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NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 02-07

Subj: GUIDANCE ON THE COAST GUARD'S ROLES AND RESPONSIBILITIES FOR OFFSHORE RENEWABLE ENERGY INSTALLATIONS (OREI)

- Ref:
- (a) Memorandum of Understanding between the Minerals Management Service (MMS) – U.S. Department of the Interior and the U.S. Coast Guard – U.S. Department of Homeland Security dated 30 September 2004
  - (b) Cooperating Agency Agreement between the MMS and U.S. Coast Guard for Programmatic Environmental Impact Statement (EIS), Coast Guard e-mail acceptance submitted 7 July 2006
  - (c) The Ports and Waterways Safety Act (PWSA) of 1972 (Public Law 92-340, 86 Stat. 424)
  - (d) Coast Guard and Maritime Transportation Act of 2006 (Public Law 109-241)
  - (e) Navigation and Vessel Inspection Circular (NVIC) No. 9-02, Ch-1, Guidelines for Development of Area Maritime Security Committees and Area Maritime Security Plans for U.S. Ports, COMDTPUB P16700.1
  - (f) Risk-Based Decision-Making (RBDM), COMDTINST M16010.3 (series), and Risk-Based Decision-Making Guidelines, 3rd edition ( <http://www.uscg.mil/hq/g-m/risk/e-guidelines/RBDMGuide.htm> )
  - (g) PAWSA Guide  
([http://www.navcen.uscg.gov/mwv/projects/pawsa/PAWSA\\_Guide.htm](http://www.navcen.uscg.gov/mwv/projects/pawsa/PAWSA_Guide.htm) )

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1. PURPOSE.

The purpose of this Circular is to provide guidance on information and factors the Coast Guard will consider when reviewing an application for a permit to build and operate an Offshore Renewable Energy Installation (OREI) in the navigable waters of the United States. This Circular identifies information that the Coast Guard will consider when evaluating the potential impacts of an OREI in the areas of navigational safety and the traditional uses of waterways and on Coast Guard missions. This will assist the Coast Guard in providing input to Minerals Management Service (MMS) or another lead permitting agency for environmental review and decision making purposes. Additionally, this Circular provides guidance to members of industry, port safety and security stakeholders, and the general public on the Coast Guard's role and responsibilities in the OREI application process.

2. ACTION.

- a. The Coast Guard will be a cooperating agency under the National Environmental Policy Act (NEPA) with MMS or another lead permitting agency considering the issuance of a lease, right of use and easement, or right of way for an OREI. As such, the role of the Coast Guard is limited to providing any such lead permitting agency with an evaluation of the potential impacts of the proposed facility on the safety of navigation and, the traditional uses of the particular waterway and other Coast Guard missions in order for MMS or another lead permitting agency to prepare their Environmental Impact Statement (EIS). The Coast Guard should help develop appropriate terms and conditions that provide for navigational safety and minimize potential impacts on other Coast Guard missions in and around the proposed facility and recommend them to MMS or another lead permitting agency for consideration. The Coast Guard will not approve or disapprove an OREI application. The Coast Guard's role is limited to assessing navigation impacts of an OREI and forwarding such considerations to the lead permitting agency.
- b. Applicants planning to build an OREI are encouraged to refer to this Circular to better understand the Coast Guard review process, provide information to assist the Coast Guard and expedite this process, and for guidance on addressing the necessary marine safety and security issues when preparing their application for submission to MMS or another lead permitting agency.
- c. This Circular will be distributed by electronic means only. It is available on the World Wide Web at <http://www.uscg.mil/hq/g-m/index.htm>.

3. DIRECTIVES AFFECTED. None



#### 4. BACKGROUND.

- a. OREI History: To reduce the United States' dependence on foreign energy supplies, alternative energy sources are being pursued. While much research continues to be done on various forms, recent developments have made the pursuit of renewable energy sources especially attractive. Often these techniques seek to exploit naturally occurring renewable sources such as solar, wind, and hydrodynamic energy. Although no OREIs presently exist in U. S. waters, several are contemplated following the successful demonstration of this technology in other countries around the world including the United Kingdom and Denmark.
- b. Permitting Agency for OREI on the Outer Continental Shelf (OCS): The Department of the Interior (DOI), under the authority of the Energy Policy Act (EPAAct) of 2005, is the lead Federal agency for permitting and approval of OREIs located on the OCS. DOI has delegated this authority to the MMS. Once MMS receives an application for an OREI permit, in accordance with the NEPA, MMS is required to complete an EIS.
- c. Other Permitting Agencies: For OREIs located other than on the OCS, other agencies such as the Army Corps of Engineers (ACoE) or Federal Energy Regulatory Commission (FERC) may be the lead permitting agency. Regardless of who the lead permitting agency is, the Coast Guard's role remains that of providing assistance to the lead permitting agency as described in paragraph 2.a which is to recommend reasonable terms and conditions necessary to provide for navigational safety and minimize potential adverse impacts on Coast Guard missions.
- d. Coast Guard Authority: The Ports and Waterways Safety Act (PWSA) acknowledges that navigation and vessel safety and protection of the marine environment are matters of national importance. The PWSA requires the Coast Guard to conduct studies when indicated to provide safe access routes for vessel traffic in the waters under the jurisdiction of the U. S. In addition, the Coast Guard must take into account all possible uses of the waterways to reconcile the need for safe access routes with the needs of all other uses of the waterways. The Coast Guard plays an important role in assisting MMS and other lead permitting agencies whose activities touch upon Coast Guard missions described above. The Coast Guard will consider the application and make recommendations to MMS or another lead permitting agency concerning the impacts of OREIs.
- e. Involvement of Other Agencies: Other Federal agencies that may be involved in the process include the Departments of Commerce, Defense, Energy, and Transportation, and the Environmental Protection Agency (EPA). In addition, appropriate state agencies and tribal governments may also be involved.

5. DISCUSSION.

- a. OREI Safety Concerns: The concerns caused by the construction and location of an OREI are primarily related to their impacts on marine navigation safety. An OREI's proposed location may physically affect commercial shipping, fishing and/or recreational boating operations, or other traditional uses of the particular waterway. In addition, the OREI may affect the performance of electronic navigation systems used in the maritime environment, including radars and communications systems.
- b. USCG and MMS Cooperation:
- (1) Under authority delegated by DOI, MMS is the permitting agency for OREIs to be located on the OCS. As such MMS will prepare a programmatic EIS. In addition, MMS inherited the responsibility to review proposals which were originally submitted to the ACoE by Cape Wind Associates for a wind turbine park on Nantucket Sound and Long Island Offshore Wind Park (LIOWP), LLC, for a wind turbine park off Long Island, NY. As part of its review process and as lead permitting agency, MMS will develop EISs for these specific projects.
  - (2) MMS invited the Coast Guard to be a cooperating agency under NEPA for both projects as well as for its programmatic EIS. The Coast Guard has agreed to be a cooperating agency under NEPA for the Cape Wind and LIOWP projects, and for MMS' programmatic EIS. The Coast Guard will serve as a subject matter expert for maritime safety, maritime security, maritime mobility, national defense, and protection of natural resources. The Coast Guard will provide MMS with the expertise and resources at the earliest possible time in MMS' NEPA process. Future MMS NEPA documents may be handled in a similar fashion. However, the Coast Guard will determine its cooperating agency role on a case-by-case basis.
  - (3) During MMS' preparation of their NEPA documentation, the Coast Guard should participate at the earliest possible time. This includes "the scoping process" as defined in the Council on Environmental Quality (CEQ) regulations (40 CFR 1501.7).
  - (4) The Coast Guard and MMS recognize the important role that risk management strategies play in ensuring the safe, secure, and environmentally responsible construction and operation of an OREI. Vessel, facility, and waterway navigational safety and security assessments are a key component of the risk management approach. Accordingly, the Coast Guard and MMS have agreed that future OREI applicants, at the time they formally submit their proposal, should commence a navigational safety risk assessment for the proposal. Useful guidance on conducting a navigation assessment such as this can be found in this NVIC.



- (5) The assigned Coast Guard Sector should make contact with MMS as early as possible in the permitting process for an OREI, to identify and establish communications with the Project Manager assigned by MMS.

c. USCG Cooperation:

The Coast Guard, when requested by any lead permitting agency to be a cooperating agency, may agree to be a cooperating agency for the identified project and will serve as a subject matter expert for maritime safety, maritime security, maritime mobility, national defense, and protection of natural resources.

d. Role of the OREI Applicant:

- (1) Applicants should file their applications for an OREI permit to MMS in accordance with regulations or procedures established by MMS or another appropriate lead permitting agency.
- (2) OREI applicants and their environmental and risk assessors evaluate, based on guidance in this NVIC and available information, all navigational issues that could be reasonably foreseeable by which the siting, construction, establishment, operations, maintenance and/or decommissioning of an OREI could 1) cause or contribute to an obstruction of, or danger to, navigation; 2) affect the traditional uses of the particular waterway where the OREI will be located; or 3) impact the Coast Guard's search and rescue mission, or otherwise impair any other Coast Guard missions. Such an evaluation should be reflected in the preparation of applicable assessments, scoping documents, engineering reports, and environmental review documents such as EISs.
- (3) OREI applicants should address and utilize existing studies or any known standard industry practices that have been conducted or created for similar OREIs by other governments or agencies, such as the United Kingdom or Denmark, to determine any applicability of the studies or industry practices for their specific OREI.
- (4) OREI applicants and their environmental and risk assessors should assess potential navigational or communications impacts to any mariners or emergency services providers using the site area and its environment. Those impacts which could contribute to a marine casualty leading to injury, death, or loss of property, either at sea or among the population ashore, should be highlighted as well as those affecting emergency services. Consultation with Federal, State, and local search and rescue authorities should be initiated and consideration given to the types of vessels and equipment which might be used in emergencies. This should include the possible use of OREI structures as emergency refuges.
- (5) Additional assessments should be made of the consequences of vessels deviating from normal routes or recreational craft entering shipping routes in order to avoid

proposed sites. Special regard should be given to evaluating situations which could lead to safety of navigation being compromised (e.g., an increase in risk of collision, reduction in sea-room or water depth for maneuvering, etc).

e. Risk Management and Standards:

- (1) Since the risk factors for OREIs vary significantly from location to location, it is not possible to create a “one-size-fits-all” policy. Rather, the applicant should use a risk-based approach when evaluating the impact its OREI will have on the particular waterway being considered. This risk analysis should address two major areas of concern: 1) navigational safety and the impact on traditional uses of the particular waterway where the OREI will be located; and 2) impacts on other Coast Guard missions. Depending on the complexities of the waterway and range of stakeholders involved, the applicant is encouraged to consult with appropriate stakeholders concerning navigational safety issues and the adequacy of its risk assessment. More specific guidance on the risk assessment process is provided in enclosures (4) through (8). Risk management guidance, which lists risk factors and mitigating strategies, is provided in enclosure (9). Further guidance on risk assessment can be found in reference (f).
- (2) The effective management of risks begins with a sound understanding of the hazards. OREIs can adversely affect navigational safety. Therefore, the issues related to navigational safety as described in enclosures (4) through (8) are the primary focus of the risk assessment. The recommended risk assessment approach is a “change analysis” technique whereby the potential impacts of the OREI can be considered and compared to the baseline situation. The risks associated with the proposed OREI should be assessed and appropriate risk mitigation strategies should be developed and evaluated. Guidance on performing a change analysis is contained in reference (f).
- (3) In order for the Coast Guard to evaluate a risk assessment and provide MMS appropriate recommendations, it is important that the data considered is described, the experts consulted are identified, and the assumptions made are thoroughly explained. To evaluate the risk assessment, consideration must be paid to the suitability of the approach; the appropriateness, reliability, and validity of the data; and any potential biases that might influence the expert’s judgment or conclusions. In addition, the uncertainty associated with the estimates should be described and a sensitivity analysis of the key assumptions performed. The sensitivity analysis should include worst-case scenarios.

- f. Stakeholder Involvement: The navigational safety risk assessment process should be conducted in cooperation and consultation with a wide range of Federal, State, and local agencies; local maritime industry representatives; and the general public. Specific groups to consider include representatives of the fishing industry; recreational boating; passenger vessels; tug and barge companies; large commercial vessels; pilots; port authorities;



waterfront facility owners and operators; law enforcement personnel; emergency responders; environmental groups; and any other stakeholders for the waterway in which the OREI will be placed.

6. IMPLEMENTATION.

After an applicant files an application with MMS or the proper lead permitting agency in accordance with their applicable regulations/requirements:

MMS or the lead permitting agency will—

- Advise Commandant (CG-3PWN-4) of the receipt of an application.
- Forward the application or parts of it as appropriate to Commandant (CG-3PWN-4).
- Inform Commandant (CG-3PWN-4) that it has advised the applicant of the availability of this NVIC.

Commandant (CG-3PWN-4) will—

- Acknowledge receipt of the application to MMS or lead permitting agency.
- Forward a copy of the application to the appropriate Coast Guard Area Commander within whose Area of responsibility (AOR) the OREI will be located.
- Provide assistance with interpreting/validation of technical data submitted by the applicant if requested by the Sector, District, or Area Commander.
- Provide MMS or the lead permitting agency with the name of the Sector's Point of Contact (POC) and authorize direct liaison between the Sector and MMS or the lead permitting agency.
- Review the Area and District Commanders' recommendations that include proposed terms, conditions, and mitigation measures.
- Provide a final package containing the Coast Guard's recommendations that include proposed terms, conditions and mitigation measures to MMS or the lead permitting agency.

Area Commanders will—

- Review the application and forward to the appropriate District Commander within whose AOR the OREI will be located.
- Obtain from the District Commander and provide to Commandant (CG-3PWN-4) the name of the Sector POC.
- Review and forward, with endorsement, the District Commander's recommendations that include proposed terms, conditions, and mitigation measures.

District Commanders will—

- Identify the Sector and its POC who will be responsible to review the application per this NVIC and provide this information to Commandant (CG-3PWN-4) and the Area Commander.
- Review the Sector's input.
- Forward the Sector's recommendations to include proposed terms, conditions, and mitigation measures with endorsement to Commandant (CG-3PWN-4), via the Area Commander.

Sector Commanders will—

- Consult with stakeholders as appropriate.
- Work with the applicant in the review of the application.
- Work with MMS or the lead permitting agency as necessary in the review of the application.
- Provide recommendations that include proposed terms, conditions, and mitigation measures concerning the OREI to the District office.

Enclosure (2) provides a flow/milestone table.

7. **DISCLAIMER.** Each Coast Guard Sector has discretionary authority over how best to address specific safety and security concerns within their AOR. Nothing in this NVIC is meant to override or subvert the discretion of the Sector when addressing the unique safety and security concerns for an OREI operation within their AOR. While the guidance in this document may assist industry, the general public, the Coast Guard, as well as other Federal and State regulators in applying statutory and regulatory requirements, the guidance is not a substitute for applicable legal requirements, nor is it a regulation itself. Thus, it is not intended to nor does it impose legally binding requirements on any party, including the Coast Guard, other Federal or State agencies, or the regulated community.
8. **CHANGES.** This Circular will be posted on the web at [www.uscg.mil/hq/g-m/nvic/index00.htm](http://www.uscg.mil/hq/g-m/nvic/index00.htm). Changes to this Circular will be issued as necessary. Suggestions for improvements of this circular should be submitted in writing to Commandant (CG-3PWN-4).



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Rear Admiral, U.S. Coast Guard  
Assistant Commandant for Prevention

Encl:

- (1) Glossary
- (2) Flow/Milestone Table



- (3) Timeline for OREI Process
- (4) Guidance on Conducting and Reviewing a Navigational Risk Safety Assessment
- (5) Facility Characteristics
- (6) Waterway Characteristics
- (7) Maritime Traffic and Vessel Characteristics
- (8) Coast Guard Mission Considerations
- (9) Example Risk Mitigation Strategies

## GLOSSARY

*Allision*: The act of striking or collision of a moving vessel against a stationary object.

*Area to Be Avoided (ATBA)*: A routing measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all vessels, or certain classes of vessels.

*Limited Access Area*: Can be a safety zone or a security zone as defined in 33 CFR part 165.

*Marine Current Turbine*: A submerged water turbine that would extract energy from ocean currents. These turbines would have rotor blades, a generator for converting the rotational energy into electricity, and a means of transporting the electrical current to shore for incorporation into the electrical grid. Marine current turbines are also known as a Tidal In Stream Energy Conversion (TISEC) devices.

*Navigational Safety Risk Assessment (NSA)*: A comprehensive, systematic process for identifying hazards to navigation that could be created by the proposed OREI. Coordinated by the OREI developer, it evaluates the magnitude of the risks associated with the hazards and identifies and evaluates the effectiveness of control measures that can be used to mitigate the risks.

*Offshore Renewable Energy Installation (OREI)*: A facility placed in the navigable waters of the United States that creates electricity by using sources other than oil or gas.

*Regulated Navigation Area (RNA)*: A water area within a defined boundary for which regulations for vessels navigating within the area have been established under 33 CFR part 165.

*Renewable Energy Source*: Source of energy used by an OREI such as, but not limited to, wind, wave, current or solar.

*Routing System*: Any system of one or more routes or routing measures aimed at reducing the risk of casualties; it includes traffic separation schemes, two-way routes, recommended tracks, areas to be avoided, no anchoring areas, inshore traffic zones, roundabouts, precautionary areas, and deep-water routes.

*Vessel*: Every description of water craft, including nondisplacement craft, WIG craft (International – 72 COLREGS only), and seaplanes, used or capable of being used, as a means of transportation on water.

*Wave Generator*: A wave power device that extracts energy directly from the surface motion of ocean waves or from pressure fluctuations below the surface.

*Wind Park or Farm*: A cluster of wind turbines for driving electrical generators.



**FLOW/MILESTONE TABLE**

<b>MILESTONE</b>	<b>ACTION</b>	<b>RESPONSIBLE OFFICE/AGENCY</b>
1	Receive application and advise Commandant	MMS or other lead permitting agency
2	Forward application to Commandant	MMS or other lead permitting agency
3	Advise applicant of availability of NVIC and advise Commandant	MMS or other lead permitting agency
4	Acknowledge receipt of application to MMS or lead permitting agency	Commandant (CG-3PWN-4)
5	Forward copy of application to Area Commander and authorize direct liaison (DIRLAUTH) as necessary	Commandant (CG-3PWN-4)
6	Review application and forward to appropriate District Commander	Area Commander
7	Identify Sector and POC responsible to review application and advise Commandant and Area Commander	District Commander
8	Review application	Sector
9	Work with applicant	Sector
10	Consult stakeholders	Sector
11	Liaison with MMS or lead permitting agency	Sector
12	Provide recommendations that include proposed terms, conditions, and mitigation measures to District Commander	Sector
13	Review Sector's input	District Commander
14	Forward Sector's recommendations that include proposed terms, conditions, and mitigation measures with endorsement to Area Commander	District Commander
15	Forward District Commander's recommendations that include proposed terms, conditions, and mitigation measures with endorsement to Commandant (CG-3PWN-4)	Area Commander
16	Review Area and District Commanders' recommendations that include proposed terms, conditions, and mitigation measures	Commandant (CG-3PWN-4)
17	Develop final package of Coast Guard's recommendations that include proposed terms, conditions, and mitigation measures	Commandant (CG-3PWN-4)
18	Forward package to MMS or other lead permitting agency	Commandant (CG-3PWN-4)

### **TIMELINE FOR OREI PROCESS**

Timelines for submitted applications will be coordinated and created between MMS or the appropriate lead permitting agency and the Coast Guard after an application is received. As the review process matures and the various organizations gain experience in handling and processing applications, timelines will become better defined and established for OREIs in general or by specific OREI types by MMS or another lead permitting agency.



## **GUIDANCE ON CONDUCTING AND REVIEWING A NAVIGATIONAL SAFETY RISK ASSESSMENT**

Navigation safety requires that mariners be able to determine their position, determine a safe course to steer, be aware of unseen dangers, be able to determine if risk of collision exists, and be able to take action to avoid collision.

Navigation safety would be impacted by an Offshore Renewable Energy Installation (OREI) if the OREI impairs the mariner's ability to do any of the above.

In order to make appropriate recommendations on the impacts to navigation safety, the Coast Guard needs to know the characteristics and number of waterway users, the routes used, the channel dimensions, bottom conditions, etc., in the area of the proposed OREI.

In order to assess the impact on navigation safety, the applicant should perform a systematic assessment of the risks to navigation safety associated with the proposed project. The risk assessment should be performed in accordance with the Coast Guard's Risk-Based Decision-Making (RBDM) Guidelines or other suitable industry standards for risk assessment. As part of the assessment, the applicant should identify impacts on navigational safety and assess the increase in risk associated with the proposed OREI. In addition, the risk assessment should identify and evaluate potential measures that could be implemented to mitigate the increased risks associated with the proposed project (see Enclosure (9) for examples). At a minimum, the risk assessment should consider the impact and significance of the appropriate factors (e.g., vessel, waterway, and traffic characteristics) as described in the enclosures. Early and continued involvement of the affected stakeholders in the risk assessment process is strongly recommended.

In assessing a proposed OREI's impact on vessel navigation and other safety concerns, the applicant should address, at a minimum, the following:

### **1. Visual Navigation and Collision Avoidance**

The applicant should assess the extent to which:

- a. Structures could block or hinder the view of other vessels underway on any route.
- b. Structures could block or hinder the view of the coastline or of any other navigational feature such as aids to navigation, landmarks, promontories, etc.
- c. Structures and locations could limit the ability of vessels to maneuver in order to avoid collisions.

### **2. Communications, Radar, and Positioning Systems**

The applicant should provide researched opinion of a generic and, where appropriate, site specific nature concerning whether or not—

a. Structures could produce radio interference such as shadowing, reflections or phase changes, with respect to any frequencies used for aviation, marine positioning, navigation, or communications, including Automatic Identification Systems (AIS), whether ship borne, ashore, within aircraft, or fitted to any of the proposed structures.

b. Structures could produce radar reflections, blind spots, shadow areas or other adverse effects:

- (1) Vessel to vessel;
- (2) Vessel to shore;
- (3) Vessel Traffic Service radar to vessel;
- (4) Radio Beacons (RACONS) to/from vessel;
- (5) Aircraft and Air Traffic Control.

c. The OREI, in general, would comply with current recommendations concerning electromagnetic interference.

d. Structures and generators might produce sonar interference affecting fishing, industrial, or military systems used in the area.

e. Site might produce acoustic noise or noise absorption or reflections which could mask or interfere with prescribed sound signals from other vessels or aids to navigation.

f. Structures, generators, and the seabed cabling within the site and onshore might produce electro-magnetic fields affecting compasses and other navigation systems.

g. The power and noise generated by an OREI above or below the water would create physical risks that would affect the health of vessel crews.



## FACILITY CHARACTERISTICS

In addition to addressing the risk factors detailed in Enclosure 4, the Navigational Safety Risk Assessment (NSA) should include a description of the following characteristics related to the proposed OREI:

### 1. Marine Navigational Marking

The applicant should determine--

- a. How the overall site would be marked by day and by night taking into account that there may be an ongoing requirement for marking on completion of decommissioning, depending on individual circumstances.
- b. How individual structures on the perimeter of and within the site, both above and below the sea surface, would be marked by day and by night.
- c. If the site would be marked by one or more Radar Beacons (RACONS) and/ or, an Automatic Identification System (AIS) transceiver, and if so, the data it would transmit.
- d. If the site would be fitted with a sound signal, the characteristics of the sound signal, and where the signal or signals would be sited.
- e. Whether the proposed site and/or its individual generators would comply in general with markings for such structures, as required by the Coast Guard or recommended by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), respectively.
- f. Whether its plans to maintain its aids to navigation are such that the Coast Guard's availability standards (i.e., "on station and watching properly") are met at all times. Separate detailed guidance to meet any unique characteristics of a particular OREI proposal should be addressed by the respective District Aids to Navigation branch.
- g. The procedures that need to be put in place to respond to and correct casualties to the aids to navigation required by the Coast Guard, within the timeframes specified by the Coast Guard.
- h. How the marking of the OREI will impact existing Federal aids to navigation in the vicinity of the OREI.

## **2. Standards and Procedures for OREI Shutdown in the Event of a Search and Rescue, Pollution, or Security Operation**

### **A. Wind Park**

(1) Design Requirements: The wind park should be designed and constructed to satisfy the following recommended design requirements for emergency rotor shut-down in the event of a search and rescue (SAR), counter pollution, or salvage operation in or around a wind park:

(a) All wind turbine generators (WTGs) should be marked with clearly visible unique identification characters (e.g., alpha-numeric labels such as "A1," "B2."). The identification characters should each be illuminated by a low-intensity light visible from a vessel, or be coated with a phosphorescent material, thus enabling the structure to be detected at a suitable distance to avoid a collision with it. The size of the identification characters in combination with the lighting or phosphorescence should be such that, under normal conditions of visibility and all known tidal conditions, they are clearly readable by an observer, and at a distance of at least 150 yards from the turbine. It is recommended that, if lighted, the lighting for this purpose be hooded or baffled so as to avoid unnecessary light pollution or confusion with navigation aids. (Precise dimensions to be determined by the height of lights and necessary range of visibility of the identification numbers).

(b) All WTGs should be equipped with control mechanisms that can be operated from an operations center of the wind park.

(c) Throughout the design process for a wind park, appropriate assessments and methods for safe shutdown should be established and agreed to through consultation with the Coast Guard and other emergency support services.

(d) The WTG control mechanisms should allow the operations center personnel to fix and maintain the position of the WTG blades as determined by the applicable Coast Guard command center.

(e) Nacelle hatches should be capable of being opened from the outside. This would allow rescuers (e.g. helicopter winch-man) to gain access to the tower if tower occupants are unable to assist or when sea-borne approach is not possible.

(f) Access ladders, although designed for entry by trained personnel using specialized equipment and procedures for turbine maintenance in calm weather, could conceivably be used in an emergency situation to provide refuge on the turbine structure for distressed mariners. This scenario should therefore be considered when identifying the optimum position of such ladders and take into account the prevailing wind, wave, and tidal conditions.



(2) Operational Requirements: Operation of all OREIs should be continuously monitored by the facility's owners/operators, ostensibly in an operations center. Recommended minimum requirements for an OREI operations center are:

- (a) The operations center should be manned 24 hours a day.
- (b) The operations center personnel should have a chart indicating the Global Positioning System (GPS) position and unique identification numbers of each of the WTGs in the wind park.
- (c) All applicable Coast Guard command centers (Sector and District) will be advised of the contact telephone number of the OREI's operations center.
- (d) All applicable Coast Guard command centers will have a chart indicating the GPS position and unique identification number of each of the WTGs in all wind parks.

(3) Operational Procedures:

- (a) Upon receiving a distress call or other emergency alert from a vessel that is concerned about a possible allision with a WTG or is already close to or within the wind park, the Coast Guard Search and Rescue Mission Coordinator (SMC) will establish the position of the vessel and the identification numbers of any WTGs visible to the vessel. The position of the vessel and identification numbers of the WTGs will be passed immediately to the OREI's operations center by the SMC.
- (b) The OREI's operations center should immediately initiate the shut-down procedure for those WTGs as requested by the SMC, and maintain the WTG in the appropriate shut-down position, again as requested by the SMC, until receiving notification from the SMC that it is safe to restart the WTG.
- (c) Communication and shutdown procedures should be tested satisfactorily at least twice each year.
- (d) After an allision, the applicant should submit documentation that verifies the structural integrity of the WTG. Reports should be made in accordance with the Marine Casualty Regulations in 46 Code of Federal Regulations Part 4.

#### **B. Marine Current Turbine**

This section TO BE DEVELOPED.

#### **C. Wave Generator**

This section TO BE DEVELOPED.

**D. Solar**

This section TO BE DEVELOPED.



## WATERWAY CHARACTERISITICS

In assessing a proposed OREI's impact on vessel navigation and other safety concerns, the applicant should address, at a minimum, the following:

### 1. The Effect of Tides, Tidal Streams, and Currents

The applicant should determine whether or not--

- a. Current maritime traffic flows and operations in the general area are affected by the depth of water in which the proposed OREI is situated at various states of the tide i.e. whether the installation could pose problems at high water which do not exist at low water conditions, and vice versa.
- b. Current maritime traffic flows and operations in the general area are affected by existing currents in the area in which the proposed OREI is situated.
- c. Set and rate of the tidal stream, at any state of the tide, have a significant affect on vessels in the area of the OREI site.
- d. Current directions/velocities might aggravate or mitigate the likelihood of allision with the OREI.
- e. The maximum rate tidal stream runs parallel to the major axis of the proposed site layout, and, if so, its effect.
- f. The set is across the major axis of the layout at any time, and, if so, at what rate.
- g. In general, whether engine failure or other circumstance could cause vessels to be set into danger by the tidal stream or currents.
- h. Structures themselves could cause changes in the set and rate of the tidal stream or direction and rate of the currents.
- i. Structures in the tidal stream could be such as to produce siltation, deposition of sediment or scouring, any other suction or discharge aspects, which could affect navigable water depths in the OREI area or adjacent to the area.
- j. Structures would cause danger and/or severely affect the air column, water column, seabed and sub-seabed in the general vicinity of the OREI.

## **2. Weather**

The applicant should conduct an analysis of expected weather conditions, water depths and sea states that might aggravate or mitigate the likelihood of collision with the OREI. This analysis should also determine if--

- a. The site, in normal, bad weather, or restricted visibility conditions, could present difficulties or dangers to vessels, which might pass in close proximity to it.
- b. The structures could create problems in the area for vessels under sail, such as wind masking, turbulence, or sheer.

## **3. Ice**

Depending on the location of the OREI and the presence of cold weather, ice and/or icing may cause problems.

- a. A thorough analysis of the potential for ice to form on the watersheet should be conducted by the applicant, and the analysis should indicate whether the presence of the OREI would mitigate or exacerbate future icing.
- b. An analysis of the ability for OREIs to withstand anticipated ice floes should be conducted by the applicant.
- c. An analysis of the likelihood that ice may form on the OREI, especially those types that have rotating blades such as a Wind Turbine Generator (WTG), should be conducted by the applicant, and should include an analysis of the ability of the OREI to withstand anticipated ice accumulation on the structures, and potential for ice to be thrown from the blades, and the likely consequences of that happening and possible actions to mitigate that occurrence.



## MARITIME TRAFFIC AND VESSEL CHARACTERISTICS

In assessing a proposed OREI's impact on vessel navigation and other safety concerns, the applicant should address, at a minimum, the following:

The applicant should ensure that the risk assessment addresses, but is not limited to, the following elements:

**1. Traffic Survey:** A recent (within 12 months of publication of the Navigational Safety Risk Assessment) traffic survey of the area for the proposed OREI should be conducted. This survey should include all vessel types and cover a minimum of one year's consecutive time, in order to take into account seasonal variations in traffic patterns. These variations should be determined in consultation with representative recreational and fishing vessel organizations, pilot organizations, the commercial maritime industry and, where appropriate, port authorities. While recognizing that site-specific factors need to be taken into consideration, any such survey should, in general, assess:

- a. Proposed OREI site relative to areas used by any type of vessel.
- b. Numbers, types (deep draft, shallow draft, fishing, recreation, high speed craft, ferries), sizes (length, width, height, draft, tonnage), and other characteristics (speed capability, navigation carriage equipment, number of authorized passengers) of vessels presently using such areas.
- c. Types of cargo carried by vessels presently using such areas.
- d. Non-transit uses of the areas, e.g. fishing, day cruising of leisure craft, racing, marine regattas and parades, aggregate dredging, etc.
- e. Whether these areas contain transit routes used by coastal or deep-draft vessels, ferry routes, and fishing vessel routes.
- f. Alignment and proximity of the site relative to adjacent shipping lanes.
- g. Whether the nearby area contains prescribed or recommended routing measures or precautionary areas.
- h. Whether the site lies on or near a prescribed or conventionally accepted separation zone between two opposing routes or traffic separation scheme.
- i. Proximity of the site to anchorage grounds or areas, safe haven, port approaches, and pilot boarding or landing areas.
- j. The ability of vessels to anchor within the vicinity of an OREI field.

- k. Whether the site lies within the limits of jurisdiction of a port and/or navigation authority.
  - l. Proximity of the site to offshore firing/bombing ranges and areas used for any marine military purposes.
  - m. Proximity of the site to existing or proposed offshore oil/gas platform, marine aggregate dredging, marine archaeological sites or wrecks, or other exploration/exploitation sites.
  - n. Proximity of the site relative to any designated areas for the disposal of dredging spoil.
  - o. Proximity of the site to aids to navigation and/or Vessel Traffic Services (VTS) in or adjacent to the area and any impact thereon.
  - p. Researched opinion using computer simulation techniques with respect to the displacement of traffic and, in particular, the creation of 'choke points' in areas of high traffic density.
  - q. Seasonal variations in traffic.
2. **Risk of Collision, Allision, or Grounding:** Based on the data collected per paragraph 1 above, an evaluation should be conducted to determine the risk of collision between vessels colliding, alliding, or grounding because of the establishment of an OREI, including, but not limited to--
- a. Likely frequency of collision;
  - b. Likely consequences of collision ("What if" analysis);
  - c. Likely location of collision;
  - d. Likely type of collision;
  - e. Likely vessel type involved in collision;
  - f. Likely frequency of allision;
  - g. Likely consequences of allision ("What if" analysis);
  - h. Likely location of allision;
  - i. Likely vessel type involved in allision;
  - j. Likely frequency of grounding;
  - k. Likely consequences of grounding ("What if" analysis);



- l. Likely location of grounding; and
- m. Likely vessel type involved in grounding.

3. **OREI Structures:** It should be determined:

- a. Whether any features of the OREI, including auxiliary platforms outside the main generator site and cabling to the shore, could pose any type of difficulty or danger to vessels underway, performing normal operations, or anchoring. Such dangers would include clearances of wind turbine blades above the sea surface, the least depth of current turbine blades, the burial depth of cabling, its anchor fields, etc.

Note: Recommended minimum safe (air) clearances between sea level conditions at Mean Higher High Water (MHHW) and wind turbine rotors are that they should be suitable for the vessels types identified in the traffic survey. Depths, clearances, and similar features of other OREI types which might affect navigation safety and other Coast Guard missions should be determined on a case by case basis.

- b. Whether any feature of the installation could create problems for emergency rescue services, including the use of lifeboats, helicopters and emergency towing vessels (ETVs). How rotor blade rotation and power transmission, etc., will be controlled by the designated services when this is required in an emergency.
- c. Whether any noise or vibrations generated by an OREI above and below the water column would impact navigation safety or affect other Coast Guard missions.
- d. The ability of an OREI to withstand collision damage by vessels without toppling for a range of vessel types, speeds, and sizes.

4. **Assessment of Access to and Navigation Within, or Close to, an OREI:** To determine the extent to which navigation would be feasible within the OREI site itself by assessing whether:

- a. Navigation within the site would be safe—
  - (1) By all vessels; or
  - (2) By specified vessel types, operations and/or sizes.
  - (3) In all directions or areas; or
  - (4) In specified directions or areas.
  - (5) In specified tidal, weather or other conditions; and
  - (6) At any time, day or night.

- b. Navigation in and/or near the site should be—
  - (1) Prohibited by specified vessel types, operations and/or sizes;
  - (2) Prohibited in respect to specific activities;
  - (3) Prohibited in all areas or directions;
  - (4) Prohibited in specified areas or directions;
  - (5) Prohibited in specified tidal or weather conditions;
  - (6) Prohibited during certain times of the day or night; or
  - (7) Recommended to be avoided.
  
- c. Exclusion from the site could cause navigational, safety, or transiting problems for vessels operating in the area.



## COAST GUARD MISSIONS CONSIDERATIONS

To determine the impact on Coast Guard missions an applicant should conduct assessments on the listed Coast Guard missions that address, at a minimum, the following:

1. **Search and Rescue:** The Coast Guard will assist in gathering and providing this information in response to an applicant's request.
  - a. How many search and rescue cases has the CG conducted in the proposed OREI region over the last ten years?
  - b. How many of these cases involved helicopter hoists?
  - c. How many were at night or in poor visibility/low ceiling?
  - d. How many of these cases involved aircraft (helicopter, fixed-wing) searches?
  - e. How many times have commercial salvors (e.g., BOAT US, SEATOW, commercial tugs) responded to assist vessels in the proposed OREI region over the last ten years?
  - f. What number of additional SAR cases is projected due to allisions with the structures?
  - g. Will the OREI prevent the search and rescue unit from being ready to proceed within 30 minutes of notification of a distress?
  - h. Will the OREI prevent the search and rescue unit from being on scene at datum, or within the search area, within 90 minutes of getting underway?
  
2. **Marine Environmental Protection/Response:**
  - a. How many marine environmental/pollution response cases has the CG conducted in the proposed OREI region over the last ten years?
  - b. What type of pollution cases were they?
  - c. What type and how many assets responded?
  - d. How many additional pollution cases are projected due to allisions with the structures?
  - e. Will the OREI prevent response units from performing their mission per Coast Guard response standards?
  - f. Will the OREI prevent the pollution unit(s) from being on scene at datum, or within the area of pollution within 90 minutes of getting underway?

### **EXAMPLE RISK MITIGATION STRATEGIES**

Mitigation and safety measures will be applied to the OREI development appropriate to the level and type of risk determined during the Environmental Impact Statement (EIS) process.

1. Promulgation of information and warnings through notices to mariners and other appropriate media.
2. Continuous watch by multi-channel VHF, including Digital Selective Calling (DSC).
3. Safety zones of appropriate configuration, extent and application to specified vessels.
4. Designation of the site as an area to be avoided (ATBA).
5. Implementation of routing measures within or near the development.
6. Monitoring by radar, AIS, and/or closed circuit television (CCTV).
7. Appropriate means to notify and provide evidence of the infringement of safety zones or ATBAs.
8. Determine minimum distance of OREI structures from shipping routes.
9. Any other measures and procedures considered appropriate in consultation with other stakeholders.