



International Whaling Commission

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RE: Proposal to evaluate and mitigate the impact of seismic exploration on Endangered Ganges River dolphins in the Brahmaputra River

Dear A.K. Sakia

Thank you for your letters, dated 7th February 2007 and 16th February 2007.

We commend Oil India's concern for the potential danger posed to endangered Ganges River dolphins and other fauna in the Brahmaputra River by the proposed seismic survey. We also appreciate that you have already taken the step of engaging Guwahati University to produce an EIA and that you have engaged an experienced seismic contractor. However, given the high profile and endangered status of the Ganges River dolphin and the fact that seismic surveys can cause serious disturbance and even physical harm to cetaceans and other aquatic organisms, a more detailed consideration of the potential biological impacts of the planned seismic program is needed. The numbers of Ganges River dolphins are so small that the loss of even a few individuals would be a significant loss to the species.

The section of the EMP you transmitted to us included the 'Table – Assessment of Impacts Associated with Routine Seismic Operation', which predicts a 'Major Impact' to aquatic fauna due to noise and vibration associated with the seismic work. This is a reasonable assessment given the restricted nature of this riverine environment and the fact that many of the organisms including the dolphins are unlikely to be able to avoid exposure to harmful noise. It is important to note, therefore, that the mitigation measures traditionally used for seismic surveys in marine environments, including the measures proposed in the EMP, may be inappropriate or inadequate to protect dolphins, fish and turtles from both short- and long-term effects in this situation.

In response to your request, we have contacted a number of specialists and their names are given in the appendix to this letter. It is essential that you put together an appropriate team to carry out a proper assessment of the likely impacts of the proposed seismic survey on river dolphins and to determine what mitigation measures are appropriate. We would like to stress that appropriate mitigation measures cannot be developed until the potential impact in the proposed area itself has been properly evaluated and appropriate baseline data have been collected on **both** the sound

sources and the animals themselves. To give you some idea of the work necessary in this regard we offer the following general guidelines – the details **must** be determined by the team of specialists you assemble. Only after this work has been completed can the question of appropriate mitigation measures be properly addressed.

I. Evaluation of Impacts – general guidelines

Measurement of sound generation and propagation

It is important (and complex) to determine the likely nature of the sound that the animals will or may encounter. In order to this, a properly designed experiment **must** be undertaken. This will probably involve finding a representative stretch of the river (where dolphins are not present) and measuring the pressure level, power spectrum and propagation of underwater sound generated by the airguns and explosives to be used in the seismic survey. Fish and dolphins are known to be sensitive to low frequency sounds (<1000 Hz) and it is essential that these are measured. However, it is equally important to measure the amount of high frequency energy (1-100 kHz) in the sounds produced by the airguns and explosives. This will require a carefully determined system of broadband (at least 20 kHz) hydrophones positioned in the water column at various ranges from the sound source to determine how well the signals propagate.

Baseline information on dolphin distribution and behaviour

Without baseline data on dolphin distribution and behaviour in the Brahmaputra River it will not be possible to assess probable impacts or develop mitigation measures. This information therefore **must** be collected prior to initiation of the seismic operation. Although some surveys have been conducted in the past (e.g. by Bairagi, Mohan, Wakid), it is essential that an updated survey is conducted and that such a survey is designed specifically for this purpose.

II. Potential mitigation measures and monitoring

As stressed above, suitable mitigation measures **cannot** be fully developed until the above impact evaluation has been completed. The purpose of the following is thus merely to give you an idea of the types of measures that might result from the work of the specialist team. Although dolphins may be concentrated primarily in ‘pockets’ as noted in the EIA, they also may be encountered elsewhere in the river so mitigation measures will need to be employed uniformly throughout the river and during all phases of the work.

Establishment and monitoring of an ‘unsafe’ area

From the information on sound characteristics, as outlined above, it may be possible to determine a zone within which the sound is potentially harmful to dolphins. It may then be possible to survey the ‘unsafe’ area (and perhaps a buffer zone beyond it) using visual and passive acoustic techniques for a specified period immediately prior to the use of airguns or explosives. If dolphins are observed within this area, work would be postponed until the dolphins move outside it. If such an approach were recommended, then the specialist team would identify the process by which a specified number of experienced, attentive observers would survey the area prior to each seismic operation and continue monitoring throughout the period of any operations.

Even with such an approach it is worth pointing out that neither visual nor acoustic monitoring can ensure detection of all dolphins present within an area; there is thus still a chance that one or more animals might be injured by the seismic operations. Dolphins spend a significant portion of time submerged, and both visual and acoustic search methods in a river have a practical range of only about 300 meters. As dolphins cannot be observed at night, it would almost certainly be recommended that the seismic survey take place only during daylight hours.

Temporal and geographical separation of industrial activity and the animals

The available evidence on calving for the Ganges River dolphins must be reviewed. If this suggests that there is a well defined calving season, it would probably be recommended that seismic operations are conducted outside that period. In addition, it is possible that disturbance from the seismic noise would, in effect, 'herd' them ahead of the operations. In such circumstances it is probable that the specialist team would recommend that the seismic survey be conducted in segments, not as one continuous transect.

Monitor dolphin response

However good one thinks mitigation measures are, it is essential that a monitoring programme is carried out to ensure that they really are working as expected. Thus appropriate monitoring of the behaviour and movement of dolphins in the Brahmaputra in the vicinity of the seismic operations will certainly be recommended. It should be recognised that if such investigations show that the mitigation measures are not sufficient to prevent adverse effects on river dolphins or other river fauna, the measures will need to be adjusted or changed during the course of the work.

It is also necessary to ensure that surveys to obtain information on dolphin distribution, abundance and behaviour are conducted after completion of the seismic work to evaluate the longer-term effectiveness of the mitigation efforts.

Use of explosives

Even at this stage we would like to point out that the use of explosives is of particular concern. Underwater explosions can be harmful to dolphins and fish due to the fast rise time of high-energy noise. Impacts will be difficult or perhaps impossible to mitigate fully and we respectfully request that an alternative approach to obtaining the necessary geophysical data be explored. For example, vibroseis technology, which uses long, low-frequency, low-power vibrations, would have relatively little impact on dolphins and other riverine fauna. If such technology could be incorporated into your work plans in place of explosives, this would go a long way towards mitigating the potential impacts on dolphins.

The next phase is for Oil India to contact the specialists listed in the Appendix to determine their availability and willingness to participate in this work as well as likely costs of their involvement.

If we can be of further assistance, please do not hesitate to contact us.

Yours faithfully,

Greg Donovan, Head of Science, International Whaling Commission

Randall Reeves, Chair, IUCN Cetacean Specialist Group

Potential Specialists

The following individuals are among the world's leading specialists in cetacean acoustics, population assessment and/or health. They are familiar with the risks posed to dolphins by seismic operations and are recommended as experts likely to be willing to assist you. We would also note that it is especially important to involve local scientists in the specialist team. One such example is Wakid Abdul (wakid@rediffmail.com).

Dr. Tomonari Akamatsu, National Institute of Fisheries Research, Japan

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Dr. Jay Barlow, Southwest Fisheries Science Center, NOAA, USA

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