

CO₂ RECOVERY SYSTEM

A. GENERAL

The Chlorine Plant in its process requires a source of carbon dioxide gas. The flue gas, approximately 10% CO₂ resulting from combustion of natural gas in the boiler furnaces, meets this requirement. Therefore, on the stacks of Boilers 1, 2 and 3 in the Power Plant there is a 12" carbon steel line takeoff which runs to a Peabody gas scrubber where it goes to a rotary positive displacement gas compressor which forces the flue gas under pressure to the Chlorine Plant.

The following is a list and description of the equipment which composes this system.

Peabody Gas Scrubber

This is a vertical gas scrubber complete with moisture eliminator and spray equipment.

The purpose of this scrubber is to cool 3720 CFM of flue gas from 360°F. to 90°F. while using cooling water at 85°F. and to remove any foreign matter which may be present.

The scrubber is so constructed that the gas is cooled and cleaned by coming into direct contact with the cooling water. It is made from 18-8 stainless steel to withstand the corrosive action of the flue gas and water.

Gas Compressor

The compressor is a Roots type RAS-60-AVM rotary positive displacement unit and is V-belt driven by a 150-HP motor.

The purpose of this compressor is to take flue gas from the boiler stacks by drawing a vacuum on the gas scrubber and the piping to the stacks and compress this gas thereby forcing it out through the discharge piping to the user.

Valving and Piping

The piping and quick opening valves are so arranged that gas can be drawn from any one or more of the five boiler stacks. Whenever a boiler is shut down, the valves from these stacks should be closed.

Instrumentation

There are pressure gauges and thermometers in the suction header and discharge header. These are local indicating devices only.

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High temperature (200°F.) and low pressure (2.0 psig) of the compressor discharge header will annunciate on the Mechanical Vertical Board (CO₂ Compressor-High Temp.-Low Press.)

The gas scrubber will withstand a temperature of 1000°F. and, since the flue gas temperature will never reach this, it is not necessary to provide a protective alarm for it.

All controls for stopping and starting the compressor and the valves for supplying cooling water to the scrubber are located on the CO₂ system slab immediately north of number one boiler.

There is a "CO₂ Scrubber High Level" alarm in the control room in the event too much water is turned into the scrubber or the drain becomes stopped up. It is important that this scrubber not be allowed to overfill as damage to the compressor can occur from carryover.

Fire Protection

FIRE PROTECTION SYSTEM

To properly protect buildings and machinery in the Lower Plant area from fire, a permanently installed deluge type spray system is employed as well as fire hoses and portable extinguishers.

Automatic Deluge Systems

protects → This system consists of three single units and one dual unit, all located in the auxiliary bay area. The single unit east of #1 ~~chemical feed station~~ serves #1 lube oil reservoir. The north side of the dual unit near #3 Boiler feed pump serves auxiliary transformers 1 and 2. The south side serves #1 seal oil unit and hydrogen manifold. The single unit just west of #2 backwash panel serves #2 lube oil reservoir and #2 seal oil unit and hydrogen manifold.

The single unit just east of #3 lighting transformer serves #3 and #4 lube oil reservoir and #3 and #4 seal oil and hydrogen manifolds.

All these units are of the "dry" type. That is, there is no water in the headers from the sprinkler unit to the spray nozzles.

Mode of Operation

At each protected location there are one or more high-temperature detectors (HTD) that are connected together with 1/8" tubing connected at the other end to the sprinkler supervisory system. There is a small, continuous flow of very low instrument air through the tubing at all times. When an HTD is exposed to a rapid increase in temperature, the air pressure inside the HTD and tubing back to the supervisory will also increase rapidly. The supervisory senses this increase in air pressure and electrically and mechanically trips the deluge valve in the sprinkler thereby pressurizing the headers with water up to the spray nozzles. It should be noted that a slow, gradual increase in temperature will not trip the system. There is provision for manual tripping of each unit.

Fire Hoses and Reels

Hose reels are located to cover the area with 75 ft. and 50 ft. hoses attached. The hose is 1-1/2 inches, flexrite brand, double jacket, dacron filler, 400 lb. test, rubber lines, manufactured by the Hamilton Rubber Company. The adjustable spray nozzles connected to each hose are Akron brass, style 7H, underwriter approved fog nozzles as manufactured by the Akron Brass Company.

Portable and Wheeled Extinguishers

Portable and wheeled extinguishers are strategically located.