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To: Distribution

From: P. L. Fetzner
Date: February 27, 1990

VISTA

Interoffice
Communication

Subject: LCCC Biotoxicity Team Status Report

The LCCC Biotoxicity Team is continuing work on three projects.

- Cooling Tower Additive Evaluation.

Biotoxicity Testing has shown the zinc additive to be highly toxic. Current treatment vendors have been requested to evaluate the additives in current and alternate treatment scenarios. Engineering assistance has been requested to help direct in-plant studies by vendors of alternate treatment scenarios and other related projects.

- Monthly Chronic Biotoxicity Testing.

Chronic testing shows the effluent to be "statistically significantly different" for the mortality and growth or weight gain criteria required by the EPA for our critical dilution, 76% effluent. The dilution at which no significant difference occurs has been at 26% or less. The R&D Biotoxicity Study Team is developing toxicity data for trace metals in the Vista effluent stream. Preliminary results are in agreement with data found in the EPA "Gold Book." Additional verification tests are in progress which should be completed by mid-March after which R & D will be able to provide ongoing assistance in evaluating biotoxicity problems associated with potential operational/engineering changes.

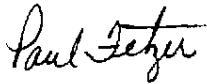
- Toxic Identification Evaluation.

The TIE study initiated in January continues. Preliminary information on four samples was discussed in a conference call on February 15. Pressure filtration and treatment through a C₁₈ column effectively reduces the toxicity. Testing on six additional samples will be conducted prior to the next conference call scheduled for March 30.

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The first draft of the TIE/TRE Plan has been received from Battelle and will be reviewed by the LCCC Biotoxicity Team during March.

Project timing is on schedule, but costs are slightly above the projected amount due to the early start on testing. Overall project costs are still on budget. Please refer to the attached figures on cost and project timing.



Paul Fetzer
LCCC Biotoxicity Team Leader

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Cooling Tower Study

Data developed by the LCCC Biototoxicity Team has indicated that all cooling tower waters exhibited toxicity. The forty-eight hour LC₅₀ data for these water samples ranged from 35 to >100. As all the cooling towers were using a zinc treatment, the additives used in the VCM Plant Cooling Tower were tested. The testing showed the zinc additive to be the main source of biotoxicity.

The current Cooling Tower treatment vendors, Drew Chemical and Nalco, were contacted and urged to begin chronic biotoxicity testing of their additives in order to reduce the toxicity. A potential cooling tower treatment vendor, Dearborn, a subsidiary of W. R. Grace, has initiated testing in preparation for conducting a comparative treatment study. The initial testing of their treatment chemicals showed toxicity, although the test data was erratic. The treatment chemicals were reformulated and retested. We are currently awaiting these results. The VCM Plant well water was tested at this same time for comparative purposes.

The LCCC Biototoxicity team decided the plant evaluation studies of various cooling tower treatments were outside the team's original scope and have requested Process Engineering assistance. A letter from the team, authored by Tom Heller, to C. R. Watson dated February 14, 1990 requested this engineering effort as it was our understanding that such engineering work would be included under the general umbrella of the LCCC Waste Water Project.

Section 308 Biototoxicity Testing

The chronic biotoxicity testing is scheduled to continue through July 1990. To date, the plant effluent has not met the "no significant statistical differences" criteria for survival on growth and reproduction as defined by the EPA for the 76% effluent dilution, the critical effluent dilution, as specified by the EPA. The dilution at which Vista shows "no significant difference" for both test species, ceriodaphnia and fathead minnow, has been at or less than 26%.

The test data for January is shown below.

<u>Ceriodaphnia</u>	NOEL Survival - 26% Effluent
	NOEL Reproduction - <13% Effluent
<u>Fathead minnow</u>	NOEL Survival - 26% Effluent
	Noel Weight - 26% Effluent

TIE Project

The Toxic Identification Study (TIE) was initiated in January following a day long meeting with the contractor, Battelle, to acquaint their personnel with the operations of the various plants within the Lake Charles Chemical Complex. All necessary background information requested by the contractor was provided. As indicated on the attached TIE Project Schedule, Task I and II were to begin immediately with testing to begin the last of January. The initial testing began January 15.

The first conference call with Battelle was held February 16. Samples results from testing conducted January 15 through February 4 were discussed.

Task I Items

The projects as outlined in the TIE proposal have been completed as scheduled with the exception of the correlation work. However, the background analytical data submitted for the correlation work has been used to guide evaluation studies.

Task II Items

The TIE/TRE Plan has been completed on schedule. The plan should be received by Vista the week of February 19. The proposed TRE will be circulated to all pertinent environmental personnel prior to a joint review of the plan. Complete review by Vista and rewriting should be completed by May 1.

Task III and Task IV Items

The toxicity testing has been initiated. Chronic biotoxicity testing conducted with the first sample and subsequent acute testing on the remaining samples shows the ceriodaphnia to be most sensitive test specie to toxicity.

Acute toxicity unit data, TU_a , (a toxicity unit is defined as being the numerical value obtained by dividing 100 by the 48 hour LC_{50} value) shows the effluent to be highly variable. The toxicity unit values ranged from 2 to >14. At the suggestion of our consultant, a lower test dilution will be used by Battelle to help define the actual value of the toxicity units.

Preliminary information from the TIE study shows little toxicity due to volatile organics. Both pressure filtration and treatment with a C_{18} resin cartridge

effectively reduced the toxicity unit by 50%. Limited testing has indicated cations are significantly contributing to the toxicity units.

The residual toxicity, 1 TU_a, of the effluent after treatment may result from the dissolved salts. Initial testing with a synthetic salt solution, the composition of which is based on historical data of Vista's effluent, shows toxicity units of near 2. Additional testing must be completed before reaching any decision.

Six additional samples are scheduled for testing before the next phone conference set for March 30.

An outline showing the TIE treatment and resulting TU_a data is as follows:

SUMMARY OF TIE TEST RESULTS

<u>Test Sequence</u>	<u>Range of TU_a</u>	<u>% Reduction</u>
Raw untreated effluent	2.1 to >14.3	--
Raw --> PF (Pressure Filtration)	1.3 to 7.9	45%
Raw --> PF --> C18 (resin)	0.6 to 1.8	4% to 43%
Raw --> PF --> Chelex	No Further Improvement	--
Raw --> Aerated	4.4 to >14.3	--
Raw + Thiosulfate	2.6 to >14.3	--
Raw + EDTA added at Hardness Equivalent	4.4 to >14.3	--
Raw + EDTA added at 1/10 of Hardness Equivalent	1.6 to 9.76	30%
Raw --> plus 1 pH Unit	Slight increase	--
Raw --> minus 1 pH	May not have any effect	--

Project Cost

Project cost and time scheduled for the TIE project are attached. Cost after one month is \$3000 over projected budget. The increase in cost is due to the testing beginning sooner than anticipated. The project is on schedule.