



National Risk Management
Research Laboratory

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Water Quality Research Program

Urban Watershed Research Facility, Edison, NJ

Providing Research Solutions to Manage Water Quality

Introduction

In an undeveloped and undisturbed environment, rainfall is naturally filtered and absorbed. In an urban setting, with development and lots of impervious surfaces, storm water transports pollutants through city streets to receiving water, resulting in many water quality issues. Scientists at the Urban Watershed Management Research Facility in Edison, New Jersey, investigate technical approaches to managing this wet-weather flow and runoff generated from rainfall in an urban setting.

The facility occupies 205 acres on the former Raritan Arsenal property, a suburban location about 30 miles southwest of New York City. The many buildings and trailers are in an isolated 20-acre open space established to develop and evaluate the performance of common and innovative storm water management practices. The laboratory building is configured to conduct bench-scale analyses of environmental samples. The facility includes:

- Greenhouses that allow all-season operation
- Analytical laboratories for on-site analysis of common chemical and microbial stressors
- A high-bay engineering development and support area
- Automated electronic monitoring and automatic sampling equipment
- Office space and storage

Researchers routinely monitor and record climatic data. On-site storage tanks, and mixing, transfer, and distribution equipment provide storm water collected from an adjacent, highly impervious drainage area. Other outdoor resources include pilot-scale swales, wet ponds, and wetlands to allow for evaluation of common control practices under varying loading and design conditions. Sewage can be accessed from a local treatment authority for research efforts that require sanitary waste. The Edison facility provides a safe location for collecting engineering data needed for design and evaluation.

Research

Wet-weather flow includes storm water, sanitary sewer overflow, and combined sewer overflow. Untreated releases of wet-weather flow can harm receiving water, which can lead to unsafe drinking water. The majority of the U.S. population lives in urban settings, where there are greater risks associated with water quality. But hydrologic-hydraulic improvements can be made. Scientists in the Urban Watershed Research Branch of the National Risk Management Research Laboratory (NRMRL) study the structural integrity of drainage and treatment systems, the control and treatment of discharge, and the effects of the discharge on receiving water.

One storm water control system under evaluation by NRMRL at the Edison facility is green roofs. The Green Roof Research Project centers on storm water absorbency. Green roofs are vegetative covers applied to building roofs to slow or totally absorb rainfall runoff during storms. While the concept of over-planted roofs is ancient, the goal of modern green roof technology is to replace the absorptive capacity of the land on which the building was erected.

Research at Edison supports the activities of various EPA organizations, including the Office of Solid Waste and Emergency Response's Environmental Response Branch, the Office of Research and Development's Release Control Branch, the Regional Environmental Science and Assessment Division, the Regional Enforcement and Compliance Assistance Division's Pesticides and Toxic Substances Program, and the Regional Emergency and Remedial Response Division's Emergency Preparedness Program.

Features

The Edison facility features a pipeline test apparatus, which is capable of supporting controlled-condition experiments on infrastructure conveyance and storage systems. Four representative pipelines support research on pipelines that simulate those in use at operational facilities. The test pipelines enable convenient study of:

- Different pipe and backfill materials
- Equipment designed to monitor for leaks and corrosion, and prevent backflow and contamination
- Remote-control instrumentation and inspection technologies

Five buried experimental pipelines include four 500-foot loops and one 100-foot loop. A test pit provides the flexibility to change leak rates and backfill materials, and control backfill moisture content. The area surrounding the test pit enables replacement of 20-foot spool sections without the need to excavate.



In August 2005, EPA renewed its commitment to support green power by entering into a three-year contract to purchase 6 million kilowatt hours (kWh) of green power annually for the Edison facility in the form of renewable energy certificates. This contract supports the generation of renewable energy from wind farms in South Dakota, North Dakota, and Wyoming, and will offset 100 percent of the electricity consumption at the facility.

Three solar water-heating systems are the primary source of hot water. All three systems consist of a preheat tank (between 66 and 120 gallons) and various numbers of roof-mounted, single-glazed, liquid-evacuated tube collectors. Because the building relies on the electrical systems only for auxiliary water heating when necessary, the solar heaters allow the facility to conserve electricity and fossil fuel. So far, Edison's solar technology has registered energy savings results significantly higher than expected.

Scientists at the Edison facility continue to develop and demonstrate new technologies and methods to manage the risks to public health, property, and the environment from wet-weather flow.

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