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U.S. DEPARTMENT OF COMMERCE
Environmental Science Services Administration
RESEARCH LABORATORIES
Idaho Falls, Idaho 83401

Date: April 23, 1970

Reply to
Attn of: RF323x1

727050

Subject: ARLFRD Monthly Activity Report March 21 - April 20, 1970

To: Chief, Environmental Branch
AEC Health Services Laboratory

Mesoscale Transport and Diffusion: Work has begun on the modification of the latest version of the mesoscale trajectory program to produce a motion picture of the transport of serially released particles. It is felt that this type of portrayal will be more effective than the current display technique for some of the more complex trajectory patterns.

Diffusion, Deposition and Depletion: Four measurements of environmental chamber turbulence with different turbulence generation techniques and hot wire arrays were made. The first test utilized a five hot wire array which was mounted at two levels in the chamber with the turbulence generators spaced logarithmically. Turbulence measurements were made for high and low mass flow during the sampling periods. The second test had to be discarded due to vibration of the hot wires and interference in the recorders. The third test consisted of measurements of velocity profiles and turbulence from single vertically oriented hot wires at four heights in the chamber. A three-inch uniform spacing of the turbulence generators during high and low chamber flow was employed. During the last test the instrumentation and turbulence generators were similar to test three. In addition, live grass in flats covered the chamber floor in an attempt to simulate natural boundary layer conditions for velocity profile and turbulence development. Computer processing of the data acquired from these tests is in progress.

Continuation of EXCES tests have been performed during this reporting period. Four 20-minute tests have been performed, the last being on April 9. The Environmental Laboratory had high volume air samplers on the 400 meter arc and on the 100-ft towers, and Geiger counters and spectral instrumentation down grid. These tests should give a graphic picture of how diffusion parameters vary under unstable conditions. Preliminary results look very good. Measurement of deposition was also made, using fallout plates.

Tetroons were serially released and tracked during the course of the EXCES tests to monitor the trajectory of the transport of the material released. Tetroon positions were continuously plotted and relayed in terms of meso-grid coordinates to the test coordinator. The value of the positioning techniques used was demonstrated on an occasion when a second crew operated the radar on East Butte and were able to locate targets in the air very quickly from coordinates which had been radioed to them by radar crew #1.

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The same technique was used very successfully in locating a target in which the mesogrid coordinates were estimated from the following quantities: 1) release location, 2) wind speed and direction, and 3) time elapsed from release. On one EXCES test the tetroons were tracked to 92,000 meters north and east of Rexburg, Idaho.

Analysis and interpretation of the CBT tests is nearly complete. Graphs and tables comparing methyl iodide with molecular iodine and uranine dye and comparing uranine dye with molecular iodine are being tabulated. A complete summary will be presented next month.

Additional numerical calculations have been performed using the puff diffusion model. These additional calculations are to demonstrate the effects of variability in plume advection and possible differences in total integrated concentration for receptors within a subarea of the computational mesh.

Work was performed for ARL headquarters on diagrams and slides to be used in briefings of ESSA Research Laboratory director.

Computer Programs: The computer processing of the final plots for the FAA Wake Turbulence study were completed.

Operations and Maintenance: Instrumentation maintenance during this period included work on the NRF wind station, EBR II telemetering, rewiring of Test Grid #3 control cables, NRTS bivanes and B&W velocity sensors, hot wire anemometry and Alden Facsimile machine.

One additional microphone and tape recorder system was installed at the Goldberg site for sonic boom measurements.

Our laboratory building was cleaned, the excess items surplused and plans drawn up for adequate shelving installation. Metal cabinets were brought in from the radar spare parts trailer and will be permanently installed inside the building for more accessible radar parts storage.

Work is progressing on Grid 3 wiring and instrument facilities installation for the forthcoming building wake study.

A proposal has been written and will shortly go out on competitive bid for a new meteorological radio telemetry system to replace our present IET system which is 16 years old and maintenance costs are becoming excessive.

Lectures and Meetings: Ray Dickson gave an invited seminar on "Aircraft Vortex Measurements from Instrumented Towers" to the Weather Bureau Western Region and Airport Station and FAA regional representatives in Salt Lake City on March 31, 1970.

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Ray Dickson, Gene Start, and Larry Wendell attended the Federal Executive Association luncheon in Idaho Falls. Congressman Orval Hansen was luncheon speaker.

Papers: A paper, "Some processes affecting the transfer of radiiodine from air to grass" by Earl H. Markee, Jr., and Donald H. Adams (AEC), was submitted for publication to Atmospheric Environment.

Staff members of this office reviewed the following papers for Air Resources Laboratory; "Large Power Plant Effluent Study" by Schiermeier and Neimeyer; "Atmospheric Oxygen in 1967-70", and "FY 1969 Summary of Division of Meteorology Support to NAPCA, USDHEW".

Consultation: Consultation was given to the Project Manager, TRA Reactor Systems on meteorological data in evaluating performance of the ATR cooling tower.

Information was given to U. S. Weather Bureau Fire Weather Coordinator at Boise on the use of 10 gram pibal procedures and tables.

Mr. H. A. Flaucher, ANL, requested an estimate of the minimum stack height required for the exhaust stack of the proposed Standby Heat Rejection System (SHEAR) to prevent the effluent entry into the air-cooled condensers and outside air intake systems of the EBR II reactor plant. The most conservative estimate of the plume rise above the stack was 45 ft due almost entirely to buoyancy forces. The estimate of the required stack height to virtually eliminate the possibility of the effluent being captured in the mechanical turbulence region created by air flow through the building complex was 155 ft.

Personnel: This office has had the misfortune of having three personnel on extended sick leave. In order to support the testing program it was necessary to hire temporary help. Mr. Wallace Passey, Scientific Assistant, came aboard on March 31; William Howell, Electronic Technician, reported for duty on April 15 and Mr. Earl Pickering, Meteorological Technician, was on loan from ARL-Las Vegas for two weeks.

Visitors: Mr. Kenneth Rice, Meteorologist in Charge at Boise Weather Bureau Office, visited to discuss general meteorological weather and communication problems that exist in SE Idaho.

C. Ray Dickson

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