

LA-UR-02-2242

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Title: HAZARD CONTROL PLAN
HCP NUMBER: CGRP-0073-005, R3
AIR CURTAIN DESTRUCTOR (AIRBURNER)
OPERATIONS AT TA-16 BORROW PIT

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Submitted to: AIR BURNERS, LLC

Los Alamos

NATIONAL LABORATORY

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1.0 Description of Work

The purpose of this Hazard Control Plan (HCP) is to identify hazards and control measures associated with the use of the Air Burners, LLC, Air Curtain Destructor units utilized to burn waste wood (slash) materials from the FWO-Cerro Grande Rehabilitation Project (FWO-CGRP) fuel mitigation operations.

Air curtain destructors (ACDs, also known as airburners) enhance burning in an open pit or firebox by using a high-speed fan to force air over the top of and throughout the materials being combusted. FWO-CGRP subcontractors will operate two types of units: a portable unit assembled at a trench that is excavated for burning and a movable unit with a pre-constructed firebox and is designed for use above ground level. The units will be relocated as needed for use in proximity to forest fuel mitigation (logging/thinning) operations.

Operations will be performed by a subcontractor. Operational stages include the following: site preparation, trench excavation, unit set-up, pre-burn loading, ignition, burn operation, burn-down, ash removal, and equipment maintenance. FWO-CGRP personnel will be performing tasks associated with coordination of operations, subcontractor management, site and equipment inspection, site security, emergency response and fire protection, and ESH monitoring.

The following pre-operational conditions must be met:

- Operation within the requirements of the New Mexico Environment Department (NMED) permit (operating hours and limits).
- Adherence with the airburner fire protection protocol (Section 6.0) and pre-ignition checklist (Attachment 5).
- If requested by the FM, FWO-CGRP will not conduct burning activities without the presence on site of LAFD or qualified wildfire fighting personnel with appropriate equipment (see Section 6.4.4), until such time as the FM notifies FWO-CGRP that such presence.

2.0 Significant Hazards

- 2.1 Physical Hazards (fire, temperature stresses, noise, trench hazards, sun exposure, and nuisance dust, ash, and smoke exposure)
- 2.2 Chemical Hazards (waste materials, explosive residues, crystalline silica)

3.0 Initial Risk Estimate

The initial risk estimate for airburner operations is: MEDIUM. This estimate is based on the “improbable” likelihood (slight chance to highly unlikely) for severe environmental harm/liability or property damage from normal ACD operations. FWO-CGRP consulted with the ACD manufacturer and examined reports of ACD operations in other jurisdictions to make this assessment.

4.0 Institutional, Facility, or Activity Operational Requirements or Restrictions

Safe Work Practices LIR 300-00-01.2
Noise and Temperature Stress LIR 402-820-01.0
Welding, Cutting, or Other Spark-Flame Producing Operations LIR 402-840-01.0
Excavation/Soil Disturbing Permit Process LIR 402-880-01.2
Forklifts and Powered Industrial Trucks LIR 402-1110.01.1
Lightning Safety LIG 402-10-01A.0
Cranes, Hoists, Lifting Devices and Rigging LIR 402-1120-01.0

5.0 Description of Controls

- 5.1 Related Controls. This HCP augments the airburner equipment manufacturers’ operating/maintenance guidelines and recommendations.
- 5.2 Preparation and Awareness. Preparation and awareness are the most important control measures. Ensuring all personnel are properly hydrated, equipped with appropriate personal protective equipment (PPE), are familiar with the terrain and features, have adequate first aid and communications equipment, and have completed all required training and authorizations before departure will result in the highest likelihood of non-injury. Awareness of the variety of potential hazards will provide the first line of defense in avoiding situations where personnel may encounter while conducting fieldwork. At least one person on the field crew will have First Aid/CPR, Thermal Stress Awareness, and Fire Extinguisher/Fire Watch training. There will be safe work practice demonstration for site workers and individual worker assessment of the use of hand tools and other equipment that may be used at the site.
- 5.3 Biological Hazards.
 - 5.3.1 Bites from snakes, spiders, and ticks are best avoided by refraining from reaching under objects, wearing appropriate field boots, and wearing long sleeved pants and shirts. Insect repellent may be required.
 - 5.3.2 Encounters with predators are rare during daylight hours and usually occur when inadvertently crossing paths with inactive animals. These encounters may best be avoided by alerting potential animals in the area of your presence with noise.

- 5.3.3 Exposure to hantavirus and the plague may be accomplished by avoiding dead or dying mammals and avoiding potential rodent nesting areas.

5.4 Physical Hazards.

5.4.1 General Controls. For control against general work hazards, PPE will include the following: hardhats, safety glasses, work boots with lug soles, long pants, shirt with sleeves that extend at least four inches over the shoulder, and leather gloves. The site will be adequately lighted during night operations.

5.4.2 Fall Hazard. Trenches for burning and ash deposition will be 7 to 15 feet deep. Personnel will be protected by adherence to the Fall Protection Plan. Control Access Zones (CAZs) will be established a minimum of 6 feet from the leading edges. During non-operational periods, the CAZ will be fenced. Access to the CAZ is restricted to authorized entrants listed on a fall protection plan and subject to a monitoring and fall protection system. (See Attachment 6: Airburner Fall Protection Plan.) Approved and precluded activities within the CAZ are identified in the plan.

5.4.3 Fire Hazard. Temperatures within the airburner will reach 2000°F or more. Burning embers will be controlled by the air curtain, but may escape during fuel material loading or during non-optimal burning conditions (high winds, uneven fuel distribution). Air burner operations are subject to a Fire Protection Protocol (presented in Section 6.0) and applicable facility site control plans. Fire hazards are controlled by establishing a combustible materials exclusion zone (EZ) and setbacks for standing trees and buildings. Access to the EZ will be limited to authorized workers wearing fire-resistant clothing (including long-sleeved shirts) and subject to a monitor or buddy system. The system requires that the locations of site workers must be known and workers must be observed at all times while in the EZ. Fire protection measures are graded, depending on fire danger considerations, and include the presence of qualified firefighting personnel, fire control equipment, and a fire communication/alarm system. The locations of fire extinguishers and other fire-related equipment will be communicated to site workers at the daily pre-job briefings.

5.4.4 Temperature Stress and Radiant Heat. Air temperatures immediately near the airburner will be a minimum of 200-500° F. Exposure is mitigated by short duration and safe distance from elevated temperatures. Temperature stress will be exacerbated during the Spring and Summer months. The effects of heat and natural aridity may be controlled by ensuring that all personnel are well hydrated, that water is readily available, and that all personnel are wearing appropriate clothing. Any changes in worker behavior should be noted and an assessment made as to whether dehydration or temperature stress may be a cause. FWO-CGRP ES&H personnel will evaluate radiant heat exposure, monitor heat stress, recommend adequate protection measures, and establish safe working zones. Cold stress during Winter months may be prevented through the use of appropriate clothing. Multiple, loose layers of clothes provide the best protection against cold and provide the means to remove

outer layers without being excessively exposed to cold. Adequate hand, foot, and head wear is also necessary when working outdoors during. Sufficient hydration is equally important in the Winter months.

- 5.4.5 Heavy Equipment Operations. Track hoes and front end loaders are used for managing wood fuel and waste ash. Heavy equipment will be operated by subcontractors. Always approach equipment from in front of the operator, never from behind. Be aware of standard hand signals, pinch points, uneven terrain, and adjacent personnel, equipment and obstacles. Ensure eye contact with the equipment operator prior to approaching the working area. Signal the equipment operator and insure he signals to the employee before employee approaches equipment. Keep from the swing radius and articulation points of the equipment. Equipment backup or bi-directional alarms must be properly functioning. During airburner operation, equipment approach to the trench CAZ will be controlled by barriers. Equipment should be placed in a de-energized state and buckets or grapples should be positioned on stable surfaces when not being operated. Heavy equipment must comply with the appropriate OSHA standards, at a minimum. Operators must demonstrate ability to operate specific equipment types either through training records, certification, or experience. Equipment will comply with LIR 402-1110.01.1 (Forklifts and Powered Industrial Trucks) and LIR 402-1120.01.1 (Cranes, Hoists, Lifting Devices and Rigging).
- 5.4.6 Noise. Exposure to unacceptable noise levels while conducting fieldwork is mitigated primarily by the short duration and the safe distance from elevated noise sources. Significant noise sources may include the airburner engine, heavy equipment, and chain saws used for reducing wood wastes. Noise in the vicinity of these sources may exceed 82 dBA. FWO-CGRP ES&H personnel will evaluate potentially excessive noise sources, perform monitoring as needed, recommend adequate protection measures, and establish safe working zones. Based on initial noise surveys during full ACD operation, a hearing protection area is established 50 feet from the ACD engine and fan, and 30 feet from the trench ACD manifold. Hearing protection is also required for chainsaw operation.
- 5.4.7 Nuisance Dust, Ash, and Smoke. Nuisance dust may result from operation of a track hoe or other heavy equipment and also during transfer of ash from the airburner trench or firebox. Dust control measures (site watering) will be implemented to control dust. Releases of smoke and ash may occur during airburner operation, particularly during startup, operational fuel loading, emergency shut-down, and adverse wind conditions. The airburner unit will typically be set up so that operations are performed on the upwind side of the unit to minimize these potential conditions. FWO-CGRP ES&H personnel will evaluate nuisance emissions and recommend adequate protection measures.
- 5.4.8 Lightning. Lightning is most frequent during the Spring and Summer months. The proximity of lightning may be estimated by counting the seconds between the lightning flash and the thunder: to estimate distance

in miles divide by 5, in kilometers by 3. Suspend operations (for the ACD unit, suspend material loading and maintain fire watch) when there is a 30-second delay between lightning and thunder (6 miles) and discontinue operations when the delay is 15 seconds (3 miles). When lightning strikes are occurring in the vicinity:

- A) suspend all work (except fire watch monitoring of active burning)
- B) seek shelter in one of the following locations, listed in the order of preference:
 - 1) steel-framed building
 - 2) enclosed vehicle with a steel roof (minimum for maintaining fire watch during active burning)
 - 3) low ground away from solitary trees.
- C) individuals should spread out to reduce the possibility of multiple casualties
- D) place any metal objects away from your position
- E) on open ground, adopt a crouched position with hands off of the ground and feet close together on some dry insulation (sleeping bag, rope, non-metal frame pack, etc.)
- F) stay away from trees and fences.

5.4.9 Tree/snag Falls. No overhead falling tree or snag hazards will be located within the EZ or within the exclusion perimeter for standing trees. Within forested areas the risk of injury due to falling trees and snags is especially high after a forest fire and during high winds; the risk is also present in the proximity of tree fellers. Awareness of wind speed, awareness of the health of surrounding trees, and hard hats are the best protection against overhead hazards in the forest. Additionally, in the proximity of tree fellers, field workers must be knowledgeable of the hand and audible signals used. Field workers must remain outside a 2½-tree-height radius of trees being felled and eye contact must be made when approaching tree fellers.

5.4.10 Trips and Falls. To minimize trips and falls personnel should ensure that the working area surfaces are as free from clutter as possible, that appropriate work boots are worn, and that step locations are firm and free of materials that may lessen friction.

5.4.11 Excessive Sun Exposure. Skin should be covered to help prevent overexposure. Sunscreen and lip balm will be made available to site workers.

5.5 Chemical Hazards. All chemical hazards should be avoided when conducting fieldwork unless the activity specifically requires your proximity to the hazard. A separate hazard assessment will be accomplished in these situations. The locations of known chemical hazards will generally be identified and isolated by FM personnel; however, field personnel may come across chemical hazards that have not been previously discovered. Chemical hazards may be either in a container or lose on the ground.

- 5.5.1 Fuels and Lubricants. Fuels, ignition sources, and airburner unit lubricants will be managed by subcontractor personnel or service vendors. These materials will be isolated in flammable storage containers prior to use.
- 5.5.2 Spill Prevention. Spill prevention measures will include inspection of equipment, implementation of spill control procedures during filling and transfers, maintaining access to spill control equipment, and notification of response personnel in the event of spill incidents. Exposed equipment hydraulic lines will be inspected on a daily basis with special attention to lines on equipment loading fuels into the active airburner unit. Equipment fueling will be monitored to prevent overfilling.

All material spills that may occur should be considered as hazardous, except where there is documentation (such as may be contained in a Material Safety Data Sheet) that indicates otherwise. A hazardous material spill of any quantity must be reported to the Emergency Management and Response Group (EM&R) at 667-6211. Use the checklist provided (Attachment 4). EM&R will make the appropriate determination for response requirements.

If a hazardous material spill occurs, the following actions will be taken:

- Ensure that there is no potential danger to you or other personnel.
- If possible without potential danger, take immediate measures to control and contain the spill.
- Keep unnecessary personnel away, isolate the hazardous area and deny entry.
- Stay upwind and keep out of low-lying areas.
- Notify the Safety Officer and field Supervisor.
- Do not allow flares, smoking, and flames in the hazard area.

If it is possible to control and contain spills, take the following actions.

- For liquids, keep combustible material away from spilled material and absorb spill with absorbent material. Place in container, cover, label, and remove to secure location.
- For dry materials shovel into container and cover, label, and move to secure area. Use care not to make material airborne.

- 5.5.3 Waste Materials. Waste materials may include any and all varieties of chemicals. Generally, waste material locations are identified and marked. However, if containers of unknown content or origin are discovered, they should be avoided and their location made known to site and FM personnel.
- 5.5.4 Crystalline Silica. Exposure to crystalline silica may occur when conducting, or in the vicinity of, earth disturbing activities. FWO-CGRP ES&H personnel will investigate potential crystalline silica sources and recommend adequate protection measures.

6.0 Fire Protection Protocol

- 6.1 **Scope.** FWO-CGRP personnel and subcontractors will not perform firefighting activities beyond their authorized work scope or training. FWO-CGRP personnel and subcontractor firefighting activities will not extend beyond extinguishing fires that are in the incipient stage. The Los Alamos Fire Department (LAFD) is the fire response agency. As indicated in the Fire Protection Requirements (section 6.4.3), LAFD, EM&R, FWO-Fire, DOE, and the FM will be notified of burning schedules.
- 6.2 **Operation Description.** Airburners enhance burning in an open pit or firebox by using a high-speed fan to force air over the top of and throughout the materials being combusted, creating very high temperatures (above 2000° F). The units are assembled in proximity to the forest thinning operations. Each unit consists of a fan, a duct, a manifold, and a trench or firebox. Operation stages include pre-burn loading, ignition, normal operation, and burn-down. The trench or box is loaded with layers of forest slash and several gallons of diesel fuel are applied to accelerate burning. At full operation, materials are added at a rate of up to 20 tons per hour. Material loading is discontinued approximately one to two hours prior to the end of operations.
- 6.3 **Fire Hazards and Control Actions.** Potential fire hazards associated with airburner operations and mitigation actions include the following:

Hazard	Control Actions
General	Trained fire watch/designated person, alarm/communication system, LAFD/EM&R notification, incipient stage firefighting equipment on-site, exclusion perimeters
Worker burn injury	HASP, HCP, PPE, ignition and material loading procedures, and trench Control Access Zone (CAZ)
Equipment fire	Proper maintenance, spill cleanup, extinguishers in equipment
Combustible and flammable materials	Approved storage containers, ignition sources segregated, combustible materials Exclusion Zone (EZ)
Fugitive embers/burning material	Proper airburner operating procedures, monitor wind/weather conditions, fire watch/designated worker, incipient stage firefighting equipment on-site

Hold points and response actions are summarized in the table presented at the end of the document as Table 1.

6.4 Fire Protection Requirements

- 6.4.1 **Perimeters and Wind Conditions.** Fire protection perimeters include an Exclusion Zone (EZ) for combustible materials and setbacks for trees and buildings. Perimeters are determined by maximum operating wind speeds as follows during “low” and “moderate” fire hazard conditions:

Material of Concern	Maximum Operating Wind Speeds & Minimum Distances Required		
	10 mph	11-15 mph	16-20 mph
Combustibles (EZ)	100 ft	150	200
Trees	150 ft	200	250
Buildings	300 ft	400	500

During “high” and “very high” fire hazard conditions, the maximum operating wind speed shall be 10 mph. Fire hazard ratings are discussed below in section 6.4.10.

Wind speeds will be monitored during burning operations using on-site equipment and/or by reference to the LANL Weather Machine (<http://weather.lanl.gov/>). Monitoring will be performed at least hourly during burn operations and monitoring will be increased when winds approach maximum operating speeds. In the event of sustained winds (average winds monitored over a minimum of a 1-minute period) above the maximum allowed, airburner loading will be suspended until windspeed is below the maximum allowed.

The fire danger rating (contact EM&R at 667-6211 for current rating) and weather and wind forecasts (contact ESH-17 AQ Meteorology at 667-8359 or LANL Weather Machine at <http://weather.lanl.gov/>) will be reviewed prior to burning operations.

6.4.2 Permits and Times of Operation. An open burning permit is required from the New Mexico Environment Department (NMED). Times of operation are limited by the NMED permit and any subsequent NMED modifications. For daily operations the limit is at least 1 hour after sunrise to at least 1 hour before sunset, provided that burning is initiated when air dispersion conditions are met (NMED 6-15-01 permit and 10-30-01 modification). NMED also allows continuous operation initiated at least 1 hour after sunrise until burning is completed, provided that burning is initiated and completed when air dispersion conditions are met (NMED 2-28-02 modification). An ESH-17 recordkeeping form for tracking information required for the NMED is presented in Attachment 8. Fire-related permits may be required from FWO-Fire (Flame/Spark Permit) and Facility Managers (FM site-specific permits). This HCP may serve in lieu of a flame/spark permit if there are no other spark/flame permit requirements. Copies of this HCP and any required permits shall be maintained at each unit location during burning operations. Contact FWO-Fire to obtain flame/spark permits and FM for site-specific permits.

6.4.3 Notifications. LAFD, EM&R, FWO-Fire, DOE, and the FM point-of-contact will be notified prior to conducting initial airburner activities. (see Attachment 3, Fire Coordination/Agency Contact List). LAFD and EM&R shall be notified on a daily basis of burn operations. The initial notification will include maps and schedules describing unit operating locations, approximate dates and hours of operation, and other pertinent information that may be requested by the coordinating agencies. Daily notifications

may be by telephone or radio. If they request, the coordinating agencies may participate in pre-ignition briefings and may monitor on-site burn activities. Coordination will be maintained between FWO-CGRP and these agencies as appropriate.

- 6.4.4 On-Site Equipment and Personnel. Extinguishers (minimum 2-A:10-BC) will be present in any motorized equipment at the site, including vehicles, heavy equipment, and airburner units. Firefighting equipment (extinguishers and hand tools) for incipient stage fires will also be present. A water truck will be on-site during “high” and “very high” fire hazard conditions for incipient fires and as a water source to support fire responders. There will be safe work practice demonstration for site workers and individual worker assessment of the use of hand tools and other incipient stage firefighting equipment that may be used at the site.

During “very high” conditions, there must be either an LAFD unit or other qualified firefighting personnel and equipment agreed to by EM&R on site. Firefighters other than LAFD will have Firefighter FET2 certification in accordance with the National Wildfire Coordinating Group “Wildland and Prescribed Fire Qualifications System Guide” (PMS 310-1).

ACDs may be operated during daylight hours or on a continuous (24-hour) basis. At least three subcontractor workers (consisting of three operators or two operators and one laborer) shall be present during the ‘day’ shift and at least two subcontractor equipment operators will be on site during the ‘night’ shift. During “high” fire danger and above, FWO-CGRP personnel will be on site.

- 6.4.5 Combustible/Flammable Sources. Fuels, ignition devices, or other combustible or flammable materials will be stored in approved containers or cabinets. Ignition devices will be segregated from combustible and flammable materials. The airburner engine will not be fueled during burning operations except as allowed under the following conditions: material loading is suspended during fueling, a fire watch is posted at the fueling location with a fire extinguisher, and fueling equipment is present only for that period of time required for airburner engine fueling. It is anticipated that airburner engine fueling will only be performed during extended or continuous burning operations. Equipment fueling will be performed outside the EZ. Fueling will be monitored to prevent overfilling. All spills/releases will be reported to EM&R.
- 6.4.6 Pre-ignition Briefing and Checklist. This briefing will be performed and documented using the attached Airburner Ignition Checklist prior to each airburner ignition. In the case of extended or continuous operations the checklist will be completed and the beginning of each work shift. The briefing will include review of any permit requirements, the fire protection protocol, site-specific conditions, emergency shut-down procedures, fire and emergency response, alarm and communication procedures, and weather/wind conditions. The briefing will include FWO-CGRP site personnel and subcontractors.

- 6.4.7 Emergency Shutdown. In the event of hazardous site conditions or an operations emergency, the airburner may be shut down by applying soil (minimum 6 inch cover, equivalent to 4 cubic yards for surface ACD unit) or other smothering media. Soil/media and delivery/application means will be maintained on site during burning operations. The burning trench or firebox may be covered to prevent the escape of embers or burning material, provided the covering device or mechanism is either agreed to by EM&R or EM&R agrees that covering is not required.
- 6.4.8 Communication/Alarm Signal. An alarm and communication system will be established and made known to alert site workers and fire responders to the presence of fire hazards. On-site alarms may consist of pre-determined equipment or vehicle horn signals. A LANL radio or LANL authorized telephone will be on site during burning operations.
- 6.4.9 Designated Worker/Fire Watch. The site safety officer or designee will monitor area conditions, including areas adjacent to the combustible Exclusion Zone, during fire operations. A person trained as a designated worker/fire watch will be present on site during burning operations. A designated worker/fire watch will remain on site for at least 30 minutes after airburner operation has been discontinued. During "high" fire danger, a designated worker/fire watch will inspect the site 1 hour after airburner operation has been discontinued. During "very high" fire danger, a designated worker/fire watch will be present on site for at least 1 hour after the airburner fire has been extinguished or covered.
- 6.4.10 Fire Hazard Rating and Related Control Measures. Airburners may operate during "low", "medium", "high", and "very high" fire hazard ratings. The daily rating is determined by EM&R (contact EM&R at 667-6211 for current rating). EM&R will work with FWO-CGRP to provide morning and, in the case of extended burning, afternoon updates of the fire hazard rating. Fire hazard controls increase with increased ratings according to the following matrix:

Fire Hazard Rating	Max Wind (Sustained)	On-Site Equipment	Hazard Controls
Low	20 mph	<ul style="list-style-type: none"> • Extinguishers • Hand tools • LANL radio/telephone 	<ul style="list-style-type: none"> • General
Medium	20 mph		
High	10 mph	<ul style="list-style-type: none"> • Extinguishers • Hand tools • LANL radio/telephone • Water truck 	<ul style="list-style-type: none"> • General • FWO-CGRP personnel on-site • Site inspection 1 hr after shutdown (300 feet and ½ mile downwind)
Very High	10 mph	<ul style="list-style-type: none"> • Extinguishers • Hand tools • LANL radio/telephone • Water Truck 	<ul style="list-style-type: none"> • General • FWO-CGRP personnel on-site • LAFD or qualified firefighters on site • Site mitigation approved by EM&R • 24-hr fire watch (300 feet and ½ mile downwind)
Extreme or Red Flag	No burning operations allowed		

Site mitigation measures must be approved by EM&R prior to operation during “very high” conditions. Upon notification by EM&R of a scheduled time for change to “extreme” or “red flag” conditions, ACD burn-down procedures will be initiated four hours prior to the change and shutdown will be completed two hours prior to the change. If notified that “extreme” or “red flag” conditions already exist, shutdown procedures will be immediately initiated. Communication with EM&R is maintained with a LANL radio, cellular telephone, and/or a pager.

During “high” fire danger and above, FWO-CGRP will be on site during ACD operation and participate in site monitoring and designated worker/fire watch duties. During “very high” conditions, there must be either an LAFD unit or other qualified firefighting personnel and equipment agreed to by EM&R on site. Firefighters other than LAFD will have Firefighter FET2 certification in accordance with the National Wildfire Coordinating Group “Wildland and Prescribed Fire Qualifications System Guide” (PMS 310-1). During “very high” and above conditions the 24-hour fire watch requirement may be discontinued if the burning trench or firebox is covered to prevent the escape of embers or burning material, provided the covering device or mechanism is agreed to by EM&R, or if EM&R agrees that covering is not required.

7.0 Ash Management

- 7.1 Scope. Burned forest fuels will be reduced by at least 95 percent to ash. Ash management tasks will include removal, storage, and land application or transfer to a disposal facility. Associated hazards include residual embers, airborne emissions, minimally corrosive (caustic) chemical character, and runoff potential. There is a potential for residual depleted uranium and beryllium in the ash as a result of operational activities. Prior to either land application or transfer to a disposal facility, the ash will be sampled in accordance with EPA criteria and a radiological survey will be performed. Land application will be conducted in accordance with ESH-17, ESH-18, and/or ESH-19 requirements. Transfer and disposal of the ash will be conducted in accordance with NMED and Department of Transportation (DOT) requirements.
- 7.2 Equipment. Ash removal will be performed using a vacuum/cyclone system or equipment such as a track hoe or front end loader. Temporary storage may be in-situ (trench or firebox); however in-situ storage will not exceed 5 working days. Storage for additional management or transfer will be in closed roll-off type containers, covered truck bed or trailer, or specially bagged/wrapped. The storage container or trench should be periodically inspected for several days following transfer for any residual embers or smoke. Hydromulch or spreader equipment will be used for land application.
- 7.3 Hazard Controls Measures.
- 7.3.1 Emission Control
- Vacuum transfer
 - Minimize free fall or spread distance
 - Wet suppression
 - Transfer/apply in low wind velocity
- 7.3.2 Erosion/Runoff Control
- Application to level (<5-10% slope) ground
 - Hydromulch (seed, nutrient, and tackifier) mixing
 - Implementation of runoff best management practices (BMPs)
- 7.3.3 Work Controls/PPE
- Work will be upwind to the extent possible
 - Dust conditions will be evaluated (see Section 5.4.7)
 - Respiratory protection (as needed based on determination by Project Safety Coordinator)
- 7.3.4 Fire Hazard Control
- Wet suppression over ash during transfer
 - Additional wet suppression in container as needed
 - Close container following transfer and periodically inspect

8.0 Record Keeping

The NMED has record keeping requirements as a component of the Open Burn Permit. These requirements are augmented by the Air Quality Group (ESH-17) and include time of sunrise, time of sunset, weight or volume of materials burned, and start and stop time of the airburners. These record keeping requirements must be maintained individually for

each airburner operated. ESH-17 will provide the form on which these NMED permit requirements will be tracked.

9.0 Essential Equipment to Safe Operations.

- Effective means of communication and summoning emergency assistance
- Wind directional and speed capability
- Work boots and hard hats
- Hearing protection, either muffs or foam plugs with appropriate noise reduction rating – NNR (ANSI approved)
- Eye protection (ANSI approved)
- Sufficient hydration liquids
- Appropriate clothing (fire-resistant clothing is required within combustible Exclusion Zone)
- Personal fall arrest system (within trench Control Access Zone)

10.0 Knowledge, Skills, and Abilities Necessary to Operation Controls and Perform the Work Safely.

10.1 Training Necessary to Obtain Pre-requisite Knowledge and Skills.

- General Employee Training (GET) if on-site for more than 10 days
- Fire Extinguisher Hands-On Training (Course No. 9893)
- Fire Extinguisher: Designated Worker and Fire Watch (Course No. 15672)
- First Aid/CPR (Course No. 3574)
- Thermal Stress Awareness (Course No. 18649)
- Fall Protection (refer to Fall Protection Plan)
- Hazard Communication

10.2 Contractor personnel will be qualified to operate heavy equipment.

11.0 Description of Residual Materials Generated.

Wood material will be reduced 95-98 percent to ash. Ash may be left in place in a trench (up to 5 working days) or periodically transferred to another management location.

12.0 Residual Risk Estimate

The residual risk for general fieldwork is: LOW. Implementation of the HCP reduces the likelihood of catastrophic personnel injury, environmental harm/liability, or property damage to “remote” (highly to extremely unlikely).

13.0 Emergency Actions

Failure of a control measure will prompt, at a minimum, the immediate communication to the designated Safety Officer. The severity of the incident will determine the appropriate response. An Emergency Response contact list is present in Attachment 3. EM&R Emergency Instructions are presented in Attachment 4. Airburner site location maps are presented in Attachment 7.

14.0 Change Control Process.

All changes to this document will be controlled by FWO-CGRP. Changes will be reviewed by the appropriate subject matter expert (SME) and subsequently recorded in section 14.1 of this HCP.

14.1 Record of Changes to this HCP.

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
R0	11-5-01	New document.
R1	2-28-02	Revise Fire Protection Protocol
R2	3-20-02	Revise Fire Protection Protocol and minor changes
R3	4-10-02	Revise Fire Protection Protocol and minor changes

TABLE 1. Hazard Assessment Hold Points and Response Actions.

Category	Hold Point	Response Action	Startup or Continue Operation
Environment	Wind limit exceeded,	<ul style="list-style-type: none"> ▪ Suspend loading ▪ Monitor winds 	Wind within limit
	Opacity limit exceeded	<ul style="list-style-type: none"> ▪ Assess condition ▪ Take corrective action ▪ Record on field card 	Opacity within limit
	Atmospheric stability outside range	<ul style="list-style-type: none"> ▪ Pre-ignition: monitor LANL Weather Machine ▪ Pre-burndown: continue loading 	Atmospheric stability within range
	Lightning	<ul style="list-style-type: none"> ▪ Suspend loading ▪ Continue fire watch with appropriate sheltering 	Site Safety Officer authorization
Fire	Ignition	Pre-ignition checklist	Checklist complete
	Rating very high or less	Hazard controls in place	Controls documented
	Rating extreme or red flag	<ul style="list-style-type: none"> ▪ Suspend loading ▪ Cover or emergency shutdown 	Rating very high or less
	Fire (incipient)	<ul style="list-style-type: none"> ▪ Suspend loading ▪ Fire suppression (fire watch or authorized responder) ▪ Fire watch monitor ▪ Assess and correct/mitigate cause and contributing conditions ▪ Document 	Site Safety Officer authorization
	Fire (not incipient)	<ul style="list-style-type: none"> ▪ Suspend loading ▪ Fire responder and FMU notified ▪ Fire suppression (authorized responder) ▪ Fire watch monitor ▪ Assess and correct/mitigate cause and contributing conditions ▪ Document 	<ul style="list-style-type: none"> ▪ Project Safety Officer authorization ▪ FMU authorization
Health and Safety	Unsafe action or unsafe condition	<ul style="list-style-type: none"> ▪ Suspend action ▪ Assess cause and contributing conditions ▪ Correct condition ▪ Document 	Site Safety Officer authorization
	Injury	<ul style="list-style-type: none"> ▪ Suspend operation ▪ First aid or appropriate initial response ▪ Notify Site Safety Officer and other as appropriate ▪ Document ▪ Assess cause and contributing conditions ▪ Correct conditions 	Site Safety Officer authorization
Equipment	Malfunction	<ul style="list-style-type: none"> ▪ Assess ▪ Suspend operation, if appropriate ▪ Repair equipment 	Subcontractor foreman authorization

TABLE 1. Hazard Assessment Hold Points and Response Actions (Cont.).

<u>Category</u>	<i>Hold Point</i>	Response Action	Startup or Continue Operation
Spill	Chemical spill or release	<ul style="list-style-type: none">▪ Suspend operation▪ Contain▪ Notify Safety Officer and EM&R▪ Respond/cleanup as appropriate▪ Document	Site Safety Officer authorization
FMU Operational Constraint	FMU Notification	Suspend loading or initiate emergency shutdown as appropriate	FMU notification

Attachment 3

**EMERGENCY RESPONSE AND
FIRE PROTECTION PROTOCOL
FIRE COORDINATION/AGENCY CONTACT LIST**

<u>Agency</u>	<u>Contact</u>	<u>Phone</u>	<u>Cell Phone</u>	<u>Pager</u>
EMERGENCY		911 or 667-6211		
FWO-Fire	Rob Farris	665-0283	699-1971	665 9800 ext. 104-6644
Facility Manager	David Padilla	667-2408	699-2816	996-4583
LAFD	Battalion Chief LAFD Station 1	667-7026		
EM&R		667-6211		
FWO-CGRP Safety Coordinator	Mike Pannell	665-2996	699-1361	996-3355
FWO-CGRP Airburner Project Safety Coordinator	Michael Dennis	665-0510	699-1268	996-1465

Attachment 4

EM&R CONTACT CHECKLIST (911 OR 667-6211)

If it becomes necessary to call for emergency services (radio, 911, or 667-6211), have the following information available:

- Site name /location (identify as Air Curtain Destructor or “thinning slash burning” operation at TA-16 “Borrow Pit” area near Fire Station 5)
- Nature of emergency
- Number of people involved
- Caller Name
- Name and condition of affected employees
- Actions taken and assistance required

**Attachment 5
AIRBURNER PRE-IGNITION BRIEFING CHECKLIST
(MANDATORY FOR EACH IGNITION)**

Fire Hazard Control	Yes	No	NA	Notes/Corrections
Fire protection protocol reviewed				
Limits of CAZ (control access zone for trench fall protection) and EZ (combustible exclusion zone) known by site personnel				
Any required flame/spark permit on-site				
NMED permit record keeping form on-site (Attachm. 8)				
EM&R and LAFD notified by phone or radio of day's burn activity (Attachm. 2)				
Emergency contact list on-site (List Attachm. 2)				
Extinguishers and incipient firefighting equipment on-site and locations known				
Water tank/source on-site				
Airburner fire smothering media and delivery means available				
Emergency shutdown procedure reviewed				
Equipment hydraulic systems inspected				
Ignition procedure reviewed				
Approved storage for ignition devices and combustible/flammable materials				
Equipment fueling outside EZ				
Airburner engine fueled (if fuel during burn, fire watch with extinguisher req.)				
On-site communication/alarm system				
External communication/alarm system (LANL radio or telephone)				
Designated worker/fire watch trained person on-site				
Fire weather/wind forecast reviewed				
Fire hazard rating low, medium, high or very high (not extreme or red flag)				
If fire hazard rating <u>high</u> water truck on site				
If fire hazard rating <u>high very high</u> , water truck and LAFD or qualified firefighters and equipment on site				
Wind/weather condition monitoring on-site				

Note: Ignition will not proceed until "NO" responses are addressed/corrected and documented.

Conducted by: _____ Date/Time: _____

Notes/Additional Items Covered _____

Attachment 6

CERRO GRANDE REHABILITATION PROJECT **AIRBURNER FALL PROTECTION PLAN**

1.0 Scope

The following Fall Protection Plan is a program prepared for the prevention of injuries associated with falls. This plan is not site specific, but addresses fall protection applicable to Air Curtain Destructor (Airburner) operations performed by the FWO-Cerro Grande Rehabilitation Project (FWO-CGRP). Airburner operations present the following conditions related to walking/working surfaces:

- Surfaces that may not have the strength and structural integrity to support workers safely.
- An unprotected side or edge that is 6 feet (1.8 meters) or more above a lower level.
- An unprotected side or edge that is less than 6 feet above dangerous equipment or a dangerous condition.

The purpose of the plan is to supplement the existing FWO-CGRP Health and Safety Plan (HASP) and the Hazard Protection Plan (HCP) applicable to airburners to ensure that FWO-CGRP personnel and subcontractors recognize workplace fall hazards and take the appropriate measures to address those hazards.

This Fall Protection Plan is designed to enable supervisors and workers to recognize the fall hazards associated with this job and to establish the safest procedures that are to be followed in order to prevent falls to lower levels or through holes and openings in walking/working surfaces. Each employee will be trained in these procedures and will strictly adhere to them except when doing so would expose the employee to a greater hazard. If, in the employee's opinion, this is the case, the employee is to notify the Project Safety Coordinator or person designated by the Project Safety Coordinator of their concern and have the concern addressed before proceeding.

The plan does not apply during an inspection, investigation, or assessment of site or field conditions prior to the actual start of work tasks; however, a buddy system (two-person rule) shall be used in these instances.

2.0 Responsibilities

It is the responsibility of the Project Safety Coordinator or his/her designated person to implement this Fall Protection Plan. There shall be continual observational safety checks of work operations and enforcement of the safety policy and procedures. The designated person is responsible for correcting any unsafe practices or conditions immediately.

It is FWO-CGRP's responsibility to ensure that all personnel and subcontractors who might be exposed to fall hazards understand and adhere to the procedures of this plan

and follow the instructions of the designated person. It is the responsibility of FWO-CGRP personnel and subcontractors to bring to management's attention any unsafe or hazardous conditions or practices that may cause injury to either themselves or any other employees.

3.0 General Requirements

Fall protection measures shall be adopted for work at sites with known and discrete fall hazards, such as around a trench. These measures include designation of a Control Access Zone (CAZ), adoption of a Safety Monitor System, and, for work within a CAZ or during tree topping, installation of a personal fall arrest system.

3.1 Controlled Access Zones (CAZ)

The CAZ shall be clearly defined by the designated person as an area where a recognized hazard exists. For worksites with unprotected sides or edges, a CAZ shall be a minimum of 6 feet from leading edges. The demarcation of the CAZ shall be communicated by in a recognized manner, either through signs, wires, tapes, ropes, chains, barriers, or other means.

The designated person shall take the following steps to ensure that the CAZ is clearly marked or controlled:

- All access to the CAZ must be restricted to authorized entrants.
- All workers who are permitted in the CAZ shall be listed on a worksite authorization form.
- The designated person shall ensure that all protective elements of the CAZ are implemented prior to the beginning of work.

Workers performing tasks within a CAZ must be trained. For any tasks performed within the CAZ, authorized workers shall not remain in the CRZ longer than necessary to safely complete the task.

3.2 Safety Monitoring System

A safety monitoring system means a fall protection system in which a designated person is responsible for recognizing and warning employees of fall hazards. A safety monitor system must be implemented for tasks performed within or near a designated CAZ or, for fieldwork, near fall hazard areas. A maximum of two workers may be monitored by one safety monitor. (Note: for work within a designated CAZ, a fall arrest system must also be used.)

The duties of the safety monitor are to:

- Be competent in recognizing fall hazards.
- Make the authorized workers aware they are in a dangerous area.
- Be on the same walking/working surface as the monitored employees and within visual sighting distance of the monitored employees.

- Be close enough to communicate orally with the employees.
- Warn by voice when approaching the CAZ boundary (or, for authorized work within the CAZ, when approaching the open edge) in an unsafe manner.
- Warn employees when they appear to be unaware of a fall hazard or are acting in an unsafe manner.
- Not allow other responsibilities to encumber monitoring.

If the safety monitor becomes too encumbered with other responsibilities, the monitor shall (1) stop the work task; and (2) turn over other responsibilities to an authorized worker; or (3) turn over the safety monitoring function to another designated person.

3.3 Personal Fall Arrest System

Personal fall arrest system means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a body harness, and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. The use of a body belt for fall arrest is prohibited. Personal fall arrest systems must comply with provisions of the OSHA Fall Protection Standard, 29 CFR 1926.502(d). Workers must be trained in the correct procedures for erecting, maintaining, disassembling, and inspecting any fall protection systems prior to use. A personal fall arrest system shall be used in combination with a Safety Monitor System.

3.5 Training

Employees who might be exposed to fall hazards will be trained to recognize the hazards of falling and in the procedures to be followed in order to minimize these hazards. Only trained workers will be allowed to perform tasks within a CAZ. Training will be performed, as necessary, by a designated person qualified in the following areas:

- The nature of fall hazards in the work area;
- The role of employees in fall protection plans.
- The use and operation of fall protection systems to be used (e.g. CAZs, safety monitor systems, guardrail systems, personal fall arrest systems, or warning line systems);
- The correct procedures for erecting, maintaining, disassembling, and inspecting any fall protection systems to be used; and
- The role of each employee in the safety monitoring system when this system is used.

General training over the Fall Protection Plan will be documented on a form (Attachment A) containing the name of the employee trained, the date of the training, and the signature of the person who conducted the training. Training for specific work tasks under the plan must be separately authorized and a copy of the authorization maintained at the worksite (Attachment B).

4.0 Airburner Operation Fall Protection Requirements

Subcontractors operating an airburner will be required to have fall protection plans that are approved by FWO-CGRP and have provisions at least as stringent as those in the present FWO-CGRP plan. FWO-CGRP personnel will not perform subcontractor tasks, but will adhere to subcontractor plans when performing work in areas covered by those plans.

4.1 Airburner Operation

This portion of the Fall Protection Plan identifies approved and precluded activities within the airburner CAZ. Specific approved activities within the CAZ that require fall protection:

- Assembly of portable airburner units adjacent to a trench prior to airburner operation at that trench.

Due to the potential for trench instability after airburner operation, the following activities within the CAZ are precluded, unless the trench walls have been inspected and approved by a soils engineer or competent person for those specific activities within the CAZ:

- Disassembly of portable airburner units adjacent to the trenches.
- Application of accelerant (diesel fuel) and ignition of fuel material to the trench.
- Removing ash and unburned debris from airburner trenches.
- Other work that may be required within the CAZ.

Airburner activities within the CAZ will be conducted by employees who are trained for the specific work tasks. The nature of these tasks normally exposes the employee to the fall hazard for a short period of time.

- 4.1.1 Assembly/Disassembly of Manifolds. Manifold assembly/disassembly for portable (trench-type) unit is performed along the trench edge. For this task, the subcontractor will install or provide a personal fall arrest system. Suitable attachment or anchorage points for the personal fall arrest system will need to be provided (for example, to a vehicle or other heavy equipment).
- 4.1.2 Application of Accelerant and Fuel Material Ignition. For start-up of the firebox or burn trench, an accelerant (diesel fuel) is applied over the material and along the sides of the firebox/trench and ignited.
- 4.1.3 Firebox. For the mobile (firebox) unit, a safety ladder will be used by workers to reach over the top of the 8-foot high firebox walls. Workers will not ascend more than 6 feet above the ground surface. A fall protection system is not feasible for this task.

5.0 Approval/Changes to Plan

The Fall Protection Plan is a part of the HCP for airburners. This plan shall be periodically reviewed by the FWO-CGRP Safety Officer and designated persons to determine if additional practices, procedures, or training needs to be implemented to improve or provide additional fall protection. Workers shall be notified and trained, if necessary, in any new procedures. Copies of this plan and the HCP shall be maintained at the worksite.

**FALL PROTECTION PLAN
(ATTACHMENT 6A)
TRAINING DOCUMENTATION**

The signature of Group Management has authorized you to perform the work under the FWO-CGRP Airburner Fall Protection Plan. Your signature below acknowledges that you have read and understand the plan. NOTE: training must be separately authorized for each work task performed under the plan (see Attachment 6B).

Employee Name (Print)	Employee Signature	Z#	Date
Safety Trainer Name (Print)	Safety Trainer Signature	Z#	Date

Attachment 7

CERRO GRANDE REHABILITATION PROJECT
AIRBURNER UNIT LOCATION MAPS

(ATTACH AS AVAILABLE)

NOTE: CURRENT LOCATION MAPS TO BE PROVIDED TO
LAFD AND FMS AS PART OF OPERATION NOTIFICATION PROCEDURE.

Attachment 8

CERRO GRANDE REHABILITATION PROJECT
ESH-17 RECORD KEEPING FORM

(ATTACH AS AVAILABLE)