CHAPTER 13

Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM)

13-1. Introduction. The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) provides detailed guidance for planning, implementing, and evaluating environmental and facility radiological surveys conducted to demonstrate compliance with a dose- or risk-based regulation. The MARSSIM guidance focuses on the demonstration of compliance during the final status survey following scoping, characterization, and any necessary remedial actions.

13-2. Data Life Cycle. The process of planning the survey, implementing the survey plan, and assessing the survey results prior to making a decision is called the Data Life Cycle. MARSSIM provides detailed guidance on developing appropriate survey designs using the Data Quality Objectives (DQO) Process to ensure that the survey results are of sufficient quality and quantity to support the final decision. The survey design process is described, and guidance on selecting appropriate measurement methods (i.e., scan surveys, direct measurements, samples) and measurement systems (i.e., detectors, instruments, analytical methods) is provided. Data Quality Assessment (DQA) is the process of assessing the survey results, determining that the quality of the data satisfies the objectives of the survey, and interpreting the survey results as they apply to the decision being made. Quality Assurance and Quality Control (QA/QC) procedures are developed and recorded in survey planning documents, such as a Quality Assurance Project Plan (QAPP). MARSSIM does not provide guidance for translating the release criterion into derived concentration guideline levels (DCGLs). DCGLs must be coordinated with the stakeholders. DCGLs must include a $DCGL_W$, the average concentration of radionuclides in an area, the area over which the $DCGL_W$ may be averaged, and a $DCGL_{EMC}$, the maximum concentration acceptable in a small localized area.

a. MARSSIM discusses contamination of surface soil and building surfaces in detail. If other media (e.g., ground water, surface water, subsurface soil, equipment, vicinity properties) are potentially contaminated at the time of the final status survey, modifications to the MARSSIM survey design guidance and examples may be required. Figure 13-1 provides a diagram of the data life cycle within the MARSSIM process. Figure 13-2 provides a flow diagram for final status survey design.

b. MARSSIM defines the limits of a site, then classifies areas of the site as impacted or non-impacted. Areas that have no reasonable potential for residual contamination are classified as non-impacted. Areas with some potential for residual contamination are classified as impacted. Impacted areas are further divided into one of three classifications:

(1) Class 1 Areas. These are areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiation surveys) above the $DCGL_W$. Examples of Class 1 areas include: 1) site areas previously subjected to remedial actions, 2) locations where leaks or spills are known to have occurred, 3) former burial or disposal sites, 4) waste storage sites, and 5) areas with contaminants in discrete solid pieces of material and high specific activity.

(2) Class 2 Areas. These are areas that have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the $DCGL_W$. To justify changing the classification from Class 1 to Class 2, there should be measurement data that provide a high degree of confidence that no individual measurement would exceed the $DCGL_W$. Other justifications for reclassifying an area as Class 2 may be appropriate, based on site-specific considerations. Examples of areas that might be classified as Class 2 for the final status survey include: 1) locations where radioactive materials were present in an unsealed form, 2) potentially contaminated transport routes, 3) areas downwind from stack release points, 4) upper walls and ceilings of buildings or rooms subjected to airborne radioactivity, 5) areas handling low concentrations of radioactive materials, and 6) areas on the perimeter of former contamination control areas.

(3) Class 3 Areas. These are areas any impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the $DCGL_W$, based on site operating history and previous radiation surveys. Examples of areas that might be classified as Class 3 include buffer zones around Class 1 or Class 2 areas, and areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification.

(4) Summary. Class 1 areas have the greatest potential for contamination and therefore receive the highest degree of effort for the final status survey using a graded approach, followed by Class 2, and then by Class 3. Non-impacted areas do not receive any level of survey coverage because they have no potential for residual contamination. Non-impacted areas are determined on a site-specific basis.

c. MARSSIM then assists in determining the number and quality requirements of data collected, and provides statistical tests to ensure that sufficient data are collected so a defensible decision to remediate further or determine no further action for the site can be made. The statistics also take into account the stakeholder negotiated decision errors.

d. While MARSSIM is designed primarily to address the final status survey of a site, the methodologies and statistical tests are applicable to scoping surveys, characterization surveys, and remedial action surveys. Additional multi-agency guidance is in draft which addresses sub-surface soils, equipment and debris release, and radiological laboratory accreditation.

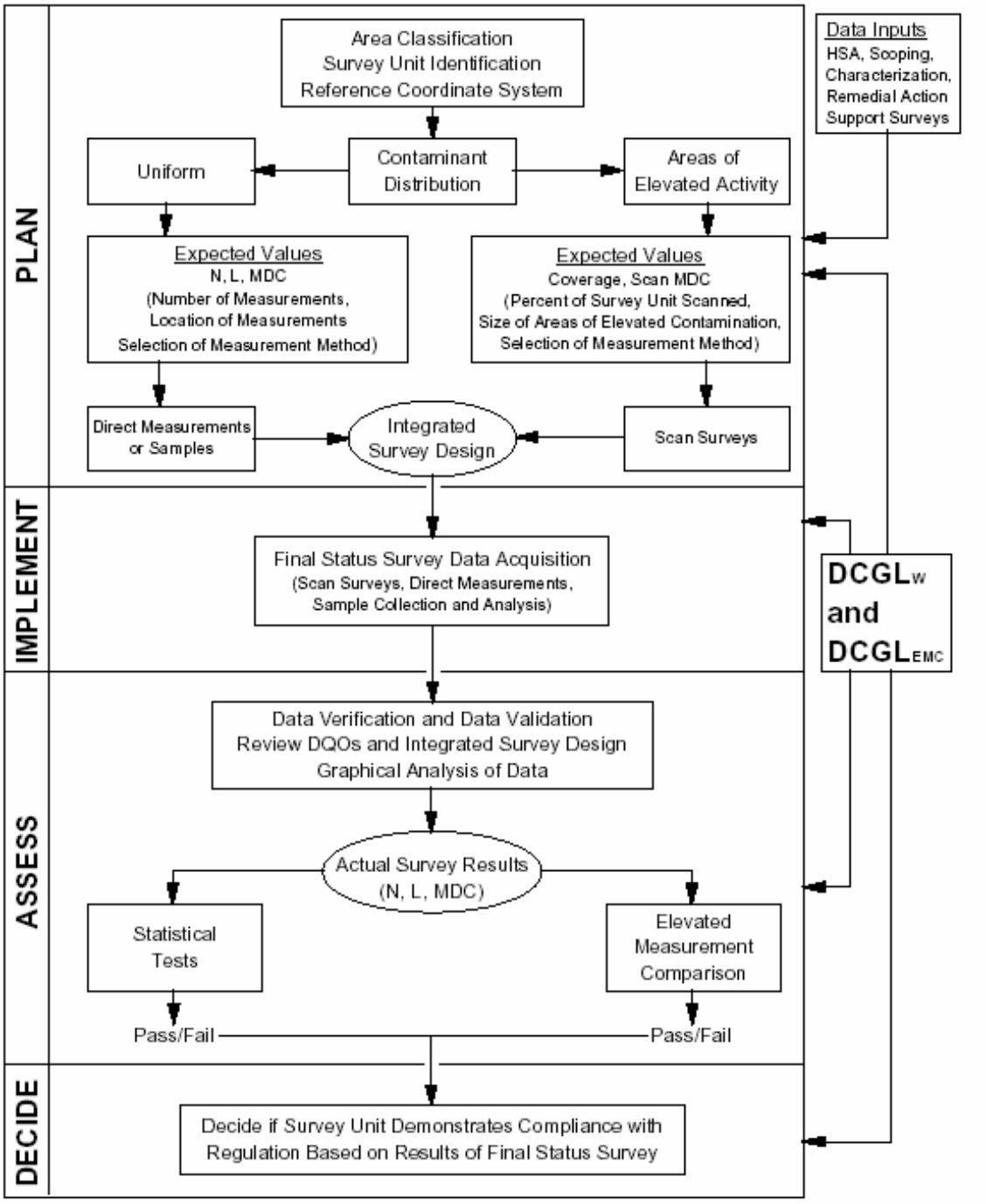

Figure 13-1. Data Life Cycle Applied to a Final Status Survey.

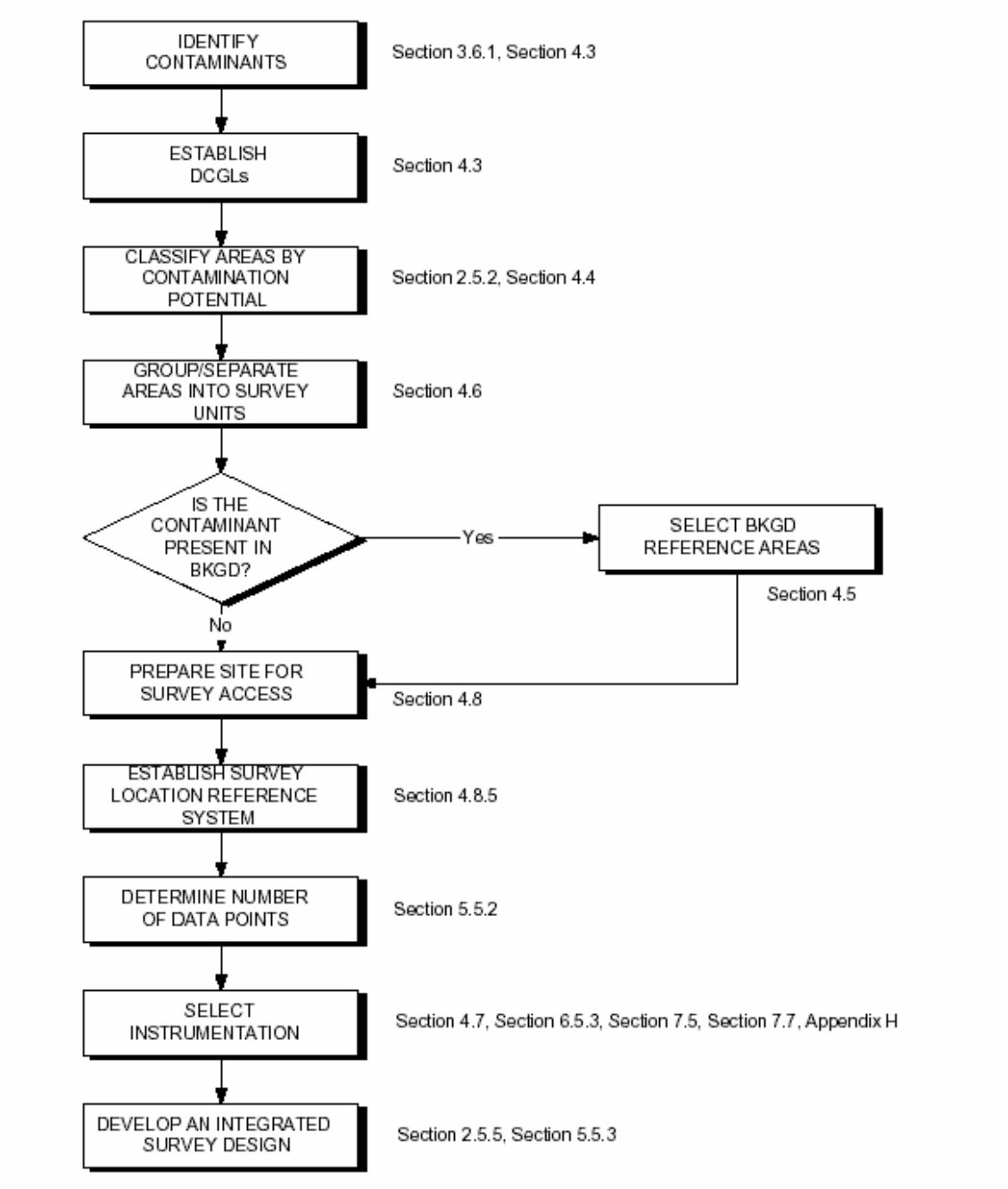

Figure 13-2. Flow Diagram for Designing a Final Status Survey.