6.1.3

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Bureau of Waste Site Cleanup
One Winter Street, Boston, Mass. 02108

Daniel S. Greenbaum
Commissioner

February 2, 1990

Dave Dickerson
U.S. EPA
HRS CAN-3
J.F. Kennedy Federal Bldg.
Boston, MA 02203-2211

Dear Mr. Dickerson:

The Department has reviewed the documents for the "Phase III Design Landfill Gas Treatment System at the Charles George Landfill" dated October 1989, prepared by Law Environmental Inc. for the Army Corps of Engineers.

Attached are the Department's comments regarding these documents. Please note that the majority of these comments were discussed at the December 12, 1989 meeting.

Very truly yours,

Dale C. Young

Dale C. Young
Project Manager

DY/bkt

cc: Paul Spano, DEP
Paul Dwiggins, DEP - AQC
Robert Zaruba, ACOE

DEQE
IS NOW
THE DEPARTMENT OF
ENVIRONMENTAL PROTECTION

MEMORANDUM

CRO

TO: DALE YOUNG, BWSC, BOSTON
THRU: MIKE BINGHAM, BWSC, CRO
FROM: PAUL SPANO, BWSC, CRO
DATE: DECEMBER 19, 1989

SUBJECT: Charles George Landfill, Phase III Design Landfill Gas Treatment System

General Comments:

Throughout the document the word **"should"** is used extensively. If the author of the document is referring to something which must be accomplished or something that will be included or accomplished in order to comply with specifications then the words shall or will must be utilized and not the word should.

Most of my concerns were addressed at the meeting of December 12, 1989, at the EPA office in Boston, MA, with representatives from EPA, COE, DEP, and Law Environmental, Inc.

There are issues which I consider to be potentially problematic, and if not approached conservatively, these areas of concern could pose a future threat to the integrity of the system. Items which I consider outstanding are: 1. proper insulation for the gas collection system to insure the prevention of condensate in the gas collection pipeline thus eliminating the possibility of frozen lines. 2. the potential to introduce air into a negative pressure gas collection system which will increase the probability of an explosion. Also, appending this commentary, comments from Mr. Paul Dwiggins, Division of Air Quality Control, CRO, raise concerns regarding the following:

- "Choice OF Thermal Oxidizer"
- "NEED FOR HEAT EXCHANGERS"
- "POSSIBLE NEED FOR SCRUBBER"
- "NEED FOR INITIAL FLARING/PILOT STUDY"

The above concerns must be addressed.

SPECIFIC COMMENTS:

CONCEPTUAL DESIGN ANALYSIS

PART II DESIGN REQUIREMENTS AND PROVISIONS

SECTION 3.0 MECHANICAL DESIGN ANALYSIS

Subsection 3.1.1 General Parameters

Page 2-5 item number 2 states " Auxiliary fuel will initially fire the thermal oxidizer to operating temperature, above 1200°F." Section 4.1.1 page 2-8 states " ...minimum operating temperature of approximately 1500°F." Please determine the proper minimum operating temperature and state it consistently throughout the document.

Subsection 3.1.2 Design Criteria and Technical Requirements

Page 2-6 item number 1 change "750 emf" to 750 cmf.

Page 2-7 item number 6 states "... during steady state operation - sample for target VOC's at least annually to monitor long term compliance ..." During the first year of steady state operation sampling for target VOC's should be monitored more often than once, a tentative sampling frequency should be established. If after one year sampling demonstrates that the system's emissions are in compliance then an annual sampling plan may be established.

Page 2-7 item number 9 states that the system will be located northeast of the Staging/Support Area. Apparently this location was chosen to accommodate access for service and deliveries, but consideration must also be given to the local residence. With respect to the citizens in the immediate vicinity of the proposed system's location, will the emissions or operations create an annoyance or a disruption of lifestyle? If there is a system failure, will the emissions pose a health threat to nearby residence?

SECTION 4.0 ELECTRICAL DESIGN ANALYSIS

Subsection 4.1.2 Systems Components and Technical Requirements

Page 2-8 item number 1 refers to PIC 101 and item 2 refers to PIG 101, is it PIC or PIG? Please make the correction.

SECTION 5.0 UNRESOLVED ITEMS OR CRITERIA

Subsection 5.2 LANDFILL GAS FLOWRATE

Page 2-11 states "The CDM (May 1985) and Ebasco (1987) measurements were comparable; with an approximate flowrate of 700 cfm." On page 2-6 item number 1 states that "... the Thermal Oxidizer Treatment System is based on a maximum flow rate of 750 cfm." Indicate that the CDM and Ebasco measurements were: maximum, minimum, or averaged flow rates.

Subsection 5.4 MASSACHUSETTS AAL'S REQUIREMENTS

Page 2-12, this paragraph states "It seems that the risk based VOC's target levels has already addressed the risks to public receptors. Any cleanup that is more stringent would be unnecessary." Agreed. However, if the risk based VOC target levels are more stringent than the National Secondary Ambient Air Quality Standards (NAAQS) and Massachusetts AAL's then the risk based target levels should be included in the report so that a comparison of the levels can be made.

In the first sentence change "...downwind and the incinerator stack,..." to "...downwind of the incinerator stack,..."
In the second sentence change "...levels has already..." to "...levels have already..."

SECTION 12.0 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

Level B protective equipment including SCBAs, for four people, should be available for an emergency operation.

SECTION 14.0 TASK-SPECIFIC ACTIVITIES

Subsection 14.1.1

Again, the use of Viton gloves and a five minute air pack should be reevaluated

SECTION 16.0 EMERGENCY RESPONSE

Subsection 16.2.5 Self Contained Breathing Apparatus (SCBA)

It is generally accepted that the buddy system is used in an emergency operation and a minimum of two people will respond to a rescue situation. Further, at least the same number of people suited in the same level of protection as the rescue team will serve as a back-up team in a rescue operation.

PRELIMINARY SITE SPECIFIC QUALITY MANAGEMENT PLAN

SECTION 3.0 PROJECT ORGANIZATION AND QM RESPONSIBILITIES

Subsection 3.2 CONTRACTOR QM RESPONSIBILITIES

Item (e) change Quantifications to Qualifications.

Subsection 5.0 ANALYTICAL METHODS AND PROCEDURES

The last paragraph on page 13 states " At the end of the project, the contractor should , at the COE"s option, provide a copy of all analytical data including log books, chromatograms, instrument outputs, and calculations". A copy of all the above mentioned items should be available for review at anytime during or after the project.

MEMORANDUM:

Date: Dec. 14, 1989

To: Dale Young

Thru: Thomas P. Cusson

From: Paul Dwiggins

Re: Proposed Landfill Gas Collection/Treatment System at Charles George Landfill, Tyngsboro, Massachusetts

Attached are my comments on the Law Environmental Design for the landfill gas system. Basically, I am elaborating on what I already mentioned at the December 12th meeting in Boston.

TPC/PD/ls
Enclosure:

Comments By: Paul Dwiggins

Division of Air Quality Control
Department of Environmental Protection
Central Regional Office

Regarding: "Conceptual Design Analysis for Phase III Design Landfill Gas Treatment System at Charles George Landfill" by Law Environmental

I. CHOICE OF TYPE OF THERMAL OXIDIZER

The document calls for a "Thermal Oxidizer" to efficiently burn the landfill gases. We agree with the need for efficient combustion and good destruction efficiency. However, there is a problem with asking the manufacturers of traditional "Thermal Oxidizers" to design a system - the problem is that their equipment is normally used to destroy very dilute Volatile Organic Compound (VOC) containing exhaust streams. Their usual equipment (burners, etc..) may not be well suited to burning a Hydrocarbon rich waste stream such as landfill gas. The alternative to a "Thermal Oxidizer" is a flare with a large enclosed stack.

Flares can be constructed with very large insulated stacks which will allow the products of combustion sufficient temperature and residence time for good destruction efficiency. These can give the same end result as a "Thermal Oxidizer". These type of enclosed stack flares have already been installed at landfills in Massachusetts, at BFI in Chicopee and at a landfill at Park Street in Billerica.

We recommend that Law Environmental get bids from the manufacturers of these "Enclosed Flare" systems as well as from the "Thermal Oxidizer" manufacturers.

II. NEED FOR HEAT EXCHANGERS

The present design assumes the need for heat exchangers, apparently for two reasons:

1. The landfill gas methane content may drop off so much that a great deal of auxiliary fuel will be needed, in which case, heat exchangers will provide economy.

2. The system blower is on the exhaust side and must be protected against high temperatures.

In response to (1), the literature shows that anaerobically generated landfill gas typically contains about 50% methane. This is because of the "typical" waste decomposition reaction:

$$C_6H_{12}O_6 > 3CH_4 + 3CO_2$$

Thermodynamic calculations show that a burning mixture of only 20% methane, 80% CO_2 landfill gas will reach temperatures well in excess of 1600°F. Therefore it is doubtful whether large amounts of auxiliary fuel will be needed.

In response to (2), it is debatable whether the blower really needs to be on the exhaust side of the incinerator. This arrangement allows pulling a negative pressure on the afterburner system which is good, however, cooling the exhaust gas stream would lead to corrosion problems and might require exotic construction materials. Besides, if the "enclosed stack flare" design were chosen, it would be so simple that it would not be likely to leak to the atmosphere.

To summarize: Heat exchangers will probably not be needed.

III. POSSIBLE NEED FOR SCRUBBER

Some of the data indicates very large quantities of bromoform in the landfill gas, up to 5.69 million micrograms per cubic meter. This amount of bromoform in 700 cubic feet per minute of gas would amount to 61 tons per year. This amount of bromoform would require gas scrubbing to reduce HBr emissions.

IV. NEED FOR INITIAL FLARING/PILOT STUDY

In order to help resolve the above issues and to provide accurate gas flow rate and composition data, we recommend:

1. Installing a conservatively sized gas collection system as soon as possible.

2. Installing a flare to burn the collected gas prior to design and construction of the final combustion system.

PD/ls