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Office Memorandum • UNITED STATES GOVERNMENTTO : J. C. Bugher, Director, Division of
Biology and Medicine, Washington

DATE: December 1, 1952

FROM : W. E. Kelley, Manager,
New York Operations Office

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SUBJECT: BROOKHAVEN'S METEOROLOGICAL PROGRAM

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The meteorological program which has been conducted at the Brookhaven National Laboratory for the past several years has been directed primarily toward maintaining the present off-site radiation level agreed upon by Brookhaven and the Commission. If, as currently proposed, the operating tolerance level is raised by a factor of 10, there will be essentially no chance that the off-site dose rate will ever be exceeded as a result of reactor operations at current maximum power levels. Consequently, it will be no longer necessary to continue meteorological work at Brookhaven on anything like the present scale for monitoring purposes alone.

In view of these facts, the Laboratory is faced with the necessity of terminating the meteorology program and abandoning the facilities at, or shortly after, the end of the current fiscal year. The facilities consist of a remodeled wood frame building, valued at \$66,840, providing 6000 sq.ft. of space for offices and housing of teletype machines and weather recording equipment. Erected in the vicinity of this building are two steel towers 160 ft. and 420 ft. in height, valued at \$311,000. The scientific equipment in the control building along with the meteorological instruments and smoke generator unit mounted on the towers are valued at \$61,000. They are now operated by a staff of 10 Brookhaven employees and 2 representatives of the U. S. Weather Bureau. Abandonment of the program would reduce the equipment substantially to scrap value.

The research work on the fundamentals of smoke diffusion which has come from this laboratory is among the outstanding work which has been accomplished in the United States in the past several years. To my knowledge, the laboratory affords the only location where continuous unclassified research on these problems is being carried out. A coordination of the work of the Brookhaven Meteorology Laboratory with that being done on the New York University Wind Tunnel Project will make possible an evaluation of wind tunnel scale factors and open the way to laboratory diagnosis of atmospheric pollution problems. The Brookhaven facilities are being duplicated in miniature for the New York University Wind Tunnel so that identical atmospheric conditions can be transferred and studied directly.

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The Laboratory has proposed that before the above action is taken, the Commission review the need for further work in this field taking the following points into consideration.

1. General and specific problems in meteorology and micro-meteorology, of fundamental and immediate practical importance, remaining to be solved.
2. The Brookhaven tower installation and associated equipment is probably the best of its kind available. The area surrounding it is flat and uncomplicated so that results obtained here may be expected to be representative of large segments of the country and the world. Knowledge of the general regional meteorology and the several years of local work would make time-consuming preliminaries to future research unnecessary.
3. A competent, and experienced staff, thoroughly familiar with the installation, is available.
4. The cost of this program to the Commission is insignificant to the possible benefit to be derived if the study of the fundamentals of meteorology is of value to the Commission.
5. On the basis of the existence of the Brookhaven project, fundamental work which has been proposed at other Commission sites has been turned down. Certainly there should be a single Commission sponsored facility wherein problems involving the fundamentals of the reduction of atmospheric pollution can be investigated.

The AEC has a variety of important meteorological problems such as the dispersion of stack and other radioactive effluents and fall-out phenomena affecting bomb testing, military applications and civil defense which require further development. It is also known that research utilizing the Brookhaven facilities would be of great interest to other agencies and organizations and that funds and personnel for such work could undoubtedly be made available if acceptable.

In consideration of the above need for additional meteorological information, with emphasis on field investigations of atmospheric turbulence with particular reference to dispersion problems, it is visualized that a cooperative program containing the following elements could be advantageously pursued at Brookhaven.

- A. A base program, supported by AEC, which would guarantee minimum operation of the facilities and support a small Brookhaven staff working on AEC problems. Such a program might involve \$30,000 to \$50,000 incrementally for direct costs and supporting services.
- B. Work carried out by Brookhaven for other government agencies, (e.g., the Air Force), supported by transfers of funds to AEC.
- C. Cooperative work involving personnel from other organizations, e.g., continuation of the cooperations with the U. S. Weather Bureau.
- D. Utilization of facilities by industrial organizations and other research groups on a paying basis, using an industrial cooperative type of subcontract. Since meteorology is a secondary interest to the Commission, other groups would be expected to pay their own way to a much greater extent than is the case in cooperative work in nuclear science and technology proper.

There is attached to this letter a description of several specific proposals made by the Brookhaven meteorological group. They feel that immediate research on these problems would produce additional worthwhile results. Since they have been notified of the discontinuance of the meteorological program at the end of the fiscal year, prompt action is necessary if further work is to continue at Brookhaven. I feel that this matter should be brought to the attention of the Washington Office staff and desire that you undertake the responsibility of obtaining their opinion concerning the advisability of a future program in meteorology at Brookhaven.

Enclosure:

Proposed Meteorological Projects.

Proposed Meteorological Projects

1. Oil-Fog Tests - In the consideration of any future research, a continuation of the oil-fog tests of atmospheric dispersion is an obvious feature, since the equipment, technique and personnel are all available for the task. The quality of the sampling equipment has improved to the point that mobile sampling can now be used as a reasonably acceptable substitute for the ideal of a large number of sampling points.

The few data that have been collected by the new "traverse" method are encouraging, and it is reasonable to expect that additional work would provide information of much greater theoretical importance than those obtained previously at this site. Future oil-fog work would involve the measurement of concentrations resulting from effluent emitted from ground-level, as well as elevated sources.

Personnel Requirements*

| <u>Scientists</u> | <u>Weather Technicians</u> | <u>Junior Technical Specialist</u> |
|-------------------|----------------------------|------------------------------------|
| 3 | 3 | 1 |

2. Stack Tests - A thorough field test of the behavior of heated stack effluent from stacks of varying diameter and height has not been undertaken. Reliable formulae describing this phenomena can result from a study in which effluent speed, temperature and volume are controlled, and in which meteorological conditions are measured to a height well above stack top.

The meteorology test stack could be readily altered to permit such a study. The basic requirements for this would be:

- a. 3 temporary 75' stacks of varying diameter to be connected to the main stack.
- b. An additional heat source (approx. 800,000 BTU/hour).

Personnel Requirements*

| <u>Scientists</u> | <u>Weather Technicians</u> | <u>Junior Technical Specialist or Weather Analyst</u> |
|-------------------|----------------------------|---|
| 2 | 3 | 1 |

3. Analysis of Existing Data - In general, the Meteorology Group has made only such use of the data already accumulated as has been required by the reactor program. A wide variety of studies should be made from this basic information.

The initial step in this project is the transfer of two years' raw data to IBM punch cards, and the U. S. Air Force has already provided funds for the work.

Personnel Requirements*

| <u>Scientist</u> | <u>Junior Technical Specialist</u> | <u>Weather Analysts</u> |
|------------------|------------------------------------|-------------------------|
| 1 (part time) | 1 (part time) | 2 |

4. Meteorological Instruments

- a. Turbulence. There is considerable room for advancement in the measurement of various parameters important in atmospheric turbulence. The Group has nearly completed the design of a new bi-directional wind vane

and anemometer. It is considered desirable to construct at least two of these units together with appropriate recorders, in order to obtain measurements at more than one level. Such data would be useful in items (1) and (2).

Additional developmental work in recorders and data processing equipment is also planned.

b. Radioactivity in Meteorological Measurements -

A review of the literature clearly indicates that the potential usefulness of radioactive isotopes in measuring meteorological variables has received little attention. The Brookhaven facilities offer unusual opportunities for research of this type. The first step in this investigation would entail consultation with members of other departments to determine the most promising lines of approach to achieve the following measurements:

- a. Rainfall intensity
- b. Raindrop size and number
- c. Air Pressure variations
- d. Humidity

Personnel Requirements*

Scientist

1

Weather Technicians

2

*The personnel estimates are not additive when more than one project is considered, since certain portions of the maintenance and supervision would be common to several different tasks. The requirements for all four projects would be as follows:

| | | |
|------------------------|----------------------------|------------------------------------|
| <u>Scientists</u> | <u>Weather Technicians</u> | <u>Junior Technical Specialist</u> |
| 3 | 5 | 1 |
| <u>Weather Analyst</u> | <u>Secretary</u> | |
| 3 | 1 | |