

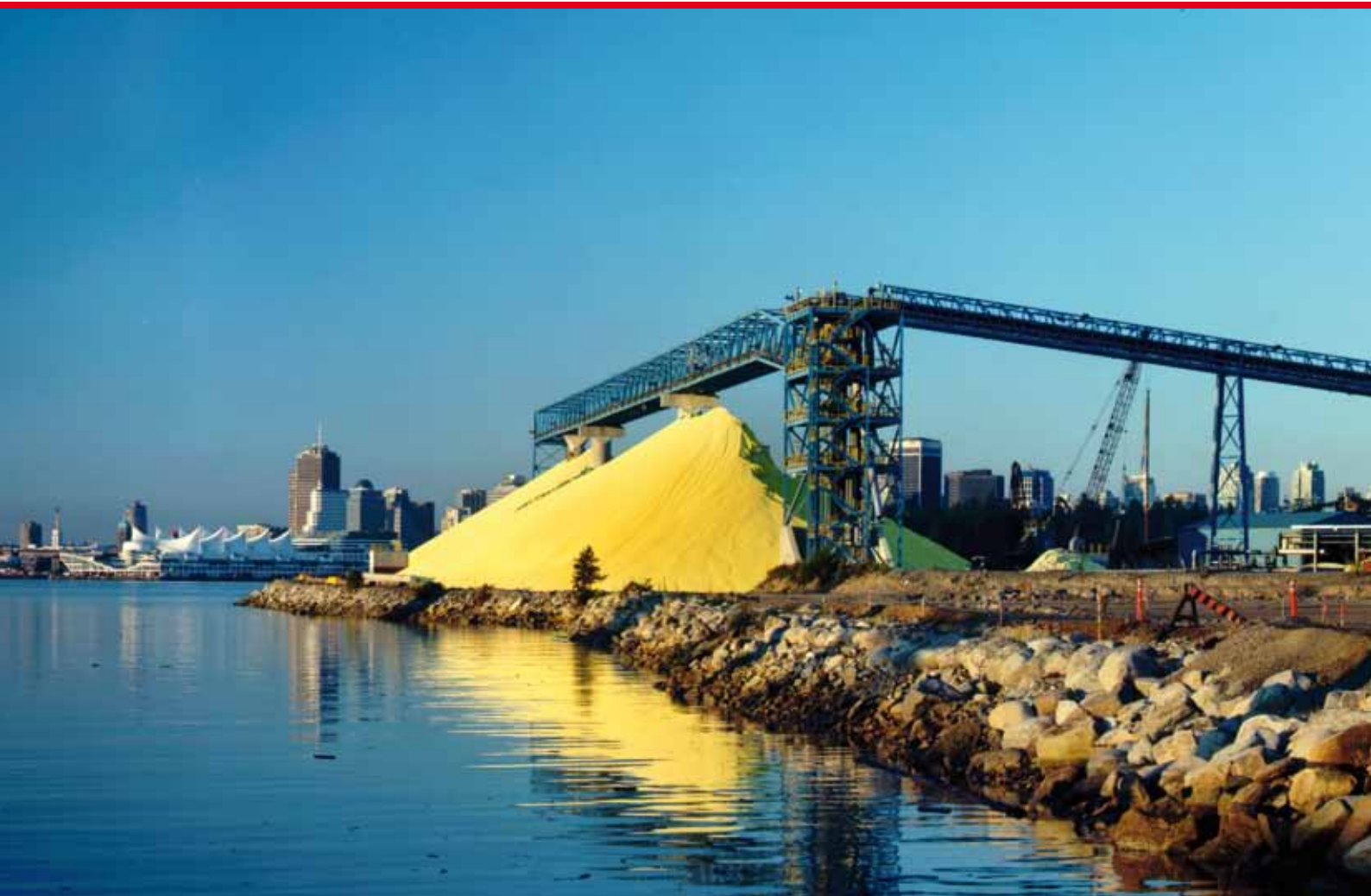


WorleyParsons

resources & energy

EcoNomics™

Total Sulphur Management Capability and Experience





WorleyParsons

resources & energy



“There is no task so important or urgent in our business, or our customers’ business, that it overrides the need to work safely...”

John Grill, WorleyParsons CEO

Zero Harm is our corporate vision for health, safety & the environment (HSE).

We are committed to our vision; it applies to all of our operations, at all times, in all locations, and at all levels of responsibility.

We will actively work to align our expectations and behaviors with those required to achieve our vision through a dedication to continuous improvement.

The launch of our HSE framework, OneWay™, enables us to further align and consolidate our global systems and procedures and continue to work with our personnel to reinforce a culture that underpins our drive to achieve our corporate differentiator of industry leadership in HSE performance.

OneWayTM
to zero harm

Corporate Overview

WorleyParsons is a leading global provider of professional services to the resources & energy sectors, and the complex process industries.

We cover the full asset spectrum, both in size and lifecycle, from the creation of new assets, to services that sustain and improve operating assets.

Our business has been built by working closely with our customers through long term relationships, anticipating their needs and delivering inventive solutions through streamlined, proprietary project delivery systems. Strong growth continues to characterize our performance both through organic development and through strategic acquisition as we strive to provide tailored services wherever our customers need us.

- Power
- Minerals & Metals
- Hydrocarbons
- Infrastructure & Environment

37
countries

120
offices

28,800
personnel

EcoNomicsTM Delivering profitable sustainability

EcoNomics™ is our range of services and technologies that profitably embed environmental, social and financial sustainability into project delivery, across the asset lifecycle. It is a seamless extension of our established project delivery capability in the key areas of Assessment, Efficiency and Treatment & Mitigation. We are committed to working with our customers to turn their sustainability objectives into good business practice.

Total Sulphur Management

WorleyParsons has the unrivalled ability to address all sulphur removal and handling issues across all industry sectors.

In whichever industry sector you operate - oil, gas, upstream, downstream, minerals and metals or power generation - and whatever your sulphur related problem - environmental protection, sulphur removal, smelter offgas cleaning, sulphuric acid production, safe sulphur handling and storage - WorleyParsons has the answer.

Sulphur removal and management have long been core services in which WorleyParsons is recognised as a world leader, servicing the resources and energy sectors on large and small projects. Our expertise has been built up over many years and covers all major aspects of sulphur management, providing a unique total sulphur management capability. In the early stages of development our *Select* team assists asset owners to identify the critical steps and decision points that maximise the value of their sulphur management project. WorleyParsons understands what it takes to create and implement a successful development and our team of global sulphur experts provide quality expertise in environmental assessment, technology selection, infrastructure requirements and safety considerations.

Total Sulphur Management project opportunities can be developed using EcoNomics™, which assists our customers in adopting a broader view of the impacts of their operations and incorporates financial, social and environmental risk into their project decisions to deliver optimised and profitable solutions. This initiative delivers projects that are future-proofed with improved risk management for our customers.

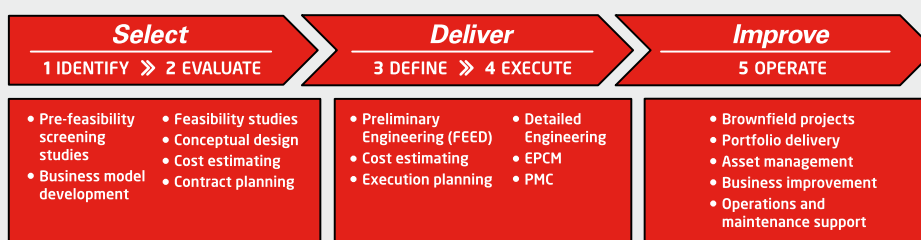
300+

sulphur management experts worldwide

8

global sulphur management centres of excellence

WorleyParsons Project Phases



WorleyParsons' experience covers all five phases of the asset lifecycle. In each one of these phases we understand the critical issues and apply our specialist business lines, *Select*, *Deliver* and *Improve* to enable our customers to achieve their business objectives.

Our phased approach enables consistent project delivery worldwide and WorleyParsons' project systems are fully aligned to this process.



Capability Overview

Sulphur Recovery Technology

WorleyParsons is a world leader in sulphur recovery technology with a track record of over 50 years. Our leading edge Claus and Tail Gas Treatment technologies have been used globally to treat natural gas and refinery gases and to meet the most stringent of environmental requirements.



Very Large Sulphur Recovery Plants

We have designed most of the biggest sulphur removal units in the world. The world's largest operating sulphur plant was designed by WorleyParsons and has a capacity of 2,450tpd.



Oxygen Enriched Sulphur Recovery

This technology was pioneered by WorleyParsons and our partner Linde/BOC. We are still the leading provider of this technology which allows cost effective debottlenecking of sulphur plants and the minimisation of capital cost for new builds.



Sulphur Bulk Handling & Transportation

WorleyParsons Westmar uses a range of technologies to model, design and optimise sulphur handling systems. The facilities designed by the specialist team include conveying systems, terminal operation and materials handling facilities which take into account site specific environmental and economic criteria.



Power Plant Environmental Control & FGD

We are a world leader in the design and implementation of air quality control for power plants. Our experience allows us to design, develop and implement projects that are technologically sound and comply fully with all environmental requirements.



Smelter Gas Cleaning & SO₂ Control

WorleyParsons' specialist smelter gas cleaning and SO₂ control division has in-depth expertise covering all aspects of high temperature off-gas handling and sulphur removal. The technologies applied can remove sulphur by producing sulphuric acid, liquid SO₂ or elemental sulphur. In-house design tools are used to provide an optimised and cost effective design.



RSR® Process

RSR® is a new process developed and patented by WorleyParsons. This process treats off-gas from ore roasters, smelters and coal fired power plants and produces elemental sulphur. The process is characterised by low fuel consumption, high recovery rates and a high quality sulphur product.



Gas Processing & Sour Gas Treating

WorleyParsons is one of the world leaders in the design of gas processing facilities. We have successfully designed plants for operation in harsh environments and have processed extremely sour gases using our expertise built up over more than 50 years.



Acid & Sour Gas Reinjection

Acid and sour gas reinjection technology can be a cost effective alternative to sulphur recovery in remote locations or where enhanced oil recovery is possible. WorleyParsons has unrivalled experience of re-injection at pressures up to 820 barg – bringing together the required specialist input from within our engineering department and from external equipment suppliers.



Sulphuric Acid

We are able to offer a truly independent view of sulphuric acid technology based on the experience of the Ralph M Parsons Company (a heritage founding company of WorleyParsons) which designed and built sulphuric acid plants. We can now work solely on our customers' behalf to provide independent evaluation of options and the development of cost effective solutions.



Modular Design Services

Modular design can provide a cost effective solution for installation of sulphur recovery facilities in remote locations. WorleyParsons' experience in modular design has developed over more than 45 years and has been successfully applied to sulphur recovery and related plants.



Operational Support & Troubleshooting

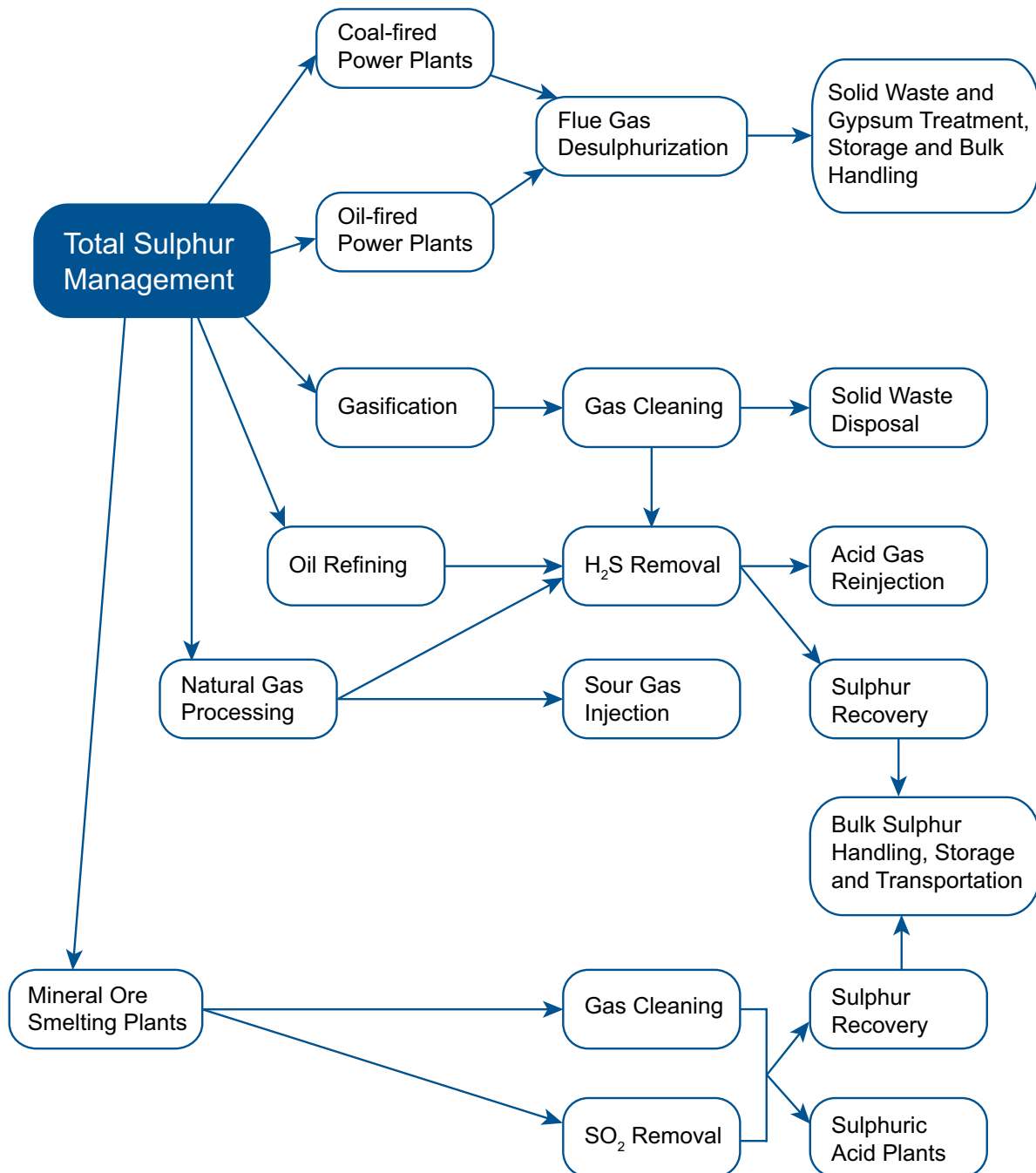
WorleyParsons routinely provides assistance to customers during plant start-up and commissioning. We also have long term relationships with some of our customers and we are able to provide ongoing assistance in the resolution of operating problems and ensure continued excellence in operation and continuous improvement.





Total Sulphur Management Technology

WorleyParsons works in sulphur management across all industries and in all phases of project development - from concept studies through design to commissioning - providing a one-stop shop for all sulphur management needs.



Sulphur Recovery Technology

WorleyParsons is a world leader in sulphur recovery technology, with a track record extending over 50 years.

We have designed and built more than 500 sulphur recovery plants worldwide using in house technologies and those of alliance partners.

Sulphur recovery is a core business of WorleyParsons. We offer unrivalled experience in the design, engineering, commissioning and support of sulphur recovery plants.

WorleyParsons currently offers more than ten sulphur recovery processes itself and in conjunction with its partners, such as Linde/BOC. These technologies include standard and oxygen-enriched Claus technology, tail gas treating technology and sulphur degassing and are able to meet the most stringent environmental standards.

WorleyParsons expertise has been maintained and developed by building plants throughout the world using our leading-edge designs and know how.

500

sulphur recovery plants worldwide

60

years experience in sulphur recovery technology

Project: PEMEX Refinery Revamps

Customer: PEMEX

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Mexico

The PEMEX Refinery Revamps Project was a grass roots sulphur recovery and BSR-TGU/MDEA unit for the PEMEX refinery. The SRU was started up in 2004 and the tail gas unit started up in 2009. This is the first tail gas unit in operation at the refinery installed to meet an enhanced 99.9% sulphur recovery requirement.



Project: Gdansk Refinery SRU

Customer: Groupo Lotos

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Poland

This major project used WorleyParsons' sulphur removal technology and was engineered, constructed and commissioned by WorleyParsons. This project was implemented at the Rafineria Gdanska in Northern Poland. WorleyParsons' scope of work covered the entire project from provision of technology through detailed design, procurement, construction management, commissioning and start-up assistance and included operator training. The sulphur plant consists of two 60tpd Claus units and a single train Beavon Sulphur Removal (BSR) plant.





Very Large Sulphur Recovery Plants

WorleyParsons has extensive experience with the particular issues associated with the design, commissioning and operation of very large sulphur removal units.

These plants use WorleyParsons technology and incorporate the combined experience of over 50 years of design experience. WorleyParsons has a depth of experience in the design of sulphur plants with capacities over 1,700tpd including the world's largest single train Claus plant with a capacity of 2,450tpd of sulphur produced.

The unique design challenges of large plant design have been successfully addressed – critical issues include the design of the furnace, burners, waste heat boiler design, catalytic reactors and sulphur condensers.

The practical design limits for these critical items have been extensively studied by WorleyParsons. The resulting designs have been shown to be robust and have operated efficiently and fully in line with expectations. The practical issues of equipment fabrication and transport to remote sites have also been successfully addressed.

The world's largest single train Claus plant with a capacity of

2,450 tpd

Single train capacities of over

1,700 tpd

Project: Habshan 2

Customer: Abu Dhabi Gas Industries Ltd (GASCO)

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

UAE

WorleyParsons is working closely with GASCO to develop the optimum processing scheme before producing the basic engineering design package for the sulphur recovery and acid gas treating units at Habshan.

A comprehensive understanding of the technologies available for sulphur removal enables WorleyParsons to select solutions that will deliver the best operational and economic outcome for projects. In this case the project selected a special, proprietary, highly selective FLEXSORB® (EMRE) solvent, which minimized both equipment sizing and energy use. The Habshan facility will comprise four trains producing a total of 5,200 tonnes of sulphur per day, making this the largest sulphur recovery plant designed by WorleyParsons.



Oxygen Enriched Sulphur Recovery

WorleyParsons has been a pioneer and leader in the use of oxygen to enhance the performance and economics of sulphur recovery plants for more than 30 years.

The use of pure oxygen instead of air in a new Claus-type sulphur recovery unit allows a smaller unit to be built to achieve a desired sulphur capacity, leading to significantly reduced capital and operating costs. Similar gains will also be realized in tail gas treating costs, with lower emissions.

Dramatic increases in operating capacities of existing Claus units are achieved by converting to the use of oxygen-enriched air, or pure oxygen. The capacity of a unit can be more than doubled by switching to pure oxygen, with relatively minor equipment modifications.

WorleyParsons licenses the SURE™ technology for the use of oxygen in Claus units, jointly with Linde/BOC, and this technology is now operating beneficially in more than 60 facilities worldwide. The successful implementation of oxygen use in these plants derives from our use of proprietary software to model the combustion process, specialized and customized burner designs and our expertise in the design and installation of piping and control systems for safe handling of oxygen in high concentrations. We can provide comprehensive classroom and in-plant training for new licensees' operating personnel.

Project: Stretford Replacement Project

Customer: Shell

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

USA

WorleyParsons was responsible for all phases of the Shell Martinez Sulphur Plant Revamp project and completed PDP, FEED, EPC, pre-commissioning and start up of the FLEXSORB unit. The unit is designed to process the gas from the FLEXICOKING® (EMRE) unit with 3,000 gpm FLEXSORB solvent. This is the largest FLEXSORB unit for this application which meant the existing sulphur recovery and the tail gas unit had to be revamped to 100% oxygen to process the gas from the FLEXSORB unit. The burner is a BOC burner.



Project: API Sulphur Recovery Unit

Customer: API Energia

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

Italy

Applying the WorleyParsons/BOC SURE™ technology and WorleyParsons' BSR tail gas treating technology, this project provided an innovative solution which met all the customer's needs. This design incorporates two SURE™ oxygen enriched Sulphur Recovery Units using the proprietary BOC burner design and a single train tail gas treating unit using WorleyParsons' Beavon Sulphur Removal (BSR) hydrogenation process. The units are installed at API's Falconara site and were part of the IGCC project which included a heavy oil gasification plant. The use of oxygen enriched technology allowed integration with the IGCC design and provided a minimum capital cost solution to sulphur removal.



Using oxygen in sulphur recovery for

30+
years

Applying SURE™ Technology in over

60
facilities worldwide



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Sulphur Bulk Handling and Transportation

WorleyParsons Westmar is a premier bulk terminal and materials handling consultant, leveraging over 20 years experience in all aspects of liquid and solid sulphur transport, forming, handling, storage and export.

WorleyParsons Westmar combines extensive knowledge of sulphur handling and associated process operations with diverse rail, marine and coastal engineering capability to deliver world leading engineering solutions for brownfield and greenfield bulk sulphur handling and terminal projects.

Sulphur specific operations and maintenance understanding, gained through our extensive experience in brownfield projects, is combined with WorleyParsons Westmar technology to provide optimum facility designs. Experience in the design and upgrade of sulphur handling terminals includes the largest export facilities in North America and the Middle East.

Our highly skilled inspections group provides inspection services for all types of materials handling equipment and facilities, and ensures that real-world lessons learned are imbedded in new designs.

20+

years experience in sulphur handling and transportation

Sulphur handling terminal design of

10,000+

tpd capacity

Project: Shah Gas Development Sulphur Handling Port and Terminal

Customer: Fluor/GASCO

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Abu Dhabi

WorleyParsons Westmar provided FEED for the development of a new port and sulphur handling terminal to facilitate GASCO's Shah Gas Development Project in Abu Dhabi. The sulphur handling facilities will include four large molten sulphur storage tanks, forming units, conveyors, 330,000 tonnes of covered sulphur storage, multiple stacker-reclaimers, two 4,000 tph quadrant shiploaders, marine structures and a new dredged port and approach channel. Our scope included site development, site services, piping, process, materials handling, buildings, conveyor structures, power supply, electrical controls, marine structures, procurement, HSE, estimating, project controls and project management.



Project: Consolidated Sulphur System

Customer: Vancouver Wharves Ltd

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Canada

WorleyParsons Westmar provided design and field services for a new sulphur receiving, storage and shiploading system at Vancouver Wharves' North Vancouver terminal. The new system, designed to consolidate all sulphur storage, uses a 140 metre long elevated stacker conveyor to create a single 25 metre high, 160,000 tonne stockpile. The project included a new rail car dumper capable of rotary dumping sulphur unit trains and bottom dumping of fertilizer cars, new conveyors, and a 200 ton surge bin, plus the reconstruction of existing underground sulphur reclaim systems.



Power Plant Environmental Control and FGD

WorleyParsons is a world leader in air quality control for power plants with 15,000 MW of new flue gas desulphurisation (FGD) design and installation.

We designed some of the first FGD systems in the mid 1970s and have since carried out over 80 FGD unit studies and many successful regulatory compliance plans. Our expertise covers all aspects of power plant air quality control including FGD, selective catalytic reduction (SCR) of NO_x and mercury control projects.

WorleyParsons is able to support all our customers' needs from strategic development through to implementation of mandated compliance. WorleyParsons' experience has led to Progress Energy selecting us to manage their AQC program for planning and implementing FGD systems at 11 units totalling approximately 4,500 MW and SCR systems at three units. In addition, we have air quality programs with other customers to install 15 units of FGD systems on existing coal-fired power plants.

We know precisely what it takes to develop and implement comprehensive, technologically sound and environmentally compliant strategies. This ensures the shortest possible schedules with the most beneficial life cycle results. We use our best-in-class automated systems to engineer, design, manage construct and commission air quality systems.

15,000

MW of new FGD design and installation

Designed some of the

1st

FGD systems in the world

Project: Air Quality Control Program

Customer: American Electric Power

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

USA

WorleyParsons is providing project management, engineering, procurement, estimating, scheduling, field liaison, and start-up for AEP's system-wide Air Quality Control compliance program. The scope of work involves the installation of FGD and SCR systems at a number of AEP's fleet of 56 coal-fired power facilities.



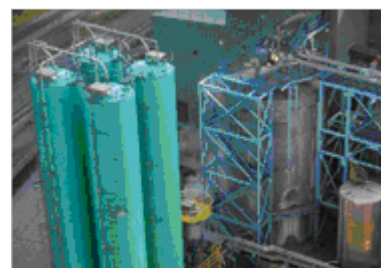
Project: Harrison Station

Customer: Allegheny Energy Supply Company

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

USA

WorleyParsons installed selective catalytic reduction (SCR) retrofits to Units 1, 2 and 3 at Allegheny's Harrison Station in compliance with the Environmental Protection Agency (EPA) requirements for NO_x reduction. Services included conceptual engineering, engineering and detail design, procurement, development of construction contracts, construction management, and start-up.





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Smelter Gas Cleaning and SO₂ Control

WorleyParsons has extensive experience in process gas cleaning and SO₂ emissions reduction for mineral ore smelting plants.

WorleyParsons expertise covers all aspects of high temperature off-gas handling and sulphur fixation design considerations. The gases contain high-strength SO₂ and high levels of metallurgical fumes that need to be conditioned and treated prior to sulphur fixation. WorleyParsons extensive experience in the selection and performance evaluation of waste heat boilers, wet scrubbers, cooling towers, and hot or wet ESPs enables us to design a cost-effective and technically reliable gas handling system. Sulphur fixation is typically achieved by producing sulphuric acid, liquid SO₂ or elemental sulphur.

WorleyParsons has been involved with a number of mineral ore smelters to evaluate and select the most effective SO₂ scrubbing technologies to achieve the regulated emission targets. We utilise our in-house design tools, including process regulated simulation and computational fluid dynamics (CFD) modelling, to design an optimum SO₂ removal system which is suited for the specific process and site requirements.

For more information contact gascleaning@worleyparsons.com.

Project: Smelter Flue Management Study

Customer: Vale Inco Copper Cliff

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

WorleyParsons worked closely with Vale Inco on a study to define existing gas conditions throughout the converter, MPV, and anode furnace ESP systems and to develop options to improve emissions capture, reduce air infiltration, prevent acid condensation and corrosion, and reduce stack reheat burner fuel consumption. WorleyParsons also performed a benchmarking study with Vale Inco that evaluated SO₂ removal technologies used at various smelters around the world including scrubbing, acid plants and liquid SO₂ plants.



Canada

Project: Lead & Copper Smelter Emissions Reduction Scoping Study

Customer: Xstrata Mt Isa Mines

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

WorleyParsons led the scoping study to reduce stack emissions of SO₂ and lead for the lead and copper smelters at Xstrata Mount Isa to achieve internal emissions goals. The study included the evaluation of various SO₂ removal options and technologies, including acid plant tail gas treatment, low strength SO₂ scrubbing, a new acid plant and a Cansolv plant.



Australia

80

process plants

50

major customers

RSR® Process

This process, developed by WorleyParsons, produces elemental sulphur from SO₂ and is suitable for treating emissions from sulphide ore roasters, smelting processes and coal-fired power plants.

The RSR® reduction process comprises:

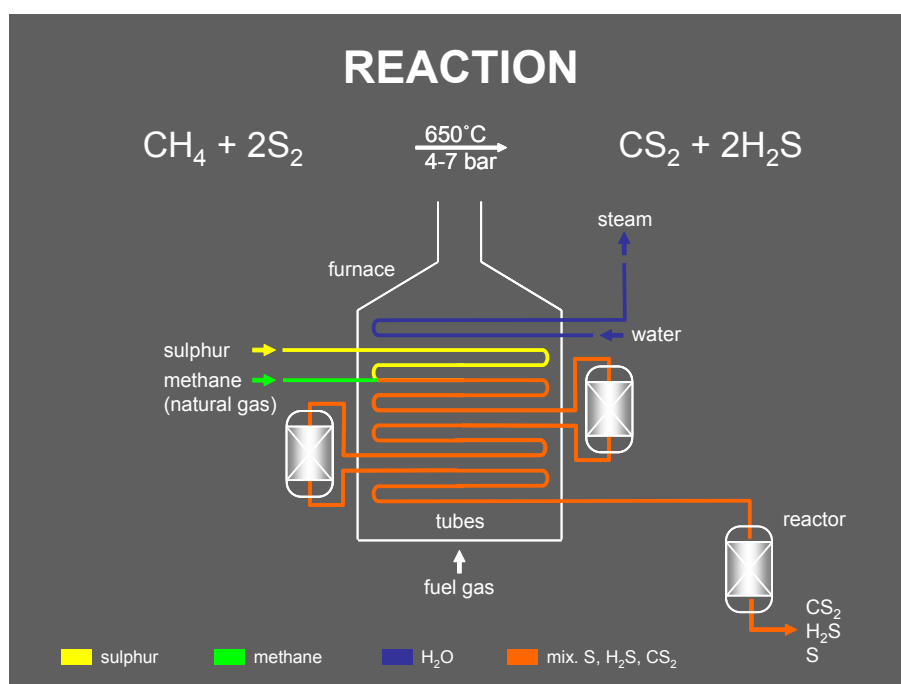
- CS₂ section – reaction of natural gas and recycled sulphur vapor to produce carbon disulphide (CS₂)
- Claus section – catalytic hydrolysis of CS₂ to H₂S and reaction of H₂S and SO₂ to produce elemental sulphur in a conventional Claus unit.

Both steps are well proven and produce high quality sulphur with low fuel consumption. The key advantages of this process, compared to conventional treatment processes, are lower fuel consumption, reduced emissions, higher purity sulphur product and better operational stability. Gas streams with a SO₂ concentration of between 1% and 100% can be processed with almost 100% sulphur recovery. Soot formation is virtually eliminated improving product quality and unit reliability. The methane-sulphur reaction is endothermic allowing easier control of temperature and side reactions. The RSR® process can be designed with or without upstream SO₂ concentration.

The RSR® process meets stringent emission requirements offering customers safe and reliable operation.

>99.9%

sulphur recovery for gas streams with a SO₂ concentration of 1-100%





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Gas Processing and Sour Gas Treating

WorleyParsons has designed and constructed over 400 gas processing plants worldwide with a total capacity of over 50 billion SCFD.

Locations range from desert regions in the Middle East to the frozen wastelands of Prudhoe Bay in Alaska. The size of installation varies from small compressor stations to facilities processing over 3 billion SCFD of gas.

WorleyParsons has extensive ranging experience in the treatment of sour gas. We have used every major solvent type in our designs to give our customers the optimum design for their particular application – MEA, DEA, MDEA, activated MDEA, FLEXSORB® (ExxonMobil Research and Engineering), Sulfinol, Selexol, Purisol, Rectisol, ADIP and Merox processes.

The unique problems associated with remote locations, hostile environments, extremely sour gas streams and very high injection pressures have all been successfully addressed in WorleyParsons' projects.

Our specialist teams of engineers are able to apply our know-how built up over many years to provide optimum processing solutions that are both efficient and cost effective.

400+

gas processing plants worldwide

Installation of facilities processing over

3billion

SCFD of gas

Project: Langede Receiving Facilities (LRF)

Customer: Langede Group (Petoro/Statoil/Hydro/Shell/Dong/ExxonMobil/ConocoPhillips)

Phases: IDENTIFY >> EVALUATE >> DEFINE >> EXECUTE >> OPERATE

United Kingdom

WorleyParsons successfully completed the front-end engineering design (FEED) for the Langede Receiving Facilities (LRF) for the Langede Group.

Design criteria for the LRF included a plant operating life of 50 years and plant availability equal to, or exceeding 99.8%. The work included laying a pipeline under the North Sea from Norway to the UK and constructing a gas receiving facility at Easington on the East coast of England, where the pipeline reaches land. Norway is a country rich in gas reserves, but uses only a limited amount domestically. In recognition of the work that was carried out on the FEED, WorleyParsons was awarded the engineering, procurement and construction supervision for the LRF. Mechanical completion was achieved in June 2006 and first gas was operational in October 2006.



Acid & Sour Gas Reinjection

WorleyParsons has extensive experience in the design construction and operation of sour gas and acid gas reinjection. We have experience of small and large projects which includes the reinjection of sour gas at pressures up to 820 barg.

Gas reinjection can be a cost effective alternative to sulphur recovery in remote locations or where enhanced oil recovery is possible. WorleyParsons has designed and built sour gas reinjection facilities that are at the leading edge of current design practice.

Such projects require close attention to detail together with deep engineering knowledge and full collaboration with major equipment manufacturers. Particular expertise is required in the safe design of these facilities – in the areas of special metallurgy, overpressure protection and isolation, instrumentation and operating procedures.

The unique combination of extreme pressures and high toxicity of the compressed gas necessitated an extensive development program in order to extend the performance envelope of existing technology and ensure a high level of safety in operations. This work has now been proven in real time operations of our designs.

Reinjection of sour gas at pressures up to

820 barg

H₂S content of re-injected gas up to

23%

Project: Second Generation and Sour Gas Injection Projects

Customer: Tengizchevroil

Phases: IDENTIFY → EVALUATE → DEFINE → EXECUTE → OPERATE

Kazakhstan

The objective of the Second Generation Project incorporating the Sour Gas Injection Project is to expand oil and gas handling facilities located on the Caspian Sea in Kazakhstan from 12 to 22 MM tonnes per year.

In conjunction with our joint venture partners, the WorleyParsons process design work has included the detailing of facilities for oil and gas separation, oil stabilization, gas treating/conditioning/polishing, sour gas injection, LPG recovery and polishing, sulphur recovery and tail gas treating and acid gas injection.





Sulphuric Acid

WorleyParsons provides expertise in sulphuric acid plant design and operation.

Our expertise in sulphuric acid plants originates from the Ralph M Parsons company (a heritage founding company of WorleyParsons) which designed and built sulphuric acid plants throughout the world. Many of these Parsons plants are still in operation today. WorleyParsons is able to offer customers an approach to sulphuric acid plant specification, design, project management, operation and troubleshooting that is independent of the technology suppliers.

We are able to work solely in our customer's interest in the evaluation of technology and processes to provide a solution that meets all production, efficiency and environmental targets while still delivering the required economic returns.

Our extensive experience in both brownfield and greenfield projects has fostered a culture of innovation while always remaining aware of safety, operational and maintenance needs.

WorleyParsons has an alliance with KVT and jointly offers KVT technology which can produce sulphuric acid directly from acid gas giving high levels of sulphur recovery exceeding 96%.

150+

major chemical projects

20+

years experience

Project: Hannibal Plant Sour Gas Project

Customer: British Gas

Phases: IDENTIFY > EVALUATE > DEFINE > EXECUTE > OPERATE

Tunisia

The Hannibal gas plant, operated by BG Tunisia, receives gas from the offshore Miskar Field and processes it to the required standard for pipeline transmission, commercial and domestic use.

In order to extend the Miskar field production plateau, BG Tunisia had approval to drill six additional infill wells into the reservoir. The scope of the Hannibal Sour Gas Project included installation of new sulphuric Acid and Export facilities to process the Acid Gas from the Amine Strippers and the de-commissioning of the existing Lo-Cat Sulphur Recovery Unit, upgrade of the NRU and de-bottlenecking of the Treated Gas Filters and increased Condensate Stabilisation Capacity.



Modular Design Services

WorleyParsons is a world leader in the design of modular industrial facilities.

Our modular experience encompasses some of the world's remotest locations including the arctic regions of Alaska, Canada and Russia, the dense forests of Colombia, Saudi Arabian deserts, and the remote Australian coastline. WorleyParsons has provided innovative and first-of-a-kind modular solutions to solve the unique challenges associated with our customers' projects in remote locations and harsh environments.

Our modularization experience began in 1961 with a single skid-mounted, 10 ton per day sulphur recovery plant; the first of many designed and built as package plants for customers throughout the world. We followed this with the modular design for a 22,000 barrels per day (BPD) grassroots refinery in Alaska, beginning our long involvement with North Slope modular facilities which continues today.

Since these early days on the North Slope, WorleyParsons has expanded our modular capabilities to include the design and installation of facilities for upstream oil and gas processing, downstream refining, mining and minerals processing, and chemical industries in over 30 countries.

WorleyParsons combines our offshore design capability with our onshore Very Large Module (VLM) expertise to optimize module size and density. This approach results in smaller, more economical module footprints and, in some cases, increased logistics benefits. WorleyParsons also combines our proven EPCM track record and extreme environments and remote locations experience with our specialist in-house skills to provide customers with cost effective, innovative modular solutions.

45+
years continuous
modular experience

Modular projects
delivered in
30+
countries

Project: Bacton Gas Terminal Sulphur Recovery Units

Customer: ConocoPhillips

Phases: IDENTIFY → EVALUATE → DEFINE → EXECUTE → OPERATE

UK

Three sulphur recovery units, in completely modularized form, were designed and fabricated by WorleyParsons.

The layout was developed using a model with a scale of 1 inch to 1 foot. This scale enabled the team to develop a detailed model that proved particularly beneficial during fabrication and assembly. The completed model fully detailed piping, cable tray, terminal boxes, instrument lines, platforms and ladders, lighting units and local panels, right through to temporary structural bracing for transportation and spreader beams for lifting. The model was used as a construction tool, enabling the units to be completed in a total of only twelve weeks. This included refractory lining, insulation and cladding, instrument and electrical cabling to skid edge terminal boxes, lighting access platforms and ladders, finish painting, pressure testing and functions checked.





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Operational Support and Troubleshooting

WorleyParsons provides ongoing support to our customers operating sulphur management plants. These services include commissioning support, operator training and troubleshooting.

WorleyParsons maintains close working relationships with our customers. Our culture is responsive to their needs and preferences and provides a focus on excellence and continuous improvement.

We provide assistance to customers during commissioning of their sulphur management plants and then offer continuing support during operation. We can provide studies to analyse performance and suggest cost effective ways to improve performance.

WorleyParsons has signed technical services agreements with a number of customers, formalising our relationship and providing annual reviews of operation at site with recommendations for future improvement. This has included providing operating and technical support for SRUs and TGTUs operating at: Philips, UK; BHP Billiton, UK; Nynas, Sweden; Nerefco, Holland; Api Energia, Italy; KNPC, Kuwait; and Gasco, Abu Dhabi.

These SRUs are providing developed recovery for an IGCC Unit, refineries and gas plants. The SRUs range from air only operating units and oxygen enrichment units through to pure oxygen units.

WorleyParsons is able to rapidly respond to requests for assistance. This ensures issues are corrected quickly at minimum cost and loss of operating time and efficiency.

50

years in operational support

Operational support for SRUs + TGTU from 4tpd to

2,450 tpd





WorleyParsons

resources & energy

Our Vision

WorleyParsons will be the preferred global provider of technical, project and operational support services to our customers, using the distinctive WorleyParsons culture to create value for them and prosperity for our people.

Leadership

- Committed, empowered and rewarded people
- EcoNomics™ - Delivering profitable sustainability
- Integrity in all aspects of business
- Energy and excitement
- Minimum bureaucracy

Relationships

- Rapport with all stakeholders
- Open and respectful
- Collaborative approach to business

Agility

- Smallest assignment to world scale developments
- Local capability with global leverage
- Responsive to customer preferences
- Optimum solutions customized to needs

Performance

- Zero harm
- Results for our customers and other stakeholders
- World-class resources, capability and experience



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EcoNomics™

**For further information about
our global capability email:
sulphur@worleyparsons.com**

www.worleyparsons.com

