ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE

RFCA Standard Operating Protocol for Recycling Concrete

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Acronyms

ACM	asbestos containing material
AHA	activity hazard analysis
APEN	Air Pollutant Emissions Notice
ASTM	American Society of Testing and Materials
ARAR	Applicable or Relevant and Appropriate Requirements
CAQCC	Colorado Air Quality Control Commission
CCR	Colorado Code of Regulations
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
dB	decibels
D&D	decontamination and decommissioning
DOE	United States Department of Energy
dpm	disintegrations per minute
DQO	data quality objectives
EPA	United States Environmental Protection Agency
FOPS	falling object protection system
HASP	Health and Safety Plan
IMP	Integrated Monitoring Plan
IWCP	Integrated Work Control Program
L	liter
LRA	Lead Regulatory Agency
NEPA	National Environmental Policy Act
PA	Protected Area
PCB	polychlorinated biphenyls
PM	particulate matter
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
ROPS	roll over protection system
RSOP	RFCA Standard Operating Protocol
SHPO	State Historical Preservation Office
SWPPP	Surface Water Pollution Prevention Plan
TPY	tons per year
TSP	total suspended particulate
TWA	time weighted average
VMT	vehicle miles traveled

EXECUTIVE SUMMARY

A Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) is an approved protocol that applies to a routine decommissioning and environmental restoration activity regulated under RFCA An RSOP can be used in lieu of preparing a project-specific decision document for repetitive, routine activities An RSOP must be approved only once, although it may be used on several projects However, DOE must notify the Lead Regulatory Agency (LRA) that the RSOP will be used on a specific project Since decommissioning activities are often similar in nature, RSOPs are an effective way to document work processes while minimizing paperwork at the project level

Recycling concrete is a common commercial practice The U S Department of Transportation has established guidelines for the use of recycled/reclaimed concrete The guidelines address the reuse of reclaimed concrete for granular base material, aggregate for concrete or asphalt pavement, and embankment and fill material These guidelines indicate that 11 states accept and include the use of reclaimed concrete by conventional aggregate specifications The predominant use of recycled concrete is as aggregate for new concrete or asphalt, however, the use of recycled concrete as backfill is a common and standard practice

Once a building at RFETS has been designated for decommissioning, a process of characterization, dismantlement, decontamination, and disposition will take place The demolition of a building will result in several by-products including concrete rubble After decommissioning and environmental restoration activities are completed, backfill will be required Concrete rubble that meets free release criteria can be used as backfill onsite, if it is properly processed

Characterization activities will be conducted throughout decommissioning activities in accordance with *The RFETS Decontamination & Decommissioning Characterization Protocol* Each decommissioning project will prepare characterization reports that will be used to determine if the concrete meets the free release criteria These reports will detail the sampling methodology, frequency, and data quality objectives and will be concurred to by the LRA The sample results will be verified and validated under a quality assurance program to determine the quality of the data set and documented in the project-specific characterization reports In addition, independent verification of the characterization data will be conducted on the facilities where appropriate Although characterization activities are mentioned throughout the RSOP, the scope of the RSOP does not include characterization activities This RSOP assumes the characterization is complete and adequately documented at the project level

Once concrete has been identified as meeting the free release criteria, it can be handled in accordance with the RSOP The rubble will be stockpiled in the following three locations 207C and 910/INFWTN Areas within the Protected Area (PA) and adjacent to Building 444 outside of the PA The rubble will be stockpiled until backfill is required The stockpile areas will have dust and surface water control measures to prevent fugitive dust and impacts to surface water from the stockpiling activities

The concrete rubble will be processed into suitable backfill material using a crusher In general, the resulting backfill will contain fragments ranging in size from 6 inches to less than 0 1 inches The backfill is proposed for use in the basement areas under Buildings 771 and 371/374, however, the backfill can be used at any location that meets the selection criteria and where backfill is needed The areas proposed for backfilling will be assessed to ensure the necessary remediation has been completed, and data verifying restoration activities has been assessed and preliminarily approved The processing and backfill transportation activities will prevent fugitive dust emissions through appropriate controls All backfilling efforts will be designed to ensure the lifetime slump is less than one percent Figure 1 shows the proposed locations of the stockpiling and backfilling

Recycling concrete rubble onsite instead of landfilling the concrete and purchasing backfill will save natural and funding resources Concrete recycling is consistent with the long-term remedial objectives of leaving Rocky Flats Environmental Technology Site (RFETS or Site) in a condition that is protective of human health and the environment and allows future land uses consistent with the Rocky Flats Vision Recycling concrete will

- Reduce offsite transportation by 19,000 roundtrips,
- Reduce the safety hazards associated with highway transportation and excess material handling,
- Reduce offsite transportation miles by 1,114,000,
- Provide a beneficial use of a product instead of taking up valuable space in a landfill, and
- Reduce the natural resources expended by reducing the quantities of offsite backfill that will be required

Figure 1 Proposed Stockpiling and Backfill Locations

1. INTRODUCTION

The U S Department of Energy (DOE) estimates approximately 174,000 cubic yards (135,000 cubic meters) of fill material will be required to contour the land after decommissioning activities are completed at the RFETS DOE estimates approximately 130,000 cubic yards (100,000 cubic meters) of free release building rubble, i e , concrete, may be available as onsite fill material By recycling the concrete fill material, the potential environmental impacts and cost of removing this material offsite as a waste will be eliminated, and the potential environmental impacts and cost of bringing similar material onsite to be used as fill material will be reduced The use of existing, onsite, free release building rubble as fill material is consistent with the long-term remedial objectives of leaving RFETS in a condition that is protective of human health and the environment and allows future land uses consistent with the Rocky Flats Vision

This RSOP only addresses concrete that meets the free release criteria and its disposition after demolition and placement as backfill The methods of building disposition and restoration of the area beneath the building will be addressed in separate decision documentation

The RFETS specific requirements and methods of facility characterization are addressed in *The RFETS Decontamination & Decommissioning Characterization Protocol* The results of this characterization, which provides the results necessary to confirm the rubble meets the free release criteria, will be documented in a *Reconnaissance Level Characterization Report* and *Pre-Demolition Survey Report*, both will be concurred to by the LRA The data may indicate that only certain portions of the building meet free release criteria The process to segregate the rubble meeting free release criteria from rubble that does not meet free release criteria will be described in a project document Free released rubble will be handled in accordance with this RSOP

Recycling concrete will reduce demolition waste quantities and preserve natural resources by reducing the required quantities of imported backfill Recycling concrete will eliminate offsite concrete disposal costs, reduce offsite backfill quantities, reduce transportation costs of both concrete and backfill, and recover scrap steel for recycling By reducing the handling and transportation activities associated with concrete disposal and importing backfill, the safety hazards associated with additional handling and offsite transportation will be decreased

2. TECHNICAL APPROACH

Structural concrete is present in over 100 buildings on RFETS The concrete is in several forms, including massive slabs associated with plutonium buildings, massive slabs, thin slabs, and cinder blocks from process buildings, and thin slabs and cinder blocks from support buildings During decommissioning, the concrete structures will be decontaminated, as required, and demolished into rubble Contaminated concrete residue resulting from decontamination activities and concrete not meeting free release criteria will be categorized, packaged, and shipped offsite as waste Any remaining concrete is demolition debris that will be stockpiled and processed onsite for backfill As defined in 6 CCR 1007-2, Regulations Pertaining to Solid Waste Disposal Sites and Facilities, concrete, which has been in the hardened state for at least 60 days, is considered inert material

The approach to recycling concrete is to stockpile concrete rubble meeting the free release criteria, process the rubble for backfill, and place the backfill in voids remaining after decommissioning and restoration activities The projected quantity of concrete for disposal or reuse is 130,000 cubic yards (100,000 cubic meters) or 229,000 metric tons The estimated volume of backfill needed is approximately 174,000 cubic yards (135,000 cubic meters)

This RSOP describes the concrete stockpiling, transportation, processing, and placement activities The implementation of these activities will be addressed through the Integrated Work Control Program (IWCP) in project-specific IWCP packages The information contained in this section should be used as a guide to develop the IWCP packages for concrete recycling The IWCP packages will be developed with the following minimum requirements lifetime slump is less than one percent for all backfilled areas, dust is controlled during stockpiling, transportation, and backfilling, and run-off is controlled at the stockpiles

2.1 Pre-demolition Building Characterization

A pre-demolition survey will be conducted to verify the nature and extent of remaining radiological and chemical contamination in the building The survey will be conducted in accordance with *The RFETS Decontamination & Decommissioning Characterization Protocol* and *Site-Wide Pre-Demolition Survey Plan* (document in preparation) or project-specific Sampling and Analysis Plans, which are approved by the LRA These are Site documents that establish the standards for building characterization at RFETS including reconnaissance level characterization and final release of the facility In general, the characterization process for final release will incorporate the following steps

1 The project develops characterization packages in accordance with the *Site-Wide Pre-Demolition Survey Plan*, which will be approved by the LRA, for taking final measurements and samples showing that the building meets free release criteria
2 The DOE and LRA review the sampling results
3 Independent verification of the characterization data will be conducted on the facilities where appropriate An independent verification is an independent contractor taking its own measurements and samples, and/or reviewing the DOE's results
4 The LRA, at its discretion, may review the results from an Independent Verification

5 Any time during the characterization process, the LRA will have access to collect samples or measurements
6 Prior to building demolition, the LRA will concur on the project-specific *Pre-Demolition Survey Report*

The free release limits for floors, walls, and ceilings constructed of concrete are summarized below for radionuclides, Resource Conservation and Recovery Act (RCRA) waste, beryllium, and polychlorinated biphenyls (PCBs) Using analytical data from the *Reconnaissance Level Characterization Report* and the *Pre-Demolition Survey Report*, each project that generates concrete for recycling under this RSOP must demonstrate that the concrete has met the free release requirements before the material will be accepted for stockpiling for re-sure For example, if PCBs were found during decommissioning of a building, the project would be required to comply with the substantive requirements of the PCB regulations for decontamination and proper disposal

It is assumed that RCRA units have been clean closed and approved by the regulator A free release limit has not been established for asbestos because asbestos will be remediated prior to decontamination activities and will not be associated with the rubble If contaminants without an established free release limit are detected, a limit will be established in a decision document or negotiated with the LRA

If concrete is found to be below the unrestricted release limits for radionuclides, and is considered to be non-hazardous, non-beryllium contaminated, and non-TSCA regulated, it can be free released and managed in accordance with this RSOP. Table 2 1 provides the limits that must be attained in order to free release the concrete The thresholds documented in Table 2 1 for radionuclides are the same levels used to release equipment and property from RFETS These thresholds are used at hundreds of nuclear sites in the United States for the free release of materials, equipment and property

Table 2.1 – Free Release Limits Summary

Contaminant	Regulatory Driver	Free Release Threshold		
Radionuclides - values are above background concentrations in dpm/100 cm^2		Total Average	Total Maximum	Removable
Transuranics	DOE Order 5400 5	100	300	20
Th-Natural		1000	3000	200
U-Natural		5000	15000	1000
Beta-Gamma emitters		5000	15000	1000
Tritium		N/A	N/A	10000
RCRA Waste	6 CCR 1007-3, Part 261	No listed hazardous waste or characteristic hazardous waste is present		
Beryllium	RFETS Chronic Beryllium Disease Prevention Program	Concentrations are less than 0 2ug/100 cm^2		
PCBs	40 CFR 761	The release level for PCBs will be determined for each project by assessment of the requirements of 40 CFR 761		

2.2 Rubble Storage

The criteria for selecting a rubble storage site and proposed locations for storage sites are addressed in Section 7 DOE may use the storage sites identified in this RSOP or may select additional and/or alternate locations based on the selection criteria described in Section 7 The rubble storage area and process will meet all substantive ARARs DOE will either use the rubble below free release levels as onsite fill as described in Section 8 or remove it from the Site prior to final closure The total storage area for all rubble, excluding the area needed for processing, is estimated to be approximately 320,000 square feet or 7 4 acres assuming an average stockpile height of 12 feet The stockpile height is presented for area requirement purposes only, the height of the stockpiles may be range from 12 to 30 feet The storage areas will consist of approximately 0 1% of the acreage on RFETS

Since rubble sources will be coming from both inside and outside of the PA and due to access restrictions in the PA, it would be advantageous to have at least two sites for storage One site should be located within the PA, and the second should be located outside the PA The rubble storage areas may be either located on a concrete or asphalt base or natural ground surface The size of broken concrete slabs and rubble is anticipated to be no larger than 6 by 6 feet Structural steel, such as T and H beams, will also be stockpiled

The storage areas will be surrounded by a silt fence and shallow berm to retain any run off from precipitation If the water volume exceeds the capacity of the berms, the water will be pumped into storage containers and allowed to evaporate Since the concrete meets free release criteria, radiological and chemical contamination are not a run off concern However, the run off water may be more alkaline due to the concrete and to prevent the water from impacting the pH of the surface water, the run off water will be controlled The residues remaining from the evaporated water will be used as backfill or disposed

The 207C and 910/INFWTN Areas have been identified as potential stockpile locations within the PA, and the parking area on the south side of Building 444 has been identified as a potential storage site outside the PA In order to store the required material, the available area at each of these sites will need to be approximately 3 7 acres

The material will be transported from the demolition area in end dump trucks or other appropriate vehicles and deposited on the ground at the stockpile area The loads will be covered or sprayed with water or surfactant prior to transport to minimize the potential for dust A rubber tired front-end loader or bulldozer will pile the material to a height of 12 to 30 feet The material will be stored in this configuration until it is processed for recycling

After stockpiling, the rubble will be treated with water or surfactant Surfactant is an inert, nonhazardous commercial product that acts as a binder and forms a crust on the outside of the treated stockpile, which inhibits wind transport of the smaller particles The surfactant will be applied whenever material is added or removed from the stockpile on an as-needed basis

2.3 Backfill Processing

When backfill is required, the rubble located in the storage areas will be processed to meet the backfill requirements Based on similar commercial operations, the final product produced by the crushing operation is a well-graded material In a well-graded material, all particle sizes are represented The smaller particles tend to fill in the empty spaces around the larger particles resulting in fewer voids after placement and compaction Backfill with fewer voids has greater compaction densities, tends to handle greater surface bearing loads, and has minimal post-placement settling Final grain size distribution requirements will be established in the appropriate IWCP packages

A processing area will be established with a processing plant and ancillary facilities The processing area will require room to locate the processing equipment, remove the structural reinforcing steel remaining in the concrete, and locate stockpiles Processing equipment may include, but is not limited to, a jaw or impact crusher, a screen, conveyors, stackers, and a magnet Three types of stockpiles may be generated during processing backfill, oversized material, and steel

The first processing step will be to remove the majority of the reinforcing steel within the rubble This activity may be achieved by several methods, including but not limited to hydraulic hammers, pneumatic hammers, hydraulic excavators, clamshells, and wrecking balls The reinforcing steel and other miscellaneous attachments will be removed from the rubble and stockpiled for recycling and/or disposal

If the backfill is stockpiled prior to placement, the stockpile will be treated with the same type of surfactant used for storing the building rubble (see Section 2 2) The surfactant will be applied whenever material is added or removed from the stockpile on an as-needed basis A surfactant or water may be necessary during processing activities A mist will be used as necessary to minimize dust in addition to engineering controls Surface run off will be controlled around the stockpiled backfill in the same manner as the stockpile area

2.4 Backfill Transportation

The backfill will be transported to the fill area using trucks and/or a conveyor system, whichever is the most economical and logistically practical As the 771 building area is located within approximately 500 feet of the proposed 207C and 910/INFWTN Stockpile Areas, it may be most cost effective to backfill using a conveyor system The 371/374 building and other potential areas requiring backfill may be more efficiently serviced by trucks

Dust control may be required during transportation Trucks or conveyors will either be covered or the backfill will be sprayed with water or surfactant prior to transport, as necessary The roads used to transport the rubble and backfill will also require dust control Control measures will include application of surfactant/water, speed reduction, and periodic road sweeping

2.5 Backfill Placement

The proposed locations for backfill placement are addressed in Section 8 DOE may use the disposition sites as identified in this RSOP, or it may select additional and/or alternative locations based on the selection criteria Areas requiring backfill will not be filled until the remediation of those areas is complete, and the closure documentation has been prepared and data verification and validation is completed

Placement requirements will be established based on the design requirements for the backfill as given in the appropriate IWCP package(s) Backfill placement and compaction methods will result in a lifetime slump of less than one percent To ensure the backfill quality will meet the slump requirements, the backfill will be geotechnically tested, as necessary, prior to placement and during backfill operations

After placement of the backfill, soil will be placed on top of the backfill to ensure the backfilled areas will blend in with the surrounding topography and support vegetation The depth and specifications of this layer will be addressed in the final remedy documentation

2.6 Monitoring

The environmental monitoring requirements for the implementation of this RSOP will be addressed pursuant to the guidance in the Integrated Monitoring Plan (IMP) The IMP establishes the routine surface water, groundwater, air, and ecology monitoring programs The plan was prepared and is annually reviewed/revised using the consultative process and involves representatives from EPA, State of Colorado, and the cities of Westminister, Northglenn, Thorton, Arvada, and Broomfield

The monitoring associated with concrete recycling is air sampling for fugitive dust Since the concrete meets free-release criteria, no sampling for radionuclide emissions or surface or groundwater sampling will be required The existing sampler network around the perimeter of RFETS will be used to ensure that excess fugitive dust is not leaving the site from the recycling operation The samplers, frequency, and sampling protocol are specified in the IMP

The run-off from the stockpiles will be collected as indicated in Section 2 2 This water will be handled as incidental water as specified in the IMP Since the concrete will meet free-release criteria, it is not anticipated that any water sampling will be conducted The IWCPs for stockpiling and processing activities will address the surface water and dust monitoring on a project-specific basis

3. WORKER HEALTH AND SAFETY

The primary health and safety concerns pertaining to concrete rubble recycling involve manually and mechanically sizing the concrete, handling concrete, transporting the concrete, and placing the backfill Personal protective equipment, hazards, controls and monitoring requirements will vary depending upon the activity and equipment used Table 3 1 provides a summary of the principal activities, hazards, controls, PPE, and monitoring An action-specific Health and Safety Plan (HASP) and Activity Hazards Analysis (AHA) will be prepared and implemented through the IWCP

Table 3.1 – Concrete Recycling Health and Safety Summary

Activity	Hazards	Controls	PPE	Monitoring
Concrete Sizing with Heavy Equipment	Flying Debris	Required PPE ROPS/FOPS on heavy equipment, glass on equipment in good condition	Safety glasses with side shields, leather over the ankle safety toed boots	None
Jack Hammering Concrete	Flying Debris, Excessive Dust, Striking Foot with Jack Hammer, Excessive Noise	Required PPE Dust suppression, as necessary Local ventilation, as necessary	Safety glasses with side shields, leather over the ankle safety toed boots, face shield, hearing protection, and metatarsal and shin guards Respiratory protection if total dust exceeds 15 mg/m^3 8 hr TWA	Total Dust Noise
Concrete Crushing	Flying Debris, Excessive Dust, Excessive Noise	Required PPE Dust suppression as necessary Local ventilation as necessary	Safety glasses with side shields, leather over the ankle safety toed boots, face shield and hearing protection Respiratory protection if total dust exceeds 15 mg/m^3 8 hr TWA	Total Dust Noise
Manual Handling	Back Injury, Cuts and Abrasion	Required PPE Adhere to 50 lb/person lifting restriction	Safety glasses with side shields, leather gloves, leather over the ankle safety toed boots	None
Heavy Equipment Handling	Flying Debris	Required PPE ROPS/FOPS on heavy equipment, glass on equipment in good condition	Safety glasses with side shields, leather over the ankle safety toed boots	None
Transportation	Flying Debris, Crushing Driver	Required PPE Cover load with tarp while transporting FOPS on truck Operator not allowed in truck during loading	Safety glasses with side shields, leather over the ankle safety toed boots	None
Backfill Placement	Flying Debris, Crushing Personnel	Required PPE Keep nonessential personnel out of area Use spotter	Safety glasses with side shields, leather over the ankle safety toed boots	None

4. WASTE MANAGEMENT

Once the concrete debris are segregated from other debris created during the demolition of the building, there should be little additional waste resulting from the activities covered under this RSOP Segregation activities and requirements will be discussed in the project-specific documents Only rubble below free release levels will be accepted for recycling The principal non-concrete material generated during concrete recycling will consist of reinforcing steel and attached steel structural members These items will be separated manually during demolition of the buildings and rubble sizing near the stockpile, and separated magnetically during crushing This material can be recycled as steel scrap under existing contracts or disposed

During demolition of the buildings, scrap steel will be stockpiled The stockpiles can be either located at the building site or transported to a location adjacent to the rubble storage area The material can be stockpiled until the rubble has been fully processed, or it can be removed from the project site during demolition It is preferable to remove the material from the project site during demolition, since handling will be reduced

No other waste streams are anticipated However, it is possible that small amounts of nonferrous metals and wood could be generated These waste streams will be properly disposed

5. ENVIRONMENTAL CONSEQUENCES

This section describes potential environmental impacts that may be associated with recycling concrete for backfill The project will have minimal adverse cumulative effects with other Site projects The adverse effects resulting from the project are expected to be minimal and temporary The cumulative effects would include air emissions (fugitive dust and exhaust emissions) and noise These impacts would add slightly to total air emissions and noise from other demolition and activities at the Site Other effects, such as health and safety and visual impacts, are independent of other projects, such as road construction, building construction, or gravel pit operations, in the vicinity or are beneficial

The beneficial effects that accrue from implementing the RSOP are substantial These benefits include the effective reuse of a resource, concrete, the costs and labor savings associated with that reuse, and the costs saved and environmental impacts avoided by sending the material to an offsite landfill Since the voids left by demolition and restoration activities must be filled to prevent ponding and adverse impacts to groundwater, this alternative protects against unnecessarily transporting offsite crushed rock to RFETS Removing the rubble from RFETS to offsite locations and bringing crushed rock to RFETS to fill voids is estimated to take from 17,000 to 23,000 one-way trips Using the crushed concrete as fill will require about 8,200 one-mile trips and 340 0 15-mile trips, taken at low speeds, and all of these trips will be onsite Truck transportation has been presented throughout the Environmental Consequences Section because trucks would have more environmental consequences then the conveyor system

There are environmental effects from sending large numbers of loaded trucks down public highways would be substantial Air emissions would be increased, the potential for accidents, spills, and adding to traffic congestion in the area would also be increased The use of crushed, graded concrete, from an on-site source, as fill avoids these impacts

The project supports the overall mission to clean up and make the Site safe for future uses The cumulative effects of this broader, Site-wide effort are described in the *Cumulative Impacts Document* (DOE 1997) That document describes the short- and long-term effects of the overall site clean up mission

5.1 Soils and Geology

Soils at the Site will be minimally disturbed by the proposed activities Approximately 7 4 acres will be used for stockpiling, the locations selected for stockpiling and crushing the broken concrete are temporary and located in developed areas The proposed sites are 207C and 910/INFWTN Areas, which is a heavily used industrial area The second site is a parking lot in the 444 Area A few additional short access roads may be constructed and used for moving concrete within the storage and crushing sites The concrete would be hauled to and from the sites on established roads or via a conveyor system

Soils in this area are identified as Flatirons very cobbly sandy loam, which have a low permeability and a slight wind and water erosion potential (CID, 1997) The soils will largely remain undisturbed until eventual Site restoration Substantial amounts of concrete fines or dust may settle to the bottom of the storage sites and remain after the recyclable concrete has been removed Remaining concrete dust will be removed to prevent wind or water from spreading the dust, and to allow for a suitable site restoration Eventual restoration may include the use of imported topsoil or other methods to improve soil quality and support revegetation Restoration of the rubble storage areas will be consistent with site closure

Subsurface geology will not be affected by the proposed activities Digging, trenching, and similar activities are not needed Using crushed concrete rather than crushed rock as fill will avoid using about 130,000 cubic yards of native rock from a quarry in the general vicinity of RFETS

5.2 Air Quality

Project activities will generate criteria air pollutants The air pollutant of greatest concern for the project is dust or particulate matter, which includes both total suspended particulate (TSP) and particulate matter less than ten microns in size (PM_{10}) Particulate emissions will be generated by travel on roads, handling of the concrete, blowing dust from storage piles, and the concrete crushing operations Estimated TSP emissions are 9 6 tons per year (tpy), and estimated PM_{10} emissions are 1 9 tpy

The U S Environmental Protection Agency (EPA) and Colorado Air Quality Control Commission (CAQCC) regulate air emissions of particulate Fugitive particulate emission rules for the storage and handling of material will apply to stockpiles associated with the project A control plan will be developed, using available practical methods that are technologically feasible and economically reasonable, to minimize fugitive dust emissions from the concrete rubble stockpiles, the haul roads, the trucks, and demolition activities and approved by the LRA

Opacity rules will apply to the concrete crusher and screening plant and any non-electric powered compressors, pumps, or generators used in conjunction with the project Dust emissions from the crushing and screening operation and exhaust from non-electric compressors, pumps, or generators used in conjunction with the project may not exceed 20 percent opacity

The construction, operation or modification of any stationary air emission source must have a valid Air Pollutant Emissions Notice (APEN) or air emissions permit if exceeding the reporting threshold for TSP and PM_{10} If the project will exceed the threshold, an APEN must be filed prior to initiating the project

The estimated emissions of TSP and PM_{10} do not exceed emission levels that trigger major source non-attainment area requirements for the Nonattainment Area New Source Review, and will not affect a Class I Area The project will be reevaluated for air regulatory requirements prior to final implementation

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5.3 Water Quality

Water quality, during rubble storage and processing, could be adversely affected by sedimentation following rain or snow events However, the stockpile site selection requirement that the area must have a relatively level ground surface (an average slope of less than four percent) will help to prevent rapid runoff from the sites Silt fences or other approved means of erosion control will be used to prevent soils and concrete fines from leaving the sites and reaching surface waters The sites will be assessed by the Site personnel to ensure that drains or other means of discharge are controlled.

Because the stockpile sites are less than five acres each, neither a Surface Water Pollution Prevention Plan (SWPPP) or NPDES construction permit are required If either site disturbs a total of five acres, the substantive CWA requirements for SWPPP will be met If either site is expanded to exceed ten acres, the RSOP may need to be modified to address the substantive CWA requirements for a NPDES permit

After the concrete has been crushed and placed, and all operations have ceased, the stockpile sites will be assessed to ensure that substantial amounts of concrete fines do not remain at the site The fines resulting from concrete processing may need to be removed since this material has the greatest potential for transport and effect on surface water pH and turbidity A final review of the rubble storage areas will be performed by Site personnel to ensure that concrete fines and dust are removed, and that the potential for future erosion is minimized

It is unlikely that the hauling, storage, and processing of the concrete will affect groundwater However, the long-term burial of crushed concrete as fill may impact groundwater The fill will be placed at a depth of 20 to 25 feet Current seasonal groundwater levels may reach 10 to 20 feet If groundwater percolates through the fill, the fill may affect the pH of the groundwater due to the alkalinity of concrete The monitoring system envisioned for post-closure groundwater monitoring will be used to evaluate this potential impact

5.4 Human Health and Safety

The greatest potential threats to human health and safety during this project are the physical hazards of construction activities to workers The physical hazards presented by this project are similar to the hazards found in similar construction activities, e g , crushing plant and road construction, and would not include unique or unusual health or safety concerns A project-specific HASP and AHA will be prepared to identify and control hazards that may be encountered Implementation of the requirements of these documents will minimize the possibility and potential consequences of accidents Physical hazards will be considered and controlled during all phases of the project

5.5 Ecological Resources

The ecological impact of the project will be temporary, and the disturbed area will eventually be reclaimed, providing a natural appearance with regard to land contours and vegetative cover The project will use two sites that will each be about 3 7 acres The sites are in developed areas of RFETS, and few animals are found at the sites Mammals such as deer, rabbits, and field mice use the sites only incidentally The sites do not support or provide habitat for threatened or endangered plant or animal species, or species of concern, nor do they contain unique or unusual biological resources However, various bird species may use the sites, and wetland areas may exist in the area Prior to any construction activities, surveys of the sites by Site ecologists will be conducted to determine specific ecological impacts, if any, with respect to birds and wetlands

5.6 Historic Resources

The Rocky Flats Plant site was placed on the National Register of Historic Places as a Historic District (5JF1227) on May 19, 1997 Historic District designation mandates compliance with the Historic Preservation Act of 1966 and with the terms of the agreement between DOE and the Colorado State Historical Preservation Office (SHPO)

RSOP activities will occur within the boundaries of the Historic District, but facilities have been recorded as required by the agreement with the Colorado SHPO Demolished facilities will be the source of the concrete, but the demolition activities will be evaluated in a separate decision document Minimal groundwork is anticipated (e g , installation of silt fences), and most work will occur on previously disturbed land Therefore, no impact to historic artifacts will occur from recycling concrete Should any historic resource be identified during the project, work will be stopped and Site procedures regarding historic resources will be followed

5.7 Visual Resources

RSOP activities will result in temporary visual impacts The piles of concrete rubble may extend above the surface of the ground by as much as 30 feet, and the crushing operations will generate clouds of dust The concrete piles and dust generated will not be in sharp contrast to the industrial setting of the Site Due to the amounts of dust generated, control measures will be used, and due to the distance to a PSD area, the dust will not affect visibility at a Class I area (see Section 5 2)

5.8 Noise

Operations will result in a temporary increase in local noise levels Most of the noise will result from concrete crushing, loading, and hauling The noise will be consistent with other Site construction and demolition activities, such as other heavy equipment operations The noise from the operations will not be sudden, short, or unexpected Operations will be conducted during the day, and will be attenuated by distance and obstructions between the sites and the nearest public receptor A rock crushing plant will generate about 78 to 95 decibels (dB) at 50 feet, depending on the side of the plant (Excel 1999) At 3,200 feet, 95 dB will drop to about 59 dB, which is below the accepted level for residential land use Trees, buildings, and terrain will further attenuate the

noise Since the nearest public receptor is over 5,000 feet from either project site, noise generated by the project will be effectively confined to the Site Appropriate hearing protection will be supplied for workers, as specified in the project HASP

5.9 Transportation

Environmental effects can be associated with hauling the concrete rubble to the storage sites, hauling the crushed concrete to the fill locations, and worker travel to and from RFETS Impacts include increased tailpipe emissions and an increased potential for traffic accidents . Vehicle miles traveled (VMT) will be temporarily increased, with most VMT occurring on RFETS property Heavy trucks (gross vehicle weight rating greater than 26,000 pounds) will comprise most of the onsite VMT Onsite shipments will eliminate the potential for accidents with members of the public, if the concrete were to be shipped offsite and fill material brought to RFETS via public roads, a substantial risk for automotive-truck accidents would exist

The incidental travel will pose minimal traffic congestion and potential for increases in traffic accidents Currently, about 5,000 people commute to RFETS daily, the small increase (less than one percent) of workers commuting to work on this project will not noticeably affect traffic on public roads or at RFETS In the event of an accident, RFETS maintains a response capability through the Fire Department The Fire Department has also partnered with local fire districts through mutual aid agreements to respond to emergencies in the surrounding areas

The additional VMT will also generate tailpipe emissions Based on 130,000 cubic yards (100,000 cubic meters) of fill material and 15 cubic yard per truck, a total of about 8,200 one mile trips and 340 trips of 0 15 miles will be required to complete the operations Therefore, about 8,250 total shipment miles will be involved in the action Conservatively assuming that all shipments occur in a single year and using a standard factor of $1\ 6 \times 10^{-7}$ latent cancer fatalities (LCF) per vehicle mile (Rao 1982), the transportation activities would be expected to result in $1\ 3 \times 10^{-3}$ latent fatalities from vehicle emissions This compares to an annual LCF of $1\ 8 \times 10^{-1}$ reported in the *Cumulative Impacts Document* (DOE 1997) for all onsite closure case transportation activities

Using fill materials from offsite sources would involve total shipment miles that would be ten to twenty times greater than that required for onsite shipment Recycling the concrete onsite will also prevent the offsite shipping of the concrete and associated VMT Since the trips would involve total VMT that would be more than one hundred times greater that would be required for onsite shipment, using materials onsite will greatly reduce impacts

5.10 Unavoidable Adverse Effects

Some temporary, adverse effects will necessarily occur because of the project activities Small areas of surface and subsurface soil conditions will be changed Minor quantities of air pollutants will be released to the atmosphere. Workers will experience health and safety risks that are typical of construction projects Stockpiles of concrete and dust generation will temporarily affect the appearance of the Site, and noise levels will increase slightly Fuels and other resources will be consumed

5.11 Short-term Uses Versus Long-term Productivity

The project area will consist of about 7 4 acres of developed land The project will use that land for temporary storage and construction purposes, until the project is completed This temporary use of the land will not affect the long-term productivity of the land The land will be eventually restored The action will also avoid using fill materials that would otherwise be purchased from offsite sources, preserving these resources for other future uses, and limiting the landfill resources that would be required if the concrete rubble was disposed of as waste

5.12 Irreversible and Irretrievable Commitments of Resources

This project will irretrievably consume fuels, small quantities of other materials, water, and money None of these resources will be consumed in quantities that are significant relative to their consumption elsewhere across the Site About 130,000 cubic yards (100,000 cubic meters) of crushed concrete will be recycled as fill material for a beneficial use

5.13 References

The following references were used in the development of the environmental consequence section

DOE 1997 – U S Department of Energy, *Rocky Flats Environmental Technology Site Cumulative Impacts Document*, June 10, 1997

Excel 1999 – Excel Recycling & Manufacturing Inc *Excel Super 1500 Plant Crushing Material Noise Survey*, February 17, 1999

USDOT 1995 - U S Department of Transportation, National Highway Traffic Safety Administration *Traffic Safety Facts,* 1995

Rao 1982 – Rao, K , E Wilmot, and R Luna, *Nonradiological Impacts of Transporting Radioactive Materials*, SAND81-1703, Sandia National Laboratories, February 1982

6. COMPLIANCE WITH ARARS

This section contains the ARARs applicable to recycling concrete The following table outlines the requirement, the citation of the requirement, the type of requirement, and comments associated with the requirement and its relationship to recycling concrete. The letters in the Type column refer to the ARAR classification, and the letters indicate the following C, chemical-specific ARAR, A, action-specific ARAR, and L, location-specific ARAR

Table 6.1 - ARARs

Requirement	Citation	Type	Comment
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq]			
NATIONAL AMBIENT AIR QUALITY STANDARDS • Sulfur Dioxide • Particulate Matter (PM10) • Carbon Monoxide • Ozone • Nitrogen Dioxide • Lead • Total Suspended Particulates	5 CCR 1001-14 [40 CFR 50]	C	National Ambient Air Quality Standards (NAAQS) define levels of air quality, which are deemed necessary, with an adequate margin of safety, to protect the public health The standards are the basis for air quality regulations that are designed to improve and protect air quality The Denver metro area is currently considered to be in non-attainment for the particulate matter, carbon monoxide, and ozone standards Ambient air quality standards are not effluent discharge limitations they are used in conjunction with air dispersion modeling to establish emission limits that are protective of air quality Air Quality Management personnel will review projects for Prevention of Significant Deterioration and Non-attainment Area permitting requirements, and perform modeling, if requested by CDPHE, to demonstrate compliance with the NAAQS
COLORADO AIR QUALITY CONTROL COMMISSION (CAQCC) REGULATIONS	5 CCR 1001 [40 CFR 52, Subpart G]		
• Emission Control Regulations for Particulates, Smokes, Carbon Monoxide, and Sulfur Oxides	CAQCC Reg 1 [5 CCR 1001-3]		Various sections of Reg 1 will apply to the RSOP for Recycling Concrete
- Smoke and Opacity	Section II A 1	C	Air pollutant emissions from stationary sources shall not exceed 20% opacity (emissions from fuel-fired pumps generators, and compressors and concrete crushing and transport operations)
- Fugitive Particulate Emissions - Material Storage/Handling - Haul Roads - Haul Trucks - Demolition Activities	Section III D III D 2(c) III D 2(e) III D 2(f) III D 2(h)	A	Details the requirements for control measures and operating procedures that are technologically feasible and economically reasonable which reduce, prevent, and control fugitive particulate emissions (control plans, use of control equipment watering, etc)
• Air Pollutant Emission Notices (APEN), Construction Permits and Fees, Operating Permits, and Including the Prevention of Significant Deterioration	CAQCC Reg 3 [5 CCR 1001-5]		

Requirement	Citation	Type	Comment
- APEN Requirements	Part A, Section II	C	An APEN shall be filed with the CDPHE prior to construction, modification or alteration of, or allowing emissions of air pollutants from any activity Certain activities are exempted from APEN requirements per specific exemptions listed in the regulation
- Construction Permits, Including Regulations for the Prevention of Significant Deterioration (PSD)	Part B		
- Construction Permits	Part B, Section III	C	Construction permits are not required for CERCLA activities However, fuel-fired equipment (generators, compressors, etc) associated with these activities may require permitting
- Non-attainment Area Requirements	Section IV D 2	A,C,L	Even though CERCLA activities are exempt from construction permit requirements, non-attainment area requirements may apply if emissions of certain pollutants exceed certain incremental limits The requirements include emissions reductions or offsets, and strict emission control requirements
- Prevention of Significant Deterioration Requirements	Section IV D 3	A,C,L	Even though CERCLA activities are exempt from construction permit requirements, PSD requirements may apply if emissions of certain pollutants exceed certain incremental limits The requirements include strict emission control requirements, source impact modeling, and pre-construction and post-construction monitoring
• Standards of Performance for Nonmetallic Mineral Processing Plants (40 CFR 60, Subpart OOO)	CAQCC Reg 6 (5 CCR 1001-8)		
- Applicability	Section 60 670(c)(2)	A	The New Source Performance Standard applies to portable concrete crushing equipment with a process capacity of greater than 150 tons per hour
- Standards for Particulate Matter	Section 60 672	A,C	Stack emissions from process shall not contain particulate matter in excess of 0 05g/dscm, or exhibit greater than 7 percent opacity unless the facility utilizes a wet scrubbing control device
	Section 60 672(a)(1)& (2)		
	Section 60 672(b)&(c)	A,C	Sets 10% opacity standard from transfer points or belt conveyors and 15% opacity standard for uncontrolled crusher emissions after the sixtieth day of maximum production rate
- Monitoring of operations	Section 60 674	A	Requirements for continuously monitoring wet scrubber systems
- Test Methods and Procedures	Section 60 675	A	Test methods and procedures for determining compliance with the previously listed standards
- Reporting and Recordkeeping	Section 60 676	A	Recordkeeping requirements for control devices and performance tests
Solid Waste Disposal Sites and Facilities	6 CCR 1007-2	A	"Recyclable materials" means any type of discarded or waste material that is not regulated under Section 25-8-205(1)(e), C R S , and can be reused, remanufactured, reclaimed, or recycled
• Definitions	Section 1 2		
• Exemptions	Section 1 4 3	A	This is the exemption for recyclable material

7. PROPOSED STOCKPILE SITES

This section outlines the criteria used to evaluate the areas available for stockpiling and proposes an area within the PA and an area outside the PA for stockpile sites

7.1 Criteria for Selecting Stockpile Area

The criteria used to select stockpile areas were assessed by effectiveness and feasibility The storage area must meet the following minimum criteria

- Drainage and other means of discharge are controlled
- Sufficient space is available for silt fences and berms
- Already impacted by site activities, e g , within the developed areas of the site
- The area needs to have a relatively level ground surface with the required dimensions and an average slope less than 4 percent
- The stockpile surface is isolated from contaminants
- The area will not be impacted by other remedial projects or delay remediation scheduled by other projects onsite
- No subsurface remediation is scheduled during the time the storage area is in use
- The storage area should be reasonably close to the source and disposition area

7.1.1 Effectiveness

The proper storage and handling of recyclable concrete will not result in any adverse effect to public health, workers, or the environment The recyclable concrete storage and handling will be managed in accordance with the ARARs, and is consistent with the long-term remedial objectives for RFETS The storage area will have concrete consisting of local aggregate and cement, and steel reinforcement The rubble, when placed with proper controls, will be stable with respect to wind and precipitation

7.1.2 Feasibility

Stockpiling concrete is technically feasible Processing concrete and re-using that concrete as aggregate for new concrete, pavement, asphalt, and backfill is a standard industry practice The necessary equipment, personnel, and laboratories required to complete this activity are available locally However, strategic planning will be necessary to ensure the equipment and personnel are available when backfill processing is required The stockpile areas will need to be designated as storage areas, an assessment made on the monitoring requirements, and the area prepared for storage prior to initiating stockpiling

7.1.3 Costs

Actual costs for stockpiling activities will depend on the nature of the material supplied by demolition subcontractors, the processing equipment utilized, mode of transportation, office support, monitoring, operating restrictions, and regulatory compliance If concrete is transported offsite for disposal or recycled, there would potentially be material stockpiling Therefore, the difference in the cost of stockpiling in two centralized locations instead of each project site is not relevant to selecting the stockpile locations

7.2 Proposed Stockpile Sites within the PA

The 207C Area has been identified as a potential storage location for the rubble generated within the PA Based on the site schedule, this area should be available for use in 2003 The 910/INFWTN Area has also been identified as a potential storage location for rubble generated within the PA, and this area is available immediately The rubble generation will commence in 1999 As additional rubble is generated, the 207C stockpile can be extended to the south across the Building 779 Area and toward Buildings 764 and 765 as necessary The exact locations for rubble storage will be based on the environmental restoration findings for each site The advantages of these sites include close proximity to the source buildings and the proposed backfilling at Building 771 Both of these sites meet the site selection criteria, and are relatively level, with the necessary area requirements The PA storage areas have been designated to store approximately half of the total anticipated volume of rubble that will be generated from demolition

7.3 Proposed Stockpile Site outside the PA

The proposed rubble storage area outside of the PA is the parking area outside of Building 444 It can be used immediately, and additional area to the west is scheduled to become available after 2002 The site meets all of the site selection criteria It is relatively level, meets the necessary area requirements, and contains no known contaminants The area has been impacted by site activities since it is currently used as a parking area and drainage controls can be established in the available area

7.4 Other Stockpile Sites

Since the recyclable concrete is nonhazardous, most areas where buildings are being demolished would be suitable for stockpiling rubble if the criteria are met If additional stockpile sites are identified that meet the established site selection criteria, DOE, using the consultative process, will document the site characteristics through a letter report The LRA will have 14 days to concur with DOE's proposed stockpile location or to non-concur and state in writing its reasons for non-concurrence If the LRA does not transmit its written non-concurrence within 14 days, DOE may begin using the proposed site for concrete stockpiling

8. PROPOSED BACKFILL SITES

This section outlines the criteria used to evaluate the areas available for backfill and proposes two specific areas for backfilling activities It also provides the criteria that may be used to designate additional backfill locations

8.1 Criteria for Selecting Backfill Locations

The criteria used to select the proposed backfill areas were assessed by effectiveness and feasibility The proposed backfill areas must meet the following minimum criteria

- Backfill is required to meet the final grading requirement
- There are no impacts to surface water
- Restoration activities and verification sampling is complete, and data has been verified and validated

8.1.1 Effectiveness

The backfill material will consist nearly entirely of concrete made up of local aggregate and cement as binder that if properly placed will meet the long-term subsidence objectives The proper disposition of backfill will not result in any adverse effect to public health, workers, or the environment and will have no residual effect concerns and will comply with the ARARs

8.1.2 Feasibility

Using recycled concrete backfill is feasible Strategic planning will be necessary to ensure the equipment and personnel are available when backfill processing and placement is required Processing and placement activities will require no specialized equipment and are available locally The backfill areas will be designated to receive backfill, and assessed to ensure that restoration activities are complete

8.1.3 Costs

Actual costs for backfilling will depend on the mode of transportation, placement and compaction equipment used, office support, monitoring, operating restrictions, and regulatory compliance Since the backfill placement costs are the same whether the backfill is imported or recycled concrete, the backfill costs are not a factor with respect to determining backfill locations and activities

8.2 Proposed Backfill Site 1

Building 771 is scheduled for demolition in 2003 Current approximations indicate that 51,000 cubic yards (40,000 cubic meters) of backfill are required to bring the subsurface excavations back to the original ground surface The 207C and/or 910/INFWTN Areas would be the most convenient

stockpile locations for Building 771 backfill The roundtrip haul distance from Building 771 to the 207C/910/INFWTN Areas is approximately 800 feet

8.3 Proposed Backfill Site 2

Buildings 371 and 374 are scheduled for demolition in 2004 Current approximations indicate that 123,000 cubic yards (95,000 cubic meters) of backfill will be required to fill the basement to the original ground surface An additional source of backfill will be required to provide the additional 44,000 cubic yards of material after utilizing all of the processed concrete Both the 207C/910/INFWTN and 444 Stockpile Areas would be utilized as backfill for these buildings The roundtrip haul distance from Buildings 371/374 to the 207C/910/INFWTN Areas is approximately one mile The roundtrip haul distance from Buildings 371/374 to the 444 Area is approximately one mile

8.4 Other Suitable Sites

Due to the physical characteristics of the recycled concrete, it can be used wherever backfill is required It is probable that some quantities of backfill will be needed for other basements, or excavations where contamination has been previously removed The proposed backfill areas will need to be assessed against the backfill site selection criteria prior to determining suitability If additional backfill sites are identified that meet the established site selection criteria, DOE, using the consultative process, will document the site characteristics through a letter report The LRA will have 14 days to concur with DOE's proposed backfill location or to non-concur and state in writing its reasons for non-concurrence If the LRA does not transmit its written non-concurrence within 14 days, DOE may begin backfill activities

9. RSOP ADMINISTRATION

This section contains the information associated with the implementation and documentation of the RSOP and the approval of the RSOP

9.1 Implementation Schedule

Once the regulatory agencies approve this RSOP, DOE may implement the RSOP throughout the duration of the Rocky Flats Closure Project No further formal approvals are required If additional stockpile sites and/or backfill sites are identified that meet the established site selection criteria, DOE, using the consultative process, will document the site characteristics through a letter report The LRA will have 14 days to concur with DOE's determination or to non-concur and state in writing its reasons for non-concurrence If the LRA does not transmit its written non-concurrence within 14 days, DOE may begin utilizing the proposed site

9.2 Administrative Record

The section identifies the documents that constitute the administrative record for this decision After completion of the public comment period, all comments received from the public, the responsiveness summary, and the approval letter will be incorporated in to the administrative record file Approval of this decision document is approval by the LRA of the project's administrative record file The following documents constitute the administrative record

- RSOP Approval Letter
- Responsiveness Summary
- Backfill Site(s) Letter Report
- Stockpile Site(s) Letter Report
- *Concrete Disposal Options*, ICF Kaiser International, Inc , September 1998
- USDOT Guidance (Reclaimed Concrete Material, Portland Cement Concrete, Reclaimed Concrete Material, Granular Base, Reclaimed Concrete Material, Material Description, and Reclaimed Concrete Material, Embankment of Fill)
- *The RFETS Decontamination & Decommissioning Characterization Protocol*, MAN-077-DDCP
- *Rocky Flats Cleanup Agreement*, July 19, 1996
- *Integrated Monitoring Plan*, latest revision
- *Rocky Flats Environmental Technology Site Cumulative Impacts Document*, USDOE, June 10, 1997
- Excel Super 1500 Plant Crushing Material Noise Survey, Excel Recycling and Manufacturing, Inc
- *Traffic Safety Facts*, National Highway Traffic Safety Administration, USDOT, 1995
- *Nonradiological Impacts of Transporting Radioactive Materials*, SAND81-1703, Sandia National Laboratories, February 1982

The notification letters for projects implementing the RSOP will be contained in the project's administrative record

9.3 Responsiveness Summary

The responsiveness summary addressing public comments will be attached to the final approved RSOP

Questions and Responses for August 9, 1999 Westminster letter regarding the RSOP for Recycling Concrete		
Question Number	**Question**	**Response**
General Response Several of the comments refer to matters that are outside of the scope of RSOP for recycling concrete The RSOP is a decision document that proposes using free-released concrete as backfill versus disposing the concrete as sanitary waste offsite and bringing similar material onsite for backfill Therefore, comments related to management and disposal of contaminated concrete, under building contamination, and building foundation removal do not directly relate to using recycled concrete for backfill material However, consideration was given to all comments and questions, and the responses explain why the comment or question is not within the scope of this decision document In response to Westminster questions, answers were provided and transmitted to representatives of the City of Westminster on August 19, 1999 Several of the following responses expand on the earlier answers At that time, the following documents were transmitted, as requested • The RFETS Decontamination and Decommissioning Characterization Protocol, Revision 0 (currently in use at RFETS) • The RFETS Decontamination and Decommissioning Characterization Protocol, working draft (a proposed revision to the above) • The Site-wide Reconnaissance Level Characterization Plan, working draft • The Site-wide Pre-Demolition Survey Plan, working draft • The RFETS Quality Assurance Manual • The Building 779 Final Status Survey Plan • The Building 779 Waste Management Plan • Concrete Disposal Options • Integrated Monitoring Plan		
1	DOE indicates that the money saved through reuse of concrete rubble will be used to obtain further cleanup Please provide document indicating the additional cleanup projects that can be achieved through the cost savings realized by rubbleizing and reusing concrete on site	The cost savings will help reach the goal of achieving closure of RFETS by 2006 The cost savings from recycling the concrete were built into the overall RFETS 2006 plan budget to avoid the need for additional funding to meet the 2006 plan

Questions and Responses for August 9, 1999 Westminster letter regarding the RSOP for Recycling Concrete		
Question Number	Question	Response
2	Westminster understands that the Decontamination & Decommissioning (D&D) Protocol used for building 779 will serve as the basic document for D&D of all other site buildings This facility has minimal contamination compared to the older production buildings that have incurred fires and other production related accidents Please provide justification for the use of one protocol for all buildings	The RFETS *Decontamination and Decommissioning Characterization Protocol* (DDCP),is written to provide guidance for how to conduct the appropriate level and type of characterization for all buildings regardless of contamination levels It is a comprehensive document that describes the characterization process and methods for all levels of contamination The Protocol incorporates the relevant parts of the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) and DOE Order 5400 5, Radiation Protection of the Public and Environment. MARSSIM is used for characterization activities at commercial facilities The application of these standards ensures that the Protocol will be effective in standardizing characterization activities for all facilities at RFETS regardless of contamination When surveys for radiological contamination are conducted, the areas of the building are divided into "survey units" A survey unit is an area within a building or room that has similar contamination characteristics A survey unit could be the floor, part of a wall, or a number of rooms Per MARSSIM, survey units can be classified into one of four categories **Impacted Class 1 Area** Areas that have potential contamination (based on building operating history) or known contamination (based on past or preliminary characterization survey data) This would normally include areas where radioactive materials were used and stored and where records indicate spills or other unusual occurrences could have resulted in the spread of contamination **Impacted Class 2 Area** Areas that have or had a potential for radioactive contamination or known contamination, but are not expected to exceed the applicable contamination limits **Impacted Class 3 Areas** Areas that are not classified as Impacted Class 1, Impacted Class 2 or Non-impacted These areas are not expected to contain residual contamination above the applicable limits, based on knowledge of building history and/or previous survey information However, insufficient documentation is present to exclude the area from survey requirements **Non-Impacted Areas** Areas not classified as Impacted Class 1, Impacted Class 2 or Impacted Class 3 These areas are areas where there is no reasonable potential for residual contamination, based on knowledge of building history and/or previous survey information Sufficient information is present to be assured that no residual contamination is present above the applicable limits These area classifications can apply to buildings with significant contamination or buildings with no contamination Buildings with more contamination will have more Impacted Class 1 areas then those with less contamination The survey requirements for Impacted Class 1 areas are significantly more stringent than for Non-Impacted areas RFETS follows these requirements when developing the survey plans for each area.

		This systematic process establishes the methods to allow the same protocol to be used in buildings of varying contamination levels
3	An independent sampling verification and quality assurance program for both the building undergoing D&D and for concrete once it is rubbleized is necessary to ensure that the building itself and the concrete rubble meet the free release criteria Please provide information and copies of the documents that define the independent sampling verification plan, the quality assurance program, and the documents that explain how the free release criteria will be met for the rubble (both radionuclide and non-radionuclide) and which regulations will be used to meet that criteria for rubble	The existing *Decontamination and Decommissioning Characterization Protocol* (DDCP) adapts the relevant sections of the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) and uses the Data Quality Objective (DQO) process and site quality assurance/quality control procedures Currently, the DDCP is used as the basis for preparing building specific sampling and analysis plans (SAPs) The ongoing decommissioning projects in buildings 779 and 886 will follow their project specific SAPs that have been approved by CDPHE and meet the site quality assurance/quality control (QA/QC) program requirements For use with future projects, the Site is updating the DDCP and has drafted a *Sitewide Pre-Demolition Survey* (PDSP) The PDSP is being worked on in consultation with EPA and CDPHE, who must approve it before the Site is allowed to implement it The PDSP is also based on the DQO process, and in accordance with the *Decommissioning Program Plan* (DPP), it adapts the use of the MARSSIM The DQO process is a systematic planning tool, based on the scientific method, that identifies the environmental problem, defines the data collection process, and ensures that the type, quality, and quantity of the data collected are appropriate for the decision making process The DQO process, defined by the EPA, is a series of planning steps to identify and design efficient and timely data collection program Independent verification and validation (IVV) is a subset of pre-demolition characterization Determining where, when and how to use it is determined on a case-by-case basis The PDSP section on IVV will specify the key criteria that DOE will use to determine on a case-by-case basis whether or not to conduct an IVV These criteria include experience and lessons learned from similar buildings, building specific issues (such as, contamination levels and locations), potential environmental and liability concerns, and, stakeholder and regulator input These criteria are used in conjunction with the pre-demolition survey DQOs to ensure 1) the need for an IVV is established, 2) that an IVV will provide sufficient data to make required decisions with reasonable certainty, and 3) the survey collects only the necessary amount of information EPA and CDPHE intend to do an IVV for Building 779, and will assess the need to conduct additional IVVs on other major plutonium buildings

		The concrete must meet the criteria outlined in the draft building RSOP before it can be stockpiled for reuse Sampling of the concrete after it has been rubbleized would not be needed A building built of concrete that is a candidate for being used as onsite fill must successfully complete the pre-demolition survey and must demonstrate that it meets the criteria for use as fill as summarized in the RSOP All decommissioning activities will be conducted in accordance with the RFETS Quality Assurance Program The DQO process must be used, confirmation must be received that the concrete has met the criteria, and the QA/QC requirements must be satisfactorily complied with before the concrete rubble is stockpiled for reuse On the other hand, if the DQOs and QA/QC were not met, the building would either be further decontaminated, or, if that is not practical, its concrete will be dropped from consideration for use as backfill The results of the pre-demolition survey are reviewed by CDPHE in accordance with the DPP Therefore, it is unnecessary to sample the concrete after it has been rubbleized, because it would have met the applicable criteria.
4	At what point in the D&D process will the HEPA filters be removed from the buildings? Will they be retained for under building characterization and deconstruction activities such as removing contaminated building sections that must be disposed of as low level or transuranic waste?	This question covers issues not within the scope of the RSOP As indicated on Page 1 of the RSOP, Section 1, second paragraph, the RSOP only addresses concrete that meets free release criteria and its disposition after demolition and placement as backfill The timing for the removal of HEPA filters is an important event that is determined on a case-by-case basis In general, decontamination will take place while HEPA filters are still operating Under building contamination will be addressed in separate RFCA decision documents
5	Concrete that meets the free release criteria will be segregated from contaminated concrete, stockpiled, and processed for use as backfill material around the site Where will the contaminated concrete be staged? Please provide detailed information showing the planned storage area, protection afforded to the area from the elements and plans for the environmental monitoring of this area Also provide a timetable for removing the waste generated, where it will be disposed and the costs associated with this activity	This question covers issues not within the scope of the RSOP As indicated on Page 1 of the RSOP, Section 1, second paragraph, the RSOP only addresses concrete that meets free release criteria and its disposition after demolition and placement as backfill Management of other wastes including contaminated concrete storage is addressed in the decision documents for building decommissioning
6	Please provide information as to the measurement instruments and processes that will be used to ensure that the surface and sub-surface of the concrete is free from radiological and non-radiological contamination before and after rubbleization	The decision for what measurement instruments and process will be used is determined on a case-by-case basis using established RFETS' procedures Guidance for characterization is contained in the DDCP, the Site QA Manual, and RFETS radiological control and safety procedures Taken together, these documents describe the process and methods for determining the appropriate instrumentation for each survey or sampling on a case-by-case basis See also Westminster comment #2
7	Please provide the City with a copy of the sampling plan for runoff water that comes from the rubbleized concrete pile berm indicating frequency of sampling and availability of those reports for public review If the plan is not available, when will it be developed?	As indicated on Page 6, Section 2 6, paragraph 3 of the RSOP, no sampling of runoff water from the concrete pile is anticipated Since the concrete will meet the free release criteria, sampling would not be necessary for runoff

8	Please provide detailed information on the cost savings achieved by keeping the rubble on site as well as information on the cost of each option that may have been considered, for use as clean fill rather than the concrete rubble, and the cost per ton disposal value for the free release rubble	A cost analysis was conducted in September 1998 to document the concrete disposal options for decommissioning activities at RFETS This document was used to assess the cost savings that were summarized in the RSOP and to provide information during briefings given at public meetings As indicated on Page 21 of the RSOP, Section 9 2, the fifth bullet, the cost analysis has been made part of the administrative record for the RSOP
9	Does the figure for concrete processing (16 50 per cubic yard) include onsite labor required to remove rebar and other debris from concrete prior to processing and the auxiliary processing facilities required before the concrete is rubbleized?	The $16 50 per cubic yard figure does include onsite labor to remove rebar and other debris and auxiliary processing See also response to Westminster Question 8
10	What will become of the other construction materials that will be removed? Will they be removed to the Erie Landfill? What are the costs associated with transporting these materials? How many shipments are anticipated?	This question covers issues not within the scope of the RSOP As indicated on Page 1 of the RSOP, Section 1, second paragraph, the RSOP only addresses concrete that meets free release criteria and its disposition after demolition and placement as backfill The disposition of other construction materials will be addressed in other decision documents
11	Initially DOE indicated that the rubble would be used to fill the cleaned foundations of the 700-371/374 buildings that are all included in the Industrial Area The industrial Area will have long term monitoring wells, DOE now plans to use the material for fill of other foundations as well as site contouring What additional monitoring wells will be put in place to ensure that there is no migration of contamination into the groundwater from the placement of rubble in areas other than the Industrial Area? Please provide written information on what other foundations are planned for infill as well as where the contouring will occur	As indicated on pages 19 and 20, Section 8 of the RSOP, there are two areas proposed for backfilling with the recycled concrete Building 771 and Buildings 371/374 Currently, there are no plans to backfill any other areas or to use the recycled concrete for contouring However, if other potential areas are identified, they will have to be screened against the site selection criteria in Section 8 1 Since the concrete will have to meet the free release criteria, there is no need for additional monitoring wells
12	Contamination under the foundations of site buildings needs to be removed prior to filling Is DOE committed to removing all building foundations as recommended by the Industrial Area Task Force as well as the City to mitigate the potential for further offsite migration of contamination into the Woman Creek/Walnut Creek drainage's and to preserve options for future use?	This question is not within the scope of the RSOP As indicated on Page 1 of the RSOP, Section 1, second paragraph, the RSOP only addresses concrete that meets free release criteria and its disposition after demolition and placement as backfill The disposition of the foundations will be determined in future decommissioning or environmental restoration decision documents
13	The RSOP states that if the number of road miles are reduced the number of potential highway accidents would be less How were the risks calculated?	Data from the U S Department of Transportation, National Highway Traffic Safety Administration for highway truck accident rates were used, as were on-Site accident rates, to qualitatively identify risks for the scenarios presented in the RSOP This data has been included in the Administrative Record for this RSOP The RSOP states that if the number of road miles are reduced the number of potential highway accidents would be less Truck and automotive accident rates, obtained from the U S Department of Transportation are maintained as a function of miles traveled The risks are calculated in a qualitative approach in that the more miles traveled, the more accidents will occur Risk is directly proportional to the miles traveled

14	Why would the environmental impacts of placing the rubble in the ground onsite be less than if they were placed in the ground at a landfill? Please clarify the calculations and rationale used to validate the environmental and cost advantages of concrete recycling	Environmental impacts would increase due to all of the associated direct and indirect impacts of hauling off concrete and hauling in rock or soil These would include, for example, traffic safety, as discussed in the response to question 13, and air emissions, as discussed in the response to question 15 Other impacts would occur from using rock and gravel in lieu of concrete for fill Impacts would be less for recycling when all environmental impacts (not just those at the rubble disposal sites) are considered The cost data is available as discussed above in the response for question #8 Cost is not a consideration under NEPA, and was not used to show an environmental benefit or detriment from concrete recycling
15	Will the truck emissions be greater or less if the trucks travel over 80 miles versus the lower dispersion found from onsite transportation in the relatively smaller confines of the site?	Regardless of dispersion, hauling a load less than 0 5 mile will generate less air pollution than hauling the same load the same 0 5-mile plus another 79 5 miles
16	The lifetime slump is designed not to exceed 1% will the onsite recycled concrete disposition sites support light, moderate, or heavy construction should the land be developed in the future?	By specifying the 1% slump requirement, the RSOP has required that an engineered assessment will be conducted to ensure that the 1% slump will be achieved depending on the future use Since the land use of RFETS after closure has not been determined, it is not yet known if the area will support light, moderate, or heavy traffic That is why no specific compaction or testing requirements were provided in the RSOP Also see response to Broomfield Question 11
17	The RSOP states that radiological air monitoring will not be necessary during the demolition, processing, or placement of the rubbleized material Previous remediation efforts called for portable air monitors around the remediation area The RSOP states that because the rubble will meet "free release" criteria the additional monitoring is not necessary Airborne dust will be generated by the deconstruction and rubbleizing activities Wouldn't placement of portable monitors around the area, in addition to the CDPHE monitors that are in place, provide further evidence and assurance to the public that the rubble was indeed clean and that there was no spread of airborne contamination during these activities? Please comment	As indicated on Page 6, Section 2 6 of the RSOP, the existing Site Radioactive Ambient Air Monitoring Program (RAAMP) sampler network will be used for ambient air monitoring The RAAMP sampler network continuously monitors airborne dispersion of radioactive materials from the Site into the surrounding environment Thirty-seven samplers comprise the RAAMP network Fourteen of these samplers are deployed at the Site perimeter and are used to confirm Site compliance with the 10 millirem per year standard mandated in 40 CFR 61, Subpart H Filters for the 14 RAAMP samplers located at the Site perimeter and from one on-Site sampler near the 903 Pad are collected and analyzed monthly for uranium, plutonium, and americium isotopes The RAAMP is in addition to the CDPHE sampling network CDPHE has determined that its network is adequate for monitoring demolitions

18	DOE does not plan to place the rubble on an impervious surface Since the materials may be stored onsite for a significant period of time, a potential exists for the downward migration of these material into the underlying soil columns Overtime, surface precipitation may dissolve materials and carry them into the underlying soil and the groundwater There are no plans to prevent the migration of concrete fines and dissolved material into the soil column or groundwater What is the cost of using the impervious material to protect the soil and groundwater from further contamination, and why was this protection not considered in the RSOP?	The concrete will not be placed on an impervious surface because the concrete will meet free release criteria Also, concrete fines will not move through the soil column and enter groundwater There would have to be voids in the soil column that would allow the fines to work down into the groundwater These voids would have to be numerous and connected Soils with these characteristics do not exist in the areas being considered for stockpiling
19	Use of impervious material will also aid in restricting the growth of weeds under the rubble pile that could provide food for small animals The concrete rubble could provide habitat for field and deer mice, which have been linked to the hantavirus as well as rattlesnakes that are indigenous to the site How does DOE plan to ensure that the rubble piles are kept free from mice and snakes?	The Site currently has an Integrated Weed Management Plan that addresses weed control Areas such as a concrete rubble storage area would be treated as other storage areas are, and would be subject to appropriate weed control under this program Without appropriate food sources, neither rodents nor the snakes that would follow them would be expected to be a problem around the rubble
20	The stockpile for free-release material will have dust and surface water control measures to prevent fugitive dust and impacts to surface water from the stockpiling activities How often will dust suppression materials be applied to the stockpile? What measures will be taken to protect the surface water from large amounts of runoff generated during storm events?	As indicated on Page 4, Section 2 2, last paragraph and Page 5, Section 2 3 last paragraph and Page 5, Section 2 4, last paragraph, dust control will be conducted through stockpiling, processing and transportation A stabilizing emulsion will be applied when material is added or removed from a stockpile and on an as-needed basis As indicated on Page 4, Section 2 2, third paragraph, the storage areas will be surrounded by silt fence and shallow berms to retain runoff If water volume exceeds the capacity of the berms, the water will be pumped off to a holding tank to evaporate This will prevent large amounts of runoff generated during storm events from affecting surface water with silt or pH See also responses to Westminster Questions 7 and 24 and Broomfield Questions 5 and 7
21	What sampling measures and schedule will be instituted to ensure that the runoff precipitation that is contained in the berms does not contain incompatible chemicals (acids, solvents, etc) leached from the concrete?	As indicated on Page 6, Section 2 6, paragraph 3, no sampling of the runoff is anticipated because the concrete will meet free release criteria Incompatible chemicals would not be present in concentrations that would react or otherwise be expected to have adverse impacts on human health or the environment See also the response to Westminster Question 7
22	A NEPA checklist should be used to ensure all environmental issues have been addressed and resolved The checklist should cover Clean Air Act, Clean Water Act, NEPA, Resource Conservation and Recovery Act and non-hazardous solid waste, radiological controls, Endangered and Threatened Species Act and other Federal and State environmental regulations Does DOE plan to use such a list? If not please explain your reasons for this decision	NEPA checklists were used to identify potential issues associated with concrete recycling All of the issues identified during completion of the checklist were analyzed and documented in Section 5 of the RSOP The regulations identified by the commentor (as well as others) were evaluated in developing the RSOP

23	Since the total land surface involved with the stockpiling and processing of the concrete exceeds five acres, does the requirements for a pollution prevention runoff plan have to be developed? Does the current National Environmental Policy Act (NEPA) documentation for the site cover this activity?	The existing NPDES permit and pending NPDES permit renewal incorporates EPA's current storm water discharge requirements, including the stormwater pollution prevention program (SWPPP). Under the existing NPDES requirements, each site is considered to be a separate site and each separate stockpile area is less than 5 acres In addition, the Site has received direction from the EPA regarding the need for a SWPPP Even when an individual site exceeded five acres, a SWPPP was not required First, when the Site undertook the construction of the new landfill, the Site was directed by EPA to send a Notification of Intent (NOI) to cover the construction activities (because the area of disturbance was greater than 5 acres and was located outside of the drainages in the Industrial Area covered by the 1992 permit application) More recently, the McKay bypass project was covered by a similar NOI for the same reasons This topic is discussed in the RSOP, which includes a NEPA values analysis (documentation) in Section 5, Environmental Consequences
24	How will the waste resulting from runoff and/or the evaporation of retained surface runoff be dealt with? Do the rubble backfill sites constitute disposal of a non-hazardous solid waste and therefore require a permit?	There will be no waste resulting from runoff and/or evaporation of runoff, see Section 4 of the RSOP, first sentence Run-off will be controlled by the berms and silt fences and will be contained at the stockpile location As indicated on Page 2, Section 2, paragraph 1, concrete is considered an inert material by Colorado solid waste regulations As indicated on Page 16, Section 6 of the RSOP, last two rows of the table, the concrete is considered recyclable material and is exempt from solid waste disposal sites and facilities regulations
25	Building 771 and several others have sump pumps to remove groundwater from the footings How does DOE plan to deal with the groundwater that infiltrated these buildings during removal of the building foundation? If rubble is added to the excavation that remains after the removal how will the groundwater be kept away from the rubble?	This question is not within the scope of the RSOP As indicated on Page 1 of the RSOP, Section 1, second paragraph, the RSOP only addresses concrete that meets free release criteria and its disposition after demolition and placement as backfill Groundwater management and sump removal will be covered in the building decision documents, future RSOPs, or in environmental restoration documents

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Question Number	Question	Response
1	The City of Broomfield cannot support the RSOP due to the lack of available information at this time	Extensive supporting technical and engineering information is referenced in section 5 3 of the draft RSOP and in the list of documents in the administrative record in section 9 2 The offer to provide supporting information was made verbally during each of the public presentations on the subject Telephone numbers of one or more Site personnel with ready access to the information were consistently provided during the stakeholder meetings, and the cover letter announcing the public comment period for the draft RSOP also included a contact for additional information Although very little information was requested of the Site, all that was requested was provided to the requestors At the request of the Rocky Flats Coalition of Local Governments (RFCoLG), 13 additional days were added to the 45-day public comment period to allow more time for review
2	The City of Broomfield is unwilling to support the proposed RSOP until the Site can prove to the community that the concrete rubble does not pose a threat to public health and the environment The City of Broomfield expects that the Department of Energy will provide the community with the documentation that proves that the rubble does not pose a threat to public health and the environment prior to implementing this RSOP	As discussed in section 2 1 of the RSOP, the free release standard for hazardous substances including radionuclides will be achieved As stated in section 5, the project will have minimal adverse cumulative effects, and the effects are expected to be minimal and temporary

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3	Has DOE Headquarters established a site-specific free-release criterion for the RFETS concrete? If so, what factors did DOE evaluate? Is the evaluation available to the public? If so, we request a copy	DOE HQ has not established a separate site-specific release standard for concrete at RFETS RFETS follows DOE Order 5400 5 which is a DOE complex wide order The order references NRC Reg Guide 1 86 Reg Guide 1 86 has been used commercially for almost 30 years as the release standard for equipment and facilities for NRC decommissioning The standard established release requirements for surface contamination The standard is directly applicable to RFETS, and it is used because the vast majority of materials that are contaminated are surficially contaminated RFETS takes a conservative approach when volumetric contamination is found Any volumetrically contaminated material is characterized, removed and managed as a contaminated waste Therefore, only surface contaminated material is left to be decontaminated to the free release standard DOE evaluated two release standards, surface contamination and "Dose Based" The current information for a dose based analysis was derived using information from the RFCA agreement Attachment 5, Table 5 for the Tier I and Tier II action levels in soil Additionally, Kaiser-Hill recently conducted an analysis as part of an internal planning exercise, which evaluated several scenarios of disposition of the concrete rubble (The Use of Dose-Based Assessment In Evaluating D&D Alternatives At the RFETS, August 1999) This was a "Rough Order of Magnitude" analysis Kaiser-hill used inputs to the model that they felt were reasonable and technically sound given the purpose and goals of the analysis All of the information provided by the analysis indicated that the surface contamination release standard was significantly more conservative than any of these scenarios and was at least as protective of human health and the environment This information is available in the Administrative Record

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4	Therefore, we suggest that a conservative approach be taken which assumes that all of the actinides will leach from the rubblized concrete These results in a much more restrictive Subsurface Soil Action Level approximately equal to the Tier I Groundwater Action Level of 15 1 pCi/L for plutonium This standard supported by a comprehensive rubble sampling and testing program will help ensure that radioactive materials are not inadvertently buried on-site Has a rubble sampling and testing program been developed?	The assumption that all of the actinides will leach into the groundwater is contrary to current information The most recent information on this subject comes from the RFETS Actinide Migration Evaluation group meeting minutes from April 29 and April 30, 1999 The latest information from experiments conducted at Los Alamos National Laboratory (LANL) has concluded that the plutonium in the environment at RFETS is PuO2 The same document indicates that PuO2 is not soluble Additionally, the internal study conducted by Kaiser-Hill rubble (The Use of Dose-Based Assessment In Evaluating D&D Alternatives At the RFETS, August 1999) which is a "Rough Order of Magnitude" analysis, indicates that the surface release criteria is several magnitudes lower than the Tier 1 Groundwater Action Level of 15 1 pCi/L
5	The PCB "free release" value of 50 ppm in Table 2-1 of the RSOP is not specifically provided in the regulations cited in Table 2-1 Generally, 50 ppm triggers mandatory cleanup actions The only post-cleanup value for PCBs that requires no additional safeguards is a residual level of 1 ppm The 1 ppm value seems to be a more appropriated free-release value It is the City's understanding that the 50 ppm value will not be provided in the revised RSOP	The reference to PCB standards in section 2 1 of the RSOP were changed to delete the 50 ppm value and to reference instead the PCB regulations at 40 CFR 761 These regulations cover the determination of the cleanup standards for historical releases of PCBs
6	What are the proposed revisions to the Integrated Monitoring Plan with respect to this project?	The Integrated Monitoring Plan provides for both project specific monitoring and routine monitoring of effluent pathways from the Industrial Area Therefore, this is already covered in the Integrated Monitoring Plan under project specific monitoring for each media and no revisions will be necessary
7	What inspection criteria will be employed to determine when additional dust control surfactant needs to be reapplied during the 3 to 5 year stockpile storage period?	Inspections will be conducted of the storage areas, and application and maintenance of the stabilizing emulsion to control dust will be completed, as determined by the results of the inspections and the stabilizing emulsion manufacturer's recommendations Inspections will be conducted at least every two weeks or when the sustained wind velocity exceeds 40 mph or when it rains more than 0 5 inches in a single event Inspections will be documented in a logbook
8	What inspection criteria will be employed to determine when repairs to the containment berm and silt fencing are needed to prevent runoff?	The inspection criteria will be berm integrity, silt fence integrity, and presence of excess water and silt If the berms or silt fence do not meet the inspection criteria, repairs will be made
9	Will the Draft Industrial Area Characterization and Remediation Strategy be consulted to ensure that the proposed interim concrete rubble storage sites are not occupied with rubble at times which will impede the schedule?	Yes The industrial area characterization and the decommissioning organizations for RFETS have been coordinating this work for the industrial area strategy and were consulted in the preparation of this RSOP

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10	What studies have been conducted to determine what effect the buried concrete will have on changing the alkalinity and pH of the groundwater and potential adverse effects of mobilizing potential groundwater contaminants?	No studies were conducted by RFETS regarding the effect of buried concrete on the alkalinity and pH of groundwater Several US Department of Transportation guidelines were consulted during the preparation of the RSOP These guidelines indicate that rubbleized concrete has the potential for affecting groundwater pH, however, with respect to embankment and fill, the pH concerns were predominantly restricted to corrosion of piping that is within the fill material See also the response to Broomfield question #4 which provides information and references for migration of PuO2
11	Does the RSOP assume an unrestricted end land-use scenario? If not what type of end land-use in the RSOP based upon?	The RSOP does not make any assumptions for the end land use of the RFETS, and was written to support any land-use scenario The end land use has not been determined, and it is outside of the scope of the RSOP However, the RSOP was written take a conservative approach It was written to ensure that the backfilled areas withstand whatever land use is decided The minimum slump requirement was established to ensure that the land use is considered and that the backfilled areas will have no effect on the end land use

Other changes and corrections regarding the RSOP for Recycling Concrete		
Question Number	Question	Response
1	Verbal comment by Steve Tarlton The *Sitewide Predemolition Survey Plan* listed in Section 9 2 is a draft document	The reference to the document was removed