

Optimized Gas Treating, Inc.

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“Unit Review” Process

The Unit Review process was utilized heavily within an operating company that previously employed a number of OGT personnel. The process is used to identify opportunities to improve the most important aspects of plant performance, namely:

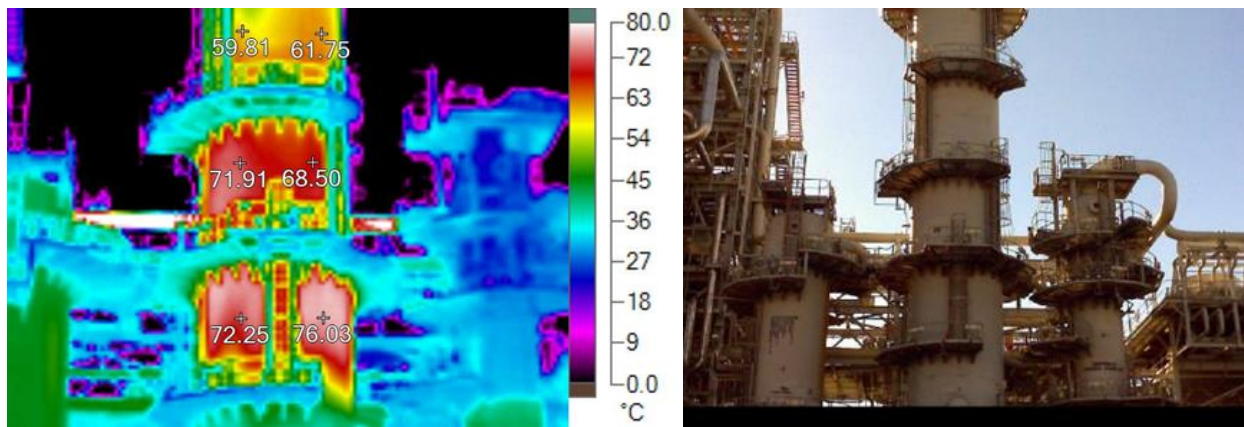
- Safety
- Environmental performance
- Reliability
- Operability
- Profitability

Sulfur processing units (amine, SWS, Claus SRU, TGU, caustic treating) are not money makers in a refinery or gas plant in and of themselves. Their main purpose is to meet environmental permitting objectives. Unfortunately, they are often treated as utilities or required annoyances for the money-making hydrocarbon processing units. When treated with neglect, these units eventually succumb to corrosion, plugging, foaming, and many major operating headaches that can destroy plant profitability over the long term and may result in hefty environmental fines.

OGT applies the Unit Review process to identify low-level restrictions to operations, capacity, reliability and safety that may control the Safe Operating Limits (SOL's) of the units that constrain upstream and downstream hydrocarbon processing capabilities. This process is particularly effective in plants where sulfur processing or treating capacity constrains the hydrocarbon production.

Herein lies the value statement for the Unit Review:

*In many cases, a simple change in one operating target can translate into many thousands or millions of dollars per year in avoided **Lost Profit Opportunity (LPO)**.*



OGT acts to facilitate the Unit Review process by working with plant engineers, operators, maintenance, and instrumentation specialists. A casual, but focused Q&A format is taken to get plant personnel talking to one another instead of pointing fingers. Many problems are solved by simply improving the communications between the plant folks. The process begins by posing high-level questions to the primary plant business and plant stakeholders, then it probes into root-cause unit limitations.

As part of the Unit Review, if the plant process operations need to be optimized, OGT will develop a model of the unit(s) using the industry recognized [ProTreat®](#) and [SulphurPro®](#) rate-based gas treating and sulfur simulation tools. Many companies offer services that superficially test or model process units. Our process goes several layers deeper with models developed on the basis of real operating column internals and catalysts as well as real sulfur plant exchanger geometries. These models *predict* how the plant *should* behave. They don't try to simply match plant performance using phony tray efficiencies, hypothetical residence times, or equilibrium and ideality assumptions.

Units that can be reviewed by OGT include:

- Amine treating and regeneration units (MEA, DEA, MDEA, DGA™, DIPA, piperazine, AMP, glycinates, activated MDEA and blends thereof, proprietary solvents such as GAS/SPEC*, UCARSOL™, FLEXSORB™, AdapT), including effects of heat stable salts (HSS's), hydrocarbon contamination and foaming abatement.
- Aqueous Amine Post-Combustion Carbon Capture
- Hot carbonate systems with and without amine promoters,
- Physical solvents such as SELEXOL™, Coastal AGR®, Genosorb®
- Dehydration units (MEG, DEG, TEG) including Stahl columns
- Sour Water Stripping (SWS) and handling including phenolic and non-phenolic waters, fouling and corrosion issues.
- Sulfur Recovery Units (SRU's)
 - Basic Claus, all major reheat schemes, NH₃ destruction.
 - Subdewpoint (e.g. CBA, MCRC, Sulfreen™)
 - Oxygen-enriched units including both low-level enrichment and high-level injection such as COPE®, SURE™ Double Combustion, OxyClaus™



- Lean acid gas processing, including issues with flame stability and BTEX destruction
- Tail Gas Treating Units (TGTU's)
 - Reduction-quench amine such as SCOT™ and low temperature (LT SCOT™)
 - Oxidative, such as Cansolv™ and Wellman-Lord
 - Beavon-Stretford
- Caustic Treating Units (e.g. UOP Merox™ and Merichem Fiber Film® units)
- Sulfur handling and degassing systems (e.g. D'GAAS)



Our staff also have knowledge and operating experience with many of the surrounding refinery and gas plant equipment items and process units to help identify how problems within the sulfur processing block affect economics and reliability in neighboring units. In many cases, an upstream unit can adversely affect the sulfur processing unit unbeknownst to the operator or vice versa.

Depending upon the scope and needs of the plant, the Unit Review can be focused into multiple phases:

- **Phase I: High-level Process Review**
 - Design basis review, PFD's, heat & material balances, P&ID's, equipment data sheets, current operating DCS typical data, lab analyses reports, test run reports, SOL's
- **Phase II: Detailed plant Unit Review**
 - Interviews on site with plant personnel, business stakeholders, and plant walkthrough

The real value of the Unit Review comes during Phase II. This is best conducted on-site or in a location close to the plant where personnel who are most familiar with the unit can be brought together for interview. A plant walkthrough is conducted with detailed Q&A to probe and identify potential opportunities. The opportunities are discussed within the group with OGT facilitating the process and can be ranked in terms of perceived benefit to the plant. OGT has considerable experience translating opportunities into economic benefits.



The deliverables from the Unit Review process typically include an **Optimization Report** with list of prospective opportunities. Accompanying the report are the **ProTreat®** and **SulphurPro®** simulation models that can be used for both monitoring current operations as well as optimizing future operations. An additional service offered by OGT includes setting up a Unit Monitoring system for the plant unit(s).

Timing

Although a Unit Review can be conducted at any time, the optimal timing will be after a unit has run long enough since the last turnaround to have a feel for the problems and limitations to achieving desired performance. Many of the opportunities identified by the Unit Review can be implemented either as new operating targets or small capital projects during the next turnaround. A Unit Review is ideal to compliment a Process Hazards Analysis (PHA) revalidation to help prioritize opportunities.