Who's Right About Seismic Models ?

The Center for Regulatory Effectiveness recently filed comments on the National Science Foundation's draft Programmatic Environmental Impact Statement/Overseas Environmental Impact Statement (DPEIS) for marine seismic research. The American Petroleum Institute, Independent Association of Geophysical Contractors, National Ocean Industries Association, and US Oil & Gas Association also filed comments on the DPEIS (Industry Comments). CRE's comments are inconsistent in several respects with the Industry Comments.

CRE is puzzled by these inconsistencies. CRE agrees with industry that

> "In over three decades of world-wide seismic surveying, there is no evidence to suggest that sound from E&P seismic activities has resulted in any physical or auditory injury in any marine mammal species. Nor have research studies and operations monitoring programmes designed to assess the potential impacts from seismic surveys indicated any physical injury, or suggested behavioural effects leading to impacts on the viability of any marine mammal population. That being said, recent studies have shown that marine mammal hearing sensitivity may be temporarily jeopardised if exposed at intense levels such as those encountered very close to an operating seismic sound source. For that reason, seismic surveys are conducted with measures in place designed to protect animals from high exposure levels."[1]

Despite this agreement, the CRE comments are impossible to reconcile with the Industry Comments on several critical issues. Is CRE wrong? That's a possibility, but after further review, we don't see how we're wrong.

For example, the DPEIS is based on a complex and novel combination of acoustic models. The DPEIS even contains a separate Appendix (B) discussing these models. The models are supposed to determine what effects, if any, a particular seismic operation may have on marine mammals and other animals. The three models used in the draft PEIS/OEIS are:

1) A JASCO model called the Airgun Array Source Model.[2] This JASCO model is proprietary. [3]

2) Another proprietary JASCO model called MONM (the Marine Operations Noise Model), [4] which is also proprietary.[5]

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[1] "Seismic Surveys and Marine Mammals, Joint OGP/IAGC Position Paper," International Association of Oil and Gas Producers ("OGP") and International Association of Geophysical Contractors ("IAGC"), available online at http://www.ogp.org.uk/pubs/358.pdf . CRE quoted and relied on this position on seismic in CRE's DPEIS comments.

[2] Draft PEIS/OEIS, page 2-54, available online at http://www.nsf.gov/geo/oce/envcomp/peis_marine_seismic_research/draft_peis_with_appendices.pdf

[3] *Id*

[4] Draft PEIS/OEIS, page 2-55, available online at http://www.nsf.gov/geo/oce/envcomp/peis_marine_seismic_research/draft_peis_with_appendices.pdf .

3) The Acoustic Integration Model, which was recently proprietary.[6] We are not sure of its current status.

With regard to NSF's use of these proprietary models, the Industry Comments on page 2 stated,

> "We support the general approach and methodology, such as the use of representative areas and acoustic modeling, used in the DPEIS and recommend that other US government agencies consider a similar approach."

By contrast, CRE criticized the DPEIS' use of proprietary models on several grounds, including the following:

> "The proprietary acoustic models used in the draft PEIS/OEIS lack practical utility and do not meet Information Quality Act ("IQA") Guidelines. They are accurate, if at all, only when modeling an SEL metric, and all U.S. agencies including NMFS regulate seismic on an rms SPL metric. They do not regulate seismic on SEL. Moreover, the draft PEIS/OEIS' proposed applications of these models have not been validated in accordance with EPA's Council for Regulatory Environmental Modeling Guidelines. The CREM guidance reflects Information Quality Act standards. The models also violate IQA Guidelines because NMFS has not produced 'especially rigorous robustness checks' for the proprietary models."

This is a complex subject. Consequently, we will address the SPL/SEL in a subsequent article. Here, we will address CRE's other model criticisms.

There are Information Quality Act problems with these models. They are proprietary, and NSF's IQA guidelines state that when

> "estimates and projections included in NSF information products are not directly reproducible by the public because the underlying data sets used to produce them are either confidential or proprietary…NSF will apply rigorous robustness checks and document what checks were undertaken."[7]

NMFS' IQA guidelines impose a similar requirement of especially rigorous robustness checks.[8]

Where are NMFS' and NSF's documentation of their "rigorous robustness checks" on the proprietary models used in the draft PEIS/OEIS? We have found none in the record.

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[5] Draft PEIS/OEIS, page B-17, available online at http://www.nsf.gov/geo/oce/envcomp/peis_marine_seismic_research/draft_peis_with_appendices.pdf .
[6] Draft PEIS/OEIS, page 2-61, available online at http://www.nsf.gov/geo/oce/envcomp/peis_marine_seismic_research/draft_peis_with_appendices.pdf .
[7] NSF IQA guidelines, pages 15-15, available online at http://www.nsf.gov/policies/nsfinfoqual.pdf .
[8] NMFS Policy Directive 04-108, Science and Technology Policy on the Data Quality Act, available online at https://reefshark.nmfs.noaa.gov/f/pds/publicsite/documents/policies/04-108.pdf

In addition, these models need to be externally peer reviewed to determine their compliance with EPA's Council for Regulatory Environmental Model guidance. The CREM Guidance Document generally reflects IQA Guideline requirements for the development and use of models like those in the DPEIS.[9] NMFS previously had the AIM model peer reviewed to determine CREM compliance.[10] The resulting AIM Peer review report states in part as follows:

> "The three terms of reference required that the Panel evaluate whether AIM correctly implements the models and data upon which it is based; whether animal movements are adequately simulated; and whether AIM meets the Council for Regulatory Monitoring (CREM) guidelines for model development and evaluation. The Panel agreed that AIM appears to be correctly implemented. However, all panelists had recommendations for further testing to be undertaken. They also agreed that animal movement appears to be appropriately modelled within AIM given the inadequacies of the available data. With regard to whether AIM satisfies the CREM guidelines there was some diversity of opinion. This is understandable given that the CREM guidelines are not *directly* applicable to AIM since it is not an application model (but a tool for developing such models).
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> One of the requirements of the CREM guidelines is for the 'model' to have undergone 'adequate' peer review. The panelists were split on this question. NMFS clearly thought that an independent peer review was required and hence they initiated this review. The Panel have now reviewed AIM (in what appears to be the first independent peer review), but it is not for them to judge whether their review was an 'adequate peer review'. The Panel did agree that the principles of credible science had been addressed during the development of AIM. They agreed that AIM is a useful and credible tool for developing application models. The need for expertise in the use of AIM was noted (e.g., in the choice of transmission loss model); as was the absence of appropriate uncertainty and sensitivity tests in the current applications of AIM. It follows, that the Panel agree that the use of AIM can lead to models which will meet the CREM guidelines. However, such models, at this stage, would need to be evaluated on a case-by-case basis (i.e., merely using AIM is not sufficient; it must be used appropriately for the specific application)."[11]

In other words, the AIM peer review report requires that NSF peer review the proposed specific applications of AIM and the two JASCO models, and the conjunctive use of these models in each application, in order to determine whether they meet the CREM guidelines. We have not found this peer review in the draft PEIS/OEIS record or anywhere else.

In 2008 API submitted comments on the CREM Guidance. API's comments asked that proprietary models not be used by federal agencies. If they are used, then they should be subjected to "rigorous peer review":

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[9] The CREM guidance is available online at http://www.epa.gov/crem/library/cred_guidance_0309.pdf

[10] See the AIM peer review report available online at http://www.nmfs.noaa.gov/pr/pdfs/permits/lfa_aim_review.pdf

[11] *Id.* at page 1

> *"Proprietary Models:* The NRC panel recommended that EPA 'establish and pursue a goal of not using proprietary elements' yet no such commitment is made by EPA in the Guidance document. Rather, EPA states a 'preference' for use of non-proprietary models, while at the same time indicating proprietary models may provide the most reliable and best accepted modeling alternates. If proprietary models are to be used, we support the NRC recommendations to subject proprietary models to rigorous peer review, with non-disclosure statements for peer reviewers if necessary."[12]

These 2008 API comments are difficult to reconcile with Industry's unqualified recommendation in their DPEIS comments that federal agencies use proprietary acoustic models, at least with regard to setting generic mitigation zones.

Are we misreading Industry's DPEIS comments?

Have the DPEIS models in fact passed rigorous peer review and robustness checks?

Have API and the other industry commenters changed their oppositions for some good reason?

There is great risk in regulatory use of acoustic models that do not meet applicable validation and peer review requirements. As two risk examples, use of such models can generate inaccurate and unreliable data which is used as the basis of regulatory action, and environmental NGOs may successfully challenge regulatory actions based on such models.

We ask that the Industry commenters and/or anyone else identify to us any mistakes in CRE's analysis of this important acoustic models issue. If we are correct, then we ask why the Industry commenters took a contrary position in their DPEIS comments.

In conclusion, we wish to state clearly CRE's position that the overwhelming weight of evidence shows no harm to marine mammals from seismic operations conducted in accordance with traditional mitigation measures, which do not include acoustic models. We do not know whether the Industry commenters agree with us. Do they believe that acoustic models are necessary to protect marine mammals from seismic even when the models are proprietary and have never been peer reviewed to determine their accuracy, reliability and reproducibility?

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[12] API September 12, 2008 comments on EPA's CREM guidance, available online at http://insideepa.com/index.php?option=com_iwpfile&file=/dir_08/epa2008_1446a.pdf