



Interim Information Sheet for Potential Permit Applicants

Permitting Process for Proposed mCDR and mSRM Activities in Ocean Waters under the *Marine Protection, Research, and Sanctuaries Act*

**Environmental Protection Agency Marine Protection Permitting Program
October 29, 2024**

Marine carbon dioxide removal (mCDR) and marine solar radiation management (mSRM) techniques are being considered for their potential to mitigate climate change or its adverse effects. Some mCDR and mSRM activities, including ocean-based research, may involve the transportation and disposition of material in ocean waters and would require a *Marine Protection, Research, and Sanctuaries Act* permit issued by the U.S. Environmental Protection Agency. For more information on these techniques and the applicability of the MPRSA to such activities, please visit the [EPA's webpages on mCDR and mSRM](#).

This document provides information for potential permit applicants and other interested entities on the permitting process for proposed mCDR or mSRM activities subject to the MPRSA, including:

- I. Background information on the MPRSA and MPRSA permit categories
- II. Contents of an MPRSA permit application
- III. Overview of the MPRSA permitting process and timeline
- IV. Contents of MPRSA permits issued by the EPA

I. **BACKGROUND: MPRSA Permits and mCDR and mSRM Activities**

The MPRSA is the United States law regulating the transportation and disposition of any material into ocean waters¹, unless expressly excluded. The MPRSA prohibits or restricts disposition in the ocean that would adversely affect human health, welfare, amenities, the marine environment, ecological systems or economic potentialities. Under the MPRSA, the EPA is responsible for establishing criteria for reviewing and evaluating permit applications and for issuing MPRSA permits for all materials other than dredged material². The MPRSA also directs

¹"Ocean waters" include the open seas lying seaward of the "baseline" from which the "territorial seas" are measured. The baseline is the mean lower low water line (or ordinary low water mark) along the coast, including the beach, or "closing lines" that are drawn on maps across rivers mouths and openings of bays and that are depicted on official United States Nautical Charts.

² Under section 103 of the MPRSA, the U.S. Army Corps of Engineers is the permitting authority for the ocean dumping of dredged materials. MPRSA permits and federal projects involving ocean dumping of dredged material are subject to EPA review and concurrence.

the EPA to identify, designate and manage MPRSA ocean sites for disposition of all types of materials. The MPRSA regulations are published at 40 Code of Federal Regulations parts 220-229. The MPRSA regulations include the criteria and procedures for MPRSA permits and for the selection, designation and management of MPRSA ocean sites.

In the United States, the MPRSA implements the requirements of the *London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention)*, one of the first international agreements for the protection of the marine environment from human activities. The United States has also signed, but not yet ratified, the *1996 London Protocol*—the newer marine protection treaty intended to modernize and eventually replace the *London Convention*. Through the *London Convention* and *London Protocol*, governments worldwide have taken specific steps to address potential harm to the marine environment from activities intended to reduce carbon dioxide in the atmosphere or mitigate its adverse effects. For more information on *London Convention* and *London Protocol* activities, [visit the EPA's MPRSA website on international treaties](#).

Do I need an MPRSA permit for my proposed activities?

Proposed mCDR and mSRM activities that involve the transportation and dumping (disposition) of material in ocean waters generally require an MPRSA permit. For general information on the applicability of MPRSA to mCDR and mSRM activities, please visit the [EPA's webpages on mCDR and mSRM permitting](#).

As described in MPRSA Section 101 and the implementing regulations at [40 C.F.R. part 220](#), an MPRSA permit may be required for:

- A U.S. vessel or aircraft transporting material to dump it into ANY ocean waters.
- A U.S. department, agency or instrumentality transporting material to dump it into ANY ocean waters.
- Anyone transporting material from the U.S. to dump it into ANY ocean waters.
- Anyone dumping material transported from outside the U.S. into the U.S. territorial sea or into the contiguous zone to the extent that it may affect the territorial sea or a territory of the United States.

Key Definitions

As provided in the MPRSA 33. U.S. Code Section 1402:

Dumping is defined broadly as “a disposition of material...” with specific exemptions and encompasses both disposal and non-disposal purposes.

Material is defined as “matter of any kind or descriptions...” with certain exclusions.

For questions regarding the applicability of MPRSA to proposed mCDR or mSRM activities, please email EPAMarineCDR@epa.gov. Early communication with the EPA helps potential applicants determine whether a proposed activity is subject to the MPRSA and which category of MPRSA permit would be appropriate.

What are the categories of MPRSA permits most relevant to mCDR and mSRM?

MPRSA permit categories have different purposes and therefore have different application requirements, permit terms and location specifications. Entities considering the disposition of material into ocean waters while conducting mCDR or mSRM research would likely seek authorization under a research permit. A special permit may be more suitable for longer-term, larger-scale activities, while a general permit may be more suitable for small-quantity activities that would have minimal adverse environmental impact. The table below summarizes the key differences among these three MPRSA permit categories as described in [40 C.F.R. 220.3](#) and [40 C.F.R. 228.4](#). Additional information is available on [the EPA’s MPRSA permitting website](#).

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| <p>MPRSA Research Permits Example of an MPRSA research permit</p> | <p>Description: For the disposition of materials into ocean waters as part of a research project when it is determined that the scientific merit of the proposed project outweighs the potential environmental or other damage that may result. Research permits cannot be issued for disposition of prohibited materials¹ or for any prohibited constituents except as trace contaminants², unless subject to the exclusion in 40 C.F.R 227.6(g). A research permit may be issued for a term of up to 18 months, with the possibility of renewal.</p> <p>Authorized location: Locations for materials released into ocean waters under a research permit are proposed by the permit applicant and assessed for approval by the EPA. Locations for research permits would depend on the nature of the proposed study. The EPA considers the general³ and specific⁴ criteria when evaluating potential study areas (research locations) and selecting a preferred location to minimize any potential adverse impacts to the marine environment or other ocean uses. The approved location is specified as a condition in the permit (40 C.F.R. 228.4).</p> |
| <p>MPRSA Special Permits Examples of MPRSA special permits</p> | <p>Description: For disposition of materials in ocean waters when the proposed activity satisfies the EPA’s marine protection criteria⁵. Special permits cannot be issued for prohibited materials¹ or for any prohibited constituents except as trace contaminants². A special permit may be issued for a term not to exceed three years, with the possibility of renewal thereafter.</p> <p>Authorized location: For special permits, the EPA designates ocean sites for authorized disposition of materials (MPRSA ocean sites) through rulemaking published in 40 C.F.R. Part 228. The site designation process includes environmental studies of the site and</p> |

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| | <p>surrounding area and typically entails assessment of alternatives consistent with the <i>National Environmental Policy Act</i>. Designated MPRSA ocean sites are precise geographic areas within which ocean disposition is permitted subject to specific conditions of an individual MPRSA special permit. Site designations are based on detailed environmental studies of the proposed site and regions adjacent to the site, as well as historical knowledge of the impact of disposition on areas similar in physical, chemical and biological characteristics. Designated MPRSA ocean sites are required to have a site management and monitoring plan.</p> |
| <p>MPRSA General Permits Example of an MPRSA general permit</p> | <p>Description: The EPA may issue a general permit under the MPRSA for the disposition of materials into ocean waters that will have a minimal adverse environmental impact and are generally released in small quantities. General permits cannot be issued for prohibited materials¹ or for any prohibited constituents except as trace contaminants². A general permit may be issued for a term not to exceed seven years, with the possibility of renewal thereafter.</p> <p>Authorized location: The geographical areas or regions where materials may be released under a general permit are specified as a condition in the general permit. General permits do not require a separate MPRSA ocean site designation or selection.</p> |
| <p>¹ 40 C.F.R. 227.5 ² 40 C.F.R. 227.6 ³ 40 C.F.R. 228.5 ⁴ 40 C.F.R. 228.6 ⁵ 40 C.F.R. 220 – 228 ⁶ 40 C.F.R. 228.4</p> | |

II. Contents of MPRSA Permit Applications for Proposed mCDR and mSRM Activities

Potential applicants should familiarize themselves with the requirements of the MPRSA regulations found in [40 C.F.R. parts 220-228](#) and, in particular, the permit application requirements described in [40 C.F.R. part 221](#).

After reviewing the information contained in the regulations and this document, the EPA encourages potential permit applicants to contact the EPA by emailing EPAMarineCDR@epa.gov before submitting any application materials.

What is the administrative record for an MPRSA permit?

Data and information received by the EPA that are relevant to MPRSA permit-related decisions are retained within the Agency's record-keeping system as the **administrative record**. A subset of the EPA's administrative record becomes part of the public docket created to document the EPA's decisions. The information in the docket may include: the complete permit application, as determined by the EPA; the proposed permit; public comments and EPA responses to comments; and the EPA's basis for its decisions, including documentation of analyses and consultations required under other federal statutes.

MPRSA permit applications provide sufficient information for the EPA to:

- Develop appropriate permit conditions, controls, monitoring requirements and safety precautions.
- Develop a clear and informative public notice describing the proposed disposition of materials; the reasons for the disposition of materials; and the potential benefits and risks to the environment, human health and other uses of the ocean associated with the proposed activities.
- Provide appropriate information on the environmental assessment of potential impacts to the marine environment and other uses of the ocean, including information the EPA would use to facilitate coordination or consultation with Tribal, federal, state or other relevant entities.

The following information is intended to help applicants understand the criteria the EPA uses to determine when an application is complete as required by the MPRSA regulations. This information does not revise or replace the requirements contained in the MPRSA regulations.

This list summarizes permit application requirements in [40 C.F.R. part 221](#) and other relevant information for applicants to include in an MPRSA permit application for proposed mCDR or mSRM activities. A more detailed list of information to consider in an MPRSA research permit application for proposed mCDR or mSRM research activities is included in [Attachment 1](#) to this document.

- 1) **Name and address of applicant.** For research permits, applicants should identify the research team members and affiliations.
- 2) **Name(s) of entities transporting or producing the material.**
 - a) Person(s) or firm(s) producing or processing all materials to be transported for disposition into ocean waters;

- b) Person or organization transporting the material to be released; and
 - c) Name or other identification information of the vessel or other conveyance to be used in the transportation and disposition of the material.
- 3) **Physical and chemical description of the material to be released, including results of tests necessary to apply the relevant Criteria set forth in [40 C.F.R. part 227](#), and the number, size and physical configuration of any additional materials to be released.** For example, ballast, bailing material or other items that will be released into ocean waters and not recovered.
 - 4) **Quantity of material to be released into ocean waters.**
 - 5) **Proposed dates and times of the release of materials, including the duration and rates of the proposed disposition activities.** For example, will the material be released at one location or while the vessel is moving? Over what length of time? At set frequencies? Over what distance?
 - 6) **Description of proposed disposition location(s).** Information on proposed locations should include relevant physical, chemical and biological characterizations. Other criteria the EPA may consider include proximity to protected areas or resources, presence of protected species or other potential for adverse impacts to marine resources or ocean uses, including navigation. Refer to Section I of this document for information related to locations for research, special and general permits.
- The EPA does not authorize disposition of materials used for mCDR or mSRM activities at MPRSA ocean sites otherwise designated for the ocean dumping of dredged material in [40 C.F.R. part 228](#) because the activities would interfere with management, monitoring or maintenance of conditions at the designated site. The EPA regulations specify that sites designated for ocean dumping of dredged material shall only be used for that purpose. Areas around these sites should be avoided to the extent that the proposed activities could be influenced by, or interfere with, designated dredged material site activities.
- 7) **Description of proposed release method for the material and means by which the release rate can be controlled and modified as required.** A description of the expected movement and fate of the released material, if relevant, would facilitate the EPA's review.
 - 8) **Identification of the specific process or activity from which the material is generated.** For example, a description of the growth, processing or packaging of biomass materials or the mining and processing of mineral materials to be released. Such information assists the EPA in determining the suitability of the material for release in the ocean, which may vary depending on how the material is generated.
 - 9) **Description of how the type of material to be released has been previously disposed or entered ocean waters from other activities, whether related or unrelated to mCDR or mSRM.** This could also include a discussion of similar studies or activities using the

proposed materials or methods. The application may also state if the materials have not, to the applicant's knowledge, been "disposed or entered ocean waters" previously.

10) A statement of the need and an evaluation of short-term and long-term alternatives to the proposed disposition. This statement may include a brief explanation of the environmental impact of such alternatives. For proposed mCDR or mSRM activities, the statement of need should include a justification for why these activities need or otherwise are ready to occur in the ocean (as opposed to on land or in a lab/mesocosm study) and an assessment of the potential climate change mitigation benefits of the proposed activities. Useful metrics may include results of carbon dioxide life cycle analyses (and comparison of alternatives, if appropriate), calculations of carbon sequestration or solar radiation mitigation potential.

- a) For a research permit, the statement of need supports the scientific rationale for proposed research activities, including the rationale for the selection of the material type or volume identified in the study design. An evaluation of land-based alternatives for a research project involving the addition of materials to the ocean might include an explanation of the theoretical, bench-scale, mesocosm or other research inquiries that support the "need" to scale up to research involving the release of materials in the ocean.
- b) For mCDR or mSRM research activities, the EPA would rely on the statement of need to justify why these activities need to occur in the ocean. The statement of need and consideration of alternatives could include:
 - i. A discussion of alternative types or amounts of materials that the applicant considered but did not select and why.
 - ii. A summary of relevant prior or in-progress research that supports the proposed research.
 - iii. A description of the research underway or to be conducted as part of a research strategy (for example, how do the proposed activities fit into a larger research plan or objective?).
 - iv. A rationale for the proposed location, scale of the activities, amounts of materials, equipment used and research methods.
 - v. An explanation of how unknowns or uncertainties could be addressed or accounted for, or how potential for adverse effects on the marine environment may be mitigated.
 - vi. A discussion of why the scientific merit of the proposal should be considered to outweigh the potential environmental or other damage that may result from the proposed research activities. This could include an evaluation of the benefits of conducting the proposed research, which might include quantifiable benefits to human or marine communities, novel contributions to a scientific body of knowledge or other benefits.

11) Assessment of the anticipated environmental impact. The assessment should include the relative duration of the effect of the proposed disposition on the marine environment, navigation, living and non-living marine resource exploitation, scientific study, recreation

and other uses of the ocean. The assessment should also include the expected interval before the marine environment recovers from any anticipatable biological, ecological, chemical or physical perturbations. The assessment should consider potential impacts to any sensitive species and critical habitats, for example species listed under the *Endangered Species Act*, dominant fisheries stocks and any essential fish habitat protected under the *Magnuson-Stevens Fishery Conservation and Management Act*.

- 12) **Description of the environmental monitoring plan designed to assess the short-term and long-term impacts in the ocean attributable to the disposition activity.**
- 13) **Description of any contingency actions should unacceptable adverse ocean impacts occur during transportation and during or after the disposition activity.** Specific thresholds or activities should be discussed along with any actions to be taken to mitigate or prevent adverse impacts.

III. MPRSA Permitting Process and Timeline

The permit application process is described in the MPRSA regulations at [40 C.F.R. part 222](#). Key steps in the process are summarized below; however, this information does not revise or replace the requirements contained in the regulations.

MPRSA regulations identify several administrative deadlines for various steps during the application process. Final action on any application for a permit will, to the extent practicable, be taken within 180 days from the date the EPA receives a complete application. The length of time from application development to final determination depends on various factors, including the time required for the applicant to develop a complete application, time required to conclude various consultation or coordination activities with non-EPA entities and time necessary to resolve and respond to public comments, including any requests for public hearings.

Step 1: Applicant requests a pre-application meeting

- The EPA encourages potential applicants to request an informal pre-application meeting by emailing EPAMarineCDR@epa.gov.
- An informal pre-application meeting provides an opportunity for the applicant and the EPA to discuss preliminary information about the proposed activities, the category of permit that may be needed for the proposed activity and the permit application process.

Step 2: Applicant develops permit application

- The application includes all necessary information detailed in the regulatory criteria at [40 C.F.R. part 221](#), depending on the nature of the proposed activity.
- Development of the permit application will likely occur through an iterative process, which may include the following:

- Applicant submits a draft/preliminary permit application for the EPA to review.
- Within 30 days of the receipt of the preliminary application, the EPA reviews the preliminary application and notifies the applicant whether the application is complete or if additional information is required ([40 C.F.R. 222.2\(a\)](#)).
- The EPA and applicant follow up to address questions and discuss additional information needs and further steps in the process to conclude permit application review.
- The EPA provides the applicant with information on how to provide the permit application processing fee as part of the complete permit application. Application processing fees are published at [40 C.F.R. 221.5](#).

Step 3: The EPA determines permit application is complete

- The EPA notifies the applicant that their permit application is complete based upon the regulatory criteria at [40 C.F.R. part 221](#).

Step 4: The EPA conducts intergovernmental and interagency coordination (Tribal, state, federal, etc.)

- Notification, coordination and consultation actions would be initiated as soon as practicable and may begin during the application development stage and would occur concurrently with the public comment period.
- The EPA prepares additional analyses for consultation(s) and other coordination actions required under federal laws, as appropriate (for example, a biological assessment to complete consultation under Section 7 of the *Endangered Species Act*). In some cases, the project proponent prepares additional necessary analyses.
- The consultation or coordination requirements for a specific permit application are determined on a case-by-case basis depending on the nature and location of the proposed project. Entities that the EPA may notify, consult or coordinate with include:
 - Tribal governments;
 - Relevant state entities needed to satisfy the requirements of the *Coastal Zone Management Act*, *Clean Water Act Section 401* and *National Historic Preservation Act*, if applicable;
 - National Oceanic and Atmospheric Administration's Marine Fisheries Service regarding coordination requirements under the *Endangered Species Act*, *Magnuson-Stevens Fishery Conservation and Management Act* and *Marine Mammal Protection Act*, and NOAA's Office of National Marine Sanctuaries regarding permitting and coordination requirements under the *National Marine Sanctuaries Act* for activities in or near a national marine sanctuary;
 - U.S. Fish and Wildlife Service regarding coordination requirements under the *Endangered Species Act*;

- U.S. Coast Guard regarding conditions to be included in the permit to facilitate surveillance and enforcement;
- U.S. Army Corps of Engineers regarding matters related to any adverse impacts to navigation, harbor approaches and artificial islands on the outer continental shelf that may result from the proposed action;
- Other federal agencies, if applicable (for example, Department of Interior); and
- Potentially affected countries and relevant international bodies.

Step 5: The EPA makes a tentative determination and initiates a public comment period

- Within 30 days of notifying the applicant their application is complete, the EPA publishes a notice of the EPA's tentative determination on whether to issue the permit and invites public comment ([40 C.F.R. 222.2\(b\)](#)).
 - For research and special permits – The EPA publishes notices in a local newspaper for the state closest to the proposed activities and in the city where the EPA office giving notice is located.
 - For general permits – The EPA publishes notice and invites public comment through the *Federal Register*.
- The EPA may also conduct additional notification or outreach actions such as providing information on the EPA's website and social media outlets, sending additional email notifications, releasing a press statement or other media information or holding a public informational meeting during the public comment period.
- The public notice includes details on how to access the data and information the EPA relied on for tentative determination and how to submit comments. The public notice may also include information about any public engagement opportunities, such as a public informational meeting.
- The public comment period remains open for 30 days, unless otherwise noted for a longer period of time. Any person may provide comment during the public comment period or request a public hearing.
 - If no comments are received, the EPA proceeds immediately to conclude analytical and consultation processes under other federal statutes ([40 C.F.R. 222.3\(j\)](#)).
 - If comments are received and no public hearing is requested, the EPA promptly prepares a written response to comments for inclusion in the supporting record.
 - If a public hearing is requested within the public comment period and the request is granted by the EPA, the EPA would follow the procedures described in [40 C.F.R. 222.4 to 222.8](#).

Step 6: The EPA makes a final determination

- To the extent practicable, the EPA issues a final permit determination to issue or deny the permit within 180 days of the filing of a complete permit application. The time

needed to conclude intergovernmental and interagency consultations required under other federal laws may extend the timeline for a final determination.

- If no hearing is held, the permit may be made effective as soon as the final determination is made. If a hearing is held, the EPA follows the timelines and processes described in [40 C.F.R. 222.9](#).

IV. Contents of an MPRSA Permit

MPRSA permits typically summarize key details included in the permit application and describe any additional monitoring, reporting or other EPA-specified requirements or permit conditions.

Research Permits

In general, a research permit for mCDR or mSRM research activities would include:

- A description of the research that is being permitted, with particular reference to the disposition of materials in the ocean.
- The person(s) or entities who will be allowed to undertake specific actions under the permit.
- The scientific basis for the research and hypotheses to be explored in the authorized research activities.
- The equipment to be used for the transportation and disposition of the materials for the research activities.
- A chemical and physical description of the material authorized for disposition in ocean waters and results of any required biological testing.
- The specific location(s) where the release of the material is authorized.
- The details of the processes allowed to be used to generate, transport and handle the material, including compliance monitoring and contingency plans.
- A description of any in situ sampling or environmental monitoring to be conducted as part of the authorized research activities, including any sampling and environmental monitoring required to protect the environment from adverse impacts due to the disposition of materials.
- A description of environmental conditions which would trigger contingency actions or permit termination, and a description of the required contingency responses, including preventative measures and contingency actions.
- The permit duration, including the days and times during which the research activities may occur, and the effective term of the permit itself.
- A description of the reporting requirements, for example, an initial and a final research report submitted to the EPA.
- A description of any other requirements determined to be necessary by the EPA for the transportation and disposition of materials in the ocean for the specific research to be conducted.

General Permits

In accordance with [40 C.F.R. 223.1](#), general permits contain terms and conditions that the EPA deems necessary or appropriate. If issued for conducting research, terms may include the type of information that otherwise would be in a research permit.

Special Permits

A special permit for mCDR or mSRM activities would include:

- A description of the materials associated with the mCDR or mSRM activity that is being permitted.
- Persons or entities who will be allowed to undertake specific actions under the permit.
- A description of the equipment and methods of transporting and releasing the materials.
- A detailed chemical and physical description of the material permitted to be released into ocean waters and results of any required biological testing.
- The quantity and timing of the material to be released to ocean waters, including the effective and expiration date of the permit.
- The specific location(s) where the release of materials associated with research activities will be taking place. Note that for special permits, the location is designated through a rulemaking process as described in [40 C.F.R. part 228](#).
- Descriptions of any necessary sampling, environmental monitoring or surveillance of the transportation or disposition of the material to ensure permit compliance and assess impacts of permitted activities on the marine environment.
- A description of any other requirements determined to be necessary by the EPA for the transportation and disposition of materials associated with the specific mCDR or mSRM activities.

Attachment 1

Suggested List of Information in an MPRSA Research Permit Application for Proposed mCDR and mSRM Research Activities

The following list is intended to help potential applicants for mCDR or mSRM research activities understand the types of information included in a complete research permit application under the applicable MPRSA regulations at [40 C.F.R. 220.3 and part 221](#). Applicants are not bound by the descriptions provided in this list and can provide information required by the regulations in any other reasonable manner. The information below does not revise or replace the requirements contained in applicable regulations.

Information needed, including necessary chemical, physical or biological testing information, will depend on the proposed activity and is determined by the EPA on case-by-case basis.

1 Name and contact information of applicant

40 C.F.R. 221.1(a)

- Name of permit applicant (firm, agency or individual)
- Point of Contact
 - Name
 - Contact address (email, mailing and physical address)
 - Telephone number
- Names of researchers, principal investigator(s) and other institutions/organizations and personnel involved in the proposed research activities, including professional affiliations and backgrounds

2 Research plan summary

40 C.F.R. 220.3(e), 221.1(j), and 221.2

- Research questions or hypotheses to be explored
- Research plan designed to address the research questions/hypotheses, including appropriate references to peer-reviewed research informing the research plan; for example:
 - Sampling and analysis plans (for example, timing, number, location, types of data to be collected)
 - Quality assurance/quality control measures
 - Sample methods and equipment
 - Analytical methods and laboratory analyses (with references as appropriate)
 - Statistical analyses to be used
- Summary of the body of research/current state of knowledge leading up to the proposed research, with appropriate references to peer-reviewed literature
- Discussion of how the research results from the proposed activities will address the research questions, how results will be used to inform future activities or how results will contribute to the current state of knowledge in the field
- Discussion of uncertainties or unknowns related to the research plan, research outcomes, etc. It is understood that unknowns and uncertainties are intrinsic to the research process; however, the research plan should explain how these unknowns/uncertainties will be addressed or mitigated

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- If applicable, describe any independent reviews that have been conducted on the research plan and/or measurement, reporting and verification aspects of the research
- If applicable, describe how research results will be shared or used to develop peer-reviewed publications

3 Characterization of material

Detailed physical and chemical description of the material to be released into the ocean

40 C.F.R. 221.1(c)

- Appearance, for example:
 - Solid, semi-solid, liquid, slurry, etc.
 - Color
 - Odor
 - Turbidity
- Physical Characteristics, for example:
 - Bulk density, liquid density, solid density
 - Particle size distribution [Frequency/size class]
 - Percent liquid, solid, suspended particulates
 - Concentration of total solids, dissolved solids, suspended solids
 - Percent or concentration of materials that float
- Chemical Characteristics, for example:
 - Chemical composition of the material
 - Concentrations of potential contaminants such as pesticides, heavy metals or environmentally relevant trace minerals
 - Other trace contaminants or toxicants
- Toxicity and Bioaccumulation Characteristics, for example:
 - Results of any toxicity, bioaccumulation or other biological tests on the material
- If applicable, the number, size, physical configuration and composition of all materials to be released into ocean waters; for example:
 - Ballast, bailing material or other items that will be relinquished to ocean waters and not recovered

Quantity of material

40 C.F.R. 221.1(d)

- Total quantity of material to be released into ocean waters
- Justification for why the amount of material is necessary and appropriate to answer the research questions and why less material would be insufficient; for research, the amount of material released into the marine environment should be the minimum amount needed to achieve the research goals

Generator or processor of material

40 C.F.R. 221.1(b)

- Name(s) of firm, agency or individual who produced or generated the material
 - Responsible official name, contact address (email, mailing and physical address), telephone number

Identification of the specific process or activity giving rise to the production of the material

40 C.F.R. 221.1(h)

- For example:
 - Description of the growth, processing and other preparation of biomass for mCDR

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- The processing or production of mineral or chemical components for ocean alkalinity enhancement or ocean fertilization activities
- Manufacturing or construction specifications of other equipment that will be relinquished to the ocean

Description of how the material has previously been disposed or entered ocean waters

40 C.F.R. 221.1(i)

Directly or indirectly, including by or on behalf of the person(s) or firm(s) producing such material

- For mCDR or mSRM activities, these materials may not have been “disposed or entered ocean waters” previously; however, any previous activities using similar techniques/methods should be discussed

4 Transportation and disposition of material

Vessel and Transporter of material for ocean disposition

40 C.F.R. 221.1(b)

(This information may be tentative if a vessel, vehicle or other craft has not yet been contracted or confirmed at the time of the application.)

- Name(s) of firm, agency or individual
 - Responsible official name, contact address (email, mailing and physical address), telephone number
- Certification of material transporter; if the transporter is a proposed co-permittee, certification must be obtained that the firm acknowledges its designation as a proposed permittee and accepts conditions under any permit issued
- Name(s), registration number(s) and country(ies) of registry of vessels or other craft to be used for transport of the material
- Port of departure for transportation of material for disposition
- Transit distance from port to release location
- Vessel or other craft description(s); for example, vessel type, length, beam, capacity and relevant equipment capabilities
- Home port and normal berth of vessel(s)
- Vessel(s) navigation and communication equipment
 - Radio equipment
 - Navigation equipment

Description of loading and transportation of material to the release location

40 C.F.R. 221.2

- Process for transporting the material to the port of departure
- Process for loading the material onto vessel or other craft
- Map showing the planned route that the vessel will follow to the release location
- Description of how any relevant safety standard(s), including maritime transport guideline(s) will be met

Proposed dates, times, duration or rates of the release of material

40 C.F.R. 221.1(e)

- Proposed initiation date(s), time(s) and duration(s) of release
- Periodicity of release (for example, will material be released all at once? Episodically?)
- The proposed total duration of the disposition activities
- The rate of release of the material; for example, a volume or weight per unit of time:
 - Maximum amount proposed over period of permit

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- Maximum amount per year/each year
- Maximum amount per day/hour/minute

Proposed methods of releasing the material

40 C.F.R. 221.1(g)

- Description of the method for releasing the material at the proposed release location and how the release rate can be controlled or modified as required; for example:
 - Design(s) of discharge openings
 - Design(s) of release mechanism
 - Method(s) of controlling release rate
 - Boat speed(s) and release pattern(s)

5 Study area characterization(s)

40 C.F.R. 221.1(f)

The study area for a proposed research activity includes the area(s) where material would be released in ocean waters and the area where research and monitoring activities associated with the release of the material may occur as part of the proposed study. If the materials are expected to travel beyond the release location (for example, floating, sinking or dispersing over an ocean area), the areas where the materials are expected to move would be characterized as part of the overall study area.

Information needed to characterize the proposed study area location(s) will depend on the proposed research activity and materials involved. The study area characterization would include detailed physical, chemical and biological information relevant to the release activities, the research/monitoring activities, the fate of the material in the environment and the assessment of potential impacts. Sources of information used to inform the study area characterization may include baseline data collected from the study area, information from previous studies or desktop analyses of existing information (including validated models) that justifiably characterize the conditions in the proposed study area. If multiple study area locations are being proposed as part of the research study, each location should be characterized independently.

Study area map

- A map of the proposed study area that includes relevant geographic information, such as:
 - Release location(s) for the material, including coordinates and geographic datum (for example, WGS 84)
 - Study area boundaries
 - Transit route(s) of the transport vessel(s) to and from the release location(s)
 - Relevant marine features in the vicinity of the study area (for example, marine boundaries, navigation or shipping lanes, marine protected areas)

Physical characterization

- Physical description of the proposed study area; relevant information may include:
 - Distance of release location to the nearest shoreline
 - Sediment characteristics
 - Currents or other ocean conditions
 - Sediment deposition rates
 - Depths
 - Bottom features
 - Substrate types

- Seasonal weather conditions

Chemical characterization

- Chemical characterization of the proposed study area, including water chemistry and sediment chemistry if appropriate

Biological characterization

- Biological characterization of the proposed study area; relevant information may include:
 - Habitat types
 - Dominant species
 - Seasonal biological activities (for example, migration routes, breeding areas)
- Discussion of any sensitive species or habitats in or nearby the study area, including consideration of:
 - Endangered or threatened species
 - NOAA National Marine Fisheries Service (NMFS) Endangered Species Act directory: <https://www.fisheries.noaa.gov/species-directory/threatened-endangered>;
 - NOAA NMFS critical habitat mapper: <https://www.arcgis.com/apps/webappviewer/index.html?id=68d8df16b39c48fe9f60640692d0e318>;
 - (New England and Mid Atlantic region) NOAA NMFS Greater Atlantic Region mapper: <https://www.fisheries.noaa.gov/resource/map/greater-atlantic-region-esa-section-7-mapper>
 - USFWS ESA and resource mapper: <https://ipac.ecosphere.fws.gov/>
 - Essential Fish Habitats designated under *Magnuson-Stevens Fishery Conservation and Management Act*
 - EFH Mapper: <https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>
 - Visit NOAA Fisheries regional websites (Alaska, New England/Mid-Atlantic, Pacific Islands, Southeast, West Coast) for additional information on EFH considerations: <https://www.fisheries.noaa.gov/>
 - Marine Protected Areas reserved by Tribal, federal, state, territorial or local laws or regulations:
 - MPA Viewer: <https://coast.noaa.gov/digitalcoast/tools/mpaviewer.html>
 - MPA Inventory: <https://marineprotectedareas.noaa.gov/dataanalysis/mpainventory/>
 - Corals
 - NOAA Deep Sea Coral and Sponge Map: <https://www.ncei.noaa.gov/products/noaa-deep-sea-coral-and-sponge-map>
 - Coral Reef Information System (CoRIS): <https://www.coris.noaa.gov/>
 - Marine Mammals
 - NOAA Marine Mammal Species Directory: <https://www.ncei.noaa.gov/products/noaa-deep-sea-coral-and-sponge-map> <https://www.fisheries.noaa.gov/species-directory/marine-mammals>

Navigation, fishing, and other uses of the ocean

- Information on other uses (historical, current or planned) of the ocean in or near the proposed study area; for example:
 - Shipping and navigation routes

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- Commercial or recreational fishing
- Offshore energy development
- Other commercial or recreational activities in the vicinity
- Marine Cadastre, Ocean Reports: <https://marinecadastre.gov/>
- Discussion of any areas in the vicinity with historical or cultural value; for example, historic shipwrecks or areas with cultural significance

6 Statement of need and evaluation of alternatives

40 C.F.R. 221.1(j)

- Justification for why the research activities must be conducted in the ocean (as opposed to on land or in a lab/mesocosm research study)
- An assessment of the climate change mitigation or other benefits of the proposed activities; supporting information may include:
 - Life cycle analysis of proposed activities
 - Calculations of carbon sequestration or solar radiation mitigation potentials
- Discussion of alternatives considered; for example:
 - Consideration of different materials or amounts of materials or alternative release methods
 - Consideration of alternative study areas should include locations that would minimize potential impacts to the marine environment, human health and other uses of the ocean while achieving the research purpose. For example, study areas should only be as large as needed to satisfy the research goals. Note, MPRSA ocean sites designated in 40 C.F.R. 228.15 for dredged material may not be used for mCDR or mSRM activities.

7 Assessment of anticipated fate and environmental impacts

40 C.F.R. 221.1(k)

The discussion of anticipated fate and environmental impacts depends on the nature of the proposed activities and would include the fate of the material after being released into ocean waters, the anticipated impacts occurring during transportation and release of material and any anticipated impacts after the release of material. The assessment may include a discussion of both adverse and beneficial impacts but should be constrained to the impacts resulting from the proposed activities.

The assessment of fate and impacts may be supported by published literature, modeling results or other resources as appropriate. The assessment would include description of anticipated impacts for each resource/habitat/species discussed in study area characterization. If a category of impact is not applicable or no impact is anticipated, this could be clearly stated. Consideration of impacts should include, but not be limited to, the categories of impacts listed below.

Fate of material

- A description of the fate and persistence of all solid, suspended solid and/or liquid fractions of the released material; for example:
 - Descriptions of relevant biological, chemical or other degradation processes affecting the fate of material in the environment
 - Calculation of expected dilution rate of material within ocean waters
- A description of the fate and persistence of potential toxicants or pathogens in each fraction of the material

Discussion of the anticipated impacts of the activities, including the anticipated duration of those impacts

- Impacts to water quality

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- Adjacent state water quality standards (<https://www.epa.gov/wqs-tech/state-specific-water-quality-standards-effective-under-clean-water-act-cwa>)
- Water quality criteria for human health and aquatic life (<https://www.epa.gov/wqc>)
- Impacts on human health
 - Presence in the material of pathogenic organisms which may cause a public health hazard either directly or through contamination of fisheries or shellfisheries
 - Exposure to toxicants that may affect human health, either directly or via bioaccumulation
- Impacts on the marine environment
 - Physical disturbance, smothering
 - Impacts from changes in water quality, chemistry, turbidity, etc.
 - Impacts from vessel traffic and vessel noise
 - Impacts to biological species and communities
 - Impacts to the pelagic environment
 - Impacts to the benthic environment
 - Assessment of impacts to sensitive or protected species/habitats, including those protected under the *Endangered Species Act* (address endangered species and critical habitat that may be present in the study area)
 - Assessment of impacts to Essential Fish Habitat (address essential fish habitats that may be present in the study area)
 - Other anticipated impacts on the marine environment
- Impacts on commercial and recreational navigation
 - Safe navigational depths
 - Impacts of disposition and monitoring activities on navigation
 - Potential for movement of materials toward beaches or other amenities
 - Other anticipated impacts to navigation
- Impacts on living and non-living marine resources
 - Consideration of the potential for introduction of non-native species
 - Other anticipated impacts on living (biotic) marine resources of recreational or commercial value
 - Other anticipated impacts on non-living (abiotic) marine resources
- Impacts on recreational, commercial, scientific or other uses of the ocean resulting from the proposed activities
 - Visible characteristics of material posing recreational nuisance
 - Impacts resulting from monitoring activities
 - Impacts on commercial or recreational fishing
 - Impacts on recreational use of shorelines and/or beaches
 - Impacts on other scientific research and study in the research area
 - Impacts to areas with historical or cultural value
 - Any other impacts on other uses of the ocean
- Discussion of relevant terrestrial impacts from the activities; for example, those from processing or transporting the materials, including carbon footprint
- Discussion of public concern for the consequences of the proposed activities
- Discussion of consequences of not conducting the research activities, including potential impact on aesthetic, recreational and economic values with respect to the municipalities and industries involved

8 Environmental monitoring plan

40 C.F.R. 221.2

- Description of the environmental monitoring plan designed to assess the short-term and longer-term impacts of the disposition activity; the monitoring plan should include:
 - Description of the specific environmental monitoring activities to be conducted, including a rationale for how these activities will appropriately monitor for potential environmental impacts from the activities
 - Timing and duration of monitoring activities; for example, a sampling and analysis plan or survey plan
 - Description of how existing environmental data (for example, baseline data) will be used to determine whether impacts are occurring

9 Contingency plan

40 C.F.R. 221.2

- Description of the contingency plan(s) should unacceptable adverse impacts occur during or after the activity, including:
 - Specific thresholds or events for contingency actions, such as accidental spill of material during transportation to the release location or exceedance of specific water quality thresholds
 - Description of mitigation action or other activities to be taken should unplanned events occur or an identified threshold be exceeded, including persons or organizations responsible for taking action

10 Discussion of how the scientific merit of the proposed research activities outweighs potential environmental or other damage that may result

40 C.F.R. 220.3(e), 221.2

- Summary of potential environmental or other damage that may result from the research activities (this could be a summary of key elements discussed as part of the assessment of anticipated fate and environmental impacts)
- Discussion of the scientific merit and need for the activities as well as any benefits resulting from the research activities, such as:
 - The need and scientific rationale for conducting the research
 - Brief discussion of broader benefits which might include the carbon sequestration/solar radiation mitigation potential, quantifiable benefits to human or marine communities, contributions to a scientific body of knowledge, etc.
- Discussion of how the benefits of the research outweigh the potential environmental damage or other impacts from the proposed research activities

11 Supporting information or Appendices

- Relevant supporting information might include:
 - Summary of community outreach or engagement activities/plan
 - Letter(s) of support
 - Documentation of published monitoring, reporting, verification procedures or sampling and analysis procedures to be used
 - Documentation of third-party verifications or reviews of methods or protocols