

CLINTON POWER STATION
ALARA PROGRAM
ILLINOIS POWER COMPANY

For general guidance and
policy only and in no way
supercedes station procedures.

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AN ANNUAL REVIEW OF RADIATION EXPOSURES RECEIVED
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REMARKS:

FRG

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ALARA PROGRAM

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production department procedures.

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ALARA

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I. Introduction

Appendix I to 10CFR50 (May 1975) issued by the U. S. Nuclear Regulatory Commission (NRC) provides numerical guides for design objectives to meet the "as low as reasonably achievable" (ALARA) criterion for radioactive material in light water reactor effluents. This has resulted in extensive and costly modifications in the radioactive waste treatment systems of presently operating plants and the installation of similar systems in new plant designs. In addition, 40CFR190 (January 1977) issued by the U. S. Environmental Protection Agency (EPA) has reduced the original limits (10CFR20) on maximum allowable exposures to the general public by a factor of twenty. Both of these new criteria have caused present operating plants and new plants to be designed with elaborate and demonstrably effective waste treatment systems. Thus, we are taking all reasonable measures to keep radiation exposure to the general public "as low as reasonably achievable" (ALARA).

The NRC has also issued two Regulatory Guides, 8.8 and 8.10, which require the development of a management and operating philosophy to keep occupational radiation exposures ALARA. In addition, the NRC, in new plant design review, and the Advisory Committee on Reactor Safeguards (ACRS) are urging the industry to go beyond qualitative commitments and establish quantitative commitments.

The intent of this document is to define a corporate management philosophy and a program that will achieve a resolution of ALARA criterion in both the public and operating plant sectors.

II. Management Philosophy and Commitment

It is Illinois Power Company's intention to ensure that nuclear power plant design and operation is conducted in a manner such that occupational exposure will be "as low as reasonably achievable". If it can be shown in a reasonable fashion that the radiation exposure is "truly unavoidable" or the "cost" of reducing radiation exposure is unreasonable in comparison with the commensurate benefit, then it is by definition ALARA. Maintaining occupational radiation exposure ALARA is a management commitment and designated individuals within the company will be charged with the responsibility of implementing it. To be achieved successfully, ALARA must be practiced at all employee levels. To fulfill this commitment, a basic management ALARA program will be defined and implemented for the Clinton Power Station. This program

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will recognize that future plant designs, operating plant design modifications and operating plant experience are inter-related and radiation exposure information developed through operating experience will be reflected in those design activities. This will be an interdepartmental program involving the Nuclear Station Engineering and Clinton Power Station Operating Departments.

III. Occupational Radiation Exposure ALARA Program

A. Objectives

In order to implement corporate management's commitment to keep occupational doses ALARA, a basic program is outlined here. The objectives of this program are twofold:

- (1) To maintain the annual dose (rem) to individual station personnel ALARA.
- (2) To maintain the annual integrated dose (man-rem) to all personnel at the station ALARA.

B. Guidelines

- (1) The quarterly dose to any individual should not exceed 2 Rem without appropriate management authorization and written justification.
- (2) As a decision tool in determining if a particular job or design is ALARA, management shall direct a cost study to be done in cases where it believes it necessary or if the dose exceeds the following guidelines.
 - (a) If the dose is either estimated or known from past experience to be greater than 10 man-rem total for a particular job.
 - (b) If the dose is greater than 10 man-rem/year for routine recurring jobs.

First and foremost ALARA represents a commitment to carefully consider all potential dose reductions to the general public and radiation workers. All aspects of the dose reduction will be considered including individual doses, total population doses, frequency of occurrence, technical feasibility of suggested modifications, and economics of suggested modifications.

In assessing the economic portion of potential modifications or programs the following guidelines should be used. When only the health benefits to the general public or plant

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radiation workers need be considered the 10CFR50 value of \$1000 (1975 dollars) per man-rem, integrated over the period of exposure, should be used. When a potential dose reduction affects plant radiation workers because of the added cost of replacement workers, a dollar value of \$6000 (1975 dollars) per man-rem per year, average dose rate reduction, should be used. This figure represents an economic equivalent of a dose rate reduction (dose per year) and cannot be integrated over the period of exposure. However, an additional value of \$1000 per man-rem, integrated over the period of exposure, should be added to this calculation to account for the health benefits to the radiation workers (see examples).

It should be emphasized that a dollar value, as calculated above, is not sufficient justification alone in deciding on the merits of a given modification. Instead, careful consideration of all factors followed by prudent judgment related to this consideration will dictate the final decision.

EXAMPLES

A proposed modification results in a savings of 5 man-rem every other year for the life of the plant.

Average man-rem/yr reduction = $5/2 = 2.5$ man-rem/yr

ALARA cost = replacement cost + health cost

Replacement cost = $\$6000 \times 2.5 = \$15,000$

Health Cost = $\$1000 \times 2.5 \times 40 = \$100,000$

ALARA cost = $\$115,000$

For a one-time dose reduction of 2.5 man-rem (all in the same year) the ALARA cost would be:

$\$6000 \times 2.5 + \$1000 \times 2.5 = \$17,500$

At the station, a dose measurement and record system shall be set up such that for each individual receiving a dose that requires a Radiation Work Permit, the source(s) of at least 80 percent of the dose as recorded by the personnel dosimetry system shall be identified in detail. The extent of the detail required is dependent upon the job category, the major plant system, the component within

the system, and the type of work done. For each job, the source(s) shall be described, and the nature of the radiation shall be identified. Most of the dose at the station (approximately 80 percent) should be accounted for in a reasonable fashion.

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IV. Organization

Figure 1 describes the organizations performing activities related to the Clinton Power Station. The positions as shown on Figure 1 which are responsible for the principal elements of the ALARA program are:

A. Vice President

The Illinois Power Company ALARA program will be implemented under the direction of the Vice President. The Vice President is responsible for the overall effectiveness of the program. This responsibility is carried out through the Manager of Nuclear Station Engineering and the Clinton Power Station Plant Manager.

B. Manager of Nuclear Station Engineering

The Manager of Nuclear Station Engineering is responsible for all design and engineering aspects of ALARA during design and construction. He will be responsible for all design and engineering aspects of ALARA for any major modifications to the Clinton Power Station.

C. Clinton Power Station Plant Manager

The Clinton Power Station Plant Manager is responsible for the overall "operational" ALARA program. He will be responsible to ensure that operational criteria for ALARA are made available to the Manager of Nuclear Station Engineering to be used for design.

D. Supervisor - Radiation Protection

The Supervisor - Radiation Protection is responsible for:

- (1) Monitoring for ALARA during plant design and construction. This will include:
 - (a) Assisting the Manager of Nuclear Station Engineering by preparing and evaluating design requirements and performing ALARA design reviews in the following areas.
 - 1. Requirements for radiological control.
 - 2. Adequacy of plant layouts for radiological control.

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3. Shield designs.
 4. Radiation detection and monitoring systems.
 5. Radiation Protection facilities.
 6. Fuel Handling
 7. Radwaste handling and disposal.
- (b) Reporting ALARA reviews or evaluation findings to the ALARA committee.
- (2) Writing implementing procedures for the ALARA program.
 - (3) Establish a suitable and adequate Clinton Power Station occupational exposure accounting system. This will include:
 - (a) A system for recording, reviewing, storing, and retrieving the exposure data to account for the exposures in the detail required by the ALARA program.
 - (b) Providing suitable and timely information to the different departmental supervisors to enable them to plan job assignments, etc.
 - (4) Establish and implement a radiation protection program for all station personnel, contractors and visitors that puts emphasis on the ALARA policy.
 - (5) Ensure that adequate resources, including personnel, facilities, instrumentation and equipment, are available to achieve an effective ALARA program.
 - (6) Participate in ALARA reviews of new or modified plant facilities and/or equipment that would cause a detrimental effect on existing radiation levels or which can affect radiation exposure to personnel.
 - (7) Coordinating or implementing, as appropriate, the ALARA aspects of internal design modifications (those of a small or limited nature) or emergency modification.
 - (8) Conduct an ALARA review of operational plant activities for the purpose of identifying the locations, operations and conditions which have a potential for causing or have caused significant radiation exposures to personnel.
 - (9) Assist the ALARA Committee by:
 - (a) Serving on the Staff of the Committee.

- (b) Conducting at least biennial (every two years) reviews of procedures, records, reports, etc., used to comply with the Company ALARA guidelines and the NRC regulatory requirements.
 - (c) Conducting reviews of NRC, INPO, Nuclear Energy Liability-Property Insurance Association (NELPIA), etc., audit reports that are related to radiation protection and plant overexposure reports.
 - (d) Providing technical guidance and assistance to persons involved in compliance with the ALARA program.
 - (e) Prior to a refueling outage review the proposed radiation protection coverage for the outage and submit a report to the ALARA Committee.
- (10) When necessary, use direct recourse via the Vice President to resolve questions related to the conduct of the radiation protection program not resolved via the ALARA Committee.

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E. ALARA Committee

A committee of six members, composed of the Clinton Power Station Plant Manager, the Assistant Power Plant Manager, the Supervisor - RadChem, the Supervisor - Radiation Protection, the Member-at-Large and the NSE representative. This committee shall be chaired by the Clinton Power Station Plant Manager. This committee is responsible for:

- (1) Assisting the Vice President, Manager of Nuclear Station Engineering and Clinton Power Station Plant Manager in ensuring that the ALARA philosophy, objectives and guidelines are complied with.
- (2) Reporting in writing to the Vice President and the Manager of Nuclear Station Engineering on the implementation and progress of the ALARA occupational exposure program and recommend policies on ALARA occupational exposure.
- (3) Providing clarification of the guidelines or develop additional guidelines as necessary to fulfill the corporate management commitment.
- (4) As an initial developmental effort (a) to provide technical guidance and assistance in the implementation phase and (b) develop detailed schedules for implementations of the guidelines.

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- (5) As a continuing effort to be responsible for:
 - (a) Assuring effective measures are taken to provide procedures and practices by which specific goals and objectives of the ALARA program are achieved.
 - (b) Assuring that the resources needed to achieve ALARA are available and effectively utilized.
- (6) During design and construction meet at least twice a year to:
 - (a) Review the current status of the ALARA program.
 - (b) Review the ALARA audits of the engineering, procurement and construction activities.
 - (c) Review any changes in regulations in the area of radiological controls.
 - (d) Review all ALARA Reviews generated by the Supervisor - Radiation Protection since the last meeting.
- (7) During commercial operation meet at least twice a year and within 30 days prior to a refueling and/or major planned maintenance shutdown (greater than 21 days) to:
 - (a) Review the outage plan relative to ALARA, to assess the potential for exposure to radiation.
 - (b) Provide technical guidance and assistance in programs to keep exposures ALARA.
 - (c) Review any radiological controls inspection reports from the NRC and evaluate corrective action plans or implementation.
 - (d) Review any changes in regulations in the area of radiological controls and evaluate or effect appropriate implementation.
 - (e) Review all ALARA Reviews generated by the Supervisor - Radiation Protection since the last meeting.
- (8) Reviewing implementing procedures for the ALARA program at the station to ensure that:
 - (a) All station personnel are informed of the ALARA program guidelines.
 - (b) Suitable authority is delegated to the appropriate plant personnel to obtain compliance with the ALARA program.

- (c) Suitable advance planning and special training is done prior to station jobs involving radiological circumstances to ensure ALARA exposures.

F. Nuclear Review Audit Group (NPAG)

The NRAG shall review the ALARA program periodically to ensure compliance by all parties and report their findings to the Vice President.

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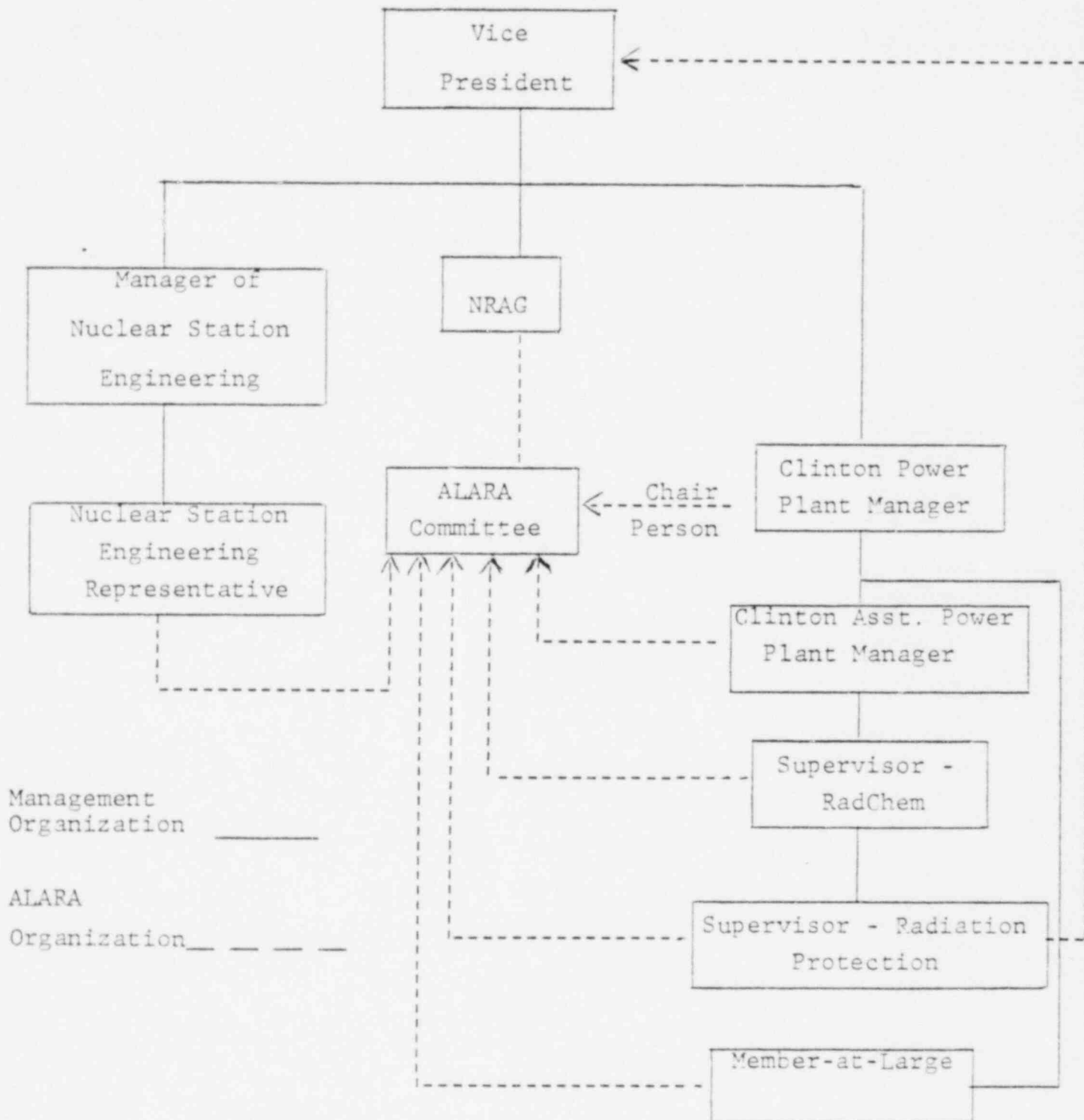


FIGURE 1

Illinois Power Company ALARA Organization