

*U.S. Department of Energy WindSentinel Buoy Loan Program
Request for Application - Statement of Work
Prepared by the Pacific Northwest National Laboratory
Rev. A, 12/06/16*

1.0 Introduction

1.1 Background and Purpose

The U.S. Department of Energy (DOE) currently owns two AXYS WindSentinel buoys that collect a comprehensive set of meteorological and oceanographic data to support resource characterization for wind energy offshore. These buoys have been deployed by the Pacific Northwest National Laboratory (PNNL), at DOE's direction, in different regions of the U.S. to collect hub-height offshore wind data in support of the U.S. offshore wind industry. The data produced by the buoys represent the first publicly available multi-seasonal hub-height data to be collected in U.S. coastal waters. The buoys consequently provide an important new opportunity to characterize the wind resource using observations in regions targeted for wind development.

The buoys have been deployed off the U.S. East Coast. One buoy was deployed approximately 42 km east of Virginia Beach, Virginia from December, 2014 through June, 2016. The second buoy was deployed approximately 5 km off Atlantic City, New Jersey in November, 2015 (Figure 1) and is due to be retrieved by the end of 2016 (weather permitting). Data from these deployments are available to the public. Interested parties can access these data by creating an account and logging in to <http://offshoreweb.pnnl.gov>.



Figure 1. Lidar Buoy – New Jersey Deployment

PNNL (on behalf of DOE's Wind Energy Technologies Office) is implementing a program to lend the buoys to qualified parties for the purpose of acquiring wind resource characterization data in areas of interest for offshore wind energy development. This program is described in the Department of Energy

WindSentinel Loan Program Description which can be accessed on <http://wind.pnnl.gov> under the *Instrumentation* category and *Lidar Buoy Loan Program* link. Applicants are encouraged to obtain and carefully review this description to assist in application preparation.

PNNL will proactively work with interested parties to enable the loan of the lidar buoys. The loan program framework is based on the assumption that borrowing partners will deploy the buoys for approximately one year to support data collection and analysis over an annual weather cycle. Partners will assume complete responsibility for the funding, deployment logistics, maintenance, and safe retrieval of each buoy over the duration of the loan. Borrowers will be required to return the buoy to DOE in the same functional condition in which they received it. Neither PNNL nor DOE will provide funds to the borrowers of the buoys to support their proposed deployment.

PNNL does not intend to closely manage the buoy deployments; however, there will key decision gates described herein where the selected partner will be expected to provide documentation and participate in discussions to demonstrate readiness to move on to the next stage. PNNL and DOE stakeholders will participate in these reviews and concurrence to proceed is required. These decision gate requirements are described in this Statement of Work (SOW).

This SOW document describes how interested parties can apply to borrow the buoys, the scope of work associated with the loan agreement, the application process and requirements, and the schedule for implementation. This scope of work and associated request for application (RFA) process apply to both buoys and also lays out the framework for subsequent loan arrangements.

1.2 Document Organization

The scope of work is organized as follows:

- Section 2 – System Description
- Section 3 – Scope and Requirements
- Section 4 – Loan Application
- Section 5 – Schedule and Deliverables

2.0 System Description

2.1 Instrumentation

Figure 2.1 is a photo of one of the buoys shortly after its delivery to PNNL. The centerpiece of the instrumentation suite for each buoy is a motion-corrected lidar system that can provide profiles of the wind speed and direction from the surface to 200 m. In addition to a lidar, each buoy collects ocean temperature, salinity, current, and wave data as well as near-surface air temperature, humidity, and wind speed and direction.

Figure 2.1. One of Two DOE WindSentinel Buoys



The WindSentinel buoys feature a comprehensive set of atmospheric and oceanographic measurements needed for offshore wind resource characterization. The system provides great flexibility for user definition and control of averaging intervals for all instrumentation. In general, observations will be recorded at the highest rate available for each instrument to allow maximum flexibility in subsequent analysis. In most cases, this is a sampling rate of at least once per second. Meteorological and oceanographic instruments on the two buoys are identical and are listed in Table 2.1.

Table 2.1. Meteorological and Oceanographic Instruments on Each of DOE’s WindSentinel Buoys

Sensor Type	Manufacturer	Model
Wind Profile (6 range gates to ~200 m above MSL)	OADS	Vindicator III
Wind Speed (2)	Vector Instruments	A100R
Wind Direction	Vector Instruments	WP200
Temperature, Relative Humidity	Rotronic	MP101A
Barometer	RM Young	61302V
Pyranometer	Licor	LI-200
Water Temperature	AXYS	YSI
Conductivity, Temperature, Depth (CTD)	Seabird	SBE 37SMP-1j-2-3c
Wave	AXYS	TRIAXYS NW III
Current Profile (ADP)	Nortek	Aquadopp 400 kHz
Tilt/Compass	MicroStrain	3DM GX3 25

Data collection on the buoys is managed by an AXYS Watchman 500 data acquisition system (DAS), which records data from all meteorological and oceanographic instruments as well as buoy system diagnostic information. These raw data are stored on a compact flash (CF) card. The DAS also processes the data to produce 10-min averages, which are also stored on the CF card. The data are transferred to shore via cell phone (high-bandwidth when close to shore) or satellite (low bandwidth). Complete data recovery requires physically exchanging the CF card during regular maintenance visits to the buoy. Each WindSentinel buoy has extensive documentation of all of its systems, including metocean sensors, power, data collection, communications, and safety.

NOTE: Applicants may propose additional instrumentation; however, the implementation and decommissioning costs shall be covered by the applicant and the data collected will be subject to the information sharing requirements described herein. Any modifications to the buoy instrumentation shall be evaluated and approved in advance by PNNL and DOE.

2.2 Ancillary Support Systems

The buoys are powered by solar, wind, and backup diesel generator resources. The generator is a two-cylinder Kubota Z602-E diesel. The two solar panels are 24V DC 210 watt units and the wind turbine is a 24V DC 1000 watt unit. The wind and solar power sources provide the majority of the power. Depending on location and conditions, the diesel generator occasionally runs to provide backup power when power from the wind turbine and solar panels are insufficient.

2.3 Buoy “Kit”

Each buoy comes as a “kit” packaged in multiple crates. The contents of each kit will be verified at the time of transition to the borrower; however, for planning purposes the kit includes LiDAR and

environmental sensors, masts and handrails, assembly hardware, diagnostic and communications equipment, renewable power systems equipment (turbine and solar panels), tool sets and dockside gear, lifting slings, and a wheel set.

The borrower will need to safely store the crates and unused equipment in an environmentally appropriate storage location during the deployment and provide for reuse at the end of deployment.

2.4 System Documentation

System documentation is available from AXYS Technologies, Inc. (www.axystechnologies.com). To obtain this information, applicants will need to enter into a non-disclosure agreement (NDA) with AXYS. The AXYS NDA form and other potentially useful project documentation and photographs from the PNNL project are accessible at the <http://wind.pnnl.gov> website under *Instrumentation* category and *Lidar Buoy Loan Program* link. The applicant is responsible for working the NDA and information exchange directly with AXYS. Available documentation from AXYS includes information on users manuals, sensors, commissioning, maintenance, transportation, moorings, communications systems, etc. Applicants should send completed NDA forms directly to AXYS representatives at mbottoni@axys.com and rthomsen@axys.com.

3.0 Scope and Requirements

The loan program will be implemented through a bailment agreement negotiated by PNNL (on behalf of DOE) and the selected partner. Within this scope and requirements section the term “bailor” refers to PNNL representing DOE, and the term “bailee” refers to the selected partner borrowing the buoy.

3.1 Site Requirements

3.1.1 Site Selection

The site proposed by the bailee shall advance the development of U.S. offshore wind energy and support the National Offshore Wind Strategy.

3.1.2 Permitting

The bailee shall prepare, submit, and obtain approvals for all necessary permits (e.g., navigational and environmental). The bailee shall perform all required permitting activities to support the deployment.

3.1.3 Mooring Design

The bailee shall prepare a mooring design tailored to the site location that meets permit requirements and provides safe and secure mooring.

3.2 Transition Requirements

3.2.1 Transition Checklist and Agreement

The bailee shall participate in the transition process by the following actions:

- Participate in assembling the transition documentation. The transition documentation package will be based on a checklist that documents the condition of the buoy at the time of transition. This documentation may include but not be limited to photographs, instrument test reports, and in some cases live demonstration of component functionality. The package will include complete materials listing.
- Participate in transition inspections and documentation reviews
- Sign off on transition documents to indicate acceptance of responsibility for the buoy.

At this time (December of 2016), transition is planned to occur at the current buoy locations:

Buoy 6NB00120
Cape Henry Launch Services
End of Marina Road
Cape Charles, VA, 23310

Buoy 6NB00130 is currently deployed off the coast of New Jersey. Once it is retrieved, it will likely be located at a subcontractor facility in Atlantic City, New Jersey.

3.2.2 Loading and Transportation

The bailee shall be responsible for all loading preparation, loading, and transportation.

For the initial loan transitions, the bailor will have decommissioned and made the buoy ready for storage; however, the bailee shall arrange for the buoy to be readied for safe and secure transport, loading and transportation to Bailee's facility, and offloading. All loading and transport-related work shall be performed in accordance with AXYS documentation and procedures, bailee's policies and procedures, and state and federal transportation requirements.

NOTE: The buoy "kit" also includes various support materials and components housed in two large wooden crates. The bailee shall take possession of, transport, and manage the full kit for the duration of the loan. Bailee may be required to provide pallets and/or crates as needed to house the materials.

NOTE: The hoisting and rigging equipment provided with the AXYS buoy kit may or may not be suitable for use. The bailee shall consult with AXYS and arrange for all qualified resources necessary (e.g., lifting equipment, operators, etc). PNNL is not accountable for any hoisting and rigging equipment or activities.

3.3 Setup and Configuration Requirements

3.3.1 Communications Systems

The bailee shall set up and fund all buoy communication systems and commercial services to support buoy deployment.

Daily data transmission from the buoy will make use of cell phone signals if available and/or satellite if cell signals are not available or reliable. The bailee shall be responsible for setting up and maintaining the necessary telecommunications features and services to support the full lifecycle of the deployment. This includes setting up and paying for the monthly services to support buoy communications. In addition the bailee will be responsible for the safe recovery and exchange of physical data storage media during regular maintenance visits.

3.3.2 Instrument Settings

By design the instrumentation setup on the buoy is flexible. The buoys have been successfully deployed at more than two locations with consistent settings. Unless the bailee negotiates alternate settings in advance, the system settings shall match the configuration described in the settings and configuration files available on wind.pnnl.gov under [Lidar Buoy and Loan Program](#) and [Standard Buoy Configuration and Settings](#) links. Applicant may propose alternate settings in the application; however, justification for the change shall also be provided. If bailee would like to use alternate settings in the future, bailee shall contact bailor in writing and request the change two weeks prior to implementation of the settings.

NOTE: Bailor recommends that bailee set up a support agreements with AXYS (or qualified contractor) to advise on critical set-up, deployment, and operations activities. The bailee may also benefit by having AXYS technical support (or qualified contractor) on call to assist in resolving potential emerging issues.

3.4 Deployment

When pre-requisites are met and conditions are suitable, the bailee shall safely transport the buoy to the deployment location and deploy the buoy according to the final deployment plan. Hoisting, rigging, securing, and towing the buoy shall be performed in accordance with the deployment plan, AXYS procedures, and Bailee's policies and procedures. Special attention in order not to damage the scientific instrumentation and power-generation equipment on deck will be required. Similarly, it is the responsibility of the bailee not to damage the vinyl logos and lettering on the sides of the buoy, e.g. by excessive contact between the buoy and a dock or other vessel. All rub points must be guarded during transport of the buoy, both on land and on sea (e.g., rubber matting or other bumpers). The bailee shall secure the buoy to the mooring as described in the deployment plan.

The Bailee shall prepare a checklist listing all steps to be taken to ready the buoy for deployment (e.g., refueling, pre-deployment in-water leak testing, etc). The Bailee shall complete these checklist actions and sign-off prior to deployment.

Readiness to deploy will be demonstrated by Bailee transmittal of the completed checklist with a minimum of 10 photographs of the deployment-ready buoy and instrumentation to PNNL for review and confirmation. The Bailee shall participate in a ~2-hour conference phone call with PNNL and interested stakeholders to review the checklist, discuss logistics, and confirm readiness to deploy. PNNL will provide authorization to deploy at the end of the phone call if all requirements and conditions are met, or subsequently upon completion of open action items. The Bailee should plan on 1 to 2 days for readiness review, teleconference call, and authorization to proceed (assuming all deployment requirements are met).

Bailee shall notify PNNL 10 days prior to deployment in writing (email sufficient). PNNL, at their discretion, may observe deployment activities.

3.5 Operations and Monitoring

The bailee shall remotely monitor the status of the WindSentinel on a weekly basis during the deployment period, and determine whether any conditions have occurred requiring further action. Monitoring shall include state of health, flash card data capacity, environmental, and engineering datasets. Equipment (e.g. the LIDAR system) shall be monitored for possible failures or maintenance needs. Data shall be monitored to ensure the buoy is on location and all power charging systems remain operational.

The bailee shall track and monitor email alert notifications received from the AXYS DMS Notification system. Bailee personnel shall communicate with the PNNL Contract Representative within a 24 hour period if any significant events or changes occur. The bailee shall monitor weather forecasts daily, and if storm conditions are forecast to generate a sustained wind speed exceeding 70-knots at the buoy location within a 5-day window, the bailee shall notify PNNL.

Each month, the bailee shall prepare a brief summary report (email – 1-page minimum, 10-page maximum) addressing overall system performance, alerts issued and responses, power system performance and generator use, and maintenance completed and/or scheduled.

3.6 Preparedness for Off-Normal Events

3.6.1 Off-Normal Event Response Level

The bailee shall plan for and have the ability to respond to two types of off-normal events: 1) system-critical, and 2) mission-critical.

System-critical events include:

- Indication of the buoy “off-position” and/or inability to verify location
- Indication of water intrusion into one or all compartments
- Sustained loss of communication (more than a day)

Under confirmed system-critical events, the bailee shall notify PNNL immediately (within 4 hours) of event confirmation and be prepared to lead discussions on appropriate response.

Mission-critical events include damage or malfunction of subsystems that could impact the effectiveness or ability to meet the mission objectives. Examples of these subsystems include power, control systems, and/or scientific instrumentation. Under confirmed mission-critical events, the bailee shall notify PNNL within 48 hours of event confirmation and be prepared to lead discussions on appropriate response.

3.6.2 Off-Normal Response Capability

At a minimum bailee shall have off-normal response capability planned and ready for implementation should an off-normal condition arise. Required off-normal capabilities include the ability to travel to the buoy location for:

- inspection
- maintenance/repair
- recovery

NOTE: “Planned” indicates that the bailee has thought through the approach and has planned for implementation of the response. “Ready” indicates that the bailee has resources in place and at the ready (including standing subcontracts) to support appropriate and timely response.

NOTE: Predicted and actual storm conditions do not necessarily constitute an off-normal event. In the past, DOE and PNNL have elected to leave the buoy in place during storm conditions as there is value

in understanding the wind profile under a variety of situations that a future wind energy system may be exposed to.

3.7 Maintenance

The bailee shall maintain the buoy during the deployment period per the work plan and based on manufacturer documentation. At a minimum, the buoy shall be actively inspected and maintained every six months.

Example: For an assumed deployment duration of 12 months, the buoy would be maintained at the 6-month interval and again after being recovered at the end of the deployment term.

The 6-month inspection and maintenance includes (but is not limited to) the following activities:

- Steps to meet permit requirements such as inspection for derelict fishing gear
- Exchange instrument data flash cards to retrieve raw data before the cards are full
- Check fuel levels
- Maintain instrumentation. In general, maintenance includes, but is not limited to, cleaning and adjusting the instruments per the scientific-instrument manufacturer's manuals, applying a zinc oxide to slow future biofouling, checking the zinc anodes and replacing them if necessary, examining the upper portion of the mooring for signs of excessive wear and repairing as necessary. The bailee shall remove biofouling as needed from the onboard and subsurface instruments with manufacturer-approved methods.
- Air tank recharge or swap-out
- Maintenance reports shall include including a description of visual observations, work performed, and photographs.

NOTE: Maintenance can be performed onshore or on location at bailee's discretion.

3.8 Data Retrieval

The bailee shall retrieve and replace flash cards from the buoy instruments at a minimum of every 6 months or when the flash cards are full, whichever is soonest. The flash cards deployed on the recent New Jersey and Virginia deployments had a 6-month capacity. The bailee shall back-up the files, transmit the files to bailor, and send the physical flash cards to the bailor via expedited carrier within one week of retrieval .

3.9 System Retrieval

At the completion of the agreed deployment period, the bailee shall retrieve the buoy in accordance with the bailee's deployment plan and manufacturer's documentation.

Under non-emergency conditions, bailee shall notify bailor of intent to retrieve within two weeks of retrieval activities. Recovery shall include safe storage once on shore to facilitate the maintenance, repair, and transition back to bailor.

3.10 Post-Deployment Repairs and Maintenance

The bailee shall be responsible for performing post-deployment repairs and maintenance to restore the buoy to full functionality and preparing the buoy for transport (by others) to the next deployment location. Once the buoy has been retrieved to the bailee's facility, the following actions shall be completed per the work plan:

- Safely secure buoy using dunnage or other support bracing per manufacturer documentation.
- Storage. The bailee shall provide interim storage for the buoy for up to 4 months while the buoy is transitioned to the next user. The bailee's storage facility shall be secure with access control and with electrical power available (at least one, 120V AC, 20A within 100 feet of the buoy).
- Post-deployment maintenance and repair. Restore the buoy to full functionality per agreements and per transition plan.
- Demobilization and make ready for storage and transport per manufacturer documentation.

The post-deployment maintenance and demobilization and preparation of a transition package to document restoration of buoy to as-delivered condition shall be performed per the deployment plan. When the transition is complete, the bailee and bailor shall sign off and conduct a conference call with stakeholders to confirm final status of this task. The task will not be complete if action items remain open.

Bailee shall provide lifting services to load and secure the buoy and other equipment onto a flat-bed truck (provided by others) using an appropriate lifting device (crane or travel lift). The bailee shall provide all necessary hoisting and rigging equipment to support lifting operations required for this project, according to specifications in the AXYS documentation and procedures.

Once the buoy is loaded on the truck and all transition documentation is approved, the responsibility for the buoy, including securing the buoy for transport, will transfer to the next bailee.

3.11 General

3.11.1 Safety

The bailee shall develop a task appropriate health and safety plan and implement the work accordingly. The bailee shall provide a copy of their health and safety (H&S) plan with the application and maintain the plan throughout the project. The H&S plan shall address known risks such as confined space entry, boat safety, etc. The purpose of providing the plan is to illustrate that the bailee understands the risks and hazards associated with working on and around the buoy. PNNL is not responsible for approving the H&S plan or verifying that it is adequate.

3.11.2 Markings

Prior to deployment, the bailee shall affix (paint preferred) a permanent marking indicating bailee organizational accountability and contact information.

3.11.3 Bailor and/or Stakeholder Staff Onsite

Onsite bailor oversight is not currently required; however, at PNNL's discretion, PNNL staff may visit the bailee's facility during any or all activities noted above. The bailee shall accommodate PNNL staff onsite by providing access and inclusion in activities (observer only).

3.11.4 Hoisting, Rigging, and Securing for Transport

The bailee shall provide all necessary hoisting and rigging equipment and qualified staff and subcontractors to support lifting operations required for this project and in accordance with Axys documentation and policies. Bailor is not accountable for lifting activities or lifting materials that may or may not be included in the buoy kit.

3.11.5 Insurance

The bailee shall demonstrate that they have sufficient insurance coverage to repair or replacement of the buoy and/or systems if damaged during the loan period.

4.0 Loan Application

4.1 Application Process

The loan application process is documented in the “Department of Energy WindSentinel Loan Program Description” which is available on <http://wind.pnnl.gov> under the “Lidar Buoys and Loan Program” tab. Accordingly, candidate borrowers will be evaluated based on the application proposal per the following three categories:

- Pre-qualification
- Project scope and benefit
- Buoy deployment plan

Applications will be reviewed by the selection team and graded based on the criteria described in the noted program description document. The selected partner will be notified and bailment negotiations will occur. If an agreement cannot be reached with the top-ranked applicant, the next ranked qualified applicant on the list will be engaged.

4.2 Application Content and Organization

Buoy loan applications shall be organized around the following subsections. The content and context for these required subsections are presented in greater detail in the Department of Energy WindSentinel Loan Program Description.

4.2.1 Application Overview

The application overview shall be a brief summary of the organization, proposed deployment, value proposition summary, and any other information pertinent to a proposal introduction. The overview is not expected to exceed five pages.

4.2.2 Pre-Qualification

All applications will be initially reviewed only based on pre-qualification pass/fail requirements. The application shall have a section entitled “Pre-Qualification Requirements”. In this section the applicant will briefly demonstrate that they have a plan, sufficient funding, technical ability, and that resulting data will be made available for public dissemination. If an applicant does not meet these pre-qualification requirements, the proposal will not be considered further. Per the program description application shall address:

- Demonstration of ability to fund the full lifecycle of the project
- Demonstration of technical ability to support operations
- Agreement to share all data from the deployment

4.2.3 Project Scope and Benefit

This section of the application provides a description of the proposed plan and a justification for the loan. The applicant will address the following topics:

- Objectives
- Description of Proposed Deployment Site
- Technical Discussion
- Technical and Logistical Qualifications
- Dissemination of Results

4.2.4 Buoy Deployment Plan

The application shall include a complete deployment plan addressing the full lifecycle. This is applicant's opportunity to demonstrate complete understanding of the scope, risks, logistics, and requirements of a buoy deployment. At a minimum, the plan shall cover the all the topics described in the loan program description document, including:

- Partner organization and stakeholders
- Site selection
- Buoy communications systems setup and operation
- Deployment logistics
- Data management plan
- Emergency response plan
- Project management plan
- Other issues specific to this proposed deployment
- Project schedule

The subject plan shall also include relevant assumptions and technical bases to demonstrate understanding of the scope and support budget and schedule estimates. If selected, the applicant should expect and plan to revise this Buoy Deployment Plan based on PNNL and stakeholder review and comment. The final revised plan will be required to close out bailment negotiations.

4.3 Partner Selection Criteria

Consistent with buoy loan objectives, the loan program must be responsive to both the wind industry and DOE programmatic objectives. DOE will retain discretion in the selection of partners. In addition to programmatic needs, partners will be selected according to the qualifications and criteria described in the Department of Energy WindSentinel Loan Program Description. Applications should directly address the following criteria described in that program description document. Accordingly, applications will be reviewed against the following:

- Pre-Qualification Criteria (Pass/Fail)
- Application Selection Criteria
 - Qualifications of Applicant
 - Technical Value
 - Timelines

4.4 Partner Selection

Each application that is considered responsive (i.e., meets pre-qualification requirements) will be considered by a partner selection team composed of the following individuals:

- Program Manager, DOE Wind Energy Technologies Office
- Offshore Wind Team Lead, DOE Wind Energy Technologies Office
- Buoy Deployment Project Manager, PNNL
- Buoy Deployment Principal Investigator, PNNL
- Contracts Representative, PNNL

The selection team will work to build consensus; however, the DOE program manager will have the final selection authority. The selection team will evaluate (score and weight) each application based on the effectiveness in meeting DOE programmatic objectives as described above.

Once the evaluation is completed, top ranked applicants will be engaged for bailment negotiations. If bailment negotiations are unsuccessful, the next highest ranked applicant will be engaged.

5.0 Schedule and Deliverables

5.1 Critical Schedule Considerations

The schedule for initial buoy loans is dependent on negotiation and acceptance of the bailee's submitted buoy deployment plans and ongoing buoy recovery and repair efforts. The critical schedule considerations for each deployment are described below.

5.1.1 Bailment Agreement

Negotiation of the bailment agreement will serve as the cornerstone of the loan and deployment of each buoy. Unless negotiated otherwise in advance, the bailment agreement shall be finalized within three weeks of successful applicant selection.

5.1.2 Transition of Buoy to Bailee

Once the buoys have been retrieved and repaired (initial performed by PNNL, subsequent by bailee), a transition will be scheduled. The first transition to the bailee shall occur within four weeks of PNNL notification to the bailee that the buoys are ready. It is anticipated that the transition inspections and turnover will take no more than two days. During this transition the receiving organization will review documentation and perform inspections to verify the "as delivered" condition. Once the checklist is filled out, all parties will sign off to indicate the completion of the transition. Mutually agreeable follow-on action items may be negotiated in advance and managed by one or both parties. PNNL will facilitate the transition process on DOE's behalf.

5.1.3 Deployment Preparation

The selected bailee will prepare for deployment in accordance with the buoy deployment plan finalized with the bailment agreement. This preparation includes design and engineering for the mooring and obtaining necessary permits. The duration of this activity will be dependent on the bailee's deployment plan, site location, permitting timelines, and other preparation activities.

5.1.4 Deployment, Operations, and Maintenance

The deployment, daily operations, and maintenance will be performed by the partner in accordance with the bailee's buoy deployment plan. The bailee shall schedule and facilitate a deployment readiness meeting with PNNL and interested stakeholders prior to deployment. This deployment review hold point shall also include the confirmation of system settings. This hold point will be cleared when bailee demonstrates readiness to deploy and there is agreement on the system configuration. The bailee shall transmit readiness materials to PNNL a week in advance of this meeting.

The bailee shall schedule and facilitate a maintenance readiness meeting with PNNL and interested stakeholders prior to the performance of the 6-month and/or final maintenance activity. This hold point will be cleared when bailee demonstrates readiness to perform the maintenance. The bailee shall transmit readiness materials to PNNL a week in advance of this meeting.

5.1.5 Monthly Monitoring and Reporting

The bailee shall provide monthly reports to PNNL on buoy status, system health, and data collection. These reports can be transmitted via email and are anticipated to be 10 pages or less. An example monthly report is provided on the noted <http://wind.pnnl.gov> site.

5.1.6 Data and Information Sharing

The high frequency data stored on the flash cards shall be retrieved and processed whenever the bailee swaps out the cards (to manage memory capacity) or during 6-month maintenance intervals, whichever comes first. These data shall be transmitted to PNNL (according to the SOW) within one week of data retrieval.

5.1.7 End-of-Deployment Maintenance and Repair

At deployment completion, the bailee will repair and restore the buoy to fully functional condition as verified by an acceptance checklist reviewed and signed off on by PNNL and the bailee. This end-of-deployment transition will be managed through inspection and review and will be documented in a transition package. The bailee shall perform all repairs and maintenance within two months of the retrieval date and facilitate this transition process.

5.2 Summary of Deliverables and Hold Points

Type	Title	Description	Initial Due Date	PNNL Review Duration	Final Due Date
Deliverable	Draft Buoy Deployment Plan	The Buoy Deployment Plan includes descriptions of all activities bailee will perform to execute the full lifecycle deployment.	Revision 0 with application	Application review.	--
Deliverable	Final Buoy Deployment Plan	The bailee shall incorporate comments from the draft review into a final deployment plan.	Revision 1 with bailment agreement	--	Finalized with bailment agreement.
Hold Point	Transition to bailee	Bailor will facilitate this process through development of a transition package including checklists, inspection reports, photos, and other evidence that the buoy is fully functional and ready for transition. This hold point is cleared when both bailor and bailee agree and sign off on the transition package.	--	--	--
Hold Point	Deployment Readiness Review	The bailee will facilitate this process through developing a briefing materials and facilitation of a confererence call. This hold point is cleared when the bailor contracting officer provides agreement in writing (or email) that bailee deployment readiness has been	--	--	--

Type	Title	Description	Initial Due Date	PNNL Review Duration	Final Due Date
		demonstrated.			
Hold Point	6-month Maintenance Readiness Review	Mid-year (and every 6-months) maintenance readiness review. The bailee will facilitate this process through developing a briefing materials and facilitation of a confererence call. This hold point is cleared when the bailor contracting officer provides agreement in writing (or email) that bailee maintenance readiness has been demonstrated.	--	--	--
Hold Point	Retrieval Readiness Review	The bailee will facilitate this process through developing a briefing materials and facilitation of a confererence call. This hold point is cleared when the bailor contracting officer provides agreement in writing (or email) that bailee retrieval readiness has been demonstrated.	--	--	--
Hold Point	Transition Back to PNNL or next Bailee	Bailee will facilitate this process through use of a transition package including checklists, inspection reports, photos, and other evidence that the buoy is fully functional and ready for transition. The bailee may use the same format as that used for the initial transition. This hold point is cleared when both bailor and bailee agree and sign off on the transition package. Ideally, the transition from one user to the next can be implemented seamlessly without intermediate custody. In certain circumstances, it may be necessary for PNNL to take possession of the buoy between campaigns.	--	One week and/or onsite review.	Within two months of retrieval.
Deliverables	Monthly Reporting	Bailee shall provide a monthly report that provides status of operations, maintenance, issues, and project performance.	By 15 th of each month.	N/A	N/A
Notifications	Off-normal System Critical	Bailee shall notify PNNL of system critical condition.	Within 4 hours of confirmed event.	N/A	N/A
Notifications	Off-normal Mission Critiacl	Bailee shall notify PNNL of mission critical condition.	Within 48 hours of confirmed event.	N/A	N/A

END OF DOCUMENT