PROPERTY LOSS PREVENTION REPORT

L.A. OFFICE COPY

ATLANTIC RICHFIELD COMPANY
(ANACONDA ALUMINUM)
ABOUT 3 MILES NORTHEAST OF
COLUMBIA FALLS, MONTANA

INSPECTED BY: W. Ham

DATE: September 20, 21, 1982

CONFERRED WITH: L. Smith, Technical Manager; D. Ryan, Technical Superintendent; R. DeVall, Lieutenant, Plant Protection

COMMENTS - OVER

M&M Protection Consultants

DESCRIPTION OF OPERATIONS:

This plant manufactures aluminum ingots by the electrolytic reduction of alumina. The plant works 24 hours/day, 7 days/week. There are approximately 935 employees.

CONSTRUCTION:

The plant is made up of mostly one high story (about 25-50 feet high) buildings of noncombustible (iron on steel frame) construction. The overall ground floor area is approximately 1.5 million square feet. The predominate structure is the process building which has ten separate 90 feet x 1,086 feet "Rooms" interconnected at each end by 50 feet wide structures. This building contains about 1.2 million square feet under one roof. The Paste Plant is a separate all metal building, 7 stories high with a ground floor area of approximately 10,000 square feet. The original plant was built in 1957 and has been approximately doubled in size in the past 25 years. The buildings are in a good state of maintenance and repair.

EXPOSURES:

The plant is located in a rural area and exposures are light in all directions.

PROCESSES:

The basic process is the electrolytic reduction of alumina. (Chemical formula-$Al_2O_3$) to form molten aluminum which is cast into aluminum ingots. The process yielding molten aluminum takes place in a multitude of individual "pots", or cells, and in each pot the steps involved are the same. The cell is lined with carbon and filled with electrolyte which is principally a mixture of cryolite, fluorspar and 2-6% alumina.



19.45

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REPORT: REC'S ARE LIGHT.
No. FIRE PUMP OR SYSTEM TESTING
POORLY DEVELOPED LOSS ESTIMATE WORK
LOSS ESTIMATES DONT CONFORM TO OUR REQUIREMENTS.

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PROCESSES: (Continued)

Carbon anodes then introduce direct current to create the reduction reaction. During the operation, a crust forms over the surface of the bath. Periodically alumina is added on top of the crust and stirred into the pot to keep the desired 2-6% alumina concentration. The molton aluminum is drained from the bottom of the pots and cast into ingots. Every few years the lining of the cell is depleted and must be rebuilt.

An important support operation for the basic process takes place in the Paste Plant. In this building petroleum coke and petroleum tar are mixed together under heat, water chilled and then chopped into coke brickets which are used to line the cells.

SPECIAL HAZARDS:

Special hazards are generally well segregated and protected. There is a large paint spray booth in the south section of the Mechanical Shop Building. The booth is sprinklered and provided with adequate ventilation and approved electricals. Flammables are handled in safety cans and stored in ventilated metal cabinets.

The making of coke brickettes in the Paste Plant produces a combustible dust hazard. This is a separate building with dust-tight lighting, explosive venting walls, sprinkler protection, and a systematic clean-up program on all shifts. There are 4 mixers in the building which are heated by closed system hot oil jackets. This oil is heated by interior electric elements. A 500 gallon reservoir is located outside in the yard.

Steam for heating and various plant processes is produced by natural gas fired boilers located in the Boiler House. These boilers can also be fired by propane which is stored in an aboveground tank in a detached yard area. The boilers have approved combustion controls and are considered well safe guarded.

Combustible oils and some flammable liquids are stored in a small part of the Warehouse (about 10 feet x 15 feet area). This storage is in closed containers, no more than 8 feet high, and is under sprinkler protection. The arrangement is considered satisfactory.

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COMMON HAZARDS:

This plant uses enormous amounts of electricity from a public utility. There are 2 large on-site electrical switch yards at the south part of the plant. The AC current is transformed to DC current for use in the basic process by rectifiers. All the electrical systems are carefully designed by engineers and closely monitored at a Central Rectifier Control Room. Since the DC current is absolutely essential to the pots' operation, an elaborate system of alternate and back-up electrical circuitory is in effect. Circuit breaker protection is afforded throughout.

MANAGEMENT PLANNING AND CONTROL:

(a) Housekeeping and Maintenance: The buildings are well maintained and housekeeping is good throughout.

(b) Smoking Control: Smoking is prohibited in hazardous areas such as the Paste Plant, spray booth,warehouse, etc. Smoking is permitted in safe areas with proper receptacles provided.

(c) Self-Inspection Program: Weekly inspections are made of the fire protection equipment, housekeeping, safeguards for special hazards, and smoking control. Records are kept for review of field inspectors.

(d) Fire Brigades: The plant has an in-house fire brigade on all shifts. A fully equipped pumper fire truck and a smaller initial response truck are maintained in full operating condition. Monthly drills are conducted.

(e) Cutting and Welding: Any welding outside the normal maintenance area is supervised by a Welding Permit System. A supervisor first inspects the proposed welding area to see that combustibles are removed, extinguishers are on hand, sprinklers are in service (if applicable), etc. and then signs a permit for the work. A fire standby is provided if considered necessary.

(f) Emergency Planning: An emergency plan of action has been developed. Copies of the plan are posted in strategic locations throughout the plant. All employees have been briefed on the details.



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PRIVATE PROTECTION:

(a) Water Supplies: A combination fire service/mill-use looped 8-inch and 10-inch main system is used for fire protection. Supplying this system are the following:

(a) Five deep well pumps.

(b) Two 230,000 gals. tanks located on a hill about 120 feet above grade.

(c) Three 1,500 gpm at 75 psi automatic fire pumps. (Two electric, one diesel).

The deep well pumps and the elevated tanks ride on the system and supply the continuous plant water usage which is estimated at about 3,500 to 4,000 gpm. The fire pumps are tied to pressure switches which will automatically start the electric pumps if the underground pressure drops below 45 psi. (A static of 55-60 psi is normal). The diesel engine drive pump is wired into the electric pump circuits and will start automatically after the electric pumps should fail to bring the pressure up to 100 psi. All pumps can be started manually and also remotely from the security guard center which is manned 24 hours/day. Starting the fire pump is a part of the responsibilities of specified fire brigade members in a fire emergency. All fire pumps were churn tested today. Due to inclement weather, proper flow tests were not made.

(b) Yard Mains and Hydrants: Combination fire/mill use 8 and 10-inch mains are well looped and valved. Adequate private hydrants are provided at approximately 250 feet intervals. The client is in the process of winterizing the hydrants.

(c) Automatic Sprinklers: The plant is mostly unsprinklered. Dry-pipe automatic sprinkler systems cover the following areas:

(1) Paste Plant
(2) Pitch Tar Unloading Shed
(3) Alumina Unloading Sheds (2)
(4) Warehouse
(5) Laboratory
(6) Paint and Carpenter Shop
(7) Quonset Building
(8) Rectifier area

PRIVATE PROTECTION: (Continued)

All of the dry pipe valves were trip-tested in August, 1982, and documentation of these tests was reviewed. All water-flow alarms tested satisfactorily today, except for the 2 alumina unloading shed systems whichwere down for repair. (Rec.)

(d) Security Patrol Service: Since the plant operates 24 hours/day, 7 days/week, watchman's rounds are only made nights, weekends and holidays. During these periods, rounds with a Detex clock are made to all the important unoccupied parts of the plant. Tours are one per shift to 21 stations. A security officer is on duty at the central guard station 24 hours/day, 7 days/week.

(e) Detection and Alarm Systems: The plant has a computerized proprietary alarm system with audible and print-out reception at a data terminal in the central security station. This alarm system monitors sprinkler system alarms, smoke detectors and the Halon system in the computer room, fire pumps, manual pull alarms, and many other features vital to plant operations. While primarily a receiving terminal, the system can also send a command to start the fire pumps.

(f) Extinguishers, Standpipes and Hose: The client has over 600 hand held fire extinguishers, mostly of the dry chemical, $CO_2$ or foam types. The extinguishers are recharged and serviced in accordance with NFPA standards. Monthly recorded checks are also made of each extinguisher's condition. The type and location of the extinguishers is proper.

(g) Other Protection: The computer room on the second floor of the office building is protected by a total-flooding Halon 1301 extinguishing system. The system is activated by cross-zoned smoke detectors or manually. It is understood the system satisfactorily passed a full concentration discharge test when first installed early this year. A second smaller system protects the media storage vault adjoining the computer room.

PUBLIC PROTECTION:

(a) Water Supplies: There are no public water supplies in this area.

(b) Fire Department: The nearest public fire department is about 3 miles away in Columbia Falls. This is a volunteer fire department. The area is Protection Class 9.

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EDP EQUIPMENT:

The electronic data processing equipment is principally for corporate accounting, consisting of general ledger, accounts receivable and payable, and payroll. Halon 1301 protection is provided for the computer room.

BUSINESS INTERRUPTION:

Because the plant operates 24 hours/day, lost production would be difficult to make-up if the plant were operating at full capacity. The most vital ingredient to production is electric power. A very detailed analysis would be required to evaluate the loss potential here from this feature. Presently, the alumina raw material is in excess and being stored in a 100 feet x 300 feet warehouse on site.

NORMAL LOSS EXPECTANCY:

Excluding a catastrophic condition, with all fire protection functioning as intended, a fire in a sprinklered area, or a molten metal spill in the pot or casting areas, should not result in loss of more than 1% of property values.

MAXIMUM FORESEEABLE LOSS:

Excluding a catastrophic condition, with all fire protection out of service, a fire in the Paste Plant might result in the loss of 5% of property values.

ITEMS OF INTEREST:

A considerable molten metal exposure exists at this plant in the pot and casting areas. Spills of the molten aluminum can set fire to anything combustible, such as a fork lift truck.

RECOMMENDATIONS:

82-1 The sprinkler systems in the 2 alumina unloading sheds should be repaired and returned to service.



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