MAINTAINING EFFLUENTS FROM MATERIALS FACILITIES AS LOW AS IS REASONABLY ACHIEVABLE (ALARA)

PROGRAM APPLICABILITY: 2800

87102-01 OBJECTIVES

01.01 This procedure is to be implemented at any facility for which accurate and current effluent information is not available, and at all facilities whose effluents are known to exceed 20 percent of 10 CFR Part 20, Appendix B, Table 2 values. Licensees are exempt from this requirement if they do not use unsealed sources, and if they do not possess sufficient amounts of unsealed radioactive materials to cause effluents to exceed the aforementioned 20 percent criterion. Implementation of this procedure, where applicable, is to be at the frequency used for routine inspections at the facility. The objective of the procedure is to determine whether the licensee effectively maintains effluents within applicable limits, constraints, and As Low As Is Reasonably Achievable (ALARA), as is required by 10 CFR 20.1101(b), and the constraint on air emissions, as established under 10 CFR 20.1101(d). Effluents include both air and water effluents, but do not include releases to public sewers. Sanitary sewers do not include sewage treatment facilities, septic tanks, and leach fields owned or operated by the licensee (see definition in 10 CFR 20.1003).

87102-02 INSPECTION REQUIREMENTS

02.01 Management Commitment. Review management's written policy statements on ALARA, and the authority of managers and line personnel to implement this policy. Review the methods used by management to supervise implementation of the program. Determine if management and technical personnel are informed of industry developments in the area of ALARA.

02.02 Audits and Appraisals. Review the results of audits and appraisals of the ALARA program since the last inspection. Determine if effluent ALARA was explicitly considered during these audits and appraisals. Review the adequacy of the licensee's responses to findings.

02.03 Procedures, Engineering Controls, and Process Controls. Determine the quality of the relevant procedures and the degree to which ALARA techniques are incorporated into them. Determine the extent to which process and engineering controls are used to minimize effluents.

02.04 Instrumentation. Determine whether effluent monitoring systems and the associated analytical equipment are adequate to detect and quantify effluents with sufficient sensitivity, and whether they are maintained, calibrated, and operated in accordance with manufacturers' recommendations and good practices.

02.05 Surveys and Effluent Monitoring. Determine if all significant release pathways are

monitored, all unmonitored pathways have been characterized, and all surveillance procedures for effluents are being implemented.

02.06 Worker Training. Determine if the ALARA concept, including its application to effluents, is included in worker training and periodic retraining. Determine if the workers understand their roles and responsibilities in the ALARA program.

02.07 Changes. Review changes in equipment, processes, personnel, and procedures that may have had an effect on effluents, and determine the licensee's understanding of the impact of these changes on effluent ALARA.

87102-03 INSPECTION GUIDANCE

General Guidance

U.S. Environmental Protection Agency (EPA) Referral Form. The EPA referral form is provided in the Appendix of this procedure. The form is intended to inform the EPA of the inspection and to provide the EPA and the U.S. Nuclear Regulatory Commission (NRC) with data on the magnitude of air emissions from the licensee's facilities. Fill out the form at the end of the inspection and ensure that all the data required in the form are entered. The form is mostly self-explanatory, but the following are some items to note when entering the information. The "Contact" entry in the top box of the form refers to a licensee representative who would be able to answer questions related to the licensee emission information if the EPA were to contact the licensee for additional information or clarification. In the second box, document the licensee's ALARA goal, as defined in its radiation protection program (typically as a percentage of the Appendix B values in Part 20). If the licensee has an ALARA goal greater than 20 percent of Appendix B, determine if the NRC has approved this goal. Finally, check to determine whether the licensee's air emissions met or exceeded its ALARA goal, and also the ALARA constraint as established under 10 CFR 20.1101 (d). If, for any reason, the licensee is unable to provide the dose to the nearest member of the public, then indicate this in the space provided for insufficient information. Inability to provide the dose may indicate a weakness in the licensee's program because this value is needed to allow evaluation of the extent to which the licensee met their ALARA goal for effluents.

Provide a copy of the completed form to the regional State/Government Liaison officer, who will keep one copy in the regional files and promptly forward a copy under the transmittal letter (shown in the Appendix of this inspection procedure) to the appropriate regional office (listed on the reverse of the form).

EPA Referral in Enforcement Cases. If the inspection findings lead to enforcement action for violations of NRC air emission regulations (e.g., Severity Level I-IV), such as those in 10 CFR 20.1301 - 20.1302, a copy of the inspection report will be sent to the appropriate EPA regional office. Provide a copy of the report to the NRC regional State/Government Liaison officer, who will forward the report with the EPA referral form and will keep a record of all inspection reports sent to EPA in connection with such enforcement actions.

Specific Guidance

03.01 Management Commitment

a. Determine whether the licensee has incorporated the ALARA philosophy in its radiation protection program supported by a policy statement issued by a level of management sufficient to ensure that the program is properly carried out. The policy statement should make clear that all personnel are responsible for ensuring that the work they supervise or perform is in accordance with ALARA procedures and practices.

b. Review the licensee's ALARA goals, and determine if they are sufficiently challenging yet

realistic. Past experience from NRC licensing and inspection activities, effluent information reported to the NRC staff, and data provided by the EPA from field studies, all indicate that release goals of less than 20 percent of Appendix B values can be achieved by almost all material facility licensees. Determine if the licensee understands and implements these goals. A licensee that does not achieve these goals should provide reasons for not doing so. Ensure that the reasons provided justify deviation from regulatory guidance. Determine if the licensee has calculated annual doses resulting from air effluents and if the doses are: (i) within the ALARA constraint as required by 10 CFR 20.1101(d); (ii) within the licensee's ALARA goals (as described in its radiation protection program); or (iii) uncertain because there is insufficient information or basis for determination. Review the licensee's history in meeting ALARA goals, and its corrective actions when the goals were not met.

c. Determine if investigation levels for releases are established and used, and the rationale for selecting these levels. The levels chosen to initiate corrective actions are usually those that represent normal and expected releases. Review the investigations initiated when such levels are exceeded, and also review the corrective actions taken.

03.02 Audits and Appraisals

a. Review reports of audits conducted since the last inspection. Assess the quality of the reports and the depth of the audits. Determine whether the auditors who performed these audits were qualified for the task.

b. Determine whether the licensee's radiation safety committee (RSC), or radiation safety officer (RSO), if no RSC exists, has conducted periodic or at least annual ALARA effluent reviews as part of the required overall examination of the radiation protection program. If a consultant performs the reviews, determine whether the reviews are examined and approved by the RSC/RSO. The purpose of the ALARA review is to compare operating experience against ALARA goals, and to adjust these goals or operating procedures or equipment, if necessary, to improve performance. Determine if the results of these reviews are sent to senior management with recommendations for changes, and review the responses to these reviews and recommendations. Determine whether the ALARA effluent reviews are considered within the context of the overall site ALARA program and the radiation protection program.

03.03 Procedures, Engineering Controls, and Process Controls

a. Identify the methods used by the licensee to control and minimize effluents to the environment and whether additional or alternative options were considered. Common control practices for effluents include filtration, encapsulation, adsorption, containment, and the storage of materials for decay. Practices for large, diffuse sources such as contaminated soils or surfaces include covers, wetting during operations, and the application of stabilizers. Verify that, when practicable, unmonitored releases do not exceed 30 percent of the total estimated effluent releases, as suggested in Regulatory Guide 8.37. Verify that, whenever effluent levels were high compared with the desired goals, the licensee considered additional ALARA measures such as recycling process fluids, leakage reduction, and modifications to facilities, operations, and procedures. Verify that the licensee considered collective exposures (i.e., both occupational and general public exposures) and not just effluent levels, when selecting effluent-reduction techniques.

b. If the licensee rejected a control practice as unreasonable, review the licensee's analysis of the practice. Quantitative or qualitative analyses may be used to justify such practices.

For quantitative cost/benefit analyses, $2,000 per person-cSv (person-rem) may be used as a guide to determine whether a change is reasonable. A qualitative analysis is used in situations where assigning monetary values to the various factors involved in the analysis would be very difficult or not meaningful.

03.04 Instrumentation

a. If continuous effluent monitors are used, ensure that the licensee performs calibrations at least annually, or more frequently, if bound by license condition, or if the manufacturer suggests more frequent calibration. Calibrations should be performed according to manufacturer suggested protocols or other written procedures that implement accepted industry good practices. If flow meters are used, ensure that they are calibrated at least annually or according to the manufacturer's recommendations. Ensure that counting efficiencies are appropriate for the samples being counted, and that corrections are applied for the various factors that may distort the results, such as absorption of alpha and beta radiations, filter efficiency, sampling errors, and any other factors that may affect the accuracy of sampling and measurement. Review the licensee's techniques to quantify the releases and verify some of the calculations.

b. Ensure that samples are collected using proper media. Liquid samples should be transferred to a container for counting with the same geometry as the calibration standard. Air samples should be collected using methods appropriate for the type of activity being sampled. If, for any reason, a collection medium's efficiency falls below about 95 percent for the material to be collected, a correction factor should be applied. Charcoal cartridge collection efficiency tables/graphs (i.e., sample flow rate versus collection efficiency) should be available on site. In the case of charcoal cartridges, if the collection efficiency drops below 85 percent, the counting geometry of the cartridge (face-loaded or homogeneous) should be investigated.

c. Ensure that laboratory equipment has been properly calibrated and that the sources and standards used in these calibrations are appropriate for the types of radiations and geometries used at the site. Calibrations should be conducted at least annually, or more frequently if required by a license condition. Calibrations should also be performed after repairs or modifications. Review the licensee's laboratory quality assurance/quality control program.

d. Ensure that laboratory equipment has sufficient sensitivity for the radionuclides being measured. Check that the counting efficiencies, background counts, sample volumes, sample count times, etc. for each measurement protocol permit achievement of the desired or required lower limit of detection (LLD). If LLD values are not clearly specified in the licensee's procedures or clearly displayed in the laboratory, investigate the reasons and verify that the licensee's methods are capable of attaining these limits. Verify that the measurement procedures provide methods to check attainment of the LLDs. Verify that LLD values are routinely checked and recorded. Determine whether the licensee participates in outside programs to periodically verify the accuracy of its methods. These programs usually consist of measuring unknown samples sent to the licensee by an accredited organization, such as the National Institute of Standards and Technology. Review the results of participation in such programs, and enquire as to the reasons for nonparticipation, if that is the case.

03.05 Surveys and Effluent Monitoring

a. Review effluent release reports for obvious mistakes, anomalous measurements, omissions, and trends. Identify any occasions where the licensee exceeded internal investigation levels. Determine if the licensee identified these events, and review the corrective actions.

b. Ensure that the licensee has identified the significant sources of radioactive materials that contribute to effluent releases, and also has identified the pathways from these sources to the points of release.

Also ensure that significant release pathways are appropriately monitored.

c. Determine whether the licensee's sampling procedures are adequate. Ensure that all samples taken are representative. Stack and vent samples should be taken isokinetically, if necessary. Non-isokinetic sampling will not introduce significant sampling errors if the effluents contain particulates smaller than 5 μm aerodynamic diameter or noble gases. In the case of batch liquid releases, holdup tanks should be thoroughly mixed before samples are taken. Identify dilution volumes to be used. Ensure that the licensee knows or has measured the efficiencies of filters or absorbers through which effluents are passed. Note effluent release frequencies, and check whether the licensee has considered possible leakage pathways.

d. For liquid releases, note that releases to a public sanitary sewer system, in accordance with Part 20 requirements, are not considered liquid effluents.

e. Verify that the licensee has considered all reasonably expected release pathways and identified any potential unmonitored release pathways. Potential pathways include doors on exterior walls, open windows, exhaust vents, and unfinished corrugated metal construction. Inquire as to any releases to storm sewers or runoff from contaminated soil.

03.06 Worker Training. Verify that ALARA is included in the annual employee radiation protection training. Verify that employees have a thorough understanding of the ALARA program's principles and goals. Determine if they understand the role of engineering controls, and their role in the ALARA effort. Do this by conducting interviews with selected employees. Review training lesson plans and some examination questions and answers.

03.07 Changes. Tour the facilities and discuss changes in equipment and procedures with cognizant management. Determine whether changes have been made that will affect the types of effluents produced, effluent monitoring, sample collection, or laboratory analyses. Verify that the licensee understands the effects of these changes on effluents and the ALARA program.

87102-04 Resource estimate

For planning purposes, the direct inspection effort to complete this inspection procedure for the first time at a licensee's facility is estimated to average from 2 hours for small licensees to up to 6 hours for larger licensees, such as holders of broad scope licenses. Subsequent implementation of the procedure at the same facility is expected to require less direct inspection effort than the above averages.

87102-05 REFERENCES

U.S. Code of Federal Regulations, Title 10, Part 20

U.S. Code of Federal Regulations, Title 40, Part 61

U.S. Nuclear Regulatory Commission Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Compliance with 10 CFR Part 50, Appendix I."

U.S. Nuclear Regulatory Commission Regulatory Guide 3.51, "Calculational Models for Estimating Radiation Doses to Man from Uranium Milling Operations."

U.S. Nuclear Regulatory Commission Regulatory Guide 8.25, "Air Sampling in the Workplace."

U.S. Nuclear Regulatory Commission Regulatory Guide 8.37, "ALARA Levels for Effluents From Materials Facilities."

U.S. Environmental Protection Agency, "Background Information Document: Procedures Approved for Demonstrating Compliance with 40 CFR Part 61, Subpart I," EPA 520/1-89-001, Office of Radiation Protection Programs, Washington DC, October 1989.

U.S. Environmental Protection Agency, "EPA Guidance Document for Facilities Subject to 40 CFR Part 61, Subpart I: Procedures for Determining Compliance with the Standard and Qualification for Exemption from Reporting," EPA 520/1-89-002, Office of Radiation Protection Programs, Washington DC, October 1989.

U.S. Environmental Protection Agency, "User's Guide for COMPLY," EPA 520/1-89-003, Office of Radiation Protection Programs, Washington DC, October 1989.

International Commission on Radiological Protection, "Limits for Intakes of Radionuclides by Workers," ICRP No. 30, 1978.

NMSS Licensee Newsletter, "Update on U.S. Environmental Protection Agency's Standard for Radionuclide Emissions from Facilities Licensed by the U.S. Nuclear Regulatory Commission", NUREG/BR-0117, No. 93-4, Dec. '93/Jan. '94.

APPENDIX

ENVIRONMENTAL PROTECTION AGENCY REFERRAL FORM AND TRANSMITTAL LETTER

END

APPENDIX

ENVIRONMENTAL PROTECTION AGENCY

REFERRAL FORM

AND

TRANSMITTAL LETTER

Mr/Ms. _____
Radiation Protection Manager
Region _____
U. S. Environmental Protection Agency
_____
[Address of EPA Regional Office]

Dear Mr/Ms. _____

In accordance with the 1992 Memorandum Of Understanding between the U.S. Nuclear Regulatory Commission and the U.S. Environmental Protection Agency, I am enclosing the EPA Referral Form(s) on air emissions from ____[licensee names and numbers]___. Should you require any additional information regarding the details of the air emissions, the resulting doses, or the methods used to obtain these doses, please refer these inquiries to the licensee representative indicated in the "Contact" entry on the Form.

[In addition, since this inspection found (a) violation(s) of Severity Level ___(I-IV) associated with air or water effluents, we are enclosing a copy of the inspection report].*

Please contact this office at (___) ___-____ if you have any other questions regarding the inspection findings.

Sincerely,

_____, Chief
State and Government Affairs
Region ___

Enclosures: 1. EPA Referral Form(s)
2. Inspection Report

cc w/encl:
Deputy Division Director, NMSS

* Add this paragraph only if there are violations of any Severity Level (I-IV).

INSPECTION REFERRAL FORM

To: Regional Radiation Program Manager, U.S. Environmental Protection Agency
(See address of regional office on the back of the form.)

From: U.S. Nuclear Regulatory Commission, Region _____

Inspector: _____Phone: (____) _____

Inspection Dates: _____ License No(s): _____

Licensee: _____

Contact: _____ Phone: (____) _____

Address: _____

_____

Licensee's ALARA goal if greater than 20 percent of Appendix B,10 CFR Part 20:

____ % Appendix B, Part 20 [____ μSv (mrem)]

If more than 20 percent Appendix B, has the U.S. Nuclear Regulatory Commission approved this goal? __ (Yes) __ (No)

Classification of Effective Dose Equivalent:

Above licensee's ALARA goal? ___ (Yes) ___ (No)

Above 10 CFR 20.1101(d) ALARA constraint requirement?

___ (Yes) ___ (No)

[100 μSv/yr (10 mrem/yr)]

Insufficient information to estimate dose? ___ (Yes) ___ (No)

ADDRESSES OF EPA REGIONAL OFFICES

EPA REGIONAL OFFICE ADDRESS	STATES IN THE REGION
EPA Region 1 JFK Federal Building One Congress Street Boston, MA 02114-2023	CT, MA, ME, NH, RI, VT
EPA Region 2 290 Broadway New York, NY 10007	NJ, NY, Puerto Rico, Virgin Islands
EPA Region 3 1650 Arch Street Philadelphia, PA 19103-2029	DE, DC, MD, PA, VA, WV
EPA Region 4 61 Forsyth Street, SW Atlanta, GA 30303-3104	AL, FL, GA, KY, MS, NC, SC, TN
EPA Region 5 77 West Jackson Boulevard Chicago, IL 60604-3507	IL, IN, MI, MN, OH, WI
EPA Region 6 1445 Ross Avenue Dallas, TX 75202-2733	AR, LA, NM, OK, TX
EPA Region 7 901 N. 5TH Street Kansas City, KS 66101	IA, KS, MO, NE
EPA Region 8 One Denver Place 999 18th Street, Suite 500 Denver, CO 80202-2466	CO, MT, ND, SD, UT, WY
EPA Region 9 75 Hawthorne Street San Francisco, CA 94105	AZ, CA, HI, NV, American Samoa, Guam, Trust Territories of the Pacific
EPA Region 10 1200 6th Avenue Seattle, WA 98101	AK, ID, OR, WA

END