August 16, 2002

Ben Baker
Project Manager
The Dow Chemical Company
9008 Bldg., Office 154
4520 East Ashman
Midland, MI 48674

SUBJECT: REVIEW OF FINAL STATUS SURVEY REPORTS FOR THE PREVIOUSLY REMEDIATED AREAS VA-I THROUGH VA-VI, DOW CHEMICAL COMPANY's BAY CITY, MI, SDMP SITE (TAC# L60463)

Dear Mr. Baker:

The Nuclear Regulatory Commission (NRC) staff has completed the review of the Final Status Survey (FSS) Reports for the six (6) previously remediated areas, (July 1997 to June 1999), at Dow Chemical Company's (Dow's) Site Decommissioning Management Plan (SDMP) site in Bay City, MI. The NRC staff review was supplemented by the Oak Ridge Institute for Science and Education (ORISE) staff review. The areas are numbered as Verification Area (VA) VA-I through VA-VI. Based on the independent review by the NRC and the ORISE staff, the FSS Reports do not adequately demonstrate that the FSS was conducted in accordance with the approved decommissioning plan and the guidance in NUREG/CR-5849. In addition, the reports need to be revised to be complete and consistent with each other.

The deficiencies are included in the enclosure to this letter. These deficiencies need to be completely addressed and the FSS Reports revised before releasing the six (6) VAs (VA-I through VA-VI) for unrestricted use. Furthermore, your basis for demonstrating compliance with the release criteria cannot rely on the independent findings or activities specific to "in-process" inspections performed at the site by the NRC staff. If you previously submitted revised reports after completion of NRC's confirmatory surveys, please provide the dates and indicate whether the reports were sent to NRC Headquarters and/or Region III. We request your response within 45 days from the date of this letter.

If you have any questions concerning this letter, please contact me at (301) 415-6694.

Sincerely,

/RA/

M. (Sam) Nalluswami, Project Manager
Facilities Decommissioning Section
Decommissioning Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure:
As stated

cc: D. Minnar, MDEQ

Docket No.: 040-00017
License No.: STB-527

If you have any questions concerning this letter, please contact me at (301) 415-6694.

Sincerely,

/RA/

M. (Sam) Nalluswami, Project Manager
Facilities Decommissioning Section
Decommissioning Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure:
As stated

cc: D. Minnar, MDEQ

Docket No.: 040-00017
License No.: STB-527

AN:

This document should / X / should not / / be made available to the PUBLIC SMN 07/ /02

DISTRIBUTION:
File Center
NMSS r/f
C.Miller, RIII
E.Kulzer, RIII
L.Camper
W.Reamer
M.Rothschild

DOCUMENT NAME: S:\DWM\DCB\SMN\DOW Prev1.wpd

*Concurred via e-mail 8/12/02

OFC	DCB	DCB	DCB	*RIII	DCB
NAME	S.Nalluswami	C.Burkhalter	S.Schneider	B.Jorgensen	C.Craig
DATE	08/14/02	08/14/02	08/ 14/02	08/ 12 /02	08/16 /02

OFFICIAL RECORD COPY

REVIEW OF FINAL STATUS SURVEY REPORTS FOR
VERIFICATION AREAS VA-I THROUGH VA-VI

THE DOW CHEMICAL COMPANY'S
BAY CITY, MICHIGAN FACILITY

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the final status survey reports (FSSRs) for Verification Areas (VAs) VA-I through VA-VI and determined that they do not adequately demonstrate compliance with the release criteria. Of greatest concern, is that the FSSRs reviewed for VA-II through VA-VI were submitted prior to NRC confirmatory surveys which found locations of non-compliance in each of these areas (see Table 1). Since it appears these FSSRs have not been revised to include and assess subsequent results from the re-conduct of the final status survey, staff cannot confirm their conclusions. Furthermore, the basis for demonstrating compliance with the release criteria cannot rely on the independent findings or activities specific to "in-process" inspections performed at the site by the NRC staff. NRC's contractor responsible for evaluating FSSRs has also reviewed all six reports and concluded that the information provided to NRC is incomplete and inconsistent between reports. In order to avoid misunderstanding of how the site specific release criteria were developed and applied, the FSSRs need to provide further explanation on this topic.

These and other related issues that require resolution before NRC can approve these areas for unrestricted release are discussed below.

General Comments

1. The decommissioning and decontamination efforts of the magnesium-thorium slag storage area have been performed in part with the NUREG/CR-5849 guidance document. In some cases this guidance appears not to have been followed. Additionally several concerns were identified such as the contradictory statements between the report text and the data presented. For example, page 11 of the report for Verification Area VA-VI states "since none of the verification soil sample concentrations exceeded the guideline values (no hot spots), it was not necessary to apply averaging techniques in any of the grids." However, in reviewing the residual soil activity results, numerous individual samples were identified in the various verification area reports, that exceeded the stated gross activity guideline of 14.5 pCi/g total thorium and/or the unity rule. Therefore staff recommends that the reports be revised to clearly document in the data table that the 100 m^2 average activity levels satisfy the guideline and unity rule.

2. The reports are not clear as to how each thorium isotope concentration was quantified. The procedures state that Th-232 was analyzed in the field using a NaI detector coupled to an MCA and that final verification soil samples were subjected to gamma and alpha analyses in Dow's Freeport, Texas laboratory. Additionally, 10 percent of the samples were shipped off-site to a contract laboratory for quality assurance analysis. The reports need to explain how the Th-228 and Th-230 concentrations were inferred and reference the applicable procedures and documents.

3. NRC staff performed confirmatory surveys on all six of the verification areas promptly after the licensee had completed the final status survey for each area. Based on these confirmatory surveys, only Verification Area VA-I was initially found to comply with the release criteria. All of the other verification areas (i.e., VA-II to VA-VI) were found to

have locations that contained radioactive material exceeding the release criteria. (Note that NRC performed a follow-up confirmatory survey only in VA-II.) Although these locations were subsequently remediated by the licensee, it appears the FSSRs reviewed have not been revised to include the findings of the NRC confirmatory surveys nor do they indicate that the final status surveys and analyses were redone to verify release-criteria compliance. Table 1 shows that the FSSRs predate the confirmatory surveys. In the case of VA-III, the FSSR was revised after the confirmatory survey identified slag exceeding the release criteria; however, the revision addressed only the relabeling of subgrids. Staff concludes that until these FSSRs are revised to include data and analyses for final status surveys conducted after the NRC confirmatory surveys, the information provided is incomplete for demonstrating compliance with the release criteria. If revised reports were submitted after completion of NRC's confirmatory surveys, please provide the dates and indicate whether the reports were sent to NRC Headquarters and/or Region III.

4. In general, the FSSRs do not discuss surface scan findings, i.e., what were the range of readings or did the surface scans identify any hot spots during the final status survey and were those hot spots remediated (with location specified) before the FSSRs were issued?

5. In general, the FSSRs did not summarize the results of preliminary surveys, such as scoping, characterization, and remedial action surveys. Also, no discussion was provided on how remedial action survey data was carried forward and integrated with the final status survey data analysis to demonstrate compliance with the release criteria.

6. The FSSR format and content is inconsistent between the six reports reviewed. The reports need to be revised to be complete and consistent with the requirements in the decommissioning plan, all subsequently NRC approved revisions and correspondence, and all guidance incorporated by reference (e.g., NUREG/CR-5849).

Specific Comments

1. For each FSSR, a map of the appropriate verification area was provided. Furthermore, each grid is comprised of nine subgrids. The tables for final verification soil concentrations indicate only one sample per subgrid (about 10 m x 10 m). Under NUREG/CR-5849 guidance, four systematic soil samples are collected per subgrid during the FSS to satisfy the average guideline. However, the approved decommissioning plan specifies that for the remedial action surveys nine soils samples will be composited into one sample per subgrid. The FSSRs need to clearly explain how the remedial action survey was conducted and the data integrated with the final status survey. It appears that the FSSs for Verification Areas VA-I, VA-II, VA-III, and VA-IV were based on one composite sample per subgrid (i.e., just the results of the remedial action surveys), whereas, four samples (without compositing) were taken in VA-V and VA-VI. Only, the latter follows the guidance in NUREG/CR-5849. In addition, to clarify how the final status survey was performed, each report needs to include an example figure of a subgrid with the sampling locations shown.

2. The survey unit maps also indicate specific areas called “excavation limit.” The FSSRs need to explain this term and explain any impacts that these areas had on the conduct of the final status survey (e.g., VA-III).

3. For Verification Areas VA-I to VA-VI, the FSSRs explain that the 30 background soil sample locations are shown in the “background sample” figure. However, the figures show only background sample locations 1 through 25.

4. For the VA-I and VA-II FSSRs, the final verification soil concentration data (Tables A3 (a) and (b)) does not indicate the analytical technique used to determine the isotopic thorium concentrations. A footnote needs to be provided that summarizes this technique with reference to the appropriate procedural document.

5. The FSSR for Verification Area VA-III does not contain a Section 3. Section 3 in the other reports discusses the survey procedure methodology. Also, this FSSR does not include a section on surface scans.

6. The FSSR for Verification Area VA-IV contains several subgrids with final verification soil concentrations in excess of the release criteria (i.e., K4-9, K5-7, and K5-8). Regarding these subgrids, the report contains no information on satisfying the area weighted average over $100m^2$ or the hot spot criteria. In addition, no summary statistics were provided for the final status survey.

7. The footnote to Table 4-4, Final Verification Soil Concentrations, in the FSSRs for Verification Areas VA-V and VA-VI, contains factors of 1.63 to convert concentrations of Th-232 to Th-230 and 0.94 to convert Th-232 to Th-228. How these factors were derived needs to be explained. Also, these factors do not appear to be consistent with the factors used to determine the thorium soil concentrations for Verification Areas VA-I through VA-IV. Finally, there needs to be a discussion in each report on the derivation of the site specific thorium release criteria of 14.5 pCi/g. Relevant reference information is provided in the Decommissioning Plan Supplement (December 1996) and the Dow Response to Comments in NRC Letter of February 5, 1996 (March 1996).

8. Section 3.1 Survey Objectives of the FSSRs for Verification Areas VA-I and VA-II, states “The entire Bay City storage area (affected area) is treated as a single survey unit, and the 95% level of confidence will be applied to the entire survey unit. While the residual concentration values are being provided for individual VAs for convenience of the final validation, the 95% level of confidence will be demonstrated on for the entire site (survey unit) upon completion of the project.” The licensee needs to explain how the statistical test (i.e., *t* test) will be done, since some of the final status surveys involved sample compositing while others did not. Also, it needs to be explained how FSS data from the yet to be remediated area will be considered in this statistical analysis.

9. A list of specific references was not provided in any of the FSSRs.

Table 1. RESULTS OF NRC CONFIRMATORY SURVEYS AND FINAL STATUS SURVEY REPORT REVIEWS FOR VERIFICATION AREAS (VA) VA-I THROUGH VA-VI

Verification Area (VA)	DOW Final Status Survey Report (Date)	NRC Confirmatory Survey (Date)	NRC Comments
VA-I	07/15/97	07/24/97 - 07/25/97	Confirmatory survey finds that VA-I meets the release criteria. Content of the final status survey report (FSSR), including procedures and data, is incomplete.
VA-II	07/15/97	07/24/97- 07/25/97 10/28/97 - 10/29/97 (Follow-up Survey)	Confirmatory survey finds many areas to be well above background. Readings at contact ranged from 25 to 50 kCPM about 5 to10x background (scan). Exposure rates at one meter ranged 15 to 20 µR. Follow-up confirmatory survey finds that VA-II meets the release criteria. Content of the FSSR, including procedures and data, is incomplete. FSSR needs to be revised to discuss the findings of the re-conduct/analysis of the FSS (I.e., post NRC confirmatory survey).
VA-III	10/14/97 11/20/97 (Amended)	10/28/97 - 10/29/97	Confirmatory survey finds contaminated slag that exceeds the release criteria. Amended FSSR explains correction to relabel subgrids. No mention of the confirmatory survey finding elevated material. Content of the FSSR, including procedures and data, is incomplete. FSSR needs to be revised to discuss the findings of the re-conduct/analysis of the FSS (I.e., post NRC confirmatory survey).

Table 1. RESULTS OF NRC CONFIRMATORY SURVEYS AND FINAL STATUS SURVEY REPORT REVIEWS FOR VERIFICATION AREAS (VA) VA-I THROUGH VA-VI (Continued)

Verification Area (VA)	DOW Final Status Survey Report (Date)	NRC Confirmatory Survey (Date)	NRC Comments
VA-IV	09/21/98	09/29/98 - 10/01/98	Confirmatory survey finds 18 individual locations with activity levels above 3x background (NaI scans). Scans in Grids J-5-6, which were under water up to 8-feet deep, indicated some activity levels above 3x background. (Licensee to remediate grids and surrounding areas, and resubmit the final survey results.) Content of the FSSR, including procedures and data, is incomplete. FSSR needs to be revised to discuss the findings of the re-conduct/analysis of the FSS (I.e., post NRC confirmatory survey).
VA-V	12/01/98	12/08/98 - 12/09/98	Confirmatory survey finds 10 locations with activity levels above 3x background (NaI scans). Content of the FSSR, including procedures and data, is incomplete. FSSR needs to be revised to discuss the findings of the re-conduct/analysis of the FSS (I.e., post NRC confirmatory survey).
VA-VI	06/22/99	07/13/99 - 0714/99	Confirmatory survey finds that Grids H-7-8-9, G-7-8-9, and I-7 have radiation levels in various locations which exceed 3x background (NaI scans). Content of the FSSR, including procedures and data, is incomplete. FSSR needs to be revised to discuss the findings of the re-conduct/analysis of the FSS (I.e., post NRC confirmatory survey).