FY21Metrics	Description	Current Year Reporting												Point of Contact
		FY-21 Q1			FY-21 Q2			FY-21 Q3			FY-21 Q4			
		Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual		
Annual number of NOAA peer reviewed publications related to environmental understanding and prediction	The annual number of peer reviewed publications is an indicator of productivity and relevance and is tracked using on-line resources. Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community.	8	10		7	7		7	7		25	50		Ariel Stein
R2A Index: Annual number of OAR R&D products transitioned to a new stage(s) (development, demonstration, or application).	The measure captures the count of significant and discrete OAR research and development products that have transitioned to development, demonstration, or an application. Products include transitions occurring within OAR and applying group(s) outside of OAR. This includes research, development, and demonstration performed and supported by OAR as well as utilization of OAR R&D products by external parties	0	0		0	0		2	2		5	5		Ariel Stein
Cumulative number of high-quality climate observations in Alaska for the long-term U.S. Climate Reference Network program	Climate change in the Arctic is an especially important environmental issue as changes in temperature and precipitation patterns are critical to a range of issues across Alaska. For example, the melting of permafrost is having major implications on human infrastructure, and the impacts on ecosystems are having major effects on industries, such as fishing and tourism. The U.S. Climate Reference Network (USCRN) is a systematic and sustained network of climate monitoring stations across the U.S. As of the end of FY21, the ATDD has installed 23 USCRN stations in Alaska. The long-term goal for Alaska is to have a total of 29-30 stations by the end of FY 26.										8760	8760		Howard Diamond
Usage of USCRN Research/Science and Associated Data	Monitor climate literature for the use of USCRN observations and data, as well as the usage and receipt of USCRN Data for community use; demonstrate the breadth of use and applicability of USCRN data across NOAA research as well as use by external partners, customers and public										670 new citations (H-Index of 30)/20,000 new visitors/10.7TB of data downloaded	823 new citations (H-index of 32)/20,000 new visitors/10.7 TB of data downloaded		Howard Diamond
Cumulative number of HYSPLIT community usage (registered users/trained people / references to HYSPLIT BAMS paper) each year, in order to serve federal, state and local air quality agencies, emergency managers, and international public health organizations.	HYSPLIT is one of the most widely used Lagrangian dispersion models in the atmospheric sciences community. ARL will expand its user base by training new users, and distributing and supporting the HYSPLIT modeling system for PC, Mac and Linux platforms. In addition, ARL will continue maintaining public access to HYSPLIT trajectory and dispersion simulations and relevant meteorological data through the web-based Real-time Environmental Applications and Display sYstem (READY).										400	1172		Ariel Stein
Cumulative number of completed field and modeling studies of nitrogen and carbon exchange between the air and land to improve understanding of atmospheric chemistry	Measurement and modeling studies will be conducted to improve understanding of nitrogen and carbon chemistry and deposition in marine and terrestrial ecosystems. An overabundance of nitrogen results in harmful environmental conditions, such as pollution in coastal waters and changes in soil and plant nutrients, and carbon exchange affects Earth's weather and climate.						Field campaigns for atmospheric chemistry have been drastically impacted by COVID-19 and travel restrictions. In some cases, lab modelling activities are attempting to replicate the work. Anticipate resumption of field activities when travel restrictions end.				5	5		LaToya Myles
Cumulative number of data and modeling products requested by the Department of Energy at the Idaho National Laboratory and the Nevada National Security Site in support of research studies, field experiments, and emergency response exercises and drills.	NOAA/ARL maintains a long-standing collaborative partnership with the Department of Energy (DOE) and its semi-autonomous agency the National Nuclear Security Administration (NNSA). This partnership allows ARL to provide comprehensive site meteorological programs which include the operation of meteorological observation networks (called mesonets) at the Idaho National Laboratory and the Nevada National Security Site. ARL provides DOE with data and modeling products derived from the mesonet observations, including annual assessments of atmospheric dispersion, climatological summaries, and support for emergency response exercises. *(Est. average 4/qtr., total 16/yr.; cumulative total)*	12			11			10			65	88		Walter Schalk

Milestone	What performance measure does this contribute to, if any?	Current Year Reporting											Point of Contact
		FY-21 Q1			FY-21 Q2			FY-21 Q3			FY-21 Q4			
		Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	
Completion of a field study to measure atmospheric nitrogen and carbon in a marine or terrestrial ecosystem.	Cumulative number of completed field and modeling studies of nitrogen and carbon exchange between the air and land to improve understanding of atmospheric chemistry										X	X		LaToya Myles
Complete HYSPLIT workshop training.	Cumulative number of HYSPLIT community usage (registered users/trained people / references to HYSPLIT BAMS paper) each year, in order to serve federal, state and local air quality agencies, emergency managers, and international public health organizations.										X	X		Ariel Stein
Complete analysis of calendar year 2020 mesonet observations for use in environmental compliance activities at FRD & SORD	Each year, the DOE Idaho National Laboratory (INL) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Field Research Division performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the INL. These meteorological statistics are used in the NESHAP compliance activities. The statistics for calendar year 2020 will be generated in the second quarter of fiscal year 2021. Each year, the NNSA Nevada National Security Site (NNSS) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Special Operations and Research Division (SORD) performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the Environmental Group of the NNSS Management and Operating contractor. These meteorological statistics are used in the NESHAP compliance activities. In the second quarter of fiscal year 2021, the statistics for calendar year 2020 will be generated.				X	X								Walter Schalk
Complete update to Climatology section of Annual NNSS Environmental Report with 2020 mesonet observations.	The ARL Special Operations and Research Division (SORD) operates a meteorological tower network (mesonet) covering the Nevada National Security Site (NNSS) which is in southern end of the Great Basin in southern Nevada. Meteorological measurements have been taken on the NNSS in various forms since the mid-1950s. The current mesonet began to take form in the late 1970s and became established in the early 1980s. Annually, SORD updates the NNSS Environment Report with meteorological data from the previous year. In the second quarter of fiscal year 2021, SORD will be updating the Climatology section of the Annual Report with mesonet data from 2020.				X		Due to SORD IT issues and access to the data file server, this project was not completed in FY21 Q2. However, it is expected to be completed early in Q3.	X	X					Walter Schalk
Complete INL dispersion modeling for calendar year 2020 using HYSPLIT.	The DOE Idaho National Laboratory annually publishes a site environmental report. This report includes estimates of radiological doses to the public resulting from routine atmospheric emissions from the laboratory. The dose estimates are based on annual runs of the NOAA HYSPLIT model performed by the Field Research Division. Meteorological input to HYSPLIT comes from the mesonet operated by the division. The HYSPLIT runs for calendar year 2020 will be completed in the third quarter of fiscal year 2021 to meet reporting deadlines. In addition, FRD prepares a written description of mesonet observations coinciding with the environmental report year.						This task is 50% complete. The FRD portion has been completed. But due to SORD IT issues and access to the data file server, this project was not completed in FY21 Q2. However, it is expected to be completed early in Q3.	X	X					Walter Schalk

Performance Measure	Description	Mapping OAR Strategic Goal	Past Year Actuals		Current Year Reporting									Future Annual Targets					Point of Contact
					FY-20 Q1		FY-20 Q2		FY-20 Q3		FY-20 Q4								
			FY-18	FY-19	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	FY-21	FY-22	FY-23	FY-24	FY-25	
Annual number of NOAA peer reviewed publications related to environmental understanding and prediction	The annual number of peer reviewed publications is an indicator of productivity and relevance and is tracked using on-line resources. Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community.	Detect Changes in the Ocean and Atmosphere	25	25		7		13		10	25	35		25	25	25	25	25	Ariel Stein
R2A Index: Annual number of OAR R&D products transitioned to a new stage(s) (development, demonstration, or application).	The measure captures the count of significant and discrete OAR research and development products that have transitioned to development, demonstration, or an application. Products include transitions occurring within OAR and applying group(s) outside of OAR. This includes research, development, and demonstration performed and supported by OAR as well as utilization of OAR R&D products by external parties	Detect Changes in the Ocean and Atmosphere		4							4	4							Ariel Stein
Expand coverage of high-quality climate observations in Alaska for the long-term U.S. Climate Reference Network program: Establish 1 new USCRN station in Alaska	Climate change in the Arctic is an especially important environmental issue as changes in temperature and precipitation patterns are critical to a range of issues across Alaska. For example, the melting of permafrost is having major implications on human infrastructure, and the impacts on ecosystems are having major effects on industries, such as fishing and tourism. The U.S. Climate Reference Network (USCRN) is a systematic and sustained network of climate monitoring stations across the U.S. As of the end of FY19, the ATDD has installed 23 USCRN stations in Alaska. The long-term goal for Alaska is to have a total of 29-30 stations.	Detect Changes in the Ocean and Atmosphere		1							1	0	Due to COVID-19, this milestone was not accomplished as April - June is the period required for Alaska installation preparation. With no access to our facility, this preparation was not possible. Furthermore, once we are able to get operational again we face a backlog of maintenance visits to existing USCRN sites that take precedence over new installations.						Howard Diamond
Cumulative number of HYSPLIT community usage (registered users/trained people / references to HYSPLIT BAMS paper) each year, in order to serve federal, state and local air quality agencies, emergency managers, and international public health organizations.	HYSPLIT is one of the most widely used Lagrangian dispersion models in the atmospheric sciences community. ARL will expand its user base by training new users, and distributing and supporting the HYSPLIT modeling system for PC, Mac and Linux platforms. In addition, ARL will continue maintaining public access to HYSPLIT trajectory and dispersion simulations and relevant meteorological data through the web-based Real-time Environmental Applications and Display sYstem (READY).	Detect Changes in the Ocean and Atmosphere	100	792							300	1,113		400	500	600	700	800	Ariel Stein
Cumulative number of completed field and modeling studies of nitrogen and carbon exchange between the air and land to improve understanding of atmospheric chemistry	Measurement and modeling studies will be conducted to improve understanding of nitrogen and carbon chemistry and deposition in marine and terrestrial ecosystems. An overabundance of nitrogen results in harmful environmental conditions, such as pollution in coastal waters and changes in soil and plant nutrients, and carbon exchange affects Earth's weather and climate.	Detect Changes in the Ocean and Atmosphere	3								4	4		5	5	6	6	7	LaToya Myles
Cumulative number of data and modeling products requested by the Department of Energy at the Idaho National Laboratory and the Nevada National Security Site in support of research studies, field experiments, and emergency response exercises and drills.	NOAA/ARL maintains a long-standing collaborative partnership with the Department of Energy (DOE) and its semi-autonomous agency the National Nuclear Security Administration (NNSA). This partnership allows ARL to provide comprehensive site meteorological programs which include the operation of meteorological observation networks (called mesonets) at the Idaho National Laboratory and the Nevada National Security Site. ARL provides DOE with data and modeling products derived from the mesonet observations, including annual assessments of atmospheric dispersion, climatological summaries, and support for emergency response exercises. *(Est. average 4/qtr., total 16/yr.)*	Detect Changes in the Ocean and Atmosphere	17	34							49	50		65	81	97	113	129	Walter Schalk

Milestone	What performance measure does this contribute to, if any?	Current Year Reporting									Point of Contact
		FY-20 Q1		FY-20 Q2		FY-20 Q3		FY-20 Q4			
		Target	Actual	Target	Actual	Target	Actual	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	
Completion of a field study to measure atmospheric nitrogen and carbon in a marine or terrestrial ecosystem.								X	X		LaToya Myles
Complete HYSPLIT workshop training.								X	X		Ariel Stein
Complete analysis of calendar year 2019 mesonet observations for use in environmental compliance activities at FRD & SORD	Each year, the DOE Idaho National Laboratory (INL) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Field Research Division performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the INL. These meteorological statistics are used in the NESHAP compliance activities. The statistics for calendar year 2019 will be generated in the second quarter of fiscal year 2020. Each year, the NNSA Nevada National Security Site (NNSS) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Special Operations and Research Division (SORD) performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the Environmental Group of the NNSS Management and Operating contractor. These meteorological statistics are used in the NESHAP compliance activities. In the second quarter of fiscal year 2020, the statistics for calendar year 2019 will be generated.			X	X						Walter Schalk
Complete update to Climatology section of Annual NNSS Environmental Report with 2019 mesonet observations.	The ARL Special Operations and Research Division (SORD) operates a meteorological tower network (mesonet) covering the Nevada National Security Site (NNSS) which is in southern end of the Great Basin in southern Nevada. Meteorological measurements have been taken on the NNSS in various forms since the mid-1950s. The current mesonet began to take form in the late 1970s and became established in the early 1980s. Annually, SORD updates the NNSS Environment Report with meteorological data from the previous year. In the second quarter of fiscal year 2020, SORD will be updating the Climatology section of the Annual Report with mesonet data from 2019.			X	Delayed to Q3		X				Walter Schalk
Complete INL dispersion modeling for calendar year 2019 using HYSPLIT.	The DOE Idaho National Laboratory annually publishes a site environmental report. This report includes estimates of radiological doses to the public resulting from routine atmospheric emissions from the laboratory. The dose estimates are based on annual runs of the NOAA HYSPLIT model performed by the Field Research Division. Meteorological input to HYSPLIT comes from the mesonet operated by the division. The HYSPLIT runs for calendar year 2019 will be completed in the third quarter of fiscal year 2020 to meet reporting deadlines. In addition, FRD prepares a written description of mesonet observations coinciding with the environmental report year.					X	X				Walter Schalk
Complete 4 emergency response exercises at the INL	The DOE Idaho National Laboratory maintains an Emergency Operations Center (EOC) in Idaho Falls for accidents and other hazardous events. Staff from the ARL Field Research Division occupy a meteorologist position at the center. The EOC has four teams that each participate in two exercises per fiscal year. FRD participation is expected to average one per quarter, for an annual total of four.							X	X		Walter Schalk
Complete a minimum of 4 emergency response exercises at the NNSS	The NNSS Management and Operating contractor maintains an Emergency Response Organization (ERO) for the Nevada National Security Site (NNSS) for hazardous material events and other hazardous, including weather, events. Staff from the ARL Special Operations and Research Division (SORD) have been trained to conduct dispersion calculations in the Consequence Assessment Team (CAT) function of the Emergency Operations Center (EOC) for the NNSS. Field exercises are conducted quarterly and Drills are conducted monthly. In fiscal year 2020, SORD will participate in the quarterly field exercises as well as 2 monthly drills.							X	X		Walter Schalk
Update 1/2 of the INL Mesonet by the end of FY20 and the other 1/2 by the end of FY21 (data loggers and temperature sensors).	Updated equipment to keep ensure peak performance from the weather stations							X		88% complete on data loggers; 25% on Temp, only replaced as they fail	Walter Schalk
Emissions update delivered to NCEP - Energy Generation Plans	Support to the National Air Quality Forecasting Capability (NAQFC)	X	X			X	X				Pius Lee
Submit calendar-specific changes expected to impact air quality (submittal to NCEP)	Support to the National Air Quality Forecasting Capability (NAQFC)	X	X								Pius Lee
Deliver preliminary emissions to GSD for testing of SARFV3-CMAQ (Hurricane Supplemental WF-1) and FV3CAM (HurricaneSupplemental WF-2)	Support of Hurricane Supplemental projects WF-1 and WF-2					X	X				Rick Saylor

Performance Measure or Milestone	Description	Performance Targets and Actuals												Primary Responsibility
		FY-19 Q1			FY-19 Q2			FY-19 Q3			FY-19 Q4			
		Target	Actual	Why was the target missed? When will the	Target	Actual	Why was the target missed? When will the	Target	Actual	Why was the target missed? When will the	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Point of Contact
		TRUE	TRUE	When	TRUE	TRUE	When	TRUE	TRUE	When	TRUE	FALSE		
Completion of a field study to measure atmospheric nitrogen and carbon in a marine or terrestrial ecosystem.	Limited data and information exists about the relationship between nitrogen and carbon exchange and resulting environmental effects (changes in vegetation, soil health, and water quality). Concentrations and fluxes of oxidized and reduced nitrogen, carbon dioxide, and methane will be measured using integrated and continuous analytical techniques.	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	FALSE		LaToya Myles
Complete a new assessment of atmospheric mercury deposition to the Great Lakes, for the year 2011, using the HYSPLIT-Hg model.	Previous assessments of mercury deposition to the Great Lakes have been conducted for the years 1996 and 2005. Hg emissions in North America and elsewhere changed dramatically between 1996 and 2005 and between 2005 and 2011. Therefore, an analysis reflecting these changed emissions will provide important new information regarding changes in the relative contributions of different sources and source regions to Great Lakes mercury loading. The modeling will be evaluated by comparison of model results with ambient measurements, including the measurements at the 3 long-term Hg measurement sites operated by the Air Resources Laboratory -- Beltsville (MD), Grand Bay (MS), and Mauna Loa (HI). Model evaluation under the different meteorological and emissions conditions present in 2011 -- as compared to 1996 and 2005 -- will be particularly valuable, as it will provide an independent test of model performance.	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		FALSE	FALSE	Report completed 12/17 (milestone met FY18). Complete 2011 assessment of mercury deposition to the Great Lakes. Additional milestone for FY19-Q4 was inadvertent; however, since the report substantial work has been put forth on model evaluation, comparing model output with measurements at ARL's Beltsville monitoring site. Results of this work were presented at the 14th International Conference on Mercury as a Global Pollutant, Sept. 2019, in Krakow, Poland.	Mark Cohen
Complete HYSPLIT workshop training.		FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		Ariel Stein
FY19: Establish 1 new USCRN station in Alaska	Weather permitting, ATDD engineers will install one new climate observing station at a National Wildlife Refuge in Alaska (exact site location TBD). The goal of the USCRN in Alaska is to characterize the long-term climate trends across the state by taking high-quality 5-minute automated observations of air temperature, precipitation, solar radiation, and eventually soil and permafrost temperature and moisture. Through the end of FY 2018, a total of 22 USCRN stations have been installed across Alaska, with an ultimate goal of 29 stations by the end of FY 2022.	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		Howard Diamond
Complete analysis of calendar year 2018 mesonet observations for use in environmental compliance activities at FRD & SORD	Each year, the DOE Idaho National Laboratory (INL) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Field Research Division performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the INL. These meteorological statistics are used in the NESHAP compliance activities. The statistics for calendar year 2018 will be generated in the second quarter of fiscal year 2019. Each year, the NNSA Nevada National Security Site (NNSS) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Special Operations and Research Division (SORD) performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the Environmental Group of the NNSS Management and Operating contractor. These meteorological statistics are used in the NESHAP compliance activities. In the second quarter of fiscal year 2019, the statistics for calendar year 2018 will be generated.	FALSE	FALSE		TRUE	TRUE		FALSE	FALSE		FALSE	FALSE		Walter Schalk
Complete update to Climatology section of Annual NNSS Environmental Report with 2018 mesonet observations.	The ARL Special Operations and Research Division (SORD) operates a meteorological tower network (mesonet) covering the Nevada National Security Site (NNSS) which is in southern end of the Great Basin in southern Nevada. Meteorological measurements have been taken on the NNSS in various forms since the mid-1950s. The current mesonet began to take form in the late 1970s and became established in the early 1980s. Annually, SORD updates the NNSS Environment Report with meteorological data from the previous year. In the second quarter of fiscal year 2019, SORD will be updating the Climatology section of the Annual Report with mesonet data from 2018.	FALSE	FALSE		TRUE	TRUE		FALSE	FALSE		FALSE	FALSE		Walter Schalk
Complete INL dispersion modeling for calendar year 2018 using HYSPLIT.	The DOE Idaho National Laboratory annually publishes a site environmental report. This report includes estimates of radiological doses to the public resulting from routine atmospheric emissions from the laboratory. The dose estimates are based on annual runs of the NOAA HYSPLIT model performed by the Field Research Division. Meteorological input to HYSPLIT comes from the mesonet operated by the division. The HYSPLIT runs for calendar year 2018 will be completed in the third quarter of fiscal year 2019 to meet reporting deadlines. In addition, FRD prepares a written description of mesonet observations coinciding with the environmental report year.	FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		FALSE	FALSE		Walter Schalk
Complete 8 emergency response exercises at the INL	The DOE Idaho National Laboratory maintains an Emergency Operations Center (EOC) in Idaho Falls for accidents and other hazardous events. Staff from the ARL Field Research Division occupy a meteorologist position at the center. The EOC has four teams that each participate in two exercises per fiscal year. These eight exercises normally occur in the last three quarters of the fiscal year.	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		Walter Schalk
Complete a minimum of 4 emergency response exercises at the NNSS	The NNSS Management and Operating contractor maintains an Emergency Response Organization (ERO) for the Nevada National Security Site (NNSS) for hazardous material events and other hazardous, including weather, events. Staff from the ARL Special Operations and Research Division (SORD) have been trained to conduct dispersion calculations in the Consequence Assessment Team (CAT) function of the Emergency Operations Center (EOC) for the NNSS. Field exercises are conducted quarterly and Drills are conducted monthly. In fiscal year 2019, SORD will participate in the quarterly field exercises as well as 2 monthly drills.	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		Walter Schalk
Number of ARL expert peer-reviewed publications	The annual number of peer reviewed publications is an indicator of productivity and relevance and is tracked using on-line resources. Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community.	6	6			9			8		25	33		Ariel Stein

Metric	Description													Comments	Lead
Expand coverage of high-quality climate observations in Alaska for the long-term U.S. Climate Reference Network program.	Climate change in the Arctic is an especially important environmental issue as changes in temperature and precipitation patterns are critical to a range of issues across Alaska. For example, the melting of permafrost is having major implications on human infrastructure, and the impacts on ecosystems are having major effects on industries, such as fishing and tourism. The U.S. Climate Reference Network (USCRN) is a systematic and sustained network of climate monitoring stations across the U.S. As of the end of FY18, the ATDD has installed 22 USCRN stations in Alaska. The long-term goal for Alaska is to have a total of 29 stations.										TRUE	TRUE			Bruce Baker
Cumulative number of HYSPLIT community usage (registered users/trained people / references to HYSPLIT BAMS paper) each year, in order to serve federal, state and local air quality agencies, emergency managers, and international public health organizations.	HYSPLIT is one of the most widely used Lagrangian dispersion models in the atmospheric sciences community. ARL will expand its user base by training new users, and distributing and supporting the HYSPLIT modeling system for PC, Mac and Linux platforms. In addition, ARL will continue maintaining public access to HYSPLIT trajectory and dispersion simulations and relevant meteorological data through the web-based Real-time Environmental Applications and Display sYstem (READY).	0	137		0			0			200	792			Ariel Stein/Glenn Rolph
Increase the cumulative number of global assessments of atmospheric mercury for regions of interest that can be used to make informed decisions on mercury emissions.	Assessments of global atmospheric mercury source-receptor relationships provide environmental policy-makers and managers with an improved understanding of the relative importance of different source types and source regions in contributing to mercury contamination in a given region. Mercury is a potent neurotoxin, particularly damaging to the development of fetuses, infants and young children. Human exposure to methylated mercury, the most toxic form, is largely through eating contaminated fish. Nearly every U.S. state warns residents to restrict their consumption of certain fish due to mercury contamination. Mercury also appears to be accumulating at potentially dangerous levels in terrestrial wildlife that do not eat fish.	0	0		0	0		0			4	4		Measure of incremental increase to 4 was met in FY18 with a report describing a complete 2011 assessment of mercury deposition to the Great Lakes. Redundant measure increase for FY19-Q4 to 4 was inadvertent; however, since the report substantial work has been put forth on model evaluation, comparing model output with measurements at ARL's Beltsville monitoring site. Results of this work were presented at the 14th International Conference on Mercury as a Global Pollutant, Sept. 2019, in Krakow, Poland. This further work is being undertaken to reduce uncertainties in future assessments.	Mark Cohen
Cumulative number of completed field and modeling studies of nitrogen and carbon exchange between the air and land to improve understanding of atmospheric chemistry	Measurement and modeling studies will be conducted to improve understanding of nitrogen and carbon chemistry and deposition in marine and terrestrial ecosystems. An overabundance of nitrogen results in harmful environmental conditions, such as pollution in coastal waters and changes in soil and plant nutrients, and carbon exchange affects Earth's weather and climate.	0	0		0	0		0			4				LaToya Myles/Rick Saylor
Cumulative number of data and modeling products requested by the Department of Energy at the Idaho National Laboratory and the Nevada National Security Site in support of research studies, field experiments, and emergency response exercises and drills.	NOAA/ARL maintains a long-standing collaborative partnership with the Department of Energy (DOE) and its semi-autonomous agency the National Nuclear Security Administration (NNSA). This partnership allows ARL to provide comprehensive site meteorological programs which include the operation of meteorological observation networks (called mesonets) at the Idaho National Laboratory and the Nevada National Security Site. ARL provides DOE with data and modeling products derived from the mesonet observations, including annual assessments of atmospheric dispersion, climatological summaries, and support for emergency response exercises.	0	12		0	9		0	8		33	34			Walter Schalk
R2A Index	Annual number of OAR R&D products transitioned to a new stage(s) (development, demonstration, or application).	2	2		2	1		1	2		3	4			

Identifier (Name of Parent Project)	Brief Description	FY-19 Targets & Actuals												Date Completed Fiscal year and quarter the project will transition to operations / applications	OAR Point of Contact	OAR Responsible SES	OAR Contributing Partners	Customer	A clear statement of what condition must be met for the product advancement to have been made. This should be sufficient to allow a	Type of R2X		
		FY-19 Q1			FY-19 Q2			FY-19 Q3			FY-19 Q4									Operations	Commercial	Other
		Target TRUE	Actual TRUE	Why was the target missed? When will the target be completed?	Target TRUE	Actual TRUE	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target TRUE	Actual TRUE	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target TRUE	Actual TRUE	Why was the target missed? When will the target be completed? What is the risk of missing the target?									
HYSPLIT operations at the NWS	Developing and testing code to use NCEP's FV3 (global) model output on the WCOSS for HYSPLIT forecasts	FALSE	FALSE		TRUE	Delayed	NWS delayed the implementation of FV3	FALSE	TRUE		FALSE	FALSE			Barbara Stunder	N/A		NWS		TRUE	FALSE	FALSE
HYSPLIT operations at the NWS	HYSPLIT driven by HRRR and GFS 1/4 degree	TRUE	TRUE		FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		ARL submitted to NCEP by the target date. Expected transition to operations in FY19 Q2.	Barbara Stunder	N/A		NWS		TRUE	FALSE	FALSE
HYSPLT ensemble products	Developing and testing code to use NCEP's ensemble meteorological model output on the WCOSS for HYSPLIT forecasts	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE			Barbara Stunder	N/A		NWS		TRUE	FALSE	FALSE
Support to the WMO for the Regional Specialized Meteorological Center program	Develop and thoroughly test the Regional Specialized Meteorological Center (RSMC) ENSEMBLE nuclear transport and dispersion predictions using the transfer coefficient matrix (TCM) approach.	TRUE	TRUE		FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		ARL submitted to NWS by the target date. Expected transition to operations is TBD - NWS must schedule implementation.	Glenn Rolph	N/A		NWS, WMO		FALSE	FALSE	TRUE
HYSPLIT READY web site	Install WRF-HYSPLIT inline on READY web server and test manually. Develop web scripts to allow users to enter input variables to run WRF. Link web scripts with WRF simulation scripts.				TRUE	TRUE									Glenn Rolph	N/A		NOAA, DOD, DOE, EPA, academia, national and international research community				TRUE
HYSPLIT READY web site	Test READY web scripts to run the WRF-HYSPLIT inline model. Link WRF meteorological data to READY HYSPLIT scripts and test.	FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		FALSE	FALSE			Glenn Rolph	N/A		NOAA, DOD, DOE, EPA, academia, national and international research community		FALSE	FALSE	TRUE
HYSPLIT READY web site	Provide WRF-HYSPLIT inline simulation access to HYSPLIT registered users.	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE			Glenn Rolph	N/A		NOAA, DOD, DOE, EPA, academia, national and international research community		FALSE	FALSE	TRUE
Support to the National Air Quality Forecasting Capability (NAQFC)	Emissions update delivered to NCEP.	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE			Pius Lee	N/A				FALSE	FALSE	FALSE
Support to the National Air Quality Forecasting Capability (NAQFC)	Optimize FV3-CMAQ5.0.2 for 72 h forecast	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE			Pius Lee					FALSE	FALSE	FALSE

Performance		Measure or Milestone Targets															PRIMARY RESPONSIBILITY		PERFORMANCE MEASURE and MILESTONE DESCRIPTIONS
Measure (The monitoring of ongoing progress toward pre-established goals.)	Milestone (A distinct activity planned for completion on a scheduled date)	Target 18 Q1	Actual 18 Q1	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target 18 Q2	Actual 18 Q2	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target 18 Q3	Actual 18 Q3	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target 18 Q4	Actual 18 Q4	Why was the target missed? When will the target be completed? What is the risk of missing the target?				Point of Contact	Responsible SES	
			TRUE			TRUE			TRUE			TRUE							
Number of ARL expert peer-reviewed publications.		8	5		15	10		20	22		25	32					Ariel Stein		Peer-reviewed publications are a recognized measure of ARL's scientific productivity, research quality, and credibility provided to NOAA, its research partners, other agencies, states, and the general public.
R2A Index: Annual number of OAR R&D products transitioned to a new stage(s) (development, demonstration, or application).		0	0		1	1		3	3		6	6							
Expand coverage of high-quality climate observations in Alaska for the long-term U.S. Climate Reference Network program.											22	22					Bruce Baker		Climate change in the Arctic is an especially important environmental issue as changes in temperature and precipitation patterns are critical to a range of issues across Alaska. For example, the melting of permafrost is having major implications on human infrastructure, and the impacts on ecosystems are having major effects on industries, such as fishing and tourism. The U.S. Climate Reference Network (USCRN) is a systematic and sustained network of climate monitoring stations across the U.S. As of the end of FY17, the ATDD has installed 21 USCRN stations in Alaska. The long-term goal for Alaska is to have a total of 29 stations.
	FY18: Establish 1 new USCRN station in Alaska	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE		TRUE	TRUE					Howard Diamond		Weather permitting, ATDD engineers will install one new climate observing station at a National Wildlife Refuge in Alaska (exact site location TBD). The goal of the USCRN in Alaska is to characterize the long-term climate trends across the state by taking high-quality 5-minute automated observations of air temperature, precipitation, solar radiation, and eventually soil and permafrost temperature and moisture. Through the end of FY 2017, a total of 21 USCRN stations have been installed across Alaska, with an ultimate goal of 29 stations by the end of FY 2022.
Expand cumulative number of dispersion and air quality prediction system updates transitioned to the NWS for operational forecasting, in order to serve federal, state and local air quality agencies, emergency managers, and international public health organizations.		0	0		0	0		0	0		9	9					Ariel Stein		The updates of dispersion and air quality modeling systems made available to NWS for operational use will contribute to improved outcomes by improving the accuracy and usefulness of NWS dispersion and air quality prediction products. Among other activities, this supports the DOC Primary Mission Essential Function-3 that states: Provide 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. The updates also improve the ease of use and flexibility of the software for meeting NWS needs. NWS uses these modeling systems, such as HYSPLIT, for dispersion and air quality predictions for applications ranging from local chemical releases to international radiological incidents to smoke predictions, providing information to customers ranging from local emergency managers to the World Meteorological Organization to state air quality agencies.
	FY18: Develop and thoroughly test the Regional Specialized Meteorological Center nuclear transport and dispersion predictions using the transfer coefficient matrix approach for delivery to the NWS.	FALSE	FALSE	FALSE	FALSE	FALSE		TRUE	TRUE	Further enhancements are in work.	FALSE	FALSE	*Further enhancements are in work.*				Barbara Stunder		The transfer coefficient matrix approach separates the atmospheric dispersion calculation from knowledge of the observed/estimated time series of emissions from nuclear incidents, allowing predictions to be readily revised as the source term information becomes available.
	FY18: NAQFC emission update delivered to NCEP.	FALSE	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE		TRUE	TRUE					Pius Lee		The accuracy of air quality forecasts is improved in part through improvements to the emissions inventories that are used to drive the models. The raw inventories are provided by EPA, but have been developed for the purpose of compliance monitoring -- and hence are frequently several years out of date. The ARL updated inventories make use of a) EPA raw inventories, b) DOE forecast projections, and c) modifications resulting from the use of satellite retrievals of some chemicals and aerosols that are used by the chemical model.
Cumulative number of HYSPLIT community usage (registered users/trained people / references to HYSPLIT BAMS paper) each year, in order to serve federal, state and local air quality agencies, emergency managers, and international public health organizations.											100	652					Ariel Stein/Glenn Rolph	??	HYSPLIT is one of the most widely used Lagrangian dispersion models in the atmospheric sciences community. ARL will expand its user base by training new users, and distributing and supporting the HYSPLIT modeling system for PC, Mac and Linux platforms. In addition, ARL will continue maintaining public access to HYSPLIT trajectory and dispersion simulations and relevant meteorological data through the web-based Real-time Environmental Applications and Display sYstem (READY).
	FY18: Complete HYSPLIT workshop training.	FALSE	FALSE	FALSE	FALSE	FALSE		FALSE	FALSE		TRUE	TRUE							A 4 day HYSPLIT workshop will be offered at NOAA's Center for Weather and Climate Prediction in College Park, Maryland. The workshop will focus on the use of the PC model and its Graphical User Interface (GUI) with a focus on the HYSPLIT model verification of the CAPTEX 2 atmospheric tracer release conducted in 1983. Participants from U.S. and state government agencies, as well as academia and foreign participants are expected to attended the workshop in person and through video conferencing.

Metric	Milestone											Comment	POC		Description
Increase the cumulative number of global assessments of atmospheric mercury for regions of interest that can be used to make informed decisions on mercury emissions.		0	0			0	0			0	0	This belongs in a column for 18 Q4: *While substantial progress was made, completion of this increment in the measure was not achieved because the PI was assigned other tasks that were higher priority. It is anticipated that the increment will be fully achieved in FY19. We don't believe that this delay will result in any significant impacts.*	4	3	While substantial progress was made, completion of this milestone was not achieved because the PI was assigned other tasks that were higher priority. It is anticipated that the milestone will be fully completed in FY19. We don't believe that this delay will result in any significant impacts.	Mark Cohen		Assessments of global atmospheric mercury source-receptor relationships provide environmental policy-makers and managers with an improved understanding of the relative importance of different source types and source regions in contributing to mercury contamination in a given region. Mercury is a potent neurotoxin, particularly damaging to the development of fetuses, infants and young children. Human exposure to methylated mercury, the most toxic form, is largely through eating contaminated fish. Nearly every U.S. state warns residents to restrict their consumption of certain fish due to mercury contamination. Mercury also appears to be accumulating at potentially dangerous levels in terrestrial wildlife that do not eat fish.
	FY18: Complete a new assessment of atmospheric mercury deposition to the Great Lakes, for the year 2011, using the HYSPLIT-Hg model.	FALSE	FALSE	FALSE		FALSE	FALSE			FALSE	FALSE	This belongs in a column for 18 Q4: *While substantial progress was made, completion of this milestone was not achieved because the PI was assigned other tasks that were higher priority. It is anticipated that the milestone will be fully completed in FY19. We don't believe that this delay will result in any significant impacts.*	FALSE	FALSE	While substantial progress was made, completion of this milestone was not achieved because the PI was assigned other tasks that were higher priority. It is anticipated that the milestone will be fully completed in FY19. We don't believe that this delay will result in any significant impacts.			Previous assessments of mercury deposition to the Great Lakes have been conducted for the years 1996 and 2005. Hg emissions in North America and elsewhere changed dramatically between 1996 and 2005 and between 2005 and 2011. Therefore, an analysis reflecting these changed emissions will provide important new information regarding changes in the relative contributions of different sources and source regions to Great Lakes mercury loading. The modeling will be evaluated by comparison of model results with ambient measurements, including the measurements at the 3 long-term Hg measurement sites operated by the Air Resources Laboratory -- Beltsville (MD), Grand Bay (MS), and Mauna Loa (HI). Model evaluation under the different meteorological and emissions conditions present in 2011 -- as compared to 1996 and 2005 -- will be particularly valuable, as it will provide an independent test of model performance.
Cumulative number of completed field and modeling studies of nitrogen exchange between the air and land to improve understanding of atmospheric chemistry		0	0			0	0			0	0		3	3		LaToya Myles/Rick Saylor		Measurement and modeling studies will be conducted to improve understanding of nitrogen chemistry and deposition in marine and terrestrial ecosystems. An overabundance of nitrogen results in harmful environmental conditions, such as pollution in coastal waters and changes in soil and plant nutrients.
	FY18: Completion of a field study to measure atmospheric nitrogen in a coastal ecosystem.	FALSE	FALSE	FALSE		FALSE	FALSE			FALSE	FALSE		TRUE	TRUE		LaToya Myles		Limited data and information exists about nitrogen exchange in coastal marshes and harmful effects on water quality and vegetation. Concentrations and fluxes of oxidized and reduced nitrogen will be measured in a coastal ecosystem in the southeastern US using integrated and continuous analytical techniques.
Cumulative number of data and modeling products requested by the Department of Energy at the Idaho National Laboratory and the Nevada National Security Site in support of research studies and emergency response exercises and drills.													17	17		Richard Eckman/Walter Schalk		NOAA/ARL maintains a long-standing collaborative partnership with the Department of Energy (DOE) and its semi-autonomous agency the National Nuclear Security Administration (NNSA). This partnership allows ARL to provide comprehensive site meteorological programs which include the operation of meteorological observation networks (called mesonets) at the Idaho National Laboratory and the Nevada National Security Site. ARL provides DOE with data and modeling products derived from the mesonet observations, including annual assessments of atmospheric dispersion, climatological summaries, and support for emergency response exercises.
	FY18: Complete updated climatology of the INL based on mesonet data up through 2015.	TRUE	TRUE	Draft document completed in December and currently under review. Estimate completion of final Tech Memo Feb. 2018.		FALSE	FALSE			FALSE	FALSE		FALSE	FALSE				The ARL Field Research Division operates a meteorological tower network (mesonet) covering the Snake River Plain in southeastern Idaho. This mesonet has been operating in various forms since the late 1940s. Periodically, the division publishes a climatology for the region using updated observations from the network. The last climatology was published in 2007 using observations through calendar year 2006. In fiscal year 2018, FRD will be publishing an updated climatology based on data through calendar year 2015.
	FY18: Complete analysis of calendar year 2017 mesonet observations for use in environmental compliance activities	FALSE	FALSE			TRUE	TRUE			FALSE	FALSE		FALSE	FALSE				Each year, the DOE Idaho National Laboratory (INL) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Field Research Division performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the INL. These meteorological statistics are used in the NESHAP compliance activities. The statistics for calendar year 2017 will be generated in the second quarter of fiscal year 2018. Each year, the NNSA Nevada National Security Site (NNSS) must perform assessments to show compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP). As part of this process, the Special Operations and Research Division (SORD) performs a statistical analysis of annual observations from its mesonet and provides the results of the analysis to the Environmental Group of the NNSS Management and Operating contractor. These meteorological statistics are used in the NESHAP compliance activities. In the second quarter of fiscal year 2018, the statistics for calendar year 2017 will be generated.

Metric													Description
FY18: Complete update to Climatology section of Annual NNSS Environmental Report with 2017 mesonet observations.	FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		FALSE	FALSE		The ARL Special Operations and Research Division (SORD) operates a meteorological tower network (mesonet) covering the Nevada National Security Site (NNSS) which is in southern end of the Great Basin in southern Nevada. Meteorological measurements have been taken on the NNSS in various forms since the mid-1950s. The current mesonet began to take form in the late 1970s and became established in the early 1980s. Annually, SORD updates the NNSS Environment Report with meteorological data from the previous year. In the second quarter of fiscal year 2018, SORD will be updating the Climatology section of the Annual Report with mesonet data from 2017.
FY18: Complete INL dispersion modeling for calendar year 2017 using HYSPLIT.	FALSE	FALSE		TRUE	FALSE		TRUE	FALSE		TRUE	TRUE		The DOE Idaho National Laboratory annually publishes a site environmental report. This report includes estimates of radiological doses to the public resulting from routine atmospheric emissions from the laboratory. The dose estimates are based on annual runs of the NOAA HYSPLIT model performed by the Field Research Division. Meteorological input to HYSPLIT comes from the mesonet operated by the division. The HYSPLIT runs for calendar year 2017 will be completed in the third quarter of fiscal year 2018 to meet reporting deadlines.
FY18: Complete 8 emergency response exercises at the INL	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		The DOE Idaho National Laboratory maintains an Emergency Operations Center (EOC) in Idaho Falls for accidents and other hazardous events. Staff from the ARL Field Research Division occupy a meteorologist position at the center. The EOC has four teams that each participate in two exercises per fiscal year. These eight exercises normally occur in the last three quarters of the fiscal year.
FY18: Complete a minimum of 4 emergency response exercises at the NNSS	FALSE	FALSE		FALSE	FALSE		FALSE	FALSE		TRUE	TRUE		The NNSS Management and Operating contractor maintains an Emergency Response Organization (ERO) for the Nevada National Security Site (NNSS) for hazardous material events and other hazardous, including weather, events. Staff from the ARL Special Operations and Research Division (SORD) have been trained to conduct dispersion calculations in the Consequence Assessment Team (CAT) function of the Emergency Operations Center (EOC) for the NNSS. Field exercises are conducted quarterly and Drills are conducted monthly. In fiscal year 2018, SORD will participate in the quarterly field exercises as well as 2 monthly drills.

Identifier (Name of Parent Project)	Brief Description	Target 18 Q1	Target 18 Q2	Actual 18 Q2 TRUE	Target 18 Q3	Actual 18 Q3 TRUE	Target 18 Q4	Actual 18 Q4 TRUE	Date Completed Fiscal year and quarter the project	OAR Point of Contact	OAR Responsible SES	OAR Contributing Partners	Customer	A clear statement of what condition must be met for the product advancement to have been made. This should be sufficient to allow a knowledgeable observer to evaluate whether the advancement has been achieved.	Type of R2A (Choose all) Operations	Commercial	Other	Cost of R2A Transition — Funding amount to move the project into operations/ applications (Only the profile shift and NOT the total
Support to the WMO for the Regional Specialized Meteorological Center program	Develop and thoroughly test the Regional Specialized Meteorological Center (RSMC) nuclear transport and dispersion predictions using the transfer coefficient matrix (TCM) approach.	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FY2019	Barbara Stunder	n/a	none	WMO		TRUE	FALSE	FALSE	none. Transition managed through base funds
Support to the WMO for the Regional Specialized Meteorological Center program	Develop NCO-standards-compliant scripts and test the RSMC nuclear transport and dispersion predictions using the TCM approach in NWS WCOSS.	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	FY2019	Barbara Stunder	n/a	none	WMO	Delivery of the code to NCEP/EMC, who will complete testing and deliver code to NCEP/NCO for implementation to operations.	TRUE	FALSE	FALSE	none. Transition managed through base funds
HYSPLIT operations at the NWS	Developing and testing code to use NCEP's FV3 (global) model output on the WCOSS for HYSPLIT forecasts	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	FY2019	Barbara Stunder	n/a	none	NOAA		TRUE	FALSE	FALSE	none. Transition managed through base funds
Support for EPA for modeling transport of nuclides from foreign accident	Add option to perform inverse modeling of Fukushima event after recalculating TCM with air concentration and deposition. Refine inverse modeling input parameters based on tests with Fukushima dataset in READY site	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FY2018	Glenn Rolph	n/a	none	EPA		FALSE	FALSE	TRUE	none. Transition managed through base funds
Support for EPA for modeling transport of nuclides from foreign accident	Instruct EPA principal scientist on use of web site for Fukushima	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	FY2018	Glenn Rolph	n/a	none	EPA		FALSE	FALSE	TRUE	none. Transition managed through base funds
HYSPLIT READY web site	Install WRF on READY web server and test manually. Develop web scripts to allow users to enter input variables to run WRF. Link web scripts with WRF simulation scripts.	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FY2018	Glenn Rolph	n/a	none	NOAA, DOD, DOE, EPA, academia, national and international research community		FALSE	FALSE	TRUE	none. Transition managed through base funds
HYSPLIT READY web site	Test READY web scripts to run the WRF model. Link WRF meteorological data to READY HYSPLIT scripts and test.	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FY2018	Glenn Rolph	n/a	none	NOAA, DOD, DOE, EPA, academia, national and international research community		FALSE	FALSE	TRUE	none. Transition managed through base funds
HYSPLIT READY web site	Provide WRF simulation access to HYSPLIT registered users.	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FY2018	Glenn Rolph	n/a	none	NOAA, DOD, DOE, EPA, academia, national and international research community		FALSE	FALSE	TRUE	none. Transition managed through base funds
Support to the National Air Quality Forecasting Capability (NAQFC)	Emissions update delivered to NCEP.	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	FY18	Pius Lee	n/a	none	NOAA	Delivery of the code to NCEP/EMC, who will complete testing and deliver code to NCEP/NCO for implementation to operations.	TRUE	FALSE	FALSE	$300K
Support to the National Air Quality Forecasting Capability (NAQFC)	upgrade chemistry and its associated emissions for NAQFC targeting forecasting improvement for coastal urban centers	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	FY18	Pius Lee	n/a	none	NOAA	Delivery of the code to NCEP/EMC, who will complete testing and deliver code to NCEP/NCO for implementation to operations.	TRUE	FALSE	FALSE	$300K

Performance				Measure or Milestone Targets												PRIMARY RESPONSIBILITY				
				Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target	Actual						
Measure (The monitoring of ongoing progress toward pre-established goals.)	Milestone (A distinct activity planned for completion on a scheduled date)	Quarterly Cumulative	Cumulative Across Years	17 Q1	17 Q1		17 Q2	17 Q2		17 Q3	17 Q3		17 Q4	17 Q4	Unit within LO/SO	Point of Contact	Responsible SES	CI Partner (if applicable)	PERFORMANCE MEASURE and MILESTONE DESCRIPTIONS
Number of ARL expert peer-reviewed publications.		X		8	9		15	15		20	22		25	27	ARL	Ariel Stein	Gary Matlock	Cooperative Institute for Climate and Satellites - Maryland (CICS-M)	Peer-reviewed publications are a recognized measure of ARL's scientific productivity, research quality, and credibility provided to NOAA, its research partners, other agencies, states, and the general public.
Cumulative number of regions for which a surface flux study has been conducted			X	0	0		0	0		0	0		5	5	ARL	Bruce Baker	Gary Matlock		"Surface flux" refers to the exchange of energy (e.g., heat) and substances (e.g., water) between the land surface and the atmosphere. These fluxes are critical drivers of climate change because they affect air and land temperatures and other important aspects of the climate. These fluxes also drive important climate-related phenomena such as droughts and such weather-related phenomena as the development of storms. Surface fluxes vary significantly with surface and weather conditions. The measurements taken in this work and the related analyses will provide essential information for improving the representation of the fluxes in climate and weather models, improving the accuracy of both weather and climate forecasts.
	FY17: Examine the impact of surface processes and land surface variability on boundary layer development and convective initiation in the Southeastern U.S.												x	x		Bruce Baker	Gary Matlock		Observations of land surface fluxes and other surface properties (soil moisture, surface temperature) collected during several intensive studies will be used to evaluate the impact on boundary layer development and how this may contribute towards either enhancing or suppressing convection.
	FY18: Examine the interaction between soil moisture and surface energy and carbon fluxes for three co-located landuse types in the Southern Great Plains															Bruce Baker	Gary Matlock		Observations obtained during the 2017 LAFE (Land Atmosphere Feedback Experiment), including the surface energy and carbon fluxes for three common landuse types, will be examined to evaluate the interaction with root zone soil moisture. Results will be compared against published results obtained earlier from a GEWEX site located in the Little Washita Watershed (1996 - 2000) for both well watered and drought conditions.
Expand cumulative number of dispersion and air quality prediction system updates transitioned to the NWS for operational forecasting, in order to serve federal, state and local air quality agencies, emergency managers, and international public health organizations.			X	0	0		0	0		0	0		8	8	ARL	Ariel Stein/Pius Lee	Gary Matlock	Cooperative Institute for Climate and Satellites - Maryland (CICS-M)	The updates of dispersion and air quality modeling systems made available to NWS for operational use will contribute to improved outcomes by improving the accuracy and usefulness of NWS dispersion and air quality prediction products. Among other activities, this supports the DOC Primary Mission Essential Function-3 that states: Provide 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. The updates also improve the ease of use and flexibility of the software for meeting NWS needs. NWS uses these modeling systems, such as HYSPLIT, for dispersion and air quality predictions for applications ranging from local chemical releases to international radiological incidents to smoke predictions, providing information to customers ranging from local emergency managers to the World Meteorological Organization to state air quality agencies.
	FY17: Develop and thoroughly test the Regional Specialized Meteorological Center nuclear transport and dispersion predictions using the transfer coefficient matrix approach for delivery to the NWS.												x	x		Ariel Stein	Gary Matlock		The transfer coefficient matrix approach separates the atmospheric dispersion calculation from knowledge of the observed/estimated time series of emissions from nuclear incidents, allowing predictions to be readily revised as the source term information becomes available.
	FY18: Develop and deliver to the NWS a set of program tools to make the HRRR forecast available in a format for input to the HYSPLIT dispersion model.											x	Milestone completed ahead of scheduled completion date of FY18 Q4. It was easier to do than originally expected.			Ariel Stein	Gary Matlock		The HRRR will be used by NWS Weather Forecast Offices in their dispersion forecasting needs, just as in their weather forecasting needs.
	FY17: Test, evaluate, and include chemical model improvements for updated ozone and PM2.5 predictions using CMAQ v5.0.2											x	This was completed ahead of schedule	x			Ariel Stein	Gary Matlock	Cooperative Institute for Climate and Satellites - Maryland (CICS-M)	This provides an update of the CMAQ modeling system to a more current version of the model. Improvements include better chemical modeling schemes and boundary conditions.
	FY18: NAQFC emission update delivered to NCEP.															Ariel Stein	Gary Matlock	Cooperative Institute for Climate and Satellites - Maryland (CICS-M)	The accuracy of air quality forecasts is improved in part through improvements to the emissions inventories that are used to drive the models. The raw inventories are provided by EPA, but have been developed for the purpose of compliance monitoring -- and hence are frequently several years out of date. The ARL updated inventories make use of a) EPA raw inventories, b) DOE forecast projections, and c) modifications resulting from the use of satellite retrievals of some chemicals and aerosols that are used by the chemical model.
Increase cumulative number of global assessments of atmospheric mercury source-receptor relationships for regions of interest that can be used to make informed decisions concerning mercury processes.			X	0	0		0	0		0	0		3	3	ARL	Mark Cohen	Gary Matlock		Assessments of global atmospheric mercury source-receptor relationships provide environmental policy-makers and managers with an improved understanding of the relative importance of different source types and source regions in contributing to mercury contamination in a given region.
	FY17: Carry out a new analysis of the atmospheric fate and transport of mercury from global sources using an improved HYSPLIT-Hg model.												x	x		Mark Cohen	Gary Matlock		Based on extensive model evaluations, and significant enhancements to the model, uncertainties in model results will be reduced. This will provide updated and more robust information about source-receptor relationships for atmospheric mercury emissions and deposition. This will be key information for air quality and environmental policy-makers, enabling them to effectively target mercury emissions reductions.
	FY18: Complete a new assessment of atmospheric mercury deposition to the Great Lakes, for the year 2011, using the HYSPLIT-Hg model.															Mark Cohen	Gary Matlock		Previous assessments of mercury deposition to the Great Lakes have been conducted for the years 1996 and 2005. Hg emissions in North America and elsewhere changed dramatically between 1996 and 2005 and between 2005 and 2011. Therefore, an analysis reflecting these changed emissions will provide important new information regarding changes in the relative contributions of different sources and source regions to Great Lakes mercury loading. The modeling will be evaluated by comparison of model results with ambient measurements, including the measurements at the 3 long-term Hg measurement sites operated by the Air Resources Laboratory -- Beltsville (MD), Grand Bay (MS), and Mauna Loa (HI). Model evaluation under the different meteorological and emissions conditions present in 2011 -- as compared to 1996 and 2005 -- will be particularly valuable, as it will provide an independent test of model performance.
Cumulative number of completed field studies of ammonia exchange between the air and land			X	0	0		0	0		0	0		3	3	ARL	LaToya Myles	Gary Matlock		Ammonia is a key atmospheric pollutant affecting ecosystems, such as estuaries. These studies provide essential information for air quality, agriculture, and environmental policy-makers and managers to inform federal and state decisions regarding coastal water quality and habitat. It also addresses a key uncertainty in air quality models. Each study addresses different regions/land uses (e.g., fertilized farm fields, concentrated animal feeding operation) and contributes to the scientific understanding of ammonia exchange in peer-reviewed journal publications. Publications are a measure of program depth, quality, and credibility.

	FY17: Completion of a field study to measure ammonia deposition in a coastal ecosystem												x	x		LaToya Myles	Gary Matlock		Measurements of the exchange of ammonia and other nitrogen compounds between coastal marshes and air.
	FY18: Develop improved measurement techniques for ammonia exchange															LaToya Myles	Gary Matlock		Utilize laboratory and field testing to improve techniques that can continuously measure ambient air ammonia concentrations and fluxes
Cumulative number of research-grade, quality-assured deposition/concentration datasets provided to the National Atmospheric Deposition Program (NADP)			X	0	0		0	0		0	0		30	30	ARL	Ariel Stein	Gary Matlock		The collection of research quality data at six locations in the United States as part of a collaborative national atmospheric monitoring network. The network follows well defined top quality national measurement protocols established through a partnership

Identifier (Name of Parent Project)	Brief Description	Research	Development	Demonstration	Operations or Applications	Target 17 Q1	Target 17 Q2	Target 17 Q3	Target 17 Q4	Actual 17 Q4	18	19	20	21	22	Date Completed Fiscal year and quarter the project will transition to operations / applications	OAR Point of Contact	OAR Responsible SES	OAR Contributing Partners	Customer	A clear statement of what condition must be met for the product advancement to have been made. This should be sufficient to allow a knowledgeable observer to evaluate whether the advancement has been achieved.	Operations	Commercial	Other	Cost of R2A Transition — Funding amount to move the project into operations/ applications (Only the profile shift and NOT the total funding amount.)
Support to the WMO for the Regional Specialized Meteorological Center program	FY17: Develop and thoroughly test the Regional Specialized Meteorological Center nuclear transport and dispersion predictions using the transfer coefficient matrix approach for delivery to the NWS.		x						x	x						FY2018	Barbara Stunder	Richard Artz	none	WMO	Delivery of the code to NCEP/EMC, who will complete testing and deliver code to NCEP/NCO for implementation to operations.	X			none. Transition managed through base funds
Support to the National Air Quality Forecasting Capability	FY17: Test, evaluate, and include chemical model improvements for updated ozone and PM2.5 predictions using CMAQ v5.0.2				X				x	x						FY17	Pius Lee	Richard Artz	none	NOAA	Delivery of the code to NCEP/EMC, who will complete testing and deliver code to NCEP/NCO for implementation to operations.	x			$300K
Support for Emergency Response Operations through the NOAA Web Operations Center	FY18: Develop and deliver to the NWS a set of program tools to make the HRRR forecast available in a format for input to the HYSPLIT dispersion model.				X					x	x					FY18	Barbara Stunder	Richard Artz	none	NOAA	Delivery of the code to NCEP/EMC, who will complete testing and deliver code to NCEP/NCO for implementation to operations.	x			none. Transition managed through base funds
Support to the National Air Quality Forecasting Capability	FY18: National Air Quality Forecasting Capability emissions update delivered to NCEP.				x						x					FY18	Pius Lee	Richard Artz	none	NOAA	Delivery of the code to NCEP/EMC, who will complete testing and deliver code to NCEP/NCO for implementation to operations.	x			$300K

5-Year Research Plan Goal: Objective - Target	Performance (NOTE: Do not report Measure or Milestone Targets in the same row) Milestone (A distinct activity planned for completion on a scheduled date)	Actuals 15	Target 16 Q1	Actual 16 Q1	Why was the target missed? When will the target be	Target 16 Q2	Actual 16 Q2	Why was the target missed? When will the target be	Target 16 Q3	Actual 16 Q3	Why was the target missed? When will the target be	Target 16 Q4	Actual 16 Q4	Why was the target missed? When will the target be completed? What is the risk of missing the target?	Target 17 Q1	Target 17 Q2	Target 17 Q3	Target 17 Q4	18	19	20	21	22	Unit within LO/SO	Point of Contact	Responsible SES	PERFORMANCE MEASURE and MILESTONE DESCRIPTIONS
		36	8	9		15	21		20	29		25	33		0	0	0	25	25	25	25	25	25	ARL	Richard Artz	Richard Artz	Peer-reviewed publications are a recognized measure of ARL's scientific productivity, research quality, and credibility provided to NOAA, its research partners, other agencies, states, and the general public.
Climate: Improve understanding - Assess Natural Variability		3	0			0	0		0	0		4	4		0	0	0	5	6	7	8	9	10	ARL	Bruce Baker	Richard Artz	"Surface flux" refers to the exchange of energy (e.g., heat) and substances (e.g., water) between the land surface and the atmosphere. These fluxes are critical drivers of climate change because they affect air and land temperatures and other important aspects of the climate. These fluxes also drive important climate-related phenomena such as droughts and such weather-related phenomena as the development of storms. Surface fluxes vary significantly with surface and weather conditions. The measurements taken in this work and the related analyses will provide essential information for improving the representation of the fluxes in climate and weather models, improving the accuracy of both weather and climate forecasts.
	FY16: Examine the impact of extreme events such as a late spring freeze and mid-summer droughts on the seasonal energy budgets of carbon and water in eastern hardwood deciduous forests.											X	X														The period of record for data collected at the Walker Branch Watershed and Chestnut Ridge near Oak Ridge, TN allow for an examination of the impact extreme climatic events such late spring freezes and the potential connection to subsequent droughts.
	FY 17: Examine the impact of surface processes and land surface variability on boundary layer development and convective initiation in the Southeastern U.S.																	X									Observations of land surface fluxes and other surface properties (soil moisture, surface temperature) collected during several intensive studies will be used to evaluate the impact on boundary layer development and how this may contribute towards either enhancing or suppressing convection.
Weather: Improved predictive guidance - Improve air quality modeling		6	0			0	0		0	0		7	7		0	0	0	8	9	10	11	12	13	ARL	Ariel Stein/Pius Lee	Richard Artz	The updates of dispersion and air quality modeling systems made available to NWS for operational use will contribute to improved outcomes by improving the accuracy and usefulness of NWS dispersion and air quality prediction products. Among other activities, this supports the DOC Primary Mission Essential Function-3 that states: Provide 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. The updates also improve the ease of use and flexibility of the software for meeting NWS needs. NWS uses these modeling systems, such as HYSPLIT, for dispersion and air quality predictions for applications ranging from local chemical releases to international radiological incidents to smoke predictions, providing information to customers ranging from local emergency managers to the World Meteorological Organization to state air quality agencies.
	FY16: Deliver to NWS a forecasting system tailored for global chemical transport model coupling capable of tracking smoke and dust plumes originating from outside the continental US.								X	X																	Sensitivity studies will be performed for recent prominent dust and wild fire events. It is scheduled for delivery to NCEP by Q4 FY16 as a Research to Operations upgrade to the NWS for the O3 and PM forecasting system.
	FY17: Develop and deliver to the NWS more quantitative volcanic ash predictions to anticipate future aviation requirements by developing more detailed emission algorithms linked with																	X									Real-time satellite retrievals of volcanic ash mass loading will be used to develop more quantitative ash forecasts for aviation safety.
	FY17: Develop a unified approach for dust forecasting for two national operational modeling systems (CMAQ and HRRR) and provide a recommendation to the NWS based on this approach for the NOAA National Air Quality Forecasting Capability																	X									At the present time, there are two Eulerian-based air quality modeling systems available to forecast dust: The EPA-NOAA Community Multi-scale Air Quality (CMAQ) model and the ESRL High Resolution Rapid Refresh (HRRR) model. The approach used by these models will be unified in an effort to provide the best available dust forecasting capability.
Coastal: Determine effects of stressors - Characterize sources, transport		2	0			0	0		0	0		3	3					3	4	4	5	5	6	ARL	Mark Cohen	Richard Artz	This provides key information for air quality and environmental policy-makers and managers and for negotiators for international agreements—enabling them to effectively target mercury emissions reductions.
	FY16: Conduct a comparison of mercury modeling results with data collected from one or more of the three ARL National Atmospheric Mercury Network sites								X	X																	Measurements at two of ARL's sites began in late 2006 (Grand Bay MS and Beltsville MD), and at one of the sites in 2011 (Mauna Loa HI). Now that mercury emissions inventory information is available for at least some of the years of measurements, it will now be possible to model concentrations and deposition at one or more of the sites and to compare the model predictions with measurements. This will provide an important opportunity for model evaluation and improvement, as well as provide information to help interpret and better understand the measurements that have been made at the site(s).
	FY17: Complete a new analysis of the atmospheric fate and transport of mercury from global sources using an improved HYSPLIT-Hg model.																										Based on extensive model evaluations, and significant enhancements to the model, uncertainties in model results will be reduced. This will provide updated and more robust information about source-receptor relationships for atmospheric mercury emissions and deposition. This will be key information for air quality and environmental policy-makers, enabling them to effectively target mercury emissions reductions.
		2	0			0	0		0	0		2	2					3	3	3	4	4	4	ARL	LaToya Myles	Richard Artz	Ammonia is a key atmospheric pollutant affecting ecosystems, such as estuaries. These studies provide essential information for air quality, agriculture, and environmental policy-makers and managers to inform federal and state decisions regarding coastal water quality and habitat. It also addresses a key uncertainty in air quality models. Each study addresses different regions/land uses (e.g., fertilized farm fields, concentrated animal feeding operation) and contributes to the scientific understanding of ammonia exchange in peer-reviewed journal publications. Publications are a measure of program depth, quality, and credibility.
	FY16: Submission of collaborative research proposal to support next phase of field studies		x	X																							A second field study is proposed to expand upon measurement capabilities and locations.
	FY17: Completion of a field study to measure ammonia deposition in a coastal ecosystem																	X									Measurements of the exchange of ammonia and other nitrogen compounds between coastal marshes and air.
		18	0			0	0		0	0		24	24		0	0	0	30	36	42	48	54	60	ARL	Rick Artz	Richard Artz	The collection of research quality data at six locations in the United States as part of a collaborative national atmospheric monitoring network. The network follows well defined top quality national measurement protocols established through a partnership