

# PROCESS GAS TREATMENT

## Scrubber Projects

### Semiconductor Industry

#### **Acid Scrubber Analysis**

##### **Hyundai Semiconductor America, Eugene, Oregon**

Acid scrubber system consisted of five acid scrubbers. Performed analysis to correct production problems and give Hyundai the ability to shut down any scrubber or any fan. Added sixth scrubber. In the investigation it was determined to use FRP ducts and fans to give more than a 10-year life. Provided preliminary and detailed engineering, including control changes.

#### **Solvent Waste RCRA Project**

##### **Semiconductor Manufacturer**

Redesigned solvent collection system in three operating production fabrications. Segregated piping systems by chemistry and collected in multiple DOT-approved totes for transport and disposal. Design included construction of an H3 waste storage building for two of the fabrications, instrumentation and controls for liquid level supervision, transfer and alarm functions. Provided evaluation of existing conditions, preparation of construction scope of work and cost estimates for multiple options prior to providing design of the selected option. Provided design, construction observation, system commissioning, and record drawings.

#### **Acid Scrubber Chemical Controls Upgrade**

##### **Intel Fab 15, Aloha, Oregon**

Redesigned the chemical feed and control system for seven acid scrubbers in an operating production fabrication. Redesigned pumps and system controls to provide stable operation with varying scrubber load conditions. Design provided for phased installation, with each scrubber being completely upgraded and tested prior to starting the next upgrade. Provided design, construction observation, system commissioning and record drawings.

#### **Gaspad Scrubber #7 Fan Replacement**

##### **Intel Fab 15, Aloha, Oregon**

Designed replacement of duplex exhaust fans for one gaspad scrubber in operating production facility. Provided evaluation of existing conditions, preparation of construction scope of work and cost estimates for multiple options prior to providing design of the selected option.

#### **Scrubber #6 Fan Coating Study**

##### **Intel Fab 15, Aloha, Oregon**

Provided analysis of various coating technologies to prevent chemical build-up on fan. Identified vendors for coatings and requested samples. Provided samples to Intel for in-service testing when project was cancelled.

#### **Process Exhaust System Installations (9)**

##### **Planar America, Hillsboro, Oregon**

Designed complete corrosive scrubbed exhaust system, including ductwork and tool connections to 30 process tools comprised of acid scrubber, exhaust fan, chemical feed system and controls. Provided design, construction observation, system commissioning, and record drawings.



## **Scrubber Projects (continued)**

### **Solvent Exhaust System Study Semiconductor Manufacturer**

Provided exhaust plume concentration calculations for permitting of solvent exhaust system in new production facility.

### **HMT Corporation Eugene, Oregon**

Analyzed chemical and physical operating characteristics of two acid scrubbers and one ammonia scrubber. Suggested changes needed for optimum performance.

### **Wet Hardboard Plant**

#### **Multiple Scrubber System Evanite Fiber Corporation, Corvallis, Oregon**

To prevent violating a MACT standard requirement for an RTO, Evanite conducted a pilot study to get the best control technology system for its hardboard plant. We analyzed materials of construction, controls, and performed preliminary engineering for the full installation. We oversaw testing of the system, which comprises three mist eliminators, a condenser, and a scrubber.

### **Pulp and Paper Industry**

#### **Acid/Wood Scrubber System Springfield Forest Products, Springfield, Oregon**

Analyzed existing scrubber for maintenance problems and efficiency. Designed dual-scrubber system. Modified old scrubber to decrease maintenance requirements and added another scrubber in parallel.

#### **Acid Scrubber System Louisiana-Pacific Corporation, Samoa, California**

Rebuilt existing scrubber on Ahlstrom recovery boiler. PM<sub>10</sub> emissions decreased by 45%.

#### **Acid Scrubber System/Bleach Plant Pope & Talbot, Inc., Halsey, Oregon**

Designed packed bed scrubber system and controls to remove discharge of chlorine, chlorinous acids, hot hydrogen peroxide, and other oxidizers and acids. Added continuous emission monitor to this system.

#### **Acid Scrubber/Recovery Pope & Talbot, Inc., Halsey, Oregon**

Performed preliminary engineering study on this scrubber system.

#### **Stone Container Corporation Missoula, Montana**

Scrubber was operating on a recovery boiler at 300°F. We analyzed scrubber system and redesigned scrubber, packing, controls and chemicals used; increased efficiency from 54% to 94%.

## RTO Projects

### **Confidential Client**

#### **Medium Density Fiberboard Plant**

A continuous Medium Density Fiberboard (MDF) plant was installed at the existing plant site, where a veneer plant, stud mill, particleboard plant, and finishing line already existed.

To add the MDF plant, the State of Georgia Department of Environmental Quality (DEQ) required all of the divisions on the plant site to be declared under one permit, which would have triggered a Prevention of Significant Deterioration (PSD) permit application and review. To avoid PSD, the MDF plant was permitted with emissions below Significant Emission Rates (SER), saving at least two years of permitting time. To meet the SER requirements, some air was recycled, critical baghouses were converted to cartridge filters, and a Regenerative Thermal Oxidizer (RTO) was installed. The RTO treated air from the flash tube dryer and press enclosure. Evergreen Engineering prepared the permits and provided preliminary engineering and detailed engineering for the control technology equipment.

### **Trus Joist**

#### **Plywood Plant**

Evergreen provided preliminary engineering for treatment of emissions from the plant, which had added a new dryer. With the addition of the new dryer, the plant would have been production-limited due to the maximum emissions allowed by the operating permit issued by the DEQ. Evergreen did a complete BACT study and recommended an RTO. This allowed maximum production from the new veneer dryer, and economically justified both the new dryer and the RTO.

### **Trus Joist**

#### **Plywood Plants**

Evergreen performed detailed engineering for RTOs installed in the Junction City and Eugene plants. 40,000 ACFM Durr RTOs were installed at each plant for emission control of the veneer dryer emissions. Evergreen did the civil engineering for the concrete pads for the RTOs, fan, and stack; mechanical engineering included design, routing, and mounting of ductwork, utility piping, and the stack; and structural work included duct supports, pipe racks, and access platforms. Evergreen did a complete power study for the installations, specified the transformers, motor control centers, and the switch gear needed. A complete electrical package was developed for the electrical contractor.

### **Confidential Client**

#### **Resin Plant**

Evergreen performed detailed engineering for the 12,000 CFM Thermal Oxidizer (TO) at Georgia-Pacific's resin plant in Albany, Oregon. An Epcon TO was installed for destruction of all of the collectable plant fumes. Evergreen did the civil engineering for the concrete pads for the TO, fan, and stack; mechanical engineering included design, routing, and mounting of ductwork, utility piping, and necessary tank modifications; and structural engineering included pipe racks and access platforms. The fume collection system included conservation vents, emergency venting, formaldehyde converter, all process tanks, storage tanks, finished product tanks, unloading area, Dowtherm units, and process area equipment. Evergreen also provided engineering for the power distribution and the instrumentation, complete with DCS integration.