

To: M. G. Hayes

From: P. L. Fetzner
Date: February 16, 1990

Interoffice
Communication

Subject: Sludge Samples - Analytical Cost Evaluation

VISTA

The Louisiana Department of Environmental Quality (DEQ) requested the sludge material in each of the seven basins for which Vista wants to secure closure be tested for hazardous waste characteristics, EP toxicity and TCLP parameters. Furthermore, DEQ requested that all sampling and analyses be conducted in accordance with the protocol as stated in the EPA Methods for Evaluating Solid Wastes (SW-846). Based on the sampling criteria requested by the DEQ, it was estimated that one thousand (1000) samples would be taken and analyzed.

It was requested that comparative analytical cost be developed between commercial laboratories completing the analysis and Vista buying the necessary equipment to complete the analysis for the one thousand (1000) samples.

The commercial laboratories analytical costs ranged from \$1.7 MM to \$2.30 MM for the normal 30 day sample turnaround time. This analytical cost can double if priority treatment is required, i.e., sample turnaround time of less than two weeks. Vista's cost to complete the testing was estimated to be \$0.52 MM. Breakdown of these costs are shown in the attached report.

For 275 samples or less, it is more economical to utilize a commercial laboratory. If more than 275 samples are generated from this study or are expected from future studies, it would be advantageous to secure the capital funding to establish the capability within Vista at the VCM Plant to analyze the hazardous characteristics, EP toxicity and TCLP parameters. Based on the experience in the VCM laboratory showing an increased utilization of the GC/MS for volatile component analyses, the work/sample load to utilize the new instrumentation would undoubtedly increase.

Equipment delivery schedules, four to eight weeks, requires the decision as to who will do the testing, Vista or a commercial laboratory, to be made quickly if a June 15 project starting date is to be met.

CWH 000010305

Another important fact which must be considered is coordinating basin sampling with the analysis schedule of the laboratory selected so the maximum allowable holding time for the samples will not be exceeded.

The detailed cost evaluation report is attached.



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lk

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CWH 000010306

SLUDGE SAMPLES
ANALYTICAL COST EVALUATION.

This report summarizes the economical evaluation requested by Mike Hayes for cost comparisons between commercial laboratories completing the analytical testing for 1000 sludge samples and the cost required for Vista to do this testing.

I. Testing Requirements

At the request of the Louisiana Department of Environmental Quality (DEQ), sludge material in the seven basins selected for closure is to be sampled in accordance with the protocol as stated in the SW-846 Manuals. DEQ requested the analytical testing be conducted per the methods listed in SW-846 for the identification of the hazardous wastes, EP toxicity and TCLP parameters. DEQ requested sludge samples be taken on a 50 ft. by 50 ft. grid over each basin and be analyzed individually. However, current sampling protocol requires only a 100 ft. by 100 ft. grid which, if agreed to by DEQ, will reduce the sample load by 75%.

The identification of hazardous wastes include; corrosivity, ignitability, reactivity and EP toxicity. The EP toxicity parameters fall into three groups; metals (8), pesticides (4), and herbicides (2). The TCLP is a modified leaching procedure whose parameters fall into the following groups; metals (8), pesticides (6), herbicides (2), volatile organics (19) and semi-volatiles - acid fraction (8) and base neutral fraction (9).

II. Comparative Analytical Cost

A. Commercial Laboratories

Comparative analytical costs have been developed between four commercial laboratories and the cost for Vista to purchase the necessary equipment to complete the testing. One thousand (1000) samples were used as the basis for the economic evaluation. Sampling and testing were scheduled to begin June 15. Care must be taken in coordinating basin sampling with the schedule of the laboratory selected so that the maximum holding time allowed by the protocol will not be exceeded.

Cost estimates to complete the required analytical testing were secured from American Laboratories,

Hattiesburgh, MS; ENSR, Houston, TX; Gulf South Environmental Laboratories, New Orleans; and Radian, Austin, TX, (R & D secured the cost estimate from Radian). Costs not addressed in this evaluation include transportation cost, sampling and shipping containers and ice to keep the sample refrigerated.

Comparative analytical costs are listed in Table I. From this data, selected costs were used to show the costs graphically as indicated in Figure I.

The analytical cost for normal sample turnaround, generally 4 weeks, ranged from \$1.71 to \$2.3 MM dollars for 1000 samples. If priority treatment is required, one week to two weeks sample turnaround, the price can double depending on the laboratory used. This would increase the analysis cost to \$4.6 MM dollars.

A 10% discount is obtainable on a per sample basis for complete TCLP analysis. In addition, a discount can be obtained for the large number of samples to be analyzed. The largest discount quoted was 20% provided all testing was completed. This lowered the cost to \$1.276 MM dollars.

Dependent on the conditions imposed on the contract laboratory, i.e., turnaround time, number of samples, the sample load where Vista's anticipated costs match the contract laboratory analysis cost ranged from 50 to 275. The 275 sample load may be nearer the actual number of samples that will be obtained from the seven basins. The maximum sampling/testing that can be completed by Vista would be 8 samples daily. This means the 275 samples would require 35 days to complete. As there is a 14 day holding time on the sludge samples, a maximum of 112 samples could be collected at one time, unless only a five day work week is observed then only 80 samples can be collected.

The cost to analyze the samples as required by the DEQ is shown in Figure II. This represents the cost for a single sample and totals \$1,710 dollars - the minimum cost without a discount. Analytical testing discount for a complete TCLP analysis lowers the cost to \$1,595. A volume discount for 1000 samples lowers the cost another 20%. This variance is shown graphically in Figure

I. Figure III shows various options should the DEQ allow Vista to forego the indicated analysis.

B. Vista VCM Laboratory

1. Equipment Requirements

For Vista to complete the analysis, several pieces of laboratory instrumentation will be required. The equipment needed are shown on Table II. Capital required for this equipment is estimated to be \$0.309 MM dollars.

Analyses which require the instrumentation are discussed briefly:

Hazardous Waste

Characterization: Minor equipment will be required for the testing associated with the corrosivity, ignitability and reactivity parameters.

Semi-Volatiles: A second GC/MS will be required to complete the semi-volatile fraction analysis. It would not be feasible to be changing columns in the GC to be able to analyze volatiles and semi-volatiles on our current GC/MS. This would lead to less instrument run time due to changing calibration requirements, increased contamination on the source, etc. There is a new accessory for a GC/MS permitting the direct analysis of volatile and semi-volatiles from solids, possibly sludge samples. The capital cost includes this equipment.

Metals:

A new fully automated atomic adsorption (AA) spectrophotometer designed for optimized flame, graphite furnace and mercury/hydride analyses would be required to complete the testing. One automated instrument would be able to keep up with the extracted samples.

Pesticides &
Herbicides:

A gas chromatograph specifically equipped for the pesticide and herbicide analyses along with associated integration equipment will be required. No gas chromatograph in the VCM laboratory is equipment with the specific detectors required.

Extraction
Equipment:

Additional extraction apparatus and tumblers, would be required to run the 1000 samples. With the purchase of an additional 12 place unit we would be capable of analyzing 8 volatile and 8 semi-volatile samples daily. The maximum one person can extract and properly clean the equipment would be 8 samples. This will be the limiting factor for the analysis as it requires 24 hours to complete the testing. It may be wise to double the number of extractors to maximize through put on each tumbler. This would allow container cleaning while other samples are being extracted.

2. Manpower Requirements

Training requirements for the new instruments, operational supplies, and manpower needs total about \$0.211 MM dollars. It was estimated that four additional people would be required to do all the work associated with the testing. The first would work with the new GC/MS, the second would work the herbicide/pesticide extraction, sample preparation and analysis, the third would work with zero headspace extractions and the fourth would run the AA instrument and help with extractions. Another individual may be required to keep the reports current, but is not counted at this time. In all likelihood, once the current sample load is completed the manpower requirements can be reduced by cross training the analysts on the AA and the gas chromatograph used for the pesticide and herbicide analyses.

With an estimated capital cost of \$0.304 MM and anticipated operating cost of \$0.211 MM dollars, the total investment for Vista would be \$0.520 MM dollars. The date to be obtaining valid data would be June 15 provided the equipment can be ordered by March 15. This would allow the equipment to be received by May 15 with installation completed by May 30. Training and method development could be completed by June 15. Meeting this date means ordering the equipment by March 15 or earlier.

If it is likely that fewer than 275 samples will be taken, then the commercial laboratory is the most logical choice. However, if it is anticipated the sample load from the current project or future projects would exceed the 275 number, serious consideration should be given to setting up our own laboratory. In the event regulatory requirements impose tighter restrictions for some specific toxic parameters, i.e., low levels of trace metals (copper, nickel) and semi-volatile trace organics, this same equipment would be required on an ongoing basis.

CWH 000010311

TABLE I
COMPARATIVE ANALYTICAL COST
COMMERCIAL LABORATORIES

<u>PARAMETER</u>	<u>AMERICAN LABS</u>	<u>ENSR</u>	<u>RADIAN</u>	<u>GULF SOUTH</u>
<u>EP Toxicity</u>				
Corrosivity	5	10	15	11
NACE	75	60	125	--
Ignitability	30	35	35	30
Reactivity	70	70	60	100
Extraction	50	75	75	--
Metals	150	200	200	200
Pesticides & Herbicides	<u>175</u> 555	<u>330</u> 780	<u>300</u> 810	<u>325</u> 736
<u>TCLP</u>				
Extraction	200	100	---	135
Metals	140	200	---	200
Pesticides & Herbicides	150	400	---	325
ZHE Extraction	Incl. Above	150	---	125
Volatile Organics	200	250	---	250
Acid Fraction	465	425	---	475
Base Neutral	---	---	---	---
+10 Components per Fractions (3)	\$100/Fr <u>NC</u> 1155	<u>N/I</u> 1525	<u>N/I</u> 1340-1500	<u>\$30/Fr</u> 1600
Total \$ Cost/Sample	1710	2305	2150-2310	2246
TCLP Discount	10%	N/I	N/I	N/I
Priority Treatment	N/I	4wk-Norm 2wk-100%	N/I	4wk-Norm 1wk-100%
Volume Discount (1000 Samples)	20%	--	--	10%
Transportation	NC	Neg.	N/I	Neg.
Sample Disposal	Ret.	N/I	N/I	Ret.

NC = No Charge
Fr = Fraction
Neg. = Negotiable
N/I = Not Indicated
Ret. = Returned to Client

CWH 000010312

TABLE II
VISTA - COST ESTIMATE

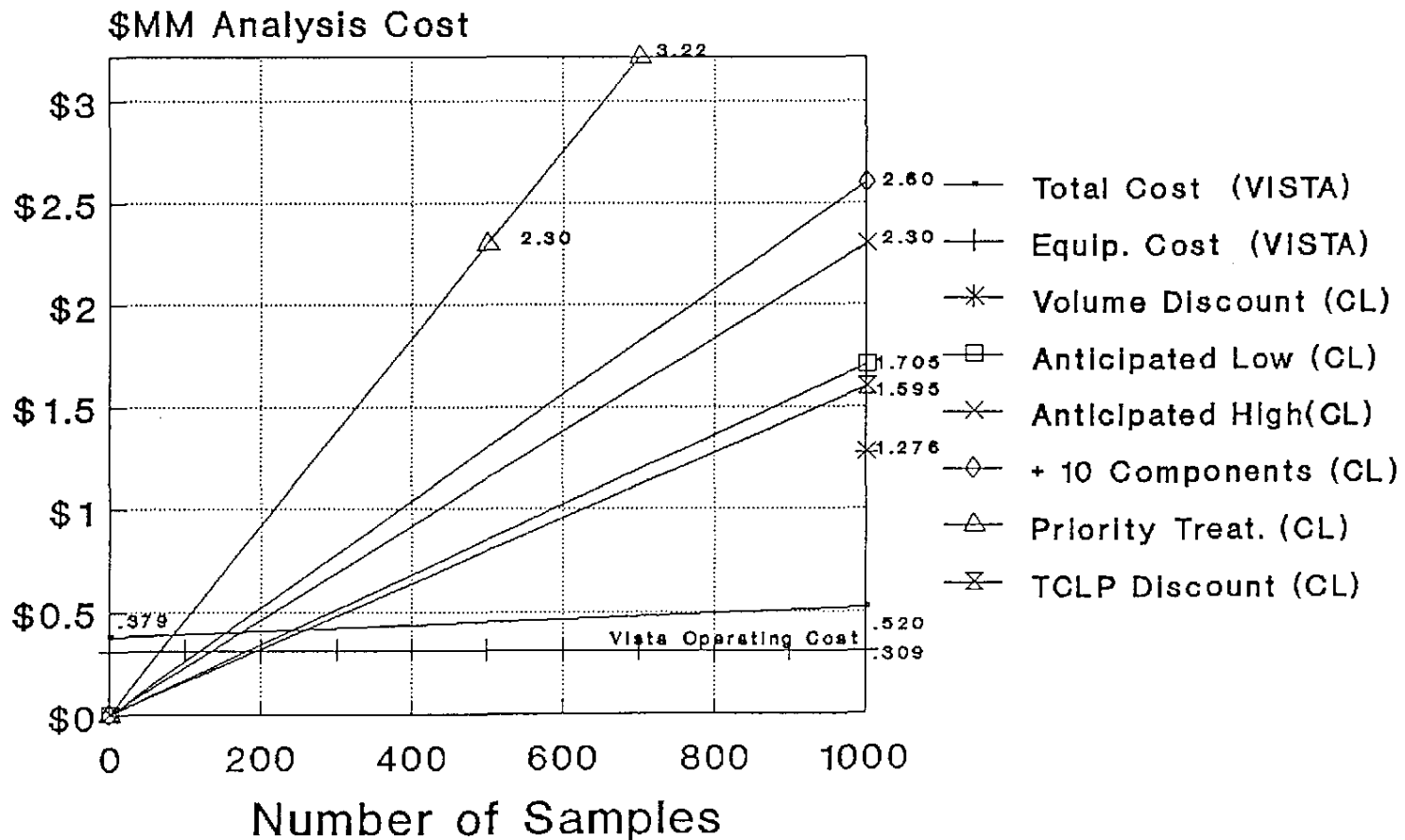
<u>Equipment</u>	<u>Cost</u>	<u>Estimated Delivery</u>
Finnigan GC/MS INCOS 50*	\$125,000	60 Days
Therm Ex.	26,000	90 Days
P & E Automated AA System for Metal Analysis	96,800	60 Days
Varian Gas Chromatograph FID and EC	16,700	
Integration Equipment	4,000	
ZHE Extraction Apparatus		
Extraction Vessels	9,800	4 Weeks
Tumblers	<u>3,000</u>	4 Weeks
	284,300	
Tax	18,300	
Transportation	<u>4,000</u>	
	294,600	
Lab Modification Cost	<u>9,250</u>	
Total Set-Up Cost	308,850	Capital
 <u>Estimated Operating Costs</u>		
Training	10,000	
Manpower	141,000	
Operating Supplies	30,000	
Maintenance Contracts	<u>30,000</u>	
	\$211,000	

* = Ordered after March 9 the cost increases to \$140,000.

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FIGURE 1

COST COMPARISON CONTRACT LAB - VISTA



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FIGURE 11

SLUDGE TESTING Analytical Cost Evaluation

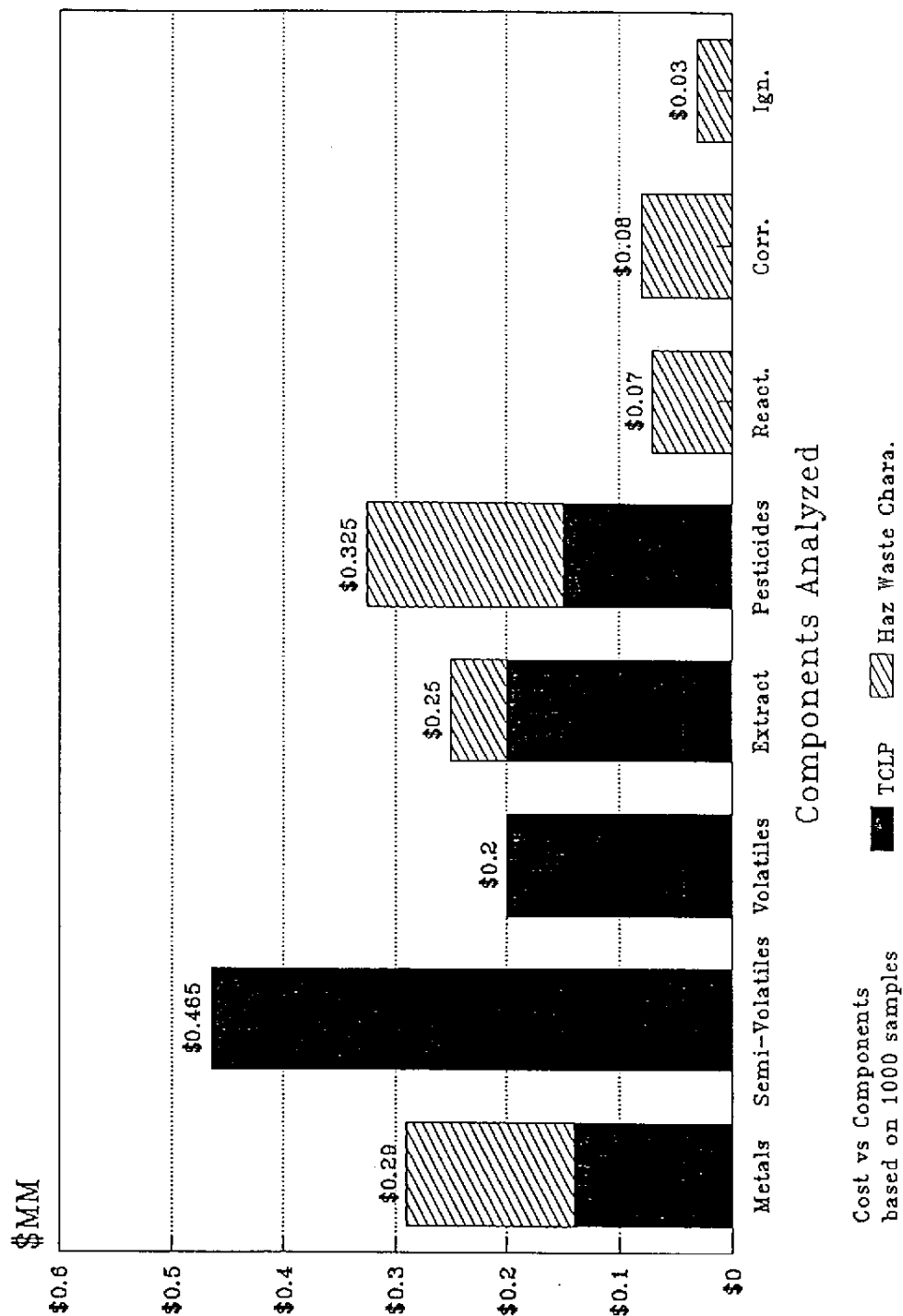
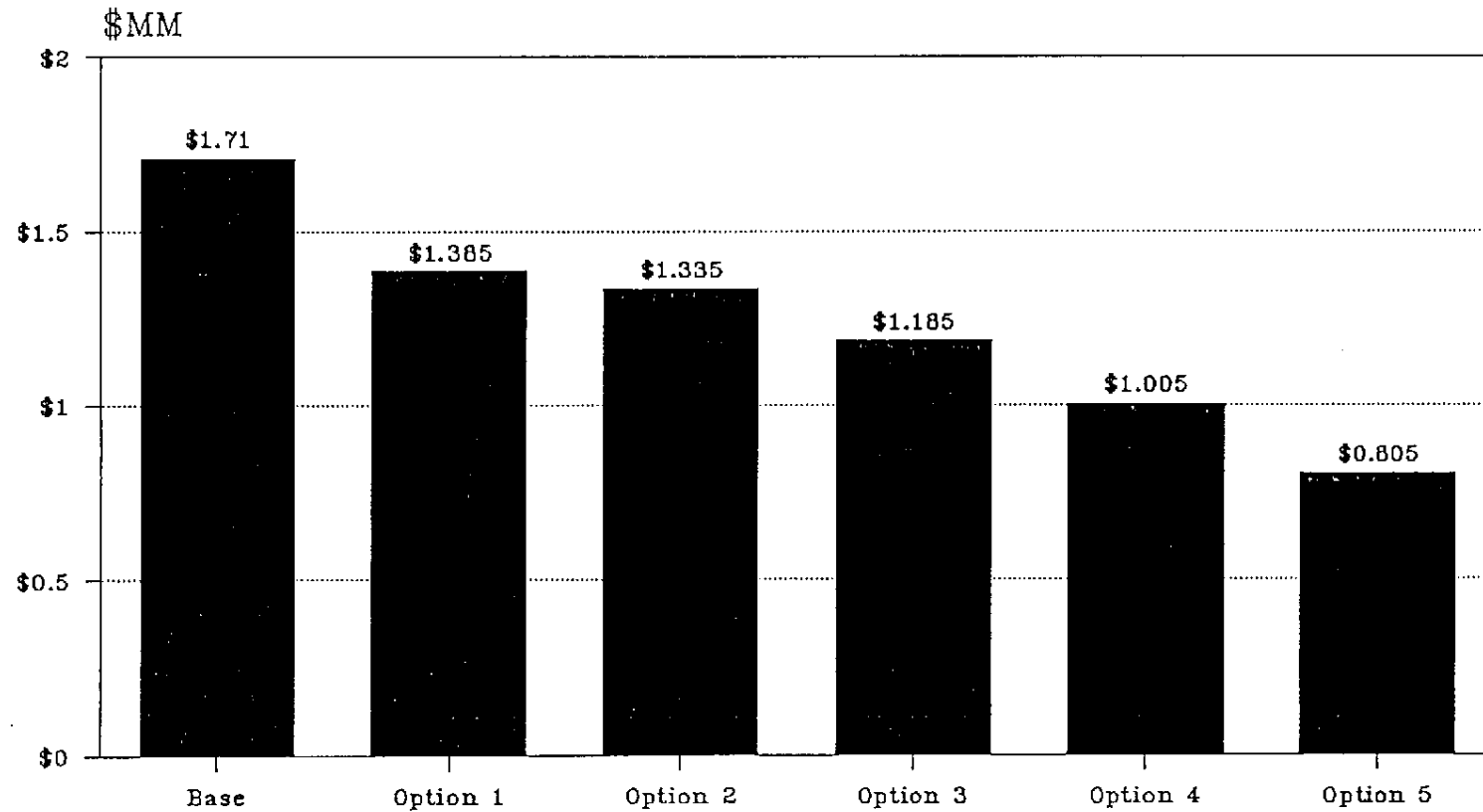


FIGURE III

SLUDGE TESTING

Base Case Analytical Cost Evaluation



■ Cost vs Option
based on 1000 samples

Options

- Base Case - Testing required by DEQ, TCLP & Haz.
- Option 1 - Assume DEQ permit elimination of Pest. & Herb.
- Option 2 - Ign., Corr., React., & TCLP
- Option 3 - Assume DEQ permit elimination of EP metals
- Option 4 - VCM to do Ign., Corr., & React.
- Option 5 - VCM to do Volatiles & Option 4

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TABLE II

VISTA - COST ESTIMATE

<u>Equipment</u>	<u>Cost</u>	<u>Estimated Delivery</u>
Finnigan GC/MS INCOS 50*	\$125,000	60 Days
Therm Ex.	26,000	90 Days
P & E Automated AA System for Metal Analysis	96,800	60 Days
Varian Gas Chromatograph FID and EC	16,700	
Integration Equipment	4,000	
ZHE Extraction Apparatus		
Extraction Vessels	9,800	4 Weeks
Tumblers	<u>3,000</u>	4 Weeks
	284,300	
Tax	18,300	
Transportation	<u>4,000</u>	
	294,600	
Lab Modification Cost	<u>9,250</u>	
Total Set-Up Cost	308,850	Capital
 <u>Estimated Operating Costs</u>		
Training	10,000	
Manpower	141,000	
Operating Supplies	30,000	
Maintenance Contracts	<u>30,000</u>	
	\$211,000	

* = Ordered after March 9 the cost increases to \$140,000.

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