Report of November 2011 NTF-1 meeting

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REPORT OF THE NOISE TASK FORCE AT ITS 1ST MEETING

13-14 NOVEMBER 2011

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1st Meeting of the Noise Task Force
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Contents

ACRONYMS

AIS	Automated Information System
ARTS	Air Rocket Transmitting System
AUAR	Automated Underwater Acoustic Recorder
CPA	Closest Point of Approach
DMNG	DalMorNefteGeophizika
EIA	Environmental Impact Assessment
EMTF	Environmental Monitoring Task Force
ENL	Exxon Neftegas Limited
FEB RAS	Far East Branch, Russian Academy of Sciences
HSE QC	Health, Safety and Environment Quality Control
IBM	Institute of Marine Biology
IUCN	International Union for Conservation of Nature
IWC	International Whaling Commission
IWG	Interdepartmental Working Group on Western Gray Whale Conservation of Russian Federation
MMO	Marine Mammal Observer
MMP	Monitoring and Mitigation Programme
MMPP	Marine Mammal Protection Plan
MNR	Ministry of Natural Resources of Russian Federation
MVA	Multivariate Analysis
NGO	Non-Governmental Organization
NTF	Noise Task Force
OV	Observation Vessel
PML	Perimeter Monitoring Line
QA/QC	Quality Assurance / Quality Control
RHIB	Rigid Hull Inflatable Boat
SSG	IWC-WGWAP Scientific Steering Group
SSTF	Seismic Survey Task Force
SSV	Seismic Survey Vessel
WGW	Western Gray Whales
WGWAP	Western Gray Whale Advisory Panel

The 1st meeting of the Noise Task Force (hereafter NTF) was held at the Metropolitan Hotel, Vancouver, Canada from 13-14 November 2011 under the chairmanship of Greg Donovan. The NTF replaces and subsumes the Seismic Survey Task Force (SSTF), which met seven times (see http://www.iucn.org/wgwap/wgwap/task_forces/seismic_survey_task_force/ for final reports of all seven SSTF meetings). The purpose of the SSTF was to understand, assess, and minimize the effects of seismic surveys on western grey whales (hereafter WGW). It was also specifically directed to pursue these targets for the planned 4D seismic survey that was eventually conducted in 2010. With that immediate milestone now crossed, the mandate of the NTF has evolved to consider a broader array of acoustic sources with the potential to affect WGW as well as potential seismic impacts. .

The list of participants is given as Annex A and the agenda as Annex B. A list of acronyms is given at the beginning of the report.

1 INTRODUCTORY ITEMS

1.1 Chairman's opening remarks

The Chairman welcomed participants and led a discussion of the reasons for formation of the NTF and the purpose of this first meeting. The NTF was formed to expand on the earlier work of the SSTF and, while continuing to focus on analyses of the 2010 Astokh 4D seismic survey results and to consider future seismic surveys (e.g., a shallow gas hazard survey currently planned by Sakhalin Energy for summer 2012), give attention to technical aspects of broader acoustics-related issues. These latter include discrete noise-generating events or activities (e.g. pile driving[1]) and the chronic problem of overall increase in ambient noise associated with industrialization of the Sakhalin shelf.

Participants acknowledged that some previous WGWAP recommendations had not been as well specified or directed as they might have been. It was agreed, therefore, that greater effort should be made by both the NTF and the Panel when considering the task force's reports, to ensure clarity with regard to objectives and timescales of proposed analyses, data requirements, formats and analytical techniques, and to set realistic timelines for delivery of results.

A summary table of prior noise-related WGWAP recommendations was prepared and circulated by IUCN for this meeting. It was agreed that these recommendations would be reviewed (and their status updated) by topic throughout the meeting.

1.2 Appointment of rapporteurs

Sarah Humphrey served as meeting rapporteur. Donovan and various members of the NTF including Muir, Reeves and a small working group consisting of Nowacek, Racca, Southall and Vedenev contributed to the final report.

1.3 Adoption of Agenda

The adopted agenda is given as Annex B.

1.4 List of available documents and data

Previous WGWAP and SSTF reports are available on the IUCN WGWAP website (http://www.iucn.org/wgwap/). No new documents or data were provided for consideration at this meeting. Instead, participants were briefed by Sakhalin Energy via slide presentations. Broker, who was unable to attend the meeting in-person, provided updates on the Astokh 4D analyses through telephone conferencing.

The October 2004 document 'Noise mitigation strategy relevant to Sakhalin II construction and operations' developed by JASCO Applied Sciences (then JASCO Research) for Sakhalin Energy was circulated by Bernal on the first day of the meeting.

[1] There are no plans by Sakhalin Energy for pile driving in the next few years.

Bernal also provided an updated version of the summary table of previous recommendations of the WGWAP and SSTF on noise related issues.

With regard to agenda item 2.3, Sakhalin Energy reported that a draft of the referenced Noise chapter existed but had not yet been cleared by the company.

2 CONTINUOUS NOISE

2.1 Review of 'open' recommendations, including those requiring clarification

The NTF began its consideration of issues related to continuous noise by working through the WGWAP recommendations that for one reason or another are still 'open' (e.g. no action yet taken, in progress, or needing clarification).

Before doing so, however, there was a general discussion on how recommendations are framed, formulated, tracked etc. Participants concluded that all parties (company contractors, task forces, Panel) should strive to establish mutually agreed and realistic timelines for implementation of recommendations, including completion of analyses and presentation of results. Those responsible for delivery need to be disciplined about timelines and about informing relevant parties regularly concerning progress, unforeseen obstacles etc. Moreover, a more efficient mechanism is needed to review progress, including on the types of analysis being considered, between meetings. Periodic conference calls have been productive in terms of generating dialogue, facilitating feedback and getting tasks accomplished. It was **recommended** that a schedule of regular teleconferences not only to track progress with the multivariate analysis of Astokh 4D data but also to deal with other NTF issues would be valuable. This should be an organisational priority for the IUCN WGWAP officer.

The NTF also **agreed** that future recommendations ideally should include clear statements regarding:

(1) precise objectives,

(2) data requirements,

(3) analytical techniques

(4) realistic timelines

(5) a means to track progress.

WGWAP-9/002: *The Panel* ***requests*** *that for WGWAP-10 an analysis of whale density for the period 15 August–15 October 2009 be calculated and presented (e.g. as a 1- or 2-week moving average) specifically to determine whether the observed change in distribution was statistically significant.*

Methods are still being developed and should also be informed by recent progress in distance estimation analyses. Therefore the analysis is not going to be completed before the February 2012 WGWAP-11 meeting. Instead, the aim is for the analysis to be available at WGWAP-12 in May 2012. Part of the delay relates to the complexity of the analysis, which is similar in nature to the methodology presently being developed for the 2010 seismic survey density MVA. This analysis requires that spatial/temporal estimates of animal density be cross-referenced and visually depicted relative to acoustic analyses (partly still to be performed as dictated by the whale density modelling). This should be done while controlling for known spatial and temporal trends in the whale densities, survey observation conditions, and ideally, concurrent drivers (*e.g.*, prey abundance). It was also acknowledged that the MVA for the 2010 seismic survey data has a higher priority within the company, and that manpower and other resources are limiting. The NTF, while agreeing with the high priority accorded to analyses of the seismic survey data, reiterated the importance of addressing recommendation WGWAP-9/002 as well as other recommendations not directly related to the Astokh 4D seismic survey. These should not be allowed to become moot simply from the lack of a sense of urgency about addressing them.

WGWAP-9/003: *The Panel also* ***requests*** *that Sakhalin Energy provides for WGWAP-10 a final report on activities on or near the PA-A platform that could have caused the recorded noise.*

WGWAP-9/004: *Finally, the Panel requests that a presentation be made at WGWAP-10 of the acoustic data for the period 15 August–15 September 2009 for buoys Piltun, Molikpaq and Piltun-S, in the format specified in recommendation WGWAP-7/002 for continuous noise.*

Evans reported that all information available to Sakhalin Energy concerning the received levels and the possible sources of the noise had been presented, analysed and discussed at WGWAP-10. The NTF **agreed** that both of these recommendations should be closed out. However, some members expressed continued interest in these data and how they might be used to improve understanding of the potential impacts of continuous noise on WGW. Consequently, it was **agreed** that Nowacek would take the lead in developing a single new recommendation that consolidates any remaining issues for all three of the above recommendations (WGWAP-9/002, 003 and 004). They can thus be changed in the status document to 'Closed' with a note that they have been superseded by the new recommendation.

WGWAP-9/005: *Reeves emphasized that there is an implicit assumption that Sakhalin Energy will keep the Panel advised on any aspects of the company's operations that could significantly change the acoustic environment or otherwise affect western gray whales. Therefore, the Panel* ***requests*** *that Sakhalin Energy report on this issue at WGWAP-10 by updating and clarifying information on recent changes with acoustic implications at either platform.*

Evans updated and supplemented the calendar of new activities presented at WGWAP-10, noting that Sakhalin Energy understands the Panel's need for advance notification of upcoming issues (including future seismic surveys) in order for it to provide advice on mitigation and monitoring. All platform topsides are already dampened to reduce radiated in-water noise. Rubber bushings are part of the design for earthquake mitigation and serve as well to decouple machinery vibration from the outer structure. Although sewage treatment plants will be converted on two platforms, this operation should not generate significant noise. No installations of coolers or new conductors are planned. All further drilling at the existing platforms will take place through the platform legs which naturally shield noise. The biggest anticipated source of non-impulsive underwater noise from existing platforms is related to ship movements for transporting supplies and personnel. Since the completion of construction at the PA-B platform in 2007, however, there has been no deliberate effort by the company to assess noise levels around the platforms and correlate these with specific activities.

The NTF developed the **new recommendation** below on the reporting of new and ongoing activities for consideration by WGWAP. It recognised that the formulation goes beyond simply noise issues but it believed that this would assist the WGWAP in formulating its recommendation which applies to all factors with potential effects on gray whales. On the assumption that this is adopted at WGWAP-11, the NTF **agreed** that recommendation WGWAP-9/005 can be closed (with an appropriate notation that it is among the recurrent items that need to be tracked at regular intervals to make sure they are not overlooked or forgotten and referring to the new recommendation).

RECOMMENDATION ON THE REPORTING OF NEW SAKHALIN ENERGY ACTIVITIES AND CHANGES IN ACTIVITIES WITH POTENTIAL IMPLICATIONS FOR WESTERN GRAY WHALES

Objective

WGWAP as a Panel and through its Task Forces has *inter alia* a responsibility to review, evaluate and advise on SEIC activities that may have impacts (including in a cumulative manner) on western gray whales. This requires that the Panel is made aware of planned 'new' activities as well as any changes to ongoing activities well in advance of these becoming operational.

Reporting/data requirements

It would be valuable and efficient to have a single 'activities' document that can be updated regularly (at a minimum, immediately prior to WGWAP meetings). While the focus of this task force is noise, activity, reporting is relevant to other concerns addressed by the Panel including ship strikes, disturbance of the benthos and oil spills.

Things to be summarised include:

(1) numbers, types, locations and general operating patterns of marine vessels working for SEIC (e.g. supply vessels, oil spill response vessels, standby vessels, accommodation vessels, diving vessels, ad hoc activities)

(2) changes to 'regular' operations (e.g. drilling, well conductor driving, maintenance and project activities)

(3) potential or actual specific/unusual activities (e.g. seismic surveys, pipeline stabilisation, construction works) – with notification as early as possible.

Where changes occur, there should be a concise explanation of why they are necessary, an evaluation (e.g. noise footprint) of any possible impacts and measures proposed by the company to ensure that disturbance or other effects on gray whales are minimised.

Responsible persons

SEIC

Timeline

The company should report at least annually in document form, consistent with the normal company business planning cycle. Information needs to reach the Panel sufficiently in advance to ensure that any ensuing recommendations can be used by the company to modify its plans if necessary. For large-scale activities such as those involved in the South Piltun development, seismic surveys etc. are best dealt with (as has been the case) as separate exercises with considerably more lead time and detailed information provided well in advance, recognising that the Task Force approach may need to be used.

WGWAP-10/015: *The Panel* ***recommends*** *that for future seismic surveys by any company, received sound levels at the edge of a western gray whale feeding area be kept below what is predicted to cause behavioural disturbance. This level was defined by the SSTF to be 156 dBSEL (per one of any radiated pulse) or 163 dBRMS. However, processing and analysis of data related to the 2010 Astokh 4-D seismic survey may indicate that these levels are either overly conservative or not conservative enough. As discussed elsewhere, until new information becomes available to revise these criteria based on measurements in 2010, the Malme et al. (1983; 1984) analyses remain as the sole basis for setting exposure criteria.*

During the discussion on issues related to behavioural response thresholds, the NTF **agreed** that the intent of a robust assessment of the 2010 Astokh 4D data was to provide a more empirical and relevant basis for setting subsequent exposure thresholds. The NTF also noted the desirability for simple exposure level thresholds, but also recognised that a complex suite of factors (e.g., previous exposure history) can affect the likelihood of animals being disturbed. How useful and appropriate the results of analyses of the 2010 data will be in subsequent modification of the behavioural disturbance thresholds or other ways of predicting impact remains an open question. Consequently, it was agreed that this recommendation should remain 'Open – in progress' as the ongoing work on the Astokh 4D data will contribute to this.

WGWAP-10/016: *Without appropriate simple analyses, e.g. average levels in full bands and 1/3 octave bands at a given sensor, the Panel cannot conduct even preliminary analyses of these data [in document WGWAP-10/18-19] and assess any potential impacts the noise might have had on the whales. Therefore, the Panel recommends that document WGWAP-10/18-19 be expanded to include acoustic data presented in the form specified in recommendations WGWAP 6/010 and WGWAP 8/03 so that these sound data can be* *integrated with the comprehensive 2003-2009 data on distribution and behaviour and checked against the Panel's and Sakhalin Energy's continuous noise exposure criteria.*

This recommendation relates to a number of previous discussions regarding the timing and format of data presentation. For instance, the SSTF and WGWAP have often received relatively unprocessed acoustics data, in contrast to photo-ID and behaviour data, and have requested that the acoustics data be processed appropriately. The manner of data analysis and presentation by Sakhalin Energy has differed between construction years (2006 and 2007) and non-construction ('normal operations') years. Not since 2007 has the company apparently perceived the need for a task to post-process the acoustics data. In considering the issue of continuous noise for any future construction years, there is a need to revisit the approach of 2006 and 2007 data analysis and the JASCO/POI reports on noise during construction. Although a rigorous statistical analysis correlating acoustics with behaviour and distribution, as is being done with the 2010 Astokh 4D seismic survey data, was not conducted in the past, at least some consideration was given to the relationship between construction activities and whale observations.

In recognition of the potential for chronic changes in ambient noise from industrial activity in the WGW feeding area, the NTF **agreed** that a method was needed to sample and analyse background noise on a regular basis. Periodic sub-sampling of background noise at acoustics stations (e.g. 10-20 times each season) would make it possible to track ambient noise conditions into the future. The NTF discussed the issues of temporal and spatial scales of sampling, as well as the recurrent problem of obtaining adequate information on industrial activities in the area beyond just those controlled by Sakhalin Energy. A small working group, consisting of the NTF members identified under Item 1.2, examined this specific issue in greater depth and provided a report and recommendations for consideration under Item 4.2.1.

2.2 South Piltun: options discarded so far & current concepts (SEIC presentation)

2.2.1 Introduction

Sakhalin Energy reported that it is studying how to recover the hydrocarbons in the "South Piltun" area under a commitment in the Sakhalin 2 Production Sharing Agreement (PSA). State's Reserve Committee (SRC) Reserves for South Piltun have been booked since 1992. Shareholder and Russian Party support is in place to continue to study the development with an objective of selecting the best development concept in 2012. Company representatives stated that work thus far has confirmed that the development is currently marginal, requiring a step change in value and robustness through innovative solutions. Identifying synergies with the existing P-A infrastructure and determining the option value of a future integrated P-A gas development are both vital. They stressed that any commercial development must safeguard Sakhalin Energy's reputation with key stakeholders through integration and understanding of the full risk profile of commitments and exposure.

2.2.2 Concept Select Phase

The project is currently in the Concept Select Phase which focuses on evaluating the best development option. In selecting the optimum concept five aspects are considered with the balance naturally dependent on the nature of the opportunity. These are Technical, Economic (and Finance), Commercial, Organisational and Political (TECOP).

For South Piltun this process is challenging for a variety of reasons including the significant subsurface uncertainties (driving a wide range of development concepts), the unique environmental challenges (including western gray whales) and the marginal project economics.

With the Project Team currently in the middle of the Select phase no decisions have been taken about the size, scope or even feasibility of the Project. However, based on previous analysis the team is only considering platform options as other options (already shared with the WGWAP) are either technically or economically not realizable. Five platform options are currently being considered ranging from a single shaft minimum facilities structure to a four shaft PA-B replication. Initial indications are that the optimum rig solution is likely to be a fixed rig on the platform (rather than seasonal drilling with a jack-up) with fluid export to PA-B.

2.2.3 Noise Impacts

Preliminary noise studies covering the installation phase of the Project suggest that the options do not differ significantly.

2.2.4 2012 Site Survey

Operations originally planned for summer 2011 have been postponed to summer 2012 as a consequence of the delay in obtaining Russian Federation approvals for the geophysical part of the work.

In addition to the South Piltun survey, surveys will be conducted to cover relief well locations associated with the PA-A, PA-B and Lun-A platforms.

2.3 South Piltun: issues report

As noted under Item 1.4, it was not possible to address this topic at the meeting (also see item 2.4, below).

2.4 Review of the 2004 'Noise mitigation strategy relevant to Sakhalin II construction and operations' in light of future operations including South Piltun

Participants had limited time to read this report. However, SEIC informed the panel that this document was reviewed internally along with other more recent information on mitigation strategies in the preparation of the plans for the South Piltun development. This is part of the information that will be included in the document being cleared at SEIC for WGWAP review. It will include consideration of measures that can be taken to mitigate noise, from pre-production construction activities through operational phases. The document covered a broad range of techniques but did not provide engineering details regarding the various options. The 2004 document was considered before pipeline construction and, according to SEIC, the majority of noise mitigation options had already been addressed or could be addressed with the company's chosen contractors. This included selection of vessels and combinations of scenarios intended to reduce the overall noise footprint. However, the extent to which the identified noise mitigation measures were implemented and effective is difficult or impossible to determine without a detailed, focussed and rigorous retrospective analysis.

For any future construction work (e.g. a South Piltun platform), the NTF **agreed** that planning efforts should include consideration of additional and newly available noise mitigation technologies, particularly ones related to types of vessels, vessel routing, and quieting of propulsion systems. Also of interest is the potential use of forecast modelling and rearrangement of operations to reduce noise from concurrent or co-located activities. The NTF **recommends** that, as Sakhalin Energy presents options for any future construction work, it explains how it has taken potentially available noise mitigation measures into account (including, if appropriate why it is not proposing to adopt certain measures).

2.4.1 Review of any new scientific information (e.g. on exposure criteria) since it was developed and
2.4.2 Ability to implement measures in practice

In the absence of any documents on these topics, and given the time available at this meeting, the NTF was unable to address these items.

2.4.3 Effectiveness of proposed measures

There was some misunderstanding between the Panel and Sakhalin Energy as to when and how this item would be addressed. On the Panel's side, it was expected that the subject of effectiveness would be part of the analyses called for at WGWAP-9 (particularly in recommendations WGWAP-9/019 and 020) and what has come to be known as the 'Retrospective Analysis of Issues' (see item 12.3 of the WGWAP-10 report). On one hand, Sakhalin Energy had indicated a desire for Panel review and feedback on this work, but on the other hand the company's formal responses to the WGWAP-9 recommendations indicated the draft would not be ready for Panel review by WGWAP-10 (which it was not, nor was the Noise section thereof ready for NTF-1 as anticipated). Evans stated that in any event the document in question (the 'retrospective' analysis) does not address the question of effectiveness of *proposed* measures, but only that of *historic* measures (i.e. those taken in relation to PA-A and PA-B construction and operations).

It was clear that no real progress on this item could be made until a document is available to review. Evans **agreed** that the awaited Noise section of the 'retrospective' analysis would be made available to the NTF (via IUCN) as soon as it has been released by the company.

2.4.4 Conclusions and recommendations

Given the absence of detailed information (see Item 2.2), few conclusions or recommendations can be drawn at this stage on the issue of the South Piltun development in terms of continuous noise. However, the NTF **recommended** that any monitoring and mitigation strategies for this development should be carefully designed to ensure consistency in both data acquired and the analytical methods recommended under Item 4.2 below.

2.5 Consideration of any new techniques that may assist in the collection of appropriate data (e.g. D-tags) for new monitoring efforts or to calibrate past data

Detailed information on D-tags had been presented at SSTF-7; Nowacek provided additional and updated information at this meeting, including information specifically on applications to eastern gray whales. Woodward and Winn (2006) were able to track gray whale feeding events and obtain precise measurements of feeding rates over periods of 24-48 hours. The metric they used was the number of times a whale dove at the same position per unit of time. The detailed D-tag data were supplemented by data on surface behaviour from visual focal follows. The kinds of measurements possible with D-tags are extremely fine-scaled and can track whale behaviour in relation to a sound field. This technology is well tested and has been applied on more than 500 individual marine mammals of over a dozen species. It has been used to obtain data on a variety of types of behaviour, including foraging and changes in foraging patterns as a function of noise.

A key difference between D-tags and satellite tags is resolution – satellite tags provide positioning accuracy on the order of hundreds of metres, potentially over periods of weeks to months, whereas D-tags provide detailed movement data (e.g. second by second) over periods of one or two days. Though each approach has its advantages and disadvantages, the D-tag approach provides a level of resolution on individual whale responses (e.g. to sound exposure) that is not achievable with other methods. D-tags could be deployed either during periods of 'normal' operations in order to establish a baseline (relatively undisturbed state) or in the presence of particular industrial activities, with the two datasets to be compared for assessment of effects.

There was brief discussion of other tagging/tracking options to account for the fact that the current D-tag design lacks GPS positioning. There was also some discussion of field logistics (e.g., tag retrieval), passive acoustic monitoring (e.g. using gliders) and animal responses to tagging.

It was anticipated that further consideration would be possible once a detailed proposal was available, possibly at NTF-2 (see WGWAP recommendation 9/028).

3 PULSE NOISE ISSUES (EXCLUDING 2010 4-D SEISMIC SURVEY)

3.1 Review of previous open recommendations, including those requiring clarification

WGWAP 5/006: *Because the actual negative bias in distance estimates tends to be substantially more than can be accounted for by refraction alone, the Panel* ***recommends*** *that an empirical distance bias correction be estimated from the comparison of vessel and shore-based sightings*

Sakhalin Energy reported that work on developing this correction factor was well underway and that it would be applied in the MVA of the 2010 Astokh 4D seismic survey data at which time the status of the recommendation can be reviewed.

WGWAP-8/003: *The Panel has requested, and again* ***requests****, that instead of or at least in addition to the current logarithmic depiction, acoustic data be plotted on a linear scale from 1-1000 Hz, which had been discussed in detail with Sakhalin Energy at the last meeting.*

Sakhalin Energy **agreed** that this would be done for the 2011 data. Once the plots are presented, the status of the recommendation can be reviewed and it can either be closed or modified as required.

WGWAP 9/007: *The Panel* ***requests*** *that its members responsible for reviewing the acoustics data (Vedenev and Nowacek) be provided with the full 2010 acoustics data set (in the form of a CD) no later than two weeks before the start of WGWAP-10.*

This recommendation was met by SEIC and can be considered closed. However, for future requests, it was **agreed** that consideration should be given to requesting additional lead time and/or working out a more efficient procedure with IUCN for making data available to Panel members immediately upon receipt rather than via manual transfer, which can cause a substantial delay.

WGWAP-9/013: *Therefore, the Panel* ***recommends*** *that IUCN make every effort to obtain the report or reports on these acoustic data as they become available either via Rosneft directly or via the Interdepartmental Working Group (MNR).*

Tsidulko reported that he was not aware of any progress had been made on the implementation of this recommendation. He and Reeves had spoken with Lev Brodsky, CEO of Rosneft Far East Shelf, during the oil and gas conference in Yuzhno in September, and Brodsky had indicated that he would consider a formal invitation from IUCN to attend the next Panel meeting and also sharing at least some of the requested acoustics data at that time. However, no such invitation had been prepared or sent at the time of NTF-1. The NTF **recommends** that this matter be addressed by IUCN.

WGWAP-9/024 *Given the acknowledged need for future geophysical profiling, the Panel reiterated the importance of continuing to review developing technologies (and their potential impacts), including electromagnetic profiling. In the light of this, the Panel* ***recommends*** *that IUCN should commission a formal review for the Panel's consideration within the next two years.*

No progress has been made on implementation. However, the NTF **agreed** that this remains an important issue, particularly regarding the noise mitigation technologies considered under Item 2, above.

WGWAP-9/026 *The most appropriate way to review the results of those analyses will be to hold a further meeting or meetings of the SSTF – the timing will need to be evaluated at future WGWAP meetings in the light of progress reported by Sakhalin Energy. The Panel* ***recommends*** *that Sakhalin Energy present a progress report and an expected timeline for completion of the analyses at WGWAP-10.*

This recommendation has essentially become moot. The NTF **agreed** that it should be revisited at NTF-2.

WGWAP-9/028 *[Regarding D-tags] the Panel agreed that Vedenev and Nowacek should provide for consideration at WGWAP-10 a detailed outline of potential objectives, survey area and timing, data that would become available, numbers of tags, etc.*

See Item 2.5, above. The NTF **reiterated** this request to Vedenev and Nowacek.

WGWAP-9/029: *The Panel* ***reiterates*** *the extreme importance of starting (and completing) any 2D survey as early in the season as possible and ensuring that the appropriate equipment is available and ready for deployment in the expected environmental conditions. Further, it* ***recommends*** *that an explicit requirement in this regard be included in any contract for the 2D survey and* ***requests*** *that Sakhalin Energy provide the Panel with an update on this as soon as possible.*

Updated information is presented under Item 3.4, below.

WGWAP-9/031: *The Panel agreed it was essential that archival acoustic monitoring take place along with shore-based behavioural monitoring. Based on the results of discussions in a subgroup chaired by Donovan and including Panel members and Sakhalin Energy, the Panel* ***recommends*** *that the monitoring programme outlined in Annex 6 [of the WGWAP-9 report] be implemented during the 2D seismic survey if and when it occurs.*

Evans indicated that all aspects of implementation of this recommendation had been in place in May-June 2011 in anticipation of this work taking place in summer 2011. Further, he stated that it was the company's intention to follow through with essentially the same programme should the survey occur in summer 2012. The NTF **agreed** that this recommendation should be considered 'Open – in progress'.

WGWAP - ***9/032:*** *The Panel* ***recommends*** *that Sakhalin Energy conduct a thorough evaluation of the options of a single airgun versus an array, from the perspective of sound footprints, practicality of operation (including technical factors) and contractual issues. It* ***requests*** *that the company present the results of that review to the Panel for its consideration.*

The NTF **agreed** that this recommendation should be considered 'Closed – implemented satisfactorily', based on actions taken by SEIC's contractor.

3.2 Alternative methods to reduce energy levels in seismic surveys or replace them altogether

Southall drew attention to a recent report by the International Association of Geophysical Contractors entitled "Environmental Impact Assessment of Electromagnetic Techniques Used for Oil & Gas Exploration & Production" assessing the feasibility of electromagnetic sampling techniques. Southall provided this report to all NTF members. It was **agreed** that this report would be considered at NTF-2 (February 2012).

3.3 Possible ways to obtain, validate, analyse and interpret data from previous seismic surveys by other companies (including Gazprom and Rosneft)

After a brief discussion, it was agreed that this issue of obtaining and reviewing data on seismic surveys from other companies would require a more focussed, aggressive and consistent effort by IUCN than has been available to the Panel previously. The NTF expressed hope that with the hiring of a new full-time project manager based in Gland to oversee the WGWAP process, this situation would improve. As mentioned under Item 3.1, Tsidulko has set the groundwork for IUCN to approach Rosneft.

Evans drew attention to the regional 'biodiversity group' that Sakhalin Energy supports, as do the Sakhalin II lenders, the Sakhalin Oblast and the Ecological Council. Rosneft and Gazprom will be represented at the next meeting, and there is potential for engagement through this group, which meets every six months. It was **agreed** that Evans would pursue the subject of data availability and potential for coordination with IUCN and WGWAP at the next meeting of the NTF.

3.4 GeoTech Survey 2012

Evans provided updated information on this topic, recalling that the purpose of the survey was to make sure there are no shallow gas hazards in the area(s) Sakhalin Energy is considering for a South Piltun platform and associated infrastructure (e.g. pipelines).

One new aspect that is being considered – the potential need for drilling relief wells – arose as a result of the industry-wide review of procedures in response to the Macondo well blowout and oil spill in the Gulf of Mexico in 2010. Evans emphasised that given the depths, pressures and other features of the Piltun and Astokh fields, the need for a relief well to control a blowout is extremely unlikely. Nevertheless, Sakhalin Energy has incorporated acoustic measurements at up to six potential relief well locations into its plans for the geotechnical survey in 2012.

Evans assured participants that the company had accepted, and plans to implement, all Panel recommendations regarding the geotechnical survey, as set forth in the reports of WGWAP-9 and WGWAP-10. This includes interpreting 'as early in the season as possible' for the start of the survey to mean not as early as contractually feasible, but rather as early as ice cover allows. Contracting and permitting were well underway at the time of NTF-1 and it was anticipated that final details on both the acoustics modelling work and the survey procedures would be presented at NTF-2.

When asked to clarify the acoustic implications of using a sub-bottom profiler (a ‘boomer’ device) continuously during the survey, Racca explained that JASCO’s modelling of the operation’s footprint had been premised on the fact that the airgun array source would dominate the acoustic field. He further noted that the modelling thus far indicated there would be a 4 km ‘buffer zone’ between the 160 dB contour and the outer edge of what has been defined as the Piltun feeding area, thus providing a presumably ample margin for any secondary contribution to the noise levels.

Finally, Evans was asked to clarify the company’s position on recommendation WGWAP-9/030 which concerns the 1000 m exclusion/safety zone. The company’s formal response, as posted on the website, states: “SEIC understands the desire for the 1000m exclusion zone for western gray whales. However, foggy conditions limit the visibility to 500-1000m, we will continue acquiring seismic until the visibility is limited to ≤500 m.” The recommendation was later formally rejected by SEIC, and this appears to be a remaining area of disagreement between the Panel and the Company with regard to the 2D mitigation and monitoring programme. Evans stressed that although the company intends to implement the 1000 m as a general rule, if fog were to become a delaying factor and risked significantly prolonging the survey, it may decide to ask the Panel’s advice as to whether the rule should be relaxed in order to complete the survey as early in the season as possible. Given this, the NTF **agreed** that it is important for the issue to be revisited at NTF-2 so that a clear and workable arrangement can be specified to address it should the need arise.

4 CUMULATIVE NOISE

4.1 Combined analysis of acoustic data from 2003-2009 in conjunction with whale distribution and behaviour (and other, e.g. benthic?) data

4.1.1 Update on the integrated data analysis being conducted with Moscow State University under the Joint Programme

Broker and Vladimirov joined the meeting via speaker phone and briefed the task force on this item. They indicated that the contract was in place, with Dr. E. Kriksunov of the Biology Department at Moscow State University as the principal investigator. The scope, methodology and timeframe for the work had been discussed at a recent meeting in Moscow and at the time of NTF-1, the company was expecting Kriksunov and his team to have made significant progress by the end of December 2011, particularly with regard to the development of methods for analysing distribution and benthic data. The work was expected to proceed in steps, with the initial effort focussed on integrating the multiyear distribution and benthic datasets, to be followed eventually by integration of the acoustics and hydrology datasets. At present, there is no intention to attempt to integrate behaviour data in this first phase of the analysis. The tentative completion date is May 2012. It is important to recognise that this work is not a regulatory requirement and thus there is no ‘official’ deadline for completion. Moreover, it is a joint project of SEIC and ENL.

There was an inconclusive discussion of how the analysts would define and distinguish seasons with no industrial activity (baseline or control years) from those with activity (‘disturbed’ years). From the Sakhalin Energy perspective, 2004 and 2008 are years with low industrial activity and 2005, 2006 and 2007 are years with industrial activity. It was noted, however, that activities by other companies often produce noise in one or both gray whale feeding areas that is unaccounted for if one considers only Sakhalin Energy’s activities.

Nowacek urged caution in how cumulative sound energy levels are determined for these analyses, noting that it is not a trivial matter. In the case of the acoustics component of the aggregate dataset, there may be more data than is needed, in contrast to some of the other variables. The NTF **agreed** that Sakhalin Energy should decide on the temporal scale of interest and then consult with task force members on potential approaches and analytical methods.

4.2 Consideration of how to examine the effects of cumulative noise in the Piltun area (both continuous and pulse, from SEIC activities and other sources)

4.2.1 Recommendations for future work

The small working group referred to under Item 2.1 concentrated its discussions on three main points which are summarised here. The task for this group was to discuss the scope and nature of previous Seismic Survey Task Force (SSTF) recommendations regarding the analysis and depiction of acoustic data from the SEIC-supported integrated monitoring program. While previous, outstanding, specific recommendations were considered to some extent, the perspective taken by this working group was to take a step back and provide a renewed perspective on the ways in which the acoustic monitoring data would be both broadly useful in assessing the industrial impact on WGW acoustic habitat and behavior across the monitoring period but also specifically informative in the assessment of specific acoustic events. The working group came to a number of conclusions and recommendations on issues related to (1) the desired analysis and reporting of acoustic data within subsequent summary reports provided to the WGWAP (and NTF); (2) analysis and reporting of summary acoustic data within the 2003-2009 retrospective analyses; (3) broader scope issues related to NTF/WGWAP recommendations and more comprehensive timeline summary of WGW-relevant issues. These are discussed within this prioritized sequence below.

1) Desired analysis and reporting of acoustic data within subsequent summary reports provided to the WGWAP (and NTF)

Previous WGWAP and SSTF reports have made a number of specific recommendations and requests related to how acoustic data are summarized and reported to the panel. As a general comment, there has been a sense that previous reports have suffered from a lack of basic overall perspective or assessment of the data while consisting mainly of copious quantities of data often on condensed temporal or spectral scales that render both a comprehensive assessment or a detailed consideration of exposures difficult. The working group felt that a more constructive means of reporting the acoustic data would be to provide summary data on temporal patterns of noise at specific locations, while ensuring that the original time series data would be available for more detailed analysis of specific events of interest. Specifically, the working group **recommended** that:

- All original time series data should be collected and stored by the Acoustic Monitoring Group at the Pacific Oceanological Institute (POI) as has been done previously to support the additional representations described here and any potential future analyses. This is not a new request but merely a remark on the critical importance of full archival preservation of the original data.
- WGWAP recommendation 7/002 remains relevant in terms of the reporting of data on specific acoustic events on relatively fine temporal (1-s for impulse noise; 1-min for continuous noise) and spectral (1-Hz band) scales. Data should be made available upon request on these fine scales for specific events of interest, but the working group felt it was not necessary or informative to compute these results for all sensors and all sampling periods. However, any steps that can be envisaged that would expedite the process of getting these data released upon request should be considered. To this end, the NTF strongly urges Sakhalin Energy to include in their contract with POI a requirement that all raw acoustic data be pre-processed and archived as time-indexed frequency resolved records (e.g., through the computation of simple, non-averaged spectrograms). This operation will minimise the time needed by POI to fulfill subsequent requests for data made under recommendation 7/002.
- For each season, beginning with 2012, the working group would like to see included in or enclosed in digital format with the reports the following tabular and graphical summary representations of the acoustic data. Specifically, the report would include[2] for every recording station and all available data periods:

[2] There was insufficient time within the NTF meeting to reach final agreement on the tabular and graphical summary representations of the acoustic data and it was **agreed** that this should be considered further at NTF-2.

* Tabular summaries in digital format of 30-min Leq levels in 1/3-octave bands between 10Hz and 10kHz (ANSI standard center frequencies)

* Graphs showing sequential 1-min Leq values for the 20Hz-2 kHz and the 20 Hz-15 kHz passbands (presented chronologically with ~3 days data/graph)

* Distinct spectrograms showing a) 1-minute averages in the range 20Hz-2kHz on a linear frequency scale and b) 1-minute averages in the range 20Hz-15kHz on a logarithmic frequency scale. For completeness and ease of reference the 2-20 Hz frequency range could be shown on a common time axis alongside the 20Hz-15kHz logarithmic spectrograms, but should be segregated and rendered separately with an independent colour scale so as not to restrict the dynamic range of the >20 Hz data.

2) Analysis and reporting of summary acoustic data within the 2003-2009 retrospective analyses

The working group agreed on the importance of conducting a comprehensive assessment of the acoustic monitoring data collected during this period. Significant discussion took place regarding the best means of representing these data on spatial and temporal scales that lend themselves to a broader view of noise in and around WGW habitat. Based in part of current best practices regarding acoustic summary statistics (e.g., from ambient noise monitoring in U.S. National Parks), the working group made the following recommendations with regard to:

- Temporal averaging: Monthly percentiles (5th, 50th and 95th) of 1h Leq values within the 20Hz-15kHz passband should be plotted on a common time axis across multiple years to enable the assessment of specific events and longitudinal general trends
- Spatial representation: A comparative spatial sampling that included some sensors along 10 and 20m isobaths and in different north-south portions of the sampling range would be important. Given that the spatial and temporal sampling effort has been uneven, certain monitoring sites will likely lend themselves better to this approach than others.

3) Broader scope issues related to NTF/WGWAP recommendations and more comprehensive timeline summary of WGW-relevant issues

Two related issues arose during the discussions that the working group brought to the attention of the NTF (and should potentially be considered by the WGWAP).

- In order to be most constructive and explicit, recommendations regarding acoustic data – and arguably other sampled data – should be categorized according to the scope of the recommendation (e.g., event-specific, systematic data analysis/reporting, historical, procedural issues).
- A comprehensive graphical timeline showing all pertinent industrial, meteorological, biological, and data sampling status variables should be provided within the overall reporting of the integrated monitoring program. This would present on a common time axis a summary of known human industrial events, weather events, sampling periods for different monitoring teams, important biological observations, and other relevant occurrences. Such a timeline would constitute a common framework for discussion and allow more efficient consideration of the events of the season.

Notwithstanding the footnote on p. 14, the NTF **agreed** with the recommendations of the small working group.

4.2.2 Cumulative noise assessment: recent, relevant, related issues

The NTF noted that several relevant presentations (as documented by pre-published abstracts) were to be given at the Society for Marine Mammalogy's biennial conference in Tampa, Florida, in late November 2011. In one of these, Rolland et al. (2011) reported a 6 dB decrease in underwater ship noise below 150 Hz in the Bay of Fundy (eastern Canada) during the days immediately following the terrorist attacks in the U.S. in September 2001, when both air and sea traffic were dramatically scaled back for security purposes. This reduction in noise was correlated with a significant decrease in 'stress hormones' in the faeces. The authors characterised their results as follows: "This is the first evidence that exposure to underwater noise from large ships is associated with a measure of chronic stress in free-ranging whales, which has implications for baleen whale populations in heavy ship traffic areas." The Rolland et al. study prompted a discussion at the NTF meeting of faecal sampling and the extent to which this had been attempted with the gray whales off Sakhalin. Weller and Tsidulko confirmed that a few samples had been collected over the years by the Russia-US research team and Broker indicated that although the joint programme's photo-ID team had been encouraged to consider it, no samples had been obtained to date. Tsidulko explained that faeces from the whales off Sakhalin tend to disperse rapidly and sink, making it generally impossible to collect samples.

The NTF took note of a presentation by Blackwell et al. (2011) that investigated in greater detail a previous finding that detected call rates from bowhead whales dropped in the vicinity of operating seismic survey airguns (median distance ~ 43 km). Four years of data from the North Slope of Alaska were analysed to determine received levels (RL) of airgun sounds at whales whose call detection rates declined, 'an important piece of information when assessing cumulative effects of airgun sounds on whales'. Logistic regression modelling showed that the RL 'dose' of airgun sound at which detected calling rates began to decline was ~ 120 dB re 1 μPa^{2}s cumulative SEL over 15 min, corresponding to received SPL at the whale of at least 100 dB re 1 μPa.

Racca also drew attention to the ongoing work of a group of academic, government and private sector scientists attempting to develop methods of assessing the cumulative effects of industrial noise on marine mammals in the Arctic, hoping to 'advance beyond commonly used simple narrative approaches' for addressing this problem (Fleishman and Streever 2011).

5 REVIEW PROGRESS ON ANALYSES OF THE 2010 4-D DATA

This item will be the primary topic at NTF-2 and thus only an update on progress was provided at this meeting. Three presentations were given.

Racca began with a summary of completed and ongoing acoustics work. For the 'special cases' where focal follow, distribution and acoustics data could be matched (these were identified at WGWAP-9), all of the tracks during active seismic acquisition have been analysed. The dataset consists of more than 60 individual tracks that include at least some period(s) when the airguns were operating. In addition, model-based estimates of cumulative SEL at offshore points have been completed as input to one of the distribution analyses. The margins of error in these estimates are not well characterized and will depend on the specific acoustic metrics (e.g., RMS SPL and SEL are likely to be more accurately predicted by modelling than peak SPL and kurtosis) and on environmental variables (e.g., localized shoaling of sand was shown to affect received sound from the 2010 seismic survey in ways that would not be well-predicted by model estimates). The estimated variance of true received levels from those modelled, on the basis of the SSV and monitoring results from 2010, is believed to be on the order of up to perhaps 4 dB in most cases. This is noted as being roughly on the order of measurement error on many archival acoustic tags in realistic deployment conditions. These estimates indicate that within the feeding area, maximum per-pulse received levels at tracked whale locations may have briefly reached 158 dB SEL in one instance. Higher received levels (up to 163 dB SEL per pulse) were estimated at rare tracked whale locations outside the feeding area. These results are also being integrated with the analysis of the distribution results from visual scan surveys, estimating the accumulated pulse sound exposure over a range of time periods preceding the mid-point of a particular scan. The objective is to detect possible correlations between the distribution analysis results and the cumulative SEL from one or multiple seismic lines.

Racca indicated that POI had not yet provided the acoustic data from the sensors along the 10 m contour. This led to a suggestion that JASCO's modelled values for received levels at the 10 m contour stations should be sequestered prior to disclosure of the experimental results, and the same should be done with output from models by A.N. Rutenko and K. Avilov so that an objective comparison of the three approaches could be made. Racca stated that JASCO would be willing to participate in such an exercise as long as it did not have excessive cost implications. Most task force members agreed that this was a potentially useful concept and that it could lead to improvements in the JASCO model. Racca added that field validation at the PML had already been carried out, but he conceded that RL estimation in shallower waters may be subject to greater error, in which case the comparison may show whether a different set of assumptions would be better for estimating sound attenuation between the PML and the whale points in the feeding area.

In discussion, Vedenev expressed concern about the fact that Panel members and others have not been able to see the estimates by the JASCO model until these have already been 'corrected' based on field measurements. Racca acknowledged the potential for up to 4 dB of variability from baseline estimates due to changes in local conditions and noted that this is why the practice was introduced to compensate for daily variations in estimating the mitigation boundaries during the 2010 seismic survey. Practically, there is no choice but to treat the model as accurate when making forecasts and to use whatever data are available in order to improve the estimates for post-activity analyses.

The second presentation was given by Muir, who has lead responsibility (with statistician Ruth Joy) for the distribution MVAs and will also be responsible for analysing the behaviour scan data from Gailey's group. The intention is to first analyse the two datasets separately, using the same models, and then, if the data support doing so, pursue a combined analysis in order to increase statistical power. Sakhalin Energy is planning to contract a second statistician to help with these analyses.

Much of the analytical effort so far has been devoted to cleaning up the data, which have proven to be extremely 'noisy', and in conducting an analysis to derive a distance correction factor for shore-based observations (recommendation ***WGWAP 5/006)***. Muir, Broker, and Joy have conferred with Justin Cooke (via two teleconferences) to get help in identifying and dealing with uncertainties and sources of error, in this analysis and to discuss the methodology that was used. Both theodolite-WGW sightings pairs and vessel sightings matched to GPS locations of the *Pavel Gordienko* were used to derive the distance correction factor. The matching of vessel sightings to shore-based observations checked all matches to confirm that the observed vessel was, in fact, the *Pavel Gordienko.* This vessel and the *Igor Maximov* are similar in appearance and thus were sometimes mistaken for each other. *Pavel Gordienko* had three GPS sources, one shipboard and two handheld. These sources did not always line up and in the end only the data from the shipboard source were used (note that data are missing in this source for the first two weeks of June).

The vessel sightings data were truncated based on the range of visibility from each shore station, which varied according to station height (maximum range: 11.5 km). This was because vessel observations can be made beyond the visible horizon, and these sightings added to the "noisiness" of the data set. The next steps will be to conduct the analysis using corrected and non-corrected data.

In trying to partition and compare scan results between 'on' times (airguns shooting) and 'off' times (seismic vessel turning between lines), no allowance has been made in the analyses thus far for decay or deterioration of whale responses immediately following shutdowns or power-downs. When asked, Muir estimated that turning times lasted at least 2.5 or 3 hours and she noted that in some cases as many as three or even four lines were shot in a day.

Muir expressed concern that benthic data are not available for inclusion in this MVA even though that variable (benthic composition and biomass) could represent a major confounding factor.

The third presentation, given by Broker (through telephone conferencing), concerned the behaviour MVA work being led by Glenn Gailey. Relative orientation of vessels to whales and whales to vessels are to be added as explanatory variables. Consideration is also being given to ways of bringing into the analysis data on vessel activity in the area unrelated to the seismic survey. Gailey has evaluated the entire dataset of whale tracks to see whether there are other potential sources of disturbance, e.g. *Pavel Gordienko* itself. Gailey and co-workers are investigating ways to improve the oceanography dataset (e.g. bathymetry, tides, swells). Although there is a good chance that preliminary results from this MVA will be ready to present by February, this will probably include only the SEL metric in the acoustics covariates. The computation of other acoustic quantities is taking too long for inclusion by then.

The so-called 'noise cases' are proving to be interesting and informative but there is much scope for interpretation, and it will be necessary to reach a decision on how much time to spend re-sampling the whale tracks. Currently the plan is to complete maps for all tracks, including vessel locations, and further variables such as respiration rate will be added if time allows. The priority at this stage is to have a draft report on the MVA ready for presentation in February. Only after the MVA report is ready will the team go back to work on the noise cases.

5.1 Conclusion

The NTF **agreed** on the value of regular teleconferences to maintain momentum on this work. Such teleconferences need to be organised by IUCN in close coordination with Donovan and others.

The NTF also **recommended** that, when preparing reports on the 2010 data, a focussed effort should be made to identify specific ways to improve future data collection methods and procedures. Assuming there is a 2D seismic survey in summer 2012, this would be the next opportunity to make use of such improvements.

6 ANY OTHER BUSINESS

6.1 Future of the joint programme

There was a substantial discussion concerning the future of the joint SEIC/ENL gray whale research and monitoring programme, particularly with regard to the question of whether the acoustics element would be maintained. Evans reported that MNR had been exerting pressure on the companies to focus on activity-based monitoring rather than continuing to annually collect essentially the same suite of acoustic and other 'monitoring' data. Getting approval for the 2011 joint programme was a major challenge, and it was not until May that companies received approval to proceed (albeit with a scaled-back programme).

Tsidulko clarified that it was his understanding that MNR had objected more to the lack of integration, e.g. analyses that attempt to relate acoustics to behaviour, than to continuation of data collection *per se*.

Vedenev agreed, noting that in fact MNR was responding to the companies' plans to eliminate the behaviour component and it was in this context that MNR was signalling that it would be pointless to continue collecting the full standard suite of acoustic measures. He believed that much of the resistance to programme continuation was financial. He also expressed the view that aspects of the programme are hard to justify when their results are largely or entirely unused. He reported on strong interest within MNR and the Interdepartmental Working Group to expand satellite tagging; reducing the costs of the 'core' programme, including acoustics might make more funding available for tagging.

Evans indicated that SEIC had consistently stressed the relevance of continuing to acquire acoustics data, but that it is ultimately the prerogative of the Russia Party are the representatives appointed under the PSA terms (Production Sharing Agreement) who agree with the Companies (effectively "a contractor" under the PSA terms, just what scope of work they will accept and pay costs for. to decide how much of the joint programme is cost recoverable.

6.2 Status of ongoing recommendations

As noted above, some previous recommendations of the Panel (and its predecessors) refer to actions by Sakhalin Energy that are expected to be incorporated into routine business and require regular attention and updating. The NTF **recommends** that the Panel develops a suitable mechanism to ensure that if such recommendations are classified as 'Closed' in the online list, they are identified so all parties (especially IUCN) are 'reminded' of the need to ensure continuing compliance/implementation.

6.3 Topics for NTF-2

The next meeting (NTF-2) will be in Geneva immediately before WGWAP-11 and will focus on the methods and results of analyses of the Astokh 4D seismic survey data and any implications these may have for the planned geotechnical (2D seismic) survey. The NTF **recommends** that Sakhalin Energy distributes in January the other documentation that had been expected for NTF-1 and that it be considered at NTF-2 to the extent that time is available. NTF-2. IUCN was asked to ensure regular teleconferences during the interim between November and February in order to ensure that Sakhalin Energy's staff and contractors have the necessary feedback from Panel members (in this case specifically Donovan, Nowacek, Vedenev, Weller, Tsidulko and Cooke).

7 ADOPTION OF REPORT

The report was adopted by correspondence on 11 February 2012.

8 REFERENCES

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Annex A

List of participants

Koen Broker (Sakhalin Energy - By telephone)
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Richard Evans (Sakhalin Energy)
Glenn Gailey (Sakhalin Energy)
Judy Muir (Sakhalin Energy)
Doug Nowacek (WGWAP)
Roberto Racca (Sakhalin Energy)
Randall Reeves (WGWAP)
Brandon Southall (WGWAP Associate scientist)
Grigory Tsidulko (WGWAP)
Dave Weller (WGWAP)
Alexander Vedenev (WGWAP)

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Annex B: Agenda

1 Introductory Items

1.1 Chairman’s opening remarks

1.2 Available documents

2 Continuous Noise

2.1 Review of open recommendations, including those requiring clarification (IUCN to provide list)

2.2 South Piltun: options discarded so far & current concepts (SEIC presentation)

2.3 South Piltun: issues report

2.4 Review of the 2004 ‘Noise mitigation strategy relevant to Sakhalin II construction and operations’ in light of future operations including South Piltun

2.4.1 Review of any new scientific information (e.g. on exposure criteria) since it was developed

2.4.2 Ability to implement measures in practice

2.4.3 Effectiveness of proposed measures

2.4.4 Conclusions and recommendations

2.5 Consideration of any new techniques that may assist in the collection of appropriate data (e.g. D-tags) for new monitoring efforts or to calibrate past data

3 Pulse Noise Issues (Excluding 2010 4-D Seismic Survey)

3.1 Review of previous open recommendations, including those requiring clarification (IUCN to provide list)

3.1.1 Alternative methods to reduce energy levels in seismic surveys or replace them altogether

3.1.2 Possible ways to obtain, validate, analyse and interpret data from previous seismic surveys by other companies (including Gazprom and Rosneft)

3.2 Consideration of any new techniques that may assist in the collection of appropriate data (e.g. D-tags) for new monitoring efforts or to calibrate past data

3.3 GeoTech Survey 2012 (SEIC presentation)

4 Cumulative Noise

4.1 Combined analysis of acoustic data from 2003-2009 in conjunction with whale distribution and behaviour (and other, e.g. benthic) data

4.1.1 Update on the integrated data analysis being conducted with the Moscow State University under the Joint Programme (SEIC presentation)

4.2 Consideration of how to examine the effects of cumulative noise in the Piltun area (both continuous and pulse, from SEIC activities and other sources)

4.2.1 Recommendations for future work

5 Review Progress on Analyses of the 2010 4-D Data

6 Any Other Business

7 Adoption of report