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AN EXAMINATION OF THE PLAN BY NSP FOR MONITORING BACKGROUND RADIATION AT THE PROPOSED MONTICELLO PLANT

In my opinion this plan suffers from several gross inadequacies. These are especially significant because the Monticello plant is the first major power reactor to be built in the state, and therefore should be monitored with extreme care as a pilot operation.

The major criticisms are: (1) inadequate sampling of environment and especially organisms, (2) insufficiently detailed analyses in many instances, (3) no consideration of local meteorology, topography, soils, vegetation, land use, and population density in relation to the details of the monitoring program, (4) no indication of the length or scale of the pre-operational survey (except in the case of thermal pollution--where two years is specified but the program is not described at all), (5) no provision for widespread emergency monitoring in the event of accidental releases of high-level radioactivity to either air or water. Because of these deficiencies, which are detailed in the following pages, I would urge the Minnesota Pollution Control Agency that the plan should not be accepted as providing for an acceptable monitoring program.

I. Air Particulate Sampling

There is no discussion of the local topographic or meteorological conditions which should be considered in determining the location of collectors. Location should be dependent on such conditions rather than (as stated) on the local availability of NSP-controlled property. No justification is given for the limitation to 6 stations, which may not be sufficient.

A. Air Samples (Inhalation)

There is no indication that occasional high-volume samples will be taken (as recommended in the Guide for Environmental Surveillance Around Nuclear Facilities, NF-67-8, Rev. 2, Dec. 1967) to provide for more sensitive analysis. No provision is mentioned for further radionuclide analyses of filters exhibiting unusual activity (recommended by ITAC Rept. #1, Dec. 1966, Routine Surveillance of Radioactivity Around Nuclear Facilities). It does not appear that carbon cartridges will be used for analysis of radioiodine, one of the isotopes of greatest concern (see recommendation in the Guide..., NF-67-8, Rev. 2).

B. Air Samples (Submersion)

These devices should certainly be employed, even on an experimental basis. It would also seem reasonable to use a much larger number of these devices than of particulate samplers, because of much lower cost. In this way the local influence of topography and meteorology could be much more thoroughly evaluated (perhaps leading to re-location of the particulate samplers).

II. Mississippi River Contamination

There is no discussion of the most suitable locations for sampling water, sediment, plants, and fish; it being assumed that one upstream and one downstream location is adequate. This is highly questionable for all but the water samples, and even in this case careful siting downstream could conceivably be important.

A. River Waters

No provision is made for tritium analysis (as recommended in the Guide..., NF-67-8, Rev. 2), or for radio chemical determinations should samples be recorded with unusual activities (see ITAC Rept. #1, Dec. 1966). No filtration procedure is proposed for separation of soluble from particulate radioactivity, which may follow different paths in the food chain. Note that the Guide..., NF-67-8, Rev. 2, suggests that radio chemical analysis is to be preferred for water samples. It will be especially useful for detailed food-chain studies, which should certainly be undertaken in the river.

B. Bottom Sediment

One upstream and one downstream sample annually is grossly inadequate, because of the possibility that radioactivity (natural, fallout, and added from the reactor) will be bound to very different degrees by different types of sediment and in different parts of the river. Twenty samples might be a minimally adequate number. Also, very careful consideration should be given to sampling procedures, since the effluent isotopes many be bound in the top few millimeters of the sediment, and hence easily diluted to undetectable levels by taking grab samples several centimeters in depth. Since there could well be seasonal changes in sediment activity, monthly or quarterly sampling at some representative sites would be desirable. Radiochemical analyses of some representative samples for specific nuclides would also be important if aquatic food chains are to be examined, as they should be.

C. Aquatic Plants

Again, the collection upstream and downstream of 2-lb. samples of broad-leafed, rooted plants in June and September is grossly inadequate. Different species will vary greatly, as will the same species in different locations and at differ-

ent times (particularly if the effluent concentrations of radionuclides vary greatly -- as they may do). Algae should also be collected for analysis, since they form an important part of the fish food-chain to man. Plants, because of their power of concentrating specific radionuclides, should be subjected to thorough radiochemical analysis (at least of the most radioactive samples). Sampling should also be carried out at varying distances downstream to establish the range of possible concentration effects.

D. The comments on plants apply with equal force to fish, which should be more widely, more frequently, and more specifically sampled and radiochemically analysed. Also, shellfish--because of their peculiarly high ability to concentrate certain nuclides -- e.g., sinc-65, iron-59, copper-64 -- should frequently be sampled and analysed in various habitats of the river, both upstream and for considerable distances downstream (see Guide..., NF-67-8, Rev. 2).

III. Contamination in the Food Cycle

A. Finished water

Some radiochemical analyses for specific isotopes should supplement the gross beta/gamma analyses (see section IIA above).

B. Well waters

Three wells (two at the plant site) do not make an adequate sample. Ten wells at varying distances from the plant (and sited with advice from a competent hydrogeologist) would seem a reasonable minimum. (The comments on water analysis in section IIA above also apply.)

C. Food crops

Two samples collected annually (at harvest and during the growing season, in one site) seem almost unbelievably inadequate (and do not meet the recommendations of ITAC Rept.#1). Much wider sampling should be carried out, to include several food crops, pasture grasses, and fodder crops from a variety

of locations, distances from the reactor, soil types, and fertilizer treatments. Irrigated crops (using water downstream of the reactor) should be given special attention. Many samples could be tested for gross beta/gamma activity, and some of the more radioactive samples selected for detailed radiochemical analysis. Some study of farm animals, (in addition to milk sampling) should also be included. It would also be valuable if some study of non-farm food chains could be undertaken, e.g., those invoving deer, pheasants, and rabbits. Since it is known that mosses and lichens have unusual powers of fallout concentration, they might be worth studying as air pollution indicators.

D. Soil in Agricultural Area

The soil sampling (one sample annually) is also grossly inadequate, since fallout contaimination from the reactor may vary greatly with location, distance from the site, soil type, vegetation type, farming practice, etc. One hundred samples annually would seem a more reasonable number, only some of which would require analysis for strontium-90 and cesium-137. Also, the activity may be concentrated in the uppermost layers of the soil, so that careful sampling (preferably on successive 1- or 2-cm. layers) is important.

E. Raw milk

Sampling should be more widespread and more frequent for iodine-131, which has a very short half-life (8 days) and could be missed in the event of brief high-level emissions to specific quarters of the compass. Widespread milk analyses should be made whenever air analyses indicate the possibility of such high-level emissions.

IV. Distribution of reports

More than 18 copies of the annual report should be prepared, since many agencies, civic groups, and interested individuals may wish to study them, especially in the event of accidental

high-level releases of radioactivity later on.

V. Ecological surveys

The description here is nil, and therefore entirely unacceptable from the point of view of evaluation.

Additional note

It would be wise to have a network of precipitation collectors in service, partly for routine monitoring, but especially for measurement after planned or accidental high-level releases of airborne radionuclides (see ITAC Rept. #1, Dec. 1966). A plan for widespread emergency monitoring in the event of accident should also form part of any proposal on background monitoring. The more extensive program of ecosystem sampling and analysis proposed in this commentary would become extremely valuable for the provision of background information in the event of such high-level releases either to air or water.

Respectfully submitted,

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