

**LIBBY SUPERFUND SITE OPERABLE UNIT 3  
PHASE IV SAMPLING AND ANALYSIS PLAN**

**ATTACHMENT A**

**ACTIVITY BASED SAMPLING (ABS) SCRIPTS**

This Attachment describes the activities to be performed by individuals performing each of the ABS scenarios described in the Phase IV-A SAP. Details on the number, location, and timing of ABS sampling events are provided in the Phase IV-A SAP.

**SCRIPT 1: RECREATIONAL VISITORS ALONG LOWER RAINY CREEK**

Recreational visitors along lower Rainy Creek (between Highway 37 and the W.R. Grace property line) may engage in activities such as hiking and antler hunting that could disturb LA in source material (soil, dried stream-side sediment, and duff). The following script will be used to simulate exposures during activities that are considered to be representative of recreational visitors along lower Rainy Creek south of the W.R. Grace property boundary.

For this scenario, Rainy Creek south of the W.R. Grace property boundary will be evaluated as a single ABS study area. ABS sampling will be performed by a team of two individual samplers. Two pumps will be worn by each sampler. Target flow rate for the first pump is 2 liters per minute (LPM) and the target flow rate for the second pump is 4 LPM.

The team of two samplers will walk from the security gate on Rainy Creek Road to Rainy Creek. Once at Rainy Creek, the two samplers will turn on their sampling pumps. This will be time = 0. Both individuals will then begin to walk up along the banks of the creek, disturbing bushes and other vegetation as needed to move along the bank of the creek. Activities will include the samplers using their hands to push aside ground vegetation to simulate hunting for antlers. To the extent possible, the samplers will cross back and forth across the creek several times so that the ABS activities represent exposures to disturbed sediments and brush on both sides of Rainy Creek.

After 30 minutes moving up the drainage, the two samplers will change positions so that the sampler originally in the lead will be in the following position. The team will then make their way back down the drainage toward the starting point. After 30 more minutes (for a total of 60 minutes), the ABS event ends and the air sampling pumps are turned off and the air sampling cassettes are capped.

## **SCRIPT 2: RESIDENTIAL WOOD HARVESTER**

Residents of Libby may harvest firewood within the OU3 study area for personal use as a heating source. Individuals harvesting wood within the OU3 study area may be exposed to LA fibers released from duff and/or soil when disturbed during walking in the woods to the selected trees, from tree bark when cutting down trees and sawing them into manageable size, and from tree bark and/or soil and/or duff when disturbed during hauling the wood to a truck or other vehicle. The following script will be used to simulate residential (non-commercial) wood harvesting activities.

Two individual samplers will perform each residential wood harvesting ABS event. Two pumps will be worn by each sampler. The target flow rate for the first pump is 2 LPM and the target flow rate for the second pump is 4 LPM.

For each ABS event at each location, each individual sampler will collect 1 sample to represent exposures that occur while driving to and from the location, and 2 additional samples during the harvesting (felling the tree, cutting it into manageable firewood sizes, stacking into the back of a pickup truck, and cleaning up the area). The scenario is performed in three steps, as follows:

### *1. Driving to the ABS Area*

The individual samplers shall initiate the event by entering a pickup truck located in the Flyway, turning on their air monitoring pumps, and riding to the location of trees to be harvested (identified by the US Forest Service ) in the truck with the windows open. Once arriving at the tree harvesting location, the truck will be parked along the US Forest Service road, the air monitoring pumps will be turned off and the air sampling cassettes will be capped and set aside until they are re-activated during the drive away from the ABS area.

### *2. Felling, Cutting and Stacking*

The wood harvesting scenario is begun by each individual exiting the pickup truck, attaching new filter cassettes to the low volume and the high volume pumps, and turning the pumps on.

During each ABS event at each designated location, the samplers will harvest one tree identified by the US Forest Service. The samplers shall hike to the tree and one of the samplers will fell the tree and remove branches using a chainsaw. The second individual will haul the cut branches and place them in a pile nearby. The duration of this activity will vary depending on the size of the tree and the distance from the road, but is expected to average approximately 20 minutes. After felling the tree and removing the branches, the samplers shall attach the cut tree to a cable and haul it to the road near the vehicle. Then one sampler will cut the felled tree into pieces of appropriate size for use in wood burning stoves (usually about 16-24 inches in length) and the other sampler will haul the

firewood back to the bed of the truck. After 15 minutes, the samplers will reverse roles and continue for another 15 minutes. After this time, all smaller branches and other small debris from the tree will be scattered at random off the road. During the cleanup, samplers shall collect samples for a period of 10 minutes. The total duration for this activity is 60 minutes.

In order to help minimize the chances of generating overloaded filters, the exposures associated with the wood harvesting activities described above will be captured on two sequential cassettes. The optimal break point between the two sequential cassettes will be determined in a pilot study to be conducted before authentic ABS sampling to support the remedial investigation are collected. For example, the first wood harvesting sample may include hiking to the tree, felling, and hauling to the road, and the second wood harvesting sample may include cutting, stacking, and clean up. Other combinations are acceptable as long as all activities are sampled.

All individuals who perform this activity must be properly trained in the safe use of gasoline powered saws and in safe procedures for felling trees.

After 60 minutes of cutting and hauling wood to the truck and cleaning up, the harvesting scenario is ended. Each individual shall turn off their pumps and remove and cap the cassettes. The area shall be further cleaned up as necessary after sampling has ended.

### *3. Driving from the ABS Area*

After removing the cassettes used for wood harvesting, each individual shall re-attach the same cassettes as were used during the truck ride to the area. The pumps will then be re-activated, and the pickup truck shall be driven back to the Flyway (windows open). Once at the Flyway, the driving scenario is ended and the pumps will be turned off and each cassette removed and capped.

At the Flyway, the wood shall be off-loaded from the truck and placed into a pile for potential future use in burning<sup>1</sup>. The wind direction and speed at the sampling location should also be monitored.

### **SCRIPT 3: US FOREST SERVICE WORKER**

U.S. Forest Service workers within the OU3 study area may be exposed to LA fibers during a variety of activities. These include activities routinely performed as part of the Forest Service's land management responsibilities such as maintenance of roads and trails, thinning of trees and vegetation, and surveying trees (stand exam). In addition to routine land management activities,

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<sup>1</sup> The potential risks associated with burning wood collected from OU3 will be evaluated as part of the OU4 risk assessment, and will not be included in OU3.

US Forest Service personnel respond to forest fires in the Kootenai National Forest. Fire fighting activities include those associated with initial ground attack, aerial attack, and sustained ground attack.

For the purposes of the Phase IV ABS investigation, the following scripts will be used to simulate a range of activities that are considered to be representative. ABS sampling will be performed by a team of two samplers except where noted. Two pumps will be worn by each sampler. The target flow rate for the first pump is 2 LPM and the target flow rate for the second pump is 4 LPM.

### Script 3a. Trail Maintenance

Trail maintenance consists mainly of clearing vegetation from the trail. Samplers will travel to the designated ABS locations and park on the roadway. Samplers will exit the vehicle and hike to the designated trail location. Once at the designated trail, samplers will turn on the air sampling pumps. One sampler will use a small chain saw and the other sampler will use a saw head trimmer to clear trees and brush to a width of about 1-2 feet, and to a height of about 8 feet. The second individual will haul the cut vegetation off the trail. After 15 minutes, the two individuals shall reverse roles. After 30 minutes, the ABS activity is ended, and both individuals shall turn off their air sampling pumps and cap their sampling cassettes.

### Script 3b. Tree Thinning

Tree thinning consists of cutting small trees (2-4 inches in diameter) and hauling the wood into a “slash” pile. This activity will be performed for a period of 30 minutes. One individual will cut for 15 minutes, while the second individual hauls wood to a pile. After 15 minutes, the roles are reversed. After 30 minutes, the ABS activity is ended, and both individuals shall turn off their air sampling pumps and cap their sampling cassettes.

### Script 3c. Stand Examination

Stand examination consists of obtaining measurements of the girth and height of trees in a stand, and collecting borings from the trees to determine age. Both samplers will perform all of these activities. Tree diameter is measured by passing a measuring tape around the tree at a height of about 1 meter. Tree height is derived by measuring to a reference point about 10-15 meters from the tree, and measuring the angle from that point to the top of the tree with a clinometer. Collection of a core using an increment borer is described in SOP Tree-Libby-OU3 (see Attachment B). This scenario will be performed by both samplers for a period of 30 minutes. After 30 minutes, the ABS activity is ended, and both individuals shall turn off their air sampling pumps and cap their sampling cassettes.

### Script 3d. Cutting a Fireline by Hand

Cutting a fireline by hand consists of establishing a fuel break 18 inches wide by removing as much combustible material as possible. This task requires initial removal of trees and brush using a chainsaw. Then a Pulaski tool or other similar device is used to scrape away all combustible material down to mineral soil to establish a line about approximately 18 inches wide. During an initial attack of a forest fire, these activities are typically done by a crew of 4-6 fire fighters. For the ABS scenario, 2 samplers will participate. This activity will be performed for a period of 30 minutes. The 2 samplers will work approximately 10 feet apart. After 15 minutes, the relative positions of the 2 samplers will be reversed. After 30 minutes, the ABS activity is ended, and both samplers shall turn off their air sampling pumps and cap their sampling cassettes.

### Script 3e. Cutting a Fireline with Heavy Equipment

Cutting a fireline with heavy equipment involves using a dozer or tractor plow to remove vegetation and all combustible material down to mineral soil within a line as wide as the dozer or tractor blade. This activity is typically done by a crew consisting of one dozer boss and a crew of several fire fighters. For the ABS scenario, 2 samplers will participate. One sampler will act as the dozer boss and will operate the dozer or tractor plow to cut the fireline. The other sampler will perform activities to simulate a firefighter. The second sampler shall be no closer than 100 feet from the heavy equipment and will pick up and discard excavated combustible material from inside the fireline to outside the fireline. This activity will be performed for a period of 30 minutes. After 30 minutes, both samplers shall turn off their air sampling pumps and cap their sampling cassettes. The dozer/tractor plow operator will then pull back the excavated lines to clean up the area.

## **SCRIPT 4: EXPOSURE OF GROUND-BASED FIREFIGHTERS TO SMOKE**

U.S. Forest Service workers who fight fires on the ground within the OU3 study area may be exposed to LA in air released by burning of contaminated duff and trees. This “smoke” exposure pathway will be evaluated after the results from Scripts 3d and 3e are available and have been evaluated.

The objective of this activity is to characterize LA levels in smoke released from high-intensity fires. This will be achieved by burning two large slash piles that presently exist in OU3. All such simulated wildfire burns in OU3 will be performed in accord with all requirements and recommendations of the U.S. Forest Service. One or more U.S. Forest Service staff will be present at all simulated wildfire events.

#### Script 4a. Personal ABS Samples

Four samplers will wear personal air monitors during each simulated wildfire. Two pumps will be worn by each sampler. The target flow rate for the first pump is 2 LPM and the target flow rate for the second pump is 4 LPM. The pumps will not be activated until the fire is generating significant levels of smoke. When smoke generation is significant, the pumps will be activated and each individual wearing the monitors will move about the area of the controlled burn, including time in the cross-wind and down-wind directions. The primary purpose is to capture exposures related to smoke release rather than soil or duff disturbance. After 30 minutes, the ABS activity is ended, and both samplers shall turn off their air sampling pumps and cap their sampling cassettes.

#### Script 4b. Stationary Monitors

Four stationary monitors will be installed around the perimeter of each simulated wildfire. These will be positioned approximately 90° apart, with one station being located in the predominant downwind direction at the time the fire is initiated. Each perimeter monitor should be sufficiently distant from the fire that it is not threatened by the heat from the fire. The perimeter monitors will not be activated until the fire is generating significant levels of smoke. Once the pumps are activated, each sample will be collected for a period of 30 minutes. After 30 minutes, the stationary pumps will be turned off and the sampling cassettes capped.

In addition, if smoke from either of the simulated wildfires is blowing towards any of the three fixed-base contingency monitors described in Attachment D (See Section 4.1 of Attachment D), one or more of these monitors should also be activated during the simulated wildfire.

Following the fire, stationary air samples will be collected from each of the four perimeter air monitors for 2 additional days to determine if fibers remain in the air or are dispersed by the wind. Because smoke emission will be much lower than during the fire, sampling time can be increased from 30 minutes to 60 minutes per sample to help decrease the analytical sensitivity.

### **SCRIPT 5: EXPOSURE OF PILOTS TO SMOKE**

Currently, within the Fire Suppression Restricted Zone (FSRZ) of the OU3 study area, U.S. Forest Service personnel fight forest fires by air, either in fixed wing aircraft or in helicopters that are used to drop water or fire retardant on burning areas. These individuals may be exposed to LA that has been released into the air by the fire.

In order to characterize the exposure of aircraft pilots during fire suppression flights, a stationary sampling pump will be installed in the cockpit of one or more aircraft deployed for fighting fires within the OU3 study area. The air sampling cassette will be positioned to sample cockpit air,

but will be located in a position that does not interfere with the pilot's vision or ability to operate the aircraft.

#### Script 5a. Responding to Simulated Wildfires in OU3

On the day(s) when simulated wildfires are performed in OU3 (see Script 4), one aircraft shall fly over the simulated wildfire area after the smoke plume is well established, simulating a flight path that would be used to attack the fire. Two such simulated aerial attacks shall be performed per simulated wildfire, resulting in 2 filters per wildfire (four total).

For each simulated attack, the air sampling pump will be turned on when the pilot is preparing for takeoff, and will be turned off when the pilot returns to base. For each sample collected, the time of the flight (from takeoff to landing) will be recorded, along with information on the location of the fire and the type of aircraft.

#### Script 5b. Responding to Authentic Wildfires in OU3

When an aerial response to an authentic wildfire in the exclusion zone of OU3 is called for, the USFS will notify Remedium. If the fire is generating significant smoke, Remedium will immediately send a person to the airfield to perform all necessary activities associated with calibrating and activating the pump and collecting the samples (as described above). It is understood that, in some cases, the pilot may be required to begin flights before this can be achieved. In this event, the pump will be activated during the first available time when the aircraft returns to base between trips to the fire.

### **SCRIPT 6: EXPOSURE OF AREA RESIDENTS TO SMOKE FROM FOREST FIRES**

EPA (2009b) previously established a plan for collecting stationary air samples at three monitoring locations to evaluate exposures of residents in Libby in the event of a significant forest fire in the Fire Suppression Restricted Zone of OU3. This original "contingency air monitoring plan" has been revised to incorporate the addition of one mobile air monitoring station that will be placed in a downwind location from any authentic wildfire that generates significant smoke in OU3. This revised "contingency air monitoring plan" is provided as Attachment D to this SAP.

In brief, when notified by the USFS of a fire in the exclusion zone of OU3 that is large enough to generate significant smoke, a designated point of contact who is a contractor to Remedium will activate stationary air sampling pumps previously deployed at three locations:

- CDM office building in Libby
- USFS Ranger station along Highway 37
- McGillivray Campground on the west shore of Lake Kooconusa.

Unless smoke levels are so high as to cause filter overloading, sampling duration for these samples will be 24 hours, changing to new filters every 24 hours until the fire is extinguished.

In addition to these three stationary monitors at fixed locations, a fourth monitoring station capable of collecting two independent samples (field duplicates) will be established in an accessible area downwind of the fire. The monitors will be transported to the collection site by truck. The sampling location and distance from the fire will depend on the conditions of the fire. Although details may vary, it is envisioned that the two monitors will be placed on a tripod in the back of the truck, which will be driven to the nearest accessible area that is being impacted by smoke from the fire. Once at the sampling location, the pumps shall be calibrated and the pumps turned on. The target flow rate for these samplers will be 4-6 LPM. Unless safety concerns dictate otherwise, this sampler shall be collected for duration of about 30 minutes. During sample collection, the coordinates of the monitor will be recorded. This information will be used later, in combination with data on the fire location, to establish the distance and direction of the monitor relative to the fire. The wind direction and speed at the sampling location should also be monitored.

**NOTE: In all cases, it is critical that this sampling effort be performed in a way that does not endanger that health or safety of the sampling personnel. If conditions are considered to be potentially unsafe, the sampler should evacuate the area immediately.**