U.S. DEPARTMENT OF COMMERCE
Environmental Science Services Administration
RESEARCH LABORATORIES

Box 2108
Idaho Falls, Idaho 83401

727043

Date: October 28, 1970

Reply to Attn of: RF323x1

Subject: ARLFRO Monthly Activity Report, September 21 -- October 20, 1970

To: Chief, Environmental Branch
AEC Health Services Laboratory

Mesoscale Wind Studies: Work has begun on a comparison of the trajectories of tetroons released in November and December of 1969, with trajectories of hypothetical particles released at corresponding times into the mesoscale wind fields obtained from the tower data. Existing computer programs have been merged and modified such that the time range, azimuth, and elevation reading along with the radar location may be read into the program which computes the trajectories of the hypothetical particles. This allows the comparisons to be made in one operation.

Signature recognition and Adaline pattern recognition techniques were investigated and dismissed at least as far as a basic approach to a statistical classification of patterns in the mesoscale wind fields. The linear correlation of wind vectors was used to derive types or typical patterns for the spring of 1969, 1500 MST. There are shortcomings because the correlation technique is really only looking at normalized variables. However, wind patterns correlated at 0.70 or greater have a distinct similarity as recognized by the eye.

A number of experiments have been conducted in which the trajectories generated by the Meso Trajectory program are counted as they pass by or over certain population centers. The program currently prints out a matrix showing the total independent 'hits' within a given radius of a population center according to time of release from the source and hours of flight before the hit. A second matrix is printed which gives the total time, in hours, that a center is continuously affected by any trajectory. The matrix has the arguments 'time of initial hit', and 'hours of dwell'.

The development of a forecast guide for the NRTS includes the forecast studies of winds developed by Mansfield and Richter. Some rules of thumb for the forecast of weather conditions were already in proper form for inclusion in the final guide.

Forecasts of wind direction and speed are being developed on a low priority basis for CFA and TAN for afternoon winds. Forecasts of late night and up to sunrise winds are impractical because of extreme direction variability under inversion conditions. The large scale variables such as pressure gradients have no noticeable effect under these conditions.

Copies of the Daily Weather Map are made and put into a small file of synoptic maps associated with certain extreme conditions such as heavy snow, heavy rain, extreme heat or cold, etc.

An additional technique for use in forecasting has been developed and will appear where appropriate in the final forecast guide. This technique is the search for limiting values of predictor variables associated with some predictand event which can be classed Yes or No.

Additional studies of the relationship between observed wind and precipitation for map types that have a very high correlation to one another is continuing. The daily forecast of precipitation probability determined from the 25 best analogues off the history tape has proven to be an excellent predictor, when using 700 mb or 500 mp maps. The correlation between todays wind and winds from the best analogues seems to be good only for 850 mb maps. It is interesting to note also that there is very little correspondence between dates of 850 mb analogues and dates of 700 mb or 500 mb analogues.

Building Effect Studies: This study is progressing very slowly since the August electrical storm. Work has been progressing on repair of digital system and transducers as replacement parts arrive. A new dispensing nozzle is being evaluated and particle size distributions are being measured. If this new dispensing nozzle proves acceptable, dissemination of uranine dye will be made simpler.

Computer Programs: Final program modifications and calculations, and graphical data depictions of the May, 1970 NAFEC data were made. Work continued on the application of the mesowind field analysis routines to the Los Angeles Basin wind data and the comparisons of wind data derived trajectories with tetroon trajectories from the September 1969 study. Most problems are solved.

Operations and Maintenance: Routine maintenance included work in the following meteorological data acquisition stations: Arco, Sand Dunes, SPERT, EBR II, Big Southern Butte, Grid #3, NRF, IET, and Blackfoot. Other instrumentation repaired were the HP 2401C digital voltmeter, Bendix Friez strip chart recorder, Cordon velocity translator, and HP 2012-B digital acquisition system.

Work was done on the noise abatement test project at Goldburg, Idaho in the form of NUS recorder repair, detector calibration and primary power rewiring.

Help was provided and meteorological data was collected during the recent CERT test which was performed on September 23 at the dairy farm.

New power switch boxes and relays were installed on the Grid 3 test area to alleviate the need to unplug high volume air samplers when alternate switching from the northeast to the southwest sectors is needed. Also earth anchors were installed for mounting 100 foot towers at the 100 meter arc (northeast) location.

One transponder-tetroon target was recently tracked by our M-33 radar and observed by visitors from the National Weather Service, Salt Lake City.

There are 15 to 25 forecasts of wind and weather conditions issued every month that are not routinely reported in this summary. Two exceptional requests for forecast services over a period of a week or more occurred this past month. The twice daily forecasts of surface wind conditions at the TRA pond were ended as of the afternoon of September 28. There were 18 weather and wind forecasts issued during the first two weeks of October in conjunction with construction projects at CPP and at LOFT.

The past 30 days has seen two outbreaks of unusually cold air from the north. The lowest September temperature on record was recorded on the 25th at 12 degrees. The first time in October history to have two successive days get less than 10 degrees was October 15 and 16 with temperatures of 7 and 9 degrees. The lower temperature tied the record cold for so early in the season. A good warm spell from September 27 through October 4 with six days of 79 degrees or over kept the past thirty days from being coldest on record. The mean temperature was 44.4 degrees, while the coldest on record was 43.9 degrees set last year. The average minimum temperature was 24.0 degrees compared to the former record of 25.9 degrees set in 1954.

Precipitation totaled 0.01", tied for second driest on record with 1958, a warm and dry year. The year 1952 was warmest on record with an average maximum temperature of 74.6 degrees and was driest with no precipitation.

Papers: A paper entitled "A Preliminary Examination of Mesoscale Wind Fields and Transport Determined from a Network of Wind Towers" by Larry Wendell was approved for publication as a technical memorandum. Revision of the text, tables and figures has been completed. The work was submitted for publication in this media to allow the windfield and trajectory plots for an entire year to be included in the appendices. The paper is being modified to be more suitable for publication in the open literature.

The interim and final contract reports to the FAA, regarding ARLFRO support of the FAA studies of Wake Turbulence and Wingtip Vortices, are undergoing review prior to their printings.

Visitors: William Chapman and Devon Smith, National Weather Service, Salt Lake City, Utah, visited our office to discuss trajectory studies by use of tetroons, and to discuss mesoscale research.

Meetings, Trips, Lectures: Mr. Ray Dickson traveled to Seattle, Washington on September 30, 1970 to attend a meeting of regional Federal Executive Association and Federal Executive Board members. Discussions were held regarding problems of an interagency type in government and solutions and approaches we should use, as Federal Executive Associations, in implementing programs from the office of Management and Budget. Mr. Dickson also met with the Honorable Robert E. Hampton, Chairman of the Civil Service Commission, to discuss upcoming problems and studies that are being carried out by the Civil Service Commission.

On September 30, Dave Bjorem, Gene Start and Larry Wendell met with Paul Ruhter, AEC, and Ray Fielding, INC. The purpose of the meeting was to discuss the possible transport statistics that might be derived, and to settle upon a particular choice of output statistics for postulated releases from PBF and TRA calculated for spring, 1969 data. An agreement was made to do the work on a project number furnished by Ruhter. The computer processing is to be done on overnight usage rates, for the sake of economy, since the results are not of an urgent nature.

Mr. Dickson, Mr. Start and Dr. Isaac Van der Hoven met with officials of U. S. Army Chemical Corps and Deseret Testing, to discuss research problems experienced by both groups. Also, the Army Chemical Corps is using programs we have developed in meso-wind analysis and diffusion predictions calculations in their work. This is a direct spin-off of AEC support.

Mr. Start and Mr. Dickson lead the discussion at a special ERC meeting of the Idaho Falls Cadre concerning new techniques in plotting radiological fallout data, on October 6, 1970.

Mr. Dickson presented a talk to some 87 members of the Idaho Chapter of the American Nuclear Society on October 13, 1970.

Ray Dickson, Gene Start and Lydia Thorngren attended the monthly meeting of the Federal Executive Association in Idaho Falls on October 15. Former Iowa Governor Norman A. Erbe was the principal speaker at this meeting. Dr. John Spickard, AEC, spoke on industrial health problems. Mr. Dickson is president of the Association for FY 71, and Mrs. Thorngren is secretary.

Combined Federal Campaign: This office had 100% participation in the Combined Federal Campaign.

C. Ray Dickson

C. Ray Dickson, Chief
Air Resources Laboratories
Field Research Office

cc: I. Van der Hoven, AREL
Chief, ARL, Las Vegas
Director, DOM, Raleigh, N.C.
Director, ARATDL, Oak Ridge
G. O. Bright, WRSPO, Inc.