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A Compendium of Information for Use in CONTROLLING RADIATION EMERGENCIES

Including Lecture Notes from a Training Session at Idaho Falls, Idaho, February 12-14, 1958

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Office of Health and Safety
U. S. ATOMIC ENERGY COMMISSION

NRTS REACTOR EXPERIMENTS

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During tests at the National Reactor Testing Station (NRTS), several reactors have provided effluent releases that were detectable by field monitoring procedures.

Contrary to some opinion, these releases have not made measurable exposure or contamination of off-site personnel or environments; in one case minimal exposure was calculated to be possible. We are satisfied with the record of exceptional control that we have achieved in connection with these operations, but do not minimize the potential hazard surrounding these tests, especially in view of the fact that the NRTS is located upwind of a large agricultural area. A number of factors have been responsible for the success of this radiation protection program. To enumerate a few:

1. Cooperation between operators and the Idaho Operations Office (IDO)
2. Communications
3. Meteorological control
4. Monitoring network

MONITORING PROGRAM

Very close liaison is maintained between the contractors, Idaho Operations Office, and other offices of the AEC. This is accomplished through weekly briefing meetings and freedom of communication between groups and individuals regardless of affiliation. During operations, direct communication is maintained between the operating contractor, IDO operation control, the U. S. Weather Bureau, and all field monitoring units by means of an excellent two-way radio network. When any doubt arises regarding the safety of a particular operation (for instance, wind shifts or increased activity) reactor shutdown can be, and has been, accomplished immediately. The Division of Security has evolved an emergency evacuation plan.

Meteorological control has been one of the greatest assets of these operations. Unfortunately, some of the test areas are in locations that are extremely unstable from a meteorological standpoint. Very extensive coverage is essential during any test in these areas.

The monitoring network developed for NRTS operations is complex—consisting of a 23-unit telemetering system, supplemented by conventional grids and supporting sampling devices. Mobile monitoring teams are placed downwind at distances ranging from 1 to 20 miles during operations.

SPECIFIC OPERATIONS

During a test operation on February 22, 1956, site survey monitoring two miles downwind detected airborne radioactive material at levels of approximately 1.5 mr/hr as measured with Geiger-Müller type instruments. Reactor shutdown was effected at the time of detection. Subsequent surveys identified an area of approximately 12 square miles contaminated to levels

averaging 20 mr/hr. Since this release occurred over the unoccupied area of the NRTS, with the exception of the immediate test area, no exposures were incurred to personnel other than those in this area. Owing to the short half-lives of the isotopes involved, levels decreased to normal within a few days.

On February 24, 1956, IDO approved operation of the damaged reactor under intensified monitoring and meteorological surveillance. At this time the operation was conducted with the wind direction over an off-site agricultural area with results similar to those described above, occurring in the area between the reactor and the Site boundary. Gamma radiation levels of 3 mr/hr were observed in air at 5.5 miles; 1.5 mr/hr at 8.5 miles. Fall-out at distances greater than 5.5 miles was negligible.

Subsequent tests to December 1957 have not provided activity or dosages of consequence. An experiment currently in progress has provided radioactive effluent release at levels that are detectable in the field. With the rapid decay of the isotopes involved, detection has been extremely difficult at moderate distances. Extensive aerial cloud tracking has been undertaken during this operation, and the results of decay are quite apparent. As a side light, we are preparing a presentation of the results acquired on this aerial monitoring endeavor. Milk and vegetation are being analyzed routinely. We have detected no increase of activity over normal background levels. Jack rabbit thyroids show increases ranging in magnitude by factors of 2 to 10; we are confident that this increase has resulted from the present operation.

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