

# **EM Task 12 - Laser Cleaning of Contaminated Painted Surfaces**

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## **EM TASK 12 – LASER CLEANING OF CONTAMINATED PAINTED SURFACES**

### **EXECUTIVE SUMMARY**

Several techniques are available or under development for surface decontamination in nuclear facilities. Each technique has its merits; however, none of them is universally the best choice for all surface decontamination applications. Because of the multitude of factors which influence the environmental and economic aspects of selecting a surface decontamination technique, it is difficult to select the best method in a given situation; an objective basis for comparing techniques is needed.

The objective of this project is to develop a software tool for use by personnel selecting a surface decontamination technique. The software will incorporate performance data for available surface decontamination techniques.

The beta release of the Surface Decontamination Assistant Software has been completed and has undergone testing at the Energy & Environmental Research Center (EERC). Minor modifications to the software will be completed before the end of November 1998, and a final release of the software will be issued.

## EM TASK 12 – LASER CLEANING OF CONTAMINATED PAINTED SURFACES

### 1.0 INTRODUCTION

Surface decontamination of concrete and steel surfaces in nuclear facilities provides cost savings during decommissioning operations by allowing recycling or reuse of concrete and steel structures. Separation of radionuclides and other contamination from the concrete or steel substrates also allows reduction in volume of hazardous materials during the D&D process, resulting in further cost savings.

Several techniques are available or under development for surface decontamination in nuclear facilities. Each technique has its merits; however, none of them is universally the best choice for all surface decontamination applications. Some issues which confront an organization selecting a surface decontamination technique for a particular application include the following:

- Project scale
- Concrete or metal surfaces
- Contamination by radiological and other hazardous materials
- Stage of surface decontamination technology development (e.g., commercial, R&D)
- Equipment operating costs
- Collection of waste generated by surface decontamination
- Occupational health and safety requirements
- Utilities required for operations
- Real-time control of surface decontamination
- Recycling or reuse of decontaminated substrates
- Waste
  - Characterization
  - Classification
  - Transport
  - Storage
  - Treatment
  - Disposal
- D&D equipment decontamination

Because of the multitude of factors which influence the environmental and economic aspects of selecting a surface decontamination technique, it is difficult to select the best method in a given situation; an objective basis for comparing techniques is needed.

### 2.0 OBJECTIVES

The objective of this project is to develop a software tool for use by personnel selecting a surface decontamination technique. The software will incorporate performance data for available surface decontamination techniques.

The major activities in the project are broken down as follows:

- Task 1** Complete decision tree development
- Task 2** Literature search for surface decontamination reports
- Task 3** Compilation of database from literature data
- Task 4** Sensitivity analysis and model design
- Task 5** Design of model data structures
- Task 6** PC Software design and coding

### **3.0 ACCOMPLISHMENTS**

Tasks 1, 2, 3, and 5 were completed prior to the beginning of this reporting period; details of the accomplishments for these tasks are given in a previous report [1]. Tasks 4 and 6 were initiated and reported in the last semiannual report on this work [2]. Work during this reporting period has completed Tasks 4 and 6 to achieve a beta release of the Surface Decontamination Assistant Software.

#### **3.1 Task 4 – Sensitivity Analysis and Model Design**

Table 1 lists a set of inputs used to test the Surface Decontamination Assistant Software. Testing of the software at the Energy & Environmental Research Center (EERC) indicated that minor modifications to the computer codes were needed.

#### **3.2 Task 6 – PC Software Design and Coding**

Work during this reporting period completed a beta release of the Surface Decontamination Assistant Software for testing at the EERC. The software is currently undergoing some minor modifications to the model. Figure 1 shows the software.

### **4.0 FUTURE WORK**

The Surface Decontamination Assistant Software will be completed prior to the end of November 1998. Copies of the software will be released to individuals concerned with surface decontamination in the DOE complex. Feedback from the users will be requested and included in the final report on this work.

### **5.0 REFERENCES**

1. Grisanti, A.A; Jensen, R.R.; Allan, S.E. "EM Task 12 – Laser Cleaning of Contaminated Painted Surfaces," semiannual report for the period April 1 – Sept. 30, 1997; EERC publication, 1997.
2. Grisanti, A.A; Jensen, R.R.; Crocker, C.R. "EM Task 12 – Laser Cleaning of Contaminated Painted Surfaces," semiannual report for the period Nov. 1, 1997 – March 30, 1998; EERC publication, 1998.

TABLE 1

## Surface Decontamination Assistant Model Test Scenarios

Scenario No.	Total Surface Area, ft <sup>2</sup>	Coating Depth, in.	Removal Depth, in.	Hard to Reach, %
1	1000	0.03	0.03	10
2	10,000	0.03	0.03	10
3	1000	0.1	0.03	10
4	10,000	0.1	0.03	10
5	1000	0.03	1	10
6	10,000	0.03	1	10
7	1000	0.1	1	10
8	10,000	0.1	1	10
9	1000	0.03	0.03	50
10	10,000	0.03	0.03	50
11	1000	0.1	0.03	50
12	10,000	0.1	0.03	50
13	1000	0.03	1	50
14	10,000	0.03	1	50
15	1000	0.1	1	50
16	10,000	0.1	1	50



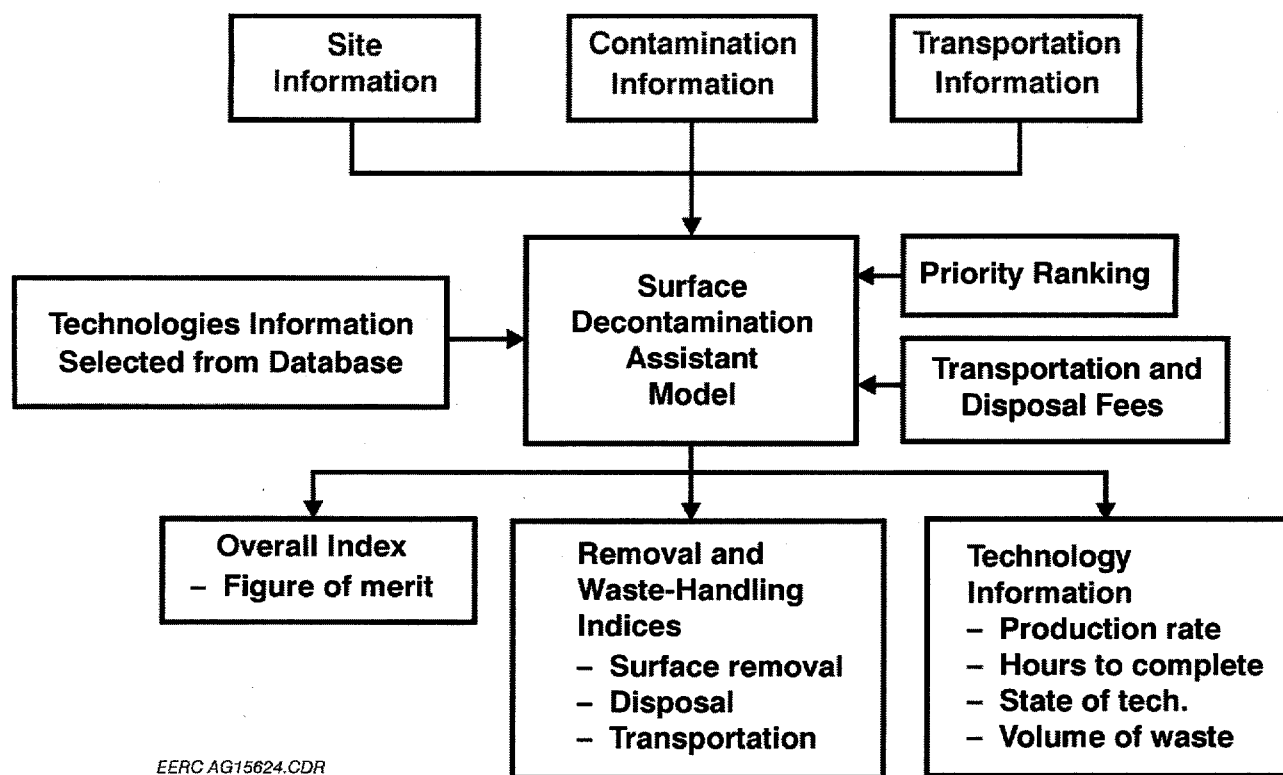


Figure 1. Surface Decontamination Assistant Software Architecture.