BP CHEMICALS

BP Chemicals Inc.
Ft. Amanda Road
P.O. Box 628
Lima, Ohio 45802-0628
(419) 226-1200

VIA OVERNIGHT MAIL

Mr. Sam Nalluswami, Project Manager
Decommissioning and Regulatory Issues Branch
Division of Low-Level Waste Management and Decommissioning
Office of Nuclear Materials Safety and Safeguards
United States Nuclear Regulatory Commission
One White Flint North
11555 Rockville Road
Rockville, MD 20852

March 1, 1994

Re: Docket No. 040-07604
License No. SUB-908

Subject: Follow-up to January 24, 1994 Meeting

Dear Mr. Nalluswami:

On January 24, 1994, representatives of BP Chemicals (BPC) met with U.S. Nuclear Regulatory Commission personnel to discuss issues related to the ongoing mixed waste pond closure project at the BPC site in Lima, Ohio. In attendance at the meeting were John Austin, Tim Johnson and Sam Nalluswami of U.S. NRC, Larry Luckett of Dames & Moore, Barry Koh of B. Koh and Associates, and Hugh Blythe and William Rupert of BPC.

The meeting was held at the request of BPC to discuss activities planned by BPC for the mixed waste pond closure project in 1994 and to emphasize BPC's need to secure regulatory approvals in order to proceed with these activities. At the meeting, BPC submitted a report entitled "Radiological Status Survey of the V-1 Pond Site, Mixed Waste Pond Closure Project, BP Chemicals, Inc., Lima, Ohio." U.S. NRC representatives indicated that every effort would be made to schedule Oak Ridge Institute for Science and Education (ORISE) to the site in February for confirmatory survey work related to the release of V-1 pond and that it was possible for ORISE and U.S. NRC to complete all work and release the site for cell construction by the end of March 1994. (It is noted that U.S. NRC followed through with the first portion of this commitment by having ORISE visit the site to undertake field survey activities on February 23 through February 25. BPC was pleased with ORISE's efforts, especially considering the adverse weather conditions. BPC also appreciated the assistance and support given to ORISE by Mr. Ken Lambert of U.S. NRC Region III who visited the site on February 24.)

The meeting also discussed approval of the license amendment application to authorize onsite disposal. This application was originally submitted on August 15, 1991 and was revised and resubmitted on February 28, 1992. BPC indicated that a second revision to the document would be submitted in the near future. This second revision was needed because the work completed in 1993 to clean out V-1 pond resulted in the excavation of a larger volume of contaminated soil than had previously been planned for. For this reason and because of the limited capacities of the cells as originally designed, a redesign would be necessary. The redesign would enlarge the size of V-1 cell and would add a third cell to be located at the site of Burn Pond and Deepwell Pond. U.S.NRC representatives indicated that an effort would be made to process the revised application for approval in April 1994. (The revised application was subsequently submitted to U.S.NRC on February 10, 1994.)

During the January 24 meeting U.S. NRC representatives expressed a concern that the activity level of Burn Pond sludge as reported in the original submittal of the license amendment application exceeded the Option II limit of 300 pCi/g. The license amendment application reported that the specific activity of the sludge in Burn Pond was approximately 500 pCi/g on a dry weight basis. If this was representative of the stabilized sludge to be placed in the disposal cell, then an ALARA demonstration would need to be submitted and approved in order to allow onsite disposal. BPC indicated at the meeting that the Burn Pond sludge had recently undergone extensive resampling to verify its specific activity and that BPC would make the results available to U.S.NRC as soon as a report could be finalized. BPC also indicated that the 500 pCi/g activity did not take into account the reduction in activity realized as a consequence of the addition of reagents for sludge stabilization. Enclosed for the U.S. NRC's information is a copy of a report entitled "Summary of Radioactivity, Mixed Waste Pond Closure Project, BP Chemicals, Inc., Lima, Ohio." This report finds that the specific activity of the Burn Pond sludge is only 120 pCi/g after accounting for the moisture content and stabilization. Thus, the Burn Pond sludge qualifies for onsite disposal under Option II and an ALARA demonstration is unnecessary.

BPC is ready to respond to any other questions or concerns which arise as the U.S. NRC reviews the V-1 Pond release survey report and the revised license amendment application. We, along with our team of consultants, are available to visit Rockville and answer your questions. In fact, we suggest such a meeting be arranged at your convenience in the near future. At that time we would make a detailed presentation to the U.S. NRC on the various technical aspects of the project. We would be willing to discuss any topics related to the project, including the following:

- History and present status of the site
- Site-wide decommissioning strategy
- Site geology and hydrogeology
- Disposal cell design
- Pathway analysis
- Safety analysis report
- Health and safety plan
- Involvement of state and local agencies
- Schedule

We look forward to working closely with the U.S. NRC to complete the decommissioning of the BPC Lima site in the near future. In 1994 BPC hopes to construct its first disposal cell for use on the pond closure project. We also hope to stabilize all pond sludges and place them in this first cell in 1994. Finally, we hope to clean contaminated soil from the site of the second cell (Burn Pond and Deepwell Pond) and to perform all necessary release sampling prior to the end of 1994 so that we can secure release of this site from both Ohio EPA and U.S.NRC before the start of the 1995 construction season. These plans are aggressive but can be achieved with the cooperation of the U.S.NRC in promptly processing our V-1 release report and license amendment application.

If you have any questions or I can be of further assistance, please give me a call at 419/226-1299.

Sincerely,

W. M. Rupert, P.E.
Technical Specialist - Environmental

WMR:ll
cc: Ken Lambert - U.S. NRC - Region III
Jim Ottarson - Ohio EPA - NWDO
WMR94.SN0301B.doc

SUMMARY OF RADIOACTIVITY
MIXED WASTE POND CLOSURE PROJECT
BP CHEMICALS, INC.
LIMA, OHIO

1.0 INTRODUCTION

This report presents a summary of the radioactivity estimated to be in the contaminated sludges to be disposed of on site as part of the Mixed Waste Pond Closure Project at the BP Chemicals facility in Lima, Ohio. Sludges from four different ponds (Deepwell, Celite, Burn, and V-1 Ponds) will be processed, solidified, and placed into closure cells which meet RCRA requirements.

Currently, the V-1 sludge is in the northern half of the Deepwell Pond, the Deepwell and Celite sludges have been combined and are stored in the southern half of the Deepwell Pond, and the Burn Pond sludge is in the Burn Pond.

2.0 METHODS

The radioactivity concentrations presented in this report are based on the sludge dry density, adjusted to correspond to the sludge in-place bulk density, and further adjusted to account for density and volume increases due to sludge processing and solidification.

In order to estimate the activity concentration of the solidified sludges to be placed into the cells, the following information was used:

1. bulk density, moisture content, and activity concentration of the sludges
2. change in sludge density due to processing and solidification
3. change in sludge volume due to processing and solidification
4. total volume of sludges to be processed

2.1 BULK DENSITIES, MOISTURE CONTENT AND ACTIVITY CONCENTRATIONS

Seventy-five samples were collected from the sludges stored in the Deepwell and Burn Ponds: eighteen from the Deepwell/Celite Pond sludge; thirty-six from the Burn Pond sludge; and twenty-one from the V-1 Pond sludge. These samples were dried then analyzed using gamma-spectroscopy for uranium-238 by NUS Laboratory in Pittsburgh, Pennsylvania (ref. 1). The results reported are based on dry weight.

Bulk density and percent moisture content for representative samples of each sludge type were also measured by RUST Engineering (ref. 2).

The moisture content and bulk density information were used to calculate the dry densities of the sludges. The dry density and activity information were then used to calculate the total activity present in each sludge type.

2.2 CHANGE IN DENSITY DUE TO PROCESSING AND SOLIDIFICATION

Bench scale testing to determine the solidification reagents and the amounts to be used is being performed by RUST Engineering. To date, the solidification reagents being investigated are soil and gypsum. Although these reagents are unconventional, they are proposed for use for two reasons. First, conventional reagents (flyash, pozzolime, portland cement, etc.) all utilize hydroxide reactions to bond and stabilize. The presence of hydroxide elevates the pH to an alkaline range (>7.0). Because the BPC sludges all contain substantial concentrations of various ammonium compounds, the elevation in pH causes the ammonium to convert to ammonia which is liberated as an air emission. Not only does this cause a potential air emission problem for which control systems may be required, but the formation of the ammonia gas seems to disrupt the newly formed stabilized sludge matrix causing it to weaken over time, instead of strengthen over time. This is unacceptable to the Ohio EPA because the minimum compressive strength requirements cannot be met. It is anticipated that the use of gypsum and soil will result in sludge stabilization at a neutral pH so ammonia will not be formed.

The other advantage of using gypsum and soil is that the soil to be used is from the V-1 Pond and is considered radioactively contaminated. Thus, there will be a lesser quantity of purchased reagents required than if conventional stabilization reagents were used. This will conserve space in the disposal cells.

Partial results are available for the Deepwell/Celite and Burn Pond sludges. These results have been used in conjunction with information obtained during previous testing to estimate the final density of the solidified V-1 sludge, for which separate results are currently not available. The mixture being developed by RUST for the Deepwell/Celite and Burn Pond sludges will result in an estimated final density of the solidified sludge of approximately 1.75 g/cc. This estimated final density was also used for the V-1 solidified sludge.

2.3 CHANGE IN VOLUME DUE TO PROCESSING AND SOLIDIFICATION

The solidification process also increases the volume of the sludge. Volume increases have been estimated by RUST for the Deepwell/Celite and Burn Pond sludges. Using these percent increases, bulking factors were calculated. The bulking factor times the untreated sludge volume results in the estimated volume of the solidified material. The bulking factor for the V-1 sludge was estimated using the results for the Deepwell/Celite and Burn Pond sludges combined with information from the past solidification studies. The estimated percent volume increase and bulking factors are listed in the following table:

SLUDGE SOURCE	PERCENT VOLUME INCREASE	BULKING FACTOR
Deepwell/Celite Ponds	145	2.45
Burn Pond	98	1.98
V-1 Pond	100	2.00

2.4 TOTAL VOLUME OF SLUDGE TO BE PROCESSED

The estimated total volumes of sludge stored in the Deepwell and Burn Ponds, as well as the calculated volumes of solidified sludge to be placed into the closure cells, are listed in the following table. The volumes of solidified sludges are calculated using the respective bulking factors given in Section 2.3 as follows:

Final Solidified Sludge Volume = (In-place Sludge Volume) x (Bulking Factor)

SOURCE POND	IN-PLACE SLUDGE VOLUME (cc)	BULKING FACTOR	FINAL SOLIDIFIED SLUDGE VOLUME (cc)
Deepwell & Celite	4.86×10^{9}	2.45	1.19×10^{10}
Burn	1.13×10^{10}	1.98	2.24×10^{10}
V-1	7.57×10^{9}	2.00	1.51×10^{10}

3.0 RESULTS

Because solidification of the sludge increases the density and volume of the material, the final average activity concentration decreases. The average activity concentrations of the solidified sludge placed into the cells were calculated to reflect these increases in volume and density.

3.1 ACTIVITIES BASED ON DRY DENSITY

The average values for the activity concentrations, measured moisture contents, measured bulk densities and calculated dry densities, are summarized below:

SOURCE POND	AVERAGE DRY WEIGHT ACTIVITY CONCENTRATION (pCi/G)	BULK DENSITIES (g/cc)	MOISTURE CONTENT (%)	DRY DENSITIES (g/cc)
Deepwell & Celite	220	1.55	31	1.06
Burn	669	1.35	53	0.62
V-1	140	1.20	46	0.65

The following table presents the calculated total sludge dry weights and the calculated total activity for each pond sludge. The calculations are based on the following equations:

Total Sludge Dry Weight = (Dry Density) x (In-place Sludge Volume)

Total Activity = (Total Sludge Dry Weight) x (Average Activity Concentration)

SOURCE POND	TOTAL SLUDGE DRY WEIGHT (g)	TOTAL ACTIVITY (Ci)
Deepwell & Celite	5.15×10^9	1.13
Burn	7.01×10^9	4.69
V-1	4.92×10^9	0.69

3.2 ACTIVITIES BASED ON EXISTING IN-PLACE BULK AND SOLIDIFIED DENSITIES

Since soil removed from the V-1 Pond area is to be used as a solidification reagent, the amount of radioactivity contained in the soil needs to be added to the total activity from the sludge. The following table presents the amount of total activity anticipated from the soil as a reagent, the amount of total activity from the sludges, and their combined total.

SOURCE POND	TOTAL ACTIVITY FROM SOIL (reagent) (Ci)*	TOTAL ACTIVITY FROM SLUDGE (Ci)	COMBINED TOTAL ACTIVITY (Ci)
Deepwell & Celite	0.02	1.13	1.15
Burn	0.05	4.69	4.74
V-1	0.03	0.69	0.72

*The total activities for the soil are based on 3 pCi/g activity concentrations, and the total amount of activity added to the sludge is directly proportional to the amount of soil added as a reagent.

The following table summarizes the total in place bulk weight of the sludges to be solidified, the total weight of the sludges after solidification, the total activity in each pond sludge, and the calculated average activity concentration of the sludges before and after solidification. The calculated average activity concentration is calculated as follows:

Calculated Average Activity Concentration = (Total Activity) / (Total Weight)

SOURCE POND	TOTAL BULK WEIGHT OF UNPROCESSED SLUDGE (g)	TOTAL WEIGHT OF SOLIDIFIED SLUDGE (g)	TOTAL ACTIVITY OF SLUDGES (Ci)	CALCULATED AVERAGE ACTIVITY CONCENTRATION OF UNPROCESSED SLUDGE (pCi/g)	TOTAL COMBINED ACTIVITY (Ci)	CALCULATED AVERAGE ACTIVITY CONCENTRATION OF SOLIDIFIED SLUDGE (pCi/g)
Deepwell & Celite	7.78×10^9	2.08×10^{10}	1.13	146	1.15	55
Burn	1.58×10^{10}	3.92×10^{10}	4.69	297	4.74	120
V-1	9.08×10^9	2.65×10^{10}	0.69	76	0.72	27

As seen from the above table, the highest estimated average activity concentration for the solidified sludge to be placed into the closure cells is 120 pCi/g.

4.0 REFERENCES

1. NUS Analytical Data, Gamma Spectroscopy (U-338), Deepwell/Celite, Burn and V-1 Pond Sludges, January 13, 1994.

2. Fax To: Britt Quinby (Dames & Moore), From: Jesse Conner, (Rust Clemson Technical Center), BP Lima Physical Test Results to Date, February 4, 1994.