



## Introduction

# Pharmaceutical

### Evergreen Engineering

- Established in 1985 as a full-service engineering consulting firm to the pharmaceutical industry
- All disciplines: civil/structural, mechanical, electrical/controls, and chemical/environmental.
- Experience and creativity to provide innovative and cost-effective designs.
- Services include: Planning, scheduling, feasibility studies, preliminary engineering, energy evaluation, capital estimates, detailed engineering, process design, environmental permitting, purchasing, and construction management. Evergreen utilizes the latest design software to achieve uniformity and high efficiency.
- We are proud of our reputation of listening to our client's objectives and being able to do jobs other firms consider difficult or impossible. Whether it's a system modification, plant modernization or a complete greenfield plant design, our staff is ready to provide the professional engineering expertise needed to do the job right ... on-time and under budget.



### Pharmaceutical Facilities Engineering

Evergreen has been designing new facilities, retrofitting existing facilities, performing upgrades/expansions, implementing new technology, and designing equipment installations for over 20 years. Our projects for the pharmaceutical and related industries range from small facility upgrades and rearrangements to full plant expansions.

We are proficient in the design of all areas of pharmaceutical research and manufacturing including familiarity with cGMP, CFR and related standards and codes in regards to pharmaceutical manufacturing. We have deep cleanroom design experience including aseptic areas, formulation, blending and packaging.

Evergreen appreciates the importance of project planning. We can help to formulate and assess options and tradeoffs early in the planning phase, to achieve maximum leverage and opportunity for success. We can then assist with project scope definition, accurate cost estimation, detailed engineering, as well as construction management, commissioning, and start-up.

If you have a unique situation with your facility that requires an engineered solution, it is likely that our diversely experienced staff has faced a similar issue on another project at some point in the past and can offer a solution.

# Pharmaceutical Projects

The following is a partial list of projects:

**Process Flow Diagram Development, Regeneron Pharmaceuticals, Rensselaer, NY** - Development of detailed process flow diagrams in electronic format from conceptual sketches. Served as project manager on the project, responsible for overall project coordination and development of process flow diagrams with client's process engineers.

**Laboratory Design, Steifel Labs, Oak Hill, NY** - Renovation of existing non-classified 2,000 sf lab to Cl.100K clean laboratory including calculations, sizing and selection of equipment. Responsible for overall project coordination and design of mechanical systems.

**Ranitidine Manufacturing Expansion, Schein Pharmaceuticals, Inc, Danbury, CT** - Design of new 15,000 sf manufacturing area including weigh, blend, fill areas with Cl. 10K clean room, new electric centrifugal central chiller plant, low pressure central steam boiler plant, HVAC, and DDC control system.

**Manufacturing Plant Upgrade, Sherman Pharmaceuticals, Inc., Abita Springs, LA** - Design of new 10,000 sf manufacturing plant including new boiler plant, HVAC, pure steam generator, USP purified water system, Cl. 100, Cl. 10,000 clean areas.

## **Planning and Construction Pharmaceuticals Production Facility, Synthetech Inc, Albany, OR**

- **Feasibility Study** – Work included scale-up of amino acid based batch processes from pilot plant (15 to 200 gal.) and semi-works (300 to 1000 gal.) reactors/tanks to 2-3,000 gal. batches. Process flow diagrams, mass balances and energy balances were developed for typical processes, which was translated into a preliminary plot plan of the process equipment and utility systems needed. A three phase capital cost estimate was developed for the board review of the appropriations request.
- **Project Engineering for Facilities / Utility Systems (\$5.5 MM)** – Functioned as the Owners representative in a design / build approach used to fast track the project and control costs. Responsible for incorporating process safety management (PSM) and the FDA good manufacturing practices (GMP) design criteria into the facility. Generated process equipment design data for the building design (architectural, mechanical, structural, electrical and civil). Functioned as the general contractor for the bidding, issuing purchase orders and scheduling of the architectural/civil, power distribution/building electrical, HVAC, mechanical piping and coatings contractor packages.

### **Other Projects Included:**

- CAD P&ID Record Drawings
- Isometric Piping Drawings
- 2nd Floor Mezzanine Structural Assess
- Installation Design for Tanks
- Mezzanine Design
- Hanger Supports for Tanks
- Design Legs for Tank
- Boilers & Piping Installation
- Support for 2500 Gallon Reactor
- On-Site Engineering Support – Caraway Support for Centrifuge
- Wastewater Treatment Tanks Analysis

**Process Chiller Plant, Organichem Corp., Rensselaer, NY** - Design of fastrack 300 Ton low temperature chilled water plant including chiller plant building and site distribution piping on existing trestle system, construction of 8 story exterior pipe riser. Responsible for overall project coordination and design of mechanical systems.

**Thermal Oxidizer Installation, Zenith Labs, Northvale, NJ** - Design of new process oven exhaust system 15,000 cfm, including thermal catalytic oxidizer for burn off of IPA from tablet drying oven exhaust. Responsible for overall project coordination and design of mechanical systems.

**Central Chiller Plant, Schein Pharmaceuticals, Inc, Carmel, NY** - Fast track design of new 700 Ton low temperature chilled water plant including new plant building, distribution piping, utility relocations, new electrical service, and central plant DDC control system. Responsible for overall project coordination and design of mechanical systems.