

Gas and Liquid Dehydration and Purification System for Petrochemical, Petroleum, and Gas Industries



Bechtel selected GPEC to provide Sonahess the entire Large Capacity Natural Gas Dehydration Systems based on Lump Sum Turn Key (LSTK) and Single Source Responsibility.



TABLE OF CONTENTS

- A. SUPPLIER'S NAME AND LOCATION
- **B.** PRESIDENT AND FOUNDER
- C. TECHNOLOGY AND STRENGTH
- D. PAST 10 YEARS PERFORMANCE
- E. SCHEDULE DELIVERIES
- F. COMPANY ORGANIZATION
 - SALES AND MARKETING
 - MANUFACTURING
 - ENGINEERING
 - FIELD SERVICES4
- G. COMMENTS ON COMPANY'S IMAGE
- H. QUALITY POLICY AND QA SYSTEM
- I. PAST PERFORMANCE



A. SUPPLIER'S NAME AND LOCATION

Gas Purification Engineering Corporation (GPEC) 8925 Research Drive, Irvine, CA 92618 U.S.A.

Phone (949) 660-1131 Fax (949) 502-7825

E-mail: gpec@gaspurification.com Website: www.gaspurification.com

B. PRESIDENT AND FOUNDER

Mr. Hassan Mahdara founded, Gas Purification Engineering Corporation (GPEC) in 1988, after 12 years of Process Engineering Management and Application Engineering Management experiences with.

The president of GPEC, Mr. Mahdara holds BS/MS degree in Chemical Engineering from University of Kentucky and has served the petroleum, chemical, gas processing and manufacturing industries since 1976. Our long-term commitment ensures that our clients receive full-service approach to meet all needs from initial project design to post-installation service and technical support

C. TECHNOLOGY AND STRENGTH

GPEC is a global supplier of the most cost-effective, most efficient and safest gas and liquid and purification systems, designed to meet your unique application requirements.

GPEC provides process design, custom skids, field installation, operator training, and, startup supervision with single source responsibility.

GPEC specializes in designing "one of a kind" systems for removal of water, carbon dioxide, oxygenates, sulfur compounds from gases, solvents, and liquefied petroleum gases. GPEC is the leader in providing adsorption equipment to dehydrate and purify air, industrial gases, solvents, and liquefied petroleum gases such as propane and butane.

GPEC provides turnkey services including Process Flow Diagram (PFD), Piping and Instrument Diagram (P&ID), vessel sizing, adsorbent selection recommendation, general arrangement, utility requirements, component selections, insulation and heat tracing requirements, construction material specification, installation supervision, operator training and start up supervision, wiring diagram, and sequence logic diagram.

GPEC technologies are used to remove one or more contaminant from a gas or liquid stream. Most contaminant is water, but GPEC units can also remove trace compounds such as ammonia, hydrogen sulfide, ethane, propane, carbon dioxide, alcohols, and olefins. GPEC units are used for drying and purifying just about all of the common gases, such as air, nitrogen, oxygen, helium, hydrogen, carbon dioxide, argon, carbon monoxide, as well as hydrocarbon gases such as methane, natural gas, ethane and ethylene. GPEC provides technical knowhow to dehydrate and purify both gas and liquids.



Following is a partial list of gases and liquids that GPEC has designed and provided system for our valued customers:

Acetylene Diesel Fuel Methyl Chloride
Air (Atmospheric) Diethyl Ether Methyl Chloroform
Air (Compressed) Diethyl amine Methyl Formate
Air (Instrument) Dimethyl Formamide Methyl Iodide
Air (Mill) Dissociated Ammonia Methylal

Air (Process) Ethyl Acetate Methylene Chloride

Air (Utility)

Acetone

Ethyl Alcohol (Ethanol)

Ethyl Benzene

Natural Gas

Acetonitrile

Ethyl Formamide

Nitrogen

Acrylonitrile

Ethylene

Nitrous Oxide

Alcohol Dehydration Ethylene Glycol Ozone Ammonia Exhaust Gas (Jet) Octane

Ammonia Vapor Exothermic Gas Oil Vapor Removal

Annealing GasFeed GasOxygenArgonFlue GasPentane

Atmosphere Gas Freon (Refrigerants) Perchlorethylene

Atmospheric Air Fuel Gas Phenol Benzene Gasoline **Propane Butadiene Hydrocarbons Propylene Heating Oil Butane Pentene** Helium **Butene Sewage Gas Carbon Dioxide Heptane Sour Utility Gas**

Carbon Monoxide Hexane Styrene

Carbon Tetrachioride Hydrochloric Acid Sulfur Dioxide
Carbonyl Sulfide Hydrogen Sulfur Hexafluoride

Chlorinated HydrocarbonsHydrogen SulfideSulfuric AcidChloroformInert GasSyntheses GasCoker GasIsobutaneT-H DimerControlled Atmosphere GasIsobutyleneTank Vent

Crude Argon Iso-octane Tetrahydrofuran (THF)

 $\begin{array}{cccc} Crude \ Hydrogen & Jet \ Fuel & Toluene \\ Crude \ S0_2 & Kerosene & Vinyl \ Acetate \\ Cyclohexane & Ketones & Vinyl \ Chloride \end{array}$

Cyclohexanone Lacquer Thinner Waste Treatment Air

Cyclohexyl amine Light Vacuum Gas Oil Xylene



D. PAST 10 YEARS PERFORMANCE

World's Largest Known Propylene Dehydration System

GPEC completed design and fabrication of "World's Largest Known Propylene Dehydration System" for Formosa Plastics Corporation VCM facility in Mailiao, Taiwan, R.O.C.

- This Propylene Gas Dehydration is 14 meter by 16 meter and 15 meter tall.
- The Dehydration System Adsorbers are 3.7 meter ID, shell length is 7.7 meter.
- Dehydration Adsorbers are charged with 46,000 kg of UOP molecular Sieve.
- Operating Weight is more than 450,000 kg.
- Dehydration System is producing less than 0.4 ppmw water purity.

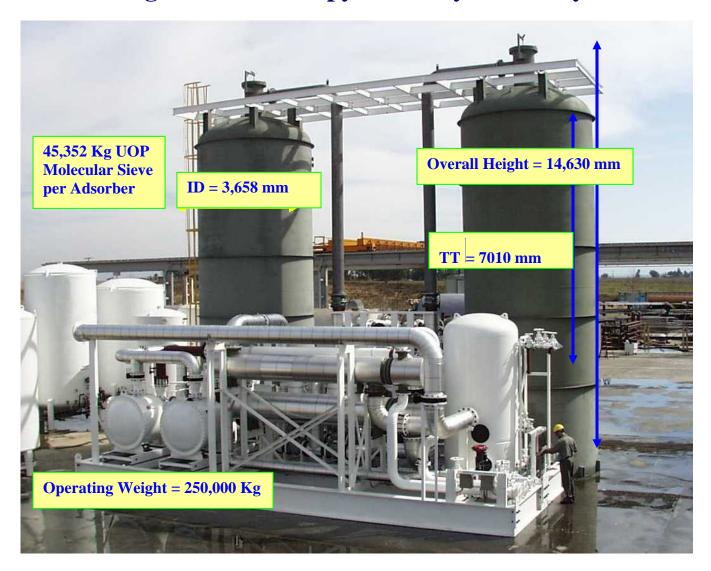
This order was confirmed to GPEC by Formosa Plastics Corporation in May 20, 1998. This order was successfully completed by GPEC and shipped on time on January 30, 1999. Total time for complete shipment: 8 months.

Total order value in 1998 was over US \$3,000,000. GPEC supplied the largest known propylene Dehydration based on an adsorption unit design summary from UOP Adsorbents group.

Based on three (3) years follow up by licensee (UOP) it has been determined that both UOP and Formosa Plastics Corporation are 100% satisfied with mechanical and process performance of this unit designed, fabricated, field installed, and field tested by GPEC in 1999.



World Largest Known Propylene Dehydration System



GPEC accepted the Turn-Key responsibility for design, fabrication, shop testing, export packaging, field installation, final assembly, leak testing, fireproofing, insulation, desiccant charging, nitrogen purging, operator training, sequential testing, regeneration, start up and performance testing. The entire system was fully assembled and inspected by Formosa Plastics Corporation in our U.S.A. manufacturing facility.

Project was completed within contractual agreement and performance based on UOP's investigation has been excellent. Please review following confirmation letter from UOP.





UOP LLC • Adsorbents • 4115 Blackhawk Plaza Circle, Suite 100 • Danville, California 94506 • Tel: 925.648.2060 • Fax: 925.648.2061

Date: February 24, 2003

To: Whom It May Concern

Subject: Experience With GPEC Adsorption System Installations

This is to advise that Gas Purification Engineering Company (GPEC)/ Irvine, California supplied a large propylene dehydration system to Formosa Plastics Corporation's (FPC) ECH Plant in Mailiao, Taiwan based on an adsorption unit design summary from UOP Adsorbents group. Feedback from FPC operations and engineering personnel has verified their complete satisfaction with the mechanical integrity, compliance with specifications and overall quality of the adsorption system package designed and supplied by GPEC. Based on the quality of the system at FPC/Taiwan as well as other adsorption systems designed by GPEC utilizing UOP adsorbent products, we highly recommend that GPEC be considered for supply of package or field fabricated adsorption unit systems to dehydrate or purify gas or liquid streams.

Please contact me if I can be of further assistance.

Sincerely,

David L. Smith

Sales Manager - Adsorbents - Asia Pacific

Jana Panita

UOP LLC

telephone #: (925)648-2060 e-mail: Dave.Smith@uop.com





Large Scale Natural Gas Dehydration Systems:

We recently completed design, fabrication and shipment of a 240 MMSCFD Natural Gas Dehydration System for Bechtel International Corporation for their Sonahess of Algeria project.

- Natural Gas Dehydration System is 32 meters by 65 meters and 19 meters tall
- The Dehydration System Adsorbers are 3.1 meter ID, shell length is 8.4 meter
- Each Dehydration Adsorber is charged with 36,500 kg of UOP molecular Sieve
- Heat source is natural gas fire heater
- Regeneration cooler is air cooled
- Regeneration system includes two large Sundyne gas compressors
- Process design included dual prefilters and afterfilters.
- The Operating Weight is more than 1,550,000 kg
- Above Dehydration System was designed to produce < 1 ppmv Water Purity
- Total contract value exceeded USD \$12,000,000
- Bechtel awarded GPEC the contact on June 19, 2005
- GPEC completed the contract for the Dehydration System October 2006





Sonahess Algeria
Gas Compression and Reinjection Facilities Project



Gas Purification Engineering Company

8925 Research Drive, Irvine, CA, U.S.A. 92618 • Phone (949) 660-1131 • Fax (949) 502-7825





Dual Regeneration Gas Compressors





Dual Stainless Steel Coalescing Prefilters



Dual Carbon Steel Particulate Afterfilters







Automated Orbit Switching Valves





Regeneration Gas Fire Heater





Fuel Gas Conditioning Packages:

GPEC completed design, fabrication and shipment of a two (2) Complete Trains of 33,000 kg/hr Each Fuel Gas Conditioning Packages for Bechtel International Corporation for their Sonahess of Algeria project.





Alky Feed Dehydration Systems:

We completed design, fabrication and shipment of an Alky Feed Dehydration System Processing Liquid Propane, Propylene and Butane Mix in 2006 for Valero Wilmington, California Refinery

Capacity: 20,000 Barrels/Day
Operating pressure: 365 PSIG
Water Purity: Less Than 1 PPMW
Contact Value: USD \$2,000,000





E. SCHEDULE DELIVERIES

GPEC has met 100% of the requested ship date in the past 10 years without any delay penalty. The committed delivery date is very important to GPEC. GPEC has a very good relationship with all major suppliers (such as Sundyne, Orbit valve, and UOP).

GPEC will place order for all critical components immediately and our team of expeditor will keep a close contact with supplier assuring on time delivery of the major components to GPEC to avoid delay ship date of your two (2) Gas Dehydration Packages.

GPEC will be manufacturing multiple Gas Dehydration Packages simultaneously, therefore all units will be export packed and delivered to exit port at the same time.

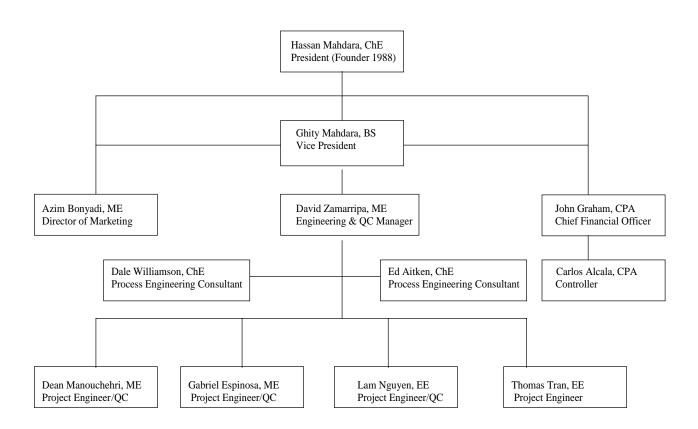


F. COMPANY ORGANIZATION

GPEC is a family owned United States Corporation. Organization is in four divisions, the division leaders are listed below:

- Sales and Marketing
- Manufacturing
- Engineering
- Service

About GPEC





G. COMMENTS ON COMPANY'S IMAGE

Our ability to deliver effective solutions is proven by statements made by our valued clients.

Mr. Alex Niculescu of Air Liquide

"Their technical contribution to the design and manufacture of this system yielded a well thought out unit and minimized delay in delivery. Based on my experience with this project, I will not hesitate to do business with Mr. Mahdara and GPEC in the future".

Mr. Norm Richardson of UNOCAL

"Our decision to award this contract to GPEC was based on their responsiveness, engineering strength, competitive cost, and good schedule. The Dehydration System project was delivered on time, and the work executed professionally. The Dehydration System performance has been excellent.

Mr. Hassan Mahdara was commended for his thoughtfulness, professionalism and, thorough knowledge of gas purification and drying processes."

Mr. Dave Smith, Sales Manager-Asia Pacific-UOP Adsorbents

"Based on the quality of the system at FPC /Taiwan as well as other adsorption systems designed by GPEC utilizing UOP adsorbent products, we highly recommend that GPEC be considered for supply of package or field fabricated adsorption unit systems to dehydrate or purify gas or liquid streams."



Unocal Corporation 376 South Valencia Avenue Brea, California 92823 Telephone (714) 528-7201



September 4, 1996

Engineering & Construction

TO WHOM IT MAY CONCERN

After careful consideration of bids received for a liquid naphtha dryer for one of our oil refineries, Unocal awarded the contract to Gas Purification Engineering Company (GPEC) to design, and build the \$500,000 dryer. Our decision to award this contract to GPEC was based on their responsiveness, engineering strength, competitive cost, and good schedule. The dryer project was delivered on time, and the work executed professionally. The dryer's performance has been excellent.

Mr. Hassan Mahdara was commended for his thoughtfulness, professionalism, and thorough knowledge of gas purification and drying processes.

> Norman S. Richardson Program Manager

Si Frichardson P.E





UOP LLC • Adsorbents • 4115 Blackhawk Plaza Circle, Suite 100 • Danville, California 94506 • Tel: 925.648.2060 • Fax: 925.648.2061

Date: February 24, 2003

To: Whom It May Concern

Subject: Experience With GPEC Adsorption System Installations

This is to advise that Gas Purification Engineering Company (GPEC)/ Irvine, California supplied a large propylene dehydration system to Formosa Plastics Corporation's (FPC) ECH Plant in Mailiao, Taiwan based on an adsorption unit design summary from UOP Adsorbents group. Feedback from FPC operations and engineering personnel has verified their complete satisfaction with the mechanical integrity, compliance with specifications and overall quality of the adsorption system package designed and supplied by GPEC. Based on the quality of the system at FPC/Taiwan as well as other adsorption systems designed by GPEC utilizing UOP adsorbent products, we highly recommend that GPEC be considered for supply of package or field fabricated adsorption unit systems to dehydrate or purify gas or liquid streams.

Please contact me if I can be of further assistance.

Sincerely,

David L. Smith

Sales Manager – Adsorbents – Asia Pacific

UOP LLC

telephone #: (925)648-2060 e-mail: Dave.Smith@uop.com





H. QALITY POLICY AND QA SYSTEM

Our long-term commitment ensures that our customers receive a full-service approach to meet all needs from initial project design to post-installation service and technical support.

The goals at GPEC are simple and powerful: "We will strive to obtain repeat business from our customers by satisfying their needs in an innovative and professional manner".

Based on our partial installation list it is clear that our clients are very satisfied with our performance and have awarded GPEC repeated businesses in the past 18 years.

I. PAST PERFORMANCE

In the past 20 Years GPEC has delivered 99% of all orders on time without delay delivery. GPEC provides engineering services, field supervision, and project management to clients who desire to fabricate their own gas or liquid purification systems.





PROPYLENE DEHYDRATION SYSTEM FOR FORMOSA PLASTICS CORPORATION, MAILIAO TAIWAN





PROPYLENE DEHYDRATION SYSTEM FOR FORMOSA PLASTICS CORPORATION, MAILIAO TAIWAN





PROPANE DEHYDRATION SYSTEM FOR SK ENGINEERING **CONSTRUCTION (PEMEX, MEXICO)**





80 MMSCFD Natural Gas Dryer Samsung (Korea National Oil Corporation, KNOC)





80 MMSCFD Natural Gas Dryer Samsung (Korea National Oil Corporation)





NATURAL GAS PURIFICATION SYSTEM REMOVES WATER AND CO2 FROM NATURAL GAS

Gas Purification Engineering Company

8925 Research Drive, Irvine, CA, U.S.A. 92618 • Phone (949) 660-1131 • Fax (949) 502-7825





HYDROGEN GAS PURIFICATION FOR SHANGHAI PETROCHEMICAL CO., LTD

Gas Purification Engineering Company

8925 Research Drive, Irvine, CA, U.S.A. 92618 • Phone (949) 660-1131 • Fax (949) 502-7825





11,000 BARREL PER DAY ALKY FEED DEHYDRATION **SYSTEM FOR EXXONMOBIL**