GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION
SPONSORED PROJECT INITIATION

No action OK OH

Date: December 5, 1977

Project Title: Evaluation of a Hazardous Waste Incineration System Preliminary Testing Program

Project No: A-2083

Co- Project Director:s: Dr. S. C. Havlicek & Dr. J. W. Ralls

Sponsor: Southeastern Waste Treatment, Inc.

Agreement Period: From 11/28/77 Until 1/27/78

Type Agreement: Standard Industrial Research Agreement, dated November 28, 1977

Amount: $2,771 (includes $250 for Patent and Data Rights)

Reports Required: Monthly Progress Reports

Sponsor Contact Person (s):

Technical Matters

Contractual Matters
(thru OCA)

Mr. James M. Henderson, President
Southeastern Waste Treatment, Inc.
P.O. Box 1697
Dalton, GA 30720

Defense Priority Rating: N/A

Assigned to: ASL/EEAD (School/Laboratory)

COPIES TO:

Co-Project Director S
Division Chief (EES)
School/Laboratory Director
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Project File (OCA)
Project Code (GTRI)
Other

CA-3 (3/76)

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION

Date: May 26, 1978

Project Title: Evaluation of a Hazardous Waste Incineration System Preliminary Testing Program

Project No: A-2083

Co- Project Director: Dr, S. C. Havlicek & Dr. J. W. Ralls

Sponsor: Southeastern Waste Treatment, Inc.

Effective Termination Date: 3/31/78

Clearance of Accounting Charges: 3/31/78

Grant/Contract Closeout Actions Remaining: NONE

_ Final Invoice and Closing Documents
_ Final Fiscal Report
_ Final Report of Inventions
_ Govt. Property Inventory & Related Certificate
_ Classified Material Certificate
_ Other _____

Assigned to: ASL/EEAD (School/Laboratory)

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Division Chief (EES)
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EES Information Office
Project File (OCA)
Project Code (GTRI)
Other _____

CA—4 (3/76)

XC: Al Becker

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

January 28, 1978

Mr. James M. Henderson
Southeastern Waste Treatment, Inc.
P. O. Box 1697
Dalton, Georgia 30720

SUBJECT: Monthly Progress Report No. 142
"Evaluation of a Hazardous Waste Incineration System-
Preliminary Testing Program"
Georgia Tech Project No. A-2083

Dear Mr. Henderson:

Three Tedlar bags containing gases collected from the Southeastern Waste Treatment, Inc. incinerator and a sample of waste material used as feed to the incinerator combustion chamber were received at Georgia Tech on the evening of December 28, 1977.

The gases in the bags were transferred immediately into purified ortho-xylene by passing the gases through the solvent contained in gas washing cylinders. Each transfer took about thirty minutes with a slow bubbling rate through the sintered glass dispersion tubes of the gas washing cylinders. The gas flow rate was maintained with a 400 torr vacuum applied to the exit side of the second of two gas washing cylinders connected in series. The samples were processed in the order: # 2, # 1, and # 3. No particulate material was observed in the bags or in the xylene solutions.

Ten milliliter portions of the three 250 milliliter volume xylene solutions, and an equal volume of untreated xylene as a control sample, were evaporated to dryness to provide a sample for iron analysis. The three incinerator gas samples in xylene solution, a solvent and glassware control sample, and four xylene concentrates were taken to the Neely Reactor Center on the Georgia Tech campus for neutron activation analysis on January 3.

Due to the possibility of interference from rare earths and other elements in boiling chips which were used in the evaporations described above, new 10 mL aliquots of the xylene solutions were evaporated in large irradiation vials. The vials with residue were irradiated in the Georgia Tech Research Reactor for 14 hours at a neutron flux of 8×10^{12} $cm^{-2}sec^{-1}$ on January 10 and 11, 1978. These irradiated residues will be counted for the Fe-59 activation product during the week of January 30.

For the chlorine and iodine analyses, smaller aliquots (about 0.5 mL) were sealed in irradiation vials and irradiated for 5 minutes

in the pneumatic facility at a flux of 8×10^{12} n $cm^{-2}sec^{-1}$. These solutions were counted as soon as possible after irradiation for the Cl-38 and I-128 activation products. A few more standards need to be run to complete the analysis. The results of these experiments will be available in early February.

A portion of the liquid waste material was sent to a firm in Knoxville, Tennessee specializing in microanalysis for measurement of carbon, hydrogen, nitrogen, chlorine and iodine content. A purchase order for these analyses telephoned to the firm on January 10 was misplaced by their office and the start of analysis was delayed until after January 24 when the information was repeated to the firm. The results of these elemental analyses will be available in early February.

We plan to send you a full report on all of the analytical results as soon as they are completed and sent to us.

Please feel free to call me if you have any questions about progress on this project.

Yours sincerely,

Jack W. Ralls, Ph.D.
Senior Research Scientist
Project Co-director

cc: Dr. G. R. Harrison
Dr. J. M. Spurlock
Dr. S. M. Havlicek
Dr. R. C. McFarland
Ms. N. S. McHan

A-2083

xc: Al Becker

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

January 28, 1978

Mr. James M. Henderson
Southeastern Waste Treatment, Inc.
P. O. Box 1697
Dalton, Georgia 30720

SUBJECT: Monthly Progress Report No. 1 & 2
"Evaluation of a Hazardous Waste Incineration System-
Preliminary Testing Program"
Georgia Tech Project No. A-2083

Dear Mr. Henderson:

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Jack W. Ralls, Ph.D.
Senior Research Scientist
Project Co-director

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Dr. J. M. Spurlock
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Dr. R. C. McFarland
Ms. N. S. McHan

ENGINEERING EXPERIMENT STATION
GEORGIA INSTITUTE OF TECHNOLOGY • ATLANTA, GEORGIA 30332

February 6, 1978

Mr. James M. Henderson
Southeastern Waste Treatment, Inc.
P. O. Box 1697
Dalton, Georgia 30720

SUBJECT: Monthly Progress Report 3
"Evaluation of a Hazardous Waste Incineration System-
Preliminary Testing Program"
Georgia Tech Project No. A-2083

Dear Mr. Henderson:

The report on the elemental composition of the liquid waste sample which was combusted in the Southeastern Waste Treatment incinerator on December 28, 1977 was received at Georgia Tech on February 1, 1978.

The commercial analytical laboratory found:

Carbon	62.32%
Hydrogen	9.25%
Nitrogen	0.04%
Chlorine	24.63%
Iodine	< 0.02%

It should be noted that the sensitivity limit for the iodine analysis was 0.02% or 200 parts per million.

Assuming an iodine content of 0.00, the oxygen content of the liquid waste sample (obtained by difference) would be 3.76%. The low oxygen content of the liquid waste sample indicates that it is composed primarily of chlorinated hydrocarbon compounds.

The Frank H. Neely Nuclear Research Center reported the following results from analysis of xylene solutions used to trap volatile compounds from the stack gas sampling bags:

Sample	Iodine (µg/ml)	Chlorine (µg/ml)	Iron (µg/ml)
Bag 1	<0.0070	2.42	0.38
Bag 2	0.011	2.65	0.50
Bag 3	<0.0083	2.40	0.62
Control	<0.0072	2.56	0.17

From consideration of counting statistics and geometry differences among standards and samples the error in the determinations were estimated to be as follows:

Iodine	20-30%
Chlorine	10%
Iron	15-20%

Only sample 2 showed detectable iodine content above the detection limit. The fact that only one of three samples showed detectable iodine content at just slightly above the detection limit suggests a very low and variable iodine level in the stack gases. This result would be consistent with the very low iodine content of the influent liquid waste.

The liquid waste which was incinerated on December 28, 1977 had a substantial chlorine content of almost 25 percent. The lack of significant differences in chlorine content among the control and stack gas samples demonstrates that the oxidation of chlorine containing compounds in the liquid waste is complete. The data also indicate that chlorine containing combustion products are removed effectively by the caustic scrubbing system. There was a low, but significant, level of iron in all three stack gas samples. The neutron activation results for iron were corrected by subtracting the control sample value and expressed as iron content in micrograms per liter of stack gas sample:

Sample	Volume liters	Iron Content Micrograms/liter
Bag 1	8.64	6.1
Bag 2	9.32	8.9
Bag 3	15.74	7.1

Neutron activation analysis determines the total quantity of an element present in a sample, but yields no information about the compounds in which the element is present. In other words, the chemical form of the iron is not determined by neutron activation analysis.

We would speculate that the most probable iron compounds in the stack gases would be iron oxides and iron chlorides. These iron compounds would be in an aerosol form in the collection samples. Considering the innocuous nature of iron oxides and chlorides, it seems unlikely that any public health threat exists from their presence at such low levels in incineration stack gases.

Please feel free to call me if you have any questions about progress on this project.

Yours sincerely,

Jack W. Ralls, Ph.D.
Senior Research Scientist
Project Co-director

cc: Dr. G. R. Harrison
Dr. J. M. Spurlock
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