

**MEMORANDUM OF UNDERSTANDING**  
**Between**  
**U.S. NUCLEAR REGULATORY COMMISSION**  
**And**  
**NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**  
**OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH, AIR RESOURCES LABORATORY**  
**U.S. DEPARTMENT OF COMMERCE**

**Atmospheric Transport and Dispersion Models**

**I. APPLICABILITY**

This Memorandum of Understanding (MOU) applies solely to collaboration between the U.S. Nuclear Regulatory Commission (NRC) and the National Oceanic and Atmospheric Administration, Office of Oceanic and Atmospheric Research, Air Resources Laboratory (NOAA/ARL), U.S. Department of Commerce. This MOU only supersedes the NRC-NOAA/ARL MOU on Atmospheric Transport and Dispersion Models that became effective on August 3, 2015. In addition, this MOU does not involve an exchange of funds.

**II. AUTHORITY**

The NRC enters into this MOU under the authority of section 205 of the Energy Reorganization Act of 1974, as amended, 42 U.S.C. § 5845(c). NOAA/ARL is authorized under 33 U.S.C. § 883d, authorizing it to conduct investigations and research in geophysical sciences.

**III. PERIOD AND TERM**

This MOU shall be effective upon the date of the last signature from both parties. The initial term of this agreement will extend for a period of 5 years from the effective date of the agreement. This MOU may be amended, modified, extended, or terminated with the approval of authorized NOAA/ARL and NRC signatories identified in section VIII.

**IV. PURPOSE**

The mission of the NRC's Office of Nuclear Regulatory Research (RES) is to conduct research to inform regulatory decisions, to anticipate and resolve potentially significant safety issues, and to develop technical bases to support regulatory positions. RES develops and maintains the MELCOR Accident Consequence Code System (MACCS) code to assess potential consequences of severe nuclear reactor accidents involving release of radioactive material into the atmosphere. The code models atmospheric transport and deposition, emergency response actions, exposure pathways, health effects, and economic costs.

A primary mission of NOAA is to provide meteorological and other environmental forecasts. The provision of forecasts has national-level significance and is designated as a Primary

Mission Essential Function (PMEF) for the Department of Commerce. This PMEF tasks NOAA with providing the Nation with environmental forecasts, warnings, data, and expertise critical to public safety, disaster preparedness, all-hazards response and recovery, the national transportation system, safe navigation, and the protection of the Nation's critical infrastructure and natural resources. NOAA's Office of Oceanic and Atmospheric Research conducts research and development to improve NOAA's ability to satisfy that PMEF. This includes work at the Air Resources Laboratory (ARL) on tools to predict atmospheric transport and dispersion (ATD) of pollutants.

A research area of interest exists in common to both agencies related to ATD models for radiological contaminants. Atmospheric transport and dispersion are key components of MACCS. NOAA/ARL develops and maintains the HYbrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model to explain how, when, and where materials are atmospherically transported, dispersed, and deposited. MACCS has traditionally used a Gaussian plume segment model, and the NRC is now integrating HYSPLIT as an alternative ATD model for use in MACCS.

## **V. PRINCIPLES OF COOPERATION**

### **1) Responsibilities of the Parties**

- a) This MOU will be implemented through the NRC's RES on behalf of the NRC and through NOAA/ARL on behalf of NOAA.
- b) NOAA/ARL will provide the HYSPLIT code, documentation, and technical support to facilitate RES integration of HYSPLIT into MACCS as an alternate ATD model.
- c) RES will continue to support integration of HYSPLIT into MACCS as an alternate ATD model. To facilitate the integration of HYSPLIT into MACCS, RES will provide expertise in radiological source term modeling and health physics. RES will provide feedback to ARL on HYSPLIT's radiological capabilities.
- d) RES and NOAA/ARL will mutually coordinate, review, and manage activities to which this MOU applies. Any work required by contractors of either party will be directed by agency Contracting Officer Representatives as coordinated by the technical points of contact identified in Section V.1.f.
- e) Senior Management Contacts – The NRC's Contact will be the Director of the Division of Systems Analysis in the Office of Nuclear Regulatory Research, and NOAA/ARL's contact will be the ARL Director. These contacts have identified their respective technical contacts below to serve as the interfaces for routine interactions between RES and NOAA/ARL.
- f) Technical points of contact:

NOAA: Ariel Stein  
NCWCP, R/ARL  
5830 University Research Court  
College Park, MD 20740-3818, USA  
Ariel.Stein@noaa.gov 301-683-1379

NRC: Tamara Bloomer, Chief  
Accident Analysis Branch  
Division of System Analysis  
Office of Nuclear Regulatory Research  
Mail Stop TWFN 10B-58, 11545 Rockville Pike  
Rockville, MD 20852-2738  
Tamara.Bloomer@nrc.gov 301-415-1785

## 2) Cooperative Research Programs

- a) Meetings: NOAA/ARL's staff and NRC RES Staff will confer as needed or at least annually to exchange information related to atmospheric models of radiological contaminants.
- b) Data Review: Both parties have the right to review data or information associated with the adaptation of HYSPLIT as an alternate MACCS ATD. Any data exchanged are subject to information control and release procedures. Classification will apply.
- c) Outside Research: Either Party may, at its own expense, conduct research beyond the scope of the cooperative agreement. The results of this additional research, if shared with the other party, will be subject to the same controls as described in Section VI.

## VI. COOPERATIVE PROGRAM ACTIVITIES

Data Sharing – All non-proprietary data produced by collaboration will be shared between NOAA/ARL and the NRC consistent with each party's obligations. Data produced or used under the cooperative programs or supplied to support the conduct of the research will be handled in accordance with NRC and NOAA statutes, regulations, policies, procedures, and Federal Government requirements (e.g., Freedom of Information Act [FOIA] and National Archives and Records Administration requirements).

Data Publication – The NRC and NOAA/ARL may publish non-predecisional or non-proprietary data developed from work conducted under this cooperative research in reports, journals, or conference proceedings with written agreement from the other party. The technical points of contact will identify any data subject to this section.

Code Distribution – The NRC will follow its procedures to distribute the MACCS code to domestic and international parties for use and will continue to distribute the MACCS code following integration of the alternate HYSPLIT model into MACCS. NOAA will follow its procedures for the distribution of HYSPLIT.

## VII. FUNDING AND AUTHORIZATIONS

This MOU is not a funds obligation document. All activities pursuant to this MOU are the responsibility of each party and subject to the availability of each party's funds and budget priorities.

This MOU is not legally enforceable and will not be construed to create any legal obligation on the part of either party. This MOU does not provide a private right of action for or by any person or entity.

This MOU in no way restricts either of the Parties from participating in any activity with other public or private agencies, organizations, or individuals.

**VIII. AGREEMENT**

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Raymond Furstenau  
Director of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission

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David Holst, Chief Financial/  
Administrative Officer  
Office of Oceanic &  
Atmospheric Research National  
Oceanic and Atmospheric  
Administration

4/29/2020

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Date