

## Smart VOC Recovery Systems

### Inland and Marine Bulk Terminals

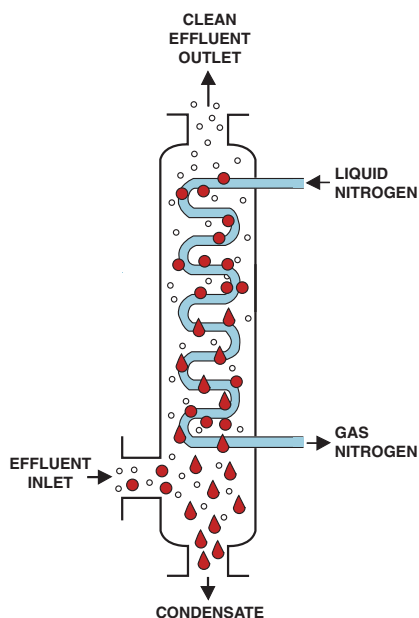
The demands of record capacity utilization and expanding regulations do not have to be at odds as your operation searches for ways to expand production and yet comply with VOC emissions permitting limits. Cryo-condensation can help you:

- Recover valuable products/feedstocks
- Reduce energy and waste disposal costs
- Comply with existing regulations or the new NESHAPs for Bulk Gasoline Distribution Terminals
- Utilize a secondary byproduct – nitrogen – to inert your processes



The VOC Recovery System supplied by Praxair using cryo-condensation technology is a high efficiency, flexible alternative to destructive and adsorptive technologies. The system can handle the ups and downs of your process – spikes or continuous flow.

Whether your terminal's current recovery system is limiting production based on applicable emission limits or has increasingly high operating costs, Praxair has a portfolio of options to handle your vent gas stream effluent in a manner that is cost-effective, ensures compliance and can potentially add to your bottom line. Praxair understands that what works for one company may not suit another. We will work with you to find what is right for your operation.



### Smart VOC Recovery Systems Using Cryo-Condensation

Using liquid nitrogen as the refrigerant, the cryo-condensation process cools the effluent in a process stream to very low temperatures in proprietary and patented heat exchangers, which are characterized by a high fractionating capacity of vapors and gases. The stream effluent is separated by decreasing the vapor pressure, condensing the VOCs and returning valuable products back into your operation, while the nitrogen is cycled back into the process for purging and blanketing operations.

### Cryo-Condensation is Efficient and Cost-Effective

In comparison to alternative abatement technologies, the cryo-condensation units are compact and skid mounted requiring a relatively small footprint. This results in lower installation and start-up costs. The system minimizes moving parts and therefore requires less maintenance and repair. The lower operating temperature of the unit and the use of liquid and gaseous nitrogen rather

than air and steam offer an increased level of safety when handling reactive or flammable materials. The need to limit the percentage of oxygen in the collection headers for safe operation is not an issue with the Praxair cryo-condensation system.

### Process Flexibility

Industry dynamics such as mandates for renewable fuel content will in turn demand a degree of adaptability in vent gas effluent abatement equipment. The VOC Recovery System supplied by Praxair has a robust history of application in industrial settings with variable process inputs. This system will be similarly adaptable in terminal applications where fuel compositions are subject to change, ensuring continuity in compliance with emissions limits.

### Proven Technology

Industry segments ranging from chemical processing to pharmaceutical, food and ceramics have benefited from cryo-condensation technology. With over 100 plants globally, the design and engineering of the systems supplied by Praxair have been tested and found solid and dependable for single and multi-component vent gas streams under a broad range of operating conditions.

### The Economics Behind the Technology

VOC Recovery Systems using cryo-condensation makes economic sense in most segments of refined products distribution.

#### Sample Process Conditions

Effluent Composition	Gasoline/Fuel blendstocks
----------------------	---------------------------

Terminal Loading Capacity	180,000 gal/hr
---------------------------	----------------

Effluent Flowrate	10,000 scfh
-------------------	-------------

Potential Losses	550 lbs/hr
------------------	------------

*0.03 – 0.1 % of annual volume – floating roof tank*

*2 – 3% of annual volume – fixed roof tank*

#### Operating Costs (est.)

Lost Product Revenue	\$170,000/mo \$0.42/lb (\$2.62/gal)
----------------------	--

Abatement Costs	\$500,000/yr
-----------------	--------------

Savings Potential	\$2.5MM/yr
-------------------	------------

### Contact Us

For technologies that provide cost-effective VOC management, call **1-800-PRAXAIR**. Or visit **www.praxair.com**.



© Copyright 2008 Praxair Technology, Inc.  
All rights reserved.

Praxair, the *Flowing Airstream* design and *Making our planet more productive* are trademarks or registered trademarks of Praxair Technology, Inc. in the United States and other countries.

Other trademarks used herein are trademarks or registered trademarks of their respective owners.

Praxair, Inc.  
39 Old Ridgebury Road  
Danbury, CT 06810-5113  
USA

www.praxair.com  
info@praxair.com

The information contained herein is offered for use by technically qualified personnel at their discretion and risk without warranty of any kind. Printed in the United States of America.

05-2008

P-10081

Telephone:  
1-800-PRAXAIR (1-800-772-9247)  
(716) 879-4077

Fax:  
1-800-772-9985  
(716) 879-2040