003 The RSOP Notification for Facility Disposition of the 991 Corridor C Tunnel and Vaults 996, 997, and 999 is submitted to CDPHE for approval.
- 10/9/2003 CDPHE approves activities presented in the RSOP Notification for Facility Disposition of the 991 Corridor C Tunnel and Vaults 996, 997, and 999.
- 10/17/2003 CDPHE approves the RSOP Notification of Component Removal, Size Reduction and Decontamination Activities for Building 991 and 998, and RCRA Closure for Units 991.1 and 984.1 (administratively closed).
- 11/19/2003 Contact Record between J.R. Marschall, K-H and D. Kruchek, CDPHE; Discuss the properties of the foam that will be used to plug the tunnel and vault areas.
- 1/7/2004 Contact Record between J.R. Marschall, K-H and D. Kruchek, CDPHE; Agreement to plug corridor A, corridor B, and room 402 with foam.
- 2/3/2004 The RSOP Notification for Facility Disposition of 998 Tunnel, Corridor B, and Room 402 is submitted to CDPHE for approval.



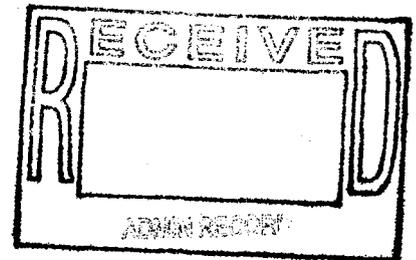
**Rocky Flats Environmental Technology  
Site**

**PRE-DEMOLITION SURVEY REPORT (PDSR)**

**Building 991, 991 East Tunnel and 998 Vault  
Closure Project**

**REVISION 0**

**February 4, 2004**



**CLASSIFICATION REVIEW NOT REQUIRED PER  
EXEMPTION NUMBER CEX-005-02**

1  
145

IA-A-001982

## PRE-DEMOLITION SURVEY REPORT (PDSR)

### Building 991, 991 East Tunnel and 998 Vault Closure Project

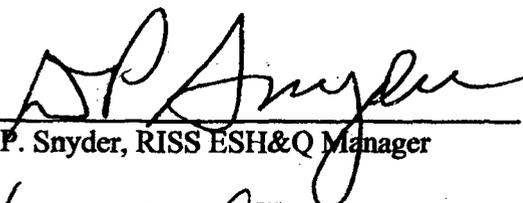
REVISION 0

February 4, 2004

Reviewed by:

 Date: 2/5/04  
Don Risoli, Quality Assurance

Reviewed by:

 Date: 2/5/04  
D.P. Snyder, RISS ESH&Q Manager

Approved by:

 Date: 2/5/04  
Karen Wiemelt, K-H Area 2 D&D Project Manager

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## ATTACHMENTS

- A Facility Location Map
- B Radiological Data Summaries and Survey Maps
- C Chemical Data Summaries and Sample Maps
- D Data Quality Assessment (DQA) Detail

#### **4.3 RCRA/CERCLA Constituents [including metals and volatile organic compounds (VOCs)]**

Based on a review of the HSAR, RLCR, interviews, facility walkdowns, and a review of waste storage area inspection forms, there is no indication that Building 991, 991 East Tunnel and 998 Vault have been contaminated by RCRA/CERCLA constituents. Chemicals have been used within most of the facilities, and RCRA/CERCLA wastes have been stored or moved throughout, but there are no records or visible signs of chemical releases. However, there were stains on asbestos floor tile in two rooms (Room 109 and Room 140) that were sampled for RCRA metals. The stains were underneath roof leaks and appeared to be from rainwater, but a sample from each area was analyzed to ensure that contamination had not occurred. Results from both samples demonstrated that RCRA TCLP regulatory limits had not been exceeded. Both sample results were below regulatory limits and are presented in Attachment C-3, *RCRA/CERCLA (Metals) Chemical Data Summaries and Sample Maps*.

Sampling for lead in paint in Building 991, 991 East Tunnel and 998 Vault was not performed. Environmental Waste Compliance Guidance #27, *Lead-based Paint (LBP) and Lead-based paint Debris Disposal*, states that LBP debris generated outside of currently identified high contamination areas shall be managed as non-hazardous (solid) wastes, and additional analysis for characteristics of hazardous waste derived from LBP is not a requirement for disposal. There were no high contamination areas identified in Building 991, 991 East Tunnel or the 998 Vault.

The facilities contained some RCRA regulated items, such as mercury thermostats, fluorescent light bulbs, mercury vapor light bulbs, mercury containing gauges, circuit boards, and lead-acid batteries. However, these items have been removed and managed in accordance with the Colorado Hazardous Waste Act.

#### **4.4 Polychlorinated Biphenyls (PCBs)**

Based on the HSAR, RLCR, interviews, and facility walkdowns of Building 991, 991 East Tunnel and 998 Vault, no PCB-containing equipment was ever used or stored in the buildings, making the potential for PCB contamination resulting from spills highly unlikely. Therefore, PCB sampling was not performed as part of the PDS.

Based on the age of the facilities (constructed prior to 1980), paints used may contain PCBs, and painted surfaces will need to be disposed of as PCB Bulk Product Waste.

The facilities contained PCB fluorescent light ballasts, however, all ballasts have been checked and leaking PCB ballasts and those weighing more than 9 lbs, have been removed from the facility and managed in accordance with the Colorado Hazardous Waste Act. Non-leaking PCB ballasts of less than 9 lbs. may remain in the facility and will be disposed of as PCB Bulk Product Waste. None of the demolition concrete rubble will be used for backfill on-site per the RFCA Recycling Concrete RSOP.

# **Final Project Closeout Report**

**For the**

## **991 Cluster Closure Project**

**Revision 0**

**April 2005**

**Remediation, Industrial DBD, and Site Services**

**Kaiser-Hill Company, LLC**

Review for Classification

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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# Final Project Closeout Report 991 Cluster Closure Project

## 1. Introduction

### A. 991 Cluster:

The 991 Cluster was located on the east end of the Rocky Flats Environmental Technology Site (RFETS) approximately 100 yards north of Central Avenue in the southeast corner of the Protected Area (PA) (see RFETS Plot Plan, Appendix 1, Article 1). The cluster was built in a natural depression that formed South Walnut Creek, and consisted of five buildings and two underground tunnels with four vaults. The structures within the 991 Cluster consisted of Building 984, a waste storage facility, Building 985, which contained an exhaust filter plenum, Building 989, the emergency generator for Buildings 991 and 985, Building 991, a storage and shipping facility, and Building 992, the guard post (removed previously except for the slab).

There were two tunnels that were part of Building 991. Corridor "A" went north from the east end of Building 991 and Corridor "C" went to the west from the northwest side of 991. Corridor "B", was a hallway in the shape of an inverted "Y" on the northwest side of Building 991 and tied Building 991 to Corridor "C" with the east leg, while the west leg went outside from Corridor "C". Corridor "A", 190' long, lead to one vault, 998, at the end of the corridor. Corridor "C", 600' long, contained three vaults, 996, 999, and 997, spaced equally through the 600'.

A transformer substation was part of the cluster (no building number) as were propane boilers located outside on separate foundations (no building number). See the Cluster Map (Appendix 1, Article 2) for building locations.

In general, the D&D effort included decontamination and hazardous substance removals, dismantlement of some equipment, ducting, and piping systems, and demolition of the entire cluster to a minimum of 4' below final finish grade. Decontamination was limited to minor radiological clean-up in Building 991, and removal of hazardous substances included asbestos, beryllium, and RCRA items. The most significant effort was the demolition of Building 991, including part of Corridor "A" and most of Corridor "B". The project included removal of the Building 992 concrete slab and the demolition of Buildings 984, 985, and 989. Also removed were the transformers, boilers, foundations, concrete retaining walls, sidewalks, power poles, fencing, and pavement. Finally, the site was filled and rough graded in accordance with the "Land Configuration Design Basis IA Grading and Drainage Concept" (Appendix 1, Article 3).

The 991 Cluster Closure Project was completed in accordance the RSOP for Facility Component Removal, Size Reduction, and Decontamination Activities (DOE 2002c); and the RSOP for Facility Disposition (DOE 2000b). This document summarizes the actions taken and the final condition of the Building 991 Cluster.

**B. Building 984:**

Building 984 was built in 1986 for additional waste storage capacity (see Appendix 1, Article 4 for building layout). It was a metal skinned building 75' long by 28' wide and 16' high. Support was provided by eight columns on pier foundations approximately 4' square with a 12" wide by 5' deep stem wall around the perimeter of the building. The floor was 5" of reinforced concrete. There was no radiological or beryllium contamination found in Building 984 and there was no asbestos containing building materials used during the construction of the building.

**C. Building 985:**

Building 985 was built in 1973 and housed the filter plenum to control air emissions from Corridor "C" and Vaults 996, 997, and 999 (see Appendix 1, Article 5 for building layout). Prior to 1973 exhaust filtering for Corridor "A" and the vaults was done through filtering systems in Room 402 which was the room formed by the two legs of Corridor "B". Building 985 straddled Corridor "B" such that the exhaust duct from Corridor "C" went through Room 402 and up through the floor of Building 985. Building 985 housed the exhaust plenum, a building supply air plenum, the exhaust fans, Health/Physics vacuum pumps, ducting, piping, and electrical service. There was also a pit against the east end of the building which contained a tank to collect plenum deluge water in the event of a fire in the plenum.

Building 985 was 40' wide x 60' long x 16' high. The floor was 8" of reinforced concrete with 1' x 5' reinforced grade beams around the perimeter and four additional internal grade beams, 1' x 5', spanning the short side. Eleven caissons in varying sizes, from 2'-6" dia. x 17' deep to 3'-0" dia. x 34' deep, were spaced around the perimeter grade beams. Two more caissons, 2'-0" dia. x 22' deep were under the entrances, and three, 2'-0" dia. x 13' deep were under the interior walls of the pit. The walls were pre-cast concrete panels nominally 6" thick, and the ceiling was pre-cast concrete Twin Tee's insulated with a built-up bituminous asphalt roofing top surface.

**D. Building 989:**

Building 989 was a small building, 16' wide x 24' long x 12' high, that housed the emergency generator in case of power loss to Building 991 (see Appendix 1, Article 6 for building layout). The building also housed the generator controls and diesel fuel day tank. Built in 1973, the exterior was 8" concrete block with #5 vertical reinforcing bars placed periodically in grout filled cores. The floor was 6" reinforced concrete with stem wall footers 8" wide x 5'-0" deep. The ceiling was 5" reinforced concrete with built-up bituminous asphalt roofing felts.

Initially, fuel was supplied from an underground tank just to the east of Building 989. That tank, approximately 5' in diameter by 10' long, was filled with foam, closed in 1997, and replaced with an above ground diesel fuel tank.

## **E. Building 991:**

The primary building in the 991 Cluster was the waste storage facility, Building 991 (see Appendix 1, Article 7 for building layout). Building 991 was one of the original four facilities that began construction in 1951 to establish a site that could manufacture and assemble nuclear weapons trigger components. Building 991 was the first building completed and occupied in 1952, so initially the facility served the machining, assembly, storage, shipping, and administrative functions for weapons component manufacturing. The machining and administrative effort only lasted until other facilities were completed in 1953, at which time the facility served only as the final weapons component assembly, storage, and shipping facility. In 1957 the facility's primary mission shifted to shipping, receiving, and storage. During the 50's and 70's a number of research and development projects were conducted in the building including radiation studies and a beryllium coating process. Early in 1990, production at RFETS was shut down pending rigorous safety upgrades site-wide. With the end of the "cold war" a few years later production never resumed at the site and Building 991 was converted to a waste storage facility to support closure activities for the site.

Building 991 was a cast-in-place concrete building that, in its final state, was approximately 156' wide by 275' long, not including Corridors "A", "B", and "C" or the covered storage area on the west end of the building. The facility was divided into three functional areas: the south, the middle, and the north areas. The south side served the administrative function and, at one time, included a cafeteria, the middle area was warehouse and mechanical rooms, and the north area was where the classified vaults and NDT Testing Vaults were with additional rooms for some research and development projects. The south section was 4" concrete exterior wall, with interior offices constructed primarily of Transite, which contained asbestos in excess of 1%. The center section was constructed of thicker concrete, and the north section had the thickest concrete ranging from a nominal 12" to 36" in the NDT vaults. Interior walls of both the center and north sections were concrete walls and metal stud walls with metal skins.

All three corridors, "A", "B", and "C" (Appendix 1, Article 8) had walls, floors, and ceilings of nominal 15" concrete. Two-thirds of Corridor "A", a small part of Corridor "B", and all of Corridor "C" were left in place. All four vaults were left in place. Vaults 996 and 997 have walls 14' thick with ceilings and floors at 12' thick; Vault 998 has 24" thick walls, ceiling, and floor; and Vault 999 has 18" and 24" thick walls with 24" thick ceiling, and 6" thick floor.

There were four major additions to Building 991 between 1959 and 1984. In 1959/60 the Radiography addition was built on the northeast corner of the building. The Radiography addition included the two Non-Destructive Testing (NDT) vaults with 3' thick concrete walls. In 1964 the east dock and maintenance shop were built south of the NDT vaults followed the same year by the container storage canopy. The container storage canopy was just a metal roof and columns on the west side of the building extending to and down the concrete retaining wall at the west perimeter of the site. The last addition took place in 1984 when the new shipping warehouse was

built on the west side of the center section of the building. It was a metal structure with metal roof and metal sides where it extended beyond the north and south sections of Building 991.

**F. Building 992:**

Building 992, the guard post for Building 991, was completed at the same time Building 991 was (see Appendix 1, Article 9 for foundation layout). The guard post was removed in 2002, but the slab was left in place due to discovery of high volatile count in the soil. The soil was covered and left at the site until the 991 Cluster demolition. The slab was typical stem wall and footing construction 4' deep with a nominal 5" reinforced floor.

**G. Miscellaneous Structures:**

Eight-foot high wire fencing encompassed the entire cluster. A number of power poles and wiring fed power to the cluster and primary 13.8 kv transmission lines, and "H" structure ran north-south at the east end of the 991 Cluster. A paved road exited the south side of the cluster, turned 90° and went north to the top of the hill where it joined Spruce Avenue. The area around most of the cluster was paved and sidewalks went from the southwest corner of the 991 Cluster site to 10th Avenue and an asphalt walkway went due west to the 750 PAD (see Appendix 1, Article 2).

## **II. Action Description**

**A. Utility Isolations**

1. Building 984:

The only utilities servicing Building 984 were water (for fire suppression system) and electricity. The water service was air-gapped underground on the west side of the building approximately 20' from the building line. The line from the air-gap to the building was removed with the building demolition and the rest of the line to the PIV was removed during final grading of the site. The electrical feed was to the east side of the building. The overhead feed lines were air-gapped at the power pole approximately 20' east of the building, and then air-gapped inside the facility at the distribution panel to assure there were no other lines feeding the facility. The power pole and power lines were also eventually removed.

2. Building 985:

Utilities servicing Building 985 included water for fire suppression and electrical power. The water line was air gapped underground just outside the west windbreak and removed from there into the building. Primary electrical service came in the east side of the building from Building 991. The secondary electrical source was through the emergency generator in Building 989. Once power was shut down in Building 991 and the electrical generator disconnected from the circuits the service to Building 985 was air-gapped. During demolition all the wiring and conduits to Building 985 were removed.

### 3. Building 989:

Utilities servicing 989 included fire suppression piped overhead from the fire suppression system on the east dock of Building 991, and electrical power. There were also fuel oil lines from both the underground tank (out of service) and the new above ground tank. The fire suppression was disconnected at the east side of the Building 991 dock and removed to Building 989. Electrical power for Building 989 was fed underground from 991. The wires were cut at both ends and pulled out of the conduits. The fuel lines from the underground tank were removed along with the underground fuel tank during demolition and the fuel and coolant lines (above ground) for the new aboveground fuel tank were removed prior to removal of the aboveground fuel tank.

### 4. Building 991:

Utilities servicing Building 991 included water, electricity, steam, natural gas, and sewer. Three water lines provided domestic water and fire water; two lines entered the building on the east side of the south basement utility corridor, and one served the new dock addition, Room 170. Approximately 30' west of the building two of the lines were exposed and air-gapped underground (including the one to the new dock). The third was exposed and air-gapped underground approximately 10' west of the building. All three lines tied into the main 10" domestic water line that entered the site from the west side. Approximately 10' west of Building 991 the water line reduces to 6", and headed south then turned east approximately where the new drainage ditch was constructed during final grading of the site. From that point to where it turned back north (to Building 995) on the east side of Building 991, the line was removed so it did not interfere with the new drainage ditch. Fire hydrants and some post-indicator valves were removed during final grading to completely restore the 991 Cluster site.

Electricity was fed to Building 991 from two transformers on the east side of Building 991. In the event of power loss the emergency generator in Building 989 provided emergency power. The wires were cut at the transformers and pulled back to where they entered Building 991 on the east side. The wires to Building 991 from the emergency generator were also cut and removed from the conduit.

Steam entered the building on the northeast corner, but was shut off in 1998 when the building converted the heating system to natural gas. The steam lines were removed from the site just prior to demolition under a separate project. Natural gas was used to fuel the boilers that replaced the steam heating system until 2002 when gas was replaced with propane using the same line used for natural gas. The natural gas/propane line was routed in overhead stanchions with the steam line and was disconnected near the propane tank farm near 10th Street and the South Patrol Road. The line was then purged all the way to the boilers at Building 991 in October 2003, and subsequently removed with the steam line.

The sewer line was routed through the basement corridors intercepting all floor drains and sanitary waste drains and directing them to the sewer manhole on the northeast corner of the building. A sump was in the northeast corner of the south basement

corridor and all basement floor drains were run to the sump and from there piped to the sewer. The roof drains were also collected in the basement and routed to the sewer. The building basement floor drains were all left in place with the basement; however the lines all tie into the basement sump. This sump was filled with dirt and the sewer manholes were grouted and disrupted.

The sewer line from the manhole to Building 995 was grouted at both upstream manholes (197 and 198) just outside the building and at the down gradient manhole (148), and the line was left in place at just over 4' below grade. Additionally, two 4-inch sewer lines that were previously abandoned were left in place at more than 3' below final grade.

## **B. Decontamination and Hazardous Substance Removals**

### **1. Building 984:**

No radiological decontamination, beryllium, or asbestos abatement was required in Building 984. RCRA designated hazardous materials removed included fluorescent and incandescent light bulbs, mercury switches, and circuit boards.

### **2. Building 985:**

No decontamination or asbestos abatement was required in Building 985. Even the plenum which had beryllium awareness signs posted on the doors was not contaminated radiologically or with beryllium and neither was any of the ductwork, hood, or Health/Physics vacuum piping. RCRA designated hazardous materials removed included fluorescent and incandescent light bulbs, mercury switches, and circuit boards.

### **3. Building 989:**

No decontamination or asbestos abatement was required in Building 989. RCRA designated hazardous materials removed included fluorescent and incandescent light bulbs and a mercury switch. Fuel from the day tank and the outside aboveground tank was removed and transferred to the B331 group fuel tank.

### **4. Building 991:**

In spite of assembling and storing nuclear components and conducting radiation studies in Building 991, there was very little radiological contamination found in the building. There were four areas in the building that were found to be radiologically contaminated. The small water trough in the west leg of Corridor "B" had several small spots of plutonium contamination that were decontaminated to below releasable levels. The trench, itself, was left in place since the floor of the Corridor "B" was in excess of 20' below proposed final grade for the area. The second area of radiological contamination was uranium contamination under a locker in the Men's Locker Room, Room 156. The uranium was decontaminated to below releasable levels and the concrete was removed and disposed of during demolition. A third area also had uranium contamination on the north wall of Room 170. It was found during Pre-Demolition Surveys and was also decontaminated below releasable levels and the

wall removed during demolition of the building. The fourth area was caused by a smoke detector inside the exhaust duct in the west leg of Corridor "B". Many years ago the smoke detector, containing americium, failed and the americium was spread through several pieces of ductwork. That ductwork was removed and packaged in a Low Level Waste (LLW) IP-2 container for shipment to the Nevada Test Site (NTS).

The beryllium coatings research resulted in beryllium contamination above releasable limits in the basement, in Room 150, the ductwork from Room 150 to the rooftop filter plenum, the southeast corner of the rooftop plenum, and a couple of elevated samples in the overheads in the north hallway. Dust containing beryllium was found on the top of all the piping in the basement corridors. Asbestos insulation also covered a number of the pipes in the basement, so the beryllium decontamination was conducted in conjunction with asbestos abatement with the exception of the fire sprinkler lines, which had to remain operable until all combustibles were out of the building. All the piping in the basement corridors was removed and either wrapped in plastic (asbestos insulated pipes) or sprayed with a fixative solution and loaded in roll-offs for transport to proper disposal sites. The two fire deluge tanks and pumps in the basement were also removed as beryllium waste as were the sump pumps. Since the basement was left in place it was completely stripped of all equipment, piping, conduit, and lighting.

The beryllium in room 150 was concentrated primarily in ductwork that at one time was connected to a hood in the room that had been previously removed. The ductwork ran through and along the top of the roof into the southwest corner of the rooftop plenum, and was removed utilizing injected foam to plug and contain the beryllium where the ducting was cut apart. Once removed the ends of the duct were wrapped with plastic and taped to the duct. All the duct pieces were disposed of as beryllium contaminated sanitary waste. The plenum was vacuumed in the area of the beryllium contamination and sprayed with a fixative solution to seal the beryllium. The entire plenum was then demolished with the rest of the building.

The area where beryllium was found in the north hallway was sealed off with plastic, including plastic on the floor, and all the ducts, pipes, and conduits were sprayed with a fixative solution to seal the beryllium. All the ducts, pipes, and conduits were removed with the building demolition.

Nearly all the walls in the office area on the south side of the building were Transite containing asbestos in excess of 1%. There were also pipes and equipment insulated with asbestos containing materials throughout the facility. The entire south side of the building, except the cafeteria, which was used as the step-off pad, was sealed off with plastic before the work began. All the Transite walls were removed. Asbestos insulated piping was wrapped in plastic and removed as component removal. Pipes insulated with asbestos, either the entire pipe or just the fittings ran throughout the facility. The component removal process was utilized to remove the piping and/or fittings. The mechanical room, Room 130, contained some piping, ducting, and equipment with asbestos containing insulation. Where possible the insulation was removed with the duct or pipe, however, some equipment required the asbestos insulation to be stripped off. There were also asbestos partitions removed from the

compartments in one of the old motor control centers. All the asbestos was disposed of as asbestos containing sanitary waste at proper disposal sites.

Due to the age of Building 991 and various additions over the life of the building the floors had both asbestos impregnated tiles and tiles that did not contain any asbestos. Since the asbestos impregnated tiles were considered non-friable unless crushed and/or pulverized, it was decided to leave all the tiles in place during demolition removing what could be easily removed with the heavy equipment and leaving the rest in place. A Contact Record, dated February 11, 2004 (Appendix 2, Article 3), was written to reflect this decision and subsequent approval. Following are the room numbers and description of the floor tiles in Building 991 that tested positive for asbestos (see building map, Appendix 1, Article 7):

- Room 124 – 12" white & green vinyl tile 7% Chrysotile
- Room 124 – 9" white, beige, & tan vinyl tile 12% Chrysotile
- Room 126 – 12" white & green vinyl tile 7% Chrysotile
- Room 131 B – 12" gray & white floor tile 7% Chrysotile
- Room 160 – 12" gray & white floor tile 7% Chrysotile
- Room 153 – 12" gray & white floor tile 7% Chrysotile

Six other samples were taken from 12" tiles in Rooms 124, 242, 245, 247, 266, and 275 that did not detect any asbestos in the tiles. Even though nearly all the rooms in Building 991 had vinyl tile on the floor no other samples for asbestos were taken. It was generally felt that there were other asbestos tiles in the building, but since nearly 100% of the tiles were removed mechanically with heavy equipment during the demolition it was not considered an issue of concern.

The only PCB's that had been in the facility were in the transformers located on the east side of the facility and those had been previously converted some years ago to non-PCB oils. RCRA regulated materials removed from the building included light bulbs, both incandescent and fluorescent, mercury switches, and circuit boards. A number of light ballasts were found to be leaking, were removed, and disposed of as TSCA waste.

## **C. Dismantlement**

### **1. Building 984:**

The only dismantlement activities in Building 984 were limited to removal of a floor mounted jib crane and floor-mounted transformer, both in excellent shape, for resale through Property Utilization and Disposal.

### **2. Building 985:**

Dismantlement activities included removal of a compressor and the Health/Physics pumps for resale. The filters in the filter plenum were also removed and disposed of as sanitary waste since they were not contaminated with beryllium.

### 3. Building 989:

Prior to demolition the Emergency Generator, control panel, and the above ground diesel storage tank were removed for resale.

### 4. Building 991:

A compressor and chiller, ducting, piping, and conduits in Room 130 were removed in order to get to asbestos insulated items during the asbestos abatement. A compressor from the east dock of Building 991, the propane boilers on the east end of the building, and miscellaneous cabinets and furniture were removed for resale.

## **D. Pre Demolition Survey (PDS)**

All the buildings in the Building 991 Cluster were characterized for radiological and hazardous substances and results detailed in a Reconnaissance Level Characterization Report filed previously with CDPHE. Since Buildings 985 and 991 along with Corridors "A", "B", and "C" and Vaults 996, 997, 998, and 999 were designated as Type 2 facilities, a Pre-Demolition Survey was required to be performed, and a Pre-Demolition Survey Report submitted to the CDPHE. Approval to proceed was received from CDPHE prior to beginning the demolition of these facilities. A detailed Pre-Demolition Survey Report for Buildings 985 and 991 along with Corridors "A", "B", and "C" and Vaults 996, 997, 998, and 999 is included in this close-out report under Appendix 3, Articles 1 and 2.

## **E. Demolition**

### 1. Building 984:

Building 984 was demolished in two steps. The superstructure of the building was demolished to floor level and disposed of as sanitary waste in October 2003, however, the slab was left in place as supplies storage (trailers) for the asbestos abatement crew. In January 2004, the entire floor, stem wall foundation, and the column support piers of the building were demolished. There were no contamination issues with Building 984, but as is policy, the underside of the slab and foundations were surveyed for radiological purposes. There were no radiological issues, and the slab was also disposed of as sanitary waste at the BFI Foothills Landfill. The depressions made by removal of the foundation were back-filled with clean soil from identified borrow areas on the RFETS site.

### 2. Building 985:

The superstructure of Building 985 was demolished in November 2003, including demolition of the supply and exhaust plenums inside the building, the exhaust fans, the deluge tank in the pit, various pumps, and all the piping, ducting, and conduit. All was disposed of as sanitary waste. Initially, the plans were to only remove the shell of Building 985 and leave the slab and foundations in place since they were at least 4' below the proposed finish grade for the area. Therefore the deluge tank pit was filled with compacted dirt and the slab left in place for a couple of months.

After the issues with the foam in Corridor "B" of Building 991 (see Building 991 Demolition below) the decision was made to remove the slab. In April 2004, the slab and grade beams were removed entirely and the pit was removed down to just below the top of the Corridor B roof as were the caissons. The underside of the floor and foundations were surveyed for radiological contamination. There were no radiological issues, and the slab was also disposed of as sanitary waste at the BFI Foothills Landfill.

### 3. Building 989:

Building 989 superstructure and slab was demolished in November 2003; however, the pad for the above ground tank (tank previously removed for resale), the control box, with pad, the previously closed underground diesel storage tank, and all the piping were underneath energized 13.8 Kva power transmission lines. The overhead 13.8 Kva power lines were de-energized in April 2004, and those items were removed at that time. Radiological surveys validated the underside of the concrete was uncontaminated and the rubble was disposed of at the BFI Foothills Landfill.

### 4. Building 991:

In August 2003, preparations began to close Corridor "C" and Vaults 996, 997, and 999 on the west side of Building 991. The corridor and vaults were stripped of all ducting, piping, lights, conduit, and the asbestos insulated water line that ran the length of the corridor. The damaged and loose asbestos floor tiles in Vault 966 were removed, all of the other asbestos tiles were left in place. Once the strip-out was completed a pre-demolition survey was conducted in the corridor and vaults; the PDSR was prepared and submitted to CDPHE for approval. The PDSR validated the corridor and vaults did not contain any radiological material. In early September 2003, Corridor "C" and the vaults were sealed with a foam plug and left in place. The foam plug was injected right at the main vault type door leading to Corridor "C". The plug was four feet in depth and went wall to wall, floor to ceiling to completely seal the tunnel. A small trench, approximately 4" wide and 2" deep, ran the entire length of the south side of Corridor "C", into Corridor "B", under the vault door, continued down Corridor "B", and exited out into the courtyard. A board was placed over the trench as it passed under the foam plug such that foam would not fill it, and it would continue to allow any accumulated water to flow out of Corridor "C".

Since Corridor "A", Vault 998, Corridor "B", and Room 402 would be 4' to 15' below the final finish grading of the site, it was also planned that they would be left in place and sealed with a foam plug (see Appendix 2, Article 1). All the areas to be left in place were stripped of any asbestos, ducting, piping, conduits, etc., and a PDS was performed. After receiving approval to proceed with the foam plugs the foaming evolution began on February 2, 2004, beginning with the plug in Corridor "A". That foam plug was placed approximately 60' north of the entrance to Corridor "A" from Building 991. The plug was wall to wall (8'), floor to ceiling (18'), and 12'-6" in length. The next foam plug placed was in the entrance to the west end of Corridor "B". That plug was also wall to wall (10'), floor to ceiling (12'), and 18' in length. The plug in the east end of Corridor "B" was wall to wall (8'), floor to ceiling (8'), and approximately 10' deep around a small dogleg to the north. The last foam plug was in

Room 402 situated between the west and east legs of Corridor "B". As discussed in the Contact Record, dated February 2, 2004 (Appendix 2, Article 2), the entire room was filled with approximately 6' of foam to mitigate subsidence in the event the roof of the room collapsed in the long term (500 to 700 years). Additionally, a plug extending 6" to 12" above and to the side of the door opening by 4' deep was placed at the entrance to the room. That was the final foam plug installed and was completed on February 5.

On February 12, workers at Building 991 detected a strong odor and subsequent investigation revealed smoke emitting from a series of vents in Room 402. An emergency call mobilized the fire department and they began injecting water into a conduit penetration above the door to Room 402. A full report on the incident is included as Appendix 7. After two weeks the smoke ceased and after a number of tests including temperature readings it was determined that it was the west entrance to Corridor "B" where a fire or smoldering of the foam plug had occurred. Once it was determined the fire (smoldering) was complete preparations were made to go in and remove the burned and/or charred foam in the west entrance to Corridor "B". With the foam removed from the west entrance there was no good way to replace the foam. The decision was made to remove the Building 985 slab above Corridor "B", remove the ceiling of Corridor "B", and remove the foam in the east end of Corridor "B" and Room 402.

The decision was also made to leave the foam plug in Corridor "A" in place if the foam could be shown to be in good shape and not burned. Three holes were drilled horizontally into the foam to a depth of 10' to 11' and a fiber optic camera inserted. The camera revealed that the foam had a lot of air pockets toward the back of the plug, but that the front 3' to 4' of the plug was in good shape, properly cured, and with no sign of charring or harmful heat build-up. Permission was requested and received from the CDPHE (Appendix 2, Article 4) to leave the foam in place and proceed with the original plan to leave all but the initial 60' of the corridor and the vault in place.

Demolition of Building 991 began on March 9, 2004, beginning in the southwest corner and working toward the northeast corner of the building. Since part of the building would be 4' or more below final finish grading of the site not all of the building was removed (see Appendix 5, Article 1). The north wall was partially left in place removing only enough of the wall to assure the top of the concrete would be 4' to 6' below finish grade. This resulted in the wall tapering from a height of approximately 12' at the northwest corner to floor level at the east end where the NDT vaults had been. The basement corridors were left in place, as was most of the main floor. The southeast section of the main floor was removed at a diagonal from a point along the south side approximately 80' from the southwest corner to the northeast corner (the NDT Vault, Rm. 165). The main floor portions over the top of the basement corridor were also removed so that the basement corridors could be filled with native soil and compacted. All the interior walls were removed to floor. As reflected in the Contact Record, dated February 11, 2004 (Appendix 2, Article 3), dirt and/or rubble was used as a cushion between the floor and any crawler type equipment to avoid pulverizing the asbestos tiles left on the floor. Additionally, water was used during demolition that kept the tiles wet. The heavy equipment was able to

remove nearly 100% of the tiles and they were hauled to the landfill with the rest of the rubble as asbestos containing non-routine sanitary waste. Air monitors were set up around the building in various locations during the demolition of the building to monitor for asbestos. There was no asbestos detected by the air monitors during the demolition (see Appendix 4, Article 1 [3 pages]).

The foundation wall on the south side was removed to existing grade from a point approximately 80' from the southwest corner to a point approximately 135' from the southwest corner. From there the remainder of the south and east foundation wall all the way to the east foundation of the NDT Vaults was removed entirely. The underside of all concrete removed from the floors, foundation walls, and footings were surveyed for radiological contamination. Radiological surveys validated the underside of the concrete was uncontaminated and the rubble was disposed of at the BFI Foothills Landfill.

The ceiling of Corridor "A" was removed to within 4' to 6' of the foam plug that had been installed approximately 60' from the entrance into Corridor "A". The side walls were then removed on a diagonal from where the ceiling was left to a point approximately 2' above the floor level at the entrance to Corridor "A" (see Appendix 5, Article 5). As discussed earlier, Building 985 slab was removed exposing the top of corridor "B". The ceiling of Corridor "B" was removed to within 4' to 6' of the foam plug at the entrance to Corridor "C" and the vaults. In addition to the ceiling, the front wall of the west entrance to Corridor "B" and Room 402 was removed in its entirety and the walls of the corridor and Room 402 partially removed (see Appendix 5, Articles 2, 3, and 4). After all the remaining foam in the east entrance to Corridor "B" and the foam in Room 402 was removed, the entire length of Corridor "A" south of the foam plug, Corridor "B", and Room 402 were filled with compacted dirt during backfill operations.

It should be noted that rumors and stories of the early days at RFETS led to the belief that there were possible hidden rooms in the basement of Building 991. Early in the project, holes were drilled in the basement corridor walls around the middle of the building area where it was suspected the hidden room(s) were located. Those initial borings revealed no voids or any sign of hidden rooms. As demolition progressed an effort was made again to find possible voids under the main floor in areas suspected of being hidden rooms. Holes were put through the main floor in northwest corner of the building and again through the center of the building where it appeared patches were put in the floor of Room 134. Again, no voids and no hidden rooms were found. Finally, the last area suspected of having a possible hidden room underneath it was Room 130, the mechanical room, on the east end of the building. In that area the floor was removed entirely revealing only native dirt underneath.

All the fencing in the entire 991 Cluster was removed along with the post foundations. All power poles and wiring was removed except for the primary 13.8 kva feeder lines, "H" structure, and power poles that ran north-south at the east end of the 991 Cluster. The two transformers at the base of the "H" structure that fed power from there to Building 991 were removed, as were the foundations they were resting on. The propane boiler foundations on the east end of Building 991 were also

removed. All paving and sidewalks were removed including the concrete sidewalk and stairs that went out the southwest corner of the 991 Cluster site all the way to 10th Street, and the asphalt walkway that went due west to the 750 PAD, including the stairway at the west end. The Building 992 slab was also removed along with a shielded cable that ran underground to Building 991. The dirt pile left, due to high readings for volatile compounds, was removed since the high readings had long since subsided. A sampling well had been installed on the east side of the guard post downstream of the dirt pile to assure no volatile compounds had migrated into the groundwater. The samples did validate there were no volatile compounds present in the groundwater and the soil pile was loaded out as sanitary waste. The sampling well was properly abandoned per state regulations and Kaiser-Hill's contract requirements.

The backfill operations for the Building 991 Cluster began in 2004. The first stage used soils from the 371 borrow area and the area was filled to 4' below finish grade. The material was spread and compacted utilizing a sheep's-foot roller and large dozer. The second stage, for the final 4' used soils from RFETS borrow areas at the South Patrol Road and Perimeter Security Zone south of the 991 Cluster site. The site was filled and graded to the final grading profiles as shown in the final Land Configuration Design Basis IA Grading and Drainage Concept, Building 991 (Appendix 1, Article 3).

### **III. Verification That Action Goals Were Met**

Five objectives were established for the 991 Cluster Removal Project prior to beginning the demolition:

- A. Decontamination of the facilities (as necessary) to support release for decommissioning per site approved procedures.*

Only Building 991 had any radiological contamination and it was limited to four areas. Small spots of plutonium over the free release standards were in the trench in the west leg of Corridor "B". A spot of uranium, approximately 12" in diameter, was on the underside of a locker in the Men's room. A spot of uranium, 12" in diameter was found on the north wall of the new warehouse section, Room 170. The fourth area, the exhaust duct in the west leg of Corridor "B", had americium inside the duct from a smoke detector that had failed some years ago. The trench in Corridor "B" was decontaminated to free-release standards and left in place with Corridor "B". The two areas contaminated with uranium were decontaminated to free-release standards and disposed of in the off-site landfill. The ductwork containing traces of americium was removed and put in IP-2 LLW waste boxes and shipped to the LLW repository at NTS (see Section VII.E).

- B. Complete decontamination and decommissioning activities in a manner that is protective of site workers, the public and the environment.*

Decontamination and decommissioning activities were completed within regulatory requirements. Radiological decontamination discussed in III.A above was performed

by workers in full face respirators, Tyvek coveralls, gloves and booties with Radiological Technicians present full-time during the decontamination activity.

In addition to radiological decontamination, asbestos and beryllium abatement were required in Building 991. Both asbestos and beryllium abatement operations were performed in the same personal protective equipment (PPE) as was the radiological decontamination above. In the basement beryllium contamination was found in Room 150 and on the tops of much of the overhead piping. Abatement activities included application of a wetting solution to control the beryllium before performing any intrusive work activities. Asbestos insulated lines were wrapped in plastic prior to disposal and the non-insulated-piping, conduit, and lighting was sprayed with a fixative solution prior to disposal. All abatement activities in the building were done in containment with filtered air circulation.

There was beryllium contamination in a run of ductwork on top of the building. That beryllium was contained by drilling holes in the duct (under negative air pressure), and injecting foam plugs about 18" long inside the full circumference of the duct thereby sealing the beryllium inside the duct. Once the foam hardened the duct was cut through the foam plug and plastic was taped around the ends to ensure all beryllium was sealed within the ducts. The ductwork was then placed in covered roll-off containers and disposed of at an off-site landfill. Area and personnel air sampling methods were utilized to ensure asbestos and beryllium was contained. Wet methods, via fire hydrant and hoses, were used to control dust and asbestos from the floor tiles during demolition.

During the foam fire in the west Corridor "B", air samples were taken periodically for noxious and harmful products of combustion such as Hydrogen Cyanate. Before efforts to clean out the foam began temperature probes were used to assure the foam had ceased burning. All precautions were taken to ensure harmful substances did not get in the air or water and workers dressed accordingly, even utilizing supplied air packs until the full extent of the products of combustion were analyzed and understood.

C. *Demolish the 991 Cluster facilities structures, utilities and process lines to 4' below grade.*

All concrete from the 991 Cluster was removed to a minimum of 4' below final finished grade as defined by the Land Configuration Design Basis IA Grading and Drainage Concept (Appendix 1, Article 3). As discussed in Section II of this report sections of Building 991 were left in place since they would be 4' or more below final finish grade. Those sections include all of the basement level (filled with compacted dirt), approximately 60% of the main floor (southeast portion removed), the north wall of the building tapered to the east to maintain a minimum of 4' below grade, Corridor "A" and the 998 Vault (except the ceiling and part of the walls for the first 55'), all of the floor and part of the walls in Corridor "B" and Room 402, and all of Corridor "C" and Vaults 996, 997, and 999. See Appendix 5, Articles 1 through 5.

All utilities were removed to 4' below grade, except those noted in Section IX as uncontaminated utilities that were left in place and the approximate depth of those

utilities. All the Process Drains were self-contained in portable tanks that were removed with Building 991. All floor drains in 991 went into the basement, then into the sewer manholes on the northeast corner of the building; the sewer manholes were grouted and disrupted.

The sewer line from the manhole to Building 995 was grouted at both upstream manholes (197 and 198) just outside the building and at the down gradient manhole (148), and the line was left in place at just over 4' below grade.

- D. Decommissioning the 991 Cluster facilities in accordance with RFCA and applicable or relevant and appropriate requirements.*

RFCA and other relevant requirements were complied with throughout the project. Any deviations from RFCA decision documents are noted in Section VIII.

- E. Coordinate with Environmental Restoration for characterization of soil under slabs. Backfill subsurface structures with clean fill and provide for reclamation of the site by re-contouring and re-vegetation.*

Environmental Restoration took a number of samples under the floor and under the basement of Building 991. There was no radiological or chemical contamination under the slabs (Appendix 4, Article 2). All other dirt on the site was below the Tier II action level and put back in the excavations or mixed with rubble and sent to sanitary waste landfill.

The final grade was achieved with fill dirt from on-site borrow pits. Approximately 7875 cubic yards was required to attain proper grade as defined in the Land Configuration Design Basis IA Grading and Drainage Concept (Appendix 1, Article 3). Once at proper grade the entire area was re-vegetated with native grasses. Final grading and re-vegetation was completed in late April 2005.

#### **IV. Verification of Treatment Process**

Suspected Under Building Contamination (UBC), Potential Areas of Concern (PAC), and IHSS areas were all present at the 991 Cluster Closure site. During much of 2003 and early 2004, prior to demolition, extensive borings were taken in the 991 Closure Cluster site (see Appendix 4, Article 2 [3 pages]) to determine if special treatment processes would be necessary to clean radiological or chemical contamination of the area. All of the surveys from the borings indicated levels of radiological or chemical contamination were well within permissible guidelines and no treatment of the area under Building 991 or in the area around it was required.

#### **V. Radiological Analysis**

Appendix 3 of this document contains the following Pre-Demolition Survey Reports (PDSR):

- Area 2 - Group 2a Closure Project (991 West Tunnel and Buildings 985, 996, 997, 999), dated August 21, 2003
- Building 991, 991 East Tunnel and 998 Vault Closure Project, dated February 4, 2004

The other facilities in this cluster were covered under the following Type 1 Reconnaissance Level Characterization Reports (RLCR):

- Type 1 Reconnaissance Level Characterization Report (RLCR) for Building 984 Closure Project
- Type 1 Reconnaissance Level Characterization Report (RLCR) for 989, 992, & 993 Closure Project

## VI. Demolition Survey Results

Since there were no levels of radiological emissions expected from the demolition of Building 991, there was no specific Air Quality Management (AQM) Program for Performance Monitoring for Radionuclides (PM-rad) set up. There was, however, RFETS perimeter monitoring that goes on continuously at RFETS and there were monitors near 991 during demolition. No activity at or exceeding action level 1 was observed during demolition of Building 991 and no significant contribution to off-site dose resulted from this demolition.

Due to some asbestos tiles being left on the floor of Building 991 during demolition, asbestos air samplers were set up as close to the demolition work as possible to monitor for any asbestos release. Twenty samples were collected during the demolition of Building 991 and the Transition Electron Microscopy (TEM) indicated no asbestos fibers on any of the sample filters (Appendix 4, Article 1 [3 pages]).

## VII. Waste Stream Disposition

### A. Sanitary Waste Disposal

Disposal Site:	BFI Foothills, Hwy. 93
Number of shipments:	851
Type of shipment:	Rear dump trucks
Waste Volume:	17,020 cubic yards (estimated)
Waste Weight:	12,129 tons
Dates Shipped:	March 10 through May 7, 2004
Additional Information:	Concrete, rebar, metals, dirt and general rubble

### B. Asbestos Containing Material Disposal

Disposal Site:	BFI Tower Road
Number of shipments:	9
Type of shipment:	Roll-Offs
Waste Volume:	260 cubic yards (estimated)
Waste Weight:	53.9 tons
Dates Shipped:	November 10, 2003 through January 12, 2004

### C. Beryllium Contaminated Waste Disposal

Disposal Site:	BFI Tower Road
Number of shipments:	3
Type of shipment:	Roll-Offs

Waste Volume: 90 cubic yards (estimated)  
Waste Weight: 2.6 tons  
Dates Shipped: February 10 through February 11, 2004

#### D. Hazardous Waste Disposal

1. Circuit Boards

Disposal Site: Kettleman Hills Facility, CA  
Number of shipments: 1  
Type of shipment: IP-2  
Waste Volume: 4.15 cubic yards  
Waste Weight: 750 lbs. (estimated)  
Dates Shipped: Unknown – shipped with other containers from RFETS

2. Lights, Switches, etc.

Disposal Site: Kettleman Hills Facility, CA  
Number of shipments: 3  
Type of shipment: 55 gal drum  
Waste Volume: 1 cubic yards  
Waste Weight: 1,000 lbs. (estimated)  
Dates Shipped: Taken to RTU and combined with like waste

3. PCB Ballast's (TSCA)

Disposal Site: Kettleman Hills Facility, CA  
Number of shipments: 1  
Type of shipment: 55 gal drum  
Waste Volume: 0.25 cubic yards  
Waste Weight: 600 lbs.  
Dates Shipped: Taken to RTU and combined with like waste

4. Burned Foam (benzene count slightly over free-release limit)

Disposal Site: Kettleman Hills Facility, CA  
Number of shipments: 7  
Type of shipment: Roll-Offs  
Waste Volume: 150 cubic yards  
Waste Weight: 45,000 lbs. (estimated)  
Dates Shipped: July through August 2004

#### E. Low-Level Waste Disposal

Disposal Site: Nevada Test Site, Nevada  
Number of shipments: 3  
Type of shipment: IP-2's  
Waste Volume: 12.5 cubic yards  
Waste Weight: 2337 lbs. (net weight)  
Dates Shipped: Unknown – shipped with other IP-2's from RFETS

## VIII. Deviations from the Decision Document

The Decision Documents for the 991 Cluster Closure Project consisted of three Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Facility Disposition Notifications.

- Kaiser-Hill Ltr. # 03-RF-01436, Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Facility Disposition - Notification Letter for 991 Tunnel - FEG-029-03, dated September 19, 2003
- Kaiser-Hill Ltr. # 04-RF-00146, Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Facility Disposition - Notification Letter for 998 Tunnel, Corridor B, and Room 402 - FEG-007-04, dated February 3, 2004

Amended by

Kaiser-Hill Ltr. # 04-RF-00355, Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Facility Disposition-Addendum to Notification (Letter for 998 Tunnel, Corridor B, and Room 402 - FEG-011-04, dated March 23, 2004

- Kaiser-Hill Ltr. # 04-RF-00129, Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Facility Disposition - Notification, Letter for Building 991 and pre-Demolition Survey Report (PDSR) for Facility 991 - FEG-004-04, dated February 5, 2004

The only deviation from the above Notifications for Facility Disposition was with the 998 Tunnel, Corridor B, and Room 402. While those areas were originally sealed off with a foam plug and planned to be left in place in accordance with the Notification for Facility Disposition, the fire on February 12 in the west end of Corridor B (reference Section II.E.4 above) changed that disposition. As a result of the fire investigation the properties of the remaining foam plugs as installed were questionable and RFETS stopped all foaming operations until a complete analysis of proper foam techniques could be resolved. As a result there was no good way to reseal the west end of Corridor "B" and the decision was made to remove the remaining foam plugs in Corridor "B" and Room 402. That was done along with most of the structure as discussed in Section II.E.4 above.

The foam plug in Corridor "A" was left in place as the best alternative available to seal the tunnel. After a number of tests to ascertain the adequacy of the foam plug and in accordance with Contact Record titled "Agreement to leave foam plug in Corridor A, Building 991", dated March 15, 2004, (Appendix 2, Article 4) the plug was left in Corridor "A" with disposition of the tunnel as stated in the Notification for Facility Disposition.

## **IX. Description of Site at End of Decommissioning**

All above ground buildings and other structures, concrete pads, paving, roads, walkways, power lines, overhead steam lines and electrical lines have been removed. The site has been backfilled, compacted, and rough graded to elevations at least 4' below the contours shown in the Land Configuration Design Basis IA Grading and Drainage Concept (Appendix 1, Article 3). The final grading of the site was with fill dirt to elevations as shown in the Land Configuration Design Basis IA Grading and Drainage Concept. Fill came from approved borrow areas on site. The entire area was seeded, including where the sidewalks were removed to 10th Street, with natural grasses and vegetation.

Some of the original Building 991 structure remains underground as described in Sections II.E.4 and III.C. Generally, that includes the basement level, approximately 60% of the main floor (southeast portion removed), and the north wall of the building tapered to the east to maintain a minimum of 4' below grade. Also remaining in place is Corridor "A" and the 998 Vault (except the ceiling and part of the walls for the first 55'), all of the floor and part of the walls in Corridor "B" and Room 402, and all of Corridor "C" and Vaults 996, 997, and 999 (see Appendix 5, Articles 1 through 5).

As a follow up to the 991 Facility Disposition RSOP Notification dated October 9, 2003 a recommendation was made under the final disposition proposal for the west tunnel. Modeling was performed for the east and west tunnels at 991. No recommendations were required for the east tunnel based on the modeling results. However, the west tunnel could potentially incur groundwater problems if engineering controls were not implemented. The final land configuration at the west tunnel installed a french drain on the north side of the west tunnel. The french drain was excavated April 12 and 13<sup>th</sup> along the north side of room 997. The dimensions were approximately 60' long x 3' wide and 2.5' deep. The french drain was approximately 4' - 4.5' below the roof surface of room 997. Filter fabric was laid down in the bottom of the french drain and filter rock (3/4" - 1-1/2") was placed on the fabric. The fabric was wrapped over the top of the rock and later backfilled.

Utility lines remaining underground include:

- 991 Building basement floor drains that were all left in place with the basement; however the lines all tie into the basement sump. The sump was filled with dirt.
- 10", 6", 3", and 2" water lines, 4" and 8" sewage lines, and 2" natural gas lines (see Appendix 5, Article 6).

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2004 FEB 16 PM 2:08

STATE OF COLORADO

Bill Owens, Governor  
Douglas H. Benerente, Executive Director

CORRESPONDENCE  
CONTROL

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.  
Denver, Colorado 80246-1530  
Phone (303) 692-2000  
TDD Line (303) 691-7700  
Located in Glendale, Colorado

Laboratory and Radiation Services Division  
8100 Lowry Blvd.  
Denver, Colorado 80230-6928  
(303) 692-3090

<http://www.cdphe.state.co.us>



Colorado Department  
of Public Health  
and Environment

February 12, 2004

Mr. Joe Legare  
Assistant Manager for Environment and Stewardship  
U.S. Department of Energy, Rocky Flats Field Office  
10808 Highway 93, Unit A  
Golden, CO 80403-8200

RE: Pre-Demolition Survey Report (PDSR) and Facility Disposition RSOP Notification for Building 991 - Approval

Dear Mr. Legare:

The Colorado Department of Public Health and Environment, Hazardous Materials and Waste Management Division has reviewed the PDSR for Building 991, 991 East Tunnel and 998 Vault Closure Project, Revision 0 dated February 4, 2004, and the Notification of intent to utilize the Facility Disposition RSOP for demolition of B991. Based on the information contained in this PDSR (and as modified on February 12, 2004), we are hereby approving the PDSR for Building 991, 991 East Tunnel and 998 Vault.

We also agree that B991 may be demolished utilizing the Facility Disposition RSOP, even though asbestos containing tile and mastic remain on the floor/slab of B991. This deviation from the RSOP requirement to remove all ACM in this specific case has been agreed upon based on the tile and mastic being uncontaminated, the asbestos being non-friable in the tile and mastic, the limited amount of asbestos containing tile and mastic to remain, utilizing appropriate demolition and debris removal techniques to prevent the asbestos from becoming friable/airborne, placing at least three feet of soil over the remaining non-friable ACM, and placing restrictions on future excavation or construction for this site. In addition, it should be recognized that all areas with ACM remaining (as well as void space and all remaining infrastructure) must be identified and notated in the Closeout Report, as well as on future stewardship maps that may be generated.

If you have any questions regarding this correspondence please contact me at (303) 692-3367 or David Kruckek at (303) 692-3328.

Sincerely,

Steven H. Gunderson  
RFCA Project Coordinator

cc: Gary Morgan, DOE  
Mark Aguilar, EPA  
Duane Parsons, KH  
Administrative Records Building T130G

Karen Wiemelt, KH  
Dave Shelton, KH  
Steve Nesta, KH

5400

CORRES. CONTROL  
OUTGOING LTR. NO.

ORDER # 4700.1

**03-RF-01344**



DIST.	LTR	ENC
DIETER, T.		
ERRERA, D.W.		
ERRI, M.S.		
INDSAY, D.		
YLE, J.		
MARTINEZ, L.A.		
PARKER, A.		
POWERS, K.		
SHELTON, D.C.		
SPEARS, M.S.		
PRICE, K.D.		
TUOR, N. R.		

September 5, 2003

03-RF-01344

AGUILAR, P.		
ALBIN, C.		
WUBLE, M.		
JEAN, C.		
BUTLER, J. L.		
DECK, C.		
FRANCIS, M.	X	X
REIBOTH, C.		
SEIS, A.		
GIBBS, F.	X	
HUMSTON, T.		
GNAPP, S.		
INSINIGLER, H.		
MYERS, K.		
NESTA, S.	X	X
FR, R.		
K.		
ERT, R.		
ROSE, A.		
RICHARDELLA, R.		
ROSENMAN, A.	X	X
SNYDER, D.P.		
THOMPSON, J.		
WEMMELT, K.	X	X

Joe Legare  
Assistant Manager for  
Environment and Stewardship  
DOE, RFFO

RSOP FOR COMPONENT REMOVAL, SIZE REDUCTION, AND DECONTAMINATION  
ACTIVITIES NOTIFICATION LETTER FOR BUILDINGS 991 AND 998, AND RCRA  
CLOSURE FOR UNITS 991.1 (B991) AND 984.1 (B984) – FEG-026-03

Attached is a draft transmittal letter to the Colorado Department of Public Health and  
Environment for the RSOP notification for Buildings 991 and 998 component removal, size  
reduction, and decontamination, and the Closure Description Document (CDD) for RCRA units  
991.1 and 984.1. The draft transmittal letter has been prepared from DOE building point of  
contact to CDPHE building point of contact; however, it could also be addressed from DOE  
RFCA coordinator to CDPHE RFCA coordinator.

Please contact Steve Nesta x6386 with questions or concerns.

*Frank E. Gibbs*  
Frank E. Gibbs  
Deputy Project Manager  
Remediation, Industrial D&D, and Site Services

CORRES. CONTROL	X	X
ADMIN RECD/T130G	X	X
TRAFFIC		
FATS/130		

Attachment:  
As Stated

CLASSIFICATION:	
UNCLASSIFIED	
CONFIDENTIAL	
SECRET	

MF:pvt

AUTHORIZED CLASSIFIER  
SIGNATURE  
DOCUMENT CLASSIFICATION  
REVIEW WAIVER PER  
DATE CLASSIFIED  
CLASSIFICATION OFFICE  
IN REPLY TO RFP CC NO.

Orig. and 1 cc – Joe Legare  
cc: Steve Tower

ACTION ITEM STATUS:  
 PARTIAL/OPEN  
 CLOSED  
LTR APPROVALS:

& TYPIST INITIALS:  
MF:pvt

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23/03

	A	B	C	D	E	F	G	H	I	J
	Unit No.	Building	Unit Description	Regulatory Status	Closure Status	Closure Date	Closure Document Approval	SET	Closure document submittal	CDPHE approval
168	90.125	991	Container Storage, Rm. 153 (149 Hall)	WITHDRAWN - Never used for haz. waste	WITHDRAWN 10/26/94 (ref. 94-DOE-10453).	NA	NA		NA	NA
169	90.126	991	Container Storage, Rm. 150							
170	90.127	991	Container Storage, Rm. 998							
171	90.128	991	Container Storage, 996 Vault							
592	991.1	991	A Container Storage, Rooms specified per Permit Mod 01-09 and as corrected 3/26/02: Rooms 101, 105, 106, 107, 1-B, 110, 110 A&B, 111, 111A, 112, 113, 114, 115, 116, 118, 119, 120, 122, 122A, 122B, 123, 124, 127, 128, 129, 132, 134, 135, 136, 137, 138, 140, 140A, 141, 142, 142A, 142B, 143, 147, 147A, 148, 149, 150, 151, 153, 155, 156, 157, 158, 166, 167, 170; B998: Room 300 and corridor	PERMITTED - CLOSED per a RFCA decision document	CLOSE. COR submitted 6/23/05. Notification to close the unit under the RSOP for Component Removal, Size Reduction, and Decontamination Operating Protocol sent to CDPHE on 10/06/03 (03-DOE-01381). RCRA Stable and transferred to RISS per email from Karen Lavorato to Steve Nesta on 09/09/03.	COR 6/23/05	991 and 998 RSOP and CDD submitted on 10/6/03		COR 6/23/05	PDSR 2/12/04 RSOP 10/17/03 states 984.1 and 991.1 are closed