

TESTIMONY OF BRIAN K. GRIMES  
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U. S. NUCLEAR REGULATORY COMMISSION  
BEFORE THE SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS  
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS  
UNITED STATES HOUSE OF REPRESENTATIVES

The U. S. Nuclear Regulatory Commission has been involved for several years in studies and evaluations on the use of potassium iodide (KI) for blocking the thyroid gland to prevent the uptake of radioiodine which might result from an airborne release during a nuclear power plant accident. As a result of these studies and the publication of the approval of KI for nonprescription use as a thyroidal blocking agent and requests for new drug applications for this purpose by the Food and Drug Administration (FDA) in December 15, 1978 (43 FR 58798), the NRC and FEMA staffs recommended that nuclear power plant licensees as well as State and local governments provide radioprotective drugs for thyroid protection in the event of a nuclear power plant accident for:

- Emergency workers and other individuals remaining or arriving onsite during the emergency.
- Emergency workers within the plume exposure EPZ.
- Institutionalized persons within the plume exposure EPZ whose immediate evacuation may be infeasible or very difficult.

This guidance was originally published, subject to public comment, in January 1980 (44 FR 9768) in NUREG-0654/FEMA-REP-1, "Criteria for Preparation and

Evaluation of Radiological Emergency Plans and Preparedness in Support of Nuclear Power Plants", in conjunction with the Federal Emergency Management Agency (FEMA). The document was revised by NRC and FEMA to take into account public comment and Revision 1 was published in October 1980. This document has since been made a Regulatory Guide (Regulatory Guide 1.101, Rev. 2). While not requirements, the criteria set forth in this document provide acceptable ways of meeting the more general provisions of the NRC Emergency Planning regulations. This guidance was influenced by the following considerations with regard to these specialized populations:

- The populations are limited in size and would require quantities of KI which could be readily maintained, distributed, administered, and controlled.
- The populations have a relatively high probability of being exposed to radioactive airborne releases should an accident occur.
- The medical history of the populations could be established readily, thus avoiding possible side effects to the sensitive persons by taking other measures for such persons.

The plans for use of KI for thyroidal blocking of offsite emergency workers and institutionalized persons are reviewed by FEMA rather than the NRC, since this aspect is under the jurisdiction of the State and local governments. The NRC Commissioners have recommended that FEMA verify that appropriate medical controls are in place prior to distribution of KI for institutional populations.

The NRC has continued to evaluate the use of KI for thyroid blocking and in particular its administration to the general public located within the 10 mile plume exposure Emergency Planning Zone (EPZ) under accident conditions. To date the NRC has found no compelling reason to recommend the distribution of KI for this purpose. The basis for this statement is the following:

- Staff studies conducted by both the FDA and NRC indicate that the fatal carcinogenic risk is greater from the whole body dose than from the thyroid dose using the airborne plume from various accidents in WASH-1400, "Reactor Safety Study". These studies are based on the analysis presented in NUREG/CR-1433, "Radiation Protection: An Analysis of Thyroid Blocking", and indicate that for a ratio of 20 to 1 thyroid to whole body dose, the resulting risk of cancer death is three times greater for the whole body dose. This difference in risk is a result of the low percentage of deaths for thyroid cancer as compared to a higher percentage of deaths for many other types of cancer. This makes the value of administering KI to the general public questionable as other protective measures (e.g., evacuation or shelter) would be instituted based on the more critical effects which would also reduce the thyroid dose. In addition, the analysis in NUREG/CR-1433 indicates that while the absolute cost of stockpiling KI is not high, the national distribution of KI for thyroidal blocking of the general public would be questionable from a cost/benefit standpoint even assuming the administration would be 100% effective.

- KI administration may give the general public a false belief that they are protected from the total radiation effects of an airborne release when only their thyroid is protected and the critical dose may be from external radiation or from inhalation of particulate matter rather than from uptake of inhaled radioiodine.
- The NRC staff is continuing its studies on the abundance and the chemical and physical forms that radioiodine might take in a release resulting from various nuclear power plant accident scenarios. As discussed in NUREG-0772, "Technical Bases for Estimating Fission Product Behavior During LWR Accidents", the most probable form for the radioiodine release during a light water reactor accident may be cesium iodide, a non-volatile particulate; however, a variety of chemical forms are possible. In the event that these studies are substantiated there may be a sizeable reduction (a factor of 2 to 10) in the radioiodine available for release in the more conservative accident scenarios. For the more probable accident scenarios the reduction in the radioiodine availability will be even larger. NUREG-0771 "Regulatory Impact of Nuclear Reactor Accident Source Term Assumptions", is currently being revised to reflect ongoing research results and should be published in about four months.
- The NRC staff is continuing studies on the use of other expedient measures (e.g., use of a dust respirator) rather than thyroid blocking to protect the general public. A report prepared by the Harvard School

of Public Health, NUREG/CR-2272, "Expedient Methods of Respiratory Protection", describing this work was published in November 1981. The work shows some promise for such alternative means of reducing the inhalation dose from an airborne release for all particulates and would be equally effective as KI against radioiodines in a particulate form.

- The problems of finding an effective means of distributing KI so that it is available to the general public in a timely fashion continues to be a problem. If the material is stockpiled at the regional, State or even at the local level, the ability to distribute and administer the KI to the public before the arrival of the plume appears to be more difficult and may require more time than to evacuate them from its path. Administration of KI more than four hours after the exposure to radioiodine will result in reducing its effectiveness from 95%, just prior to exposure to the plume, to less than 50% effective in preventing thyroid uptake. If on the other hand, the KI is predistributed to each household, control of when and how it is used is not assured. The NRC has requested FEMA to study the logistic problems of distribution of both KI and of simple respiratory protection devices.

The NRC staff has been in contact with staff members of FDA, FEMA and the Environmental Protection Agency (EPA) and has recommended that FEMA in its capacity as the chair of the Federal Radiological Preparedness Coordinating Committee (FRPCC) establish a subcommittee or working group to develop

federal guidance on respiratory protection and the use of radioprotective drugs for the general population. This group would be composed of representatives of the FDA, FEMA, EPA and NRC who would attempt to establish unified federal policy and guidance with regard to KI as well as any other devices or materials for emergency protective use by the general public around nuclear power plants. A letter containing these recommendations was recently sent to the Chairman of the FRPCC from NRC. The development of such policy guidance to State and local governments is particularly timely as the FDA guidance on the projected dose at which KI should be administered and on the groups which may be sensitive to the administration of the drug is near completion.

In summary, although the Commission has not addressed this subject yet, it is the opinion of the NRC staff at the present time that:

1. The utility of distributing KI to the general public for thyroid blocking in case of a reactor accident is questionable.
2. There is still some potential for side effects from KI which some medical authorities believe may warrant limiting its use.
3. Additional guidance from the federal government is appropriate in order to aid States in developing their policy on the use of KI for the general public.

NUCLEAR FUEL ASSEMBLY PLANTS CURRENTLY IN OPERATION

Babcock & Wilcox  
Commercial Nuclear Fuel Plant  
P. O. Box 800  
Lynchburg, Virginia 24505

Combustion Engineering, Inc.  
1000 Prospect Hill Road  
Windsor, Connecticut 06095

Exxon Nuclear Company, Inc.  
2101 Horn Rapids Road  
Richland, Washington 99352

General Electric Co.  
Castle Hayne Road  
P.O. Box 780  
Wilmington, North Carolina 28402

Westinghouse Electric Corp. (Columbia, S.C.)  
P.O. Box 355  
Pittsburg, Pennsylvania 15230



- DOE GENERATING SITE
- ▲ DOE STORAGE AND DISPOSAL SITE
- COMMERCIAL DISPOSAL SITE
- FISSION PRODUCT/INDUCED ACTIVITY-CONTAMINATED WASTE
- ◻ URANIUM-CONTAMINATED WASTE
- △ TRANSURANIUM-CONTAMINATED WASTE

Generating, storage, and disposal sites for solid low-level radioactive waste. (From *The Shallow Land Burial of Low-Level Radioactively Contaminated Solid Waste*, National Academy of Sciences, 1979.)