

BEFORE THE UNITED STATES
ATOMIC ENERGY COMMISSION

1 IN THE MATTER OF)
2 CONSOLIDATED EDISON COMPANY) DOCKET NO. 50-286
3 OF NEW YORK, INC.)

4 Testimony of C. Rogers McCullough
5 Consultant to Consolidated Edison Company
6 of New York, Inc.

7 Q. Please state your name and address.

8 A. C. Rogers McCullough, 15201 Rosecroft Road,
9 Rockville, Maryland 20853.

10 Q. Please describe your education.

11 A. I received my Bachelor of Arts degree from
12 Swarthmore College in 1921, my Master of Sciences
13 degree from Massachusetts Institute of Technology in
14 1922, and my Ph.D. from Massachusetts Institute of
15 Technology in 1928.

16 Q. What is your principal business activity?

17 A. I am a consultant in chemical and nuclear engineering
18 and function as Technical Director of Southern
19 Nuclear Engineering, Inc., a company which offers
20 professional engineering services to the nuclear and
21 affiliated industries.

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2 Q. What are your memberships and affiliations in and on
3 professional societies and committees?

4 A. I am a longtime member of the American Chemical
5 Society of the American Institute of Chemical
6 Engineers, and am a fellow of the American Nuclear
7 Society. I am a member of the Standards Committee
8 of the American Nuclear Society, Vice Chairman of
9 the Reactor Safety Committee of the Atomic Industrial
10 Forum, and a member of the technical committee N-45
11 of the United States of America Standards Institute.
12 I am also a member of the Subcommittee on Nuclear
13 Power of the Boiler and Pressure Vessel Committee of
14 the American Society of Mechanical Engineers, and
15 Chairman of a Task Group of this same committee to
16 write Criteria for Prestressed Concrete Reactor
17 Vessels.

18 Q. Please explain your experience in analyzing the
19 design and operation of nuclear power plants.

20 A. In 1945, when all atomic energy activity in this
21 country was conducted within the Manhattan Engineer
22 District, a start was made to demonstrate that atomic

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2 energy could be used for civilian purposes, particu-
3 larly the generation of electrical power. At the
4 Clinton Laboratories of the Manhattan Engineer Dis-
5 trict, now the Oak Ridge National Laboratory, a
6 special division was formed in 1946 known as the
7 Power Pile Division, and I was appointed its Director.
8 The task of that division was to develop and build
9 an experimental nuclear power plant using the reactor
10 concept known as the Daniels Pile. Because of rela-
11 tive priorities this effort was terminated in 1947.

12 In 1951, Monsanto Chemical Company and the Union
13 Electric Company of Missouri formed a group to study
14 the possibilities of producing plutonium and electrical
15 power in a suitably designed nuclear power plant. I
16 was Technical Director of this group. It was found
17 that such a project was not economically feasible at
18 the time, and the effort was terminated.

19 In 1951, I became a member and Chairman of a
20 committee formed by the Atomic Energy Commission called
21 the Industrial Committee on Reactor Location Problems.
22 This Committee started with a review of the reactors
23 at Richland, Washington and then continued, at the

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2 Commission's request, to explore other reactor proj-
3 ects in the Commission's program. The function of
4 this Committee was to determine the interaction of
5 nuclear reactors with the environment and the public,
6 both from a normal operating and an accident point
7 of view. Involved therefore was not only an under-
8 standing of the design and operation of the reactors,
9 but also of environmental factors such as population
10 density, land use, meteorology, hydrology, etc.
11 This Committee was merged in 1953 with the Reactor
12 Safeguards Committee of the Atomic Energy Commission,
13 to form a new committee called the Advisory Committee
14 on Reactor Safeguards. I was Chairman of this newly
15 created Committee. This Committee had the responsi-
16 bility of reviewing all reactor projects in the
17 Commission's program and advising the Commission as
18 to the adequacy of the reactor design for the pro-
19 tection of employees and the public and the environ-
20 ment.

21 On September 6, 1957, the Congress amended the
22 Atomic Energy Act to make the Advisory Committee on
23 Reactor Safeguards a statutory committee and to require

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that all reactors subject to the Atomic Energy Com-

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mission's licensing jurisdiction be reviewed by this

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Committee and a report given before a construction

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permit was granted. I was Chairman of this Committee

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until 1960 and continued as a member of it until

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September 19, 1961.

8

Q. Are you a consultant to Con Edison in this proceeding?

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A. Yes.

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Q. When did you become a consultant?

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A. I first became a consultant to Consolidated Edison

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on March 30, 1966. This was for the Indian Point

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No. 2 Nuclear Power Plant, a unit very similar to

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Indian Point No. 3. On March 15, 1967 Consolidated

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Edison asked me to consult with them on the Indian

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Point No. 3 Nuclear Power Plant. I have continued

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to work with Consolidated Edison on both Indian Point

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Units Numbers 2 and 3 as required.

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Q. Please explain the nature and extent of your partici-

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pation in reviewing safety analyses and other infor-

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mation flowing from this application, and in advising

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the applicant with respect thereto?

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A. Consolidated Edison has furnished me copies of the

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Preliminary Safety Analysis Report and supplements prepared for the Indian Point No. 3 Nuclear Power Plant, which I have reviewed. In addition, I have attended meetings with the ACRS and its subcommittee and with the AEC regulatory staff. There have also been several meetings with Consolidated Edison and its principal contractor, Westinghouse, which I have attended. On several occasions members of the staff of Southern Nuclear Engineering, Inc. have attended meetings of the type mentioned above and have discussed the results with me. This is essentially the same type of evaluation that I performed of the design of the Indian Point No. 2 Reactor.

My primary function as a consultant to Consolidated Edison in this proceeding is to review the design of the proposed plant and the analysis of the proposed design from a safety point of view and advise Consolidated Edison as to whether or not, in my opinion, the design is safe for operation at the Indian Point site. Further, I have advised them, as required, as to the necessity of

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2 further description and analyses of the features of
3 the plant. I have reviewed the plant design and its
4 engineered safeguards in an overall manner, putting
5 more emphasis on some features than others as indi-
6 cated by the design. In my work, I have been
7 assisted by the staff of Southern Nuclear Engineering,
8 Inc.

9 Q. What is the extent of your familiarity with the site
10 of the plant?

11 A. I am very familiar with the Indian Point site, hav-
12 ing visited it several times over a period of years
13 and having studied its population and land usage,
14 meteorology, etc., which is presented in Volume 1
15 of the Preliminary Safety Analysis Report on Indian
16 Point No. 3.

17 Q. On the bases of your education, of your experience
18 in nuclear technology, of your study of the design
19 of this plant and of your knowledge of the site,
20 please state your opinion whether the plant, if con-
21 structed substantially in conformance with the design
22 before this Board and if operated according to pro-
23 cedures similar to those previously approved to your

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2 knowledge by the Atomic Energy Commission, can be
3 operated in such a way as not to pose an undue risk,
4 as to nuclear aspects of such operation, to public
5 health and safety?

6 A. In my opinion, this plant can be operated at this
7 site without undue risk, in relation to nuclear
8 aspects of such operation, to public health and
9 safety if the plant is constructed substantially
10 in conformance with the design before this Board
11 and if operated according to procedures similar to
12 those previously approved to my knowledge by the
13 Atomic Energy Commission.

14 Q. Speaking as a technical expert, what do you mean by
15 the phrase "without undue risk"?

16 A. To me, the phrase "without undue risk" means that
17 the activity concerned does not unreasonably increase
18 the risk to which the public and the environment
19 are normally subjected in our modern industrial
20 society. What is reasonable or unreasonable depends
21 in large part upon whether the benefits to the public
22 outweigh any risk resulting from the activity.

23 I use the word "outweigh" as testing the serious-
24 ness and substantiality of both benefit and risk.

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2 The benefits here to the public of cleaner air and
3 cheaper power are surely substantial. On the other
4 hand, I can not, in my judgment, attribute any such
5 substantiality to the risk if the design is carried
6 out as planned and if operating procedures similar
7 to those employed in other nuclear plants are put
8 into effect. I consider that the risk to the public
9 from nuclear hazards will be so low in the scale of
10 probability as to be meaningless and unimportant.