Response to Comments Received from INAC Regarding the EISC Project Description for the Remediation of the Drilling Sump at Unipkat I-22

[ ] Green highlighting indicates information that has been updated since this Table was last issued.

Item	Comment	Stakeholder(s)	Response	Action	Category
1	The project is for a "Sump Remediation" not a "Site Remediation"	ENR	The primary objective of the proposed program is the removal of drill cuttings and mud from the drilling sump. Pending regulatory approval from the NWTWB, Shell will also remove debris found at two locations on the river bank. The site will be the subject of on-going management.	Clarification provided in this Table.	Definition
2	Phase I, II and III ESAs/RAP have not been provided to stakeholders for review. Not convinced that the site has been correctly assessed. Should follow assessment guidelines provided by CCME.	ENR	Unipkat I-22 has undergone a number of assessments; Hrudey et al. 1975, Kokelj and GeoNorth 2002, IEG and Komex 2002 (geophysical survey), IEG and Komex 2004 (preliminary ESA), IEG 2009 (Phase II ESA), and IEG 2010 (Phase II supplementary sampling). A full RAP for the remainder of the site that includes site specific criteria will be produced for stakeholder approval and future management of the site. Following the removal of the drill sump material, the site will continue to be monitored to evaluate future conditions. Note: Shell has also maintained this site by abandoning the well head, repairing infrastructure as needed and removed exposed debris from the shoreline in 2006.	Pre 2009 work was submitted to INAC. 2009 and 2010 Phase II ESA and supplementary data has been submitted to INAC, DFO and ENR as requested.	Remedial Planning
3	Proponent estimated volumes of PHC soil comparing results to CCME Industrial Guidelines which do not provide adequate protection for the environment, wildlife and potential users of the site. CCME Parkland criteria are more appropriate.	ENR	Final site specific criteria for PHC will be generated based on risk assessment and realistic exposure rates. At present, regardless of criteria used, PHC containing soils tend to be concentrated in the drilling sump and the extension to the north. Shell intends to remove the drilling sump during this remediation program. Residual PHC containing soils will not be at surface. The CCME parkland guidelines are derived from long term, concentrated exposure to a site. Although increasingly proximal to the river, Unipkat is an isolated site with no sings of intensive habitation by humans or harvested species. The final site specific criteria will consider protection of aquatic life as well as exposure pathways to terrestrial life.	Site specific criteria are currently under development through a risk based assessment. The site specific criteria will be submitted to stakeholders when they are available in February.	Criteria
4	The PD contains differing volumes for the estimated volumes of PHC affected soil at the site.	ENR	The current estimate for volume of soil to be removed from the drilling sump during the proposed remediation is 3000 m^3. The current estimate of PHC affected soil above CCME Industrial guidelines to be left in place at this time is 2000 m^3.	Clarification provided in this Table.	Volume
5	Doubt that the site has been delineated.	ENR	The site has undergone significant assessment (see response #2) and has been well delineated with historical record reviews, geophysics and more than 100 boreholes or hand auger sampling points in addition to sediment, groundwater and surface water samples.	Provided ENR with analytical results and remediation figure.	Volume

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6	Camp Sump and Flare Pit should be investigated as part of the Phase II ESA.	ENR	Both the flare pit and camp sump have been assessed. Pending approval from the NWTWB, these two areas will be excavated and removed from site. Debris removal from these locations also occurred in 2006. Additional confirmatory samples will be collected following removal of material from these areas and will include analysis for PAHs, dioxins and furans.	Clarification provided in this Table.	Assessment
7	Contaminants of Concern listed in the PD do not include total metals, PAHs and dioxins and furans.	ENR, EC	Total metals were assessed and found to be minimal and geographically isolated to two boreholes (As, Cu and Ni in BH42 and Cd in MW9). MW9 is in the sump material and will be removed during the proposed remediation. BH42 is not currently at risk of erosion and metals exceeding residential parkland criteria are greater than 0.5 m deep. Records indicate that this exploration well was dry and flaring is unlikely to have occurred. However, post-remedial confirmatory testing of the flare pit area will include analysis for PAHs, dioxins and furans.	Clarification provided in this Table. Commitment to conduct post remediation confirmatory sampling.	Assessment
8	ENR should be listed as an agency for the tracking of contaminated soils and for the registration of the storage cell.	ENR	The drilling material being removed does not contain constituents that would classify it as "Hazardous Waste" under TDG regulations and we are unaware of similar material being classified as "Hazardous Waste" in the NWT or in other jurisdictions. Using the guidelines referred to by ENR, the drilling muds are non-hazardous and therefore, the waste does not need to be manifested and the Inuvik cell is not required to be registered. Hazco and IEG will track the type and volume of soils transported from the site to the Inuvik cell and from the cell to the final disposal locations.	IEG has provided ENR with lab analysis of the material and requested clarification on classifications from ENR.	Regulatory Approval
9	Proponent must use movement documents to track hazardous waste.	ENR	If encountered, hazardous waste will be correctly manifested on movement documents supplied by ENR.	ENR to provide information on classification of hazardous waste	TDG
10	Proponent must use scales to quantify the weight of each load of material entering the containment cell until accurate estimates can be made and must weigh each load of material and water leaving the containment cell.	ENR	The type and volume of soils transported to and from the Inuvik cell will be tracked. The volume of water released from the cell to the environment will be estimated on-site. The volume of any water shipped to a disposal facility will be tracked.	Proponent to track volumes and movement of wastes.	Waste Management

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11	Provide information regarding the disposal of treated soils.	ENR	In the event that some of the soil in the cell is shown to meet CCME industrial criteria, Shell will seek local disposal options to use the material as industrial backfill. At this time, the preferred disposal location is the Inuvik landfill where the soil could be used as intermediate fill and would not be subject to re-use elsewhere. Regardless of where the industrial fill is disposed of, Shell will receive written authorization from the receiver acknowledging the receipt of the fill and a commitment from the receiver to limit the use of fill at industrial locations. ENR will be provided analytical results and notification prior to the soil being removed from the cell. All soil that does not meet industrial criteria will be transported to an appropriate CCS landfill in BC.	The actions described in the response have been discussed with ENR and satisfy their concerns.	Waste Management
12	The Alberta treatment cell code of practice should be referenced to determine the capacity of the Inuvik storage cell.	ENR	As per ENR's request, the Ealberta Environmental Code of Parctice for Land Treatment of Soil Containing Hydrocarbons (2008) has been reviewed. The containment cell in Inuvik will meet the storage requirements in the code of practice. Additional detail on the cell are included with this Table.	Photos of the cell under construction and figures of the storage cell are included with this Table.	Storage Cell
13	What disposal criteria will the water in the Inuvik containment cell meet proir to discharge?	ENR, GLWB	The water will meet NWT industrial waste water discharge criteria as published in the Guideline for Industrial Waste Dishcharges in the NWT prior to release. Prior to release of water to the environment, water samples will be collected and sent for analysis at a CALA certified laboratory.	IEG discussed this approach with ENR and satisfies ENR.	Criteria
14	The Inuvik sewage lagoon is not designed to accept industrial leachate from the dewatering soils in the Inuvik cell. Disposal of waste water should be directed to the ditch.	ENR	Following advice provided by ENR, the waste water in the Inuvik cell will be treated as necessary and disposed of in the natural environment in a manner that will prevent erosion once the waste water is shown to meet NWT industrial waste water criteria. Waste water that can not be treated to meet discharge criteria will be shipped to an approved facility capable of treating the water.	IEG discussed this approach with ENR and will follow ENR's guidance.	Water disposal
15	How will the Proponent manage waste water generated at the site?	ENR	Waste water generated by the camp facilities will be stored in sealed, waste water storage tanks. Waste water from the camp will be transported via sewage trucks to the Inuvik sewage lagoon. No other waste water will be generated at the Unipkat I-22 site.		Waste Management
16	The Inuvik sewage lagoon may not meet the Proponent's requirements.	ENR	Waste water generated by the camp will be indistinguishable from waste water generated by the Town of Inuvik. The municipal sewage lagoon is capable of managing this type of waste.		Waste Management
17	No indication has been provided that the Town of Inuvik is willing to accept solid waste or waste water generated by the camp operations.	ENR, NWTWB	The Town of Inuvik regularly accepts waste water and solid waste for disposal in it's facilities that has been generated by local camp operations supporting industry.	A letter of acceptance for waste will be acquired from the Town.	Waste Management

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18	No details were provided about the Proponent's plan to manage solid waste generated by the camp.	ENR, NWTWB	Solid waste generated by the camp will be stored on-site in a covered metal garbage bin. The waste will be inaccessible to animals and the wildlife monitor on-site will watch for signs of animals near the site.		Waste Management
19	No estimates of the volume of waste to be generated by the camp were provided by the Proponent.	ENR	The sleigh camp is estimated to produce less than 37,000 L of waste water (combined total of grey and black water).		Waste Management
20	The Proponent should prepare and submit for approval a Project-Specific Waste Management Plan.	ENR	A plan is under development and will be submitted to ENR for approval.	Prepare plan for approval.	Waste Management
21	If flowing water is found during bank disturbance DFO should be contacted to determine a new method of material removal.	DFO	Agree. DFO will be notified if flowing water is encountered.		Aquatic Disturbance
22	Notify stakeholders if any plans described in the PD have changed.	DFO, EC	As a result of community consultation feedback and INAC's request to completely backfill the remedial excavation, DFO and other regulatory stakeholders have been notified about the Proponent's revised plan to source borrow material from exposed frozen sand bars.	Continue dialogue with DFO and NWTWB to achieve approval of plan	Aquatic Disturbance
23	Proponent's staff and contractors on-site should be aware of all mitigation measures undertaken.	EC	All workers on-site will receive an orientation that will describe environmental mitigation measures.	Worker Orientation	Compliance
24	Why will 2000 m3 of identified PHC affected material be left on-site? Where is the additional material?	EC	The objective of this sump remediation program is to remove the drilling muds and surrounding affected material from the drilling sump that are at risk of being eroded by Arvoknar Channel. At the current rates of erosion, the remaining 2000 m3 of affected soil to the north of the main drilling sump is not at risk of erosion in the next 30 to 40 years. Pending approval from the NWTWB, additional material and debris will also be removed from the camp sump and flare pit that are currently subject to erosion.	Clarification provided in this Table.	Volume
25	Permafrost may not be a reliable barrier for contaminant migration and may not be stable. Thermistors used to measure the integrity of the barrier should extend below the depth of affected soil.	EC, INAC	A new thermistor will be installed beneath the depth of affected soil. To further decrease possible migration of material into the backfilled area the proponent proposes to add a bentonite barrier between the remaining affected soil to the north and the excavated area (conceptual figure supplied with this Table). To decrease the porosity of the permafrost zone, the backfilled material may be periodically saturated and allowed to freeze prior to additional lifts of soil being placed.	Future Monitoring	Monitoring

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26	In relation to the flare pit and camp sump areas the Proponent is advised that deleterious substances must not be permitted to enter the water.	EC	As discussed with the NWTWB and EC, Shell intends to remove these areas during the remediation program pending NWTWB approval.	Remove Camp sump and flare pit areas pending NWTWB Water Licence.	Regulatory Approval
27	Proponent is advised that Environmental soil quality guidelines do not apply within 10 m of a surface water body.	EC	Site specific criteria based on risk assessment and protection of aquatic life are under developed for this site.	Complete development of site specific criteria and submit to stakeholders when they are available in February.	Criteria
28	Delineation of groundwater as a potential pathway for migration.	EC	Natural sediments at the site contain or transmit little groundwater. The previous assessment work at the site did not identify evidence of contaminant migration from the sump. Dissolved iron was above FWAL guidelines in MW 6. TDS and Cd were above CCME FWAL guidelines in MW1 and MW6. MW9 contained concentrations of toluene, TDS, and pH above FWAL guidelines. MW9 will be removed during the proposed remediation program.	Water, sediment and soil analytical results provided with this Table.	Assessment
29	A more active land farming approach should be considered for soils in the containment cell and CCME guideline parameters should be used to monitor the extent of remediation.	EC	Soils affected by salinity or high concentrations of barite can not be treated and must be transported to an appropriate disposal facility. Baseline samples will be collected from the soils in the treatment cell affected only by PHC and the results will be compared to CCME criteria to help determine the exact future management options undertaken. If the soils are treated in the cell, the progress of the treatment will be tracked by analysing samples during the treatment process.	Characterize and track soil in the Inuvik cell.	Waste Management
30	Recommend that substances that may attract wildlife be made inaccessible to animals at all times.	EC	Measures will be undertaken to avoid attraction of wildlife. A wildlife monitor will patrol the area for signs of approaching animals and human/animal interactions will be minimized.	Minimize interaction with wildlife, comply with Migratory Birds Act and SARA.	Wildlife
31	The Territorial Government should be consulted with respect to species managed by the GNWT.	EC	The Proponent has consulted with ENR regarding bear denning in the project area. Although it was too late in the season to conduct a denning survey, the worker orientation will stress the importance of reporting all bear observations.		Wildlife
32	Has Shell considered removing all of the affected material from site?	INAC	See response for Item 24.		Remedial Planning

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33	Disposal of industiral waste water [from the Inuvik containment cell] in the Inuvik sewage may violate the Town's Water Licnece.	GLWB	It is no longer our intention to dispose of waste water from the dewatered soils in the Town lagoon. Following ENR's advice, waste water in the containment cell will be discharged to the environment once proven to meet NWT industrial discharge criteria.		Waste Management
34	What volume of water is expected to be disposed of from the dewatered soils in the containment cell?	GLWB	The volume of water requireing disposal from the containment cell will be partially dependant upon weather conditions. Warm, dry weather would likely lead to a significant decrease in volume through evaporation while significant percipitation would increase the volume. However, the cell will be closely monitored to avoid significant accumulation of standing water within the bermed area. Water will be pumped into holding tanks if and when required to avoid ponding.		Waste Management
35	Will any treated soil be used as cover material in the Inuvik landfill?	GLWB	The Inuvik landfill is the Proponent's prefered disposal location for soil that meets CCME industrial landuse guidelines. Prior to any soil being offered to the municipality for landfill cover, the soil will be analysed for concentrations of CCME regulated; metals, hydrocarbon fractions, salinity and pH. If the soil originated from the flare pit area it will also be assessed for PAHs, dioxins and furans. The soil will be shipped to a CCS landfill in BC in the event that the soil does not meet industiral guidelines.	Confirmatory soil analysis.	Waste Management
36	Request clarification regarding the location for the temporary storage for each type of soil (PHC soil, Ba soil, KCl soil, sump soil and clean soil)	NWTWB	PHC, Ba and salt (KCl) affected soil tend to be co-constituents in the "sump soil". The soil surrounding the sump has been assessed as being affected by PHC. These two categories of soil will be separated as much as possible during the excavation process, and stored on an ice pad (on-lease) prior to transport to the containment cell in Inuvik. The material will be frozen when on-site and a possible release of fluids from affected soil is therefore not an issue. The ice pads will be scraped down following removal of the affected soil and the dirty ice/snow will be transported to the Inuvik containment cell. The clean soil will be stored on-lease prior to being used as backfill in the excavation.	Information provided in this Table.	Waste Management
37	What are the concentration levels of affected soils?	NWTWB	Concentration levels are shown in the analytical summary tables provided on January 27.	None required	Assessment
38	What is the proposed method of disposal for soil affected by KCl and Ba?	NWTWB	The soil will be dewatered in the Inuvik containment cell and then transported to the CCS landfill in Ft. Nelson BC for final disposal.	Information provided in this Table.	Waste Management
39	What are the volumes of soil and sump material to be disposed of?	NWTWB	See response for Item 4.	Information provided in this Table.	Volume

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40	Does the Town of Inuvik approve the disposal of all types of waste, fuel and affected soil from this project?	NWTWB	See response for Item 17. In addition: there will be no waste fuel generated from this project; affected soil will be disposed of at the CCS Ft. Nelson BC landfill; and, if and when treated soil meets applicable CCME criteria, it will be offered to the local municipal landfill as intermediate cover. If the treated soil is refused at that time, alternate disposal locations will be sought in consultation with ENR and may include transport to the landfill in Ft. Nelson.	Information provided in this Table.	Waste Management
41	Does the intended CCS landfill in BC approve the disposal of sump material?	NWTWB	Yes. The landfill regularly accepts drilling waste. The material generated from Unipkat I-22 will meet the landfill criteria.	Information provided in this Table.	Waste Management
42	Require more information regarding the treatment of soils in Inuvik.	NWTWB	The soils that may be treated in the Inuvik containment cell will be characterized once they are within the cell. Exact remedial methodology, if any, will then be determined. Options currently under consideration are aeration with an Allu bucket, addition of nutrients to increase bio-remediation or addition of products such as peroxide to breakdown the hydrocarbons.	Information provided in this Table.	Waste Management
43	Require more information regarding the treatment of water from within Inuvik containment cell.	NWTWB	The treatment will depend upon the constituents of concern identified by analytical testing. In the event that hydrocarbon concentrations do not meet discharge criteria, the water will be passed through a low pressure filtration system to remove sediments prior to treatment for hydrocarbons using pre-packaged granular activated carbon (GAC) supplied by Siemens. In the event that salinity or metals are found to be a concern in the water, the volume of affected water will be reduced using an evaporator.	Information provided in this Table.	Waste Management
44	The location of waste water discharge from the containment cell is required.	NWTWB	See response to item 14. ENR has requested that any waste water from the containment cell should be discharged to a local ditch.	Information provided in this Table.	Waste Management

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45	More information regarding the disturbance to the riverbank is required.	NWTWB	Two areas of bank disturbance are anticipated on the site. The camp sump area excavation is expected to be 15 m long and remove 3 m of bank material from the existing shoreline. The flare pit area excavation is expected to be 19 m long and remove approximately 5 m of bank from the existing shoreline. All material will be frozen. An excavator with a ripper will be used to remove the frozen material. The new bank will be left in a vertical cut, similar to the existing bank and the excavation will be a scalloped shape similar to natural shapes found along the river. Any differences between the excavated bank areas and natural bank erosion will be negligible. In addition to the bank material being removed from the site, Shell has proposed to use approximately 3000 m^3 of exposed, frozen sandbars as borrow material to backfill the sump excavation. This proposal is outlined in a letter supplied to DFO, NWTWB, ENR and INAC on January 25, 2010. An Application for Fisheries Act Authorization will be filed with DFO for approval of this operation. Exact locations of bar removal will be provided in the application to DFO. Only the top 0.3 m of sand bars would be removed and the natural sediment volumes in the channel are expected to rapidly replenish the removed material.	Volumes and locations of the proposed sand bar harvesting will be provided to NWTWB when they are filed with DFO during the application for an Authorization.	Information
46	More information regarding spill contingency planning is required.	NWTWB	In addition to the information provided in the EISC PD, a shipping container containing spill response equipment will be staged at Unipkat I-22 during the field program. This spill kit (nuisance spill container #3) is supplied through the Mackenzie Delta Spill Response Corporation. The inventory of this container is supplied with this Table (Feb. 1, 2010). Furthermore, each person working on the project will receive a site orientation presentation that will provide information regarding spill response. In the event of a spill, the site superintendant will take control of abatement and clean up operations and report the spill to the GNWT and Federal agencies.	Nuisance spill kit inventory supplied with this Table. A full spill response plan is under development and will be presented and available to all employees working at the site. A copy of the plan will be provided to the NWTWB, INAC and the EISC.	Information

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47	Please provide more detail regarding the slope of the "bentonite wall" and a diagram to the locations of the wall.	INAC	The slope of the bentonite wall will be as vertical as practically possible and is expected to be near vertical. The slope of the bentonite wall will have little affect on it's performance as a hydraulic barrier but a high slope would make future excavation of the remaining material more difficult. The bottom of the bentonite barrier will also be keyed into the permafrost zone and the surrounding soils saturated (and frozen) to reduce the possibility of groundwater migration.	Provide a diagram to INAC showing the bentonite wall location.	Design
48	What contingencies will be in place if the walls of the excavation slump or fail?	INAC	The material on-site is a dense silt with a high moisture content. The material will also be frozen. These factors will make the side walls solid and stable. No wall failures or slumps are expected. However, slope stability will be assessed on an ongoing basis. No one will be permitted to enter the excavation if there is any indication of instability.	Information provided in this Table.	Safety
49	How much ice content is in the sump area being removed and surrounding area?	INAC	Ice content in the boreholes on site is highly variable between locations and depths. Some of the sump material has an estimated ice content of 50% in some locations and less than 25% in other locations. Outside of the sump there is generally a lower moisture content and less ice but the variability ranges from borehole to borehole.	Information provided in this Table.	Design
50	Request further clarification of the monitoring program for the excavated area and of any ponded water.	INAC	The site will be visited in the summer of 2011 to assess the affects of thaw, settlement and possible ponding in the backfilled area. If any ponding is apparent, surface water samples and sediment samples will be collected. Data from the on-site thermistors will also be downloaded and analysed. If the observed settlement and temperature profile do not indicate that ponding is imminent, the next monitoring event will be scheduled for summer 2013. The assessment of conditions and observed trends at that time will be used to determine future frequency and scope required to assess the site conditions.	Information provided in this Table.	Monitoring