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SURVEY PROCEDURE:
CONTROL AND ACCOUNTABILITY OF NUCLEAR MATERIALS

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GLOSSARY

NMMSS	Nuclear Materials Management and Safeguards System
DOE	(U.S.) Department of Energy
ID	Inventory difference
MC&A	Material Control and Accountability (System)
NDA	Nondestructive assay
NMMSS	Nuclear Materials Management and Safeguards System
NOL	Normal operational loss
OSS	Office of Safeguards and Security (of DOE)
SAN	San Francisco Operations Office (of DOE)
S/RD	Shipper/receiver difference
TID	Tamper-indicating device

SURVEY PROCEDURE: CONTROL AND ACCOUNTABILITY OF NUCLEAR MATERIAL

1.0 INTRODUCTION

This procedure outlines the method by which the Department of Energy (DOE) San Francisco Operations Office (SAN) will plan and execute periodic field surveys of the Material Control and Accountability (MC&A) program and practices at designated contractors' facilities.

1.1 APPLICABLE DOE ORDERS

The surveys will be conducted in accordance with DOE Order 5630.7, Control and Accountability of Nuclear Materials Surveys (7/8/81) to ascertain compliance with applicable DOE Orders and SAN Management Directives in the 5630 series, as well as the adequacy of the contractor's program and procedures.

1.2 IMPLEMENTATION RESPONSIBILITY

Surveys will be conducted by the Safeguards & Security Division of DOE-SAN.

1.3 SURVEY SCOPE

The survey process is illustrated in Figure 1. The survey team will review and evaluate the adequacy of the contractor's procedures and practices for nuclear material control and accounting by means of physical inventory, internal control, measurement and statistics, material control indicators, records and reports, and personnel training. The survey will include an audit of records and reports, observation of inventory procedures, an independent test of the inventory and a review and evaluation of the inventory differences (ID), accidental losses, and normal operational losses (NOL) as applicable to the facility to be surveyed.

2.0 PLANNING THE SURVEY

To assure that the survey team will be effective and complete in their review, adequate advance planning must precede the conduct of the survey. The following steps should be taken once the survey is scheduled.

2.1 ASSIGNMENT OF PERSONNEL

The Nuclear Materials Representative, Safeguards and Security Division, will assign the personnel who will comprise the survey team, designate a Team Leader, and assign specific responsibilities to each member based on their expertise, experience, availability, and any other pertinent considerations.

2.2 NOTIFICATION TO THE CONTRACTOR OF THE SURVEY

Both the Team Leader and the Nuclear Materials Representative, Safeguards and Security Division, should review and approve the team's preparations for the survey. The Team Leader should then, in writing, arrange with appropriate facility personnel the survey dates, identify the survey team members, and request any special advance information that may be desired.

2.2.1 Planning Visit to Contractor's Facility

If desired, arrangements may be made at this time for a pre-survey visit for discussion of the survey plans with the facility management staff.

2.3 REVIEW PAST SURVEY RESULTS

The team members should review prior survey reports, workpapers, and pertinent correspondence in order to:

- o Become familiar with the facility to be surveyed.

- o Review findings and recommendations for improvement from previous surveys.
- o Determine the contractor's progress to date in implementing previous recommendations.

2.4 ESTABLISH SURVEY PLANS

Each team member should establish priorities for review in his or her assigned area of responsibility. The team, as a whole, should establish an overall coordinated plan of their prioritized objectives for the survey. The Team Leader should concur with the priorities and make certain that the overall survey plan covers the five areas described below.

2.4.1 Measurement System

Review measurement system procedure manuals, prior survey workpapers, and other applicable information from the contractor to determine present status of the MC&A procedures, including consistency with facility procedures, replacement of existing equipment, and the addition of new equipment and procedures. Based on this information, determine those aspects of the measurement system that should be emphasized in the review and prepare an appropriate plan for survey activities.

2.4.2 Statistics

As part of the measurements system survey planning, review the statistical methods utilized in the facility. In particular, flag any prior survey recommendations for improvement and plan to follow up on these items. Any newly applied equipment and methods should be scheduled for special attention during the survey.

2.4.3 Internal Control

Examine the facility internal control procedures manual and prior survey findings and conclusions. Include in the new survey plan those aspects that require follow-up in order to improve prior deficiencies and check the adaptation to changes in facilities, equipment, or procedures.

2.4.4 Inventory Observation and Verification

Review the facility procedures manual and other available documents pertinent to the facility's inventory procedures. Using the most recent inventory data and results of the prior survey, set plans for observation of the physical inventory, review any areas needing special emphasis in the new survey, and conduct independent inventory verification tests as appropriate.

2.4.5 Examination of Records and Reports

Examine the prior survey audit report, nuclear material control records, Nuclear Materials Management and Safeguards System (NMSS) data, and accounting system procedures to select those items to be emphasized in the survey. In particular, identify for attention those areas of the records and reporting system that have changed since the prior audit. Sampling plans for audit tests to be performed should be developed on the basis of prior survey activities and results. Audit plans should be developed to fit the specific facility being surveyed and should include review of source documents for completeness, authorization, accuracy, and proper entry into the records system for both internal and external transactions. Obtain the NMMS survey audit package for the facility.

2.5 Plan for Workpapers, Checklists, and Questionnaires

Before the survey starts, each survey team member should plan to create workpapers during the survey that will provide an adequate record of the survey results. During the survey these workpapers may be supplemented by checklists, questionnaires, or outlines.

3.0 CONDUCTING THE SURVEY

It is SAN policy to conduct surveys as one uninterrupted activity; however, in some instances that may not be practical. In such cases, the survey may be conducted in logical stages over a period of time.

3.1 INITIAL BRIEFING

The field survey activities should start with an initial briefing of facility management by the Team Leader. During this briefing, the Team Leader should describe survey objectives, discuss any special concerns of the survey team or facility management, set activity schedules, and generally provide for efficient use of both team- and facility-personnel time and effort in conducting the following activities.

3.2 PHYSICAL INVENTORY

3.2.1 Observe Contractor's Physical Inventory

This observation ensures that the contractor's physical inventory is conducted in accordance with applicable facility procedures and that all materials are accounted for.

1. Obtain an inventory list from the contractor and review applicable inventory procedures before beginning the inventory.

2. Arrange with the contractor for the appropriate survey staff members to be present to observe the conduct of the physical inventory.
3. Observe and document the evaluation of the physical inventory. If the physical inventory is significantly inconsistent with facility procedures and good inventory practices, the Team Leader and facility MC&A personnel should be notified. Comment, as appropriate, on such factors as proper labeling or tagging for identification, appropriate segregation of materials, intact tamper-indicating devices, piece counts, and serial-number checks.

3.2.2 Inventory Reconciliation

The survey team should evaluate the contractor's reconciliation of the data developed during the physical inventory with the facility's records. Any adjustments for inventory differences (IDs) must be fully explained.

3.2.3 Inventory Verification

Except for those cases where the materials are inaccessible for verification purposes, the nuclear material inventory should be independently verified as a part of the survey activities. The verification may be conducted by statistical sampling techniques and may be accomplished by piece count, weighing, nondestructive assay (NDA), chemical analysis, or a mixture of methods.

3.3 INTERNAL CONTROL REVIEW

Internal control encompasses all plans and procedures by which an organization maintains control of nuclear materials from the time they are received by the facility until they are shipped from the facility. Consequently, throughout the field survey all members of the survey team should be involved in the review of the effectiveness of a facility's internal control system. Each survey team member should be thoroughly familiar with

the facility's procedure manual and any other facility documents relating to internal control methods. During the course of the survey, each team member shall document observations concerning:

1. The degree to which the written procedures provide for adequate and effective control procedures and are consistent with DOE orders.
2. The degree to which current practices conform to the written procedures.
3. The degree to which the written procedures are adequate in describing current practices.

The internal control review should include the following:

- (a) The facility's organizational plan as it relates to MC&A.
- (b) Action in response to prior survey recommendations for internal control improvements.
- (c) The facility's physical inventory program.
- (d) Internal audits and reports.
- (e) Material access and transfer controls.
- (f) Egress controls.
- (g) Tamper-indicating device controls.

3.4 MEASUREMENT SYSTEM REVIEW

The objectives of this review are to determine if the facility's practices (1) conform to procedures, (2) are consistent with DOE orders, and (3) are capable of providing acceptably accurate measurements. Depending on the nature of the facility's operations, measurements may involve any or all of the following: item counts, bulk measurements, sampling, and analytical

determinations. Measuring equipment used may include scales and balances, volume measuring devices, and analytical laboratory equipment for destructive and nondestructive analyses.

Areas to be emphasized during the measurement system review will be based on the extent of prior review, prior survey findings, facility upgrades, and additions of new equipment. In general, the survey team should consider the following factors as they apply to the areas selected for review.

1. For scales and balances, evaluate the procedures used to make measurements, the adequacy of calibration practices, and the standards used for calibration. Also ascertain the means used to determine both the calibration status and the need for periodic recalibration.
2. For volume measurements, evaluate the procedures used to make the measurements and the calibration of the measuring devices.
3. For destructive and nondestructive analytical measurements, evaluate the procedures used, the handling of samples, and the record system used in the measurement process.
4. For sampling procedures, determine the method used for establishing the sample size, the homogeneity of liquid samples, and the reliability and suitability of the analytical method employed for the material being analyzed.

3.5 STATISTICAL PROGRAM REVIEW

Statistical procedures based on fundamental principles should be used by the facility to ensure that the precision and accuracy of measurement practices is known and is adequate. The survey team should assess the validity

of the contractor's random sampling plans; setting of warning and alarm limits for IDs, for both individual items and the entire inventory; and the bases used to determine the precision and accuracy of measurement procedures.

3.6 MATERIAL CONTROL INDICATORS

Material control may include the use of procedures, records, and hardware.

- o Procedures include access-portal rules and orders for material transfers and waste handling, as well as other operating rules designed to prevent or detect any unauthorized movement of nuclear materials. Procedures should also include requirements for the training and qualification of appropriate facility personnel to ensure that they can detect unauthorized activities and threats to the integrity of the MC&A system. Frequent exercises that evaluate the effectiveness of detection of challenges to the MC&A system should also be specified in the facility procedures.
- o Records and reports include such items as material transfer forms, shipper/receiver differences (S/RDs), inventory differences (IDs), normal operational losses (NOLs), and accidental losses reports.
- o Hardware may involve such items as tamper-indicating devices (TIDs), other tampering/intrusion detecting systems, and material-sensitive alarms suited to the facility.

The survey team should evaluate the adequacy of material control procedures and determine the degree to which they are followed. This review should include evaluation of training and qualification of personnel, as well as the frequency and results of facility MC&A exercises. The team's evaluation may include, when practicable, the observance by survey team members of an actual MC&A exercise. The team should also review all NOLs, IDs, and accidental losses occurring during the survey period to ascertain

their reasonableness and to determine that proper action was taken by the contractor. Also, the team should review the means by which records are controlled in order to assess the possibilities for records tampering or alteration as a cover for material diversion at the facility.

Finally, the team should check that hardware items are in good operating condition, are properly maintained, and are appropriate and effective for their intended purposes.

3.7 AUDIT RECORDS AND REPORTS

Examine records and reports to determine that they are generated and maintained in accordance with written procedures and DOE orders and that they accurately present the transactions and inventories of nuclear material received, processed, used, transferred, or stored by the facility. The survey team should develop records and reports-audit methods and plans appropriate to the facility, and the team involved should use tests and checks in accordance with generally accepted auditing principles. As described in Section 2.4.5, audit sampling plans should be developed before the field portion of the survey is started. The sampling plan should be statistically valid in order to provide a basis to support an opinion as to the accuracy of the facility's Material Balance Reports. Some of the audit activities may be conducted at SAN on a routine on-going basis.

3.8 TRAINING

Proper formal training of personnel is vital to ensure that facility staff members are qualified to perform their assignments adequately in all areas of the MC&A program. Periodic exercises and tests, coupled with refresher courses, can ensure that the MC&A program continues to be effective. The survey team should review the facility procedures and records to assess the degree to which the contractor provides for and implements an appropriate training program for the facility.

4.0 COMPLETION OF THE SURVEY

Once the field survey activities are completed, the Team Leader should ensure that no obvious aspects have been overlooked or misinterpreted. The following activities help accomplish this goal.

4.1 COORDINATE AND EVALUATE SURVEY FINDINGS

The Team Leader should review the team's workpapers to determine if any discrepancies or omissions have occurred. The team should discuss their findings and determine significant points that appear to be questionable or incomplete in nature. The survey team discussion should result in:

1. Determination of the adequacy of the contractor's overall material control and accountability system.
2. Assessment of the adequacy of the contractor's progress on prior survey recommendations and suggestions.
3. Selection of areas where improvements are desired and development of recommendations and suggestions that lead to their accomplishment.
4. Development of points for discussion with the facility's management, including commendations for good performance as well as focus on areas needing corrective actions.

4.2 VALIDATION BRIEFING WITH MC&A STAFF

A meeting with facility MC&A staff members should be held to validate the survey team's findings. Detailed discussion should take place regarding any assumptions made, weaknesses found, and the team's recommendations.

4.3 CONDUCT EXIT BRIEFING

The Team Leader alone or with survey team members should plan for an exit briefing of facility management personnel. The discussions should focus on the significant findings, including both deficiencies and points for commendation. Recommendations for action should be discussed so that management will be aware of what to expect in the written report. As part of the survey workpapers, a record should be kept of the discussions and management's reactions to the recommendations.

5.0 WRITE THE REPORT

The survey report should be issued within 60 days after completion of the survey field work. The submittal letter should request the facility's action plans for correcting deficiencies within 30 days after its receipt. The survey report is also intended to inform DOE management, both in the field and at headquarters, about the status of the nuclear materials control and accountability system at the facility. The report should be written in a concise manner so that findings, conclusions, and recommendations can be understood without the use of lengthy written discussions. To accomplish this goal, the report may be organized into the following sections.

5.1 REPORT ORGANIZATION

1. Introduction. A brief description of the facility, its functions, and MC&A organization.
2. Scope. The extent of coverage of the survey.
3. Material Control and Accountability Improvements. Improvements made to the facility's MC&A program since the prior survey.

4. Summary of Findings. Provide an opinion on the overall effectiveness of the facility's MC&A system.
5. Recommendations. Summarize specific recommendations for improvements in the facility's MC&A system. Include comments regarding the status of prior recommendations.
6. Discussion.
 - (a) Physical Inventory
 - (b) Internal Control
 - (c) Measurement and Statistics
 - (d) Material Control Indicators
 - (e) Records and Reports
 - (f) Training

5.2 EXTERNAL REPORT DISTRIBUTION

The survey report should be issued to the contractor and copies sent to the Director, Office of Safeguards and Security; Chief, Material Control and Accountability Branch (OSS); and other Headquarter's Program Organizations.

6.0 SURVEY WORKPAPERS

Survey workpapers are used to collect data obtained during the survey. These papers are the supporting backup for all findings, opinions, and recommendations furnished in the survey report. Each survey team member should ensure that adequate information is included in the workpapers to support the survey report. At the same time, workpaper entries should be clear and concise to provide an easily understood starting point for future surveys and for the review and evaluation of the quality of the survey performance.

6.1 WORKPAPER CONTENTS

The survey workpapers should contain, as a minimum:

- o Audit schedules, including data from NMMSS System.
- o Meeting notes
- o Names and titles of facility personnel from whom specific information was obtained for the topical areas reviewed.
- o Data resulting from inventory verification, including sampling plans.
- o Copies of computer printouts, as needed.
- o References to other permanent records that support survey report items but don't need to be part of the workpaper set.

6.2 WORKPAPER ORGANIZATION

Workpapers should identify authors and dates of entries. As far as practicable, the workpapers should be titled according to their specific area of coverage: e.g., Measurement System Review, Internal Control Review. When appropriate, they should be cross-referenced to other workpapers generated from the survey. Workpapers should be placed in a permanent file folder (except for oversize computer printouts) and arranged in a manner consistent with the format of the survey report. Workpapers should be reviewed by the Team Leader to assure completeness and accuracy.

6.3 WORKPAPER STORAGE

The completed workpapers should be filed in the storage area for permanent records.

7.0 SURVEY FOLLOW-UP

When deficiencies uncovered in the survey need to be remedied by means of an action plan developed by the contractor, follow-up on quarterly intervals, or as otherwise specified, should be undertaken by the SAN Safeguards and Security staff to ensure that timely corrective action is achieved. Such follow-up should include a facility inspection visit, when applicable, and documentation of the contractor's progress in implementing the action plan.

Finally, all survey team members should review their experiences during the survey and provide the Team Leader with written recommendations for improving the effectiveness of future surveys. Areas for consideration include:

- o Improving present methods of survey planning, execution, and documentation.
- o Improving the usefulness of workpapers and supplements to workpapers.
- o Providing for more effective transfer of prior survey findings from one survey team to the next.