MANUAL CHAPTER 1302

FOLLOW-UP ACTIONS AND ACTION LEVELS FOR RADIATION EXPOSURES ASSOCIATED WITH MATERIALS INCIDENTS INVOLVING MEMBERS OF THE PUBLIC

1302-01 PURPOSE

To provide advice and guidance on a course of action to follow in case of incidents involving radiation exposure to members of the public. The guidance provided in this document is for U.S. Nuclear Regulatory Commission (NRC) staff to use in responding to incidents that do not require activation of the NRC Incident Response Program (Management Directive (MD) 8.2). It is specifically for use after actions have been taken to prevent the source of exposure from further affecting the public, and it is intended for use as initial guidance, when situations arise. This Manual Chapter (MC) should be used in conjunction with MC 1301, "Response to Radioactive Materials Incidents That Do Not Require Activation of the NRC Incident Response Plan."

1302-02 OBJECTIVES

To ensure that correct follow-up action is taken when there is an incident involving radiation exposure to members of the public.

1302-03 DEFINITIONS

03.01 Agreement State. A state that has signed an agreement with the NRC under which the State regulates the use of by-product, source and small quantities of special nuclear material within that state.

03.02 Member of the Public. Any individual except when that individual is receiving an occupational dose

03.03 Radioactive Material in the Public Domain. Any radioactive material, subject to NRC or Agreement State jurisdiction, for which control in accordance with NRC or Agreement State regulations or with applicable license conditions is not being implemented, and which may, or have already resulted in, radiation exposures to members of the public.

1302-04 APPLICABILITY

This MC applies to the Office of Nuclear Material Safety and Safeguards (NMSS) and the Divisions of Nuclear Materials Safety in the NRC regional offices.

1302-05 RESPONSIBILITY

The responsible Region shall have the lead responsibility for follow-up actions for incidents involving radiation exposure to members of the public, with the following exception. NMSS may have the lead responsibility when the incident involves several regional offices, international entities, or when NRC management decides the incident would be better handled by Headquarters to ensure a coordinated approach among the various agencies and licensees involved.

05.01 Director, Office of Nuclear Material Safety and Safeguards

Develops policy and guidance for the Headquarters and regional staff who respond to incidents involving radiation exposures from licensed material to members of the public. Develops and administers the program for NRC follow-up actions and coordinates incident follow-up activities.

05.02 Director, Office of Nuclear Security and Incident Response

Maintains and staffs the NRC Operations Center at NRC Headquarters. Receives and documents incident reports from NRC regional offices, licensees, or other parties. Makes initial and follow-up notifications within NRC, and to other Federal agencies and State agencies, coordinating with NMSS.

05.03 Regional Administrator

Completes incident response activities according to the policy and guidance established by NMSS and refers questions on policy matters to NMSS for resolution.

05.04 Director, Office of International Programs

Coordinates international aspects of incident follow-up activities with the Department of State, International Atomic Energy Agency (IAEA), foreign governments, and other international groups.

05.05 Director, Office of State and Tribal Programs

Coordinates applicable incident follow-up activities with State, local, and Native American tribal governments.

05.06 Director, Office of Public Affairs

Prepares, coordinates, and disseminates information about incidents involving radioactive material to the public and news media.

05.07 Other Federal Agencies

Roles of other Federal agencies in responding to incidents involving radioactive material are summarized in MC 1301, "Response to Radioactive Materials Incidents That Do Not Require Activation of the NRC Incident Response Plan."

1302-06 GENERAL GUIDANCE

Incidents involving radioactive materials are, by nature, event-specific. Because the conditions surrounding each incident are unique, follow-up action must be developed on a case-by-case basis. The information provided in this MC is meant to be a guide, and

should not be used in isolation of other guidance for incidents and basic radiation safety principles.

Staff should use the guidance in MC 1301, "Response to Radioactive Materials Incidents That Do Not Require Activation of the NRC Incident Response Plan" in conjunction with the guidance provided in this MC when responding to incidents involving radiation exposures to members of the public. Manual Chapter 1301 provides detailed guidance for responding to radioactive material incidents, including incident assessment; dose assessment if individuals are exposed to radiation; need for medical consultants; interaction with other Federal, State and local government agencies; types of inspections, etc.

As part of the guidance in MC 1301, procedures direct staff to: (1) evaluate the potential or actual exposure of a member of the public, (2) keep public exposures as low as possible, and (3) evaluate the potential radiological consequences and personnel exposures. Staff should follow the guidelines in MC 1301 for incident assessment and documentation. With any incident, staff will be working closely with any known licensees involved with the incident. If a responsible licensee is not immediately known, general response procedures are outlined in MC 1301, which include descriptions of which Federal, State or local entity would be in charge under various circumstances. The purpose of MC 1302 is to provide additional information and dose ranges/guidance if members of the public are exposed to radiation. Also, there are additional references in Attachment 1 regarding dose limits and radiation exposures.

Some incidents may be considered abnormal occurrences. NRC submits an abnormal occurrence report to Congress annually. The report, NUREG-0090, "Report to Congress on Abnormal Occurrences," includes the criteria for abnormal occurrences. As part of an incident assessment involving radiation exposure to members of the public, staff should also provide information to Headquarters in accordance with current procedures for submitting incidents considered possible Abnormal Occurrences.

06.01 Specific Guidance

The guidance in this MC is intended for incidents involving radioactive material and not for routine, non-accident operations. The regulations have specific limits for exposures to members of the public. The dose limit for members of the public is given in Section 20.1301, "Dose limits for individual members of the public." Licensees are to conduct operations so that the limits in Section 20.1301 are not exceeded for members of the public. Currently, the public dose limit is 1 mSv (100 mrem). Section 20.1301(c) allows a licensee to permit visitors to an individual who is undergoing medical treatment and cannot be released under Section 35.75 to receive a dose not to exceed 5 mSv (500 mrem). Note that any accidental exposures to members of the public may be investigated, depending on the nature of the exposure, regardless of the dose. However, exposures from routine operations, for example, when material is disposed or released via effluents in accordance with the regulations, would not be part of the scope of this MC.

If a licensee is required to report to the Commission, under Section 20.2202, "Notification of incidents," and Section 20.2203, "Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the constraints or limits," the licensee is responsible, in accordance with Section 19.13(d), for notifying and providing an exposure report to any individuals that were exposed. Depending on the circumstances of the incident, NRC may also notify the affected individuals. For example, NRC might notify individual(s) if the staff believes that the licensee response is not adequate, a responsible licensee is not known at the time, or the staff wants to make sure the individual(s) is(are) getting complete information. A list of the type of information that should be included in any notification to a member of the public is provided in Attachment 2.

The actual doses to members of the public are likely to be uncertain, especially during the initial follow-up after an incident. Doses will usually be estimated in a dose range or a maximum dose based on the circumstances of the incident. For this reason, it is important to talk with exposed individuals because this can help the staff in assessing the incident and in estimating the dose.

Depending on the nature of the incident, further analysis of the estimated dose may be necessary, using techniques such as bioassays, whole body counting, and cytogenetic analysis, and should be considered as the estimated doses approach 10-20 rem and up. In evaluating the need for these types of analyses, staff should keep in mind that performing the study can help reassure an individual who was exposed to radiation, but it can also increase the anxiety about the exposure. Therefore, staff should be sensitive to this and use their best judgement in deciding when to recommend cytogenetic analysis. All cytogenetic analyses should be coordinated with NMSS. NMSS is the lead for coordinating testing through the testing laboratory and for obtaining laboratory samples. Also note that other dose evaluations may need to be coordinated with NMSS as well. Staff should follow current procedures and guidelines.

Because people are often more anxious about radiation exposure than with other hazards and risks, staff should be especially sensitive when providing information about the incident and the estimated doses. Staff must be as factual as possible about characterizing the dose based on available information, without causing undue stress. Staff should not discuss medical issues or provide medical advice to exposed individuals. Instead, staff should refer individuals to their personal physicians.

06.02 Dose Ranges and Guidance

1. <u>Dose Range from 0 to 1 mSv (100 mrem)</u>

   Exposures with estimated doses in this range are within the public dose limit in 10 CFR Part 20. There are no regulatory requirements requiring reporting and notifications. Typically, no further action is needed, but the need for additional action must be evaluated based on the specific incident.

2. <u>Dose Range from 1 mSv (100 mrem) to 50 mSv (5 rem)</u>

   In cases when the estimated dose is between 1 and 50 mSv (100 mrem and 5 rem), the incident needs to be evaluated following the guidance in MC 1301 and MC 1360, "Use of Physician and Scientific Consultants in the Medical Consultant Program." Staff will need to determine if a medical consultant is necessary. If a medical consultant is necessary, the medical consultant will determine whether or not a medical evaluation of exposed individuals is necessary. Staff should not discuss medical issues with an individual who was exposed, or provide medical advice. Instead, if an individual expresses concern or wishes additional information on possible medical affects, staff should refer the individual to his/her personal physician or to the NRC's medical consultant, if NRC has consulted with one to analyze the incident. If additional assistance is needed, NRC staff can call the Radiation Emergency Assistance Center/Training Site (REAC/TS). Information on REAC/TS is provided below in Attachment 3, "Medical Assistance in Radiation Exposure Emergencies."

3. <u>Dose Range Greater than 50 mSv (5 rem)</u>

   For estimated doses that appear to be over 50 mSv (5 rem), assess the incident following the guidance in 2. above. If the calculated effective dose equivalent is more than 100 mSv (10 rem), further medical evaluation should be considered. Depending on the circumstances of the incident, a medical consultant may be brought in, the

exposed individual will be referred to his/her personal physician, and/or REAC/TS may be consulted for additional guidance. At dose estimates in this range, and approaching 200 mSv (20 rem), the need for further analysis of the dose, as discussed above, should be evaluated.

4. Members of the Public Who Are Pregnant

Information regarding the disclosure of pregnancy must be on a voluntary basis because of issues involving individual privacy. If, in the course of evaluating an incident involving exposures to members of the public, staff is informed by a female member of the public that she is pregnant, the follow-up action is essentially the same as in 1. through 3. above, extending the evaluation to look at the impact on the embryo/fetus. A medical consultant will probably be asked to evaluate the incident and the likely dose to the embryo/fetus. As stated previously, staff should not discuss medical issues or provide medical advice to the woman, but should refer her to her personal physician. Additional information on exposures to the embryo/fetus can be found in: 1) Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure," and 2) National Council on Radiation Protection and Measurements Report No. 128, "Radionuclide Exposure of the Embryo/Fetus." Additionally, staff may get additional guidance if needed from REAC/TS.

ATTACHMENT 1

REFERENCES FOR DEVELOPING GUIDANCE ON RADIATION EXPOSURE ASSOCIATED WITH INCIDENT FOLLOW-UP

The following references may assist staff with incident follow-up. These references provide additional information on recommended dose limits and radiation exposures.

I. U.S. Nuclear Regulatory Commission

1. NRC's current 10 CFR Part 20 establishes an explicit dose limit of 1 mSv (100 mrem) per calendar year, resulting from any licensed activity, to any individual in an unrestricted area, with 5 mSv (500 mrem) per year allowed in certain temporary NRC pre-approved situations. Part 20 also establishes a dose limit of 5 mSv (500 mrem) to the embryo-fetus during the entire pregnancy for the occupational exposure of a declared pregnant woman. If the fetal dose has exceeded that level before the pregnancy is declared, other limits apply.

2. NRC's Regulatory Guide 8.13, Revision 3, "Instruction Concerning Prenatal Radiation Exposure," Revision 3, June 1999, provides occupationally exposed women with guidance on the biological effects of radiation on the embryo-fetus and whether or not to declare pregnancy.

3. Regulatory Guide 8.29, "Instruction concerning Risks from Occupational Radiation Exposure," Revision 1, February 1996, describes the information that licensees should provide to workers about health risks from occupational exposure.

II. NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS

National Council on Radiation Protection and Measurements Report No. 128, "Radionuclide Exposure of the Embryo/Fetus" provides information about radiation doses to the embryo/fetus and the effects of radionuclide exposure during pregnancy. The report includes information on approaches for estimating radiation doses to the embryo/fetus that result from radionuclide burdens or intakes by a pregnant woman that relate to medical, occupational and environmental sources of radioactive material. The dosimetry of external sources is beyond the scope of this report.

ATTACHMENT 2

OUTLINE OF INFORMATION TO PROVIDE TO MEMBER OF PUBLIC

NOTE: THIS LETTER SHOULD NOT BE THE FIRST CONTACT TO AN INDIVIDUAL THAT HE/SHE WAS EXPOSED TO RADIATION.

If the licensee is required to report to the Commission under Sections 20.2202 or 20.2203, the licensee is responsible, under Section 19.13(d), for notifying and providing an exposure report to any individuals that were exposed. Depending on the circumstances of the incident, NRC may also notify the affected individuals, as discussed earlier in this MC. Also, if NRC is on-site evaluating an incident, staff may have already had interactions with members of the public who were, or were possibly, exposed to radiation.

1. State why the letter is being provided

   a. Explain that NRC is conducting or has conducted an investigation of the incident
   b. Explain that the individual is being notified because they received an exposure to radiation
   c. Cite the regulations that require that they be notified
   d. Provide details of the incident, such as location; any information about the incident; an estimate of the dose, along with an example for a comparison dose, i.e. chest x-ray is about 10 mrem; etc.

2. Refer individuals to their personal physician for any medical questions or concerns. Depending on the nature of the incident, NRC may request a medical consultant, who may evaluate individuals who were exposed. Refer to MC 1301 and MC 1360.

3. Include information that the radiation dose information contained in this letter is exempt from disclosure in accordance with 10 CFR 2.390(a). Include a copy of 10 CFR 2.390(a) in this notification.

4. Include contact information for the primary NRC staff contact in case the individual or the individual's personal physician has questions or needs additional information.

5. Signature: typically, the Regional Administrator or Division or Office level manager at Headquarters signs the letter.

ATTACHMENT 3

MEDICAL ASSISTANCE IN RADIATION EXPOSURE EMERGENCIES

In the early stages of a response, NMSS may have to determine whether medical evaluations are warranted for members of the public who are, or who were potentially, exposed to radioactive materials. It should be noted; however, that staff should not discuss medical issues with members of the public or provide medical advice in cases dealing with an exposure to radioactive material. Always refer any medical questions or concerns about biological effects of radiation exposure to a physician. For some incidents, a medical consultant may be used (see MC 1301 and MC 1360) to evaluate exposures to members of the public. Also, the Radiation Emergency Assistance Center/Training Site (REAC/TS) is a source of information on radiological effects.

If medical advice is needed, or if the exposed person's physician is not trained in the effects of radiation exposure and the treatment of such effects, and wants additional information or guidance, call or refer the physician to the Radiation Emergency Assistance Center/Training Site (REAC/TS). REAC/TS is a U.S. Department of Energy (DOE) response asset that maintains a radiological emergency response team consisting of physicians, nurses, health physicists, coordinators, and necessary support personnel. It is on 24-hour call to provide first-line responders with consultative or direct medical and radiological assistance at the REAC/TS facility or at the accident site. They have expertise in, and are equipped to conduct: (1) medical and radiological triage; (2) decontamination procedures and therapies for external contamination and internally deposited radionuclides, including diethylene triamine pentaacetic acid (DPTA) chelation therapy; (3) diagnostic and prognostic assessment of radiation-induced injuries; and (4) radiation dose estimates by methods that include cytogenetic analysis, bioassay, and in-vivo counting.[1] The REAC/TS emergency telephone number is 1-865-576-1005 (ask for REAC/TS). If the telephone numbers have changed, the NRC Headquarters Operations Center should be called for the new number at (301) 816-5100.

END

[1]REAC/TS website: www.orau.gov/reacts/resources.htm