NES

# BUILDING 20

# RADIOLOGICAL CHARACTERIZATION PLAN

# FOR

# CHEMETRON CORPORATION

PREPARED BY

NUCLEAR ENERGY SERVICES, INC.

JANUARY 7, 1991

BUILDING 20
RADIOLOGICAL CHARACTERIZATION PLAN
FOR CHEMETRON CORPORATION

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LIST OF FIGURES

## 1. INTRODUCTION

The radiological characterization plan herein is limited to the structure located at Harvard Avenue known as building 20. Presently, McGean-Rohco Inc. owns and operates building 20. Radiological characterization of building 20 will be used to assess the following:

- the extent and location of radioactive contamination within the building and along its outer structure
- the type of contamination (fixed vs. loose surface) and its accessibility
- the appropriate techniques and equipment for decontamination

The information obtained from this characterization will be used to estimate the decommissioning effort required to prepare building 20 for unrestricted release in accordance with NRC guidelines.

## 2. PURPOSE

The purpose of the radiological characterization plan is to describe the surface methodology of building 20. A thorough characterization is necessary to ensure that areas requiring decontamination are identified and that the building will be suitable for NRC unrestricted release as described in "Guidelines for Decontamination of Facilities and Equipment prior to Release for Unrestricted use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material, August 1987."

Site specific radiological procedures have been developed for use as part of this plan to ensure that standardized methodology and documentation is used throughout the characterization. Based on interim findings, additional surveys may be required to ensure that an adequate assessment of building 20 is performed. Also, minor modifications to this characterization plan may be necessary based on these interim findings. If such circumstances arise, field changes can be made to the original plan to minimize time loss during radiological characterization.

## 3. SITE SETTING

Building 20 is located on the McGean-Rohco Chemical Corporation property at 2910 Harvard Avenue south of downtown Cleveland, Ohio (see Figure 1). This building is adjacent to the land mass known as the Harvard Avenue site, as shown in Figure 2.

The suspect portion of building 20, consisting of segments 20A, B and C shown in Figure 3 are used to batch process a variety of chemicals as the need arises. The new addition at the rear of building 20 (Figure 3) is used for chrome-plating materials.

Building 20 is basically a brick and cinder block 1 1/2 story edifice with a corrugated metal high-bay addition in the rear. The main portion of the building dates back to the 1930's.

## 4. COMPONENTS OF THE RADIOLOGICAL CHARACTERIZATION

### 4.1 Building Preparation

Any materials temporarily stored within building 20 such as drums or other containers will be subject to a brief survey and moved to a protected area. This will maximize the available unobstructed floor and lower wall space for survey.

Building 20 is physically separated into 4 segments as shown in Figure 3. A variable size grid system will be used on all structural surfaces within the first three segments. The grid system will comply with the recommendations of NUREG/CR-2082, "Monitoring for Compliance with Decommissioning Decontamination Survey Criteria." The majority of the building surfaces will be divided into a 3m by 3m grid size. Lower walls and the adjacent floor perimeters will be comprised of a smaller 1m by 1m grid pattern due to the higher probability of these areas being contaminated. Due to the unusual size of such areas as the catwalks and stairs, the grid size will be adapted to the structure being surveyed.

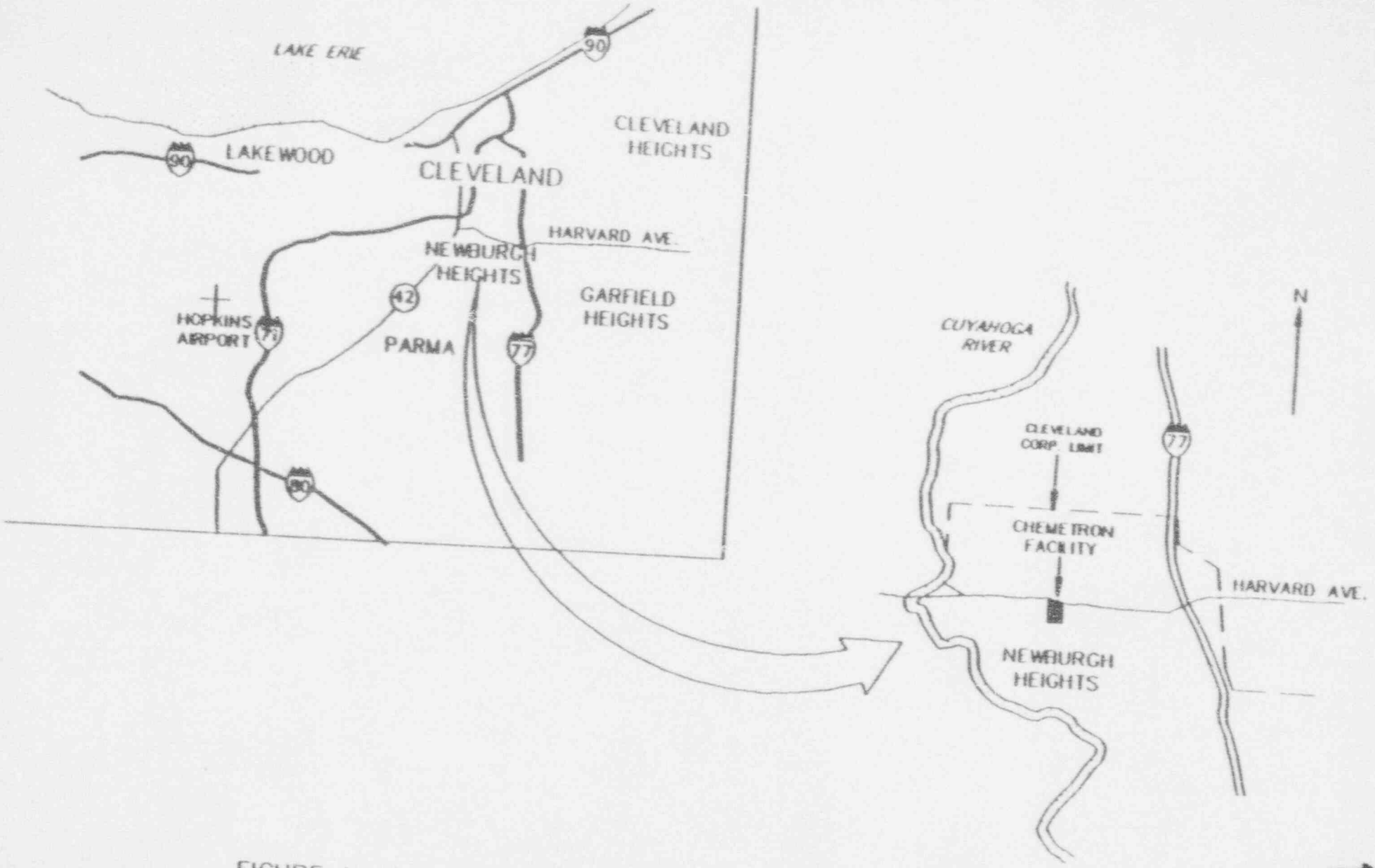



FIGURE 1: Cleveland, Ohio Area, Indicating the Location of Chemetron's Harvard Avenue Site

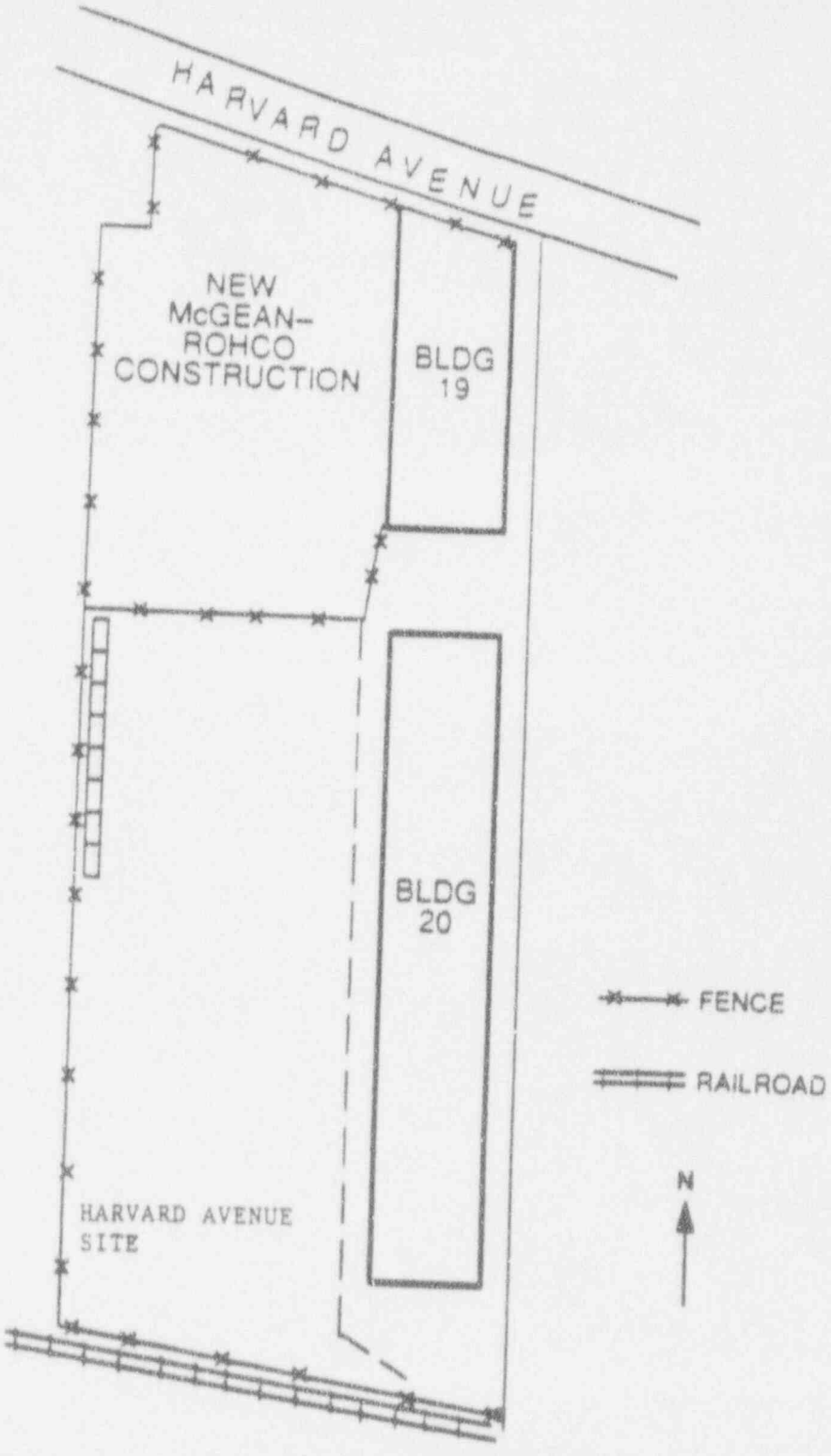



FIGURE 2

BUILDING 20 SITE MAP

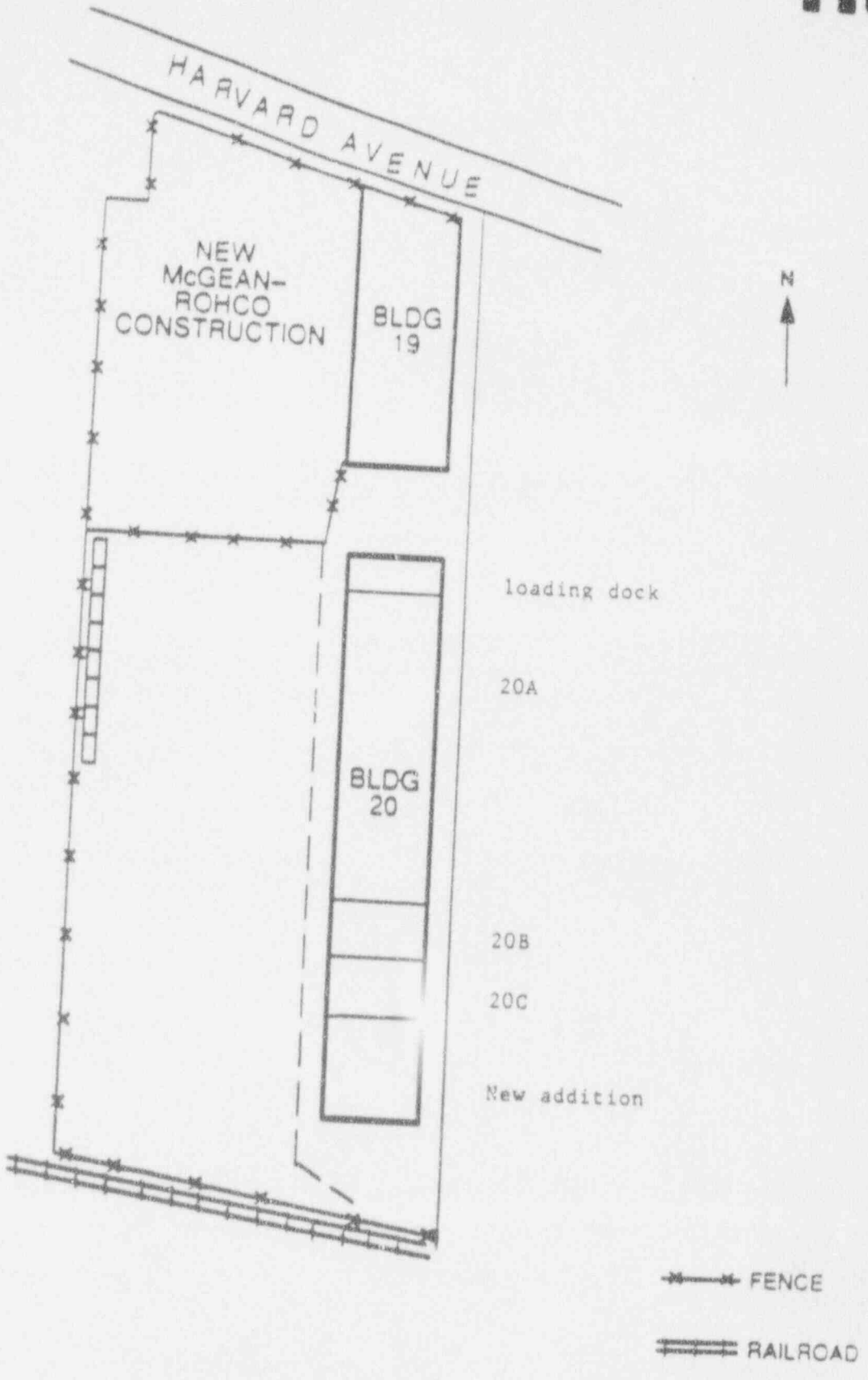



FIGURE 3

BUILDING 20 SEGMENTS

Grids will be marked in accordance with the attached NES Procedure No. 1 using a chalk-line, spray-paint or other acceptable method.

The new addition to building 20 will not be formally gridded for survey since it is a new construction and not expected to be contaminated. However, should either loose or fixed contamination be found in several areas within this segment of building 20, a formal grid system will be established and a thorough survey performed.

Paperwork needed to support the radiological survey for building characterization will include survey maps identifying grids and any structures or components within the grid. All survey maps will be prepared on blank NES survey forms and used in the field for raw data transcription during survey. These survey maps will accompany survey sheets listing the data in tabular form. Information specific to the survey instruments used and the surveyor will also be recorded. The survey map and sheet are shown in NES Procedure Nos. 2, 3 and 4 attached.

4.2 Baseline and Background Determination

Direct background radiation measurements will be made within several nearby buildings of similar construction for comparison with the ambient measurements in building 20. Approximately 20 measurements will be made within building 20 to determine the average ambient background present in that building. NES Procedure No. 2 will provide additional information for the acquisition of these measurements.

4.3 Surface Survey

Surface surveys will be performed within each grid to detect the presence of alpha and/or beta-gamma contamination on surfaces. Integrated counts of approximately 1 minute each will be taken at each grid intersection, the grid center and suspect spots within each grid. If no spots are considered by the surveyor as suspect, random spots will be selected. A minimum of five (5)

spots within each grid will be surveyed in accordance with the applicable NES Procedure Nos. 3 and 4 to ensure adequate coverage of the grid area.

Alpha direct surveys will be performed using survey meters accompanied by a ZnS scintillation probe. Beta-gamma surveys will utilize survey meters with pancake-type GM probes. Masslin wipes and smears will be used to identify and quantify areas with loose surface contamination. Smears will be taken within each grid and additionally in suspect areas. Smears will be counted for alpha and beta-gamma contamination in accordance with the applicable NES procedure.

Contaminated areas will be considered as those areas which exceed the criteria of Table 1 from the NRC document, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material, August 1987."

4.4 Material Sampling

Both random and suspect areas of walls, floors and ceilings will be sampled for laboratory analysis by collecting a small, physical sample. These samples may include paint, brick or concrete chips, small pieces of wood, wallboard, ceiling and roofing materials.

In all, approximately 70 physical samples will be collected from building 20. All samples collected will be analyzed by gamma spectroscopy.

As identified during surveys, sludge and floor debris as well as sump and drain materials will be sampled and analyzed by gamma spectroscopy.

Although not included as part of this initial characterization plan, excessive floor contamination or evidence of downward migration into cracks or other uncontrolled floor openings may warrant core boring to determine the extent of contamination. A recommendation for core boring will be made, as necessary, only as a last alternative.

## 5. IMPLEMENTATION OF THE RADIOLOGICAL CHARACTERIZATION PLAN FOR BUILDING 20

NES will maintain the responsibility for implementation of this radiological characterization plan. All work associated with this plan will be performed by NES personnel.

NES will coordinate with McGean-Rohco to ensure that the characterization work performance does not hinder operations within building 20. No work will be performed by NES without prior notification of McGean-Rohco for access authorization.

## 6. RECORDS AND REPORTS

Field data, notes, instr ent calibration certificates and serial numbers as well as laboratory analysis data d other pertinent information will be maintained by NES.

Data retention will occur in a variety of forms including survey maps and standardized survey forms.

Records will be locked in a secure storage area to protect them from loss or damage.

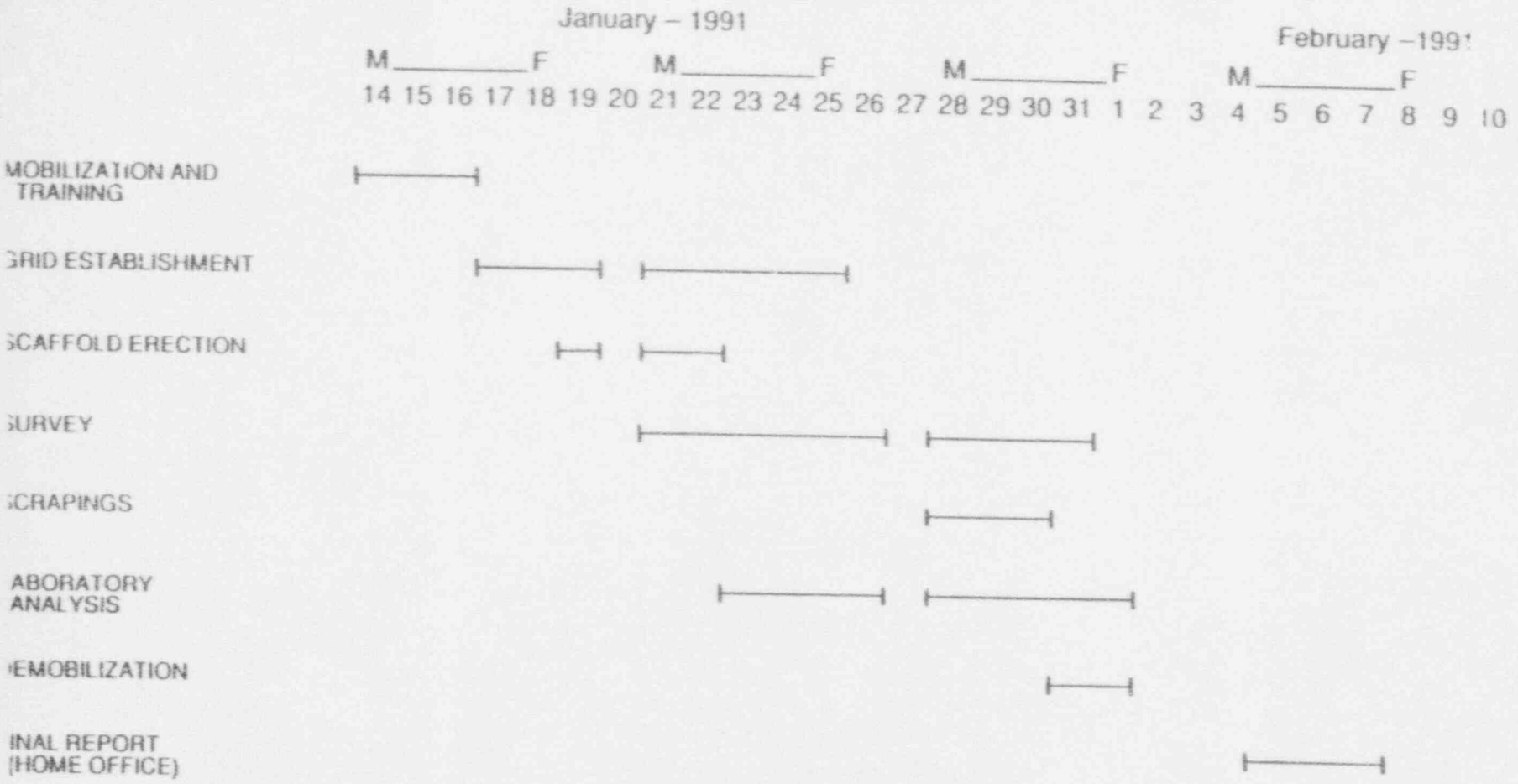
Data obtained during the radiological characterization of building 20 will be tabulated and reviewed by NES. NES will issue a final report documenting the characterization. This report will also provide (if necessary) the guidance necessary for remediation of the residual contamination within the building.

## 7. SCHEDULE

The building 20 characterization schedule presented in Figure 4 depicts the chronological sequence of activities for performance of the overall radiological characterization of that building.

The January 14th start date was chosen to provide an example start point for characterization.

This schedule will support the March 1, 1991 overall remediation plan submittal to the NRC but alternative schedules may be considered.




**SAMPLE CHARACTERIZATION SCHEDULE**
**BUILDING 20**
**FIGURE 4**

BUILDING 20
RADIOLOGICAL CHARACTERIZATION PLAN
FOR CHEMETRON CORPORATION

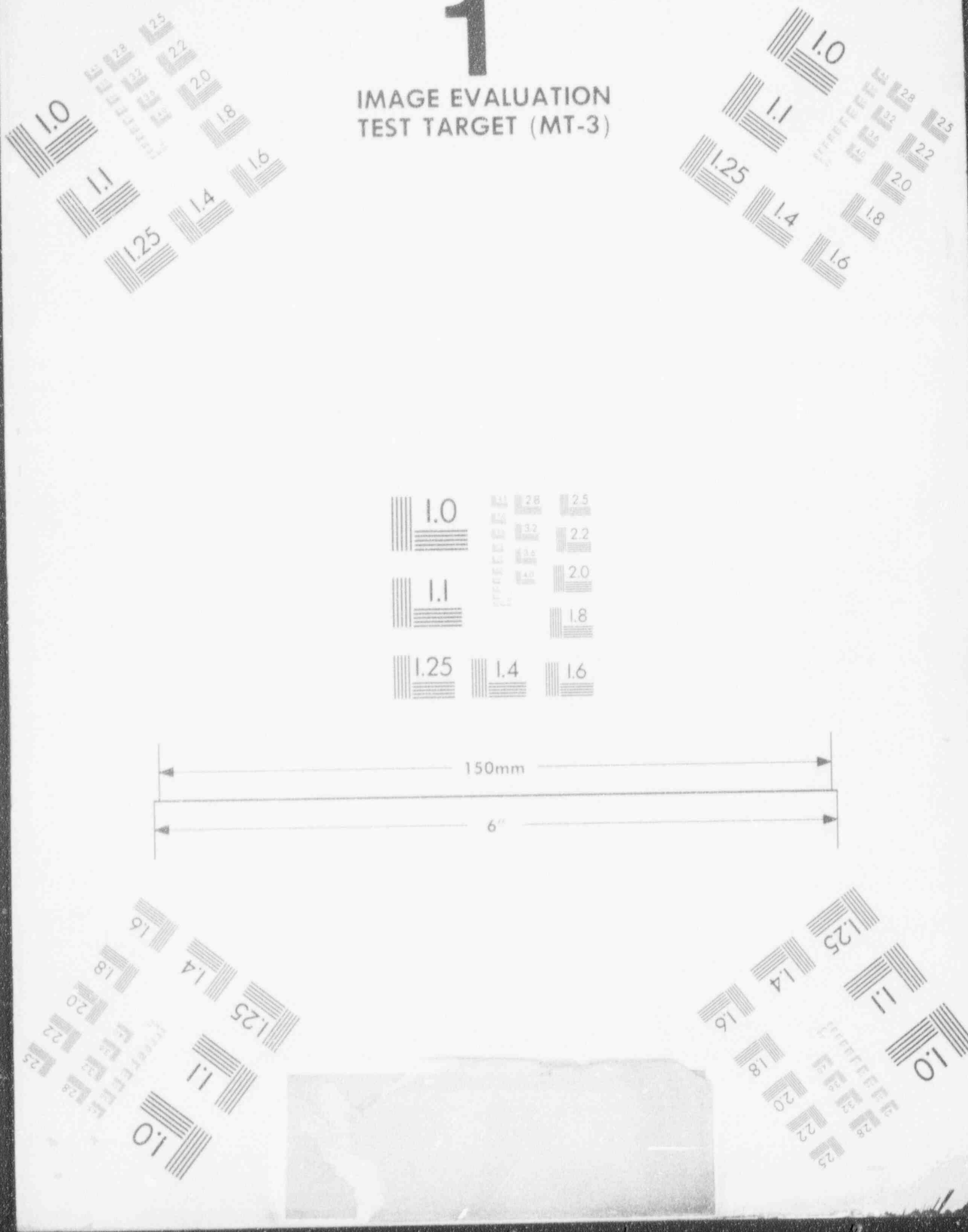
APPENDIX A

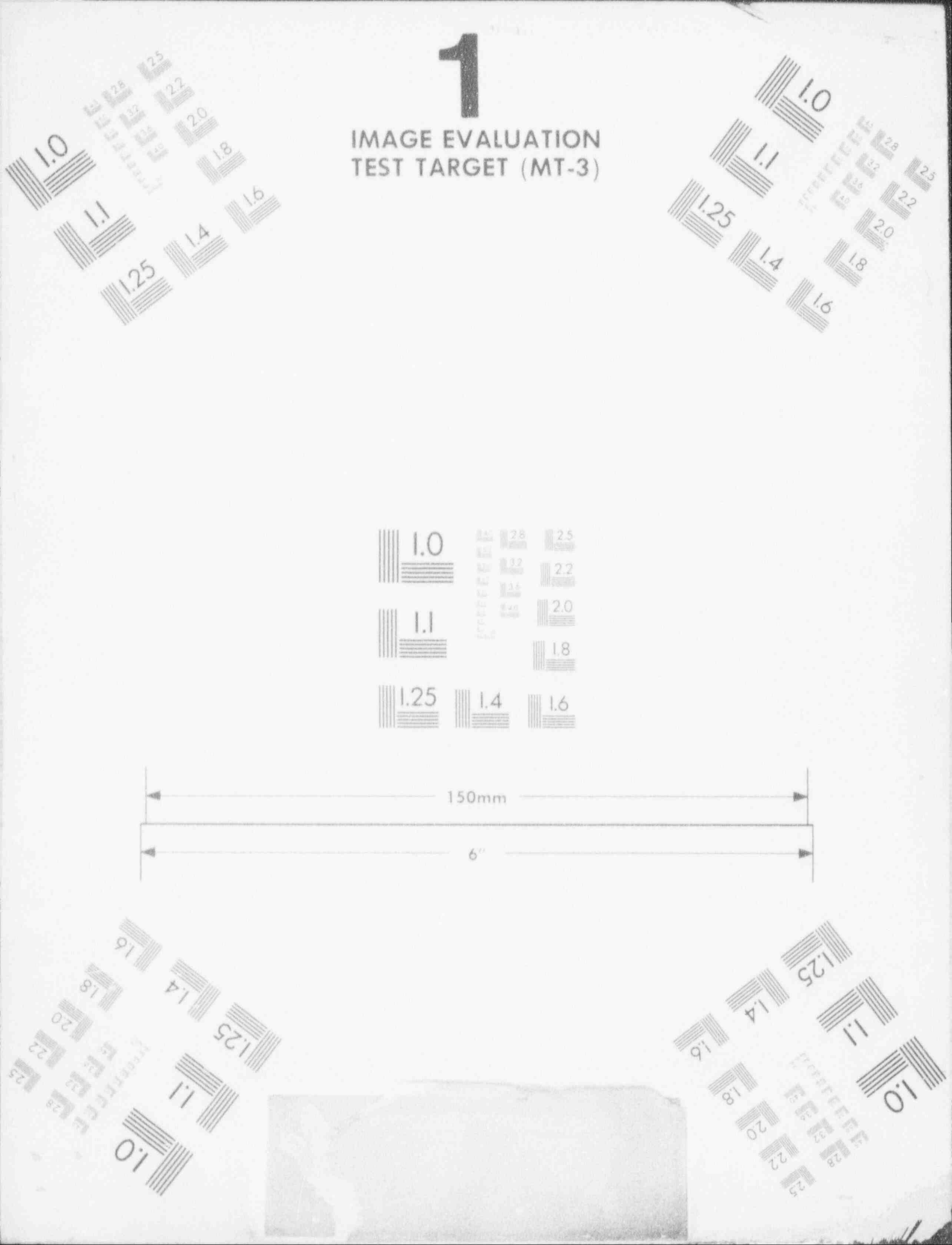
LIST OF PROCEDURES

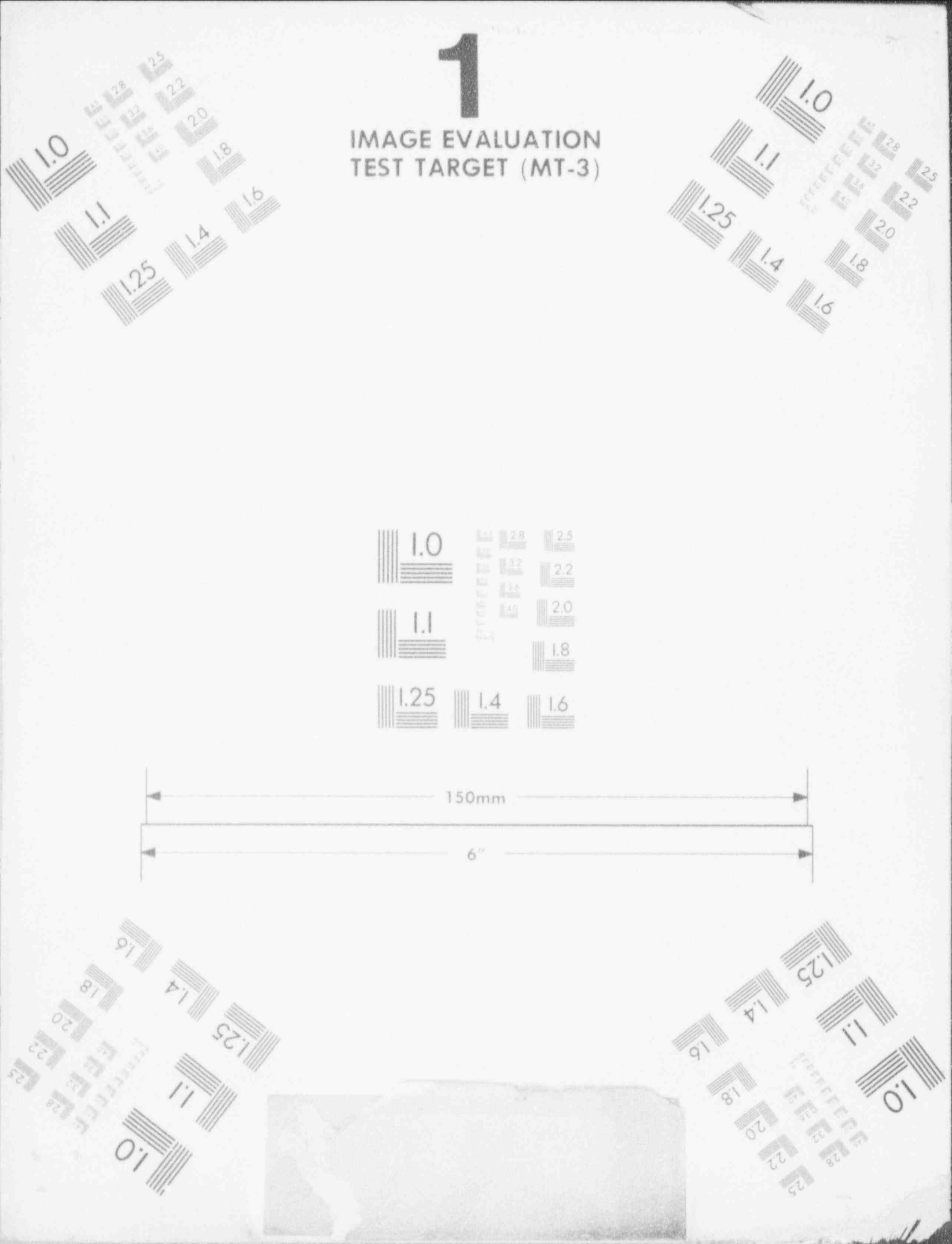
1. Preparing a Reference Grid System
2. Background Determination
3. Alpha Surveys
4. Beta-Gamma Surveys
5. Determination of Smearable Contamination
6. Material Sampling
7. Sample Identification and Tracking

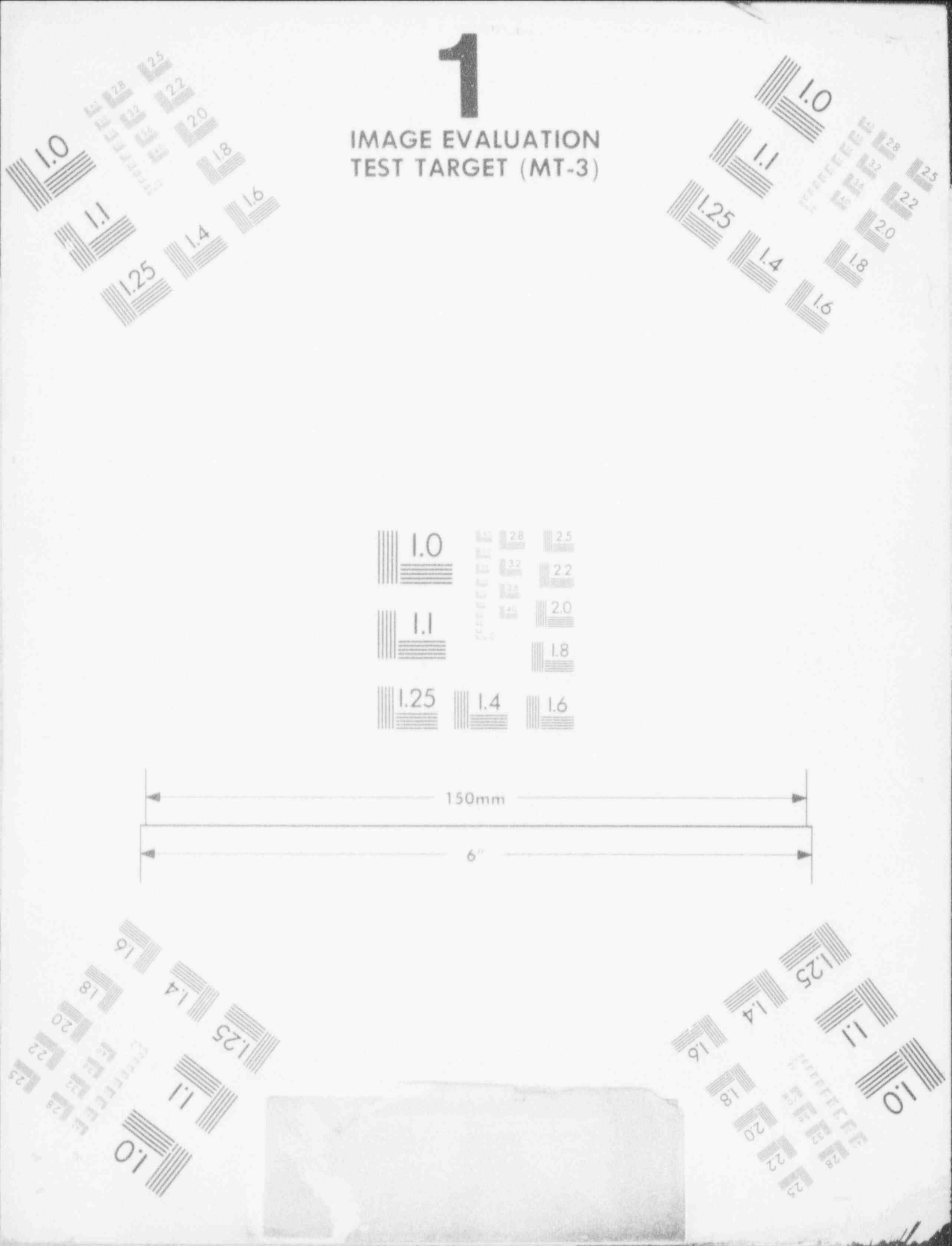
# 1

## IMAGE EVALUATION TEST TARGET (MT-3)




1
IMAGE EVALUATION
TEST TARGET (MT-3)
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
150mm
6"


1
IMAGE EVALUATION
TEST TARGET (MT-3)
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
150mm
6"


1
IMAGE EVALUATION
TEST TARGET (MT-3)
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
150mm
6"

# PREPARING A REFERENCE GRID SYSTEM

PROCEDURE NO. 1

# PREPARING A REFERENCE GRID SYSTEM

## TABLE OF CONTENTS

## 1. PURPOSE

This procedure details the methodology for establishing a reference grid system for radiological survey and sampling activities.

## 2. RESPONSIBILITIES

2.1 Grid establishment will be prepared in accordance with the recommendations of NUREG/CR-2082 and the requirements of the Building 20 Radiological Characterization Plan.

## 3. PROCEDURE

3.1 Baseline Grid Establishment

3.1.1 A grid system baseline should be the longest dimension of the building. Where possible, it should also be a building boundary line (i.e., where floor and wall meet).

3.2 Grid Dimensions

3.2.1 Grid dimensions will be determined based on NUREG/CR-2082 criteria, the potential for contamination in a specific area and the size constraints of an area. Adequate systematic measurements are necessary to provide data of statistical significance.

3.2.2 NUREG/CR-2082 establishes the following parameters for establishing a grid system for indoor areas:

(a) No survey block should measure less than 1 meter on a side

(b) No survey block should measure more than 3 meters on a side

(c) There should be at least N survey blocks in the population (where $N \geq 30$).

3.2.3 Commonly, the grid size used for large open floor areas is 3 meters x 3 meters unless the area is expected to be highly contaminated.

3.2.4 Grid points will be identified by use of an alphanumeric system whereby grid lines that are perpendicular to the originating baseline are labelled alphabetically and those lines that are parallel to the baseline are labelled numerically, increasing in size with distance from the baseline.

3.2.5 If a spot within a grid system is to be identified, (such as a hot spot) it will be labelled by measuring the distance from the spot to the intersection of two grid lines (see Figure 1).

3.3 Specific Exceptions to Gridding

3.3.1 Large pieces of equipment, and other sizable structural materials will be treated separately. Each will be moved, if possible, and surveyed. Relative grid locations and specific identification numbers may be used if something is too large to move.

## 4. REFERENCES

4.1 Building 20 Radiological Characterization Plan for Chemetron Corporation.

4.2 NUREG/CR-2082, Monitoring For Compliance with Decommissioning Decontamination Criteria.

TYPICAL SURVEY GRID

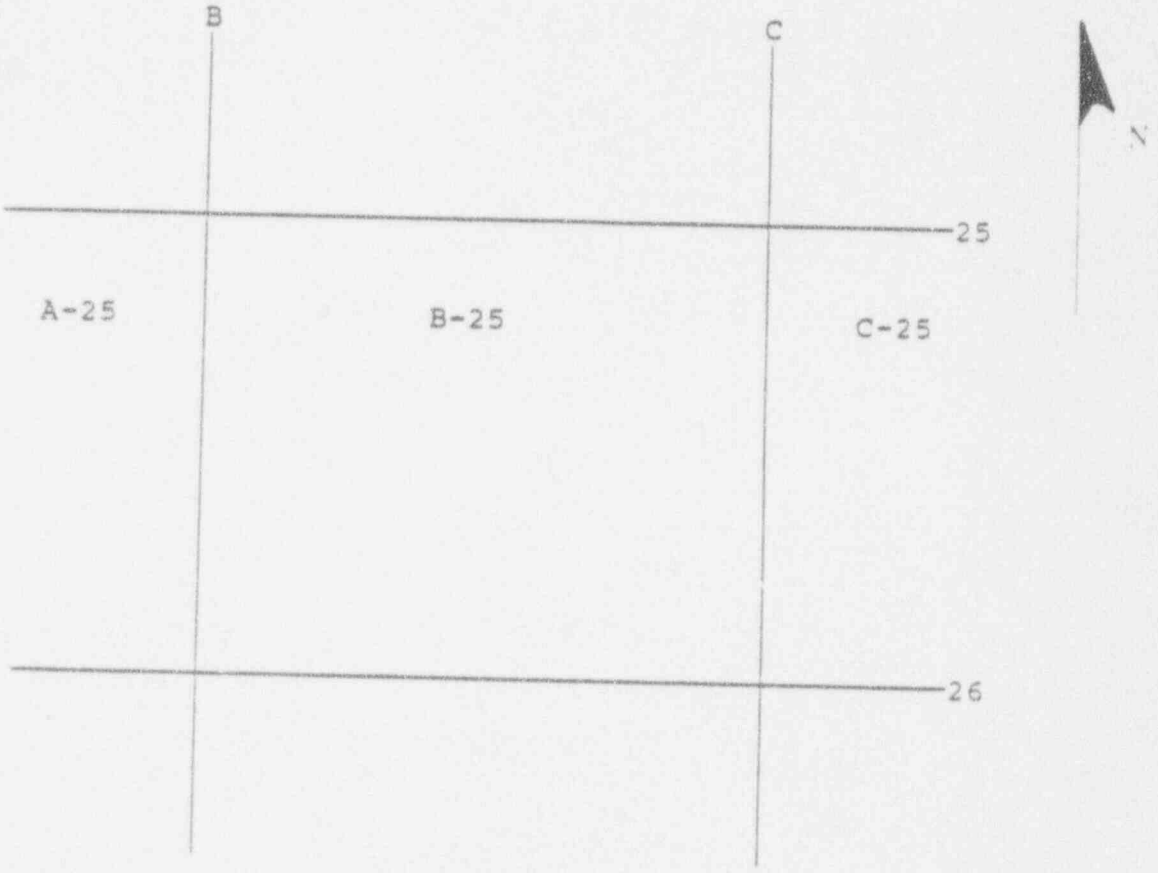



FIGURE 1

PROCEDURE NO. 1

# BASELINE SAMPLING AND BACKGROUND DETERMINATION

PROCEDURE NO.:

TABLE OF CONTENTS

NES

## 1. PURPOSE

This procedure describes the methods and criteria for performing background radiation measurements.

## 2. RESPONSIBILITY

2.1 The RCS is responsible for ensuring implementation of this procedure in a timely manner.

2.2 NES Health Physics Technicians are responsible for utilizing proper radiological technique during surveillance.

## 3. PROCEDURE

3.1 Measurement and Sample Locations

3.1.1 The locations chosen for background radiation measurements and baseline sampling should be undisturbed by radioactivity from building 20 or other sources.

NOTE: Many building materials contain naturally high levels of uranium and thorium.

3.1.2 A minimum of twenty (20) measurements should be made for determination of background radiation levels within nearby buildings. Planning and forethought should be used to ensure locations are selected without interference from building 20 or other questionable sources.

3.2 Background Radiation Measurements

3.2.1 The external gamma exposure rates will be measured at the ground surface and at 1 meter above the ground surface. A Ludlum Model 19 $\mu$R meter, or equivalent, will be used for these measurements.

3.2.2 The beta-gamma count rate will be measured at each background location using a pancake G-M detector held approximately 1cm (0.4 inches) from the ground surface.

## 4. REFERENCES

4.1 Building 20 Radiological Characterization Plan for Chemetron Corporation.

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ALPHA SURVEYS

PROCEDURE NO. 3

ALPHA SURVEYS

TABLE OF CONTENTS

## 1. PURPOSE

This procedure describes the methodology for measuring elevated alpha radiation levels on surfaces.

## 2. RESPONSIBILITIES

2.1 The Radiological Control Supervisor (RCS) is responsible for implementing this procedure.

2.2 Health Physics technicians performing alpha surveys are responsible for following this procedure.

## 3. PREREQUISITES

3.1 Instrumentation

3.1.1 Select an appropriate count rate meter such as:

- Ludlum Model 2220/222I
- Eberline PRS-2 (RASCAL)
- Eberline ESP-1

3.1.2 Ensure that the appropriate alpha scintillation probe is attached.

3.1.3 Select an appropriate alpha check source.

3.2 Preoperational Checks

3.2.1 Turn on the instrument
3.2.2 Check the battery
3.2.3 Turn on the audio speaker
3.2.4 For the Rascal, adjust the high voltage and threshold, if necessary
3.2.5 For the ESP-1, set the mode to scaler for count per minute readout
3.2.6 Check the background count rate

3.2.7 Place the check source in contact with the alpha scintillation probe and verify response

## 4. PROCEDURE

4.1 Alpha Survey Techniques

4.1.1 Hold the alpha scintillation probe approximately 1/4 inch away from the surface to be surveyed.

4.1.2 Pass the probe slowly across the surface.

NOTE: Survey speed will vary depending upon the experience of the surveyor but is usually about 5 cm per second (2 inches/second).

4.1.3 Place the probe face in contact with the survey surface and count for 1 minute.

4.1.4 Due to the delicate nature of the probe face, care must be taken to avoid damage by rough surfaces or sharp objects.

4.1.5 Listen for changes in the audible clicks or whining sound of the detector for quick response to elevated levels of alpha radiation.

4.1.6 Mark areas of elevated count rates using paint, grease pencil, survey flags or other methods, depending on the survey location.

4.1.7 Traverse the survey area at very close intervals. Best results are obtained when the areas under the probe overlap. This is due to two factors. 1) the directional dependence of the probe and 2) the short range of alpha particles.

4.1.8 Record the locations and levels of elevated survey results on the Survey Record Form (Attachment A).

4.1.9 For direct reading surveys calculate the alpha dpm/100cm$^2$ by using the following equation:

$$\text{alpha dpm/100cm}^2 = \frac{\text{gross cpm - background cpm}}{\text{efficiency} \times \frac{\text{probe area}}{100}}$$

where:

efficiency = source cpm/source dpm = (c/d)
probe area = sensitive area of the probe in cm$^2$

## 5. REFERENCES

5.1 Building 20 Radiological Characterization Plan for Chemetron Corporation.

ATTACHMENT A

# Survey Record

NO. Page 1 of ___

DATE

TIME

LOCATION: _____

REASON FOR SPECIAL SURVEY: _____

☐ ROUTINE
☐ SPECIAL

| ITEM NO. | ITEMS | DIRECT PROBE MEASUREMENTS | | | | DISTANCE | SMEARABLE CONTAMINATION | | SMEAR |
|---|---|---|---|---|---|---|---|---|---|
| | | α cpm | α dpm/100 cm2 | β & γ cpm | dpm/100 cm2 | | β & γ dpm | α dpm | AREA |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
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| 18 | | | | | | | | | |

| DIRECT SURVEY INSTRUMENTS | | βγ CONTAMINATION INSTRUMENTS | α CONTAMINATION INSTRUMENTS |
|---|---|---|---|
| INST. | | S/N | S/N's |
| S.N. | S.N. | CAL DUE DATE | CAL DUE DATES |
| CAL DUE DATE | CAL DUE DATE | EFF | EFF |
| B.C.F. | B.C.F. | BKG | BKG |
| | | | |
| REMARKS: | | | AIR SAMPLE DATA: |
| | | | |

Surveyor (print name) _____

Surveyor (signature) _____ Reviewed by _____ Date _____

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# BETA-GAMMA SURVEYS

# BETA-GAMMA SURVEYS

## TABLE OF CONTENTS

## 1. PURPOSE

This procedure describes the methodology for measuring elevated beta-gamma radiation levels on surfaces.

## 2. RESPONSIBILITIES

2.1 The Radiological Control Supervisor (RCS) is responsible for implementing this procedure.

2.2 Health Physics technicians performing beta-gamma surveys are responsible for following this procedure.

## 3. PREREQUISITES

3.1 Instrumentation

3.1.1 Select an appropriate count rate instrument such as:

- Ludlum Model 2220/222l
- Ludlum Model 3
- Ludlum Model 12

3.1.2 Ensure that the appropriate G-M pancake probe is attached.

3.1.3 Select an appropriate check source.

3.2 Preoperational Checks

3.2.1 Turn the instrument on

3.2.2 Check the battery

3.2.3 Turn on the audio speaker

3.2.4 Check the background count rate

3.2.5 Place the check source in contact with the G-M probe and verify response

## 4. PROCEDURE

4.1 Beta-Gamma Survey Techniques

4.1.1 Hold the pancake probe approximately 1/4 to 1/2 inch away from the surface to be surveyed.

4.1.2 Pass the probe slowly across the surface.

NOTE: Survey speed will vary depending upon the experience of the surveyor but is usually about 5 cm per second (2 inches/second).

4.1.3 Place the probe face in contact with the survey surface and count for 30 seconds.

4.1.4 Due to the delicate nature of the probe face, care must be taken to avoid damage by rough surfaces or sharp objects.

4.1.5 Listen for changes in the audible clicks or whining sound of the detector for quick response to elevated beta-gamma levels.

4.1.6 Mark areas of elevated count rates using paint, grease pencil, survey flags or other methods, depending on the survey location.

4.1.7 Traverse the survey area at very close intervals. Best results are obtained when the areas under the probe overlap due to the directional dependence of the probe.

4.1.8 Record the locations and levels of elevated survey results on the Survey Record Form (Attachment A).

4.1.9 For direct reading surveys calculate the beta-gamma dpm/100cm$^2$ by using the following equation:

$$\text{Beta-gamma dpm/100cm}^2 = \frac{\text{gross cpm - background cpm}}{\text{efficiency} \times \frac{\text{probe area}}{100}}$$

where:

efficiency = source cpm/source cpm = (c/d)
probe areas = sensitive area of probe in cm$^2$

## 5. REFERENCES

5.1 Building 20 Radiological Characterization Plan for Chemetron Corporation.

ATTACHMENT A

# Survey Record

NO. Page 1 of ___

DATE

TIME

LOCATION: _____

REASON FOR SPECIAL SURVEY: _____

☐ ROUTINE
☐ SPECIAL

| ITEM NO. | ITEMS | DIRECT PROBE MEASUREMENTS | | | | DISTANCE | SMEARABLE CONTAMINATION | | SMEAR |
|---|---|---|---|---|---|---|---|---|---|
| | | α cpm | α dpm/100 cm2 | β & γ cpm | β & γ dpm/100 cm2 | | β & γ dpm | α dpm | AREA |
| 1 | | | | | | | | | |
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| 18 | | | | | | | | | |

| DIRECT SURVEY INSTRUMENTS | | βγ CONTAMINATION INSTRUMENTS | α CONTAMINATION INSTRUMENTS |
|---|---|---|---|
| INST. | | S/N | S/N's |
| S.N. | S.N. | CAL DUE DATE | CAL DUE DATES |
| CAL DUE DATE | CAL DUE DATE | EFF | EFF |
| B.C.F. | B.C.F. | BKG | BKG |
| | | | |
| REMARKS: | | | AIR SAMPLE DATA |
| | | | |

Surveyor (print name) _____

Surveyor (signature) _____ Reviewed by _____ Date _____

# DETERMINATION OF SMEARABLE CONTAMINATION

TABLE OF CONTENTS

## 1. PURPOSE

The purpose of this procedure is to provide guidelines for measuring smearable alpha and beta-gamma radioactivity on equipment and building surfaces.

## 2. RESPONSIBILITIES

2.1 The Radiological Control Supervisor (RCS) is responsible for assuring this procedure is implemented.

2.2 Health Physics Technicians (HPT) are responsible for following this procedure.

## 3. PROCEDURE

3.1 Equipment and Materials

a. Filter papers (Whatman 50 or equivalent), 47mm diameter, numbered or tacky-backed smear papers
b. Masslin wipes/mop
c. Glassine or paper envelopes
d. Record forms
e. Counting equipment

3.2 Sample Collection (Smears)

3.2.1 Grasp the smear (filter) paper by the edge, between the thumb and index finger.

3.2.2 Applying moderate pressure with two or three fingers, wipe the numbered side or flat side of the paper over approximately 100 $cm^2$ of the surface.

3.2.3 Place the filter in an envelope.

3.2.4 Record the collector initials, site, date, location of the smear, and the number of the filter paper on the appropriate record form, Attachment A, and on the envelope.

3.3 Sample Collection (Masslin)

3.3.1 Wipe the area (using moderate pressure) with the masslin cloth or map.

NOTE: Wipes are not restricted to the 100 $cm^2$ area as in 3.2.2.

3.3.2 Place the cloth under a survey probe (both alpha and beta-gamma) and count the wipe in the field.

3.3.3 Follow-up with smears as in Section 3.2 if any activity is detected.

NOTE: Masslin wipes are used for information only! 100 $cm^2$ smears will be used exclusively for documentation purposes.

## 4. REFERENCES

4.1 Building 20 Radiological Characterization Plan for Chemetron Corporation.

ATTACHMENT A

## Survey Record

NO. Page 1 of ___

DATE

TIME

LOCATION: _____

REASON FOR SPECIAL SURVEY: _____

☐ ROUTINE
☐ SPECIAL

| ITEM NO. | ITEMS | DIRECT PROBE MEASUREMENTS | | | | DISTANCE | SMEARABLE CONTAMINATION | | SMEAR |
|---|---|---|---|---|---|---|---|---|---|
| | | α cpm | α dpm/100 cm2 | β & γ cpm | dpm/100 cm2 | | β & γ dpm | α dpm | AREA |
| 1 | | | | | | | | | |
| 2 | | | | | | | | | |
| 3 | | | | | | | | | |
| 4 | | | | | | | | | |
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| 18 | | | | | | | | | |

| DIRECT SURVEY INSTRUMENTS | | βγ CONTAMINATION INSTRUMENTS | α CONTAMINATION INSTRUMENTS |
|---|---|---|---|
| INST. | | S/N | S/N's |
| S.N. | S.N. | CAL DUE DATE | CAL DUE DATES |
| CAL DUE DATE | CAL DUE DATE | EFF | EFF |
| B.C.F. | B.C.F. | BKG | BKG |
| | | | |
| REMARKS: | | | AIR SAMPLE DATA |
| | | | |

Surveyor (print name) _____

Surv signature) _____ Reviewed by _____ Date _____

PROCEDURE NO

MATERIAL SAMPLING

PROCEDURE NO. 6

MATERIAL SAMPLING

TABLE OF CONTENTS

## 1. PURPOSE

This procedure describes the methods used for collection of material samples within building 20.

## 2. RESPONSIBILITIES

2.1 The Radiological Control Supervisor (RCS) is responsible for implementation of this procedure.

2.2 The Health Physics Technicians (HPT) collecting the samples are responsible for following this procedure.

## 3. PREREQUISITES

3.1 Equipment

3.1.1 The tools, equipment and materials required for sample collection are:

- scraper
- hammer and chisel
- garden trowel, spade or shovel
- plastic bags and twist-ties or zip-loc
- bailer
- 1 liter wide-mouth plastic bottles with screw top
- masking tape
- indelible marker
- equipment cleaning supplies
- log books or data sheets

## 4. PROCEDURE

4.1 Solid Material Sampling

4.1.1 Paint Chips

4.1.1.1 Prepare a plastic bag for sample collection

4.1.1.2 Label the bag with indelible marker

4.1.1.3 With a scraper, razor blade, screwdriver or other sharp-edged tools, remove paint from the selected surface and place as much as possible into the collection bag.

Note: A minimum of 10 grams of material is necessary for adequate analysis but at least 100 grams is preferred.

4.1.1.4 Record the sample identification, location and any other pertinent information on the data sheet or log book.

4.1.1.5 Clean the sampling tools, as necessary prior to proceeding to the next sample collection point.

4.1.2 Brick or Concrete Chips

4.1.2.1 Prepare a plastic bag for sample collection.

4.1.2.2 Label the bag with indelible marker.

4.1.2.3 Using a hammer and chisel or mechanical chisel, break away approximately 1/2 - 1kg of material for sampling.

4.1.2.4 Place the material removed into the labelled collection bag.

4.1.2.5 Record the sample identification number, location and other pertinent information on the data sheet or log book.

4.1.2.6 Clean the sampling tools, as necessary prior to proceeding to the next sample collection point.

4.1.3 Wood, Ceiling Tile, Wall Board, Roofing Material or Other Solid Surfaces

4.1.3.1 Prepare a plastic bag for sample collection.

4.1.3.2 Label the bag with indelible marker.

4.1.3.3 With a hammer, saw or other cutting tools, remove a portion of the material selected for sample analysis.

4.1.3.4 The sample should weigh approximately 1/2 - 1kg.

4.1.3.5 Place the material removed into the labelled collection bag.

4.1.3.6 Record the sample identification number, location and other pertinent information on the data sheet or log book.

4.1.3.7 Clean the sampling tools, as necessary prior to proceeding to the next sample collection point.

4.1.4 Sludge and Floor Debris

4.1.4.1 Prepare a plastic bag for sample collection.

4.1.4.2 Label the bag with indelible marker.

4.1.4.3 Using a shovel, trowel, spoon or other scooping device, collect approximately 1/2 - 1kg of material.

4.1.4.4 Place the material removed into the labelled collection bag.

4.1.4.5 Record the sample identification number, location and other pertinent information on the data sheet or log book.

4.1.4.6 Clean the sampling tools, as necessary prior to proceeding to the next sample collection point.

4.1.5 Sump and Drain Materials

4.1.5.1 Prepare a plastic bag or bottle for sample collection.

4.1.5.2 Label the container with indelible marker.

4.1.5.3 Scrape the materials from within the sump or drain.

Note: If sump bottom materials are soft sediment-types a submersible pump may be used to remove liquid and scoop of bottom materials collected.

4.1.5.4 Place the material removed into the labelled collection container.

4.1.5.5 Record the sample identification number, location and other pertinent information on the data sheet or log book.

4.1.5.6 Clean the sampling tools, as necessary prior to proceeding to the next sample collection point.

4.1.6 Liquid Samples

4.1.6.1 Dip the bailer into the water source for sampling.

Note: If insufficient liquid exists for bailing, a squeeze-bulb type syphon may be used for collection.

4.1.6.2 Transfer the liquid collected to the plastic bottle via a funnel.

4.1.6.3 Collect approximately 1-2 liters of liquid if possible and cap the container(s) when finished.

4.1.6.4 Label the container(s) appropriately.

4.1.6.5 Record the sample identification, location and any other pertinent information on the data sheet or log book.

4.1.6.6 Clean the collection equipment prior to proceeding with additional sampling.

## 5. REFERENCES

Building 20 Radiological Characterization Plan for Chemetron Corporation.

# SAMPLE IDENTIFICATION AND TRACKING

nes

# SAMPLE IDENTIFICATION AND TRACKING

## TABLE OF CONTENTS

## 1. PURPOSE

The purpose of this procedure is to avoid sample misidentification during acquisition and handling.

## 2. RESPONSIBILITIES

2.1 The Radiological Control Supervisor (RCS) is responsible for ensuring implementation of this procedure.

2.2 The Health Physics Technician (HPT) is responsible for following this procedure.

2.3 The Laboratory Technician is responsible for receipt and subsequent analysis of the samples. He shall verify that pertinent sample data has been included and shall assign a consecutive identification number to each sample received in accordance with this procedure.

## 3. PROCEDURE

3.1 Sample Identification

3.1.1 Each sample shall be collected in accordance with the applicable procedure(s).

3.1.2 The sample will be labeled with a location identifier to include the grid identification, distance from the intersection of two grid lines, type of sample and, if applicable, depth (see Figure 1 for an example).

3.1.3 The sample information will be transcribed into a field log book or record sheet.

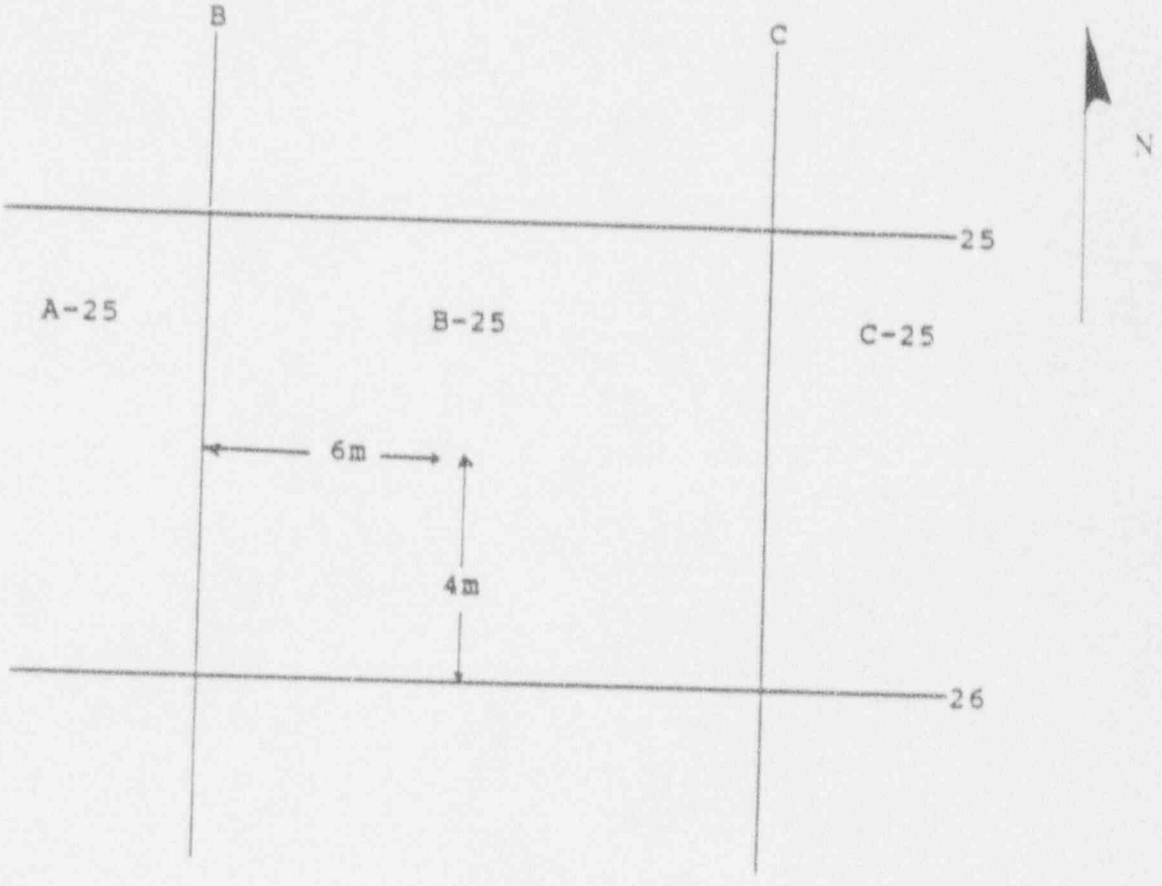
3.1.4 An independent, identification number will be assigned to each sample by the NES laboratory technician. This number will be written into a laboratory log and also on the collection container.

NOTE: Laboratory numbers will be used for sample tracking purposes. All other information will be supplemental.

## 4. REFERENCES

4.1 Building 20 Radiological Characterization Plan for Chemetron Corporation.

TYPICAL SURVEY GRID




SAMPLE IDENTIFICATION

| | |
|---|---|
| Date Collected | 10/5/90 |
| Grid | B-25 |
| Sample | Soil |
| Depth | 8' |
| Location | 6m East of Line B<br>4m North of Line 26 |

FIGURE 1

# DAMES & MOORE
## HEALTH AND SAFETY PLAN

| | |
|---|---|
| Project Name: | Allegheny International, Harvard/Bert Ave. Sites |
| Project Number: | 17653-003-023 |
| Project Site Location: | Newburgh Heights, Ohio |
| Project Manager: | Theodore Adams |
| Site Safety Officer: | Larry Keefe |
| Plan Preparer: | Kathryn A. Sova |
| Preparation Date: | September 1990 |

**APPROVED:**

Regional Health & Safety Manager

Kathryn A. Sova 9/27/90
(Date)

Office Safety Coordinator

John P. Englert 9/27/90
(Date)

Managing Principal-in-Charge

James P. Clancy 9/27/90
(Date)

Project Manager

Theodore G. Adams 9/27/90
(Date)

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TABLE OF CONTENTS (continued)

## 1.0 PURPOSE

The purpose of this Plan is to assign responsibilities, establish personnel protection standards and mandatory safety practices and procedures, and provide for contingencies that may arise while conducting sampling and other on-site activities at the Allegheny International (Harvard/Bert Avenue) sites in Newburgh Heights, Ohio.

## 2.0 APPLICABILITY

The provisions of the Plan are mandatory for all on-site Dames& Moore employees and Dames & Moore subcontractors engaged in on-site operations who will be exposed or have the potential to be exposed to on-site hazardous substances.

Dames & Moore policy states that Dames & Moore subcontractors shall provide a health and safety plan for their employees covering any exposure to hazardous materials and shall complete all work in accordance with that plan. The subcontractor may choose to use Dames & Moore's Health and Safety Plan as a guide in developing its own plan or may choose to adopt in full the Dames & Moore plan. In either case, the subcontractor shall hold Dames & Moore harmless from, and indemnify it against, all liability in the case of any injury. Dames & Moore reserves the right to review and approve the subcontractor's plan at any time. All subcontractors will, at a minimum, follow all provisions of the Dames & Moore Health and Safety Plan.

Inadequate health and safety precautions on the part of the subcontractor, or the belief that the subcontractor's personnel are or may be exposed to an immediate health hazard, can be the cause for Dames & Moore to suspend the subcontractor's site work and ask the subcontractor's personnel to evacuate the hazard area.

Dames & Moore's subcontractor will be responsible for operating in accordance with the Occupational Safety and Health Administration (OSHA) regulations 29 CFR Part 1910.120 - Hazardous Waste Operations and Emergency Response. These regulations include the following provisions for employees exposed to hazardous substances, health hazards,or safety hazards: training as described in 120(e); medical surveillance as described in 120(f); and personal protective equipment described in 120(g).

## 3.0 SITE DESCRIPTION

### 3.1 GENERAL INFORMATION

Site: Allegheny International, Harvard/Bert Avenue Sites
Job No.: 17653-003-023
Objectives: To conduct an environmental investigation.
Proposed Date of Investigation: September 1990 - Unknown
Background Review of the Site: Complete ___ Preliminary _X_
Documentation/Summary: Overall Hazard: Serious ___ Moderate _X_
Low ___ Unknown _X_

### 3.2 SITE HISTORY

#### Bert Avenue Site

Prior to 1975, the Chemetron Corporation disposed of industrial wastes and rubble at a nearby dump site at Bert Avenue. These wastes included general plant trash, process residues, and building debris. Some of the material discarded was contaminated with low levels of depleted uranium ($U_3O_8$). This contaminant resulted from the dismantling and decommissioning of the company's former depleted uranium conversion and catalyst product facility, which was operated at the Harvard Avenue site. Other wastes discarded at this dump were: antimony slag, containing nuclide of the

natural uranium and thorium decay series in disequilibrium; fly ash, containing the natural uranium and thorium decay series; and fire brick and crucibles, also containing the uranium and thorium decay series radionuclides.

Currently, the southern portion of the property is on the same level as the adjacent land; there is a steep slope to a swampy surface-water drainage area in the northeast portion of the site. Discarded equipment and miscellaneous trash and rubble are located around the edges of the slope. The site is fenced with access controlled by a locked gate.

Harvard Avenue Site

In 1959, the Chemetron Corporation purchased a foundry warehouse at the company's present location in Newburgh Heights, Ohio. Portions of this building were used from 1965 to 1972 to convert depleted $UF_6$ to $U_3O_8$ for use in producing a chemical catalyst. Processing operations subsequently contaminated the south end of the building.

The site consists of a parcel of vacant land adjacent to the current McGean/Rohco facility. The site is at grade level, fences on three sides, and bounded on the fourth side by the warehouse wall.

### 3.2.1 Dames & Moore Activities

Dames & Moore will:

- Collect surficial soil samples;
- Perform radiological surveys;
- Perform air monitoring surveys for chemical hazards; and

- Monitor a subcontractor drilling soil borings, and collect soil samples from the borings.

## 3.3 FACILITY DESCRIPTION

Waste Types: Liquid _X_ Solid _X_ Sludge ___ Gas ___

Characteristics: Corrosive ___ Ignitable ___ Radioactive _X_

Volatile ___ Toxic _X_ Reactive ___ Unknown _X_

Unusual Site Features (dike integrity, power lines, terrain, etc.):

(Steep, deep slope - Bert Avenue site)

Status: (active, inactive, unknown) _Inactive_

## 3.4 HAZARD EVALUATION

### Radiological

Hazardous exposures associated with uranium are of two types: chemical and radiological; of the two, radiation is the more hazardous. Prior radiological surveys and soil sampling at both sites have identified residual surface and subsurface radioactive contamination. There are three principal types of natural radioactive emissions from radionuclides.

Alpha particles have very low penetrating power and can be stopped by paper or the upper layers of skin, but are hazardous if inhaled or ingested.

Beta particles have fairly low penetrating power, but can cause localized skin reactions, such as burns, when external to the body. Beta particles are also hazardous if inhaled or ingested.

Gamma rays have high penetrating power when external to the body, and if gamma-emitting sources exist within the body, it poses an internal hazard as well.

Protective equipment is required to prevent inhalation and ingestion of gamma-emitting materials.

As activities on-site include drilling and sampling, close attention will be paid to site monitoring for radioactive contamination. Therefore, an NES Health Physics Technician will follow screening/sampling procedures as outlined in the NES Radiological Control Plan (Attachment A).

Safety

The Bert Avenue site has an excavation which is deeply sloped and littered with debris, e.g., glass, metal, etc. A registered professional engineer will assess the stability of the slope prior to on-site activities and determine if protective system(s) are needed.

The Harvard Avenue site has several excavations which, after periods of rain, accumulate water in the bottom of the excavation. Dames & Moore personnel will not enter any excavations unless a registered professional engineer has evaluated safety conditions in terms of OSHA regulations 29 CFR Part 1926 Subpart P - Excavation Standard.

Standard Safe Work Practices employed by Dames & Moore are listed in Attachment B and must be adhered to at all times.

Chemical

Recent sampling indicates the presence of metals in soils and sediment. The exposure limits, recognition qualities, acute and chronic effects and first-aid treatment for these contaminants are presented in Tables 1 and 2.

Routes of exposure associated with contaminated dusts are via inhalation and eye and/or skin contact if dry or dusty conditions exist. Volatile organic

compounds, if present in environmental media, may be hazardous if inhaled or absorbed through the skin.

Therefore, a minimum of Level D+ protection is recommended to perform work on site with the potential to upgrade to Level C if organic vapors exceed action levels and/or if dry or dusty conditions exist. Tables 3 and 4 provide hazard monitoring methods, action levels and protective equipment required for on-site activities.

## 4.0 EMERGENCY INFORMATION

If an emergency develops on-site, the procedures as listed in Attachment C should be utilized. Should the situation require outside support services, the client will be notified along with the appropriate contact from the list which follows.

### 4.1 EMERGENCY CONTACTS

| Contact | Person or Agency | Telephone |
|---|---|---|
| Police (Bert Ave. Site) | Newburgh Heights | 911 |
| Police (Harvard Ave. Site) | Cuyahoga Heights | (216) 883-6800 |
| Fire (Bert Ave. Site) | Newburgh Heights | 911 |
| Fire (Harvard Ave. Site) | Cuyahoga Heights | (216) 641-1923 |
| Ambulance | Newburgh Heights | 911 |
| Hospital | Saint Vincent Charity (Emergency Room) | (216) 363-2716 |
| | (Occupational medicine department) | (216) 363-2746 |
| Client Contact (Chemetron) | Micheal Lederman | (412) 562-4417 |
| D&M Project Manager | Theodore Adams | (716) 662-8016 |
| D&M Project Manager (Bert Ave.) | | (216) 341-6818 |
| D&M MPIC/Group Leader | James Cline | (914) 735-1200 |
| D&M Regional H&S Manager | Kathryn A. Sova | (201) 272-8300 |
| D&M Cert. Health Physicist | Dr. Carlyle Roberts | (716) 942-3235 |
| NES Project Manager | Mitchell Callahan | (203) 796-5305 |
| NES Site Supervisor (Bert Ave.) | Paul Terp | (216) 271-0084 |

## 4.2 LOCATION OF SITE RESOURCES (for emergency use)

Water Supply: Available on site.
Telephone: Available on site.

The location of site resources for emergency use will be identified by the Site Safety Officer prior to initiation of on-site activities.

## 4.3 ADDITIONAL ARTICLES TO BE TAKEN INTO FIELD

1. First Aid Kit
2. Disposal Eye Wash (1 liter or more)

# 5.0 SITE SAFETY WORK PLAN

## 5.1 MONITORING

### 5.1.1 Monitoring Requirements

The Site Safety Officer (SSO) will conduct air monitoring for the hazards present in Table 1. Equipment necessary for air monitoring at this site consists of an OVA/PID, a particulate meter and an explosimeter. The type of monitoring instruments specified by the hazard and the action levels to upgrade personal protection are shown in Table 3. All monitoring equipment shall be maintained following procedures outlined in the owner's manual for the specified monitoring equipment.

### 5.1.2 Monitoring Schedule

#### 5.1.2.1 Instrument Calibration

All applicable instruments shall be calibrated daily. Readings shall be recorded on the Instrument Calibration Check-Out Sheet provided in Attachment F.

#### 5.1.2.2 Background Readings

Before any field activities commence, the background levels of the site will be read and noted on the Air Monitoring Forms in Attachment F. Daily background readings shall take place away from areas of potential contamination to obtain accurate results.

Generally, background levels for organic vapors in ambient air read zero. If background readings indicate higher levels of organic vapors than anticipated, the Site Safety Officer will determine the source of the readings prior to initiation of on-site activities. This Plan will be amended, as appropriate, to reflect any adjustments necessary as the result of higher than expected background levels.

#### 5.1.2.3 Air Monitoring Frequency

All site readings may be noted on the Air Monitoring Form provided in Attachment F along with the date, time, weather conditions, wind direction and speed, if possible, and location where the background level was recorded.

The following schedule should be followed for air monitoring activities as specified for each activity.

Activity: All Activities

| Air Monitoring Equipment | Monitoring Frequency |
|---|---|
| CGI | Monitor every 15 min/every sample retrieved |
| HNu/OVA | Monitor every 15 min/every sample retrieved |
| Particulate Meter | Monitor continuously |

## 5.2 LEVELS OF PROTECTION

A minimum of Level D+ protection is needed to perform work on site. Level C protection may be required, as described in Table 4, and will be available on-site.

## 5.3 RESPIRATORY PROTECTION

### 5.3.1 Types of Cartridges/Limits of Cartridges

If air purifying respirators are required, organic vapor/acid gas cartridge(s) with high efficiency dust and mist filters will be used.

Sampling activities will be initiated in Level D+. If organic vapors as measured in the breathing zone by the OVA/PID exceed 1 ppm, don respirators. However, if organic vapors exceed 5 ppm, evacuate the area and notify the Project Manager. A re-assessment of personal protective equipment (PPE), including respiratory protection, will be made.

All ambient air measurements which are taken to evaluate personnel exposure will be taken within the individual's breathing zone and shall be fairly frequent or constant for a duration of at least 30 seconds.

If dust levels, as measured by the particulate monitor, exceed 1 $mg/m^3$, implement dust suppression measures or Level C. If dusty conditions continue following dust suppression, don respirator.

## 5.4 WORK LIMITATIONS

In general, field work will be conducted during daylight hours only. At least two personnel will be in the field at all times. The Dames & Moore Project Manager (PM) or Regional Health and Safety Manager (RHSM) must grant special permission for any field activities conducted beyond daylight hours. All Dames & Moore personnel working in the field have completed the Dames & Moore Hazardous Material Sites Training Course (or its equivalent) and the NES Radiation Worker Training Course. Additionally, all Dames & Moore field personnel have been declared medically fit for duty and, where respiratory protection is necessary, have been properly trained, fit tested and declared fit for respiratory use. No drilling shall take place without first confirming the absence of subsurface utility lines or other buried metal objects.

## 5.5 FIELD PERSONNEL

The responsibilities of the Project Manager, the On-Site Safety Officer and project personnel are listed in Attachment E and must be adhered to at all times.

A work party consisting of the following persons will perform the tasks:

Project Manager: Theodore Adams

Site Safety Officer: Larry Keefe

## 5.6 HEAT STRESS/COLD STRESS

If on-site activities are conducted during extreme weather conditions, instructions for minimizing heat stress/cold stress are in Attachment E.

## 6.0 DECONTAMINATION PROCEDURES

### 6.1 GENERAL

#### Radiological

A single radiological entry/exit (control) point will be established for each site such that, prior to entry, all Dames & Moore and Dames & Moore subcontractor work personnel are checked by an NES Health Physics Technician for proper protective clothing. Upon exiting, contaminated or suspected contaminated clothing is removed, and placed in proper waste receptacles, and all exiting personnel will perform a self-frisk to determine any presence of contamination.

Persons found to be contaminated will be deconned in accordance with the NES Radiological Control Plan (Attachment A), and the levels and extent of the contamination documented. The results of any and all decontamination efforts will also be documented.

#### Chemical

Personnel should follow the decontamination procedures outlined below.

1. Locate a decontamination area.

2. Estab''ch a personnel decontamination station consisting of a basin with soapy water, a rinse basin with plain water and a can with a plastic bag.

3. Wash and rinse boots.

4. Remove outside gloves and discard in plastic bag.

5. Remove disposable suit and discard in plastic bag.

6. Upon leaving the contamination area, all personnel will proceed through the appropriate Contamination Reduction Sequence as described above.

7. All protection gear should be left on-site during lunch break following decontamination procedures.

The maximum decontamination layout for Level C protection is shown on the attached diagram, and a description is given below.

Maximum Measures for Level C Decontamination

| Station | |
|---|---|
| 1: Segregated Equipment Drop | 1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, clipboards, etc.) on plastic drop cloths or indifferent containers with plastic liners. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area. |
| 2: Boot Cover & Glove Wash | 2. Scrub outer boot covers and gloves with decon solution or detergent and water. |
| 3: Boot Cover & Glove Rinse | 3. Rinse off decon solution from Station 2 using copious amounts of water. |
| 4: Tape Removal | 4. Remove tape around boots and gloves and deposit in container with plastic liner. |

| | | |
|---|---|---|
| 5: | Boot Cover Removal | 5. Remove boot covers and deposit in container with plastic liner. |
| 6: | Outer Glove Removal | 6. Remove outer gloves and deposit in container with plastic liner. |
| 7: | Suit and Boot Wash | 7. Wash splash suit, gloves, and safety boots. Scrub with long-handled scrub brush and decon solution. |
| 8: | Suit, Boot & Glove Rinse | 8. Rinse off decon solution using water. Repeat as many times as necessary. |
| 9: | Cartridge or Mask Change | 9. If worker leaves exclusion zone to change cartridges (or mask), this is the last step in the decontamination procedures. Worker's cartridges are exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty. |
| 10: | Safety Boot Removal | 10. Remove safety boots and deposit in container with plastic liner. |
| 11: | Splash Suit Removal | 11. With assistance of helper, remove splash suit. Deposit in container with plastic liner. |
| 12: | Inner Glove Wash | 12. Wash inner gloves with decon solution. |
| 13: | Inner Glove Rinse | 13. Rinse inner gloves with water. |

| | |
|---|---|
| 14: Face Piece Removal | 14. Remove face piece. Deposit in container with plastic liner. Avoid touching face with fingers. |
| 15: Inner Glove Removal | 15. Remove inner gloves and deposit in lined container. |
| 16: Inner Clothing Removal | 16. Remove clothing soaked with perspiration and place in lined container. Do not wear inner clothing off-site since there is a possibility that small amounts of contaminants might have been transferred in removing the disposable coveralls. |
| 17: Field Wash | 17. Shower if highly toxic, skin-corrosive or skin-absorbable materials are known or suspected to be present. Wash hands and face if shower is not available. |
| 18: Redress | 18. Put on clean clothes. |

Minimal Decontamination

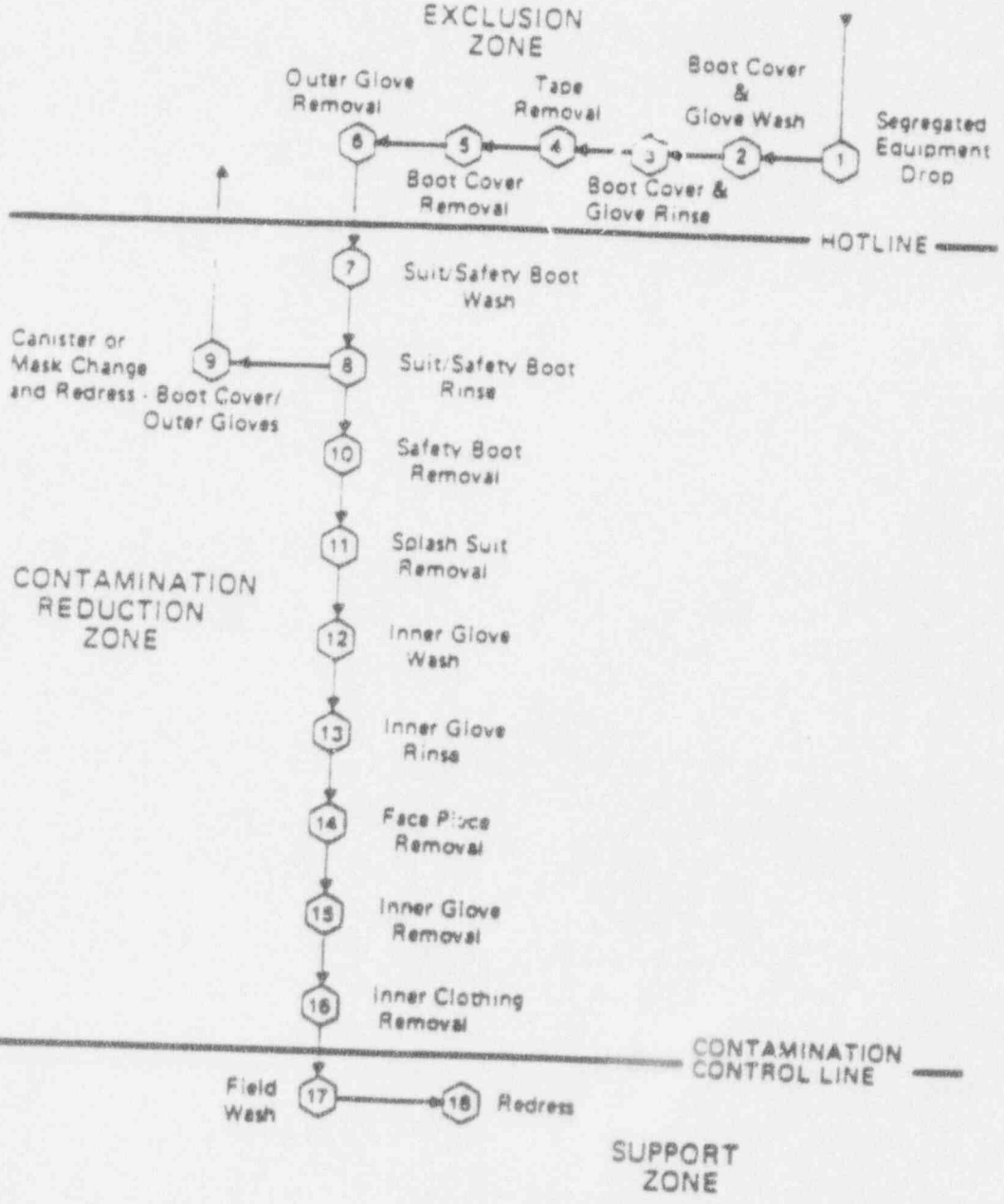
Less extensive procedures for decontamination can be subsequently or initially established when the type and degree of contamination becomes known or potential for transfer is judged to be minimal. These procedures generally involve one or two washdowns only. The layout for a minimal decontamination operation is shown in the attached diagram.

Closure of the Personnel Decontamination Station

All disposable clothing and plastic sheeting used during the operation should be double-bagged and removed to an approved off-site disposal facility. Decon and rinse solution will be contained on site. Re-usable rubber clothing should be dried and prepared for future use. (If gross contamination has occurred, additional decontamination of these items may be required.) Cloth items should be bagged and removed from the site for final cleaning. All wash tubs, pail containers, etc. should be thoroughly washed, rinsed, and dried prior to removal from the site.

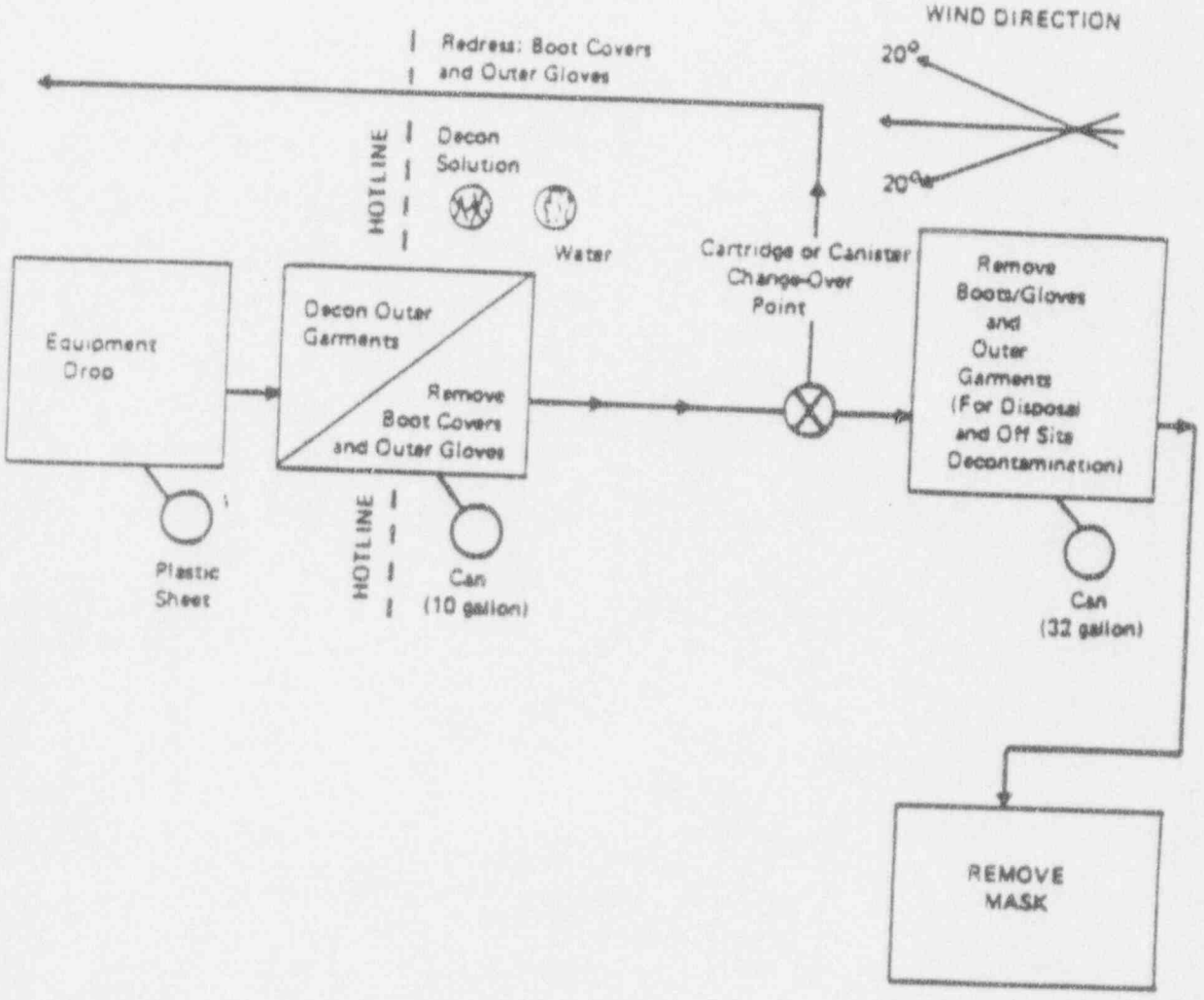
MAXIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION



MINIMUM DECONTAMINATION LAYOUT

LEVEL C PROTECTION



## 7.0 FORMS

The following forms are located in Attachment E:

Site Safety Briefing Form
Plan Acceptance Form
Plan Feedback Form
Accident Report Form
Exposure History Form (to be completed by PM only)
Calibration Check Sheet
Air Monitoring Form

The Site Safety Briefing Form will be completed prior to initiation of on-site activities. The Plan Acceptance Form should be filled out by all employees working on the site. The Plan Feedback Form should be filled out by the On-Site Safety Officer and any other on-site employee who wishes to fill one out. The Accident Report Form should be filled out by the Project Manager in the event that an accident occurs.

ALL COMPLETED FORMS SHOULD BE RETURNED TO THE BUFFALO HEALTH AND SAFETY OFFICER

# TABLE 1

## EXPOSURE LIMITS AND RECOGNITION QUALITIES

| COMPOUND | EXPOSURE[a] LIMITS (PPM UNLESS OTHERWISE INDICATED) | IDLH[b] LEVEL (PPM UNLESS OTHERWISE INDICATED) | ODOR | WARNING CONCENTRATION (PPM) | LEL[c] % | UEL[d] % | IONIZATION POTENTIAL (EV) |
|---|---|---|---|---|---|---|---|
| Uranium | 0.2 $mg/m^3$(2) | 20 $mg/m^3$ | Variable | -- | Variable | Variable | -- |
| Chromium | 1 $mg/m^3$(1)<br>0.5 $mg/m^3$(2) | None | Variable | -- | Variable | Variable | -- |
| Antimony | 0.5 $mg/m^3$(1)(2) | 80 $mg/m^3$ | -- | -- | -- | -- | -- |
| Arsenic | 0.2 $mg/m^3$(2) | Ca | Variable | Variable | -- | -- | -- |
| Zinc | Varies with Compound | None | -- | -- | -- | -- | -- |
| Lead | 0.15 $mg/m^3$(2) | None | Variable | -- | Variable | Variable | -- |
| Copper | 1 $mg/m^3$(1)(2) | None Specified | Odorless | -- | -- | -- | -- |
| Nickel | 1 $mg/m^3$(1)(2) | Ca | Variable | -- | -- | -- | -- |

NOTES:

(a) * OSHA Permissible Exposure Limit or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value.
(b) Immediately Dangerous to Life or Health Level.
(c) Lower Explosive Limit
(d) Upper Explosive Limit

(1) OSHA Time Weighted Average
(2) ACGIH Time Weighted Average

Ca = Potential human carcinogen

The odor warning concentrations given are generally odor thresholds with irritation thresholds given in parenthesis.

# TABLE 2

## ACUTE AND CHRONIC EFFECTS AND FIRST-AID TREATMENT

| COMPOUND | ROUTES OF ENTRY | EYE IRRITANT | ACUTE EFFECTS | CHRONIC EFFECTS |
|---|---|---|---|---|
| Uranium | Inhalation<br>Ingestion | Yes | Dermatitis, skin burns, chest rales, cough, nausea, vomiting | Skin, bone marrow, lymphoatics, blood liver, kidneys |
| Chromium | Inhalation<br>Ingestion<br>Skin and/or<br>Eye Contact | -- | Histologic fibrosis of lungs | Respiratory system, Chromium VI carcinogen |
| Antimony | Inhalation<br>Skin and/or<br>Eye Contact | -- | Irritates nose, throat, mouth; cough, dizziness, headache, nausea, vomiting, diarrhea, unable to smell | Respiratory system, CVS, skin, eyes |
| Arsenic | Inhalation<br>Ingestion<br>Skin Absorption<br>Skin and/or<br>Eye Contact | -- | Ulceration of nasal septum, dermatitis, GI disturbances, hyperpigmentation of skin | Liver, kidneys, skin, lungs, lymphatic system |
| Zinc | Inhalation | -- | Sweet metal taste, dry throat, cough, chills, fever, tight chest, blurred vision, back pain | Respiratory system |
| Lead | Inhalation<br>Ingestion<br>Skin and/or<br>Eye Contact | -- | Lassitude, insomnia, eye grounds, abdominal pain, gingival lead line | GI tract, CNS, kidneys, blood, gingival tissue |
| Copper | Inhalation<br>Ingestion<br>Skin and/or<br>Eye Contact | Yes | Irritates mucous membranes, metal taste, dermatitis | Respiratory system, skin, liver, increased risk with Wilson's disease, kidneys |
| Nickel | Inhalation<br>Ingestion<br>Skin and/or<br>Eye Contact | -- | Nasal cavities, sensitive dermatitis, allergic asthma, pneumonitis | Nasal cavities, lungs, skin |

General First-Aid Treatment (A first-aid kit will be kept in the site vehicle)

Eye - Irrigate Immediately (A portable eye-wash unit will be kept in the site vehicle.)
Skin - Soap Wash Promptly
Inhalation - Move to Fresh Air
Ingestion - Get Medical Attention

# TABLE 3

## HAZARD MONITORING METHOD, ACTION LEVELS, AND PROTECTIVE MEASURES

| HAZARD | MONITORING METHOD | ACTION LEVEL | PROTECTIVE MEASURES | MONITORING SCHEDULE |
|---|---|---|---|---|
| Toxic Vapors | OVA/PID (10.2 EV lamp) | (1) Measurable Above Background Based on Judgement of SSO up to 1 ppm | Level D+ (see Table 4) | o Continue working<br>o Continue monitoring every 15 minutes/ every sample retrieved |
| | OVA/PID (10.2 EV lamp) | (1) Measurable Above Background Based on Judgement of SSO 1-5 ppm | Level C (see Table 4) | o Continue working<br>o Continuous monitoring |
| | OVA/PID (10.2 EV lamp) | (1) Measurable Above Background Based on Judgement of SSO >5 ppm | STOP WORK<br>EVACUATE AREA<br>NOTIFY PROJECT MANAGER | |
| Toxic Dust | Particulate Monitor | < 1 $mg/m^3$ above background | Level D+ (see Table 4) | o Continuous monitoring |
| | | > 1 $mg/m^3$ above background | *Implement dust suppression measures. Level C (See Table 4) | o Continuous monitoring |
| Explosive Atmosphere | Explosimeter | 0-10% LEL | | o Continue monitoring every 15 minutes/ every sample retrieved |
| | | 10-25% LEL | | o Continuous monitoring |
| | | >25% LEL | EVACUATE AREA<br>EXPLOSION HAZARD<br>NOTIFY PROJECT MANAGER | |

NOTES:

(1) The above action levels are not solely based on the criteria for selecting levels of protection by the 1984 EPA Standard Operating Procedures, but also on the professional judgement and experience of the Site Safety Officer (SSO).

* Super windy or dusty conditions exist. The area should be hosed down to try to minimize the potential for the inhalation of contaminated dust.

TABLE 4

PROTECTIVE EQUIPMENT FOR ON-SITE ACTIVITIES

| Activity | Level | Protective Equipment |
|---|---|---|
| All Activities | D+ | o Hard hat<br>o Safety goggles<br>o Tyvek coveralls(1)<br>o Heavy duty anti-C rubber gloves and inner latex gloves<br>o Outer chemical-resistant (neoprene) steel-toe/steel-shank boots or rubber boots over steel-toe work boots<br>o Dosimetry Badge (TLD)<br>o Hearing protection (foam ear plugs or ear muffs)(2) |
| All Activities | C | o Same as above plus<br>o Full-face respirator with organic vapor/acid gas cartridges with high-efficiency dust and mist filters(3) |

(1) Cotton coveralls can be used in place of Tyvek coveralls (except during drilling) when direct reading instrumentation and visual observation indicate that no contamination is present.

(2) Required during noise intensive activities.

(3) If the OVA/PID reading is measurable above background or dusty conditions exist.

ATTACHMENT A

SEE NES RADIOLOGICAL CONTROL PLAN

ATTACHMENT B

# STANDARD SAFE WORK PRACTICES

## I. GENERAL

1. Eating, drinking, chewing gum or tobacco and smoking are prohibited in the contaminated or potentially contaminated area or where the possibility for the transfer of contamination exists. Employees who handle contaminated or potentially contaminated materials or articles must wash with soap or mild detergent and water before eating.

2. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground, leaning or sitting on equipment or ground. Do not place monitoring equipment on potentially contaminated surface (i.e., ground, etc.).

3. Prevent, to the extent possible, spillage. In the event that a spillage occurs, contain liquid, if possible.

4. Prevent splashing of contaminated materials.

5. All field crew members shall make use of their senses (***all senses***) to alert them to potentially dangerous situations in which they should not become involved (i.e., presence of strong, irritating or nauseating odors).

6. Field crew members shall be familiar with the physical characteristics of investigations, including:

   - Wind direction in relation to ground zero area;,
   - Accessibility to associates, equipment, vehicles;
   - Communications;
   - Hot zone (areas of known or suspected contamination);

- Site access;
- Nearest water sources.

7. The number of personnel and equipment in the contaminated area should be minimized, but only to the extent consistent with work force requirements of safe site operations.

8. All wastes generated during Dames & Moore and/or subcontractor activities at the site will be disposed of as directed by the Project Manager.

## II. DRILLING AND SAMPLING PROCEDURES

For all drilling and sampling activities, the following standard safety procedures shall be employed.

1. All drilling and sampling equipment shall be cleaned before proceeding to the site.

2. At the drilling or sampling site, sampling equipment shall be cleaned after each use.

3. Work in "cleaner" areas should be conducted first where practical.

4. The minimum number of personnel necessary to achieve the objectives shall be within 25 feet of the drilling or sampling activity.

5. If emergency and back-up subcontracted personnel are at the site, they should remain 25 feet from the drilling or sampling activity, where practical.

6. Exclusion zones will be established within designated hot lines. Delineation of a hot line will reflect the interface between areas at or below a predetermined threshold contaminant concentration, based on available data including the results of monitoring and chemical analyses, information from site personnel regarding historical site activities, and general observations. This determination will be made by the Project Manager in conjunction with the On-Site Safety Officer and site personnel.

ATTACHMENT C

# CONTACTS AND PROCEDURES

## I. CONTACTS

Should any situation of unplanned occurrence require outside support service, the appropriate contacts should be made. The list of appropriate contacts is found in Section 4 of the Health and Safety Plan.

## II. PROCEDURES

In the event that an emergency develops on-site, the procedures delineated herein are to be immediately followed. Emergency conditions are considered to exist if:

- Any member of the field crew is involved in an accident or experiences any adverse effects or symptoms of exposure while on-site; or

- A condition is discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

A. Personnel on-site should use the "buddy system" (pairs). Buddies should pre-arrange hand signals or other means of emergency signals for communication in case of lack of radios or radio breakdown (see the following item).

- Hand gripping throat: out of air, cannot breathe.

- Grip partner's wrist or place both hands around waste: leave the area immediately, no debate.

- Hands on top of head: need assistance.

- Thumbs up: Okay, I'm all right, I understand.

- Thumbs down: No, negative.

B. Site work area entrance and exit routes should be planned, and emergency escape routes delineated by the On-Site Safety Officer.

C. Visual contact should be maintained between "pairs" on-site with the team remaining in close proximity in order to assist each other in case of emergencies.

D. In the event that any member of the field crew experiences any adverse effects or symptoms of exposure while on-site, the entire field crew should immediately halt work and act according to the instructions provided by the Site Safety Officer.

E. Wind indicators visible to all on-site personnel should be provided by the Project Manager to indicate possible routes for upwind escape.

F. The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team and re-evaluation of the hazard and the level of protection required.

G. In the event that an accident occurs, the Project Manager is to complete an Accident Report Form for submittal to the Office

Safety Coordinator (OSC), who will forward a copy to the Regional Health and Safety Manager (RHSM). The OSC should assure that the follow-up action is taken to correct the situation that caused the accident.

H. In the event that an accident occurs, the Project Manager is to complete an Accident Report Form for submittal to the MPIC of the office, with a copy to the regional health and safety program office. The MPIC should assure that follow-up action is taken to correct the situation that caused the accident.

ATTACHMENT D

# RESPONSIBILITIES

## I. PROJECT MANAGER

The Project Manager (PM) shall direct on-site investigations and operational efforts. The PM, assisted by the Site Safety Officer (SSO), has primary responsibility for:

1. Making certain that appropriate personnel protective equipment and monitoring equipment are available and properly utilized by all on-site personnel.

2. Making certain that personnel receive this plan and are aware of the provisions of this plan, are instructed in the work practices necessary to ensure safety, and are familiar with planned procedures for dealing with emergencies.

3. Making certain all field personnel have had the Dames & Moore Core Health and Safety Training Course or its equivalent, and the NES Radiation Worker Training Course.

4. Making certain that personnel are aware of the potential hazards associated with the site operations.

5. Monitoring the safety performance of all personnel to ensure that the required work practices are employed.

6. Correcting any work practices or conditions that may result in injury or exposure to hazardous substances.

7. Preparing any accident/incident reports (see Accident Report Form) and routine job exposure records.

8. Assuring the completion of Plan Acceptance and Feedback Forms attached hereto.

## II. SITE SAFETY OFFICER

The Site Safety Officer (SSO) shall:

1. Implement project Health and Safety Plans and report to the Site Safety Coordinator and the PM for action if there are any deviations from the anticipated conditions described in the plan; the SSO has the authorization to stop work at any time.

2. Calibrate all monitoring equipment (except radiation detection equipment) on a daily basis and record results on the attached sheets (see Section 7.0 - Daily Instrument Calibration Check Sheet and Daily Radiation instrument Operability Check Sheet).

3. Making certain that all monitoring equipment is operating correctly according to manufacturer's instructions and provide maintenance if it is not.

4. Confirm that personnel working on-site have the proper medical surveillance program and Health and Safety training which qualifies them to work at a hazardous waste site. Also be responsible for identifying all site personnel with special medial problems or restrictions.

## III PROJECT PERSONNEL

Project personnel involved in on-site investigations and operations are responsible for:

1. Taking all reasonable precautions to prevent injury to themselves and to their fellow employees.

2. Performing only those tasks that they believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the SSO.

3. Notifying the PM and SSO of any special medical problems and making certain that all on-site personnel are aware of any such problems.

ATTACHMENT E

# HEAT STRESS/COLD STRESS

## HEAT STRESS

If site work is to be conducted during the summer or in other hot environments, heat stress is a concern in the health and safety of personnel. For workers wearing permeable clothing, follow recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Heat Stress. For workers wearing semi-permeable or impermeable clothing, the ACGIH standard cannot be used. For those situations, workers should be monitored when the temperature in the work are is above 70°F (21°C).

To monitor the worker, measure:

- *Heart rate*. Count the radial pulse during a 30-second period as early as possible in the rest period.

  If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

  If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

- *Oral temperature*. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

  If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.

If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear a semi-permeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).

- *Body water loss*, if possible. Measure weight on a scale accurate to ± 0.25 pound at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, is nude. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work (see following Table). The length of the work cycle will be governed by the frequency of the required physiological monitoring.

## SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATIZED WORKERS

| Adjusted Temperature[1] | Normal Work Ensemble | Impermeable Ensemble |
|---|---|---|
| 90°F (32.2°C) or above | After each 45 min of work | After each 15 min of work |
| 87.5°F - 90°F) (32.8°C - 32.2°C) | After each 60 min of work | After each 30 min of work |
| 82.5°F - 87.5°F) (28.1°C - 30.8°C) | After each 90 min of work | After each 60 min of work |
| 77.5°F - 82.5°F) (25.3°C - 28.1°C) | After each 120 min of work | After each 90 min of work |
| 72.5°F - 77.5°F) (22.5°C - 25.3°C) | After each 150 min of work | After each 120 min of work |

(1) Calculate the adjusted air temperature (ta adj) by using this equation: ta adj °F = ta °F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine - no cloud cover and a sharp, distinct shadow; 0 percent sunshine - no shadows.)

If workers are not monitored for heat stress, work activities in hot environments can result in dehydration, heat exhaustion, heat stress or even heat stroke.

Signs and Symptoms of Heat Stress

- *Heat rash* may result from continuous exposure to heat or humid air.

- *Heat cramps* are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
  - muscle spasms
  - pain in the hands, feet and abdomen.

- *Heat exhaustion* occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:
  - pale, cool, moist skin
  - heavy sweating
  - dizziness
  - nausea
  - fainting

- *Heat stroke* is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:
  - red, hot, usually dry skin
  - lack of or reduced perspiration
  - nausea
  - dizziness and confusion
  - strong, rapid pulse
  - coma

## COLD STRESS

### Frost Bite

Frostbite is an injury resulting from exposure to cold. The extremities of the body (fingers, toes) are most often affected. The signs of frostbite are:

- Skin turns white or grayish-yellow.
- Pain is sometimes felt early, but subsides later. Often there is no pain.
- The affect part feels intensely cold and numb.

### Hypothermia

If site work is to be conducted during the winter, cold stress is a concern in the health and safety of the personnel. Additional insulated clothing will be provided to field personnel. Of special note for cold stress on this site is the wearing of Tyvek suits. Disposable clothing does not breath; therefore, perspiration is not provided with a means of evaporation. During strenuous physical activity, an employee's clothes can become wet. Wet clothes combined with cold temperatures can lead to hypothermia. If the air temperature is less than 40°F and an employee becomes wet, the employee must change to dry clothes. The on-site heated trailer facility or a personnel vehicle may be utilized as a change area.

Hypothermia is characterized by shivering, numbness, drowsiness, muscular weakness and a low internal body temperature when the body feels warm externally. This can lead to unconsciousness and death.

In either case (frostbite or hypothermia), seek immediate medical attention.

To prevent these effects from occurring, persons working in cold environments should war adequate clothing and reduce the time spent in the cold area.

ATTACHMENT F

# SITE SAFETY BRIEFING FORM

## ON-SITE SAFETY MEETING

Project _____

Date _____ Time _____ Job No. _____

Address _____

Specific Location _____

Type of Work _____

## SAFETY TOPICS PRESENTED

Protective Clothing/Equipment _____

Chemical Hazards _____

Emergency Procedures _____

Hospital/Clinic _____ Phone _____

Hospital Address _____

Special Equipment _____

Other _____

## ATTENDEES

| Name Printed | Signature |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

Meeting Conducted by: _____ _____

Name Printed Signature

Site Safety Officer _____ Team Leader _____

# PLAN ACCEPTANCE FORM

## PROJECT HEALTH AND SAFETY PLAN

INSTRUCTIONS: This form is to be completed by each person to work on the subject project work site and returned to the Office Safety Coordinator.

Job No. _____

Client/
Project _____

Date _____

I represent that I have read and understand the contents of the above Plan and agree to perform my work in accordance with it.

_____
Signature

_____
Print Name

_____
Company/Office

_____
Date

# PROJECT EXPOSURE HISTORY FORM

(To Be Completed by Project Manager)

Job Name _____

Job Number _____

Dates from/to _____

D&M PERSONNEL ON-SITE

1. _____ 5. _____

2. _____ 6. _____

3. _____ 7. _____

4. _____ 8. _____

| Suspected Contaminants | Verified Contaminants and Airborne Concentrations Thereof |
| --- | --- |

# PLAN FEEDBACK FORM

Job Number _____

Job Name _____

Date _____

Problems with plan requirements:

_____
_____
_____
_____
_____

Unexpected situations encountered:

_____
_____
_____
_____
_____

Recommendations for future revisions:

_____
_____
_____
_____
_____

# AIR MONITORING

## GENERAL INFORMATION

Name(s) _____ Background Level _____

Date _____ Weather Condition _____

Time _____ _____

Project _____

Job No. _____

Estimated Wind Direction _____

Estimated Wind Speed (i.e., calm, moderate, strong, etc) _____

Estimated Air Temperature and % Relative Humidity _____

Location where Background Level was Obtained _____

## EQUIPMENT SETTINGS

### HNu

Range _____

Span Pot _____

Calibration Gas _____

### EXPLOSIMETER

Alarm Trigger-%LEL _____

Alarm Trigger-%02 _____

Calibration Gas _____

## FIELD ACTIVITIES

Field Activities Conducted _____

_____ _____

_____

| TIME | HNU | EXPLOSIMETER %LEL %02 | DRAGER TUBE | RADIATION METER |
|---|---|---|---|---|
| | Equivalent | | ppm-consistent | |

# ACCIDENT REPORT FORM

SUPERVISOR'S REPORT OF ACCIDENT

DO NOT USE FOR MOTOR VEHICLE OR AIRCRAFT ACCIDENTS

TO

FROM

TELEPHONE (Include area code)

NAME OF INJURED OR ILL EMPLOYEE

DATE OF ACCIDENT | TIME OF ACCIDENT | EXACT LOCATION OF ACCIDENT

NARRATIVE DESCRIPTION OF ACCIDENT

NATURE OF ILLNESS OR INJURY AND PART OF BODY INJURED

LOST TIME
YES ☐ NO ☐

PROBABLE DISABILITY (Check One)

| FATAL | LOST WORK DAY WITH DAYS AWAY FROM WORK--- | LOST WORK DAY WITH --- DAYS OF RESTRICTED ACTIVITY | NO LOST WORK DAY | FIRST AID ONLY |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

CORRECTIVE ACTION TAKEN BY REPORTING UNIT

CORRECTIVE ACTION WHICH SHOULD BE TAKEN (by whom and by when)

NAME OF SUPERVISOR

TITLE

SIGNATURE

DATE