Revision 6/98

CORRES. CONTROL
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DOE ORDER #

98 - RF - 05102

DIST.	LTR	ENC
BACON, R.F.		
BENSUSSEN, S.J.		
BORMOLINI, A.M.		
BOYTER, N.C.		
BRAILSFORD, M.D		
BRYNER, C.J.		
BURDGE, L.		
CARD, R.G.		
COSGROVE, M.M.		
CRAWFORD, A.C.		
FERRERA, D.W.		
FULTON, J.C.		
HARDING, W.A.		
MARTINEZ, L.A.		
PARKER, A.	X	
POLSTON, S.		
SHELTON, D.C.	X	
TUOR, N.R.		
Hickman, M.	X	
Whiting, J.	X	
COR. CONTROL	X	X
ADMN. RECORD	X	X
TRAFFIC		
PATS/T130G		

CLASSIFICATION:		
UCNI		
UNCLASSIIFIED	✓	✓
CONFIDENTIAL		
SECRET		

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10/14/98

Date

IN REPLY TO RFP CC NO:

ACTION ITEM STATUS

☐ PARTIAL/OPEN

☐ CLOSED

LTR APPROVALS:

ORIG & TYPIST INITIALS
JWW:cah

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COMPANY

98-RF-05102

October 12, 1998

Henry F. Dalton
Asst. Manager Material Stabilization & Disposition
DOE, RFFO

TRANSMITTAL OF THE MODIFICATION TO THE BUILDING 779 DECOMMISSIONING OPERATIONS PLAN (DOP) FOR THE DEMOLITION OF BUILDING 729 – BWM-028-98

Attached are four copies of the Minor Modification Addendum to the Building 779 Cluster DOP, for demolition of Building 729. The modification incorporates comments from Rocky Flats Field Office (RFFO) as discussed and dispositioned on October 8, 1998. Upon review and concurrence by RFFO, the Minor Modification should be transmitted to the Colorado Department of Public Health and Environment (CDHHE) for approval.

Notification of submittal of the document to CDPHE for approval would be appreciated. If you have any questions regarding this subject, please call myself at extension 3432, or John Whiting at extension 7592.

Brian W. Mathis
Division Manager
D & D Projects

JWW:cah

Original and 1 cc - Henry F. Dalton

Attachments:
As Stated

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ADMIN RECORD

IA-B779-A-00071

Safe Sites of Colorado & Rocky Mountain Remediation Services

779 Closure Project

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE (RFETS)

MODIFICATION TO THE 779 CLUSTER DECOMMISSIONING OPERATIONS PLAN

FOR DEMOLITION OF BUILDING 729

October 1998

Table of Contents

1. PURPOSE

The purpose of this document is to describe the activities necessary to safely demolish Building 729. This document will be submitted as a minor modification to the 779 Cluster Decommissioning Operations Plan (DOP).

2. INTRODUCTION

The anticipated condition of Building 729 prior to demolition is as follows:

- The building will be isolated from all Site utilities.
- The final closeout radiation survey of Building 729 has been completed and reviewed by DOE and the Lead Regulatory Authority (LRA) in accordance with the 779 Cluster DOP. The closeout radiation survey demonstrates that the Building 729 structure (interior and exterior) meets radiological free-release criteria.
- The following systems have been removed from the building:
  - Zone I (Glovebox) ventilation, Zone II (Building) ventilation,
  - House vacuum,
  - Process piping,
  - Electrical distribution (B729),
  - Alarm systems, Filter plenums,
  - Control room,
  - Emergency diesel and support systems, and
  - Contaminated surfaces are decontaminated and removed.
- All asbestos containing material has been removed from the facility.
- The building has been fully characterized and does not contain any hazardous substances. Analysis of the paint for RCRA metals was performed using Toxicity Characteristic Leaching Procedure (TCLP). No RCRA metals were detected above the Land Disposal Regulation (LDR) thresholds.
- All below grade openings have been plugged, capped, blind flanged or covered with an appropriate protective covering.

The scope of the demolition activities covers the disassembly of the Building 729 structure to the slab, segregation of building materials and relocation of those segregated materials for recycling, re-use or off-site disposal.

The project will not disturb any soil around the building, except in an incidental manner, e.g., impressions from heavy material or equipment resting on and compressing the soil. Common types of mechanical demolition methods and equipment will be used. Some of these are identified and described in Appendix A; however, the demolition will be performed and exact methods determined by an experienced and qualified demolition contractor.

Although Building 729 will be demonstrated to be free releasable, air samples will be taken to supplement the RFETS boundary monitoring system. In addition, qualified radiation control technicians will be available to do random checks of the demolition debris, as directed by the Project's Radiological Engineer.

After demolition is complete, only the concrete floor slab that has concrete curbs and equipment pedestals protruding above the slab, will remain at the Building 729 site. The soil and all other below grade structures will be assessed as necessary for below-grade contamination at a later time.

3. BUILDING 729 DESCRIPTION

Building 729 was built in 1971 to house the four-stage exhaust filtration system for the gloveboxes and the two-stage filter plenum for room ventilation air from the glovebox laboratories in Building 779, Annex B. The heating, ventilation, and air conditioning (HVAC) system for Building 779-B is separate and can be operated independently from the HVAC system that supports the Building 779 proper and Annex A. Building 729 is one of two filter plenum buildings supporting Building 779 and is rectangular in shape. It is 72 feet long by 38 feet wide by 16-1/2 feet high. It is located south of Building 779 and is connected to it via a second story duct bridge. The duct bridge is 38 feet long by 6 feet 8 inches wide by 7 feet 4 inches high.

Building 729 includes a small penthouse that is the terminus of the HVAC duct bridge. Also included in the building is a 150 kW emergency diesel generator used to maintain power to critical equipment within Building 729 in the event of a power failure.

4. BUILDING DEMOLITION

A qualified and experienced demolition contractor shall perform the work in accordance with industry practices. The primary demolition steps and mechanical techniques recommended for dismantling and segmenting the building are provided below. Protection of the existing utilities and installation of safety nets will be accomplished at appropriate steps. Additional demolition technologies are provided in Appendix A, any of which may be used in the appropriate situation.

4.1 Remove Stack

Lift points will be identified and lifting devices will be attached to the stack as required. The stack is expected to be lifted as a single unit and placed on the ground. The stack will be parted at the flange midpoint and will be laid down in two sections. A crane will be used to lift the stack. Because of the proximity to occupied buildings and active aboveground utilities in the vicinity, lifting of the stack and all other lifts associated with the demolition will be considered critical lifts, so Critical Lift Plans will be prepared. Because of limited space, a portion of the fence just south of Building 729 may be removed to assemble the crane boom. The crane will be set up and the stack removed outside of normal workhours.

4.2 Roofing Materials

The layer of gravel, the silicone rubber roofing, and 2 inches of foamed-in-place urethane comprising the roof will be removed either prior to demolition or after the building is demolished. The roofing material may be segregated from the demolition debris, if necessary, prior to transport offsite.

4.3 Demolition

The expected demolition sequence is as follows:

- The bridge walkway is shored up from the road below the bridge.
- Scaffolding will be built to provide access to the sides of the bridge.
- The bridge roof will be cut loose and rigged away from the area using a crane.
- The bridge walls will be dismantled using manual techniques.
- The bridge walkway will then be cut loose and rigged away from the building using a crane.
- A caterpillar with LaBonty shears (or equivalent equipment) will be used to demolish the rest of the facility. The building will be dismantled starting from the east side of the building, working west. The walls will be knocked in until the east side of the roof is on the ground. The roof will be cut up and pulled to the east for material size reduction, separation, and removal. The remaining structure will be knocked in from the east and south sides.

4.4 Demobilization

During demobilization, power generators, if any, and the trailer will be disconnected and moved off site. The utility protection structure will be removed. The cordoning will be removed and any remaining demolition debris will be removed. The lock out/tag outs will be removed and all mobile equipment will be moved off site. The foundation will be barricaded to minimize foot traffic and potential tripping hazards will be properly identified.

5. WORK CONTROL AND AUTHORIZATION

Work control and authorization will be managed using the organization identified in Section 2.0 of the 779 Decommissioning Operations Plan (DOP).

Demolition activities will comply with the 779 Cluster DOP and with RFETS site-specific procedures. The RFETS Integrated Work Control Program (IWCP) incorporates the requirements to include Integrated Safety Management (ISM) principles in accomplishing demolition activities. The ISM principles ensure workers involvement in the planning, hazard identifications and implementation of the demolition activities. The IWCP review process evaluates the activity for worker safety, hazards identification, mitigation measures and compliance with Building 779 Cluster authorization basis documents.

Project personnel have the authority to stop work if an unsafe condition is observed. Restart authority for any work stoppage, for any reason, lies within the Project Work Authorization Team (WAT) Manager.

Security requirements for this project are identified in the Special Security Plan W 97-016, Rev. 2, for the Building 779 Cluster, dated February 27, 1998. A security island has been established within the PA that allows free access to people within the 779 Cluster security island fence (Isolation Area). Escorts are required to transport uncleared personnel from Portal 1 to the Isolation Area around the 779 Cluster. Project activities involving movement of equipment and material into and out of the 779 Cluster will have appropriate security measures incorporated into their work plans.

6. ENVIRONMENTAL, HEALTH AND SAFETY CONTROLS

6.1 Environmental Protection

The Subcontractor will minimize environmental impacts resulting from demolition through the use of procedures designed to prevent uncontrolled releases of waste, control water run-on and run-off, and minimize fugitive dust emissions. All wastes generated during demolition will be characterized and packaged in compliance with project-specific ARARs (779 Cluster DOP Section 9.3), relevant RFETS Waste Management Procedures (RFETS procedures reflect applicable DOE requirements), and applicable Waste Acceptance Criteria (WAC).

Fugitive dust emissions will be controlled using standard dust suppression methodologies, e.g., a controlled water fog using minimal amounts of water. Concrete and brick walls will be demolished using one of the standard demolition activities (see Appendix A). Building debris will be separated and managed to control fugitive dust emissions.

The existing Site Radioactive Ambient Air Monitoring Program (RAAMP) sampler network will be used for ambient air monitoring during demolition. The RAAMP sampler network continuously monitors airborne dispersion of radioactive materials from the Site into the surrounding environment. The existing monitoring will be supplemented by more frequent sampling using five existing fixed samplers in the immediate vicinity of and surrounding Building 729.

The Building 729 Demolition Project Air Monitoring Plan identifies the enhanced monitoring samplers, defines the action levels, and lays out the filter collection and analysis protocol. These five samplers will be collected and analyzed weekly. The alpha/beta screening results from these samplers will be compared on a weekly basis to two pre-defined concentration levels: the 0.1 mrem, Level 1, and 5.0 mrem, Level 2, values. Level 1 data is used as an initial screen to ensure that radionuclide emissions from the project are not higher than expected while Level 2 data is used to ensure that the Site 10 mrem per year regulatory standard is not exceeded.

The Building 729 Demolition Project is not expected to warrant radionuclide air monitoring beyond the enhanced ambient air sampling described above. This determination will be based on The Close-Out Radiological Survey Plan for Building 729. The Close-Out Radiological Survey Plan for Building 729 defines the methods used to verify that radioactive contamination in Building 729 meets unrestricted release criteria levels. If portions of Building 729 do not meet the unrestricted release criteria, the area will be decontaminated or removed in accordance with the DOP prior to demolition.

The use of water collection equipment is not expected to be necessary. Stormwater-related run-off will be controlled through the use of standard construction industry accepted Best Management Practices such as silt fencing and hay bales.

Periodic inspections of the demolition equipment will be performed to verify that equipment fluid leaks are detected as early as possible. This inspection practice will assure that there are no significant equipment fluid spills for the duration of the project.

6.2 Health and Safety

Health and Safety practices are identified in a project specific Heath and Safety Plans (HASP). The HASP defines mechanisms and procedures to identify, mitigate, and control/eliminate potential safety, health and environmental hazards associated with the demolition of Building 729. Activity Hazard Analyses (AHAs) or Job Hazard Analyses (JHAs) address specific hazards associated with the demolition activities.

No tasks (excluding walkdowns, general work tasks, surveillance, inspections, and other tasks specified by the Project Health and Safety Manager) will be performed until an AHA/JHA has been written and approved. The AHA/JHA is task specific and addresses the hazards for each task step, controls to be used, special equipment needs, training, and any necessary monitoring.

The Project Health and Safety Manager, together with radiological personnel will assess the need for employee personnel and area monitoring. Such monitoring may include noise, heat stress, chemical, and radiological hazards.

Known Hazards: Anticipated hazards associated with this project are physical hazards (e.g., noise, muscles strains, cuts/abrasions, electrical shock, slips/trips, use of heavy equipment, dropped loads, and falls from elevated surfaces). These anticipated hazards are associated working with portable hand tools, working at heights, and using heavy machinery. The HASP and associated AHA/JHAs address methods to control these hazards.

Lead paint has been used on the interior surfaces of Building 729. Analysis of the paint for RCRA metals was performed using TCLP. No RCRA metals were detected above the LDR thresholds. During demolition, these painted surfaces are kept wet to prevent fugitive dust releases and precautions are taken to control and contain the run-off of excess water through the use of earthen dams and hay bales.

Work activities will be stopped if any unanticipated hazard is discovered or a known or potential hazard is present at a level exceeding established control limits. Appropriate notifications and mitigation of the hazard encountered will be pursued.

The requirements for the following plans will be incorporated into the HASP or issued as separate documents.

- Lead Compliance Plan
- Fall Protection Plan
- SHP
- Critical Lift Plan
- Preliminary Hazard Analysis

6.3 Completion Report

At the end of the Building 729 Demolition Project, a Project Completion Report will be prepared. This report will include a listing of wastes removed from Building 729 and characterization data that contributed to the final forms and volumes of wastes generated during demolition of the building.

APPENDIX A
ADDITIONAL DEMOLITION TECHNOLOGIES

1. DIAMOND WIRE CUTTING

Description of Technique

Diamond wire cutting, which has been adapted from techniques used in the stone quarries of Europe, involves a series of guide pulleys that draw a continuous loop of multi-strand wire strung with a series of diamond beads and spacers through a cut. The length of wire required for a cut is obtained by assembling standard length sections of wire end-to-end using screwed sleeves. A contact tension is kept on the wire. This force, in combination with the spinning wire, cuts a path through concrete and reinforcing rods. A typical drive unit has a ~ 31-inch drive pulley with a ~ 47-inch travel. Linear wire speed is adjustable for 0-5,900 ft/min, and wire tension can be adjusted from 1 to 330 lbs. The wire is wrapped around the object to be cut and tension is applied. If an internal cut is required (e.g., doorway), core drilling is necessary, and the wire is fed through the holes. Almost any thickness can be cut with this technique. Figure 10.10 is a photograph of a diamond wire saw in operation.

One of the major benefits of the wire saw is the flexibility of its pulley system, which allows it to cut unusual configurations. This flexibility also allows easy and safe cutting difficult access areas without moving obstructions. The wire saw also lends itself to remote cutting in hazardous, radioactive, or underwater environments. Moreover, little noise and vibration is created, so the structural integrity of the surrounding structure is not affected. Water is used not only for cooling and lubricating purposes, but also for removing sward from the kerf. This water can be treated and recycled, and the swarf, if contaminated, must be properly disposed of.

Potential concerns associated with wire saws include physical hazards caused by mechanical failure or contaminant transport. For example, a wire that breaks while it is being sued can inflict injury upon the operator. It is just as important; however, that the same vigilance with which the project manager ensures that the saw and drive unit is carefully maintained be extended to potential problems associated with contaminant transport. Contaminated swarf can be carried from the cutting area by the wire, contaminating the wire saw itself, the areas along the path of the wire, and the area where the drive unit is located.

Applications

Although a diamond wire system can cut any material, in decommissioning projects it is usually used to cut thick, reinforced concrete slabs or walls, such as the biological shield in a nuclear facility. For example, a diamond wire cutting system was used during the decommissioning of the PPA to efficiently utilize the volume of the shipping containers. Although the floor of the accelerator reached a depth of 33 inches, it was successfully and precisely cut. In the conversion of Zimmer Nuclear Power Plant to a coal-burning point, a diamond wire cutting systems was used to cut openings in thick, reinforced concrete wall that had many obstructions and embedded pipes and conduits. More than 60 blocks of concrete were cut and removed, some as large as 22' long by 5' wide and 6' thick and weighing 40 tons. The job took 3 months, and as many as five wire saws were used simultaneously.

Diamond wire saws have been used to cut heat exchanger tube bundles at many nuclear facilities, including a component cooling heat exchanger bundle at Sequoyah Nuclear Station in 1989, a preheater bundle at Millstone Nuclear Station in 1990, and a condenser tube bundle at the Indian Point Nuclear Unit 2 in 1991.

An example of how these saws might be used in this application is provided by activities at the Studsvik Nuclear Station in 1989, where a preheater with a bundle diameter of 2.5 m was cut using a wire saw. The first step was to cut the shell with a heavy travel cutter to expose the tube bundle. Once the shell was cut, a portable wire saw was bolted to a support plate; and idler wheels were positioned about the bundle, which contained approximately 4,000 2-cm in diameter, 304L stainless steel tubes and a 12-cm carbon steel center pipe. The approximate cutting time was 17 hours, with a linear wire speed of less than 24 m/s.

2. WRECKING BALL OR WRECKING SLAB

Description of Technique

The wrecking ball is typically used for demolishing nonreinforced or lightly reinforced concrete structures less than 3-ft thick. The equipment consists of a 2-5 ton ball or flat slab suspended from a crane boom. The ball may be used with either of two techniques. The preferred method is to raise the ball with a crane 10-20 feet above the structure and release the cable brake, allowing the ball to drop onto the target surface. In this instance, the maximum height of the structure is limited to about 100 feet. This method achieves good fragmentation of the structure and maintains maximum control of the ball after impact. The second method is to swing the ball into the structure using a suck line for recovery after impact. In this instance, the maximum height of the structure is limited to about 500 feet because of the instability of the crane during the swing and after impact. The second method is not recommended because the target is more difficult to hit, and because the ball could easily ricochet off the target. If the ball ricochets, it could damage not only the surrounding structures but also the crane boom itself because it would be forced to bear side loads. The flat slab can only be used in the vertical drop mode, but it offers the advantage of being able to shear through steel reinforcing rods as well as concrete.

Applications

The wrecking ball or slab is recommended for nonradioactive concrete structures less than 3-feet thick. Controlling the release of dust during demolition would be virtually impossible because of the access needed for the crane to drop or swing the slab or ball. The containment (or confinement) barrier would have to be breached to allow for access, and no method is available to filter the dust-laden air after impact. For nonradioactive structures; however, the wrecking ball is an effective method and provides good fragmentation that readily exposes reinforcing rods.

A wrecking ball used successfully in dismantling the Elk River Reactor containment building but was not successful at the Shippingport and PPA decommissioning projects because the concrete was 4 feet or more in thickness and heavily reinforced. A wrecking ball is not recommended for heavily reinforced concrete.

Typical concrete removal rates with a wrecking ball are shown in the Table below, exclusive of loading or disposal.

CONCRETE TYPE	Removal Rate (yd^3/day
Lightly reinforced standard concrete	40
Nonreinforced standard concrete	50
Concrete block structures	60

3. CABLE-SUSPENDED AND EXCAVATOR-MOUNTED ATTACHMENTS FOR CONTROLLED DEMOLITION

Description of Technique

Controlled demolition refers to the use of various attachments mounted on an excavator or suspended by cable to disassemble a structure. Basic attachments, which operate off a hydraulic system, include such items as concrete pulverizers, shears, grapples and rams. These attachments perform the following functions:

- Pulverizer: crushes concrete and separates rebar and encased steel beams;
- Shears: sever concrete, metals, structural steel, wood, rubber, and plastic;
- Grapple: serves as an all-purpose tool for demolition and materials handling; and
- Rams: demolish concrete structures (approximately 6-feet thick) using a moil or chisel point.

In addition, a family of interchangeable jaws (concrete pulverizer jaws, shear jaws, and concrete-cracking jaws) is marketed. This line of equipment improves processing, reduces costs, and increases versatility. The attachments can be changed in 20 minutes to 1 hour, depending upon the size of the attachment. Figure 10.25 shows a concrete-cracking jaw in operation as well as a photo and a schematic of the interchangeable jaws. Specially designed attachments that can be suspended by cable in order to take advantage of the long reach of a crane are also available.

Applications

Cable-suspended or excavator-mounted attachments are recommended for a wide variety of demolition projects. This technique may not be suitable for contaminated concrete given the difficulty in controlling airborne contamination, although spraying water before and during breaking activities may be helpful.

Concrete pulverizer jaws are capable of separating rebar and embedded steel beams from concrete.

Two types of mobile shears are available—plate shears for clean-cutting steel plate up to 1-1/4 -inch thick and wood shears for cutting and processing oversized wood products. The plate shears are more applicable to decommissioning and can be used to dismantle above and below-ground tanks and to cut separated rebar and concrete.

Grapples are versatile and provide for a wide range of uses, such as demolition, scrap recycling, land clearing, and materials handling (e.g., loading rebar, crushed concrete). They can also loosen large concrete slabs from roadbeds. Grapples can be used as an alternative to loaders and buckets as tools for demolition cleanup.

Rams (air powered or hydraulic) are usually mounted on a backhoe because they cannot be suspended by cable. The ram is a resistance-driven tool in that it begins operating as soon as the chisel point touches the workpiece and stops as soon as the chisel is lifted or has cleared the workpiece. Figure 10.26 shoes the hydraulic ram used at Shippingport.

Air-powered rams can be used for lightly reinforced concrete that is less than 2 feet thick. Hydraulic rams can be used for demolition of much larger sections of concrete (up to 6 feet thick) and are available with heads capable of delivering 7,000-10,000 ft/LB of energy per blow. Operating costs for the ram can be high because it takes so much abuse during the course of a demolition project. Whether or not the workpiece is contaminated, air-powered rams need to be modified so that air is directed away from the work area.

A concrete pulverizing jaw was suspended by cable from a 330-foot crane to demolish three smokestacks from a former steam0-generating plant in Winnipeg. The unit was fitted with custom-stabilizing legs to provide safe, controlled demolt8ion. The jaws were placed over the rim of each stack and then proceeded down. The crew consisted of five people, and the actual working time was approximately 30 days (not including time lost because of high winds). It should be noted that operators might not be able to control the machine with cable-suspended attachments and a long boom length in wind.

During the decommissioning of Shippingport, a 10,000 ft/LB, hydraulically operated, backhoe-mounted ram was used with good success to demolish heavily reinforced concrete walls.

While the backhoe was out of service, attempts were made to use a wrecking ball to achieve the same results. However, results were not satisfactory and use of the wrecking ball was discontinued.