

Kraft pulp mills must collect and incinerate their odorous non-condensable gases in order to minimize odour and to comply with the environmental regulations. Great care must be taken when designing and operating concentrated NCG systems; the gases are corrosive, toxic and potentially explosive.



NORAM OFFERS COMPREHENSIVE SERVICES IN CNCG/ LVHC GAS SYSTEMS:

- Audits of existing operation, including troubleshooting and debottlenecking
- Revised logic and control strategies (e.g. ventless transfer between incineration devices)
- Process Safety Management (PSM)/HAZOP analysis

NORAM SYSTEMS FOCUS ON THE FOLLOWING:

- Safety and reliability
- Innovative and effective designs
- Low capital and maintenance costs

Concentrated NCG contains total reduced sulfur gases (TRS), methanol, and terpenes that are released from digesters, turpentine recovery systems, strippers and multiple effect evaporators. CNCG/LVHC gases are collected and maintained at all times above their upper explosive limit (UEL).

NORAM offers a reliable system with multiple levels of protection, which fully accounts for the toxic, corrosive and flammable nature of these gases. Our paramount design philosophy is to prevent air ingress into the system. Various features are provided to ensure that even during an upset condition safety is not seriously jeopardized:

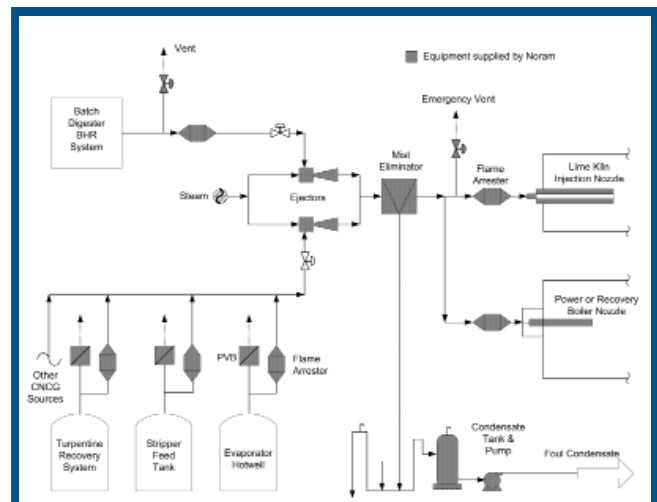
NORAM SYSTEM DESIGN:

- All sources collected are properly sealed
- Water-sealed pressure/vacuum breakers protect equipment and piping during upsets
- Steam ejectors motivate the CNCG and further dilute any oxygen that may be present
- Flame arresters prevent flame propagation
- Rupture discs provide instantaneous pressure relief in the unlikely event of a sudden overpressure
- Fail-safe logic and controls ensure that CNCG will safely vent if a major upset occurs

Other design details include proper piping layout for effective condensate collection, suitable location of rupture discs, providing back-up incineration options, etc. A hazard and operability study (HAZOP) is always conducted by a group of NORAM engineers to ensure safety and reliability.

Once the CNCG/LVHC gases are effectively collected they can be combusted in one of a variety of devices, including existing mill equipment such as lime kilns, power boilers, recovery boilers, or in new equipment such as dedicated incinerators equipped with SO₂ scrubbers and optional heat recovery.

NORAM is experienced with all of these options for incineration and are available to help determine which is the best system for your mill.



Typical Concentrated NCG System

NORAM Engineering and Constructors Ltd.



COMPANY PROFILE

NORAM is an engineering and technology development firm based in Vancouver, Canada. Founded in 1988, NORAM employs a highly qualified technical staff of approximately one hundred. NORAM has a global client base and has successfully completed projects on five continents.

Today NORAM is the world's leading supplier of mononitrobenzene (MNB) plants, a key intermediate in the production of polyurethane. In addition, NORAM offers sulfuric acid equipment, biological treatment facilities, energy systems, and technologies for the chemical, minerals processing, environmental, and pulp & paper industries.

NORAM offers proprietary technology to customers through engineered equipment and complete chemical plants. NORAM's core competencies include:

- Biological Treatment Technologies
- Electrochemical Systems
- Energy Systems
- Environmental Technologies
- Feasibility Studies
- Fluid Dynamics & Finite Element Analysis
- Heat Transfer Systems Design
- Nitration Technology
- Project Management
- Pulp & Paper Technologies
- Sulfuric Acid Manufacture

PARTNERING WITH INNOVATION AND EXPERIENCE

NORAM is focused on the development, commercialization and supply of established and novel processes. With its entrepreneurial culture, NORAM has a demonstrated track record of thinking outside the box to provide innovative solutions. Technologies can be evaluated and integrated into an advanced engineering solution based on first principles.

NORAM has made its mark internationally by supplying proprietary systems to various industries world-wide. NORAM can bring this expertise and innovative ideas to your projects.

NORAM has established strategic relationships with the following organizations:

- ◆ Bateman Engineering BV
- ◆ Canadian Hydrogen and Fuel Cell Association
- ◆ Eco-Tec
- ◆ First Chemical Corporation (A DuPont Company)
- ◆ FP Innovations
- ◆ Kemetco Research Inc.
- ◆ Membrane Reactor Technologies
- ◆ Ostara Nutrient Recovery Technologies Inc.
- ◆ Radient Technologies
- ◆ Siloxy Limited
- ◆ Simon Carves Limited (Punj Lloyd Group)
- ◆ The Electrosynthesis Company

NORAM Engineering and Constructors Ltd.
Suite 1800 - 200 Granville Street
Vancouver British Columbia Canada V6C 1S4
Telephone: +1 604.681.2030
Fax: +1 604.683.9164

Visit us on the internet at
www.noram-eng.com