

# Attachment 5

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Carbonate Geology

***IESI PA Bethlehem Landfill Corporation***  
**Southeastern Realignment**

LAND DEVELOPMENT PLAN SUPPORTING DOCUMENTATION

**CARBONATE GEOLOGY**

Carbonate Geology at the IESI PA Bethlehem Landfill has been reviewed and documented since development of the landfill. Attached hereto is a letter outlining carbonate geology near the IESI Bethlehem Landfill property.

# MEISER & EARL, INC.

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## Hydrogeologists

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November 30, 2010

Mr. Richard M. Bodner, P.E.  
Martin and Martin, Inc.  
37 South Main Street, Suite A  
Chambersburg, PA 17201-2251

**Re: IESI Bethlehem Landfill Corporation  
Carbonate Geology**

Dear Rick:

In response to Lower Saucon Township's question, whether there is carbonate geology or bedrock beneath Basins 2 and 4 at the IESI Bethlehem Landfill Corporation (Bethlehem Landfill) site, I have prepared the following response. Attached is the Site Well Plan map that was revised by Thomas A. Earl, Meiser & Earl, Inc. in May 2001 to address the carbonate issue at the Bethlehem Landfill for the Lower Saucon Township Zoning Hearing. Based on this map, gneiss bedrock exists to the south of both basins and therefore there should be no carbonate bedrock beneath Basins 2 and 4.

If you have any further questions, please do not hesitate to call me.

Sincerely,

A handwritten signature in cursive script that reads "Robert M. Hershey".

Robert M. Hershey, P.G.  
Principal Hydrogeologist

Enclosure



# MEISER & EARL, INC.

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July 20, 2000

Mr. Paul Yelinek  
IESI PA Bethlehem Landfill Corp.  
2335 Applebutter Road  
Bethlehem, PA 18015

*Re: Carbonate geology near IESI Bethlehem Landfill property  
Lower Saucon Township, Northampton County*

Dear Paul:

At your request I have reviewed several sources of geologic data covering the area of the IESI Bethlehem Landfill site along Applebutter Road with the specific goal of better defining the location of the carbonate rocks near the site. The Leithsville Formation occurs south of the site and is composed of dolomite, which is a carbonate rock and therefore subject to certain zoning restrictions by Lower Saucon Township under "Carbonate Geology Areas". The sources of data I used in arriving at the conclusions stated below include: 1) our prior site investigations done in 1985 and 1989 for a possible expansion of the Bethlehem City Landfill, 2) the Gannett Fleming site investigation reports done in the early 1990s for expansion of the landfill, 3) the drilling logs of the numerous monitoring wells installed by Gannett Fleming at the landfill site and 4) a report done by Keystone Environmental Consultants in 1990 for a planned landfill on the Bethlehem Steel property immediately south of Applebutter Road, and provided to me by Rick Bodner of Martin & Martin, Inc.

By way of background, the landfill area is part of what is known as the Reading Prong, a very complex geologic structure in which the bedrock has been deformed by crustal forces, resulting in numerous faults and folds in the sedimentary rock layers which overlie the much older metamorphic rocks. The generalized state mapping done by the U.S. Geological Survey (USGS) shows the contact between the sedimentary Leithsville Formation and the metamorphic granitic gneiss on which the landfill is located as being a thrust fault whose surface expression trends east-west about 200 to 400 feet north of Applebutter Road. This fault dips, or is inclined, steeply to the north, and there may be as much as 1800 feet of gneiss beneath the landfill. No wells, test borings or core holes drilled on the landfill property down to Applebutter Road have encountered any carbonate rocks.

The Lower Saucon Township Zoning regulations include consideration of carbonate rock issues under §180-95, in which a Township Zoning Map showing Carbonate Geology Areas is used to identify those areas subject to certain restrictions on land use. This map was based on Open-file Report 8702, "Sinkholes and Karst Related Features of Northampton County,

Pennsylvania" by Wm. Kochanov of the Pennsylvania Geologic Survey. The zoning map is identical to the USGS map and therefore shows the presence of carbonate rocks extending north of Applebutter Road along a band ranging from 200 to 400 feet wide. It is important to understand that the original mapping of these geologic contacts and rock types was done at a small scale, and was not necessarily field checked in the area of the landfill. Detailed subsurface information from drilling at specific properties often is not available or known to the USGS geologist, so locations of contacts must be considered approximate.

As part of ongoing improvements at the landfill, Martin & Martin, Inc. has designed a truck wash near the present entrance gate. This necessitated a zoning review that requires confirmation of the absence of carbonate rocks in this area, since this location would be on the edge of the carbonate area on the zoning map. The planned location of the truck wash is 120 feet due west from one of the monitoring wells, BI-2Dd, which encountered granitic gneiss bedrock, so I am confident that the carbonate rocks are south of the truck wash. The exact location of the contact, however, remained unknown, because only that one well encountered bedrock in this area.

An industrial landfill planned by Bethlehem Steel in 1990 was investigated by drilling a series of test holes on the tract immediately south of the entrance to the present IESI Bethlehem Landfill. The logs of these drill holes are very revealing in that the southernmost holes (roughly 1300 feet south of the landfill entrance) did encounter the Leithsville dolomite, while others further north encountered shale and quartz sandstone. One hole (MW-4) about 350 feet southwest of the entrance road reported hit carbonate rock at a depth of 140 feet, but MW-25, about 80 feet east of MW-4 and closer to the landfill entrance hit granitic gneiss, which is the bedrock beneath the landfill. The Bethlehem well MW-23, located 130 feet southeast of the landfill entrance, hit Hardyston quartzite. The normal succession of rock types from oldest upward is the granitic gneiss, above which is the quartz sandstone of the Hardyston Formation, which is in turn overlain by the younger Leithsville Formation. The Leithsville typically is shaly in the upper portion. This sequence matches the results found on the Bethlehem Steel property

The results of my review of the geologic data at and near the site are as follow:

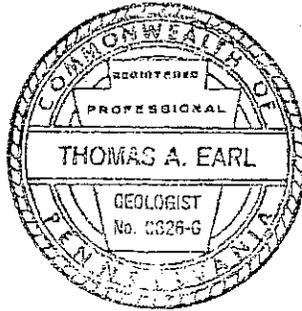
1. The contact between the Leithsville dolomite and the non-carbonate Hardyston Formation and the granitic gneiss beneath the landfill site is at least 100 feet south of Applebutter Road in the area of the present landfill entrance.
2. There is no carbonate rock beneath or adjacent to the landfill property.
3. The generalized geologic map prepared by the U.S. Geological Survey and used to designate sensitive carbonate areas in Lower Saucon Township is based on regional information, and should not be expected to accurately reflect exact contact locations for consideration of such small-scale features as the planned truck wash.

Mr. Paul Yelinek

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July 20, 2000

I hope this short summary will provide the information you need, but if you have any questions, please let me know.



Sincerely,

A handwritten signature in cursive script that reads "Thomas A. Earl".

Thomas A. Earl, Ph.D., P.G.

Cc: Richard M. Bodner, P.E.