

Implementing the Cleanliness Program

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I. Introduction

The cleanliness program has five elements and four phases. The five, by now very familiar, elements¹⁻⁴ are:

1. Establishing Clean Conditions.
2. Delivering Clean Components to the Cavity.
3. Maintenance of Cleanliness During Construction.
4. Final Clean-up Measures.
5. Cleanliness during Operation.

The four phases are:

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| I. → Planning | 1988 to | 9/92 |
| II. Preparation for Implementation | 10/92 to | 5/93 |
| III. Implementation for Clean Construction | 6/93 to | 10/94 |
| IV. Implementation for Operation | 11/94 to | 6/95 |

Phase I entailed writing design criteria and specifications¹⁻⁵, R&D⁶, and in general developing an overall program to achieve our cleanliness requirements³. A document corresponding to each of the elements 1-4 has been prepared. Other cleanliness-related documents, such as the specifications for wall finishes⁷, procedures for the personnel entry⁸ and carwash⁹, have also been written. Phase I will be finished when the review of one remaining document has been completed.

Phase II, now beginning, consists of ensuring that what was planned in the first phase will be in place and functioning at the start of clean construction. Phase II means fleshing out what was outlined or developed in concept; it means attention to detail. This phase continues through the dirty construction period to the fine cleanup preceding the start of clean construction.

Phase III, which continues through clean construction until water is introduced in the cavity, will consist of a rapid learning curve, as initial procedures are refined or modified to meet the needs of actual construction. Most of Phase III should be characterized by regular cleanliness maintenance and monitoring.

Phase IV involves regular operation. In this case there may be a scaling back of cleanliness requirements in some parts of the laboratory and increased requirements in other parts. Detailed planning for this phase will come later.

The purpose of this note is to list tasks to be accomplished during Phase II. The following list is not necessarily exhaustive, but it should contain most of what needs to be done.

II. Tasks

A. Establishing Clean Conditions

1. Specify and acquire spray cleaning units to be used for the fine cleaning and subsequently in the carwash.
2. Specify and acquire all wet vacuuming systems and dry vacuuming equipment to be used in establishing and maintaining clean conditions.
3. Specify cleaning agents and procedures.
4. Estimate manpower required for the fine cleanup.
5. Specify and acquire boot cleaners.
6. Verify HVAC performance, HEPA filter integrity.

B. Personnel

1. Specify color coding of floors in personnel entry, carwash.
2. Design instructional signs for personnel entry and carwash.
3. Specify and acquire garmenting.
4. Arrange for space in INCO warm room for storage, handout, and retrieval of clean garments.
5. Specify and acquire double plastic bags for carrying lunch pail and clean garments.
6. Develop instruction materials and program for training employees in cleanliness procedures.

C. Equipment and Material

1. Determine cleaning procedures and cleanliness verification for equipment and material to remain in laboratory at the start of clean construction.
2. Acquire all equipment (not already in A.1. and A.2. above) and cleaning agents needed for car washing and drying.
3. Develop washing/drying procedures for containers and other kinds of transport packaging.

4. Work with groups supplying components (AV, PSUP, panels, PMT's, reflectors, cables, etc.) to see that criteria and procedures described in ref. 2 are followed.

D. Cleanliness Coordinator

1. Write detailed job description for Cleanliness Coordinator, determine qualifications needed at hire, and on-the-job training that will be necessary.
2. Decide on time to begin search, interview and selection procedure, and when to hire.

E. Monitoring Program

1. Specify and acquire air particle monitoring system, locations for monitoring, and protocol. Train Cleanliness Coordinator in air monitoring.
2. Design witness plates for monitoring dust deposition and specify locations throughout the laboratory.
3. Acquire equipment needed for surface dust measurement.
 - a. build x-ray fluorescence spectrometer and qualify it for use in Canada and underground at INCO.
 - b. refurbish Queen's U. optical microscope.
4. Train Cleanliness Coordinator in surface dust measurement techniques.
 - a. wipe tests.
 - b. visual tests and comparison with calibrated samples.
 - c. x-ray fluorescence spectrometer
 - d. microscope.
5. Develop protocol for surface dust measurements and for inspection of equipment and personnel entering the laboratory.

F. Janitorial Program

1. Estimate janitorial work that will be required once clean conditions are established.

G. Surface Assembly Facility

1. Specify cleanliness procedures to be followed for assembly of reflectors and PMT's into panels.
2. Garmenting, training of personnel in cleanliness procedures, etc., should be similar to that in section B.
3. Develop monitoring program.
4. Estimate janitorial work.

III. Assignment of Timelines and Responsibilities

The timelines for accomplishing these tasks will be dependent on the rest of the construction schedule. Responsibility for each task should be decided by a group of people involving SNO and Monenco personnel having an overview of the entire construction phase. The Cleanliness Coordinator, depending on job description, qualifications, and time of hire, may carry some of these responsibilities.

References

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4. "Final Cleanliness Measures: A Conceptual Plan," R.G. Stokstad, SNO-STR-92-023, July 1, 1992.
5. "Cleanliness Considerations for Construction of the SNO Detector," H.C. Evans and H.W. Lee, SNO-STR-88-73, June 10, 1988.
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7. "Laboratory Wall and Ceiling Finish Specifications," E. D. Hallman and H.C. Evans, SNO-STR-91-067, November 15, 1991
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9. "Procedures for the Car Wash," R. G. Stokstad, SNO-STR-92-52, July 14, 1992.