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## Fact Sheet

# The National Incinerator Testing and Evaluation Program (NITEP)

## Garbage — An Historical Problem

Garbage has been with us since civilization began. However, while civilization has flourished in many areas, it has not learned to manage its garbage. Conventional methods of disposal in landfill sites are not only costly, but may be harmful to human health and the environment. As well, since garbage represents such a massive amount of material, it does not make sense to discard it without considering ways of reducing it, as well as uses for it.

The most promising future for garbage lies in its uses as a resource. Environment Canada endorses the implementation of a hierarchy of waste management practices that will make productive use of garbage and at the same time reduce disposal problems. These practices include reduction, recycling, re-use and, where applicable, recovery of energy through incineration. Each year, Canada produces over 16 million tonnes of garbage. After recycling and re-use, a substantial amount of the remaining material can be incinerated to recover energy. Garbage is clearly a resource worth utilizing.

Twelve major municipalities in Canada now have working solid waste incinerators. Six of these are energy-from-waste facilities that recover the energy from municipal solid waste in the form of steam. This steam is sold to a variety of local industries. While the potential exists for more incinerators, the problem remains that incineration has not been considered safe. If not properly run and controlled, incinerators may produce unpleasant as well as poisonous emissions, such as metals, dioxins and furans. Incinerating waste in an environmentally-acceptable manner means finding ways to minimize the emission of these pollutants. A need was thereby recognized for improved incinerator technology.

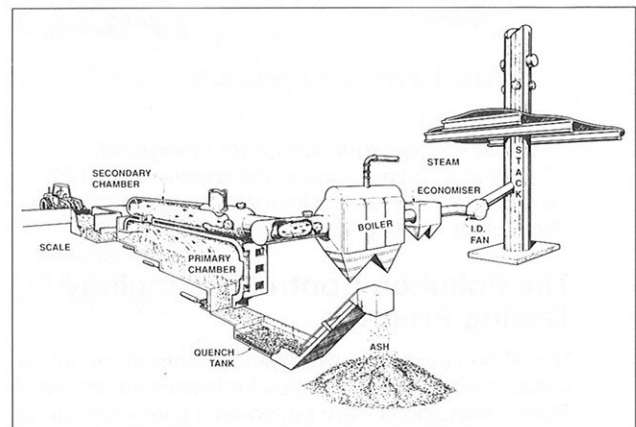
## NITEP Puts Garbage Into Perspective

Environment Canada developed the National Incinerator Testing and Evaluation Program (NITEP) to address the threat to health and the environment posed by incinerator emissions and ashes. Through NITEP, Environment Canada has worked with industry, municipal governments, provincial governments, and international organizations to study energy-from-waste incineration and emission control technologies.

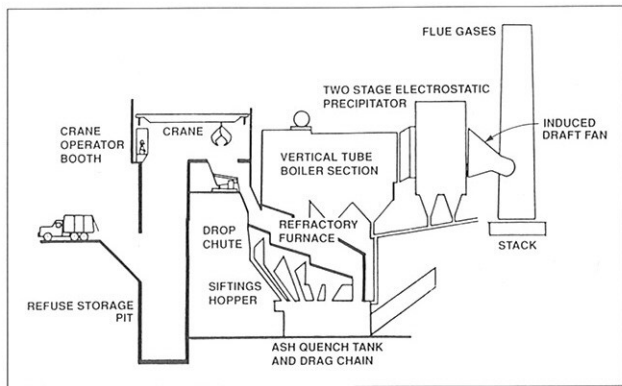
Its aim was to define the optimal design and operating conditions to minimize or eliminate incinerator emissions of concern. These aims were met through in-depth studies of three types of incineration technologies, two types of emission control technologies, and the characteristics and utilization and disposal properties of the ashes that incinerators produce.

## The Incinerator Testing Program

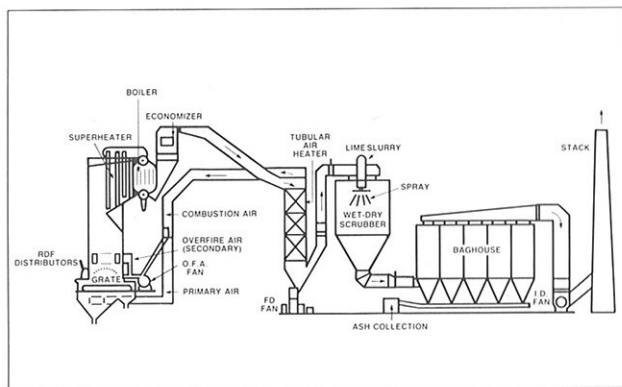
NITEP has evaluated three types of incineration technologies:



- A two-stage combustion incinerator in Parkdale, Prince Edward Island. This is a small, modern incinerator typically applicable for communities of under 100,000. The test program took place in 1984.



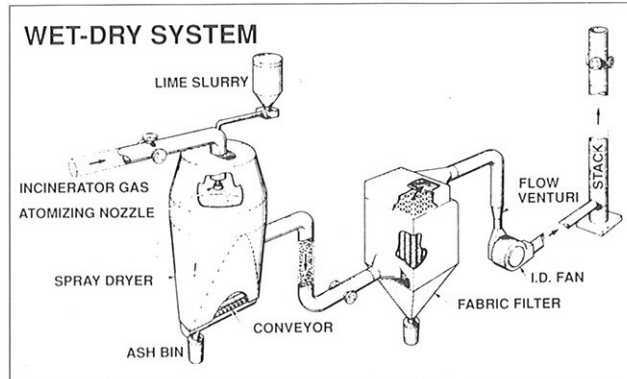
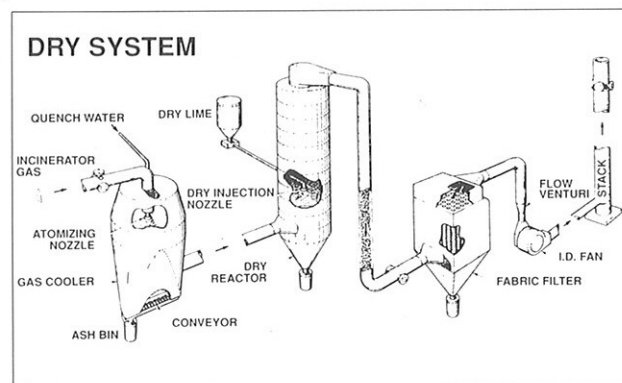
- A modernized mass-burning incinerator operated by the Communauté urbaine de Québec (CUQ) in Quebec City. One of the four incinerators was totally refitted to state-of-the-art combustion design and fully evaluated over its practical operating range. The refitting and testing took place in the spring of 1986.



- A refuse-derived fuel incinerator in Hartford, Connecticut. Tests began in the winter of 1988-89 under a joint program with the U.S. Environmental Protection Agency.

## The Pollution Control Technology Testing Program

NITEP has evaluated two types of state-of-the-art air pollution control technologies for incinerator emissions. These evaluations were based on a pilot scale study of a wet-dry scrubber and a dry scrubber system, each incorporating a fabric filter for fine dust collection.



The test program took place in the summer of 1985 at the CUQ incinerator in Quebec City.

## Test Procedures

Each of these projects evaluated both the incineration technology and associated air pollution control systems by monitoring their operation, and learning how different operating conditions affected emissions. Through this work, simple and reliable operating limitations were identified to ensure that the waste was incinerated as cleanly and efficiently as possible.

Each of these projects was carried out in accordance with established NITEP procedures. Initially, the equipment was put through a series of characterization tests of all practical operating conditions. From these tests, a small number of representative operating conditions were selected for more detailed performance testing. Each of the selected conditions was tested two or three times, and the data analysed.

During these tests, each stage of the incinerator's operation and emission control was closely monitored. Parameters measured included operating temperatures, garbage feed rates, combustion air flow rates, flue gas temperatures and other process variables. At the same time, the amounts of heavy metals and organics, such as dioxins, furans, and PCBs were measured in the garbage entering the incinerator, and in the ashes produced by and gases emitted from the incinerator. The emissions were also monitored for carbon monoxide, oxygen, acid gases and particulates or fine dust.

## Significance of Test Results

The NITEP testing program was designed to determine in detail how incinerator and emission control technologies operated, and how different operating conditions affect the levels of pollutants in emissions and ashes. The results will help to set emission and operating guidelines that will maximize energy generation and result in the lowest possible emissions.

All of the tests have produced significant results. Considerable knowledge has been gained in the areas of improved incinerator operation and emission monitoring. Incinerator design and operation have also proven to play an important part in emission reduction. For example, the modernizing of the mass-burning incinerator furnace and control system in Quebec City into a state-of-the-art design has resulted in a dramatic reduction of emissions of dioxins, furans and fine dust.

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These studies also showed that emission rates can be significantly controlled with simple process adjustments. Emission rates of trace organics that are difficult to measure can be linked to the emission rates of easy-to-measure substances such as carbon monoxide and oxygen. As a result, incinerator operation can now be more accurately controlled and the emissions of dangerous substances minimized.

Similar results have been duplicated for incinerator emission control technologies. NITEP results, supported by more recent full-scale evaluations, indicate that the best available emission control technologies consist of a wet-dry or dry scrubber and a fabric system similar to those tested at Quebec City.

## The Ash Testing Program

NITEP's ash testing program has been carried out to conduct a thorough characterization of the various types of ash collected from different types of incinerators and associated air pollution control facilities. This characterization involves:

- Analysing the ashes for substances such as unburned carbon, heavy metals and trace organics;
- Conducting leachability tests to determine which substances will seep from ashes disposed in a landfill;
- Evaluating the alternatives for ash disposal using solidification and stabilization techniques;
- Assessing the feasibility of recovering metals from the ash; and
- Determining the toxicity of ash leachate.

Ash has been obtained from incinerators across Canada and the United States and includes samples from all of the popular types of incinerators currently in use. Facilities in Canada that have cooperated in this program include Parkdale, PEI, the CUQ in Quebec City, London Victoria Hospital, 3M in London, SWARU in Hamilton, and the Greater Vancouver Regional District. Sites in the U.S. include the Mid-Connecticut Resource Recovery Facility in Hartford, Connecticut, and the Montgomery County South incinerator in Dayton, Ohio.

## Changing Incineration Practices

NITEP's work has already led to a number of important results. NITEP has been able to establish a technically valid data base of information on incineration technology that makes Environment Canada a world leader in this area. NITEP has also advanced and standardized sampling and analysis protocols required for incinerator testing. New legislation, including regulations under the Canadian Environmental Protection Act, concerning incinerators and associated emission control technology will continue to be based on these and future results.

Operating and Emission Guidelines for Municipal Solid Waste Incinerators were recently published by the Canadian Council of Resource and Environment Ministers (CCREM). These guidelines, which relied upon NITEP data, cover most aspects of incinerator design, emission limits, and operating procedures.

## NITEP and the Future

NITEP will continue to accumulate useful data on incineration and emission control technology, and will use this information to help Environment Canada and other regulatory bodies establish guidelines and operating practices for incinerators. In addition, this data will provide designers, policy makers and operators with the information that they require to design, select, and operate these facilities in an environmentally sound manner. Since a growth in incinerator use in Canada is anticipated as a compliment to other garbage reduction programs, NITEP will continue to monitor this growth and ensure that new technology meets the most rigid of standards. In this way, Canada's environment will be protected from the possible harmful effects of improper design and operation of incinerator technology.

## NITEP Data Available to the Public

Environment Canada has published results of all the completed studies. For this or other information contact:  
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