RESPONSE TO DOE COMMENTS TO SRA'S EXECUTIVE SUMMARY OF RADIATION SURVEYS PERFORMED AT ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

DOE Comment:

1 *The Shonka Executive Summary suggests the need for "a search of historical records to establish that the placement of the tile floor preceded use of the building or that the floor was not placed specifically to control contamination from a historical incident or spill" (See page 12, 2nd paragraph) This issue is the possibility of tile being installed as shielding for a spill of radioactive material in the past Where is the result for this search presented?*

SRA partial response

During the survey, we observed that the location of the contamination fell on a crack between where floor tiles would have been (the mastic that remained and a line on the floor was the visual clue used to reach this conclusion) It would seem that this indicates the contamination fell on top of the floor tiles and leaked down to the underlying concrete It is not as likely, in our opinion, that the floor tiles were placed over contamination As an aside, this would occur not for shielding but as a means to control the contamination If this were the case (tiles cover up old spill), we believe that we would have found more than just the one spot One spot on a line where two tiles meet indicates that the source of contamination was likely on top of the tiles We just wrote that sentence to make this observation for your attention SRA was not funded and was not in a position to perform a historical site assessment (HSA, from MARSSIM terminology) If there had been a historical spill, then citrosol or another approved solvent could have been used to dissolve the mastic and survey the underlying concrete The mastic that remained on the floor following tile removal would have stopped all alpha radiation SRA assumes that RFETS staff can assert that there were no major incidents or spills prior to placement of the floor, and that there was no need to remove the mastic

RMRS Radiological Engineering Response:

At the start of the Building 123 D&D Project, a Historical Site Assessment was performed to identify potential areas of concern The results of this "search" are detailed in the Close-Out Radiological Survey Plan for the 123 Cluster, RF/RMRS-97-110, Section 4 1 Identifying the Potential for Residual Radioactivity and Contaminants of Concern

DOE Comment:

2 *The Shonka Executive Summary raises the question of bias introduced because of*
A elevation of the idealized calibration source above the surface, and
B *failure to account for surface roughness,*
(See pg 19, full paragraph) What process was used to deal with these concerns?

SRA Response:

Our statement was directed to respond to verbal comments by RFETS observers during survey activities at Building 123 There were areas of the floor that had been subjected to decontamination by needle gun, a process that left a very rough and irregular surface Large area detectors that were used by SRA do not conform to the rough surface as well as small (hand-held) probes It is our understanding that RFETS staff elected to re-survey areas where the SCM would have not been able to assure that the detector window was in close proximity to the surface SRA staff also performed a survey of these areas using conventional instruments and found nothing SRA walked down the area with RFETS Staff discussing this issue, and we believe that a good understanding was obtained

As far as I know, no one addresses either (A) source height or (B) roughness explicitly There are no DOE, ANSI or other industry guidance documents on how to make such corrections The closest reference I can find is NUREG-1507, which addresses factors that affect surveys and limits of detection The NUREG-1507 data indicates that there might be slight derating of our asserted detection limits to account for calibration source height (versus surface monitored), however, since we performed at levels well below the requirements, I don't think this impacts the conclusions we reach In my opinion, this would remain true even if RFETS RCTs had not re-surveyed the rough areas

RMRS Radiological Engineering Response:

To assure compliance with 10 CFR 835 401, survey technology used at Rocky Flats Environmental Technology Site for radiological control purposes is tested and qualified by the central Radiological Engineering group The Shonka Research Associates, Inc and Millennium Services, Inc is no exception The testing and qualification of this system has been included in the Close-Out Radiological Survey Report 123 Cluster, dated 8/31/98, Refer to Qualification of SRA/Millennium Services, Inc Data for Use in Building 123 Final Surveys – RLM-004-98 It should be noted that the "bias" Shonka refers to is not unique to the Shonka equipment, but is the same "bias" that Site's contamination survey instrumentation experiences in the field

DOE Comment:

3 *The Shonka Executive Summary states (for the north and east wings) that a single 100 cm^2 area was identified where the contamination identified was in excess of the maximum contamination limit using the primary detector, and five using the recount detector*

SRA Response:

Comment number three raises several separate issues Each one will be addressed independently in the following text

Paragraph 3 of Section 5 2 of the Executive Summary actually identifies two blocks associated with the primary detector that had contamination in excess of the maximum contamination limit Only a single square meter was identified as exceeding the maximum limit in both the primary and recount detectors

Then Table 5 1 presents the results of the survey The Survey Area RF12306A has a reading of 305 dpm/100 cm^2 yet there is no entry in the column entitled "No exceeding 100 cm^2 limit,"

SRA Response:

The release criteria for alpha was 300 dpm/100 cm^2 above background The values reported in the "Highest 100 cm^2 Area" column of the table are gross dpa and include background When considering whether a grid exceeds the 100 cm^2 limit, the appropriate background, as identified in Section 3 of the executive summary, is subtracted from the gross dpa To alleviate confusion, future survey summary tables will include a column denoting the background for each survey area

and Survey Area RF12312A has an entry in that column even though the "Highest 100 cm^2 Area" is shown as 162

SRA Response:

Survey Areas RF12312A (Primary) and RF12313A (Recount) are both incorrectly identified as having grids exceeding the 100 cm^2 limit in Rev 0 of the Executive Summary During the initial review of the draft report a QA problem was identified with survey areas 12-14 The surveys were corrected and re-entered into SIMS The tables in the Executive Summary (Rev 0) are not automated and require manual entry As a result of a clerical error the "Highest 100 cm^2 Area" column was updated correctly, however, the "No exceeding 100 cm^2 limit" was not updated

A revision to the report will be issued (Rev 1) that will correct the "No exceeding 100 cm^2 limit" column Also the text in Paragraph 3 of Section 5 2 will be changed to reflect

the modifications to the table Please inform SRA how to transmit the revised report to RFETS

RMRS Radiological Engineering Response:

It appears that there is an error in Table 5 1, RF12312A (Primary Detector Highest 100 cm^2 Area 162) and RF12313A (Recount Detector Highest 100 cm^2 Area 117), should not indicate a "1 " In the "No exceeding 100 cm^2 limit" block This comment has been directed to SRA Regarding the RF12306A reading of 305 dpm/100 cm^2, this value includes background, after subtracting background this value is below the release criteria In addition, it should be noted that a transcription error had occurred in survey units RF12301A through RF12311A A background value of 20 dpa was applied in lieu of 10 dpa This correction will be made in Revision 1

DOE Comment:

4 *Table 5 2 is a tabulation of information for the areas resurveyed Apparently the decision was made to resurvey all areas with excedences regardless of which counter identified them I note three items*

A Survey Area RF12313A was identified in Table 5 1 but is omitted from Table 5 2 Was it resurveyed? _

SRA Response:

RF12313A was incorrectly identified in the table (See Question #3)

RMRS Radiological Engineering Response:

Pertaining to comment 4A An apparent error in Table 5 1 included RF12313A, this grid was not resurveyed

DOE Comment:

B *If the Shonka is superior to the use of hand-held instrumentation, as stated in the Shonka Executive Summary, pg 4, then why was the resurvey performed with manual instrumentation when "the (Shonka) system has reported data at levels far below the capabilities of previous measurements"?*

SRA Response:

The Surface Contamination Monitor (SCM) used in the survey logs data The data is processed by the Survey Information Management System (SIMS) at a later time The crew would have to stop survey work and re-deploy the SCM back to the area that had been surveyed to study an area found with SIMS to be at or near the limits There are two limits, <u>average</u> and <u>maximum</u> The SCM/SIMS takes 400 each (25 cm^2) measurements (that are called pixels) per square meter, with two sets of measurements

taken (primary and recount) in about 20 seconds As the report shows, the average measurements were shown to be less than 20 dpa, a factor of 5 below the limit To perform a survey for average contamination at the limits, a survey using conventional instruments might take 5 each, one minute counts and measure only 5% of the area to estimate the average More time is required to process and report an average Typically, the detection limit for this measurement is about 100 dpa Thus, for reporting average contamination levels, the SCM/SIMS is much more than 15 times faster with a 5 times lower detection limit than conventional surveys The maximum measurement is based on only 4 pixels of data and reflect only 2 seconds of count time for each pixel during each (primary and recount) survey The method is considered to be superior to hand-held surveys for assessing maximum levels of contamination in that there is greater assurance that 100% of the area is measured, and other human factors that affect hand-held survey performance (scan speed, detector placement, vigilant observation, etc) are eliminated When a suspect area is detected, it is easy to place a hand-held meter over the area and perform a long observation (e g minute or longer counts) The long observation permits the level of maximum contamination to be more accurately measured (due to the long count time) Since the location is known, the measurement can be accurately made with the hand-held meter It would be inefficient to suspend survey operations to re-locate the SCM back to an area and use it to take a standing count for a minute or longer

Only one area was identified by the SCM (as a result of analysis of both Primary and Recount) to be in excess of the maximum contamination limit for alpha To separate out false positives resulting from statistical fluctuations the SCM considers both the recount and primary detectors when assessing contamination As this was the first survey at RFETS to use this technology, and to be conservative, any areas exceeding the limit in either the recount or the primary detector were resurveyed with the SCM Only RF12301A showed contamination on a second scan

This was the first survey performed with the SCM at Rocky Flats To aid in providing a baseline to the conventional instrumentation used to survey the remainder of the building, any areas identified in either the SCM primary or recount detector were also surveyed with a conventional detector The conventional detector was used in the scalar mode, integrating the counts for a single 100 cm^2 area over several minutes This is not the normal scanning mode for a conventional detector If the survey of each 100 cm^2 area would have been conducted with a conventional instrument in this mode, the survey area measured by the SCM in 40 hours would have taken approximately 2000 man hours (250) days (with a one minute count) with a significant challenge posed by data management

RMRS Radiological Engineering Response:

It is a common practice to confirm an elevated or anomalous reading obtained during a scan survey by obtaining an integrated measurement It is impracticable to obtain an integrated measurement with a 6 foot long detector when the elevated reading is over a discrete area, a hand-held detector is more appropriately suited for this measurement

DOE Comment:

C> There is no map to tie these identifying numbers to specific locations on the building floor

SRA Response:

Attachment A was intended to provide this key The key was not completed The first figure in Attachment A shows the –07 survey grid placed on a RFETS grid system that was provided to SRA The orientation is not provided Subsequent figures do not indicate the grid or its orientation At the time the report was generated, SRA did not have images for some of the RFETS grid system for areas surveyed with the SCM SRA could generate an appropriate key upon request for the next revision of the report

RMRS Radiological Engineering Response:

Correct, there are no maps to tie these identifying numbers to specific locations on the building floor For areas where activity was found in excess of the release, resurvey maps are included in the Close-Out Radiological Survey Report 123 Cluster For future surveys performed by Shonka, the use of electronic CAD or GIS maps will improve the correlation between Shonka surveys and survey location

DOE Comment:

5 The Shonka Executive Summary states No discussion is given concerning how the fourteen survey areas cited in Table 5 3 were resurveyed Were they?

SRA Response:

Table 5 3 addresses the beta contamination surveys As addressed in the response to question 3, the values in the "Highest 100 cm^2 area" column of Table 5 3 are gross dpa The background identified for each area in Section 3 must be subtracted from the 100 cm^2 gross dpa when considering the maximum contamination limits None of the beta surveys were above the limits, and no areas were subjected to re-survey

RMRS Radiological Engineering Response:

Table 5 3 lists Gross survey results, the reporting criteria stated by Shonka on Page 6, 100 and 300 dpm/100 cm^2 alpha (average and maximum respectively) and 750 and 2250 dpm/100cm^2 beta (average and maximum respectively) are activities above background For Survey Areas RF12301B – RF12311B, the total (gross) activity is 4000, dpm/100cm^2 and 6000 dpm/100cm^2 beta (average and maximum respectively) For Survey Areas RF12312B and RF12313B, the total (gross) activity is 3225, dpm/100cm^2 and 4725 dpm/100cm^2 beta (average and maximum respectively) For Survey Area RF12314B, the total (gross) activity is 3955, dpm/100cm^2 and 5415 dpm/100cm^2 beta (average and

maximum respectively) No measurements in Table 5 3 exceed those stated, as such, no area was resurveyed

DOE Comment:

6 *There is no explanation of a method to tie the survey unit designations in the executive summary to the colored overlays of Survey Results on Site Drawings presented in Attachment A*

SRA Response:

Correct See response to 5 C This can be addressed in a revision

RMRS Radiological Engineering Response:

Agreed, improvement in correlating between Shonka survey areas and Survey Units is necessary Future Projects involving Shonka or similar technologies would be well advised to prepare common survey units or electronic CAD or GIS maps to better correlate survey areas

DOE Comment:

7 *The Shonka report entitled Detailed Reports of Alpha and Beta Surveys presents the table denoted as Table 5 1 in the Shonka Executive Summary This table is a listing of alpha survey results for the north and east wing of Building 123 No explanation is provided for why the table is there or what the reader is supposed to discern from it*

SRA Response:

The table (along with beta results shown in Table 5 3, which is located half way through the Detailed Reports Volume) is shown and intended to serve as a table of contents and summary of results for the survey reports The reader is saved the effort of reviewing each survey to determine which grids exceeded the limits, and can review those alone if he chooses Each survey report is separately produced and given page numbers that have the survey unit number as a preface The reviewer's comments might be accommodated with the addition of a paragraph that explains the organization of the volume and the intent of the table This could be accommodated in a revision, which would provide a single page preface to the volume Insertion of a card separator or tab midway through the volume would also help the reader find the beta survey data faster

RMRS Radiological Engineering Response:

Paragraph 2 of Section 5 2 in the Executive Summary discusses Table 5 1, this table is also included in the Detailed Reports of Alpha and Beta Surveys I used the table to verify all Survey Areas were included in the report What the reviewer discerns from the data would be up to the reviewer

DOE Comment:

8 *The Detailed Reports then presents a discussion plus graphical and tabular information There is a section for each Shonka survey area Using the first survey area, RF12301A, as an example the following items were noted*

A *It is unfortunate that the location of the place where the 477 dpm/100 cm^2 was found is not illustrated in the presentation Does the single dot on Figure 3 provide the area where radioactivity exceeded the "Guidelines"? If so, how does this location tie to the survey map provided in the RMRS Closeout Radiological Survey Report?*

SRA Response:

The location of the contamination can be seen in Figure 3 of the RF12301A primary survey report As you have suggested the "dot" in Grid (3,7) does represent the contamination, as stated in the caption of Figure 3 It appears as a dot because it represents a 5 cm by 5 cm area on the floor and because of the scale of the image The RFETS provided CAD overlays in Attachment A of the Executive Summary show the location of each grid in the building The south west corner of each survey area is used as the origin of the survey axis This could be better presented Any specific suggestions would be appreciated We can re-issue the Executive Summary, and amend Attachment A to add all survey grids, noting which correspond to our designation We also can indicate the origin of the data (lower left corner of images and data table with a symbol of some sort In general for floors, this is the southwest corner of the area, to remain with the conventional orientation of maps (north is up) This may not be the case if the RFETS CAD overlays do not maintain this convention (north is up)

RMRS Radiological Engineering Response:

Yes, the black dot does represent the elevated reading, as well as the reddish dot in Figure 2 This point correlates to Grid # 137 of Survey Unit #6 and is discussed in the Close-Out Radiological Survey Report 123 Cluster, Survey Group 2 Page 2

DOE Comment:

B The words say "Bold text denotes grids which exceed release limits," but no bold text is apparent

SRA Response:

We assume you are referring to the caption for table 1 The caption states that the contamination is averaged over 1 square meter and that the bold text identifies grids exceeding release limits We concur that the language is ambiguous In the version of SIMS used in the Bldg 123 survey, only the grids containing contamination in excess of the average contamination limit would have been highlighted (bolded) In the most recent version of SIMS, Table 1 also highlights (bolds) any 100 cm^2 area above maximum contamination release limits This should alleviate any confusion in future surveys

RMRS Radiological Engineering Response:

Agreed that this confusing, if the Note pertains to the $1m^2$ as a whole, i e exceeding the average contamination limit over 1 square meter, then there should be no **bold** grids, if however, any limit exceeded is considered, then grid (3,7) of 12301A should be in **bold**

DOE Comment:

C The presentation for the first survey area ends with a statement of release limits that is very troubling The Total activities shown are NOT the limits stated in the Executive Summary for alpha activity

SRA Response:

The final section of each auto generated survey report is "Comparison of Results with Guidelines" This section makes no statement of "release limits", but rather reports the criteria used to assess the gross dpa data from the SCM The criteria is the release limit with the addition of background for the survey area The present version of SIMS reports the "release limits" and background, showing the criteria as the sum We regret that the presentation of the data was confusing to the reviewer

RMRS Radiological Engineering Response:

The values given for release criteria on the pages titled "Comparison of Results with Guidelines" are gross activity Subtracting background from these values results in levels which coincide with the release criteria

DOE Comment:

9 All subsequent sections give the same release limits, which are NOT correct

SRA Response

Actually, each section does not contain the same release criteria For the alpha surveys Sections 1 through 11 and Section 14, the auto-report generator used a criteria of 120/320 (100/300 dpm limits plus 20 dpm background) and sections 12 and 13 used 106/306 (100/300 dpm limits plus 6 dpm background for a different detector and different floor covering) The different backgrounds primarily result from the different material used to cover the floor (epoxy paint versus concrete) The beta reporting criteria are also expressed in gross dpa terms with different numbers for different floor surface or detector combinations

RMRS Radiological Engineering Response:

See response to 8C

SHONKA RESEARCH ASSOCIATES

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