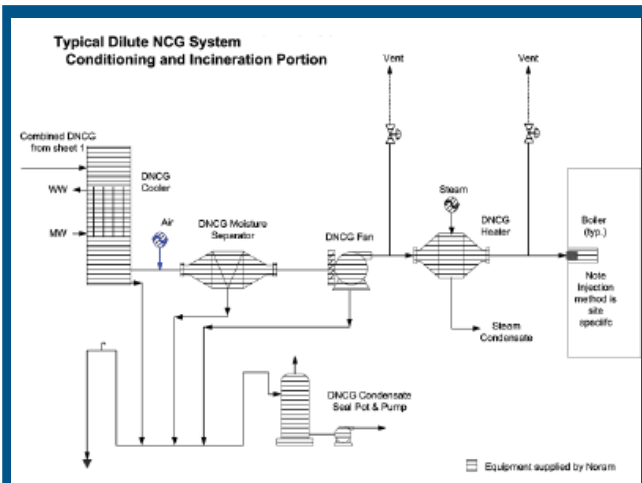


Collection and treatment of dilute non-condensable gases is a further step that Kraft pulp mills take to mitigate ambient odour. In the U.S., the EPA Cluster rule mandates that DNCG/HVLC systems be implemented.



Typical Dilute NCG System - Cond. & Inciner. Portion

NORAM OFFERS A WIDE RANGE OF SERVICES IN DNCG/HVLC GAS SYSTEMS:

- Audits of existing operation, including troubleshooting and debottlenecking
- Studies to evaluate and recommend system improvements
- Process Safety Management (PSM)/HAZOP analysis
- Operator training
- Design and supply of state-of-the-art technology

NORAM SYSTEMS FOCUS ON THE FOLLOWING:

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

Three unique DNCG sources requiring special consideration are chip bins, brown stock washers and heavy black liquor tanks.

Chip Bin Gases require additional conditioning compared to typical DNCG sources. Unsafe TRS and turpentine concentrations can sometimes be present. Chip bin gas collection is the most hazardous of all the sources within a mill and NORAM engineers know what is necessary to ensure safe collection and disposal.

Brown Stock Washers are typically the largest volumetric source of DNCG, particularly if the hoods are not properly enclosed and air ingress not controlled. NORAM will work with mills to best reduce overall flow without adversely affecting operation.

Heavy Black Liquor Tanks are generally operated hot and the gases that are vented contain substantial amounts of water vapor. Based on experience, NORAM engineers have found that installation of a condenser is often justified.

DNCG/HVLC CONDITIONING:

After collection, the combined DNCG/HVLC gas must be properly conditioned prior to final treatment, in order to minimize its impact on the treatment device and reduce project costs.



DNCG Cooler

DNCG/HVLC CONTROL:

The DNCG/HVLC system is designed for simple operation and minimal control. The two main objectives are:

- Provide automatic isolation of the system during unsafe operations (primarily the Chip Bin System).
- Stabilize the DNCG/HVLC gas flow, temperature, and pressure to reduce the net effect on the incineration location.

Put NORAM Expertise to work in ensuring the safe and effective operation of your existing DNCG/HVLC system or in the design of a cost effective system to achieve new levels of environmental performance.

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

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