

ORTLOFF ENGINEERS, LTD.
 Summary
 of
 REFINERY SULFUR RECOVERY PROJECTS

YEAR	PLANT OWNER & PLANT LOCATION	CONTRACTOR(S)	SIZE LT/D	PROJECT DESCRIPTION
1985	Clark Oil Company Garyville, LA	Lummus Ortloff Engineers, Ltd.	15	Troubleshooting investigation to determine pressure drop and other operating problems. Performed miscellaneous engineering assignments.
1986	Fina Oil & Chemical Company Big Spring, TX	Ortloff Engineers, Ltd.	38	Sulfur Recovery unit troubleshooting and performance testing assistance to assure compliance with TACB emissions requirements.
1986	Little America Refining Company Casper, WY	Ortloff Engineers, Ltd.	19	Sulfur Recovery unit turndown study to develop modifications and changes required to operate unit at 10 to 25 percent of design.
1986	Placid Refining Co. Port Allen, LA	Ortloff Engineers, Ltd.	10	Sulfur Recovery unit evaluation study involving data collection and analysis to define problems and recommend changes in an existing SRU. Prepared revamp design package and reviewed client's documents for installing the modifications.
1987	Hawaiian Independent Refinery, Inc. Ewa Beach, HI	Ortloff Engineers, Ltd.	14	Sulfur Recovery unit study including evaluation of the effects of using oxygen enriched air to increase acid gas feed capacity of existing unit to 20 LT/D.
1987	Powerine Oil Company Santa Fe Springs, CA	Ortloff Engineers, Ltd.	2x23	Sulfur Recovery unit consulting services to inspect two shutdown SRU's prior to being restarted. Also prepared inspection report and recommended modifications and operating procedure changes as required.
1988	Diamond Shamrock Refining Company McKee Refinery Sunray, TX	Ortloff Engineers, Ltd. The Pro-Quip Corporation	50	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and a waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.

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1988	Fina Oil & Chemical Company Big Spring, TX	Ortloff Engineers, Ltd.	60	Sulfur Recovery unit capacity increase study involving various modifications versus the use of oxygen-enriched air. Prepared design package for modifications and installed cost estimates to increase capacity from 38 LT/D.
1988	LL&E Petroleum Marketing Mobile, AL	Ortloff Engineers, Ltd.	50	Sulfur Recovery unit tailgas incineration system retrofit design package prepared for operation at 8 LT/D.
1988	LL&E Petroleum Marketing Mobile, AL	Ortloff Engineers, Ltd.	50	Sulfur Recovery and SCOT unit turndown study to specify and estimate cost of modifications required to operate the unit at reduced feed rates.
1988	LL&E Petroleum Marketing Mobile, AL	Ortloff Engineers, Ltd.	10	Sulfur Recovery unit consulting to review the design of a reapplied SRU, then recommend and design modifications for improved performance and operability.
1989	Conoco, Inc. Ponca City Refinery Ponca City, Oklahoma	Ortloff Engineers, Ltd. The Pro-Quip Corporation	20	Skid-mounted Claus Sulfur Recovery System with a tailgas incineration system. Provided conceptual design package and process engineering for project.
1989	Fina Oil & Chemical Company Big Spring, TX	Ortloff Engineers, Ltd.	60-110	Sulfur Recovery plant capacity increase study involving the evaluation of various existing plant retrofit modification schemes versus addition of new units.
1989	LL&E Petroleum Marketing Mobile, AL	Ortloff Engineers, Ltd.	10	Sulfur Recovery unit study to predict performance of a reapplied SRU for environmental permitting purposes.
1989	Western Slope Refining Company Fruita, CO	Ortloff Engineers, Ltd.	12	Sulfur Recovery unit consulting assistance in the restart of a Claus SRU and Tailgas Incinerator with new feed streams.
1990	Ashland Petroleum Ashland, KY	The Pritchard Corporation The Pro-Quip Corporation Ortloff Engineers, Ltd.	50	Sulfur Recovery project design consulting and assistance in the implementation of Schedule A packages.
1990	Fina Oil & Chemical Company Port Arthur Refinery Port Arthur, Texas	Ortloff Engineers, Ltd. Fluor Daniel, Inc.	160 260	Sulfur Recovery plant Schedule A Package for new SRU No. 3 Claus Sulfur Recovery System and a SCOT TGCU and Tailgas Incinerator with waste heat recovery.
1990	Giant Refining Company Gallup, NM	Ortloff Engineers, Ltd. The Pro-Quip Corporation	10	Sulfur Recovery preliminary design package furnished for AFCE cost estimate study.

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1990	Koch Refining Koch St. Paul, MN	Ortloff Engineers, Ltd. Ford, Bacon & Davis Utah	250	Sulfur Recovery unit bid qualification support, selling assistance, and design consulting and review.
1991	Coastal Derby Refining Company Coastal Derby Refin. Wichita, Kansas	Ortloff Engineers, Ltd. The Pro-Quip Corporation	20	Skid-mounted Claus Sulfur Recovery System with a tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
1991	Fina Oil & Chemical Company Big Spring, Texas	Ortloff Engineers, Ltd. Fluor Daniel, Inc. The Pro-Quip Corporation	60	Preliminary process design and cost estimate for a new refinery Sulfur Recovery facility consisting of a Claus SRU, SCOT TGCU, and tailgas incinerator with waste heat recovery.
1991	Fina Oil & Chemical Company Port Arthur, TX	Ortloff Engineers, Ltd.	105 200	Sulfur Recovery and Tailgas Cleanup unit consulting and engineering work to assist Fina in developing a plan to eliminate excessive sulfur emission episodes. Attended meetings with the TACB, Texas Attorney General's office, and Fina.
1991	Hawaiian Independent Refinery, Inc. Ewa Beach, HI	Ortloff Engineers, Ltd.	23 40	Sulfur Recovery on-site assistance to advise and assist client's personnel in preparing the Sulfur Recovery and Tailgas Cleanup Units for a compliance test, gathering data during the test, and analyzing the results of the test.
1991	Hawaiian Independent Refining, Inc. HIRI Refinery Ewa Beach, HI	Ortloff Engineers, Ltd. The Pro-Quip Corporation E. H. Black Co.	23 40	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
1991	Sinclair Oil Corporation Tulsa, OK	Ortloff Engineers, Ltd.	35	Sulfur Recovery and Gas Treating study to determine and recommend the debottlenecking modifications and/or replacement options required to achieve a sulfur recovery capacity of at least 35 LT/D.
1992	Fina Oil & Chemical Company Port Arthur, TX	Ortloff Engineers, Ltd.	105	Sulfur Recovery and Tailgas Cleanup unit consulting and engineering activities required to revise the SCOT TGCU and Tailgas Incinerator design packages for a lower capacity, instead of the design basis capacity previously used to prepare the Schedule A package.
1992	Fina Oil & Chemical Company Big Spring Refinery Big Spring, Texas	Ortloff Engineers, Ltd. Fluor Daniel, Inc. The Pro-Quip Corporation	60	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and waste heat recovered tailgas incineration. Provided conceptual design package, process engineering for project, and startup assistance.

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1992	Frontier Refining Company Frontier Refinery Cheyenne, Wyoming	Ortloff Engineers, Ltd. The Pro-Quip Corporation	65	Skid-mounted Claus Sulfur Recovery System. Provided conceptual design package, process engineering for project, and startup assistance.
1992	LL&E Petroleum Marketing Mobile, AL	Ortloff Engineers, Ltd.	1-15	Sulfur Recovery, SCOT, and incineration units revamp project. Provided conceptual design package, process engineering for project, and startup assistance to revamp existing 50 LT/D plant for operation at variable low rates.
1992	Pacific Refining	Ortloff Engineers, Ltd. The Pro-Quip Corporation	20	Sulfur Recovery unit report prepared for use in an application for permit to construct a Sulfur Recovery plant including SRU, SCOT, and INCIN systems.
1993	Amoco Oil Company Salt Lake City Ref. Salt Lake City, Utah	Ortloff Engineers, Ltd. The Pro-Quip Corporation The Pritchard Corporation	15	Skid-mounted Claus Sulfur Recovery System. Provided conceptual design package, process engineering for project, and startup assistance.
1993	Fina Oil & Chemical Company Port Arthur, TX	Ortloff Engineers, Ltd. Fluor Daniel, Inc.	160	Reviewed detailed design work for a Claus Sulfur Recovery System being constructed using the Schedule A package prepared previously by Ortloff.
1993	Indian Refining Company L.P. Lawrenceville Refin. Lawrenceville, IL	Ortloff Engineers, Ltd. The Pro-Quip Corporation	57 80	Skid-mounted Claus Sulfur Recovery System and SCOT tailgas system. Provided conceptual design package, process engineering for project, and startup assistance.
1994	Ergon, Inc. Vicksburg	Ortloff Engineers, Ltd.	15	Evaluate the condition and applicability of one or more used sulfur recovery plants for installation in Client's refinery.
1994	Murphy Oil USA, Inc. Meraux Refinery Meraux, Louisiana	Ortloff Engineers, Ltd. The Pro-Quip Corporation	80	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and a tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
1995	ECOPETROL Barrancabermeja Colombia, S.A.	Ortloff Engineers, Ltd.	54	Sulfur Recovery study for improving recovery reliability of existing SRU. Prepared conceptual design package for recommended modifications and provided startup assistance.
1995	Lion Oil Company El Dorado Refinery El Dorado, Arkansas	Ortloff Engineers, Ltd. The Pro-Quip Corporation	80	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.

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1995	YPF S.A. La Plata Refinery Buenos Aires, Argen.	Ortloff Engineers, Ltd. The Pro-Quip Corporation	60	Sulfur Recovery unit study to recommend modifications to upstream processing units to improve the quality of the acid gas streams produced. Prepared conceptual design package for recommended modifications.
1995	YPF S.A. Lujan de Cuyo Ref. Mendoza, Argentina	Ortloff Engineers, Ltd. The Pro-Quip Corporation	60	Sulfur Recovery unit study to recommend modifications to upstream processing units to improve the quality of the acid gas streams produced. Prepared conceptual design package for recommended modifications.
1996	Atlas Processing Company Shreveport Refinery Shreveport, LA	Ortloff Engineers, Ltd. The Pro-Quip Corporation	20	Skid-mounted CBA Process Sulfur Recovery system. Provided conceptual design package, process engineering for project, and startup assistance.
1996	Little America Refining Company Casper, WY	Ortloff Engineers, Ltd.	19	Sulfur Recovery troubleshooting study of existing sulfur recovery unit and incinerator.
1996	Pemex Salamanca and Tula Plants, Mexico	Ortloff Engineers, Ltd. Ford, Bacon & Davis	60	Provide instrumentation and control specialist to perform precommissioning check-out, startup advisor, and instrumentation troubleshooting work.
1997	Fina Oil & Chemical Company Port Arthur, TX	Ortloff Engineers, Ltd.	260	Sulfur Recovery study to determine the maximum sulfur production rate that can be achieved utilizing the existing SCOT towers. Determine what modifications would be necessary to the SCOT and incinerator to utilize all existing sulfur plant capacity.
1998	YPF S.A. La Plata Refinery La Plata, Argentina	Ortloff Engineers, Ltd. The Pro-Quip Corporation Astra-Evangelista S.A.	61	Skid-mounted Claus Sulfur Recovery System and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
1998	YPF S.A. Lujan de Cuyo Refin. Mendoza, Argentina	Ortloff Engineers, Ltd. The Pro-Quip Corporation Astra-Evangelista S.A.	60	Skid-mounted Claus Sulfur Recovery System and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2000	Frontier Refining, Inc. Cheyenne, Wyoming	Ortloff Engineers, Ltd.	100	Tailgas Thermal Oxidation unit study to debottleneck existing unit and correct operating deficiencies.
2000	Jordan Petroleum Refinery Co. Ltd. Zarka, Jordan	Ortloff Engineers, Ltd. Larsen & Toubro Limited	23	Sulfur Recovery unit study to critique design package prepared by another designer and suggest changes to improve reliability and service life.

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2000	Port Arthur Coker Company, L.P. Port Arthur Refinery	Ortloff Engineers, Ltd. The Pro-Quip Corporation Foster Wheeler Jacobs Engineering	417	Claus Sulfur Recovery System (2 trains), SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2000	Ras Laffan Onshore Qatar	Ortloff Engineers, Ltd. Foster Wheeler USA Corp.	240	Sulfur Recovery unit study to critique design package prepared by another designer and suggest changes to improve reliability and service life.
2000	Saudi Aramco Mobil Refinery (Samref) Yanbu, Saudi Arabia	Ortloff Engineers, Ltd. Foster Wheeler USA Corp.	2x153	Sulfur Recovery unit study to debottleneck existing SRUs to increase capacity to 2x219 LT/D, and to correct operating deficiencies in existing operations.
2001	Exxon Mobil Campana Refinery, Argentina	Ortloff Engineers, Ltd. The Pro-Quip Corporation	15	Screening study and cost analysis for new refinery gas treating and sulfur recovery units.
2001	Shell Chemical Company Mobile Refinery Saraland, AL	Ortloff Engineers, Ltd.	Expand to 18 LT/D	Prepare a report recommending what modifications should be made to debottleneck the existing Sulfur Recovery Unit #1, existing SCOT Tailgas Cleanup Unit, and existing Tailgas Incinerator (SRU#1/SCOT/Incin) for processing a nominal 18 LT/D sulfur feed rate.
2003	Abu Dhabi Oil Refining Company Ruwais Refinery Ruwais, U.A.E.	Ortloff Engineers, Ltd. Larsen & Toubro Limited L&T - Chiyoda	51	CBA Sulfur Recovery System and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2004	Valero Port Arthur Refinery Port Arthur Refinery Port Arthur, TX	Ortloff Engineers, Ltd. Linde BOC Process Plants LLC Jacobs Engineering	208	Claus Sulfur Recovery System. Provided conceptual design package, process engineering for project, and startup assistance.
2004	Valero Port Arthur Refinery Port Arthur Refinery Port Arthur, TX	Ortloff Engineers, Ltd. Linde BOC Process Plants LLC Jacobs Engineering	417	Claus Sulfur Recovery System (2 trains), SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2005	Coffeyville Resources Refining & Marketing Coffeyville Refinery Coffeyville, KS	Ortloff Engineers, Ltd Linde BOC Process Plants LLC	100	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2006	Calumet Shreveport Lubricants Shreveport Refinery Shreveport, LA	Ortloff Engineers, Ltd. Linde BOC Process Plants LLC	25	Skid-mounted CBA Process Sulfur Recovery system. Provided conceptual design package, process engineering for project, and startup assistance.

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2006	Sinclair Wyoming Refining Company Sinclair Refinery Sinclair, WY	Ortloff Engineers, Ltd. Linde BOC Process Plants LLC	80	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2006	Sinclair Wyoming Refining Company Sinclair Refinery Sinclair, WY	Ortloff Engineers, Ltd. Linde BOC Process Plants LLC	80	Skid-mounted Claus Sulfur Recovery System, SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2007	Petrojam Limited Petrojam Refinery Kingston, Jamaica	Ortloff Engineers, Ltd. SNC - Lavalin	60	Amine regeneration, sour water stripping, Claus Sulfur Recovery System (2 trains), SCOT Tailgas Cleaning System, and waste heat recovered tailgas incineration system. Provided conceptual design package.
2008	Abu Dhabi Oil Refining Company Ruwais Refinery Ruwais, U.A.E.	Ortloff Engineers, Ltd. GS Engineering & Construction	100	Claus Sulfur Recovery System, SCOT Tailgas Cleanup System, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering during project, and startup assistance.
2008	Sinclair Tulsa Refining Company Sinclair Refinery Tulsa, OK	Ortloff Engineers, Ltd. Linde Process Plants	150	Amine regeneration, sour water stripping, SUPERCLAUS Sulfur Recovery System, waste heat recovered tailgas incineration system, and DynaWave tailgas scrubbing system. Provided conceptual design package.
2008	Sinclair Tulsa Refining Company Sinclair Refinery Tulsa, OK	Ortloff Engineers, Ltd. Linde Process Plants	150	Amine regeneration, sour water stripping, SUPERCLAUS Sulfur Recovery System, waste heat recovered tailgas incineration system, and DynaWave tailgas scrubbing system. Provided conceptual design package.
2008	Sinclair Tulsa Refining Company Sinclair Refinery Tulsa, OK	Ortloff Engineers, Ltd. Linde Process Plants	150	Amine regeneration, sour water stripping, SUPERCLAUS Sulfur Recovery System, waste heat recovered tailgas incineration system, and DynaWave tailgas scrubbing system. Provided conceptual design package.
2008	Total Petrochemicals USA, Inc. Port Arthur Refinery Port Arthur, TX	Ortloff Engineers, Ltd. Fluor Corporation	225	Claus Sulfur Recovery System, SCOT Tailgas Cleanup System, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering during project, and startup assistance.
2008	Total Petrochemicals USA, Inc. Port Arthur Refinery Port Arthur, TX	Ortloff Engineers, Ltd. Fluor Corporation	225	Claus Sulfur Recovery System, SCOT Tailgas Cleanup System, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering during project, and startup assistance.

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2010	Hindustan Petroleum Corporation Ltd. Mumbai Refinery Mumbai, India	Ortloff Engineers, Ltd. Linde Process Plants Linde Engineering India	130	Claus Sulfur Recovery System (2 trains), SCOT Tailgas Cleanup System, and waste heat recovered tailgas incineration system. Provided conceptual design package, process engineering for project, and startup assistance.
2011	Samsung Total Petrochemicals No. 2 Aromatics Complex Daesan, Korea	Ortloff Engineers, Ltd. UOP LLC Samsung Engineering	68	Claus Sulfur Recovery System (2 trains), SCOT Tailgas Cleanup System, and waste heat recovered tailgas incineration system. Provided conceptual design package.
2012	PEMEX Refinacion Madero Refinery Tamaulipas, Mexico	Ortloff Engineers, Ltd. CB&I, Inc. ICA Fluor	148	CBA Sulfur Recovery System. Provided conceptual design package.
2012	PEMEX Refinacion Minatitlan Refinery Veracruz, Mexico	Ortloff Engineers, Ltd. CB&I, Inc. Tecnicas Reunidas	148	CBA Sulfur Recovery System. Provided conceptual design package.
2012	PEMEX Refinacion Salamanca Refinery Guanajuato, Mexico	Ortloff Engineers, Ltd. CB&I, Inc.	295	CBA Sulfur Recovery System (3 trains). Provided conceptual design package.
2012	PEMEX Refinacion Salina Cruz Refinery Oaxaca, Mexico	Ortloff Engineers, Ltd. CB&I, Inc. FW Iberia	79	CBA Sulfur Recovery System. Provided conceptual design package.
2012	Shell Chemical Company Mobile Refinery Sinclair Refinery Saraland, AL	Ortloff Engineers, Ltd.	Expand to 35 LT/D	Prepare a report recommending what modifications should be made to debottleneck the existing Sulfur Recovery Unit #1, existing SCOT Tailgas Cleanup Unit, and existing Tailgas Incinerator (SRU#1/SCOT/Incin) for processing a nominal 35 LT/D sulfur feed rate.
2016	ADNOC Refining Ruwais, U.A.E.	Ortloff Engineers, Ltd Wison Engineering, Ltd.	100	Claus Sulfur Recovery System, SCOT Tailgas Cleanup System, and waste heat recovered tailgas incineration system. Will provide conceptual design package, process engineering during project, and startup assistance.
2017	Valero Energy Corporation Port Arthur, TX	Ortloff Engineers, Ltd Richard Design Services	417	Claus Sulfur Recovery System (2 trains), SCOT tailgas cleanup system, and waste heat recovered tailgas incineration system. Provided conceptual design package.