Review and Analysis of Mississippi Major Economic Impact Authority's Proposed Rules and Regulations Governing Geophysical, Seismic or Other Type Exploration on State-Owned Lands

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H.C. Clark, Ph.D.
Consulting Geophysicist
2300 Bolsover
Houston, Texas 77005
hcclark@rice.edu;
[713]529-0090

EXECUTIVE SUMMARY

The Mississippi Major Economic Impact Authority has issued proposed "Rules and Regulations Governing Geophysical, Seismic or Other Type Exploration on State-Owned Lands." These regulations will govern seismic and geophysical activities in the Mississippi Sound, as well as areas on land.

From a practical standpoint, many provisions of the regulations are vague and unenforceable. Rule 14 further permits any requirement of the rules to be waived at the request of a seismic operator.

There are a number of concerns associated with seismic exploration in the marine environment. The scientific literature documents the potential for harm to wildlife and other resources from the sound sources associated with seismic. This potential for harm has led many regulatory bodies to require safety measures for seismic operations, including observers and area closures to protect sensitive resources.

The proposed regulations require the submission of only skeletal information concerning proposed seismic surveys, and do not require any structured consideration of impacts on other resources. The regulations do not require any specific mitigation or protective measures. In addition, the regulations allow much of the information concerning seismic operations to be withheld from the public.

At a minimum, the regulations should require detailed information concerning any seismic survey, including information impacts to other resources. Before a seismic operation is approved alternatives including avoiding sensitive resources should be considered. Information concerning the surveys themselves, including locations, should be fully accessible to the public.

DISCUSSION

This discussion was prepared by H.C. Clark, Ph.D. I am a geophysicist, and live in Houston, Texas. I taught geology and geophysics at Rice University from 1966 until my retirement in 1989. During that time, I participated in a number of marine geophysical surveys and am familiar with the issues involved with these proposed rules. I am now a consultant, primarily in environmental matters and deal with the regulatory framework on a daily basis. A copy of my curriculum vitae is attached to this report.

I have had the opportunity to review the document entitled "Rules and Regulations Governing Geophysical, Seismic or Other Type Exploration on State-Owned Lands." It is my understanding that this is a preliminary version, for public comment, of regulations to be promulgated by the Mississippi Major Economic Impact Authority. These regulations will govern seismic and geophysical exploration in the Mississippi Sound, as well as in other areas.

1. <u>The Regulations are vague, and largely unenforceable</u>

An initial observation concerning the regulations is that many parts are vague and lacking specificity. This makes it difficult to suggest improvements or evaluate the potential for the regulations to adequately ameliorate the potential negative impacts of seismic exploration. In addition, the lack of specificity means that many of the requirements of the regulations will be essentially unenforceable.

Examples include the following:

Rule 7.A.1 purports to limit the size of charge that may be used to 20 pounds TNT equivalence, but states that greater charges may be used with "special permission

from the Executive Director or his designee." No standards or other guidelines for the decision to permit larger explosive charges are given.

Rule 7.F purports to restrict explosive use within 250 feet of oyster beds, but actually allows such use with approval of the Executive Director. Again, there are no standards or guidelines, and the Executive Director's decision is purely discretionary.

Rule 7.I states that restoration of surface conditions after seismic exploration is required, but only "as nearly as practicable." No definition or other standard is given.

Rule 7.L contains various broadly worded requirements, for example that geophysical exploration will not "cause significant harm or damage to aquatic life," or "unreasonably interfere with or harm other uses of the area." The requirements are so broadly stated as to be unenforceable, however.

Rule 8 provides for a "seismic agent" to accompany geophysical exploration crews, but permits operations to go forward even if the agent is absent. The rule also permits a waiver of the requirement for a seismic agent, but states no standard for granting such a waiver.

Rule 9.C provides that a person carrying out geophysical exploration should report activities that "adversely affect the environment, aquatic life, cultural resources or other uses of the area", but provides no definition or standards, apparently making this determination entirely discretionary with the geophysical operator.

Rule 10.F provides that "Vessels, boats, marsh buggies or other types of marsh vehicles used in connection with seismic exploration activities must be so used as to cause minimum disturbance or injury to the lands, water bottoms and wildlife and fisheries thereon." "Minimum disturbance or injury" is not defined, however.

Rule 10.I provides that activities "may" be shut down if there is a "threat of serious, irreparable or immediate harm or damage to life, including fish and wildlife, other aquatic life, to property, or to the natural, or human environment." Under this language, activities may only be suspended if "serious, irreparable or immediate" harm is threatened, and even then suspension is discretionary with the Executive Director. Likewise, Rule 10.J makes the suspension of a permit for failure to follow the regulations or terms of the permit discretionary with the Executive Director.

Finally, Rule 14.B provides for a complete waiver or modification of any provision of the regulations, at the discretion of the Executive Director and the "appropriate supervisory agency." In effect, this provision makes every aspect of the regulations completely discretionary, and subject to waiver.

To summarize with regard to the vagueness and lack of enforceability, the regulations themselves contain very little in terms of enforceable protections for natural resources, and those terms it does contain are subject to waiver at the discretion of the Executive Director of the Mississippi Major Economic Impact Authority and any other supervisory agency.

2. <u>The Regulations Do Not Provide for Any Assessment of Natural Resource Impacts, or Mitigation to Prevent Damage</u>

The proposed regulations do not provide in any structured way for the assessment of the potential impacts to natural resources by proposed geophysical testing. There is a substantial body of scientific work and federal and state regulation dealing with these issues, but these regulations do not take account of it.

On land, the issues of concern in seismic testing focus on the ground disturbance left by shot holes. The regulations do address this specific issue, at least to the extent of

requiring site remediation, but the regulations do not address, in other than a cursory way, the issue of impacts to wildlife and other resources in the marine environment.

In the marine environment, most concerns about seismic testing center around the seismic source. At its most basic, seismic exploration involves artificially creating seismic waves directed into the earth, and using arrays of measuring devices such as seismometers or geophones to receive and record these waves. There are a number of different techniques for generating seismic waves, ranging from explosive charges to compressed air guns, controlled frequency vibrating pads, high frequency piezoelectric crystals, etc. Sound levels created in the water column by these sources vary but can be as high as 240 decibels, in the case of compressed air gun arrays.

Each source for generating seismic waves has potential environmental concerns and impacts associated with it. For example, electrical sparkers have been associated with fish kills and are seldom used in modern seismic operations. Use of explosives has been associated with other environmental concerns, and as explained below, the Minerals Management Service ("MMS") of the Department of the Interior no longer contemplates that explosives will be used in Outer Continental Shelf seismic operations. Compressed air guns have also raised numerous concerns about their effects on marine mammals, as well as impacts to fish and other marine animals.

Physiological and behavioral impacts of sound on fish, marine mammals and other organisms are documented in the scientific literature. The nature of the effects depends on the species, proximity to the sound source, and other factors. Department of Fisheries and Oceans Canada, Review of Scientific Information on Impacts of Seismic Sound on Fish, Invertebrates, Marine Turtles and Marine Mammals (2004). Eggs and

larvae could also be injured or killed by sound sources. Royal Society of Canada, Report of the Expert Panel on Science Issues Related to Oil and Gas Activities, Offshore British Columbia (2003) at 76. Impacts can be particularly acute in marine mammals, which rely on sound waves for communication and life functions.

Seismic exploration in areas such as the Mississippi Sound is of particular concern, since water depths are much less than those encountered on the Outer Continental Shelf or other deepwater areas. This means that sound sources such as compressed air guns may be only a few meters away from bottom dwelling organisms or other marine life. Recent research indicates that noise from seismic sources may be greater than has generally been thought in shallow water areas. Tolstoy, et al, Broadband Calibration of R/V Ewing Seismic Sources, 31 Geophysical Research Letters L14310 (2004).

In addition, in shallow water environments the range of impacts of seismic sources may be greater. Shallow water environments have the potential for damage to aquatic vegetation or other sea floor resources from the equipment used to carry out seismic operations. This can include vessels, the seismic arrays towed by vessels, or the equipment used to drill shot holes.

The potential impacts of seismic sources in the marine environment vary depending on a number of factors, including the location and type of sensitive resources, the strength of the seismic signal, the makeup of the water bottom, water depth and background noise from other sources. Carrying out seismic operations in a way that protects sensitive resources involves considering the specific makeup of the seismic

operation, and tailoring protective measures to the situation. The proposed regulations do not contain any requirement that these variables be taken into account.

For example, the proposed regulations do not distinguish between seismic wave sources, and in fact seem to contemplate that any technology may be used. The definition of "energy sources in Rule 1 cites "[e]explosives, vibrators, weight droppings, confined explosive gases, air guns, implosives, electrical sparkers, active transducer, radio frequency transmitters, or other energy source." The regulations also do not contemplate any specific operating or other practices to identify and avoid or mitigate impacts to sensitive resources.

Particularly in the marine environment, a requirement that the party carrying out the seismic program use the least damaging technology available is appropriate. For example, prior to 1989 the MMS, which manages seismic operations on the federal Outer Continental Shelf, routinely required the preparation of an Environmental Assessment, a document which considers alternatives to an action and the effects of the action itself, before allowing the use of explosives. More recently the MMS has assumed that explosives will no longer be used on the OCS in light of other technologies with less significant environmental impacts. Minerals Management Service, Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf (2004), at I-3.

Mitigation measures to protect against harm to marine life are readily available and commonly employed during seismic exploration operations. These include the deployment of trained observers for marine mammals or other species, "warm up" periods which allow marine life to leave the vicinity, seasonal restrictions geared to the

presence of sensitive species, area restrictions protecting sensitive habitats or resources, and choice of least intrusive seismic array. For example, the National Marine Fisheries Service has required such measures in permitting research seismic cruises. Richardson, et al Marine mammal monitoring and mitigation during recent seismic surveys for geophysical research, 2004. In the Gulf of Mexico region the Minerals Management Service has required use of observers for marine mammals. United States Department of the Interior Minerals Management Service, Notice to Lessees 2002-G07.

By contrast with the practices in use elsewhere, the proposed regulations do not require information concerning the potential impacts on marine resources, and do not require any monitoring of environmental impacts, consideration of alternatives, or structured consideration of mitigation measures.

For example, Rule 3.C requires only that extremely basic information concerning the proposed seismic survey be provided. There is no requirement concerning configuration of energy sources, expected decibel levels, sound attenuation, or other specifics concerning the survey. Without this information, it is impossible to determine the actual impacts of a proposed survey operation.

According to Rule 3.D, an "environmental form" will be filled out and forwarded to the "Appropriate Supervisory Agency," which will then "review its file" to determine measures to be included in the permit. There is, however, no indication what information the environmental form will include, nor is there any provision for structured analysis of the actual or potential impacts of the proposed seismic operation. Since Rule 3.C does not require any specific information concerning the proposed seismic operations, preparing mitigation measures will at best be difficult.

Rule 10, "Protection of marine life, marine resources, and wildlife management areas," states in Section G that "permittees conducting seismic operations shall use reasonable precaution in accordance with approved and accepted methods to prevent destruction of, or injury to, fish, oysters, shrimp and other aquatic life, wildlife or other natural resources of the State." Again, however, there is no requirement for any particular method, and the regulation is so vague that it is essentially unenforceable. In fact, the "seismic agent" contemplated by Rule 8 cannot even unilaterally terminate the seismic operation if a violation of this rule is found to be occurring. Rule 8.H.

In addition to the problems created by the seismic source and the related immediate effect on marine life, any regulations must consider the long-term effect of the overall survey operation. The proposed regulations recognize this aspect, and require the operator to remove pipe, clean up shotholes, etc. Before final adoption, the agency should consider a matrix of impacts of various surveys on the shoreline, marsh, shallow transition zone, and deeper water. Marsh buggy tracks remaining from old seismic lines are a familiar and dramatic example of a long-term effect. As technology has changed, equipment has become more compact and deployment more efficient, but the typical survey has changed from widely spaced 2-D lines to dense 3-D grids. The permanent effect of a more extensive survey on the bottom in deep water is minimal, but the disturbance left by pulling seismometer sets or streamers through the transition zone or marsh should receive careful consideration. This information would speak to the concern expressed in Rule 6 B and 7 F, for examples.

3. Survey Information Should Be Detailed and Available to Agencies and the Public

At a minimum, a geophysical survey permit application should be accompanied by a baseline survey. This survey should include, at a minimum:

- A topographic or bathymetric map
- Aerial photograph[s]
- Sidescan sonar or an equivalent means to identify potentially affected reefs, vegetation or cultural resources
- A description of sensitive resources such as spawning or recruitment areas for marine life, resident marine mammal populations, threatened or endangered species, and parks or wilderness areas.
- A description of the physical means of carrying out the seismic activity, for example, vessels, marsh buggies or other equipment
- Maps depicting proposed tracklines, source points, etc.
- A narrative with plans to minimize impacts and remediate damage following the survey and aid the agency involved in the review under Rule 6.B. This narrative should address the purpose and need for the proposed seismic activity and alternative methods of carrying out seismic activity
- A description of cumulative impacts of the seismic activity with other activities

This baseline survey should be subject to a full review by the appropriate agencies, with independent consideration of alternatives. Alternatives considered should include alternative technologies, survey design configurations, use of less damaging equipment to carry out the surveys, mitigation plans including seasonal or area restrictions to avoid sensitive resources, and a “no action” alternative.

The baseline survey and the agency's evaluation and decision on this survey should be available as a matter of public record. In addition, citizens should have access to all surface data from a survey. This would include the information from recordkeeping and reporting discussed above as well as the impact evaluation submitted with the permit application.

The regulations also will keep all post-survey information confidential. It is important that the agency maintain a database of permitted geophysical surveys accessible to the public. The global positioning system [GPS] record of each day's work should be submitted along with the appropriate calibrated record of each shot. This information would support Rules 7 A,F,G,H and L, for example. This would not be a great burden, since the field party typically records this information. The proposed regulations express concerns about careless survey practices, and by such recordkeeping and reporting, anything accidentally left behind, or any unfilled shothole could be tracked. This recordkeeping would also be an advantage to the geophysical survey party seeking to document a careful operation as outlined in Rule 7. It would also enhance and simplify the Party Chief's and Seismic Agent's responsibilities outlined in Rule 8.D.

4. Conclusion

The proposed regulations are vague and unenforceable. The regulations do not contemplate a number of fundamental potential environmental impacts associated with geophysical exploration, particularly in shallow estuary areas such as the Mississippi Sound. The regulations do not require even a minimal pre-survey impact analysis or detailed exploration plan. Once a survey is underway, there virtually no specific

recordkeeping or reporting requirements to affirm that the permit holder has acted according to sound environmental practices.