

December 30, 1964

To: J. A. Kelley

From: R. A. Diech

Subject: Report on Dust Control at Libby Operation

MINE:

The Reich Rotary drill is a source of high dust concentration. Prior to the purchase of the rotary drill, it was possible for the operator of the Joy Drillmobile to stand clear of the dust created by the pneumatic hammer. This is not possible with the Reich drill. The Reich drill was originally equipped with only a centrifugal fan, collection hood and cyclone. This system was inadequate and a liquid dust control system was installed and is now in use. A controlled quantity of water is used during drilling to suppress the dust. During the freezing weather season, Diesel fuel is substituted for the water and works equally as well. The system is adequate.

The Euclid trucks pulverize the top surface of the main haul roads into a fine layer of dust during the approximately 4 months of dry weather. For a number of years the road were sprinkled with water on an almost continuous basis. However, with temperatures of 25 plus degrees and humidities of 15 to 20%, the results were not adequate. During the past two years, No. 5 oil has been used and has given good dust control. One to two applications have been sufficient. Some Pentaprima has been successfully used with more permanent results. The oil system gives adequate control.

The actual digging and loading is no problem. The material is relatively coarse and also is slightly damp or moist.

The Transfer Point is in the same category as the shovel loading. The same material is handled and there is no problem.

The auxiliary equipment such as patrols, dozers etc. have much less road time than the Euclids so there is much less exposure and what control is adequate for the Euclids and drivers is more so for the auxiliary equipment operators.

MILL:

The dust problem in the mill is entirely concentrated in the Dry Mill. The mill feed bins and the wet mill are no problem.

The sources of dust in the dry mill are roll crushers, hammer mills, screens, elevators and belt conveyors. There are 12 roll crushers, 6 hammer mills, 54 screens, 17 elevators and 36 points of conveyor loading and discharging.

There are 4 fans and their cyclones operating on dust collection systems. The dryer exhaust fans are independent units. The ventilation fans are exhausting approximately 8000 CFM, 12,000 CFM, 15,000 CFM and 40,000 CFM respectively. Prior to January 20, 1964, an 13,000 CFM unit was operating on the system now connected to the 40,000 CFM unit.

All operating units or equipment in the Dry Mill are connected to ventilation systems. All belt discharges are hooded and connected and all chutes are covered.

The installed duct systems are for the most part well-designed and balanced within the individual systems. However, in no instance has there actually been a surplus of fan capacity so that an increase of air flow throughout each individual system as a whole could be made. This situation has also been aggravated to a small degree by the various remodeling of the ore circuits during the past. The activation of the 8,000 CFM fan system was the results of circuit revision. Another factor contributing to the inefficiency of the system has been the loss of air effectiveness by leaks in flexible connections, holes in elevator casings, open hand holes in chutes, etc.

The following program for dust control in the Dry Mill is now under way and will have priority until all hazard is eliminated.

1. On January 20, 1964, the 18,000 CFM fan was replaced by a 40,000 CFM fan. The areas served by the connected system have shown a very marked improvement and substantiated that for the most part the system design is adequate if fan capacity is available.

The cyclone for this system has not been changed and some capacity is being lost. Also, the cyclone cannot settle the collected material at an excessive amount of dust and larger particles are being discharged from the fan outlet which adds to the air pollution within the general shop and service area.

A new cyclone arrangement has been designed and detailed. Installation has been scheduled to begin on February 15, 1965, and completed by March 1, 1965. This will fully utilize the fan capacity and settle all materials within the ability of a cyclone. Estimated cost is \$15,000.

2. During the past year, a program of repair and maintenance on all air ducts, chutes, casings, etc. has been in effect. Maintenance men have been directly assigned to this duty. This program is showing results not only in better use of existing air but also in the reduction of material spills and leaks each of which contribute to dust as well as sweeper chores. Still more emphasis is in effect on this phase.
3. All Dry Mill personnel have always been issued approved respirators and instructed to wear them at all times. Compliance and enforcement of this rule has not been 100%, but is now being rigidly enforced. Respirator supplies are in stock and available at the warehouse.

4. Any dust in the mill atmosphere will and does result in some build-up of dust on rafters, purlins, gutter boxes, sills, etc. This is true even with dust concentrations well below the allowable standards. If this dust is allowed to accumulate beyond a point, the vibrations of the mill cause the dust to shake back into the mill atmosphere and add to the concentration caused by the machines. The "sweepdown" of the mill buildings, etc. has not been done at adequate intervals and has added to the problem. A monthly "sweepdown" interval is now in effect.
5. A dust count apparatus identical with that used by the State Board of Health is on hand. Supervisory personnel have been trained and checked out in the use of the equipment by the State Engineer. A complete schedule of dust concentration within the Dry Mill every month is now in effect. This will give a measure of progress and control after allowable concentrations are achieved.
6. The 18,000 CFM fan which was replaced by the 40,000 CFM fan is not now being used. It has been tentatively earmarked for replacing one of the smaller ventilation fans. The fan is presently in a very awkward location and mill space is at a premium. Although Engineering has made some primary layouts, no actual installation has been scheduled.
7. The dust concentrate readings have been taken on an average sample. That is, an entire floor of the mill has been taken as an area from which a sample has been taken. Therefore, some areas of a floor or floors which have been considerably improved are still being contaminated from areas that are extremely difficult to correct and actual progress tends to be hidden by a few extreme areas. One of these difficult areas is directly beneath the roll crusher installations. The roll crushers which are the only actual concentrating machines in the Dry Mill (the hammer mills are delaminating and size reduction machines on concentrates) are extremely difficult to hood and vent. The decision to replace them with a wet process will decrease the period of time of their contributing to the dust problem. A wet process will also decrease the contributions of the hammer mills. The wet process program is now underway.
8. There are no definite plans for additional de-dusting of concentrates in the mill concentrate bins. At this time, there are several ideas which require testing but have not been definitely scheduled.

The skipping operation is not a dust-free operation, but is not a hazardous operation. If the cars were loaded by hand, it would be. However, the remote control loading and operator house give adequate protection at this time. The operator is equipped with a respirator in case of the need to enter a dusty atmosphere. No change is contemplated at this time.

HAULING:

The dumping of the skip cars into the lower ore bins creates dust as does any handling of vermiculite concentrates. No personnel is involved in the dumping operation. The only exposure is while changing chutes during which time no skipping is done and the area is naturally ventilated.

Loading of the Kenworth truck beneath the lower ore bins is a dusty operation in a somewhat confined space. The drivers are respirator-equipped and after opening the loading gate do not need to remain at that point but can move a few feet to a clean location. The truck will not overflow. It takes approximately 5 minutes to load the truck. Total loading time is about 1 hour per day. The ventilation problem is immense and other than a rigid enforcement of respirator wearing, no change is scheduled.

The haul road to the river loading bins becomes very dusty during the dry season. Again water was formerly used but the situation has been adequately controlled by the use of oil as in the case of the mine haul roads.

The dumping of the Kenworth truck into either the river loading hoppers or the horizontal storage creates dust in considerable quantities because the vermiculite has been handled through the skip system, lower ore bins and Kenworth truck loading. Each handling has been cumulative. However, actual dumping is in the open so exposure is reduced to a low level.

STORAGE:

The unloading of the horizontal storage bins requires the use of the Cat 955 loader-dozzer. This is a dusty operation. The dust entrained into the atmosphere is kept to a minimum by careful operation of the machine. However, the operator is exposed and is respirator-equipped. The operator compliance with respirator wearing can be termed 100%. There is no practical answer other than careful use of a respirator. The load-out gates were equipped with hoods, duct system and fan in 1956.

The silo-type storage bins (six 1250 ton) were built during the period March 1959-December 1961. The load-in elevator, the load-out gates, belt discharge, load-out elevator and the discharge onto the river belt are equipped with a ventilation system and dust control is excellent. When the silo-type storage bins (four 1250 ton) for No. 2 ore were built in 1963, the ventilation system was extended to include the discharge gates, belts, etc. A larger fan was installed capable of handling both systems.

The dust control at the storage silos and their respective load-out equipment is good and is adequate. Although there is no ventilation system on the screw and belt conveyor galleys across the top of the bins, there is no personnel exposure because bin changes etc. are made during downtime.

LOADING:

Although the dust control of the actual loading of the river belt from the hoppers or storage bins is adequate, the result is dust containment rather than dust removal from the ore.

In 1962 a system consisting of fan, cyclone and dust holding bin was installed at the discharge terminal of the river belt. The ducts are connected to the discharge hopper, sampler and loading chutes. The purpose of this installation was not only to contain the dust created by the loading into cars but also to actually remove the dust from the ore.

Complete removal of dust from the ore during car loading will give better products and eliminate the unloading problem at the plants. The dedusting installation at the loading terminal was only partly successful. The high loading rate (50 to 100 TPH) and minimum headroom presents a very difficult aeration problem and much of the dust remains trapped within the ore stream. From 300 to 800 pounds of dust per car can be removed. Some extremely thin flakes of vermiculite are always present in the removed dust. The vermiculite is excessive at the 800# rate so an average of about 300 to 400# per car is normal. There is additional air capacity available and two flexible exhaust ducts for use in both hopper cars and box cars have been tentatively designed. These will be installed as soon as they are completely designed and the weather permits. There is some personnel exposure and respirators are furnished. It is not necessary to wear the respirator all the time--probably 5 minutes per hour--and compliance is very good.

The downtown storage and loading facilities are comparable to the river storage and loading. All truck dumping is into open hoppers which reduces the hazard. Except for the truck loading, all loading is bagged. The bagging equipment is ventilated.

EXPANDING PLANT:

The expanding plant including the special vermiculite equipment is no better or no worse than any normal commercial plant. Complete dust control will be designed into any new installation.

LABORATORY:

The regular mill testers do not wear respirators in the laboratory. They are respirator-equipped and are required to wear them when pickup concentrate samples in the dry mill. Rigid enforcement of this rule is in effect.

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The mine testers (testing bin checks, blast hole samples, prospect hole samples) wear respirators while preparing dried samples by hammer milling, attrition milling and roll crushing. These machines are also ventilated.

In addition to the dust concentration sampling outlined for the dry mill, a systematic monthly check will be made on other areas in order that the degree of exposure can be determined and control steps taken.

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