3.0 ASSESSING THE RADIOLOGICAL STATUS OF THE SITE

The initial step in the decommissioning process is a preliminary assessment of the radiological status of the site. This assessment consists of:

- Identifying potential residual radioactive materials,
- Establishing the applicable release criteria,
- Determining the general locations and extent of activity, and
- Estimating the levels of activity.

Information from this assessment provides the basis for the licensee's decommissioning plan and the design for subsequent radiological surveys. This section describes the scoping of the site status. A flow diagram (Figure 3-1) and a checklist to assist the user in this assessment are included at the end of the section.

3.1 Document and History Review

The starting point in this assessment is a review of the site license and supporting or associated documentation, e.g. license conditions, license amendment applications, inspection records, material acquisition and disposal records, site maps and facility drawings, process flow charts, etc. These documents will specify quantities and chemical and physical forms of radioactive material authorized for possession, operations for which the materials could be used, locations of these operations at the site, and total quantities of material used at the site during its operating lifetime. Such records must be maintained by licensees, per provisions of 10 CFR 30.35 (g) 40.36 (f), and 70.25 (g), until the license is terminated by the NRC. Operating records will provide information on spills, fires or other incidents that may have resulted in the release or spread of radioactive contamination.

These records may also include previous radiological surveys, which will assist in identifying potentially contaminated areas. Records should also identify the locations of potential subsurface radioactivity from former waste processing and disposal operations which may have been conducted in accordance with previous provisions of 10 CFR 20.302 and 10 CFR 20.304.

Information concerning past site activities and potential residual activity beyond expected locations is often available from unofficial sources, such as interviews with senior or former employees and area residents, old photographs, and local newspaper articles. Ingenuity will be required in identifying such sources and extracting and evaluating the information obtained.

Sometimes facilities, particularly those that used radioactive materials prior to the advent of the Atomic Energy Commission licensing, have residual material on site from prior, unlicensed operations. In these cases, records may be sketchy or non-existent, but knowledge of the general type of operations at that site will assist in determining the radionuclides which would most likely be present.

3.2 Identifying Potential Contaminants

After the radioactive materials that were used at the site have been identified, the potential for residual contamination by these materials is evaluated. Site operations greatly influence the potential for residual contamination. An operation which only handled encapsulated sources, for example, would be expected to have a low potential for contamination, assuming that the integrity of the sources was not compromised. A review of leak-test records for such sources may be adequate to dispel concern for residual contamination. A chemical manufacturing process facility would likely have contaminated piping, ductwork, and process areas, with soil/land area contamination limited to locations where spills or leaks may have occurred. Sites using large quantities of radioactive ores and those with outside waste collection and treatment systems are more likely to have contaminated grounds. If loose, dispersible materials were stored outside or process ventilation systems were poorly controlled, then windblown surface contamination may be possible.

Consideration should be given to the amount of time that has passed since the site was in operation. Radionuclides with short half-lives may no longer be present in significant quantities, if enough time has elapsed since the site discontinued operations to allow for radioactive decay. In this case, calculations to prove that residual activity could not exceed guideline values may suffice, and surveys may not be required to demonstrate the site's radiological status, relative to license termination criteria. On the other hand, certain radionuclides, such as Th-232, may experience significant daughter product ingrowth, which must be considered in evaluating the potential residual contaminants at the time of decommissioning.

3.3 Identifying Potentially Contaminated Locations

Using information gathered from document and site history reviews and evaluation of potential contaminants, locations of likely residual contamination are identified. Such locations will include facilities or areas where radioactive materials were processed; where wastes were handled, stored, or disposed of; and where spills, fires, or other incidents occurred which may have released or spread contamination. These locations will be the principal targets for the scoping survey.

3.4 Performing the Scoping Survey

The scoping survey is performed to substantiate and, where necessary, better define the identity of potential radioactive contaminants and the general extent of residual activity. Based on the anticipated radionuclides, appropriate survey instruments are selected (refer to Section 5.0), and cursory measurements are conducted in suspect locations. These measurements typically consist of surface **scanning** (moving the detector at a consistent speed and distance near the surface) and measuring levels of direct radiation (surface activity and exposure rate) at representative points. Samples of surface soil and residues from surfaces, cracks, pipes, ducts, and other areas where contaminated material may have accumulated are collected and analyzed (refer to Section 7.0) for specific radionuclides. Bear in mind that these survey activities are more of a screening nature and are not intended to be as comprehensive or stringent as those required to demonstrate that final site conditions satisfy the release criteria. Results can, however, be utilized as valid data to supplement the final status survey reports, if appropriate procedures are followed and the subsequent decommissioning activities have not altered the survey location.

One of the most difficult situations to evaluate is the presence of buried materials or possible subsurface contamination. Such subsurface material is usually covered by several feet of soil and the surface may be paved over or may be the site of a building. Such conditions prevent detection of the residual activity by surface surveys only. Methods, such as ground penetrating radar or electromagnetic measurements, to identify subsurface anomalies or disturbances, are used. Subsurface sampling can also be performed. These procedures are, however, usually beyond the scope of the scoping survey; such information is typically collected during the characterization and/or final status survey.

3.5 Establishing Site Guideline Values

Evaluation of license and document review and analyses of samples from the scoping survey are used to identify the residual radionuclides at the site. If a single radioactive material or a combination of radioactive materials with the same guideline values were used at the site, the guidelines can then be selected from tables developed by the NRC. In many cases, however, multiple radionuclides with different guideline values are

present at the site; site-specific guidelines should then be established. The procedure for determining site-specific guideline values is described in Appendix A.

3.6 Comparison of Radiological Conditions with Guideline Values

Scoping survey results are compared with the site guideline values, and locations of contamination, if any, are identified. Findings of the assessment, describing the review and evaluation of pertinent documents and results of the scoping survey are documented for submission to the NRC. If, based on the radionuclides used and activities conducted, it can be demonstrated that residual contamination would not be possible, the NRC may determine that no further actions by the licensee are necessary. If residual contamination is possible, but no conditions exceeding guidelines have been identified, plans for conducting additional surveys to demonstrate that the final site status satisfied release criteria should be developed. If residual site contamination is identified, the licensee should develop and submit plans for characterizing and remediating contaminated locations and for conducting surveys to demonstrate that the final site status meets the guideline values and conditions.

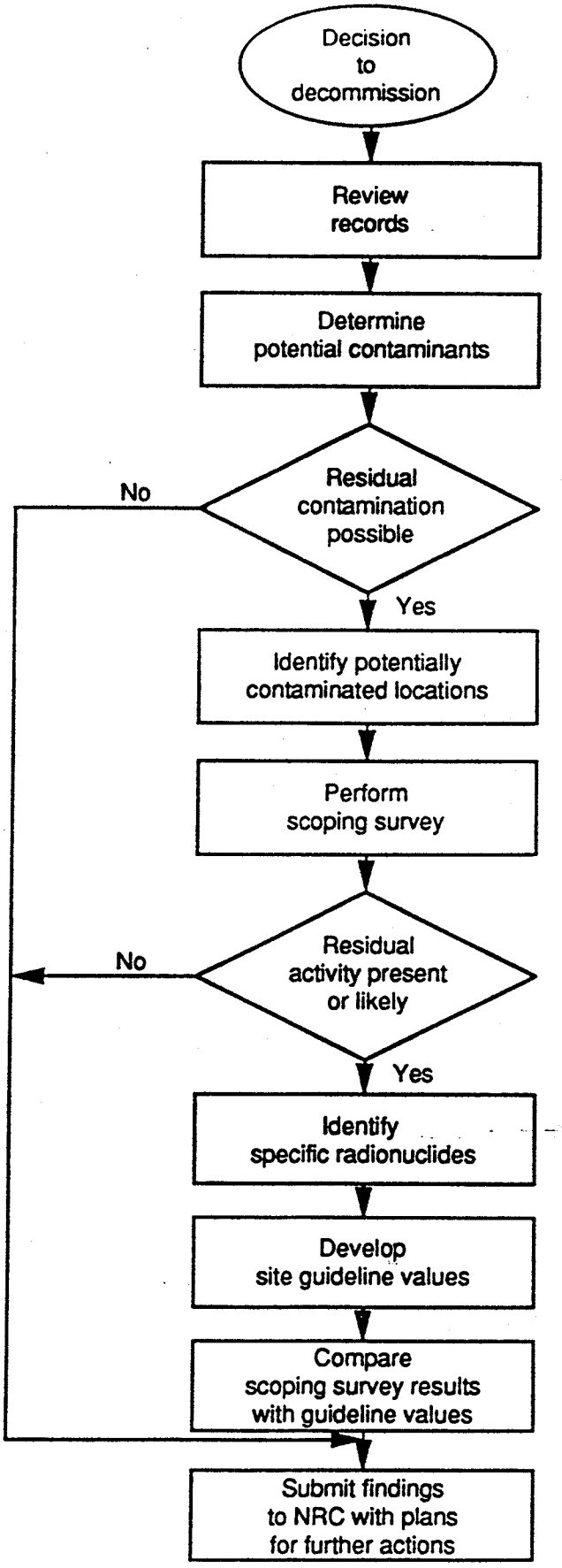

FIGURE 3-1: Flow Diagram for Assessing Site Status

Checklist for Conducting Assessment of Site Radiological Status

_____ 1. Review license operating records, documentation supporting license ammendment applications, and other pertinent documents.

_____ 2. Discuss site history with senior and former employees and others who may have information on past operations.

_____ 3. Identify radionuclides used.

_____ 4. Determine which radionuclides could be site contaminants.

_____ 5. Identify locations of likely residual activity.

_____ 6. Perform scoping survey.

_____ 7. Identify specific radionuclides at site.

_____ 8. Establish guideline values; develop site-specific guidelines if applicable.

_____ 9. Compare scoping survey findings with guideline values.

_____ 10. Prepare report to NRC identifying locations of contamination (if any) and describing plans for decontamination and/or further survey actions.