Meeting Date: March 28, 2005
Date Prepared: April 4, 2005

# MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL (MARSSIM) WORKGROUP MEETING NOTES – DRAFT

MONDAY, MARCH 28, 2005

ATTENDEES:

U.S. Environmental Protection Agency - Headquarters: K. Snead
U.S. Environmental Protection Agency - Headquarters: L. Bender
U.S. Nuclear Regulatory Commission - RES: R. Meck
U.S. Nuclear Regulatory Commission - RES: G. Powers
U.S. Air Force: R. Bhat
U.S. Air Force: Major C. Bias
U.S. Army: D. Chambers
U.S. Department of Energy (DOE/ESH): A. Williams

MEMBERS OF THE PUBLIC:

Cabrera Services, Inc.: N. Berliner (U.S. Air Force contractor)

DISCUSSION

R. Meck serves as acting chairperson in C. Petullo's absence this afternoon. R. Meck welcomes the work group to the MARSSIM work group meeting. Members not in attendance of the meeting today are either experiencing travel delays or are scheduled to arrive at the meeting starting tomorrow.

ADMINISTRATIVE ISSUES

A. Williams describes current tie-ups with DOE's A-76 procedures and internal review of tasks that can be outsourced, and how it has limited his ability to participate in the MARSSIM work group. He later notes that many DOE contracts have been awarded, and that these contract awards can be reviewed on DOE's web site. He adds that the posted awards are being protested and are not final.

C. Bias notes that the work group needs to determine how to allocate new MARSAME funding from the EPA. R. Meck remarks that this decision will have to be made when the contractor (Cabrera Services) is not present.

R. Bhat notes that work group members should review the NCRP 2005 Annual Meeting agenda to determine a consensus regarding when work members would like to attend the meeting. After a brief survey of work group members who are present, K. Snead notes that Thursday morning appears to be the best time slot.

AGENCY UPDATES

K. Snead discusses that MARSAME is noted for projects involving clean-ups and guidance pertaining to decontamination. Although the clean-up focus is supposed to address all hazards, the principal focus has been the radiological portion of the hazard. Shatzi Fitz-James is the primary contact. R. Bhat comments regarding the propensity of risk for groundwater contamination to the public. He suggests that the risk-based table (Table 3) in the historical site assessment section of MARSSIM be consulted. R. Bhat adds that he has a meeting tomorrow that will discuss a survey list that may be applicable and useful for MARSAME.

**ACTION ITEM:** R. Bhat to examine this survey list and include it on the MARSSIM work group web site if it is appropriate.

A. Williams provides an example of a Master's thesis that was used to conduct research on subsurface geologic and groundwater conditions within a region, and that this approach (i.e., free research) will be very helpful for gathering data as a basis for radiological work for many sites.

R. Bhat sites NUREG-1757, volumes 1 through 3. He states that volume 3 pertains to financial assurance, i.e. for providing long-term estimates of the costs for a long-term NRC license. R. Meck questions the basis assumptions for cost calculations for decommissioning, and the applicability for MARSSIM/MARSAME. R. Bhat replies that the calculated estimates are based on labor rates, survey approaches, and related equipment. R. Meck notes that the concern of the work group starts and stops with measurements. He continues that the work group is not concerned with the cost of running equipment (e.g., a bull dozer), that the work group is only concerned with cost as far as it affects measurement. G. Powers adds that inclusions pertaining to cost will quickly become obsolete, so he dismisses the applicability of cost-based comparisons. R. Meck observes that *relative* costs retain significance.

R. Meck proceeds with the NRC agency update, beginning with the proposed rule for solid materials (this was addressed during the NRC agency update at the February 2005 meeting). He states that the timeline for this ruling is a moving target, and that he has no discretion for discussing the nature of the proposed ruling prior to its issuance. It remains a significant item on the horizon, but the work group will simply have to wait and see what implications it has towards MARSAME.

G. Powers discusses the subsurface aspects of code development for SADA, noting that training for this latest Rev. 4 is already filled. The NRC may hold two additional trainings to compensate for the high training demand. He describes the combination of Markoff Base 2 survey and geological data to construct a model that has the capability of condensing a 350,000 data point model into a 2,000 data point model to compute realistic scenarios of contaminant plume propagation. He continues his explanation of how SADA incorporates MARSSIM, ArcView, and AutoCAD to produce highly-detailed models. SADA computes detailed scenarios of the spread of contaminants in the environment, computes quantities of contaminated material to be removed, and ultimately allows the MARSAME reader to produce quantitative risk-based decisions. SADA does not require a detailed initial sampling plan; a brief plan outline will provide sufficient

input to set up a modeling scenario. In response to a question from R. Bhat, G. Powers notes that the user does need some process knowledge regarding the radionuclides of potential concern. In response to a question from A. Williams, G. Powers notes that SADA incorporates area factors from RESRAD. There is a particular MARSSIM-based modeling approach that is particularly effective, though he notes that there are 28 other available approaches (the accuracy of data produced using these approaches may be questionable). He also notes that the data quality of the inputs restricts the output quality of the model produced (i.e., "garbage in yields garbage out").

He sites how SADA is being used world-wide in mining/oil exploration applications. He notes that there are already 40 to 45 pages of comments from users pertaining to how to improve the program since the last "open house" in September 2004. There are plans to hold another open house in September 2005, which will be oriented towards gathering data to help steer the direction of the up-coming SADA Rev. 5. G. Powers briefly compares SADA to an EPA rapid assessment program entitled "RATS," noting that the EPA is having problems with their program.

R. Meck describes another NRC project that is intended to determine how the MARSAME process is working. This project consists of a small team dispatched to Oak Ridge National Laboratory to qualitatively compare data from materials surveyed via both scanning and direct measurements. This project will then serve as a validation process for measurement methods described in MARSAME. D. Chambers describes automated scanning data (containing both fixed and scanning measurements) from of contaminated steel I-beams that were obtained from a building 200 to 300 yards in length and 75 to 100 yards wide. He volunteers the use of this data to R. Meck to assist in this process.

D. Chambers provides a brief agency update for the Army, noting that Greg Komp (a CHP stationed in the Pentagon) has been named a civilian senior health physicist for the Army.

C. Bias notes that Miss Koetz (an under-secretary for the Air Force) issued a new policy in October 2004 that all contracts should now be performance-based. He notes that this is a cost-driven change, as the Air Force has performed many remedial actions where excessive amounts of soil were removed to eliminate a contaminant source. This is aimed at limiting the Air Force's costs in paying for remedial actions. As an example of new policy directed by this new policy, C. Bias describes a scenario that is designed to 100 $m^2$ of contaminated soil. Prior to the new policy, the soil could be characterized as a six-inch lift prior to excavation. Now the soil might be characterized in two-inch lifts, with characterization performed iteratively during excavation.

K. Snead briefly addresses an upcoming series of seminars pertaining to qualifying and validating expert opinion (i.e., expert elicitation).

INTER-AGENCY STEERING COMMITTEE ON RADIATION STANDARDS (ISCORS)

K. Snead and A. Williams note that they were both present at the most recent ISCORS meeting. K. Snead notes that the MARSAME intro was basic and generally non-technical.

BROAD REVIEW OF CHAPTERS 3 AND 5 AND CASE STUDIES 1 AND 2

The work group proceeds with broad reviews of the chapters and case study documents prepared for this meeting. Review comments pertaining to the February meeting minutes will be addressed off-line.

G. Powers has been reviewing sections of Chapter 5, and remarks that the scope of the quantifiability sections should consist of more than just "minimum detectable in the field," and should be almost exclusively based on guidance in MARLAP. N. Berliner notes that he will revise the quantifiability sections after revisiting the appropriate sections in MARLAP.

The work group moves to broad review of Chapter 3. N. Berliner has no introductory comments pertaining to Chapter 3. K. Snead remarks that she only has minor comments. C. Bias notes that references to Chapter 2 within Chapter 3 are merely "virtual" references at this point, as Chapter 2 has not yet been revised to reflect the restructuring of the chapter discussed at the February meeting. R. Bhat, G. Powers, A. Williams, and R. Meck note no comments.

R. Meck notes that in the February meeting, the work group identified contacting A. Williams to locate well-written examples of DOE SOPs as an action item. A. Williams indicates that he will have to look for some good example SOPs for Work group use. R. Meck asks if there are currently plans for a Case Study 3.

**ACTION ITEM:** A. Williams to locate example DOE SOPs for work group use.

N. Berliner responds that the scenario on the table for Case Study 3 is a front loader used at the mineral processing facility in Case Study 1, and the interdiction scenarios it entails in order to move the front loader into and back out of a radiologically-controlled work area.

R. Bhat and C. Bias discuss the level of detail to include in the in situ gamma discussion in Chapter 5. R. Bhat favors a qualitative roadmap-type comparison for various measurement methods (in situ versus portal monitors versus direct measurements). R. Bhat also notes that a GPS discussion might be beneficial to Chapter 5. R. Meck and A. Williams remark that GPS probably doesn't fit into MARSAME, as GPS is not nearly as helpful a tool for material that is not real property, unlike the scope of MARSSIM.

ADJOURN

**NOTE:** Discussions regarding removable activity and smears transpired on several different days over the course of the meeting. For the sake of condensing these

discussions into a single, comprehensive summary at the end of the minutes, the actual chronology of these discussions will not be preserved in this document.

Meeting Date: February 15, 2005
Date Prepared: April 5, 2005

**MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL (MARSSIM) WORKGROUP MEETING NOTES – DRAFT**

TUESDAY, MARCH 29, 2005

ATTENDEES:

U.S. Environmental Protection Agency - OSWER/ERT-West: C. Petullo
U.S. Environmental Protection Agency - Headquarters: L. Bender
U.S. Environmental Protection Agency - Region II: N. Azzam
U.S. Nuclear Regulatory Commission - RES: R. Meck
U.S. Air Force: Major C. Bias
U.S. Navy: S. Doremus
U.S. Army: D. Chambers
U.S. Department of Energy (DOE/ESH): A. Williams

MEMBERS OF THE PUBLIC:

Cabrera Services, Inc.: S. Hay (U.S. Air Force contractor)
Cabrera Services, Inc.: N. Berliner (U.S. Air Force contractor)

CHAPTER 5

R. Meck begins discussion of Chapter 5 with a general comment that he would like to see the next revision of Chapter 5 contain a strengths and weaknesses "trade-offs" comparison of different instrument types and measurement methods. This will help the MARSAME reader to evaluate measurement methods by comparing the cost with the quality of the measurement. Doremus questions the inclusion of the general instrument section (this describes various gas-proportional and scintillation detector types). R. Meck and other work group members defend it as a useful, stand-alone section for basic detector information, though R. Meck notes is may be most appropriate as an appendix. R. Meck also adds that the writing in Chapter 5 is good, but it does illustrate that the author (N. Berliner) is not intimately familiar with the instrumentation being discussed. This tone should be corrected in by providing more uniform depth in the various sections associated with each measurement method in the next revision of Chapter 5 and detailed review by experienced personnel. D. Chambers also requests increased consistency with regards to depth on a sub-section to sub-section basis.

C. Petullo decides to devote a 45-minute time slot for reading.

R. Meck notes that the end of Chapter 4 leaves the MARSAME reader with a completed survey design. Chapter 5 needs to be re-arranged to reflect the order of items to be considered for implementation. As a logical progression, the first piece of implementation (Chapter 5) needs to be addressed is health and safety. M&E Handling should be brought together, though not combined into a single section. Additionally, in

following with the basic section formatting of Chapters 2 and 4, the section titles should be revised so that they contain verbs to reflect action. (e.g., "ensure protection of health and safety).

The section structure of Chapter 5 will be revised as follows:

- Introduction
- Ensure Protection of Health and Safety
- Ensure Safe Handling M&E
- Segregate the M&E
- Select Instrumentation and Measurement technique
- Convert Data
- Implement Quality Control

N. Azzam suggests that a practical table to list pros and cons for each measurement technique will help address implementation, instrumentation, and measurement techniques and methods. S. Doremus agrees that these revised approaches will improve the MARSAME reader's ability to make informed decisions regarding which measurement method to choose. A. Williams and S. Doremus note that a table with ranges will also help facilitate accurate measurement method choices with regards to the type and magnitude of activities being investigated.

D. Chambers asks if inclusion of a measurement method in Chapter 5 infers agency acceptance of the given method. The work group states that inclusion of a method only infers agency acceptance of a given method for the particular scenario as documented. R. Meck clarifies that the work group does not set policy and only provides technical guidance for one method for making a decision, and A. Williams specifies that the applicability of the guidance must be addressed for each specific project to determine whether the measurement method is an acceptable approach. There are no implications for acceptance of a method beyond each individually-documented and qualified application. For example, this comparative view will help illustrate that in situ gamma spec cannot be used for quantifying hot particles in a clean material matrix for dilution.

R. Meck questions the current degree of separating out of sub-sections in the current table-of-contents for each measurement method. D. Chambers, L. Bender, S. Doremus, and R. Meck discuss the issue, and determine that the detailed breaking out of sections is helpful for MARSAME readers needing particulars on each measurement method. A. Williams notes that this is the way DOE likes these sections to be put together. S. Hay notes that the text of Chapter 5 should state that sampling with laboratory measurements is the most time-consuming, but it also yields the lowest MDCs. For a full comparison of the different analytical methodologies incorporated in the sampling with laboratory measurements section, refer the reader to the two volumes of MARLAP for an accurate comparison. The sampling with laboratory measurements section in MARSAME is a smaller, stand-alone snapshot.

S. Doremus questions the use of the terms fixed, static, and direct. S. Hay clarifies that MARSSIM uses the terms scan, sample, and direct measurement, and that samples and direct measurements both represent fixed contamination.

R. Meck makes suggestions for a new introduction to Chapter 5, that the new introduction should adopt a prose approach to represent what will be the content of the chapter. S. Doremus adds that the introduction should cover only instrumentation, and apply it for all implementation.

D. Chambers comments on the health and safety section, noting that the current text uses the terms job safety analysis and activity hazard analysis. He informs the work group that activity hazard analysis is a sub-set of job safety analysis, so these two terms should be used carefully to ensure that they are being used properly. N. Berliner will limit the discussion to only include one of these two terms for simplicity. L. Bender asks for an example of a job safety analysis or activity hazard analysis.

**ACTION ITEM:** N. Berliner to include example of job safety analysis or activity hazard analysis in Revision 7 of Chapter 5.

R. Meck also suggests that a graded approach be incorporated into the health and safety section for multiple hazards (e.g., contrasting a radiological hazard with an explosives hazard).

The work group comments on the table contained in Chapter 5 (Table 5.8, pages 38 and 39). N. Azzam notes that PCBs are absent from this table, yet A. Williams responds that PCBs are not in a similar table distributed by OSHA, which is what this table is derived from. D. Chambers recommends that this table be deleted, as it highlights any hazardous material type that is absent. R. Meck suggests that references may be added in an appendix (29 CFR, 40 CFR, OSHA, NIOSH, etc.). A. Williams adds that generic hazard types should be listed here or referenced to OSHA HAZWOPER training. The work group concurs that language should be incorporated to convey the idea that "all disposition surveys have been reviewed by H&S personnel for site-specific hazards."

Discussion moves from health and safety to M&E handling. The work group identifies segregation as a sub-set of materials handling, and notes that handling should have a narrow focus to address radiological concerns only. General hazards associated with materials handling will be moved to the health and safety section; the revised M&E handling section will be dramatically different. The work group likes the current M&E handling text, but it will be relocated to the health and safety section.

The new focus of handling will be implementation. This will consist of reasons to move or handle M&E (minimizing the physical handling of hazardous materials), including:

1. Move to a low background area for surveying
2. Measurement identification, labeling, and tracking (quality control)
3. Disassemble or cut and chop to provide access
4. Contamination control (prevent exacerbating a problem)

5. Move it to the detector (e.g., a barrel counter room)

R. Meck notes that this must be broad enough to address M&E from diapers from nuclear medicine facilities to Y12 materials, and the graded approach must be applied here too. N. Azzam adds that this section should explain that the MARSAME reader must know how to handle the M&E to maximize the efficiency and detectability of the measurement while minimizing the potential spread of contamination.

**ACTION ITEM:** Cabrera to find handling versus segregation in the minutes from previous meetings to direct the context of these sections.

C. Petullo asks Cabrera is they have a clear picture of what the handling section will consist of. Cabrera indicates "yes." S. Hay notes that the Chapter 2 segregation section will be re-written and simplified (along with the rest of Chapter 2), with much of the current text being moved to the Chapter 5 segregation section. Segregation will consist of removal of material to "clean pile" versus "dirty pile," and "survey" versus "no survey." S. Hay adds that segregation needs to consider disposition options, e.g., recycling copper chop probably limits the potential for mixing.

D. Chambers and C. Petullo inquire about the differences between the scanning and direct measurements with hand-held instruments sections. The work group discusses the option of merging these sections, and decides to keep them separate.

**ACTION ITEM:** A. Williams to prepare table providing typical detector types and ranges, per question box in both scanning and direct measurements with hand-held instruments sections.

N. Berliner addresses the differences between scalers and rate-meters. The work group asks for a list of pros and cons to highlight the differences between these measurement quantification approaches. S. Hay notes that data-logging has not been addressed thus far in Chapter 5. He adds that it is difficult to retrace elevated, logged readings on a single piece of M&E. S. Hay and S. Doremus discuss data-logging incorporated with the principle of "clean as you go." S. Doremus also suggests re-examining the definition of rate-meter, because averaging logarithms utilized by rate-meter systems vary.

The work group revisits the sections for range of detectable activity ("Range" in Chapter 5). R. Meck notes that these sections are describing if a given instrument and measurement method will be able to detect the radioactivity. S. Doremus questions changing the title of these sections to "Range and Scale," and the sections currently called "Scale" to "Field-of-View." C. Petullo defends the current section titles, but that each section needs introductory descriptors to explain what the section is describing.

D. Chambers, N. Azzam, and C. Petullo note that what is being described as instrument background can really be described as ambient background.

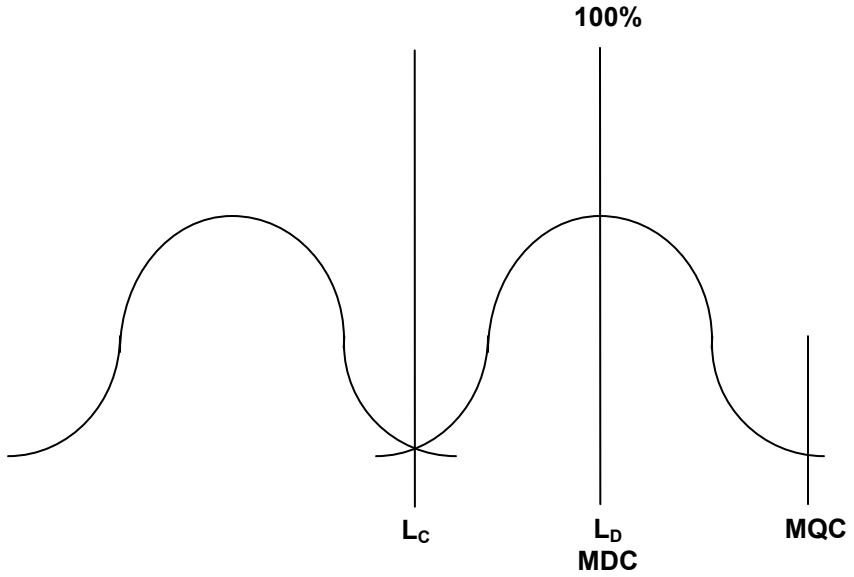
S. Hay mentions that a new distinction is being made in Chapter 5 between source efficiency versus surface efficiency.

S. Hay and S. Doremus suggest that a section be added for ruggedness, addressing instrument temperature ranges and other field parameters that affect instrumentation.

**ACTION ITEM:** R. Meck to email ORISE study pertaining to instrument temperature ranges to N. Berliner to support the ruggedness sections in Chapter 5.

N. Berliner asks about the current ordering of the most significant sources of uncertainty in the uncertainty sections. R. Meck responds that there is no correct order for any particular measurement method, as they'll vary depending on different conditions, M&E types to be measured, etc. The uncertainties should be based on survey design objectives, which serve as a reminder to the reader to account for variabilities in survey design (Chapter 4).

S. Hay and S. Doremus discuss detection limit versus quantification limit. S. Hay provides an example detection limit as 50 cpm, and an example quantification limit as 150 cpm with 15% error. Quantification limit really addresses the question "can the instrument and measurement method detection the radioactivity?" R. Meck notes that quantification as it is described in Chapter 4 should be tracked for consistency into Chapter 5. It will be stated that quantifiability is uncertainty at an activity level, considering that 95% of the time you want to be able to detect the radioactivity. This will be linked to the uncertainty sections in Chapter 5 and the action level in Scenario A. S. Hay remarks that Appendix A needs to address detectability versus quantifiability. S. Hay illustrates the following on paper:




The work group revisits the title of the section "Box Counters." As this type of instrument will be noted to include counting instruments that are not enclosed (e.g., drum counters), the title will be revised to "Volumetric Counter (Drum, Barrel, Four Pi Counters)." A. Williams also notes that the section should include fissionable material box counting. N. Azzam comments that special attention must be paid to the differences

between drum versus box counters (for example, drum counters utilize significantly longer count times than box counters).

The work group discusses the three figures in Chapter 5 (these figures show a typical box counter, a typical automated scanning system, and a typical portal monitor). N. Berliner notes that these were included at the suggestion of D. Caputo, and that they are intended for internal work group reference only, as using figures of manufacturer-specific equipment should be avoided in MARSAME. The work group likes the use of figures for these measurement techniques, and would like to retain figures here. A. Williams suggests soliciting pictures of measuring devices from manufacturers. C. Petullo decides a better approach is to have schematic line drawings designed based on the three figures currently in Chapter 5.

**ACTION ITEM:** N. Azzam to design schematic line drawings based on the three figures in Chapter 5.

N. Azzam, S. Hay, and A. Williams discuss text in Chapter 5 noting that box counters are not "ideal" for use with Class 1 M&E. N. Azzam and S. Hay note that this is becomes detectability is an issue, and A. Williams remarks that box counting for Class 1 is okay as long as you are using an average activity action level. N. Azzam and S. Hay agree. A. Williams also notes that spatial variation is not as big of a deal as we're making it out to be in the current text of Chapter 5. S. Hay instructs N. Berliner to note this in the appropriate pros and cons sections, and that it is not as significant as it is currently described to be. D. Chambers questions the efficiencies of the box counters, requesting that the references be re-checked for validity and that the work group be debriefed on the factors that lead to the noted efficiencies.

The work group will resume Chapter 5 discussion tomorrow, starting on Section 5.7.

ADJOURN

Meeting Date: March 30, 2005
Date Prepared: April 6, 2005

**MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL (MARSSIM) WORKGROUP MEETING NOTES – DRAFT**

WEDNESDAY, MARCH 30, 2005

ATTENDEES:

U.S. Environmental Protection Agency - OSWER/ERT-West: C. Petullo
U.S. Environmental Protection Agency - Headquarters: K. Snead
U.S. Environmental Protection Agency - Headquarters: L. Bender
U.S. Environmental Protection Agency - Region II: N. Azzam
U.S. Nuclear Regulatory Commission - RES: R. Meck
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U.S. Air Force: Major C. Bias
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MEMBERS OF THE PUBLIC:

Cabrera Services, Inc.: S. Hay (U.S. Air Force contractor)
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CHAPTER 5

C. Petullo resumes discussion on Chapter 5, stating that she intends to finish discussion by 1100 and then move to Chapter 3. The work group discusses the differences between the terms spectrometry and spectroscopy, which are both used in Section 5.9 (Sample with Laboratory Analysis). S. Hay noted that his understanding is that spectrometry is more quantitative, and spectroscopy is more qualitative. The work group decided that the term spectrometry would be used with alpha analysis, and that the term spectroscopy would be used with gamma analysis.

The work group continued review of Revision 6 of Chapter 5. Individual comments from the work group will be incorporated into revision 7 of Chapter 5 and are not repeated in the minutes. In the midst of minor comments pertaining to Chapter 5, N. Azzam notes that it is very important to determine with regards to Section 5.9 how a given lab may contend with pebbles and large clasts in a sample matrix (e.g., sieving or crushing to integrate and homogenize). This is important because larger chunks of material may often constitute the most significant source of radioactivity. S. Hay notes that discussions of on-site versus off-site laboratories, radiochemistry versus gross analyses, sample preparation versus “as is” counting techniques, and the costs for delays may all be warranted in this section. S. Hay also notes that an instrument response discussion needs to fit into Chapter 5 somewhere (e.g., sodium iodide and high-purity germanium detectors are energy-dependent, while plastic scintillators feature more linear response). There were no other major discussions during the review of Chapter 5.

CHAPTER 3

C. Bias requests that the text from EPA QA/G-4 be used verbatim on line 10 rather than paraphrasing. He then asks if information regarding the planning team should be provided in Chapter 2 or if the appropriate paragraph in MARSSIM should be referenced. C. Bias and S. Hay discuss where the decision-maker is important in the MARSAME process. What are necessary credentials for the planning team? The work group decides to include a paragraph from MARSSIM (refer to MARSSIM Section 3.2) to describe the planning team.

D. Chambers addresses practical constraints on data collection (line 35) and what would be examples of these constraints. S. Hay provides a simple example: "if you can't sample in the rain, don't." N. Azzam adds that examples of practical constraints on data collection are listed in Chapter 2.

The work group discusses a question on lines 42 to 44 in Chapter 3 by S. Hay, regarding a discussion of resource constraints. C. Petullo indicates that this should consist of a discussion of financial constraints, i.e., relative cost. The work group agrees that a short paragraph should be added to Chapter 3, including resource constraints related to financing, equipment, personnel, and time. C. Bias raises issue with the placement of a paragraph pertaining to resource constraints here, as this discussion belongs in Chapter 2 (i.e., inputs to the decision). He reaches accord with the rest of the work group by agreeing to allow this text in Chapter 3 on a tentative basis.

**ACTION ITEM:** A. Williams to determine if DOE will allow MARSAME to use the physical Figure IV-1 (Surface Contamination Guidelines) from DOE Order 5400.5, rather that just referencing the figure (this reference is on line 59).

N. Azzam questions the choice of the most restrictive action level, as noted in Figure 3.1 (Selecting Action Levels flowchart). R. Meck, C. Petullo, S. Hay, C. Bias, and S. Doremus, and N. Azzam discuss the issue, and decide this is the correct, most defensible approach for selecting action levels. C. Bias suggests revising the title of Section 3.2.2 to "Select Most Restrictive Action Level," noting that the text in Chapter 3 should then refer the MARSAME reader back to the source of the action level. This is a departure from the current section title ("Identify Whether Radioactivity is Surficial or Volumetric"), reflecting the change in focus from differentiating between whether surficial or volumetric activity is present to identifying the most restrictive action applicable to the M&E in spite of the activity distribution. The work group approves this change in focus.

The work group discusses moving the paragraph from lines 138 to 163 to Chapter 2 as suggested by C. Bias. N. Azzam defends keeping the text where it is, while C. Bias maintains that it best belongs in the initial assessment. S. Hay and C. Bias decide to move the paragraph, but to retain a reference to this information in Chapter 3; the work group approves.

K. Snead addresses the footnote on page 3-7 in regards to MARSAME readers having difficulty referencing important information contained in footnotes. K. Snead, S.

440 Doremus, and S. Hay discuss the content of the footnote, and ultimately decide to leave it
441 alone, as S. Hay justifies that it is intended to help the MARSAME reader determine the
442 relative fraction of the total activity contributed by a given radionuclide. A reference to
443 MARSSIM Chapter 4 as the source of this guidance will be added to the footnote to
444 provide a reference for the information.

445 K. Snead questions the inclusion of the sentence from lines 357 to 359, stating that this is
446 beyond the scope of what MARSAME should discuss. R. Meck agrees, and the sentence
447 will be cut. C. Bias comments on the scope of the paragraph starting on line 356 and the
448 examples that follow, which consider individual parameter values used to convert a
449 disposition criterion into an action level. The sentence on lines 357 through 359 will be
450 deleted. The reference to a disposition criterion on line 356 will be changed to specify a
451 dose- or risk-based disposition criterion since these are the only type that will require
452 modeling. This discussion will be linked to Chapter 4 of MARSAME where guidance on
453 developing a disposition survey design is provided.

454 S. Doremus raises issue with Section 3.3, "Specify the Target Population." R. Meck
455 responds and attempts to more clearly explain what is meant by the term "target
456 population," and then suggests the term be changed to "M&E population." He states this
457 is more direct in the case of MARSAME as it always refers to M&E, and that the M&E
458 population may contain multiple survey units. S. Hay, S. Doremus, K. Snead, N. Azzam,
459 and N. Berliner discuss, and determine that the term M&E population refers to only one
460 survey unit at a time. The work group decides to rename the section "Determine the
461 Survey Unit."

462 C. Bias commented on line 379 that the two major parameters to consider when defining
463 the target population of M&E (survey unit boundaries and measurement methods) are
464 both affected by segregation, and that the ways in which segregation affects these
465 parameters should be highlighted here. He adds that the segregation section in Chapter 2
466 should be revised to state that it can affect the definition of the target population (i.e.,
467 M&E population). S. Hay responds that the Chapter 2 segregation section will be revised
468 to decide whether or not to segregate, and that C. Bias' comment will be addressed in the
469 revised section as well. C. Bias states that this will affect the introductory text in
470 Sections 3.1 and 3.2 as well.

471 K. Snead and R. Meck comment on the footnote on page 3-16, highlighting a difference
472 in approach for modifying survey unit boundaries between MARSSIM and MARSAME.
473 They indicate that this should be incorporated into Chapter 1 as well.

474 **ACTION ITEM:** R. Meck to check with NRC officials if it is acceptable to place side
475 boxes for key points in MARSAME per a C. Bias suggestion.

476 Conclude Chapter 3 review. R. Meck asks Cabrera for its perspective on which of the
477 two case studies is more important to review for tomorrow. S. Hay indicates that the
478 work group should focus on the last six or seven pages of Case Study 1, which is the new
479 material that has been added to the document in this revision, and to examine if Case
480 Study 2 goes as far as it needs to go into the MARSAME process before deferring to a

481 series of mock SOPs. S. Doremus requests that the introduction to Chapter 7 (Case
482 Studies) state that "some elements in Case Study 2 may not be included for brevity."

483 ADJOURN

Meeting Date: March 31, 2005
Date Prepared: April 7, 2005

**MULTI-AGENCY RADIATION SURVEY AND SITE INVESTIGATION MANUAL (MARSSIM) WORKGROUP MEETING NOTES – DRAFT**

THURSDAY, MARCH 31, 2005

ATTENDEES:

U.S. Environmental Protection Agency - OSWER/ERT-West: C. Petullo
U.S. Environmental Protection Agency - Headquarters: K. Snead
U.S. Environmental Protection Agency - Headquarters: L. Bender
U.S. Environmental Protection Agency - Region II: N. Azzam
U.S. Nuclear Regulatory Commission - RES: R. Meck
U.S. Air Force: R. Bhat
U.S. Air Force: Major C. Bias
U.S. Navy: S. Doremus
U.S. Army: D. Chambers
U.S. Department of Energy (DOE/ESH): A. Williams

MEMBERS OF THE PUBLIC:

Cabrera Services, Inc.: S. Hay (U.S. Air Force contractor)
Cabrera Services, Inc.: N. Berliner (U.S. Air Force contractor)

CASE STUDY 1

Discussion on Case Study 1 begins with a comment by D. Chambers that the crushed concrete in this scenario would generally be considered surficially-contaminated. The approach of characterizing the material volumetrically might be considered dilution of the residual radioactivity. K. Snead describes the work group resolution regarding this scenario that the characterization of this material as a homogenous volumetric mass is an acceptable approach as long as it's part of standard processing procedure. N. Azzam adds that it's okay to rubbelize and blend the crushed concrete mixture as long as it is performed in a manner consistent with standard processing procedures and it does not affect the waste classification. S. Hay states that the introduction will be revised to indicate that a MARSSIM-type survey would be used on the concrete floor if it was still intact when the residual radioactivity was addressed. R. Meck cautions that this approach may be instituting policy, which the work group cannot do. N. Berliner responds that the inclusion of this case study in the final MARSAME document will serve to condone this approach and therefore the MARSAME reader may infer it constitutes policy. R. Meck notes that a disclaimer stating that this approach can be used with regulator approval should cover the work group.

K. Snead voices concern over the use of 15 centimeters (six inches) thickness for the crushed concrete layer for surveying (as noted in line 572), as people are going to think this represents a particular thickness that should be used. N. Azzam reiterates that 15

523 centimeters was chosen because it is the default thickness derived from MARSSIM as
524 well as RESRAD. R. Meck adds that the true derivation of 15 centimeters is the root
525 depth of vegetables, and EPA's depth for radium. A statement will be added to reflect
526 that a thickness of 15 centimeters was used for consistency with modeling parameters.
527 Additionally, the work group decides that the scenario should be re-run with different
528 thicknesses to see how thick the concrete layer can be before the detection sensitivity is
529 prohibitively small. D. Chambers also indicates that samples for lab analysis should be
530 taken from an appropriate comparative depth. He continues that the most practical
531 survey approach is to scan the crushed concrete pile, scan it again in the bucket of the
532 front loader (or other equipment used to move the material around the site), and scan it
533 once again once it has been dropped off and staged somewhere. S. Hay adds that this
534 will be indicated as a slight difference between the documented survey design and the
535 implementation, as there was simply not enough space to spread out the material as
536 initially planned. It will be noted that the documented survey design was adjusted and
537 subsequently re-approved.

538 K. Snead asks for clarification in the term "batches," as used on line 646. R. Meck
539 suggests the use of the term "survey units" instead of batches. S. Hay replies that a
540 survey unit is not a batch in this instance, as a survey unit contains seven batches. S.
541 Doremus, R. Meck, and S. Hay discuss the differences between these two terms. R.
542 Meck remarks that you cannot physically measure a single survey unit at one time, so the
543 smallest portion that you can measure (in this case a bucket-full of the front loader used
544 to transport the material around the site) is termed a batch. R. Meck asks that this be
545 reflected in the text, and also that the text be revised to indicate that this is a "clean-as-
546 you-go" scenario, meaning that batches with high concentrations of residual radioactivity
547 may be segregated as they are detected.

548 D. Chambers questions why the case study does not use materials with notably elevated
549 concentrations of residual radioactivity as an example. S. Hay indicates that he did not
550 wish to use this sort of material as an example. The approach taken by S. Hay was to
551 have the batch with the highest concentration of elevated measurements fail the Wilcoxon
552 Rank Sum (WRS) test, and to have all the others pass. C. Petullo and C. Bias endorse
553 this approach. S. Doremus on the other hand raises issue with this approach. S. Hay
554 explains this method for categorizing the batches in greater detail. He indicates that you
555 segregate your 17 highest-concentration batches (note that 17 survey units × 7 batches
556 each = 119 total batches) of material (based on scan results), and run a WRS test, which
557 fails. You remove the highest-concentration batch and replace it with the next highest-
558 concentration batch, and re-run your WRS test. This time it passes. The highest-
559 concentration batch can be disposed as rad. waste (i.e., disposition option for M&E above
560 the action level), and all the remaining material can be released per the disposition option
561 below the action level. Following this explanation, S. Doremus, R. Meck, C. Bias, S.
562 Hay, and N. Berliner comment on this approach that entails some degree of "mixing and
563 matching" of batch material. The issue that S. Doremus and N. Berliner see as
564 problematic is the fact that you have sets of systematic data points, which you are then
565 biasing for categorization. C. Petullo states that a statistician will examine and comment
566 on this case study to determine if this approach is valid.

567 **ACTION ITEM:** C. Gogolak to review scenario for categorizing M&E in Case Study 1
568 and determine if it is a valid statistical approach.

569 D. Chambers asks that lines 655 and 656 be clarified to explicitly state that the
570 radioisotope analyses are surrogate measurements for the uranium and thorium
571 radioactive decay series ($^{214}$Bi and $^{228}$Ac, respectively). N. Azzam suggests the use of an
572 isotope besides $^{214}$Bi to avoid the necessary 21-day waiting period for in-growth of the
573 decay progeny. S. Hay responds that while you can use another radioisotope as the
574 surrogate for the uranium decay series, alternative surrogate radioisotopes will require
575 lots of correction factors and the analyses will ultimately cost many times more than
576 using $^{214}$Bi, so it is advisable for the documented survey design to incorporate a 21-day
577 delay for the lab analytical results. The work group agrees with this approach.

578 S. Hay addresses the figures on page 26, and asks the work group if they would like to
579 see any additional plots added. The work group requests a quantile-quantile plot. The
580 work group also asks for text describing how to interpret the retrospective power curve.

581 S. Hay notes that at this point, health and safety has not been addressed in this case study.
582 R. Meck comments that language should be included to indicate that health and safety
583 were pre-considered in the survey design. S. Doremus adds that "for brevity, it has not
584 been included here" should be included in the text. C. Bias states that this represents a
585 good opportunity to state that this survey approach is ALARA.

586 CASE STUDY 2

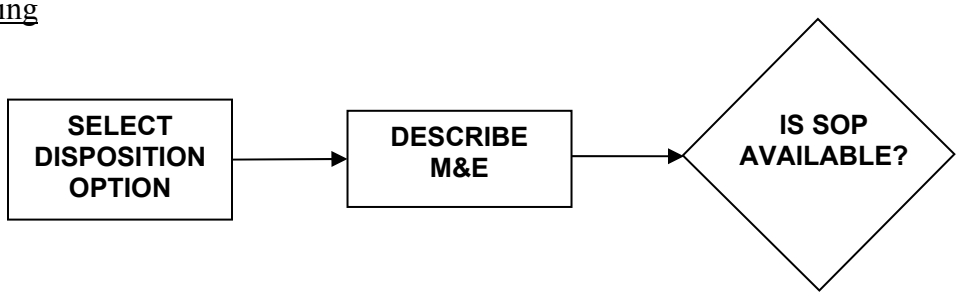
587 S. Hay begins by stating that example SOPs are not really needed with this case study, as
588 it is really an example implementation. R. Meck asks if the work group still wants to
589 review an example powerplant SOP (he has brought with him an SOP from Tennessee
590 Valley Authority Watts Bar Nuclear Powerplant). S. Doremus indicates an example SOP
591 should still be provided in the document. All work group members present except for K.
592 Snead and C. Bias, who are neutral. This will entail revisions to the Case Study 2 SOP
593 (SOP # 123). This will be added to the priority list of work to be performed, though it is
594 not required for inter-agency review.

595 K. Snead and N. Azzam note that the inclusion of SOP # 123 with Case Study 2 will
596 prompt revisions of current powerplant SOPs to comply with MARSAME. C. Bias
597 explains his hesitation at including this SOP with Case Study 2, as it will be seen as a
598 policy-changer and will prompt revisions of current powerplant SOPs (R. Meck
599 addressed the substantial costs associated with revisions of this nature for powerplants at
600 the February work group meeting). N. Berliner defends the format of the SOP as being
601 based upon the structure in EPA QA/G-6, and that as stated in EPA QA/G-6, it represents
602 one possible format for an SOP. A. Williams suggests placing a disclaimer in the
603 introduction to Chapter 7 that this is one possible format. R. Bhat suggests making one
604 SOP a stand-alone document; R. Meck agrees. S. Doremus counters this suggestion by
605 outlining an example where you have lots of radiologically-controlled areas in a single
606 facility, and you want the SOPs to be applicable to all of them. It will also state that only

607 one SOP is included and that others are fictitious. This information will be included in
608 the introduction to Chapter 7, which will describe the purpose of each case study.

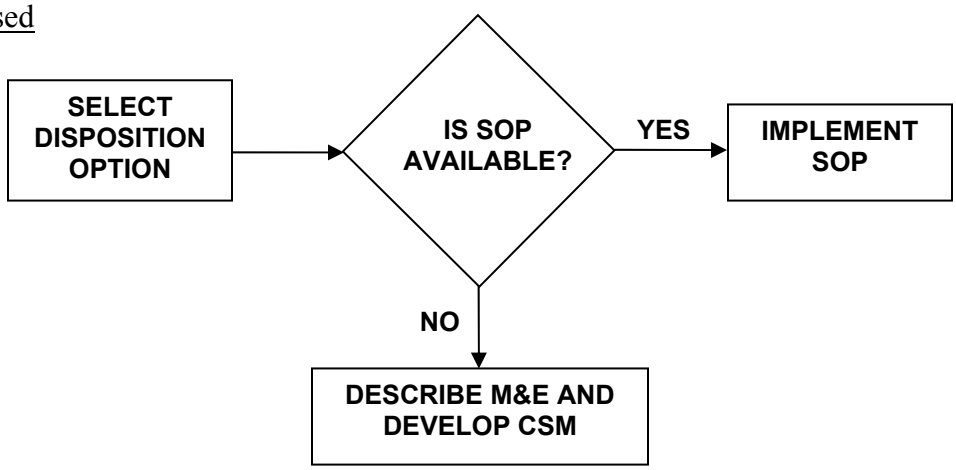
609 C. Bias comments on the structuring of Case Study 2, noting that the section progression
610 from Section 7.3.3.2 ("Select a Disposition Option") to Section 7.3.3.3 ("Select an
611 Appropriate SOP") is a departure from the current Chapter 2 flowchart (Figure 2.1)
612 format. He continues that following the flowchart literally, the M&E should be described
613 and documented prior to selecting an SOP. S. Doremus and C. Bias debate the
614 description and documentation of the M&E prior to the application of an SOP, as S.
615 Doremus fears this will make the process restrictive. C. Bias and R. Meck favor
616 following the flowchart to the letter for the sake of providing an example that walks the
617 MARSAME reader through the process step-by-step, and reassure S. Doremus that this
618 will not complicate the actual process for technicians performing surveys. C. Bias
619 suggests including text stating that we are streamlining the MARSAME process here, and
620 although not every step is listed in the documentation, they have all been considered and
621 addressed. C. Bias and R. Meck then suggest revising the flowchart so that the M&E
622 does not have to be described and documented if you have an applicable SOP. C. Bias
623 illustrates the changes to the Chapter 2 flowchart as follows:

Existing




624

Revised

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626 The work group accepts C. Bias' proposed changes to the Chapter 2 flowchart.

627 REMOVABLE ACTIVITY DISCUSSION

A. Williams notes that DOE is trying to get away from sampling for removable activity, and had asked Argon National Laboratory for some direction in putting together an alternative method for estimating removable activity. Argon informed DOE that inhalation represents the most prevalent exposure pathway for alpha activity, making airborne radioactivity very important and sensitive as an estimate for removable activity. K. Snead notes that at the most recent ISCORS meeting C. Petullo had remarked that the MARSSIM work group was moving completely away from smears as a data source in MARSAME. (C. Petullo revisited Section 2.2.4 and realized that she inadvertently jumped from sentinel measurements to smears.) K. Snead adds details of a discussion she and L. Bender had regarding the fact that the current track of MARSAME completely ignores smears and removable activity as a characterization method, with the exception of a mention of smears in the section in Chapter 2 devoted to sentinel measurements. L. Bender observed this is a somewhat flawed approach, as this represents a potentially crucial data source, particularly in the case of $^{3}H$, $^{14}C$, and $^{63}Ni$.

R. Meck addresses action levels for removable radioactivity, stating that if you assume all measured contamination is removable, then you have covered all the bases. K. Snead asks if it is regardless still dangerous to close the door on removable contamination, as it does represent a data source and the technology to sample for removable radioactivity will improve in time. The work group discusses this point, and decides that MARSAME does need to allow wiggle room for future removable radioactivity characterization methods. R. Meck and C. Bias remind the work group that the use of smears is currently documented in Section 2.2.4 ("Perform Sentinel Measurements"). R. Bhat and A. Williams raise concern over the fact that it is very difficult to survey for $^{3}H$, $^{14}C$, and $^{63}Ni$ without the use of smears. S. Hay notes that these radionuclides can all be detected using lab analysis, but he concedes that a 100% scan will not work for any of these radionuclides. A. Williams notes that the work group is struggling with this issue, and that there is no consensus. K. Snead suggests that a section for smear sampling may be appropriate for Chapter 5.

**PARKING LOT:** Inclusion of a section for smear sampling in Chapter 5. Provide pros and cons discussion for including a smears section.

SCHEDULE

The work group decides that the next work group meeting will be planned around C. Gogolak's availability at K. Snead's suggestion because of the importance of his role in developing Chapter 6.

C. Petullo states that she would like to stay with the current schedule for the next meeting (to be held April 25 to 29), unless C. Gogolak is unavailable. As both R. Meck and C. Petullo are unavailable in May, if C. Gogolak is unavailable for the April meeting, the next meeting will be in June (June 13 to 17). S. Hay comments that Cabrera can write Chapter 6, but that the schedule for other deliverables will be disrupted and will need to be rearranged if Cabrera is tasked with writing Chapter 6. Another option is to have CABRERA work on deliverables for the June meeting. C. Petullo will contact C. Gogolak on Monday, April 4, 2005 to determine whether he will be able to author Chapter 6, and

670 arranges a conference call for 1300 to 1400 on Wednesday, April 6, 2005 to debrief the
671 work group. She asks K. Snead to set up a conference call line.

672 Current status of chapters:

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|---|---|
| Chapter 1 | Delayed until the rest of the chapters are finished |
| Chapter 2 | Close to being ready (near final), about one week of work to finish |
| Chapter 3 | Close to being ready (near final), about one week of work to finish |
| Chapter 4 | Close to being ready (near final), about one week of work to finish |
| Chapter 5 | Require a substantial rewrite to prepare Revision 7 |
| Chapter 6 | Requires an outline and first draft |
| Chapter 7 | Requires revisions to Case Studies 1 and 2, first draft of Case Study 3 |

673 A. Williams suggests using Chapter 6 from NUREG-1761 ("Data Quality Assessment")
674 as the basis for the statistics in MARSAME Chapter 6. As NUREG-1761 was written by
675 C. Gogolak, E. Abelquist, and R. Coleman, the statistics would probably be very close to
676 the content we would have for MARSAME. A decision will be deferred until after the
677 teleconference on April 6.

678 The work group decides future meetings will be held during the following weeks:

679 • June 13 to 17
680 • July 25 to 29
681 • August 22 to 26
682 • September 26 to 30 (Inter-agency Review Approval)

683 S. Hay notes that Cabrera's period of performance ends on May 31, and that work after
684 that date is not funded. C. Bias responds that if Cabrera puts in for an extension,
685 additional funding is in-house at the Air Force already and will be allocated.

686 C. Petullo establishes June 1 as the deadline for a draft of Chapter 6. A. Williams notes
687 that Chapter 6 is a critical path (while Case Study 3 is non-critical). S. Hay comments
688 that Cabrera can finish Chapters 2, 3, 4, 5, Case Studies 1 and 2, and Appendices B and C
689 with the current funding. C. Bias asks if there will be an additional iteration (i.e.
690 Revision 8) of Chapter 5 prior to inter-agency review. S. Hay responds that once Cabrera
691 receives comments on the upcoming Revision 7, a Revision 8 will be able to be prepared
692 before the document goes out for inter-agency review (goal for inter-agency review is
693 September 2005).

694 S. Hay and N. Berliner leave the room so that the work group members can discuss
695 administrative issues.

696 ADJOURN

## ACTION ITEMS

| | |
|---|---|
| R. Bhat | Examine survey list from 3/29/05 meeting and include it on the MARSSIM work group web site if it is appropriate. |
| R. Meck | Email ORISE study pertaining to instrument temperature ranges to N. Berliner to support the ruggedness sections in Chapter 5. |
| | Check with NRC officials if it is acceptable to place side boxes for key points in MARSAME per a C. Bias suggestion. |
| C. Gogolak | Review scenario for categorizing M&E in Case Study 1 and determine if it is a valid statistical approach. |
| N. Azzam | Design schematic line drawings based on the three figures in Chapter 5. |
| A. Williams | Locate example DOE SOPs for work group use. |
| | Prepare table providing typical detector types and ranges (per question box in both scanning and direct measurements with hand-held instruments sections). |
| | Determine if DOE will allow MARSAME to use the physical Figure IV-1 (Surface Contamination Guidelines) from DOE Order 5400.5, rather than just referencing the figure (this reference is on line 59). |
| N. Berliner | Include example of job safety analysis or activity hazard analysis in Revision 7 of Chapter 5. |
| | Complete revision Revision 7 of Chapter 5. |
| | Provide draft of Case Study 3. |
| S. Hay | Complete revision Revision 7 of Chapter 4. |
| | Provide draft of Chapter 6. |
| S. Hay/N. Berliner | Find handling versus segregation in the minutes from previous meetings to direct the context of these sections. |

## PARKING LOT

Class 3 definition in MARSSIM may need adjustment to cover the "simple" case where the relative shift is very large, which may become the definition of Class 3.

Develop an FAQ on classification to decide when an area is Class 2 and not Class 1 or Class 3.

Given a classification of Class 2 or Class 3, provide a % scan to release. Determine whether scan coverage can be 0% in Class 3 areas.

Should MARSAME include prior knowledge (process knowledge) to design a disposition survey using a Bayesian approach?

Develop a range of expected values for radionuclide relationships that may be used for surrogate measurements.

Review the structure of Section 3.2.4.

Where are survey unit boundaries finalized, Chapter 3 or (new) Chapter 4?

Perform a pilot study to evaluate the MARSAME guidance. Suggested locations include Nellis AFB and Hunters Point Naval Shipyard. OSWER may perform pilot study for chemical contaminants.

Include the concept of "clean-as-you-go" in MARSAME.

Develop an FAQ on reliability of individual scanning instruments and other equipment (e.g., global positioning system) used to collect data during radiological surveys.

Develop tables summarizing the important examples from the Case Studies.

A Chapter 2 revision comment by S. Doremus from the web site brings up the issue of ROPCs versus ROCs, i.e., the initial versus final list of radionuclides of concern. Chapter 2 states the list of radionuclides of concern may be expanded, reduced, or remain the same based on the results of preliminary surveys.

Inclusion of a section for grappling hook detectors in Chapter 5.

Inclusion of a section for smear sampling in Chapter 5.