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Larry Wallace, Chair
Sahtu Land and Water Board

April-28-14

***RE: Husky applications S14L1-002 and S14A-003***

Dear Mr. Wallace,:

The ʔehdzo Got'ı̨nę Gots'ę́ Nákedı (Sahtú Renewable Resources Board, the Board) has reviewed Husky Oil Operations' Land Use Permit and Water License Applications based on its mandated responsibilities under the Sahtú Dene and Métis Comprehensive Land Claim Agreement.

The Board's detailed technical comments and recommendations are found in the attached Excel table. This letter provides a summary of the main points addressed in the table.

Overall, it is the Board's view that this project might cause significant adverse environmental impacts, particularly impacts on fish habitat (including water quality), migratory birds, caribou and other sensitive species like wolverine.

## Fish habitat and water

Fish habitat and water quality could be impacted by this project in the following ways:

- **Risk of spills on lease area** – Husky plans to transport hazardous chemicals, waste materials, produced oil and fuels across creeks and wetlands within the lease area during times when fish are active in the area, including spawning, feeding, and rearing times. Spills into wetlands are more difficult to clean up when the ground is not frozen.
- **Risk of spills into Mackenzie River** – Husky plans to transport hazardous chemicals and waste fluids via barges on the Mackenzie River. Husky has not provided a plan for cleanup of potential spills on the Mackenzie River.

Some of these risks and impacts can be lowered through the following recommended measures:

- Ø Use double walled tanks during the handling and transport of all hazardous materials.
- Ø Use a tracer in the fracking fluid as a means of verifying whether the fracking fluid has leaked into the groundwater.

Husky's water monitoring program needs to be strengthened as a basis for verifying whether Husky's operations are having an impact on water quality or stream flow. All monitoring data (including well monitoring data) should be publicly available for review by communities and co-management boards.

## Migratory birds

Migratory birds such as ducks and geese could be impacted by this project in the following ways:

- **Destruction of nests** – If Husky decides to clear the area for its well pads between May and July, it could destroy bird nests.
- **Disturbance during staging and feeding** – Husky plans to fly helicopters and planes at any time of the year. Husky has not identified which bird species could be affected or where those birds like to gather and feed (areas that should be avoided).
- **Risk of spills on lease area** – Husky plans to transport hazardous chemicals, waste materials, produced oil and fuels across wetlands within the lease area during times when migratory birds are nesting, staging, and feeding. Spills into wetlands are much harder to clean up when the ground is not frozen.

Husky has not yet completed a proper assessment of potential impacts on migratory birds.

Some of these risks and impacts can be lowered through the following recommended measures:

- Ø Avoid clearing any areas that could contain migratory bird nests between May 1 – July 31.
- Ø Identify locations of important staging and feeding habitat areas and avoid flying over those areas.
- Ø Fly no lower than 650 m and stay at least 1.5 km away from any observed flocks of birds.

## Caribou and other sensitive species such as wolverine

Tǫdzı (boreal woodland caribou, listed as a "Threatened" species under the Federal and Territorial Species At Risk Acts) and other sensitive species such as nǫ́gha (wolverine, federally listed as "Special Concern") could be impacted by this project in the following ways:

- **Leave the area** – Husky expects species that are sensitive to forest clearing and noise disturbance to move out of the area while the program is active – that includes boreal caribou and wolverine.

The best way to protect boreal woodland caribou and wolverine is to protect their habitat. In Alberta and British Columbia, the best practice is to use a "no net loss" strategy – any loss of caribou habitat has to be replaced with habitat that grows back somewhere else nearby. Caribou habitat in the Sahtú Region should be managed at the same standard as caribou habitat in other jurisdictions. Caribou populations from declining the way they have in many parts of Alberta and British Columbia.

Husky should adopt best practices in reclamation of impacted wildlife habitat. Ɂehdzo Got'ıę (Renewable Resources Councils) should be involved throughout the reclamation planning process to ensure that traditional knowledge and the interests of the long term stewards of the

land are accommodated, and impacted areas will be restored to a state that is acceptable to community members.

Husky's wildlife monitoring program needs to be strengthened as a basis for verifying whether Husky's operations are having an impact on sensitive wildlife that may be moving out of the area.

**Cumulative Effects and Adaptive Management**

In its application, Husky said it would work with other operators in the Sahtú Region to develop a cooperative cumulative effects management plan and to reduce the overall footprint by combining infrastructure and using areas that are already disturbed. More details about these initiatives are requested, and the Board should be involved in collaboratively developing any plans that will affect wildlife, habitat, and harvesting in the Region.

A 5-year term is too long for this land use permit and water license. The program should be reassessed after two years to check what impacts it had on the environment and local communities, and whether or not mitigation measures are working well. If this application is not referred to environmental assessment, the Board recommends that the Sahtu Land and Water Board allow the land use permit and water license for this program to extend 2 years only (to 2016), at which time a detailed assessment should be conducted to evaluate predicted vs. actual impacts and the effectiveness of Husky's mitigation measures.

Thank you for taking the Board's comments into consideration.

Sincerely,

Deborah Simmons
Executive Director

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| 1. Fish Habitat - Risk of Contamination through Spills | Husky's application states: "These watersheds (i.e., Slater River and Little Bear River watersheds) are used by fish moving to and from the Mackenzie River, as well as other life history activities (e.g., spawning, rearing and feeding), and have the potential to be affected by activities within the lease." (Appendix 1, 5-108) The application also indicates that watercourses within or downstream from the lease area may contain bull trout, which is ranked by COSEWIC as a species of Special Concern (Appendix 1, 5-114). Husky is proposing to operate at any time of the year, which means potentially transporting hazardous chemicals, waste materials, produced oil and fuels across creeks and wetlands during times when fish are active in the area, including spawning, feeding, and rearing times. Husky's Spill Contingency Plan states: “Spills in wetlands or muskeg can be some of the most difficult spills to contain, recover and clean up because of limited site access for both manpower and equipment. Because of the sensitive nature of these ecosystems, more damage may be caused by emergency response operations than was caused by the original spill.” (SCP Part 3, p. 18) In contrast, "[s]now is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered." (SCP Part 3, p.27) | If this operation is to be carried out at times of the year when fish are active in creeks and rivers across the lease area and when the ground is unfrozen, there is potential for significant environmental impacts on fish habitat due to the risk of spills of hazardous chemicals, waste fluids, produced oil, and fuel being transported throughout the lease area. Further study is needed to understand and mitigate these risks. |
| 2. Transport of Toxic Materials by Barge - Risk of Spills into Mackenzie River | The Mackenzie River (Deh Cho) is a very important river to communities throughout the Northwest Territories, a source of drinking water for Sahtu communities, and important fish habitat. It is a Special Management Zone within the Sahtu Land Use Plan. Husky plans to transport toxic materials, including large amounts of waste fluids produced as a result of hydraulic fracturing, by barge along the Mackenzie River, creating the risk of a toxic spill into the River. Husky's application does not mention any spill prevention or clean-up measures in place with regard to a potential spill/accident involving a barge carrying hazardous materials along the Mackenzie River. | Q: How many barge trips would be required to transport all the waste and any other hazardous materials? Q: Will the hazardous materials be transported within the hulls of the barges or within double-walled tanks on deck? Will Husky require contractors to transport hazardous materials in double-walled tanks? Q: Does Husky plan to take responsibility for spill contingency and emergency response should there be a spill of Husky’s waste materials or other toxic substances into the Mackenzie River? If so, please give details of what will be contained in Husky's spill contingency plan and emergency response plan to address such a scenario. |

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| 3. Risk of Wellbore Integrity Failure through Permafrost Thawing and Subsidence - Surface Water and Groundwater Quality Concerns | Husky's application states: “During drilling and completions, the ground material in contact with the well casing is warmed by the transfer of heat through the casing from the circulated warm drilling fluid or water within the well bore. Heat transfer could cause localized thawing and subsidence of the material around the wellbore.” (Appendix 1, 5-12) Wellbore integrity could be compromised by permafrost thawing and subsidence, potentially leading to groundwater and surface water contamination. | Q: Please cite statistics or examples from oil and gas operations in permafrost zones, indicating how often and to what extent wellbore integrity has been compromised due to permafrost thawing and subsidence around the wellbore. |
| 4. Water Monitoring Program Inadequate | Husky’s Surface Water Evaluation program conducted in July 2012 was not adequately designed to collect a robust baseline from which project-specific impacts can be measured going forward. The data collected in July 2012, as summarized on page 5-98 of Appendix 1, found some inconclusive evidence of hydrocarbons present in water bodies across the lease. It is important to determine the extent of natural hydrocarbons in water bodies both upstream and downstream of proposed hydraulic fracturing operations, in order to be able to determine whether the operations cause any contamination. | Before any further operations are permitted, the proponent should be required to design and implement an improved surface water quality monitoring program with better site selection and increased number and frequency of sampling. In particular, the source of toluene found at site 31 (downstream from the all-weather road) needs to be investigated to determine whether it is naturally occurring or related to run-off from the all weather road. |
| 5. Double Walled Tanks for Produced Fluid Storage - Surface Water Quality Protection | On page 5-103 of Appendix 1, Husky indicates that flow back water from hydraulic fracturing and well testing will be contained in double-walled tanks with overflow meters and controls. This contradicts what is stated on page 2-20, which indicates fluid storage will be in singled-walled tanks with a portable lined dike. | Q: Please confirm whether flow back / produced fluids will be stored in double-walled tanks with overflow meters and controls. The Board recommends that Husky be required to use double-walled tanks with overflow meters and controls to store flow back / produced fluids. |
| 6. Use of Tracer in Frac Fluids - Groundwater Quality Protection | It is important that all frac fluids contain a tracer, so that if this tracer was ever found in the groundwater, we would know that frac fluids are contaminating the groundwater. ConocoPhillips committed to the use of a tracer in its hydraulic fracturing operations in the neighbouring lease. | Husky should be required to use a tracer in its frac fluid. Q: Please explain how often Husky will be testing the groundwater for tracers, and how often Husky will be reporting results of that testing to the Sahtu Renewable Resources Board, Sahtu Land and Water Board, and local community governing bodies. |

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| 7. Monitoring Data Should be Available to the Public | Strict monitoring and enforcement is required to protect groundwater during the drilling and horizontal fracturing process, to ensure ongoing wellbore integrity and to confirm the length of the fractures. Communities and co-management Boards should have access to all monitoring data to ensure groundwater is being protected. | Husky should be required to include in its annual reports to the Sahtu Land and Water Board: the well pressure integrity tests on all vertical and horizontal wells, the cement bond logs on all vertical and horizontal wells, and the results of the microseismic monitoring undertaken during the hydraulic fracturing operations. |
| 8. Migratory Bird Habitat - Risk of Contamination through Spills | Husky's application acknowledges that the Middle Mackenzie River Islands constitutes a globally recognized Significant Important Bird Area (IBA, Site NT081) because it supports high concentrations of waterfowl during spring migration, including tens of thousands of lesser snow geese (Appendix 1, 5-54). Husky is proposing to operate at any time of the year, which means potentially transporting hazardous chemicals, waste materials, produced oil and fuels across wetlands during times when migratory birds are staging, nesting, and feeding. Husky's Spill Contingency Plan states: “Spills in wetlands or muskeg can be some of the most difficult spills to contain, recover and clean up because of limited site access for both manpower and equipment. Because of the sensitive nature of these ecosystems, more damage may be caused by emergency response operations than was caused by the original spill.” (SCP Part 3, p. 18) In contrast, "[s]now is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered." (SCP Part 3, p.27) | If this operation is to be carried out at times of the year when migratory birds are active in the area, there is potential for significant adverse impacts on migratory bird habitat due to the risk of spills of hazardous chemicals, waste fluids, produced oil, and fuel into wetlands, as they are being transported throughout the lease area. Further study is needed to understand and mitigate these risks. |

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| 9. Impacts of Clearing on Migratory Bird Nesting | With regard to construction/clearing, Husky proposes the following mitigation: “For any construction activities, including vegetation clearing, planned during the breeding bird season (generally May 01 – July 31; AANDC 2010), pre-disturbance bird surveys will be conducted no more than four days prior to the commencement of activity; these will focus on the wellsite pad and a 300 m buffer adjacent to the well pad. If an active nest is found, setback distances as defined in AANDC 2010 will be applied and maintained until the nest is no longer active, unless exceptions are approved in consultation with ENR and/or CWS.” (Table 8-1, 8-6) Husky also proposes to “reduce clearing where possible” between May 1 and July 31. According to Environment Canada: "active nest searches are generally not recommended because 1) searchers may disturb or stress nesting birds, and 2) in most habitats, the likelihood of detecting all nests in a given search area is known to be low." Instead, Environment Canada recommends: "Avoid engaging in potentially destructive or disruptive activities at key locations or during key periods, including the breeding periods and periods of high usage, such as migration and/or feeding periods". (See http://ec.gc.ca/nature/default.asp?lang=En&n=ED993EAB-B7CE-4A51-82CF) | Any clearing between May 1 and July 31 should be avoided in areas that could potentially contain migratory bird nests. |
| 10. Impacts on Migratory Birds - More Information Required | In order to assess the potential impacts of a project on migratory birds, a proponent should, at a minimum, provide information on: the species of migratory birds likely to be affected by the proposed project; the species' seasonal occurrence, relative or absolute abundance, and population trends; and the distribution of those species with respect to local habitat types (for nesting, staging, feeding). (Migratory Birds Environmental Assessment Guideline, CWS, 1998) | Husky should be required to conduct a more detailed assessment of potential impacts on migratory birds, including, at a minimum, providing information on: the species of migratory birds likely to be affected by the proposed project; the species' seasonal occurrence, relative or absolute abundance, and population trends; and the distribution of those species with respect to local habitat types (for nesting, staging, feeding). As part of this assessment, Husky should identify key staging and feeding areas in and around the Mackenzie River, with input from Canadian Wildlife Service, traditional knowledge holders, ?ehdzo Got’i?ne? (Renewable Resource Councils), and the Sahtu Renewable Resources Board. |

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| 11. Flight Setbacks and No-Go Zones for Migratory Birds | Husky's application acknowledges that the Middle Mackenzie River Islands constitutes a globally recognized Significant Important Bird Area (IBA, Site NT081) because it supports high concentrations of waterfowl during spring migration, including tens of thousands of lesser snow geese (Appendix 1, 5-54). Frequent air traffic may have significant impacts on migratory birds in the area. | Husky and its contractors should maintain a vertical setback of 650 m for point to point flying and maintain a 1.5 km horizontal setback from those key staging and feeding areas identified through a proper impact assessment (see recommendation #10) or when flying near any observed concentrations of birds, during staging and nesting seasons between May 1 and July 31. |

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| 12. Boreal Caribou - Net Neutral or Positive Impact on Caribou Habitat | The application presents evidence from several sources that EL494 serves as boreal caribou habitat (Appendix 1, 5-48 to 5-49). Husky's Environmental Protection Plan which was submitted within its application for the all-weather road (S12F-007) outlined the status of boreal caribou habitat within the Regional Study Area as of November 2012: "The current linear corridor density in the RSA is 0.8 km/km2. This current linear density is already above the current management threshold of 0.4 km/km2 suggested by Antoniuk et al. (2009), predominantly because of a single large scale 3-D seismic program carried out in 2012, located in the proposed program area. The proposed program will contribute 19.5 kilometres of new linear corridors, which will not considerably increase the linear corridor density in the RSA, which will remain at 0.8 km/km2, but it will create a long-term corridor with associated year-round stimuli and disturbances… Using these guidelines suggested by the Recovery Strategy for the Woodland Caribou, Boreal Population in Canada, and the 25 kilometre buffer for the RSA suggested by ENR, it was concluded that 55% of the RSA is disturbed. This is above the 35% threshold suggested for the Northwest Territories range by Environment Canada." (p. 83) In Husky's June 2013 application (S13A-002), the proponent stated that caribou were expected to move out of the area for the duration of the program. (Environmental Protection Plan (Appendix 1), p. 109.) Husky is now proposing to disturb further portions of boreal caribou habitat in order to construct all-season well pads. The cumulative effect of Husky's previously permitted projects and its current proposed project will be to make much of the Regional Study Area essentially unusable as boreal caribou habitat. This is a significant impact on a nationally Threatened species, therefore mitigation measures with proven effectiveness are required. The national Boreal Woodland Caribou Recovery Strategy makes it clear that the most critical mitigation measure required to protect boreal caribou populations is the maintenance of adequate habitat. Moreover, the National Recovery Strategy acknowledges that a target of 65%undisturbed habitat only has a 60% chance of keeping boreal caribou self-sustaining, thus we should work to keep undisturbed boreal caribou habitat well over the 65% threshold. The best practice with regard to boreal caribou habitat protection is the B.C. government's Mitigation and Monitoring Guidance for South Peace Northern Caribou, which specifies that any project must have a "net neutral or positive effect" on caribou habitat. For any habitat loss which cannot be avoided, proponents are required to offset. (See http://www.env.gov.bc.ca/wld/speciesconservation/nc/documents/South% | The proponent should be required to produce a boreal caribou mitigation plan that offsets any loss of boreal caribou habitat so that its operations have a net neutral or positive effect on the viability of boreal caribou in the region, in accordance with best practices in British Columbia and Alberta. The Sahtu Land and Water Board may not have the power to require such a mitigation measure; this may require action from GNWT-Environment and Natural Resources and/or the Mackenzie Valley Environmental Impact Review Board. |

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| | 20Peace%20Northern%20Caribou%20Mitigation%20and%20Monitoring%20Plan%20Guidance.pdf) The principle of caribou habitat offsetting was also employed by the joint review panel in their decision on the Northern Gateway Pipeline (conditions 57-62). While boreal caribou in the Sahtu Region are currently doing better than herds in Alberta and British Columbia, we must not wait until herds are on the brink of extirpation before implementing caribou habitat restoration. This Board expects best practices to be implemented now in order to maintain healthy caribou populations. | |

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| 13. Impacts on Boreal Caribou - More Information Required | Husky's application does not include a specific assessment of the predicted effects of the project on boreal caribou. Its rating of the severity of potential residual effects on boreal caribou in Table 5-17 does not hold any scientific validity and it does not contain any reference to criteria contained in the legally binding National Recovery Strategy for boreal caribou. Significant errors in Figure C: "Land Resources- Caribou Habitat" of Appendix 1C (see Sahtu Renewable Resources Board letter regarding this issue) make it clear that understanding the various boundaries and intersections between caribou populations, groups, and ecotypes within the lease should be a priority for future research. | A proper impact assessment should be produced which evaluates the predicted effects of this project on boreal caribou, based on accepted science, traditional knowledge, and the National Recovery Strategy. Husky should contribute to research on boreal caribou in the area, which would help to inform range planning, including: -compiling traditional knowledge and scientific information about the ways in which boreal caribou use different kinds of habitat in the area; -rates of forest regeneration after disturbance (industrial or fire), including ways that habitat restoration can be actively supported to speed up recovery; and -genetic spatial structure between groups of caribou in the region. |
| 14. Wildlife Monitoring Program Inadequate | Wildlife monitoring methods currently employed by Husky include: wildlife cameras, winter track counts, and cards to keep track of wildlife sightings by employees. Evidence collected through these monitoring methods and other scientific studies have already established that various species-at-risk frequent the lease area (eg. boreal caribou which is ranked as Threatened; wolverine which is 'Threatened' in the NWT and considered by COSEWIC as a species of 'special concern', etc). In Husky's June 2013 application (S13A-002), Husky acknowledged that the proposed operations would likely cause both boreal caribou and wolverine to leave the area as a result of linear and sensory disturbance (Environmental Protection Plan, pp. 73 and 109). Husky is now proposing to disturb further portions of boreal caribou and wolverine habitat in order to construct all-season well pads. Driving sensitive species out of an area is a serious impact that deserves scientific monitoring and documentation, at the very least. The methods currently employed may not be good enough to effectively monitor potentially serious impacts of the project on species-at-risk such as boreal caribou and wolverine. | Before any further operations are permitted, Husky should be required to design and implement an improved wildlife monitoring program, including scientific studies of boreal caribou and wolverine, in collaboration with GNWT-Environment and Natural Resources, the Sahtu Renewable Resources Board, and ?ehdzo Got'i?ne? (Renewable Resources Councils). |

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| 15. Noise Reduction Methods - Disturbance to Wildlife | Husky commits to "[a]void sensitive wildlife habitats to the greatest extent possible, including reduction of noise below 48 dBA at known residences of SARA-listed species when discovered" (Table 8-1). However, Husky has not identified where those sensitive wildlife habitats are, or how it will effectively identify the residences of SARA-listed species. | Q: What methods will Husky use to reduce noise below 48 dBA? Husky should use noise-reducing equipment and methods wherever possible, rather than only at known residences of SARA-listed species. |
| 16. Commitment to Reclamation Best Practices | The application states: "Husky will begin to assess potential remediation and reclamation activities for the 2014–2018 Program closer to the expiry of the SLWB LUP approval." (Appendix 1, 2-21) Notwithstanding the regulatory gap in the Northwest Territories regarding reclamation planning by oil and gas companies (which we hope will be addressed in a timely manner), the recognized best practice is for reclamation planning to be reviewed and approved during the first stages of any activity impacting the land. Planning for reclamation should start several years ahead of program completion. Best practices in reclaiming well pads include replanting of native seedlings, which is more effective in forest restoration than the application of seed mixes. For more details on best practices in reclaiming well pads, see Osko and Glasgow (2010): http://www.biology.ualberta.ca/faculty/stan_boutin/ilm/uploads/footprint/Upland%20Recommendations%20-%20Final%20Revised%20-%20Small%20File.pdf | Husky should be required to submit an initial Reclamation Plan for review by the SLWB, SRRB, and ?ehdzo Got'i?ne? (Renewable Resources Councils), and that this Plan contain best practices as outlined by Osko and Glasgow (2010). ?ehdzo Got'i?ne? should be involved throughout the reclamation planning process to ensure that traditional knowledge and the interests of the long term stewards of the land are accommodated, and the site will be restored to a state that is acceptable to community members. |
| 17. Cumulative Effects Management Initiatives | In its application, Husky indicates its commitment to the following cumulative effects management initiatives: attempting to develop a cooperative cumulative effects management plan with other oil and gas operators in the Sahtu Settlement Area; and attempting to develop a land use plan in cooperation with other oil and gas operators that reduces the oil and gas footprint (e.g., use existing linear features) (Appendix 1, 6-15). The Board was not aware of either of these initiatives. | Q: Please provide more details about the cumulative effects management initiatives mentioned in the application on p. 6-15. The SRRB and ?ehdzo Got'i?ne? (Renewable Resources Councils) should be involved in cooperatively developing any management and land use plans that have implications for wildlife, habitat and harvesting. |
| 18. Renewable Energy Pilot Project - Solar Hybrid LED Light Towers | An opportunity exists for Husky to initiate a pilot project, potentially in collaboration with Arctic Energy Alliance, to replace its light towers which currently run on diesel fuel with Clean-Tek Solar Hybrid LED Light towers. This switch to renewable energy would reduce diesel consumption, resulting in less risk of spills, lower air emissions, and less disturbance to wildlife through reduced use of the road. | Husky should initiate a pilot project, potentially in collaboration with Arctic Energy Alliance, to replace its diesel light towers with solar hybrid LED light towers. |

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| 19. Adaptive Management - Limit License and Permit to 2 Year Period | Adaptive management should be conducted on an ongoing basis to check whether predictions of environmental impacts were accurate, and to ensure that mitigation measures are being employed as effectively as possible. The Board feels that a formal assessment of impacts associated with this program should be conducted sooner than 2019 (if a 5-year term was granted for the land use permit and water license). | If this application is not referred to environmental assessment, the Board recommends that the Sahtu Land and Water Board allow the land use permit and water license for this program to extend 2 years only (to 2016), at which time a detailed assessment should be conducted to evaluate predicted vs. actual impacts and the effectiveness of mitigation measures employed. |