

Multiple Pathway Health Risk Assessment and Multimedia Environmental Monitoring Programs for a Municipal Waste Resource Recovery Facility in Maryland

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ABSTRACT

Following a 1986 decision by Montgomery County in Maryland to construct a municipal waste resource recovery facility near the town of Dickerson, the local community expressed concern regarding the potential human health effects from air emissions of dioxins and trace metals released through the stack of the proposed facility. To address this concern, the County conducted health risk studies and ambient monitoring programs before and after the facility became operational. The purpose of the health risk studies was to determine potential cancer and non-cancer risks to the nearby residents from the operations of the facility. The purpose of the ambient monitoring programs was to determine if any changes would occur in the ambient levels of certain target chemicals in the environmental media, and if such changes can be attributed to the operations of the facility.

Accordingly, the County conducted a multiple pathway health risk assessment in 1989 prior to the construction of the facility. The pre-operational health risk assessment was based on estimated stack engineering parameters and available stack emissions data from municipal waste resource recovery facilities that were operating in the United States, Canada and Europe during the 1980's. The health risk assessment used established procedures that were accepted by the U.S. Environmental Protection Agency (U.S. EPA) and many state agencies at that time. The Montgomery County Resource Recovery Facility (RRF) became operational in the spring of 1995. The facility is equipped with the state-of-the-art air pollution control (APC) equipment including a dry scrubber-fabric filter baghouse system to control organics and trace metals, ammonia injection

system to control nitrogen oxides, and activated carbon injection system to control mercury. In 2003, the County retained ENSR International to update the 1989 health risk assessment study. In the 2003 operational-phase update, as-built engineering data and measured stack emissions data from a total of eighteen quarterly stack emissions tests were used. The study was conducted in accordance with the U.S. EPA's Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities published in 1998 [1], and an Errata, published in 1999 [2]. Both the 1989 study and the 2003 study demonstrated that there is a very low chance (less than one chance in a million) for occurrence of cancer and no adverse non-cancer health effects to the nearby community as a result of exposure to facility-related emissions.

The multi-media ambient monitoring programs were conducted in abiotic and biotic environmental media. These programs included an air-monitoring component and a non-air monitoring component. The pre-operational phase of the air media and non-air media monitoring was conducted in 1994-1995. The pre-operational program was designed to produce baseline data for target chemicals in both air and non-air media. The operational-phase air media monitoring was conducted in 1997 and 2003. The operational-phase non-air media monitoring was conducted in 1997 and 2001. Target chemicals monitored in both air and non-air media included polychlorinated dioxins and furans (PCDDs/PCDFs) and selected toxic metals (arsenic, beryllium, cadmium, chromium, lead, mercury, and nickel). The non-air media included crops, farm pond surface water and fish tissue, and cow's milk. The ambient levels of target chemicals monitored in the operational phase of the facility

(1997, 2001 and 2003) demonstrated no measurable difference from the ambient levels of these chemicals monitored in the pre-operational phase (1994-95) of the facility, in both the air media and non-air media.

The results of the health risk studies and ambient monitoring programs demonstrate that municipal waste combustion facilities that are equipped with the state-of-the-art air pollution control equipment pose no significant health risk to the population.

INTRODUCTION

In 1989, the County retained Roy F. Weston to conduct a multiple pathway health risk assessment for a solid waste resource recovery facility to be constructed near Dickerson Maryland [3]. The 1989 health risk assessment was based on a review of the literature on engineering (stack design) and emissions data for resource recovery facilities in the United States, Canada and Europe that were operating during the 1980's. The study also incorporated one year of onsite meteorological data collected from the Dickerson generating station of the Potomac Electric Power Company (PEPCO) which is located within half a mile northwest of the RRF. The health risk assessment focused on pollutants for which there were no established air quality standards, but for which there was a body of evidence that indicated potential effects on human health. The health risk assessment used established procedures that were accepted by the U.S. EPA and many state agencies at that time.

The County's RRF became operational in the spring of 1995. After seven years of operation, the County retained ENSR International to conduct an update of the 1989 study with measured stack emissions data from eighteen quarterly stack emissions tests conducted for the facility since 1995. The updated health risk assessment for the County facility utilized as-built stack engineering parameters, measured stack emission rates, recent onsite meteorological data, and updated air quality dispersion modeling methods recommended by the U.S. EPA [4].

The multimedia ambient monitoring programs were conducted in air media and non-air media prior to the operation of the facility and during the

operation of the facility. The objective of these sampling programs was to gather ambient data for emission constituents which may directly affect human health. The pre-operational programs were designed to produce baseline data for target chemicals in both air and non-air media.

The pre-operational phase of the air monitoring was conducted between February 1994 and February 1995 [5,6]. Subsequent to the facility becoming operational, operational phase air media monitoring programs were conducted from February 1996 to August 1997 [5,6], December 2002 to January 2003 and May 2003 to June 2003 [7]. The pre-operational phase of the non-air monitoring was conducted between May 1994 and April 1995 [8,9]. The operational phase non-air media monitoring programs were conducted between 1996 and 1998 [8,9], and November 2001 [10]. The pre-operational phase (1994-95) and first operational phase (1996-98) programs were conducted by Roy F. Weston and the second operational phase programs (2001-03) were conducted by ENSR International.

DESCRIPTION OF THE SITE AND THE FACILITY

The County's RRF is located approximately two miles southwest of the Town of Dickerson in Montgomery County, Maryland on a tract of land contiguous to the coal-fired electric power generating station that was owned by the Potomac Electric Power Company (PEPCO). Currently, the PEPCO facility is owned by Mirant Corporation. The area surrounding the facility is rural. Within a 15-mile radius of the RRF, the majority of the area is used for a mix of residential and agricultural purposes. The remaining area is woodland with some open land and scattered small towns and residential housing. A few residences are located within two miles of the facility. Three townships (Beallsville, Barnesville, and Dickerson) are located within five miles of the RRF. Several recreational areas are located within ten miles of the facility. These include the Chesapeake and Ohio Canal National Park, the Dickerson Regional Park, the Monocacy Natural Area, and Sugarloaf Mountain. The Potomac River, located west of the facility, is also used for recreational activities. There are several farm ponds within 3 miles of the