

Critical gas use in sophisticated manufacturing processes demands reliable back-up systems

A significant need to provide packaged process plant back-up gas supply systems has grown from the increasing demand for industrial gases in all areas of manufacturing. These back-up systems are in place in the event of the failure of the primary supply system, resulting in a "loss of supply" situation.

Traditionally, gas companies have provided gas from centrally located, large cryogenic air separation plants. Trucks transported the product to storage tanks at the customer's site. Recently, other forms of supply have emerged relying on mechanical generation of the gas. These require regular maintenance and are always backed up by cryogenically-stored gas and a back-up vaporizer system. Reliability and efficient operation are absolutely essential. Cryoquip has provided hundreds of economic, reliable, and compact back-up systems and has emerged as the world's premier supplier of this type of system.



FIGURE 1—Ambient air vaporizer back-up system.

There are three types of back-up systems. The simplest and most reliable is the ambient vaporizer back-up system. (See figure 1.) Normally used for low to medium flow rates, these systems are based on using single or multiple units in banks with common interconnecting pipework, switching for defrost when required. There are no moving parts or power requirements for ambient vaporizers, therefore, reliability is not in question. For larger flow rates or specialized applications, fan assisted units may be employed.

Location, weather, and frequency of power outages are typical design criteria that need to be considered during the specifying of a back-up system.

For medium to high flow rates for use with unmanned industrial gas generating plants, Cryoquip provides the WCV series which features heated water circulation. (See figure 2.) The system comprises a stainless steel process shell and tube vaporizer, dual water circulation pumps, and a reliable standing pilot natural gas water heater. The heat

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FIGURE 2—WCV Series back-up system with standing pilot natural gas water boiler.

ACD's sealess centrifugal pump offers long life with zero leakage

The ACD sealess centrifugal pump has gained widespread acceptance for applications requiring long life with zero leakage. The pump line eliminates the need for a conventional shaft seal by connecting the pumping portion of the unit to the section that holds the motor. The entire assembly is designed as a pressure vessel.

The reliability of the sealess pump begins with motor design and production. Advanced heat transfer techniques allow for the design of a motor which doesn't require the flow of the pumped fluid through the air gap for proper cooling. This prolongs insulation life and reduces windage loss caused by liquid in the air gap.

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Cryoquip engineering technology helps you see better

Cryoquip has recently completed the design and manufacture of a special chilling cabinet for use in the optical lens industry.

With this machine, disposable contact lenses are continuously solidified using cryogenic cooling technology while they are being machined. This operation is performed in order to achieve desired optical properties. Cold nitrogen gas is sprayed directly onto the lens under strictly controlled conditions.

After completion of the machining process, the lenses are polished to meet the necessary level of optical clarity. The polishing is achieved by rotating a number of lenses in a "solution" of deionized water, surfactant, polish and glass beads, within a sealed polypropylene jar for several days, at a controlled temperature of 4°C (39°F).

Cryoquip was awarded the contract to design and develop this prototype pro-



The Cryoquip chilling cabinet for solidifying contact lenses.

The cabinet is configured to hold four (4) independent drawers each having a capacity of 10 tumbling (rotating) jars. The jars are rotated by direct contact with stainless steel, low durometer, polyurethane coated rollers. This guarantees traction at low temperatures against the plastic jars. Each drawer has its own drive motor and roller drive system capable of rotating the jars between 125 and 500 rpm indirectly through a system of synchronous pulleys and belts. Actual jar speed is digitally displayed on the front of the drawer.

The cabinet is controlled by a micro-processor-based temperature control system which enables the operator to set, monitor, and regulate all aspects of the operating parameters from a single controller. The system ensures refrigeration is maintained under optimum conditions with minimal energy consumption at all times.

Additional controls are provided for individual drawer operation, variable rotational speed of the jars, continuous temperature indication and recording and proximity switch control for each of the drawer drive systems. This allows necessary shut down of the jar drive system located in an open drawer, while the others remain closed and functional.

In order to preserve the integrity of the cabinet while jars are being unloaded and re-loaded from one drawer, the unique drawer design provides a seal to the cabinet when the drawer is fully opened. This prevents the loss of refrigerated air and the ingress of warm air and moisture during the changeover of jars.

The refrigeration system is fully automatic requiring no attention. Every 12 hours the refrigeration units changeover and the off-line unit defrosts ready for use. During this cycle if temperature recovery is needed, both units can be used to achieve recovery even faster.

For more information, contact Bryan Smith at Cryoquip.

SPECIFICATIONS

PERFORMANCE

- Operating temperature range: -10°C (+14°F) to +10°C (+50°F)
- Normal operating temperature: +4°C (39.2°F)
- Initial chamber cool down time: 30 minutes from 22.2°C (+72°F) to 4°C (+39.2°F)
- Chamber recovery after load change: 20 minutes maximum

DIMENSIONS

- 85" high x 50" wide x 35 1/2" deep

WEIGHT

- Total weight: 1000 lbs
- Drawer weight: 100 lbs

POWER REQUIREMENTS

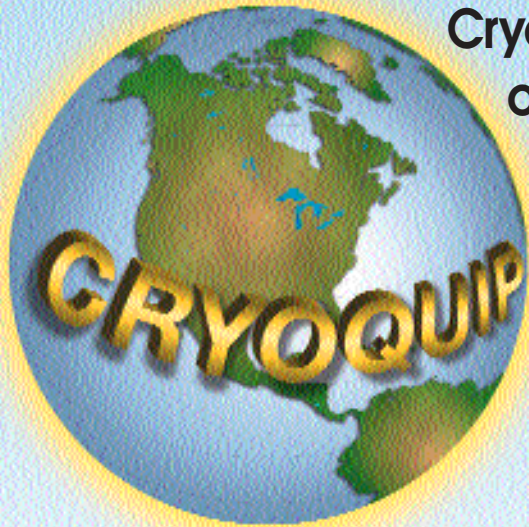
- VAC/60 hertz /single phase 20 amp

REFRIGERANT

- R134a

duction machine that will perform the temperature controlled polishing process with the flexibility to simultaneously add and remove lenses at random without affecting the overall process or the polishing of other lenses. A thorough investigation of commercially available cooling cabinets revealed the uniqueness of this application, both in terms of operating temperature and equipment configuration. The insulated cabinet is entirely fabricated from stainless steel and painted white to comply with optical laboratory codes.

The cabinet is cooled by means of twin CFC free "frostless" refrigeration units, cycling on and off every 12 hours. The cabinet temperature is maintained uniformly throughout its interior to a close tolerance of 1°C over a range of -10°C (14°F) to +10°C (50°F). Initial cool down and intermediate temperature recovery are both achieved within 30 and 20 minutes respectively.



Cryoquip continues to expand its area of operation to become a true global supplier

For three decades Cryoquip has been manufacturing a diverse line of industrial gas and cryogenic products. Included are a range of cryogenic vaporizers (HEX and Cryoquip brands), heat exchangers and thermal systems, food freezers and chillers (Kryospray), special products, and gas recycling systems.

Cryoquip has secured steady business growth and has emerged as the world's leading supplier of cryogenic heat exchange equipment. Because of this, Cryoquip has been able to effectively expand its area of operation to include local manufacturing and distribution facilities and support/service centers throughout the world. Manufacturing operations are headquartered in Murrieta, CA, USA. A second manufacturing facility is in Kuala Lumpur, Malaysia. This facility is also used as a storage and distribution center for USA made vaporizers and heat exchangers for the Pacific Rim. Additional storage and distribution facilities are housed with Cryogenic Industries member companies in Europe, Australia, the United States, Canada, and China. Cryoquip has plans

to expand manufacturing operations into both China and South America.

The majority of Cryoquip's resources are concentrated on the engineering design and manufacture of cryogenic vaporizers and heat exchange systems. The company inventories an average 20 to 50 completed units ready for shipment for immediate blanket order/call-off and delivery. Also stocked are a larger number of finished modules which require minimal final welding. This enables Cryoquip to offer a five (5) day turn-around on a number of different ambient air vaporizer models. These on-demand inventories require large stock piles of extruded aluminum; Cryoquip is one of the largest aluminum consumers in the United States, extruding over 5 million pounds per year.

Pump training workshops offer hands-on approach to pump repair and maintenance education



Cryogenic Industries has an organized, comprehensive service and repair network with facilities located in key areas throughout the world. This group of highly trained cryogenic pump

specialists is available to assist in the repair and servicing of cryogenic reciprocating and centrifugal pumps and ancillaries. As part of an ongoing commitment to better service their customers, free Pump Training Workshops are being organized at each facility.

The workshops are typically two-day events that focus on installing, repairing, and maintaining cryogenic centrifugal and reciprocating pumps. The pump technicians who participate experience

hands-on training that enables them to expertly install and repair their company's pumps. The first day of the workshops are classroom orientated where pump design theory and proper operating practices are reviewed. The balance of the sessions involve actual hands-on tear-down and assembly of cryogenic reciprocating and centrifugal pumps. Common repairs and recommended maintenance procedures are discussed by highly-experienced instructors.

The following is the Pump Training Workshop schedule for the remainder of 1997. Additional workshops will be added as needed. Please contact your nearest service center (see page 6) for more information.

December (tbd)	September 16 and 17 November 4 and 5	October 7 and 8 December 6 and 7
Cryogenic Industries Sdn Bhd Selangor, Malaysia Contact: Jim Estes Phone: +60 (3) 365-4801 FAX: +60 (3) 365-4798 jestes@pc.jaring.my	CryoAtlanta, Inc. College Park, GA USA Contact: Tom Farmer Phone: +1-770-909-0291 Phone: 888-217-9355 (USA) FAX: +1-770-909-0694 tfarmer@bellsouth.net	Pittsburgh Cryogenic Services Inc. Imperial, PA USA Contact: Carl Henningson Phone: 800-327-6461 (USA) Phone: +1-412-695-1910 FAX: +1-412-695-1926 pittcryo@pulsenet.com

Employee Profiles

Inside Cryogenic Industries



Cliff Selby was hired as Regional Sales Manager for Cryogenic Industries located in Houston, Texas. His responsibilities include soliciting and serving customers and clients for ACD, Cosmodyne, and

Cryoquip in the Southwestern United States.

Prior to his hire at Cryogenic Industries, he was a Director of Marketing and Sales for Dow Chemical Company in Midland, MI, USA. In this capacity he was responsible for overall marketing, sales, application engineering and product management activities for commercializing a newly patented technology for on-site production of atmospheric gases. He also led a team focused on product development and system standardization, as well as, directed communication and advertising programs.

Selby worked at Union Carbide Corporation, Linde Division in various sales and marketing positions, focused on the industrial gas market sectors. He has 26 years of experience in cryogenic marketing sales and business management. He graduated from Finlay Engineering College in Kansas City, KS, USA with a BS in Civil Engineering.

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Mike Coco has been promoted to General Manager of CryoCal, Inc., Santa Ana, CA, USA. He is responsible for all business operations at the pump service and repair facility.

His primary goal is to increase CryoCal's business position.

Prior to his hire in 1994, Coco was Production Manager at Cryogenic Components, Inc., for four years. He was responsible for the stockroom, purchasing, shipping and receiving, machine shop, assembly shop, and production planning activities, including the supervision of 22 employees. He was also involved with maintaining customer service practices.

Coco had also been employed by Airco Cryogenics, Inc. as a Customer Service Administrator and Representative. He managed the training of customer service representatives and implemented new inventory control computer programs to account for all stock being sold and stored at service centers. He also administered government spare part contracts and interfaced with engineering and manufacturing regarding new design equipment. Coco has 20 years experience in the field.

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Jim Peeples has joined Cryogenic Industries as the group's General Manager of the Service Center Organization. He is based at Cryogenic Industries Headquarters in Murrieta, CA, USA with responsibility

for the network of Cryogenic Industries Service Companies worldwide.

Cryogenic Industries currently has Global Service Companies at key geographic locations with plans to expand in support of Cryogenic Industries products and customers. (See page 6 for locations.) The Service Center Organization provides parts inventory for many products, on-site repair services, product Exchange Programs, and training programs for customers in equipment operation and repair. New equipment sales and geographic customization

of the current product line also takes place within the Service Organization.

Prior to joining Cryogenic Industries, Peeples was President of CVI, Inc. in Columbus, OH, USA. He also worked at Air Products and Chemicals, Inc. for sixteen years in various assignments including process engineering, plant operations, sales, and general management. In his early career he was a project engineer in Texaco's Offshore Gas Division working on natural gas pipeline and cryogenic liquid production facilities. Peeples is a B.S. Chemical Engineer from Clemson University with a MBA from Loyola.

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Cryogenic Industries recently hired David Krichen as its Regional Sales Manager for the East Coast, USA. He is responsible for representing the ACD and Cosmodyne product lines in this region.

Krichen has 24 years of experience in the industrial gas industry providing engineering support for gas applications, and technology and equipment sales to manufacturing and government segments in marketing/sales, process engineering, and research.

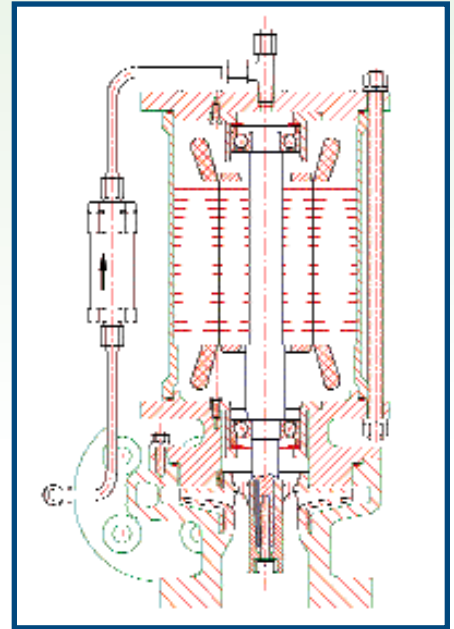
He was Senior Principal Engineer for Air Products and Chemicals, Inc., in Allentown, PA, USA, in the Gas and Equipment Group. There, he was accountable for technical support of \$10 MM of existing business and \$1.2 MM per year of new business in the area of non-ferrous metals. He also led a development team in oxygen combustion.

Also at Air Products and Chemicals, Inc., he was Principal Process Engineer in the Environmental

Seless pump

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Because the motor is operating in a cryogenic environment, the physical size is greatly reduced. Conventional motors must be designed to provide the required torque and be capable of removing the heat generated by the electrical losses. The prime consideration for a seless pump motor is the ability to provide the design torque. The available cooling from the pumped product is almost always more than enough to remove the heat generated.



Inducers are available to provide the lowest possible NPSH. ACD engineers utilize computers to evaluate and optimize all necessary hydraulic parameters. The inducers act to generate an adequate amount of pressure to allow the main stage impeller to operate without cavitation. Cavitation not only limits flow (or prevents it altogether), but is extremely destructive to the rotating elements. The bearings may be damaged, the impeller and case wear rings will deteriorate rapidly, and the overall pump performance and efficiency is compromised.

The seless pumps' lubricated bearings are designed and manufactured to ACD's exacting specifications. Bearing lubrication and cooling is achieved by diverting a portion of the pumped product flow through the bearing. Through proper selection of internal bearing geometry, coupled with the required amount of cooling flow, bearing life expectancy is greater than that of a conventional grease lubricated bearing. The seless pumps are available in a wide range of performance requirements.

For more information, contact Rick Young at ACD.

Division. In this capacity, he focused on developing processes for oxygen wastewater treatment plants and engineering management.

He earned a bachelor of Chemical Engineering from Villanova University in Villanova, PA, and took graduate courses in Chemical Engineering at the University of Pennsylvania and Lehigh University.

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Steve Kellett has recently been named International Marketing Manager for Cryogenic Industries. He is replacing Rick Young who is the new Director of Pump Products at ACD. Kellett is responsible for

overseeing the group's Pacific Rim sales agent network. Cryogenic Industries recruited Kellett to work in the United Kingdom in April, and then transferred him to corporate headquarters in Murrieta, CA, USA.

Prior to this position, he was an Account Manager for Air Liquide in Northern California. He was responsible for account maintenance, growth and establishing new business within the food sector.

Kellett also worked as a Program Manager at MG Industries in St. Louis, MO, USA. There he supervised marketing/sales, installation, commissioning, and spare parts supply for nitrogen injectors in that company's Beverage Group. He also acted as a consultant for Habas Industrial Gas, providing marketing information on the frozen food market in Turkey.

Kellett has twelve years of industrial gas experience. He earned a BS degree in Food Technology from the Reading University, England.

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Tero Hagelin was recently hired as Sales and Application Engineer for Cryoquip, based in London, England. His responsibilities include all technically-related issues involving Cryoquip's

European marketing effort. Hagelin focuses on answering and clarifying customers' technical questions as they relate to the Cryoquip product line, including vaporizers and heat exchangers and food freezing and chilling equipment.

Formerly, he worked as a Technical Consultant for SmithKline Beecham Pharmaceuticals in Ireland. In this capacity he was involved in environmental projects. Hagelin was also a Sales Engineer for a packaging and international marketing systems company in Finland.

Hagelin graduated from University of Oulu in Finland with a MS degree in Process (Chemical) Engineering. He specialized in thermal and diffusion engineering. During his studies, he worked in different industrial sectors in Finland, Sweden, and the United States.

He completed his Industrial Engineering and Management coursework at Tampere University of Technology in Finland. He is fluent in Finnish, English, and Swedish, and is familiar with French.

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Cryoquip negotiates a global sales agreement



Cryoquip and industrial gas manufacturer BOC Group plc have negotiated a seven year global sales agreement for the purchase of Cryoquip's range of cryogenic processing, heat transfer and vaporization equipment.

The agreement outlines the terms and conditions of purchase between Cryoquip and all of the BOC Group companies and subsidiaries. A tiered rebate structure, linked to sales volume worldwide, is part of the agreement.

Cryoquip is also offering a worldwide pricing structure, whereby geography is not factored into the pricing of products; all BOC companies will pay the same price for like products regardless of their location. Cryoquip has established nine (9) equipment distribution and storage locations around the globe to better meet the demands of BOC and its other industrial gas customers. The company has manufacturing facilities in both the US and Malaysia.

For more information, contact Bryan Smith at Cryoquip.



Cosmodyne has developed a new air separation plant called the ASPEN 2000.

The new plant produces approximately 80 tpd of liquid and boasts a specific power of 1 kW/Nm³. Like the ASPEN 1000, the new plant is completely prefabricated and can be easily relocated.

For more information, contact George Pappagelis at Cosmodyne.



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Back-up systems *Continued from page 1*

exchanger is ASME or TÜV rated and designed for service with oxygen, nitrogen, argon, carbon dioxide, LNG, hydrogen, and others, with multiple process stream capabilities per skid. Dual 100% rated, water circulation pumps are provided and have automatic change-over to standby with TEFC motors.

One of the most critical design areas is the gas-fired water heater. The reliability of this system hinges on the ability of the water heater to light and fully fire upon demand in any kind of weather and after extended idle modes. Cryoquip has pioneered the advancement of boiler reliability by working with boiler manufacturers to develop a true industrial grade outdoor boiler design with a NEMA 4 controls enclosure, IRI burner controls, and a standing pilot burner design for maximum outdoor reliability.

The standing pilot is lit from the moment the boiler is placed into service and remains lit and on-line continuously. The physical size of the standing pilot is much larger than a standard ignition pilot and much more difficult to extinguish by strong winds and rain. It is able to remain lit through very severe ambient conditions. A version of the WCV, the WCVB, is available with a water ballast tank which extends operation time during power outages.

If steam is available as a fuel to heat the water, Cryoquip offers the VSSU series. The system comprises a horizontal, insulated steel tank, a heat exchanger, a steam sparging manifold, and controls. (See figure 3.) This series is particularly



FIGURE 3—VSSU Steam Sparged Series back-up system.

suited for relatively high cryogen flow rates where ballast is required to prevent discharge temperature drop as a result of a sudden, large demand in the process flow (i.e., peaks and transits) or for process plant back-up service. The design features a removable tube bundle(s). The steam spargers maximize steam bubble surface contact area, providing efficient heat transfer between steam and water over a wide range of steam flow rates. The variable orifice design of the spargers maintains a constant pressure differential, eliminates steam-water hammer, and reduces noise and vibration. Units with very large ballast requirements include provisions for water circulation to maintain an even bath temperature distribution, reducing stratification effects. The VSSU series represents the most economic approach to back-up system evaluation, but steam is required.

For high flow rates and maximum flexibility, Cryoquip offers the VFTU Series. (See figure 4.) The system includes an insulated horizontal tank, single or multiple stainless steel process gas tube



FIGURE 4—VFTU Fire Tube Series back-up system.

bundles, twin fuel-fired electronic ignition burners, and controls. The NEMA 4 burner control panel is integral to the unit and they are totally enclosed. It is extremely compact and is configured for easy installation and subsequent process pipeline connection(s). The burners fire into internal tank mounted fire tubes and indirectly heat the water. The heated water volume, which can range from 5,000 to 60,000 gallons, provides sufficient ballast for the units to operate for at least 30 minutes during complete power outages.

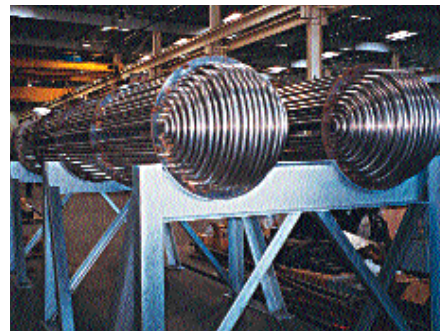


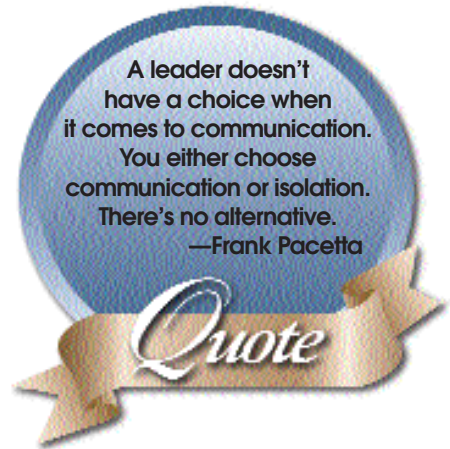
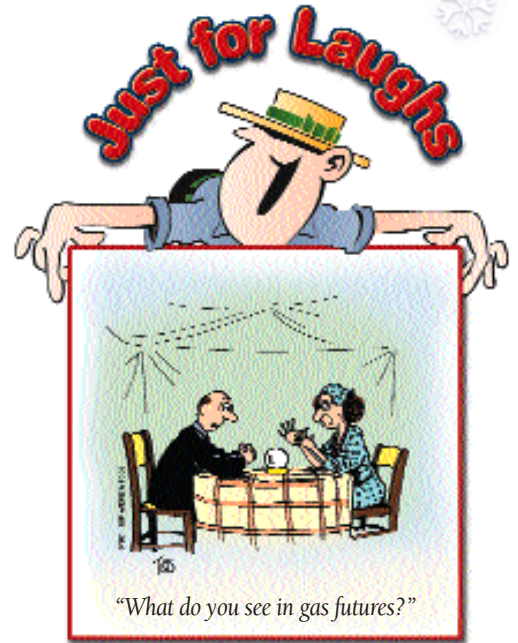
FIGURE 5—Tube bundles for ground tank installation.

Cryoquip also designs and manufactures specialty systems when local conditions influence the economic and process operation. (See figure 5.) A recent project called for the submersion of stainless steel tube bundles in a ground tank which replaces the ballast tank. The concrete-lined ground tank is filled with recirculating, heated water and is sometimes fed directly by seawater. The tube bundles are supported by carbon steel galvanized frames. This type of system presents unusual design challenges. The tube bundles need to be corrosion-proof and are often fabricated from composite materials.

For more information, contact Bryan Smith at Cryoquip.

CALENDAR OF EVENTS

- SEP 1-27 CRYOGENIC TECHNOLOGY AND AIR SEPARATION, Certificate Course
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kanchan@hijli.iitkgp.ernet.in
- SEP 11-14 CHEMTECH South '97
Madras (Chennai), India, *91-22-207-2044/47
- SEP 22-25 FUNDAMENTALS OF NATURAL GAS, Petroleum Economist
Denham, UK, *44 171 831 5588
- OCT 18-22 NWSA 53rd ANNUAL MEETING
(National Welding Supply Association)
Washington D.C., USA, *1 215-564-3483
- OCT 28-31 OIL & GASTEC '97
International Trade Fair Equipment for the Oil and Gas Industry
Kiev, Ukraine *49 211 4560 739
- NOV 18-20 '97 CHEM SHOW
New York, NY, USA, *1 203 221-9232, www.chemshow.com
- NOV 24-27 ASCOPE '97 Conference and Exhibition
hosted by PERTAMINA
Indonesia's state-owned oil & gas company
Jakarta, Indonesia, *65 222 3422
- NOV 25-30 CHEMINDIA '97
Mumbai (Bombay), India, *1 212-356-0400
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