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Summary Bulletin on Rochester Gas and Electric Corporation's
Ginna Nuclear Power Plant*

*By: Robert E. Lee
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Corporation's Ginna Nuclear Power Plant

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Summary

An earlier bulletin said that Rochester Gas and Electric Corporation had made an impressive effort to safeguard the environment. The present bulletin describes the operation of the nuclear plant and discusses some remaining radiation problems.

The Ginna Nuclear Power Plant adds radioactive gases and liquids to the environment. These radioactive gases and liquids are released in small amounts and in a controlled way both to the air and to Lake Ontario. There are also thermal effects in that some 334,000 gallons a minute of Lake Ontario water are drawn in, heated by 18 F°, and then returned to the lake.

The Rochester Committee for Scientific Information finds that the Ginna Plant, while polluting the environment, does so to an amount much lower than that allowed by AEC regulations and/or New York State laws. Further, the nuclear power plant does not put out the air-polluting wastes normally associated with fossil fuel burning plants, either the visible particulates or the gases such as CO, CO₂, SO₂, etc.

The liabilities of using atomic power are serious and the following aspects deserve consideration: 1) The effects of nuclear power are not strictly local. The largest portion of the radioactive wastes are shipped from the Ginna Plant to a reprocessing plant in another county. The standards for noncontamination of the environment by this nuclear fuel reprocessing plant are much less stringent than those maintained by the Ginna Plant.¹ 2) The effects are also distant in time. The long-range effects are not known at the present time. 3) Two long-lived radioactive wastes, Tritium and Krypton 85, are not reduced at all, either at the Ginna Nuclear Plant or at the fuel reprocessing plant, but neither is concentrated by biological mechanisms. 4) More power plants are planned for the shores of Lake Ontario and the damage caused by the total heat load may become great.

The Ginna Nuclear Power Plant is a Pressurized Water Reactor, and, as such, has a closed flow of water under pressure as a coolant for the reactor. This in turn is cooled by another closed cycle of water, also under pressure. In cooling the first

*This is a summary report, prepared by the investigator. The full report is in R.C.S.I. files and will be furnished on request.

flow the second is boiled, becoming steam which then turns a standard steam turbine producing electricity. The turbine exhaust steam is then condensed by huge amounts of water from Lake Ontario. The Ginna Nuclear Power Plant also adds radioactivity, both gas and liquid, to the environment.

The gases are stored for 45 days in expansion tanks to allow radioactive decay. The principal gases are Iodine-131 (half-life of 8.2 days), Xenon-133 (half-life of 5.3 days) and Krypton-85 (half-life of 9.4 years). The 45 day hold-up reduced the Iodine and Xenon significantly. No reasonable holding time would reduce the Krypton level. If RG&E built more and/or larger holding tanks they could provide for further radioactive decay before release to the atmosphere. This of course would increase costs which would be passed on to the consumer. The present equipment is sufficient to keep their discharge below about one-tenth the maximum permitted by the AEC. In contrast to many nuclear plants, where the nuclear pollution is continuous during operation, the Ginna Plant is progressive and provides for sampling and monitoring so the release can be delayed or further dilution provided if needed.

The radioactive liquids are collected and the impurities concentrated by evaporation followed by condensation. The residue after evaporation is then mixed with cement and shipped as a solid for permanent disposal elsewhere. All of the radioactive heavy water, Tritium, and about one thousandth of the other radioactive elements pass through this evaporation process. They are then diluted with the entire 334,000 gallons per minute flow of cooling water from Lake Ontario and discharged into the Lake.

RG&E is also holding their liquid radioactive discharge to about one tenth the maximum limit allowed by the AEC. Since a Pressurized Water Reactor does not use the water cooling the reactor to directly drive the steam turbine, but rather to heat an intermediate fluid which drives the turbine, it has better radioactive isolation than many nuclear plants and so causes less radioactive liquid pollution. On the other hand it could (with added equipment and hence added capital expense and finally added cost to the consumer) provide for two stages of evaporation and further reduce the radioactive pollutants, other than heavy water, by another factor of a thousand.

The AEC is charged with promoting atomic energy as well as safeguarding the public. Some critics say these conflicting duties have caused the AEC to give the benefit of the doubt to the nuclear industry rather than to be neutral or cautious. One source estimates that the AEC maximum permissible concentrations, if reached, would cause 16,000 to 32,000 extra deaths per year from cancer and leukemia.² Other reputable scientists say the AEC limits are the best that can be set with the presently available evidence.³ Even opponents of nuclear power don't expect these limits to be reached but argue that a high limit should not be allowed on the assumption that it won't be reached. In any event, the Ginna Plant is well below these maximums. There is no agreement that the lower level of radioactive pollution caused by Ginna Plant will not cause some smaller numbers of deaths, however.

Any power plant causes thermal pollution. The condensing of the exhaust steam after passing through the turbine places large amounts of waste heat in the environment. A coal-fired plant places about the same total amount in the environment as does the Ginna Plant but puts about 15-20% into the atmosphere by way of the smoke stack with the remainder going into some body of water. A nuclear plant has no smoke stack and places essentially none of its waste heat directly into the air, all

going to the cooling water. (An exception to this is when the cooling water in turn is completely cooled by the atmosphere through evaporation using large cooling towers. The huge evaporation then causes humidity, fog, etc. No plants in the Rochester area use this technique.) This heat in the water is ultimately lost by radiation to space, heating of the air, etc. but can cause large changes in the ecology of the Lake. RG&E's waste heat causes a nominal temperature increase of 18 F° in the 334,000 gallons a minute of lake water used for cooling. This heated water is deliberately returned to the lake at the surface so convection will not cause mixing. This arrangement facilitates transfer of heat to the atmosphere and radiation to space. Thus the waste heat, while large, is not presently a problem for Lake Ontario.

The nuclear power plant produces less particulate pollution (smoke) than is customarily associated with coal-fired plants. The smoke and other gas pollutants of the coal plants could also be removed or reduced using expensive modern equipment. If they were removed then the air pollution of coal-fired and nuclear power plants might be comparable, so this is not a determining factor.

In conclusion, it can be said that the Ginna Plant is adding radioactive pollution, both gaseous and liquid, to the atmosphere but at a rate well below the maximum limits allowed by the AEC and to a lesser extent than many other nuclear plants. The releases are controlled and monitored. Nevertheless, the releases could be further reduced through use of more equipment but with consequent increases in cost to the consumer. The Ginna Plant is producing thermal pollution to the same extent as all power plants and is minimizing the effects as well as it can.

Acknowledgement

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References

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2. Tamplin, A. R. and Gofman, J. W. in congressional testimony, April 7, 8, 1970.
3. Letter to Chairman of Joint Committee on Atomic Energy, signed by twenty-nine scientists, reprinted in Electrical World, April 27, 1970.