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Project

August 14, 1992

Mr. Don Ferrier
Project Manager
EG&G Rocky Flats, Inc.
P. O. Box 464
Room 121A
Golden, Colorado 80402-0464

Subject: Rocky Flats Plant Solar Evaporation Ponds Stabilization Project
[WBS 439C - C POND ERECTION - HALLIBURTON NUS ROCKY FLATS]
RF-HED-92-0511

Dear Mr. Ferrier:

A study was conducted in the Pittsburgh Laboratory to evaluate cold weather impacts on the C Pond Brine materials. Two observations resulted from the test:

- The Brine precipitated dissolved solids at about 32°F.
- Volume of the sample did not change until the liquid was cooled to -6°F.

This data in conjunction with general cold weather cementing criteria offer the following conclusions:

- Brine left in the systems during winter operations is not likely to exhibit expansive freezing which would have detrimental impacts on the equipment or piping systems.
- Precipitants are likely to occur at or near the freezing point of water which may change the pumping characteristics of the fluid at cold temperature.
- Upon warming of the brine, any precipitants from chilling will return to solution.

The minimum cementing temperature is 50°F for the incoming slurry. We conclude that the 50°F will not create problems pumping the slurry through the system. The current design of both process trains (A/B and C) is neither winterized nor has heating systems for warming incoming slurries. Our assessment is that neither processing system is well suited for operation during inclement weather conditions.

The following concerns exist for C Pond:

- All automatic valving on the batch tanks and averaging tanks are pneumatic valves. We do not have dryers on the air compressors to minimize moisture in the control systems.
- Many of the pipelines are only infrequently operated, allowing stagnant pipelines to freeze.
- Additional solids will precipitate in the pond as the water temperature in the pond is lowered, increasing the existing crystal layer.
- Infrequently operated fresh water systems exist at the 750 Pad and 207C Pond areas, providing opportunities for freezing and rupturing piping systems.

We have designed systems to blow pipelines "dry" to facilitate winterization procedures. The system will be drained starting at 207C Pond and the contents will be pumped to the 750 Pad for cementing prior to abandoning the process train during inclement weather. During cold weather, tanks could be agitated continuously to minimize stagnant water in the system. Fresh water will need to be drained from the system if inclement weather is anticipated to be more than overnight.

The following concerns exist for A/B Ponds:

- The Surge Tanks use gravity settling to consolidate and thicken sludges. Overnight settling is required to accomplish the required consolidation which would lead to freezing.
- Reclaim operations will require substantial personnel to work within the confines of the B South Pond. Heath & Safety work rules preclude personnel descending from the berms into the pond when wet or freezing conditions occur.
- The flocculant and chemical mixing equipment require 50°F to mix and work effectively.
- B Pond water and fresh water will freeze and expand at 32°F.
- The A/B Pond process would be difficult to heat because of the large volumes of materials in the two surge tanks (12,000 gallons each).
- Would need to raise the temperature to 50°F prior to cementing if the determination is made that processing will occur during cold weather periods.

We will be in a position to start SO Test for C Pond by September 4, 1992. The current SO Test DELIVERABLE (WBS 439A) should be performed within 3 weeks. We are still discussing the "Hot Test" portion of the SO Test prior to submission. As a minimum, 3 weeks will need to be scheduled to allow laboratory analysis to be completed to provide certification of the process. Currently the processing period for C Pond/Clarifier is 68 days (both single and double shift periods). Depending on the climate conditions this year, we can anticipate delays due to cold and/or rainy/snow periods which will have risks associated with freezing tanks and pipelines.

Recent discussions with S. DeWitt indicated that freeze protection is required in place at Rocky Flats Plant by November 1, 1992. We have not yet studied all the ramifications of complying with freeze protection criteria.

Please provide any comments or actions you require associated with winterizing either of the two process trains. These decisions will need to be made in the next week prior to HNUS fusing the outside secondary containment pipeline onto the overland pipeline.

I am attaching a letter from R. Simcik, HNUS Pittsburgh Lab, presenting laboratory results for C Pond Brine. If you would like to schedule any discussions, please advise.

Sincerely,

Ted A. Bittner
Project Manager

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INTERNAL CORRESPONDENCE

C-49-08-2-005

TO: TED BITTNER

DATE: AUGUST 4, 1992

FROM: ROB SIMCIK

cc: R. NINESTEEL
T. SNARE
M. SPERANZA
S. MATHEW

SUBJECT: ROCKY FLATS - FILE 2K68
TEMPERATURE TESTING FOR
207C POND WATER

Testing was conducted to evaluate the effect lower temperatures have on Pond 207C water. This information will prove to be important in the event the material is processed during the winter months.

The testing performed consisted of placing 1000 ml of 207C water (approximately 35% TDS, less than 1% TSS) in an ice bath to lower the temperature to approximately 45 degrees fahrenheit, then placing it into a freezer (-22°F) to further lower the temperature to minus 15 degrees fahrenheit. Physical observations of the sample were made to determine if there were any changes in volume, formation of salt crystals, formation of ice crystals, and/or viscosity variations.

The sample was kept in the freezer until it was frozen solid at which point it was removed and allowed to thaw at room temperature. Physical observations were again taken as the temperature increased toward ambient room temperature.

Table 1-1 lists the observations made at various temperatures. The time when the temperatures were taken are also listed to show the rate at which the temperature will change.

It was observed that a precipitate forms around the freezing point of water (32°F). It is difficult to distinguish between salt and ice crystals. The precipitate was located on the bottom which indicates a higher density material than the original solution, thus indicating it is most likely a salt crystal formation. As the temperature decreased the amount of precipitate increased. At the lower temperatures, it is likely the precipitate is a combination of both salt and ice crystal.

RS/pam

TABLE 1-1

FREEZING TEST OF 207C

Time	Temperature	Observations
7/30/92, 10:00 am	67°F	Sample at room temperature. No crystals or precipitate observed. Clear yellow liquid. Very Low TSS.
7/30/92, 10:10 am	59°F	Ice bath. No visible change.
7/30/92, 10:30 am	52°F	Ice bath. No visible change.
7/30/92, 11:00 am	45°F	Ice bath. No visible change.
7/30/92, 11:05 am	42°F	Freezer. No visible change.
7/30/92, 11:20 am	40°F	Freezer. No visible change.
7/30/92, 11:50 am	35°F	Freezer. No visible change.
7/30/92, Time Unknown	32°F	Freezer. At this point a precipitate formed. Very small (pin head) round crystals, could be salt or ice crystal.
7/30/92, 12:45 pm	30°F	Freezer. 200 to 250 ml of slurry precipitate formed on bottom. No volume change. Cannot tell if precipitated crystals are salt or ice. Crystals are clear white.
7/30/92, 1:15 pm	25°F	Freezer. About 300 ml of slurry precipitate at bottom of beaker. No change in free liquid on top, still clear and of same consistency.
7/30/92, 1:45 pm	21°F	Freezer. Much denser formation on bottom 300 ml. No formation on top. No change in volume.
7/30/92, 2:20 pm	20°F	Freezer. The bottom half of the sample was a slurry precipitate. Solution on top was clear. Closer to the bottom the slurry gets denser.

7/30/92, 4:00 pm	11°F	Freezer. Bottom 3/4 of sample was a slurry precipitate. Top 1/4 was clear solution. No layer formed on top. The slurry formation is getting denser, but not solid at this point.

Sample kept in freezer over night to freeze solid.

7/31/92, 8:00 am	-15°F	Removed from freezer and placed at room temperature. Most of the sample was frozen solid. A small amount of free liquid was present at the top of the sample (about 1/8"). Bottom 800 ml very hard and top 200 ml hard but slightly softer. The top 1/8" layer was slurried and had large flakes like ice on top. Volume increased slightly from 1000 ml to approximately 1010 ml.
7/31/92, 9:20 am	-6°F	Room temperature. Sample thawed around top outside edge 1/3 way in and about 1/2" down from top. Volume returned to original 1000 ml.
7/31/92, 10:45 am	16°F	Room temperature. Approximately half of the sample thawed. Bottom half of sample was a slurry and the top half was liquid.
7/31/92, 11:40 am	32°F	Room temperature. No change in sample. Still about half liquid and half slurry.
7/31/92, 1:00 pm	41°F	Room temperature. The top 2/3 of the sample thawed. Slurry on bottom 1/3 of sample.
7/31/92, 1:50 pm	46°F	Room temperature. No change in sample. Still about 2/3 thawed.

Sample stored at room temperature over weekend.

8/3/92, 6:30 am	66°F	Sample identical to starting point. No precipitate. No volume change.