

REPOSITORY DOE-FORRESTAL

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FOLDER LUSHBAUGH MEXICAN ACCIDENT
COBALT-60

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REACTS

newsletter

REAC/TS responds to a cobalt-60 problem in Mexico

The Radiation Emergency Assistance Center/Training Site (REAC/TS) is operated by Oak Ridge Associated Universities for the U.S. Department of Energy contract number DE-AC05-76OR00033.

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The problem began in November 1983 when a ^{60}Co -teletherapy source (originally 1000 Ci in 1977), taken from a medical storeroom, was sold as scrap metal to a junkyard in the city of Juárez. Prior to the sale of the source holder and capsule that held more than 6000 cobalt-60 pellets, the device was broken allowing the release of most of the pellets, which were one millimeter in diameter and had an activity of about 70 mCi each. Scrap metal, unknowingly contaminated by the pellets, was sold to foundries and processed into furniture and steel reinforcing rods.

Employees of the junkyard are believed to have received total body doses of up to 450 rems, and another person might have received a dose of as much as 15,000 rems to his hands. Moreover, people living near the junkyard were exposed to about 25 millirads per hour outside their houses. Some of the pellets became attached to shoes and automobile tires and were spread outside the junkyard and into the city of Juárez. The accident was not discovered until January 16, 1984, when a truck carrying some of the "hot" steel rods happened to cross a radiation sensor in Los Alamos National Laboratory.

A medical consultant to the Juárez officials invited Dr. Karl Hübner from REAC/TS, which serves as the WHO/PAHO assistance center for radiation accidents in Central and South America, to assist him in evaluating the seriousness of the exposures. Dr. Hübner, Dr. Myles Cabot, and Eugene Joiner went to Juárez on February 18, 1984, and obtained personal and demographic data on four of the victims. Dr. Hübner examined and from whom blood samples were obtained for chromosome analysis.

The REAC/TS team visited the junkyard for a firsthand view of the accident site. Survey meter readings taken from various distances in front of the sealed-off junkyard gates ranged from 3 to 30 milliroentgens per hour.

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REAC/TS assists local emergency department

This past year, REAC/TS responded to two calls for assistance by the emergency department of the Oak Ridge Hospital of the United Methodist Church (ORHUMC).

In separate incidents where the possibility of radioactive contamination of the victim was recognized, REAC/TS staff members Dr. Robert C. Ricks and Harold Hodges surveyed two accident victims who were admitted for treatment at the ORHUMC for injuries involving possible radioactive contamination. Since both men were working with radioactive materials when the accidents occurred and both suffered skin lacerations, samples were taken for spectrographic analysis in the health physics laboratory at REAC/TS. Fortunately, there was no evidence of radioactivity with either the initial survey of the victims or in any of the samples taken from the wounds.

It should be noted that in each incident, before the victim arrived, staff members of the ORHUMC emergency department had taken correct precautions to prevent the spread of radioactivity within the hospital. Pathways taken by the victims to the treatment rooms were covered with bed sheets to prevent potential contamination of the carpeted flooring, and the victims were isolated in the treatment areas. A later survey of the pathways and the treatment areas indicated no levels of radiation above normal background readings.

Potassium iodide (KI) or not; the debate continues here and in Japan

by C. C. Lushbaugh, Ph.D., M.D.

Karl F. Hübner, M.D.

Harold D. Hodges, B.S.

Whether potassium iodide (KI) tablets should be distributed to residents in the vicinity of nuclear power plants is still a controversial issue worldwide. Our report on NCRP's (National Committee on Radiation Protection and Measurements) and the FDA's (Food and Drug Administration) views and recommendations on use of KI appeared in the July 1981 issue of this newsletter.

Proponents argue that the KI tablets should be immediately available so that the thyroid gland can be blocked as soon as possible after an accidental atmospheric iodine release. Opponents argue that the action level of a 10-rem thyroid dose (Bureau of Radiological Health) is too low and a plan for distribution and use of KI should be part of an evacuation plan. Furthermore, they point out that the bottle will most likely be lost or its contents consumed on false alarms and that some persons (1:10,000) will have an adverse reaction to iodine. What are the facts?

It is well known that KI given within six hours (preferably within one hour) of exposure will block the thyroid uptake of radioactive iodine, and NCRP Handbook 65 recommends that individuals at risk during a nuclear reactor accident take 130 mg of KI (in tablet form) every day for 7 to 14 days. Some states stockpiled KI, and others have actually distributed KI tablets to potential at-risk populations, stipulating that the KI not be used until the Governor so orders on the advice of the State Health Commissioner. Some experts argue that this plan may lead to potential misuse, overuse, or abuse of these tablets if the inhabitants have their own supply. It should be noted, however, the NCRP discussed the efficacy of KI

and the contraindications (Report No. 55) but made no recommendation with regard to thyroid blocking for the general public.

In a recent conference at REAC/TS, two Japanese reactor safety engineers requested the "correct" solution to this problem, acceptable for their accident response plans in Japan. We were surprised to find that they were not considering the fact that the need for thyroid protection in Japan is not as great as in inland cities remote from oceanic coastal lines. They seemed to be puzzled when we questioned the need for KI stockpiles in Japan where seaweed rich in iodine is a staple in almost everyone's diet. The Japanese consume daily at least twice as much iodine as a Boston codfish lover, who consumes about twice that of an Iowa cornhusker.

Practically speaking, it would seem the most expeditious Japanese response to a nuclear reactor accident resulting in the release of radioactive iodine would be to further increase the high-iodine content of their diet with heavy sprinklings of dried seaweed on their food.

Edible seaweed grown in Japan contains on average about 0.4% iodine by dry weight, or 4 mg iodine/gm dry seaweed. Since the recommended daily dose in the form of one 130 mg KI tablet actually contains only 76% iodine, i.e., 100 mg., a daily intake of 25 grams of dried seaweed or six teaspoons (@ 4 grams per teaspoon) does provide sufficient iodine and therefore would be an effective countermeasure. The use of commercially available seaweed-containing foods would avoid the \$1,500,000 cost that is estimated for the stockpiles of tablets needed for protecting a comparable U.S. population within a 10-mile radius of a nuclear power plant.

How to order training materials from REAC/TS

If your organization provides training in emergency response, you may need the two training packages on the management of radiation accidents recently prepared by REAC/TS. One package covers "Prehospital Management of Radiation Accidents," and the other, "Hospital Emergency Department Management of Radiation Accidents."

Each package includes a 36-page training manual and a 25-minute videotape. The text and videotape can be used together or separately in a short course or in a program of individualized instruction. The presentations focus on the principles and techniques of effective response to peacetime radiation accidents in industry, research, and transportation. In illustrative case studies involving a small number of victims, emergency workers take safe and effective steps to care for accident victims. The videotapes may help newcomers to emergency care overcome anxieties about responding to radiation accidents.

The "Prehospital Management" materials cover recognition of potential radiation hazards, personnel protection, rescue and emergency care to victims, tran-

sporting victims to the hospital, and postemergency follow-up. The "Hospital Management" package covers preparation for and reception of contaminated (or possibly contaminated) patients, medical and decontamination procedures, containment and monitoring activities, patient transfer, and postemergency procedures. Both training packages emphasize coordination of activities among the various groups who participate in emergency response—police, fire, ambulance services, and hospital departments.

The videotapes were prepared with the participation of hospital, police, fire, and other rescue workers in the Nashville, Tennessee, area (see *REAC/TS Newsletter*, Fall 1982, for an account of the filming).

Each set of training materials, consisting of one manual and one 3/4-inch videotape of broadcast quality, costs \$75. Additional manuals may be ordered for \$10 each. The prices include postage and handling. Please address orders and inquiries to the Office of Information Services, Oak Ridge Associated Universities, P.O. Box 117, Oak Ridge, TN 37831-0117 (615/576-3146).

REAC/TS responds to cobalt-60 problem in Mexico

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On his return to Oak Ridge, Dr. Hübner commented that the Juárez incident was a "serious radiation accident affecting perhaps as many as 200 people." The physicians, health officials, and the Mexican Commission on National Nuclear Safety and Safeguards (CNSNS) need help in bringing the contamination under control and avoiding or stopping continued human exposure to the ⁶⁰Co radiation. After the evaluation of clinical data is complete, *REAC/TS Newsletter* will publish a more detailed account of the investigation.



Dr. Karl Hübner was invited to Juárez, Mexico, to help in examining employees of a junkyard that had unknowingly received a ⁶⁰Co-teletherapy source as scrap metal.

A new chelator evaluated

During the last few years a new chelator drug, "Puchel," a highly lipophilic derivative of DTPA developed in the United Kingdom, has been under scrutiny. Claims that it may be a superior chelator to calcium DTPA have been questioned because of its greater toxicity.

Questions surrounding actinide chelation therapy are of special interest to REAC/TS which has held the investigational new drug (IND) for DTPA since February 20, 1976. REAC/TS, on behalf of DOE, is responsible for supplying Ca-DTPA and Zn-DTPA to 44 coinvestigators who may administer DTPA according to standard clinical investigation protocol.

In the *Health Physics Journal* of February 1984 (volume 46, no. 2, pp. 422-426), Drs. V. Volf and E. Peter of Karlsruhe, West Germany, present data to support their view that "there is no . . . reason to replace DTPA with Puchel for practical decorporation purposes." The REAC/TS staff agrees with this opinion since, according to medical division director and principal investigator of the DTPA project Dr. C. C. Lushbaugh, "we have found in the DTPA users group and in the follow-up program that both calcium and zinc DTPA remove actinides in significant amounts whenever the need for actinide chelation therapy has arisen. In addition, the only signs of toxicity following DTPA therapy have been pain at the site of intramuscular injections and metallic-fume syndrome (one case) after administration of Zn-DTPA by aerosol." Dr. Lushbaugh explains that metallic-fume syndrome is the sudden onset of a toxic reaction and flu-like upper respiratory condition following the development of a metallic taste sensation after breathing certain metal containing aerosols. He added that this remarkable record encourages our continuing use of DTPA in cases of actinide contamination.

Visitors from Taiwan study at REAC/TS

Beginning the last week in February, a group of scientists from Taiwan spent a seven-week period studying radiation accident management at REAC/TS.

Members of the group were Hsiu Hsiao Cheng, a nurse with an interest in the care of radiation accident victims; Lai-Lu Chong, M.D., a physician with a specialty in hematology; Yung-Lin Kuo, a nuclear engineer interested in radiation biology; Tzyy-Yuan Shann, M.D., a surgeon interested in cytogenetics and surgical procedures complicated by radiation exposure; and Shyh-Jen Wang, M.D., a specialist in nuclear medicine.

During their stay, they attended the REAC/TS medical and emergency training courses, consulted with members of the Medical and Health Sciences Division, and participated in independent study.



Scientists from Taiwan studied at REAC/TS. From left in back Drs. Lai-Lu Chong, Tzyy-Yuan Shann, Shyh-Jen Wang; in front Yung-Lin Kuo and Hsiu Hsiao Cheng.



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