

May 13, 2025
File No. 27224515.25

Mr. Mike Smith, P.E.
Iowa Department of Natural Resources
Land Quality Bureau
6200 Park Avenue
Des Moines, Iowa 50321

Subject: Methane Action Plan Extension Request
Henry County Sanitary Landfill
Permit No. 44-SDP-01-75C

Dear Mike:

SCS Engineers, on behalf of the Henry County Solid Waste Commission, requests an extension to the submittal date for an action plan to address methane concentrations measured above the action level in a facility structure at the Henry County Sanitary Landfill (Landfill).

In email correspondence dated September 5, 2024 (Doc #110838), the Iowa Department of Natural Resources (DNR) was notified of an exceedance of the action level of greater than 25% of the lower explosive limit (LEL) measured in the larger on-site building on September 5, 2024. The gas exceedance was measured in a storage closet used to store business records off the building's kitchen. The initial reading was 43% of the LEL and a recheck was 39% of the LEL. During the September 5, 2024 monitoring event, monitoring throughout the rest of the building, including in areas near the closet, did not have a detection of methane. Subsequent monitoring events have only detected methane in the closet and in the void space beneath the closet.

A summary of methane measurements in the closet and the void space beneath the floor of the closet since September 5, 2024 is shown below. The void space beneath the closet floor was unknown during the September 2024 monitoring event.

Date	Closet	Void
	% LEL	% LEL
September 5, 2024	43	NM
December 18, 2024	2	23
March 11, 2025	33	>99
May 7, 2025	10	77

A DNR comment letter dated September 24, 2024 (Doc #110923), requested an action plan and schedule to mitigate the gas level exceedance.



Previously, the building was used by the landfill operation, and it had a subgrade area where a truck could back in and serve as a public drop-off area. Residential customers could throw their trash into the truck so as not to have to drive to the working face of the Landfill. Landfill staff would then empty the truck at the working face as needed. The site and building were purchased in the early 1990s and expanded to the north over a portion of the subgrade area. The subgrade truck access area was filled in for the building expansion, but a small subgrade closet-type area was not filled. In the expanded building, this subgrade void is located under the closet. It should be noted that the closet has an unsecured wood-plank floor, allowing relatively simple access to the subgrade void.

Actions completed since the extension request dated April 2, 2015 (Doc #112718) and approved on April 3, 2025 (Doc #112724) include the following:

1. In an effort to determine the source of the methane measured in the closet of the building, a gas sample was collected from the void space beneath the closet and submitted to Isotech for chemical analysis.
2. Warning signs were installed on the door of the closet to warn of the potential danger associated with the detected methane gas (see photograph below).



Sampling as described in Doc #110974 was performed on March 11, 2025. The sample was submitted to Isotech for gas characterization analyses to attempt to identify the source of the methane beneath the closet.

Results of the air sample analysis were received on April 9, 2025; the laboratory analytical data sheets are included in **Attachment A**. An interpretive analysis was received as an email from Isotech expert Keith Hackley, Ph.D., PG – Senior Isotope Geochemist, on April 22, 2025. The interpretation stated the following:

Based on the information provided, the subgrade area beneath the building/closet where the gas sample was collected was filled/partially filled with unknown debris which could have included some natural organic matter.

Since it is not clear what type of debris was used to fill, or partially fill, the subgrade area beneath the building closet we will need additional analyses to better evaluate the source of the gas.

Based on the molecular and isotopic composition that we currently have; the gas appears to be microbial gas. For example, the only hydrocarbon reported is methane and there is a high concentration of carbon dioxide also reported, consistent with microbial gas. Additionally, the molecular and isotopic results indicate that the gas has been oxidized. These results would be consistent with landfill gas but could be consistent with biodegradation of buried natural organic debris or sewer gas coming up through the void beneath the closet. I presume there is a sewer line or septic system nearby.

To determine if the gas is from the landfill or from an alternative microbial source such as biodegradation of buried natural organic matter not associated with normal municipal landfill debris, we will need to have carbon-14 (^{14}C) and, ideally, tritium run on the methane in the gas. We will be able to prepare a sample for ^{14}C from the gas sample we already have on hand. However, for tritium, we will need a larger gas sample, which entails using a propane tank (20 lb. LP-tank). Unfortunately, it does not appear you would be able to collect a large enough gas sample from closet area to obtain sufficient methane concentration for tritium analysis. We would need to fill an LP-tank (~18 liters) to a pressure of 20 to 25 psig. The problem is that, based on the description you gave and the picture, it appears the subgrade area has a very large opening which would be difficult to seal off for sampling purposes and the gas sample collected would likely be too diluted with air, reducing the methane concentration to very low levels so that we would not be able to obtain sufficient methane for the tritium analysis. The 7% methane concentration observed for the subgrade void beneath the closet is about the low limit we need to run tritium analysis, of course it depends on the tritium concentration.

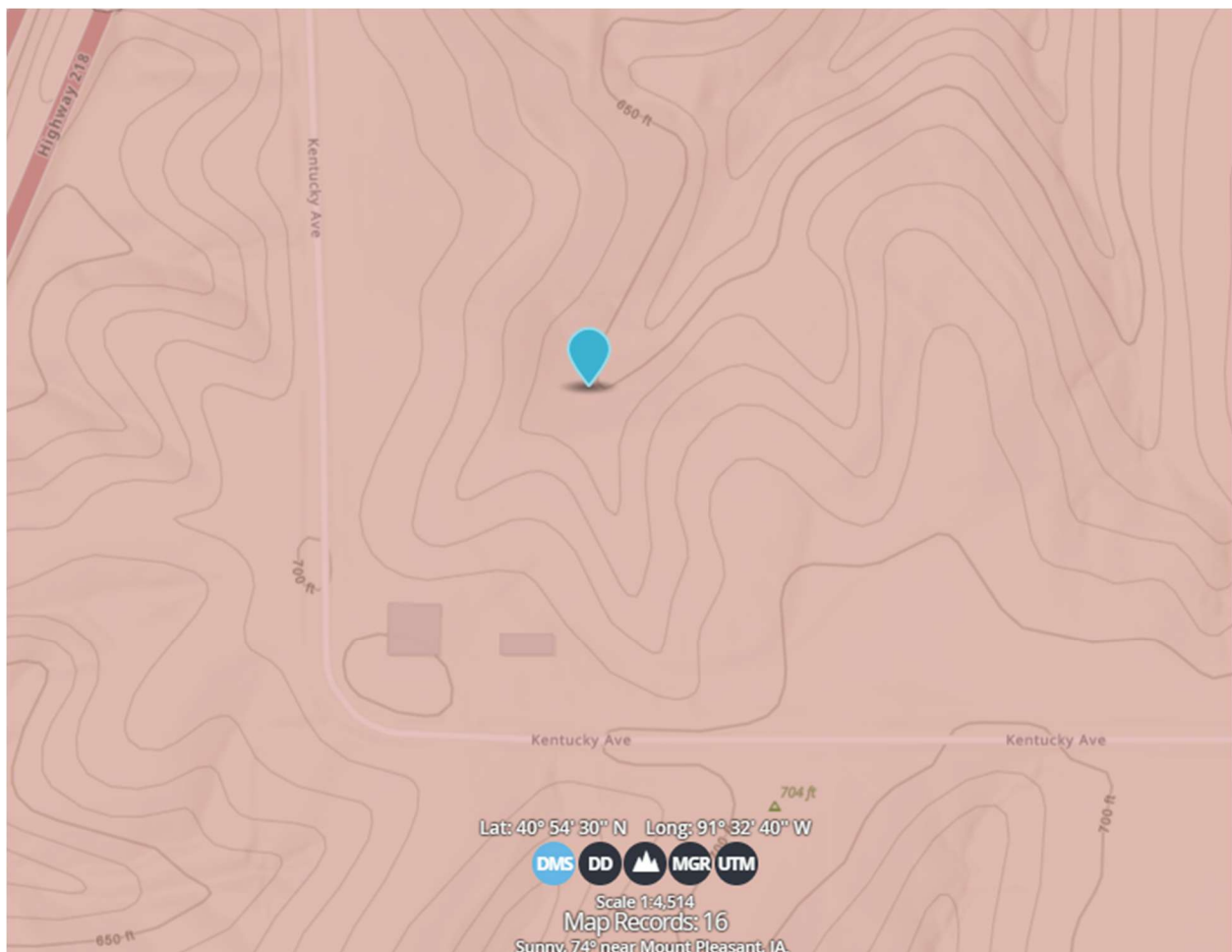
In a follow-up telephone conversation with Mr. Hackley, it was discussed that with some minor modifications, it may be possible to collect a sample from the void space beneath the closet without removing the floor boards. This would help with the dilution concern. Isotech was also instructed to analyze the sample they currently have for ^{14}C . Collecting a gas sample from one of the leachate piezometers is also being pursued for ^{14}C analysis for comparison to the closet subgrade void space sample.

A *Groundwater Assessment Report* was prepared by Shive-Hattery and dated August 12, 1994 (Doc #20484, transmittal letter only. Physical copy obtained from facility operating record). The document contained the following regarding drainage pipes in the vicinity of the subgrade void.

The building was constructed by Don Whaley, Sr., the contract operator for Phase I and Phase II fill areas and used for equipment maintenance and storage during Phase I and II operations. A septic tank which serves the building is reportedly located immediately west of the building. Effluent from the septic tank reportedly discharges into the upper portion of a gravel filled trench approximately 50 feet in length and 24 to 30 inches deep. A perforated collection pipe at the base of the trench is connected to the tile drain. The tile drain runs through the earthen berm separating the Phase I and Phase II fill areas and discharges northeast of the Phase I area. The tile drain is also connected to two drainage tiles located at the base of the depression immediately north of the old maintenance building. [Note, this depression is assumed to be the subgrade area that provided the truck access for

the public drop-off area] *Septic tank effluent from an old farm house formerly located east of the maintenance building also reportedly discharged to this tile drain.*

A copy of **Figure 1** from the above-referenced report is included in **Attachment B**. The depression immediately north of the building near monitoring well MW-1 is shown in the figure along with the tile outlet between monitoring wells MW-19 and MW-14/MW-15 on the north side of the Landfill fill area. The above description mentions that a tile drain extended from apparently north of the building northeast through an earthen berm that separated the Phase I and Phase II fill areas. The map below appears to show the topography prior to landfilling at the site and depicts three ravines prior to filling that appear to correspond with Phases I, II, and III shown on Figure 1 in **Attachment B**. The earthen berm is assumed to correspond generally to the location of the subtle ridge north of the east building shown in the map below. The tile drain therefore runs below the Landfill fill area in a generally south/southwest to north/northeast direction.



<https://ngmdb.usgs.gov/topoview/viewer/#17/40.90742/-91.54438>

Based on the citation from the *1994 Groundwater Assessment Report*, it appears that this tile drain had at least four pipe connections as follows:

- The perforated collection pipe associated with the former septic system for the maintenance building (building with methane compliance limit exceedance).
- Two drainage tiles apparently used to drain storm water from the depression or subgrade access to the north side of the maintenance building.
- The septic system from an old farm house located east of the maintenance building. It is assumed that one of the buildings east of the maintenance building shown on **Figure 1** in **Attachment B** is the old farm house.

It is not known what the current disposition of the drain tile or the pipe connections to the drain tile currently is, although they may still be present and could potentially serve as preferential conduits for gas migration to the general area of the void below the closet.

Based on the initial gas sample results from the void below the closet, and the drainage tile and septic system pipes all reportedly connected to the tile drain that extended north/northeast under the Landfill fill area, there is potential that the methane detected in the subsurface void could be from the waste mass, the former septic systems, or from debris accumulated in the void. As such, further air sampling and analysis are needed to further assess the source of the methane. The Isotech expert indicated challenges associated with obtaining a usable sample, one of which is collecting a sample with a sufficient methane concentration. Since methane readings have been variable in the closet and beneath the closet, with readings as low as 2% LEL in the closet and 23% LEL in the void space measured in December 2024, numerous attempts to collect a usable sample may be necessary. Prior to sample collection, it will need to be determined through field measurements if a sufficient methane concentration is present in the void space for sample collection. If field measurements indicate that methane concentrations are above at least 7% by volume, then a sample can be collected. If field measurements indicate that methane concentrations are below 7%, a sample should not be collected and an attempt to collect a sample will be made during the next site visit.

In order to accommodate the potentially multiple attempts that could be required to obtain a suitable sample, complete sample analysis, and develop a plan, if the Landfill is determined to be the source of the methane, an extension to December 31, 2025 is requested. If you have any questions regarding this extension request, please contact Nathan Ohrt at (319) 331-9613.

Sincerely,



Nathan Ohrt
Senior Project Professional
SCS Engineers

NPO/TCB



Timothy C. Buelow, P.E.
VP - Senior Project Advisor
SCS Engineers

Attachment A

Lab #: 959597

Job #: 61776

Co. Job#: 27224515.25

Sample Name: FOMW2-LE

Company: SCS Engineers

Container: IsoBag

Location: Henry County

Date Sampled: 03/11/2025
 11:51

Date Received:
 03/13/2025

Date Reported:
 04/09/2025

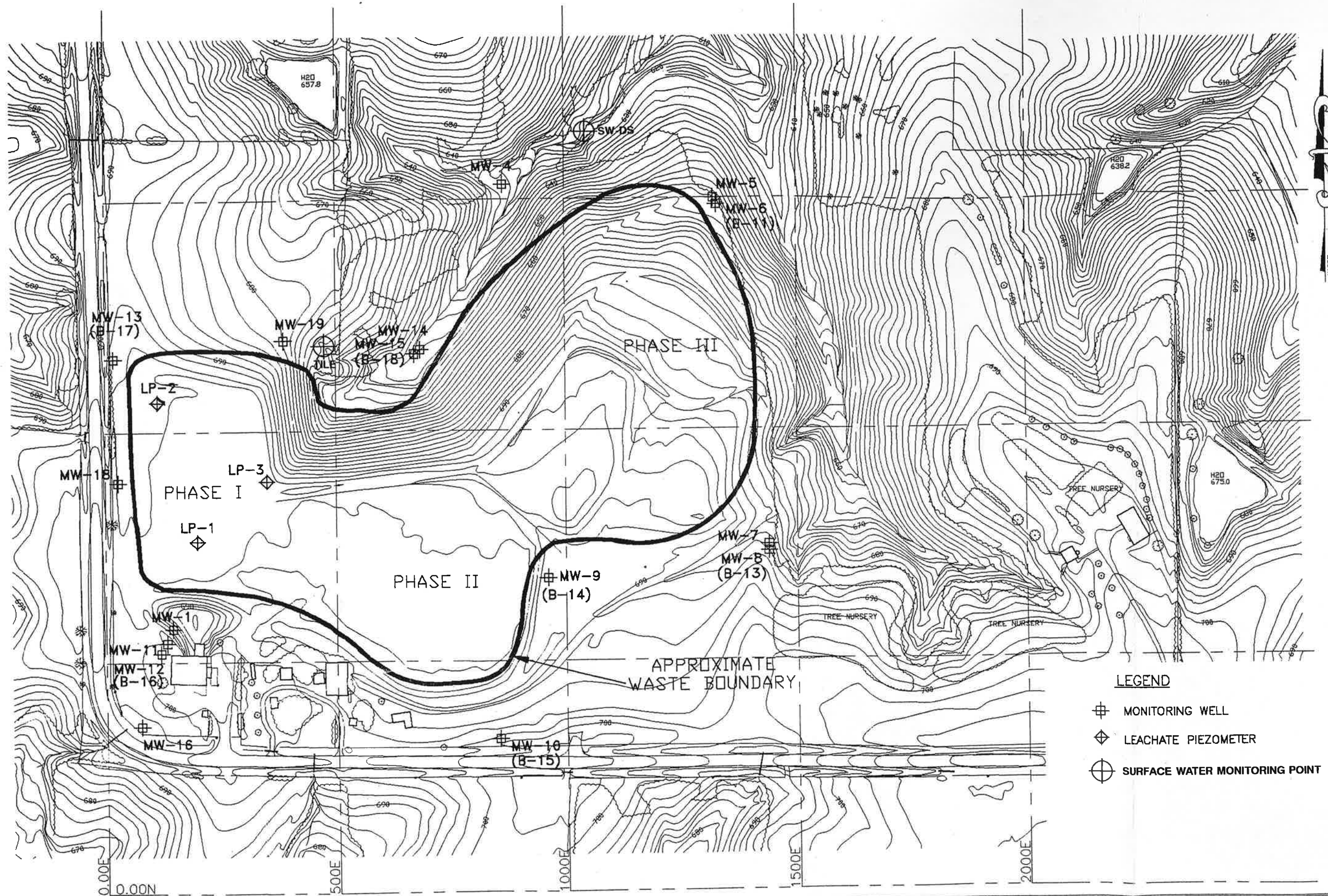
Component	Chemical mol%	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{18}\text{O}$ ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide	nd				
Helium	nd				
Hydrogen	nd				
Argon	0.947				
Oxygen	1.82				
Nitrogen	78.52				
Carbon Dioxide	11.59	-33.84			
Methane	7.13	-36.80	-193.7		
Ethane	nd				
Ethylene	nd				
Propane	nd				
Propylene	nd				
Iso-butane	nd				
N-butane	nd				
Iso-pentane	nd				
N-pentane	nd				
Hexanes +	nd				

Total BTU/cu.ft. dry @ 60° F & 14.73psia, calculated: 72

Specific gravity, calculated: 1.008

Remarks:

Attachment B



HENRY COUNTY SANITARY LANDFILL
SITE PLAN

TITLE

PROJECT NO.

194140-0

SHEET NO.

FIGURE 1

SHIVE-HATTERY
ENGINEERS AND ARCHITECTS, INC.

SCALE 1" = 200'

FIELD BOOK

REVISION

DATE 6-8-94

DRAWN B.G.

APPROVED W.C.