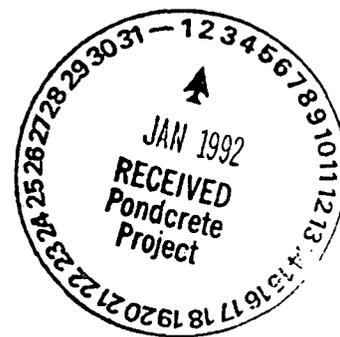




INTERNAL CORRESPONDENCE

TO: Don Brenneman
 FROM: Shaj Mathew
 DATE: December 31, 1991
 RE: **TREATABILITY STUDIES STATUS REPORT**



The following report summarizes some of the treatability studies activities currently underway:

1. POND 207C STUDIES

The following salient observations were made on the contents of Pond 207C: contents:

- The salts have an alkalinity (methyl orange) of approximately 300,000 mg/kg of CaCO_3 . The supernatant liquid has an alkalinity of approximately 150,000 mg/kg of CaCO_3 . This compares with a value of 61,000 mg/kg that I found in the waste characterization study.
- The salts do not exhibit the characteristic nitrate efflorescence which is predominant in all the surrogates prepared in Duncan even though the nitrate concentration is very high.
- In the process of heating and cooling saturated solutions of the salt in pond water, various phases were seen at various times including: material of a "snow-cone" consistency, thick emulsion, thin emulsion, hard crystals and clear solution. This tallies with observations made during sampling by Jack Templeton.
- The pH of Pond 207C salt/water available for the treatability study is abnormally high (11.25) compared with 10.1 observed during the waste characterization study and 9.5 mentioned in earlier communications.
- It was fairly difficult to remove all the free water when saturated solutions were dried overnight (110°C) for TDS measurements. The water on occasion was trapped under a hard crystalline surface in discrete pockets. In other cases, a mushy slurry remained mushy even after extended periods at 110°C .

Solubility Information

The supernatant solution at room temperature had a solids content of 44.4%. This

—The results presented in this memo, are meant for discussion purposes and are not intended to be a formal documentation of the treatability studies.—

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though, is not representative of the entire salt because only the most easily soluble salts could go into solution. The difference in the crystalline salt and the saturated solution is also evidenced by the fact that the nitrate concentration in the solution was 2.5 times that in the salt.

Lowering the temperature by 5°F did not make any observable solubility differences. However, an experiment is being conducted to measure the solubility at 55°F. The results however are delayed by the fact that the solution is not drying up easily enough for TOS measurements.

Heating the salt/solution at 110° for a certain length of time produced a "creamy emulsion."

Phase Transformation

The phase transformation described earlier, make Pond 207C crystals fairly difficult to characterize. I have observed that the same material at the same temperature can have drastically differing physical natures - from a "pudding" containing 62% solids to a solution having 45% solids. It was also observed that once the emulsion was formed, it was very difficult to dissolve the emulsion, even with excessive dilution.

Among all the methods attempted, the only successful method to get the solids completely dissolved was to lower the pH from 11.2 to 9.2. A considerable amount of acid had to be used to achieve this. This prompted the examination of the alkalinity of the salt/solution which was described earlier.

Buffering

*buffer 9.5 - 10.2
(11.1 -> 11.3)*

Titration curves were conducted with solutions of the Pond 207C salt (Figures 1 and 2). As can be seen in both curves, the system buffers twice - once at a pH of about 9.6 and again at a pH of about 6.

2. CEMENT/TRASH TESTS

Studies are being conducted to evaluate the appropriateness of trash addition into the cemented product as is envisioned in the present process concept. The following preliminary observations on the cement/trash formulations appear to indicate that the tests were successful.

- All the cylinders that were cast look good visually.

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- All the formulations withstood pressures upto 2000 psi after the 7-day accelerated cure.
- Both freeze/thaw and wet/dry samples look good
- The formulations with trash were more viscous during mixing. This made them more difficult to be deaerated. This is observable as poch-marks on the surface of the cylinders.

It has to be noted though that the approach will not be completely proven until the tests run to completion and the TCLP results are in.

3. BELT FILTER STUDIES

The previous status report did not include any hard numbers from the Roediger Belt Press study. The various %solids during the various phases of the study are summarized below:

	Initial % solids on sludge	% solids after gravity drain	% solids after hand belt press
1. 207A (untreated sludge - 250 mls 0.2% Praestol 644BC - 20 mls)	5.4	20.4	29.2
2. 207A (chlorinated) sludge - 250 mls 0.2% Praestol 644BC - 40 mls	5.4	29.1	36.0
3. 207B N/C/S (untreated) sludge - 250 mls 0.2% Praestol 644BC - 80 mls	9.5	14.1	21.0
4. 207B N/C/S (chlorinated) sludge- 250 mls 0.2% Praestol 644 BC - 80 mls	9.5	16.0	28.6

4. 30%/60% SOLIDS COMPARISON STUDY

A study was conducted to compare the product resulting from sludges with initial solids concentrations of 30% and 60%. The differing solids contents were obtained by

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conducting separate tests: one using belt filter and the other using Buchner filtration. The total final volume (after mixing with cement/flyash) of the sludge treated, using the belt filter method, was 25% lower than that obtained using the Buchner fund method. Unfortunately, both the casts, after a 48 hour 90-95° cure, were not strong enough.

The following table summarizes the tests:

BUCHNER FUNNEL TEST

Initial Sludge:

5000 mls having 11.7% solids

Experiment:

To above volume,

Lime 78g

Flyash 448g

Cement 234g was added. It was then subjected to Buchner Filtration under vacuum.

RESULTS

Product volume = 1800 mls

UCS testing:

Withstood pressures up to 5, 12 psi
after 2 day 95°F cure

Product composition (calculated)

Dry sludge	17.7%
Water	54.9%
Lime	2.3%
Flyash	13.5%
Cement	7.1%

BELT FILTER PRESS TEST

Initial Sludge:

5000 mls having 11.7% solids

Experiment:

To above volume, 1600 mls of 0.2% Praestol 644BC was added. The water was hand-squeezed out between fields of a belt filter cloth. The cake had 26.2% solids. The cake was mixed with

Lime 75g

Flyash 448g

Cement 236g

RESULTS

Product volume = 1500 mls

UCS testing:

Withstood pressures up to 91, 92 psi
after 2 day 95°F cure

Product Composition (calculated)

Dry sludge	25.6%
Water	41.2%
Lime	3.2%
Flyash	19.6%
Cement	10.3%