INFORMATION SHEET FOR THE FY2019 NOAA/OAR/OWAQ *HIGH IMPACT WEATHER TESTBED* COMPETITION

NOAA collaborates with the external science community on cooperative research activities and provides financial support for research-to-operations (R2O) transition projects through the USWRP managed by OAR's Office of Weather and Air Quality (OWAQ) to accelerate their transition to operations and to enhance the public benefits derived from these research activities. OWAQ sponsors a portfolio of USWRP-supported high impact weather testbeds, including the Joint Hurricane Testbed (JHT), the Hazardous Weather Testbed (HWT), and the Hydrometeorology Testbed (HMT), through coordination with each of these testbed's managers and staff and through funding of R2O projects to be demonstrated, tested, and evaluated within their testbeds. These testbeds are jointly managed by both NWS and OAR staff. The USWRP testbed program supports advanced projects seeking to transition to operations where testbed interactions and demonstrations in a quasi-operational environment are key aspects. To get a sense for the types of current and past JHT, HWT, and HMT testbed projects funded by OWAQ through these USWRP testbeds, please go to http://owaq.noaa.gov/GrantsandProjects.aspx. and sort by the appropriate testbed theme.

NOAA's testbed objective is to foster a two-way exchange of information between the research and operational communities, including research-to-operations (R2O) transitions and operations-to-research (O2R) communications, that are enabled through organized experimentation in a simulated operational NWS environment. This will involve close collaboration, facilitated by the testbed staff, between funded researchers and operational center forecasters. For example, NOAA operational forecasters may actually run or utilize output from experimental techniques during their operational shifts or during episodic experimental periods, and they may then provide direct feedback to the researchers for possible improvement.

Science projects focusing on high impact weather that are relatively mature and not in the early or middle stages of development or proof-of-concept are appropriate for these testbeds and this funding opportunity. This includes those projects that propose practical outcomes that could be transitioned operationally to NOAA in the next 3-5 years. Given this expectation, projects selected for funding from this announcement should be ready or nearly ready to test and demonstrate their new capabilities in one of the testbeds during the project period. In the parlance of NOAA and other federal agencies, this requirement translates to the higher "technology readiness levels". Readiness levels (RLs), as adopted by NOAA per NAO 216-105B, have been described in the associated NOFO for this competition and announcement in Section I.A "Program Objectives". Please refer to that section for additional information.

Projects that are most appropriate for the three testbeds generally fall in or near the "demonstration" level of technical maturity, i.e., readiness levels of about 5 through 8 during the duration of the project. Transitioning a mature demonstrated capability from level 8 to 9 is beyond the scope of the testbeds and this funding opportunity but could occur after the projects end if they are successful and approved for operational implementation by the NWS.

Testing in the testbed facilities during the project performance period and working with the associated testbed staff to plan this testing and demonstration is a key required component of the project. Applicants are encouraged to review each testbeds' web site for background on the testbed facility and its concept of operations, which varies from testbed to testbed. Given the relatively short grant project period, this necessarily requires mid to high readiness levels at project start-up. Ideally, the transition of a funded project from, say, readiness level 5 or 6 at start-up to 8 at completion is OAR's driving goal in funding these testbed projects. As a result, projects in early stages of development or proof-of-concept that are not ready or nearly ready for testbed demonstration during the project period (those with start-up readiness levels of 4 or below) are not the focus of this testbed funding opportunity.

Upon NOAA's selection of a proposal for funding, the testbed staff will coordinate with the PIs regarding project administration and planning, experimental schedules, and engagement with its test facility. They will provide access to the NOAA-funded testbed facility and infrastructure (staff, computer hardware, software, and data) to facilitate the testing and evaluation in an environment that closely matches that of the operational entity. In preparation for the testing and evaluation, the PI, testbed staff and leadership, and operational forecasters (if appropriate) will collaboratively develop a Test Plan within six months of the project start date describing what will be tested, what the schedule milestones are, and how each group will be involved in the evaluation process, including development and review of documentation, training, instructions, and success metrics. Guidance will be provided. PIs must be involved directly in the evaluation as well as the earlier process to make any necessary system adjustments when preparing their project for testing in the testbed. Performance progress will be monitored throughout the project by the testbed staff and OWAQ through communications and periodic progress reports by the PIs. Completed projects satisfying NWS metrics for success and operational constraints (e.g., added value, ease of use, computational efficiency, etc.) may be selected later for operational implementation by appropriate NWS operational offices.

In addition to Test Plans, PIs will also collaboratively develop Research-to-Operations Transition Plans in coordination with designated NWS staff within six months of the project start date. This plan will outline how the project outcomes are envisioned to be transitioned to NWS operations. NOAA guidance will be provided.

The science focus of a specific proposed project will determine which testbed is most appropriate for a given proposal. The overarching themes of each testbed are described below.

a) Joint Hurricane Testbed

The JHT mission is to facilitate the rapid and smooth transfer of new technology, research results, and observational advances of agencies, the academic community, and other groups into improved tropical cyclone analysis and prediction at operational centers. It is based at the NWS National Hurricane Center (NHC) in Miami, Florida. The operational forecast centers where JHT projects could be tested and evaluated include the NHC, the NOAA Central Pacific Hurricane Center (CPHC), and the Joint Typhoon Warning Center (JTWC) operated by the United States Navy and Air Force. For additional details about JHT, past funded projects, science priorities, business practices, and measures of success, go to http://www.nhc.noaa.gov/jht/.

b) Hazardous Weather Testbed

The HWT is a facility jointly-managed by the OAR National Severe Storms Laboratory (NSSL), the NWS Storm Prediction Center (SPC), and the NWS Norman Weather Forecast Office, all located at the National Weather Center in Norman, Oklahoma. The HWT serves as a critical step in the process of bringing new hazardous weather science to NWS operations by examining ways to increase the lead-time and accuracy for weather and water warnings and forecasts for severe convective weather. The HWT consists of two primary programs normally conducted in an annual Spring Experiment. The Experimental Forecast Program (EFP) and the Experimental Warning Program (EWP) are focused on testing and evaluating new applications, techniques, and products to support NWS SPC and WFO severe convective weather operations, respectively. Projects selected for funding may be part of the Spring Experiment or at another more suitable time. For additional details about HWT, go to http://hwt.nssl.noaa.gov/.

c) Hydrometeorology Testbed

HMT facilitates engagement with the scientific community through the development, testing, and transition to operations of new hydrometeorology capabilities focusing on precipitation and land surface processes associated with high-impact weather. HMT is managed by OAR Earth System Research Laboratory's Physical Science Division in Boulder, Colorado and NWS Weather Prediction Center (WPC) in College Park, Maryland. HMT also partners with the NWS Weather Forecast Offices and River Forecast Centers and the National Water Center. HMT's annual Winter Weather Experiments and the summer Flash Flood and Intense Rainfall Experiments at WPC's facility provide excellent opportunities to test and evaluate new data, analysis techniques, models, and applications. The testbed has these major activity areas: quantitative precipitation estimation, quantitative precipitation forecasting (rain, snow, ice), snow information, hydrologic and surface processes, probabilistic and ensemble forecasting techniques, short to medium range forecasting, and decision support tools. For additional details about HMT, go to http://hmt.noaa.gov/.