Cape Dorset	Inter	lov	Compliation C		lnoo.	Lanaro
ISSUE	INAC	GN	EC	AE	BGC	NWB
Application before the NWB	The proponent is encouraged to					
	submit a license renewal					
	application that addresses all					
	municipal activities related to					
	freshwater consumption and					
	waste disposal practices as soon					
	as possible.					
	The need for developing a					
	municipal license application					
	supplementary questionnaire					
	should be considered.					
Construction of P-Lake						
Sewage Lagoon						
Design	INAC recommends that the	NWB ensure that all final design	Proponent is to ensure that all	A concern that the Board is being	3.1(1)The review copy is not	
	NWB require the applicant to file	and construction drawings are	construction activities on the	asked to use an engineering	signed and professionally sealed.	
	final design plans that are	signed by a registered	sewage lagoon do not result in	document to support an	The Board should confirm to	
	stamped, signed, and dated by a	professional engineer, registered	sedimentation of any	amendment application that may	BGC that the original documents	
	qualified professional, with in	in Nunavut, prior to issuing the	surrounding water bodies.	not have been sealed by a	received from Dillon are signed	
	advance of project	water license.	Preventative measures, such as	Professional Engineer.	and bear the professional seal of	
	implementation.		the use of silt curtains/fences		the responsible engineer,	
			should be used to help mitigate		registered to practice in Nunavut.	
			any potential impacts.		regioned to produce in realization	
			arry potertial impacts.			
					3.1(2) In Section 1 there should	
					be a paragraph noting that this	
					document addresses the	
					concerns and issues raised by	
					the previous review, particularly	
					the items noted to Dillon during	
					the September 19, 2006	
					Technical hearing.	
					3.1 (4) In section 2 the water	
					license requirements should	
					include the technical	
					requirements derived from the	
					technical hearing held in Cape	
					Dorset, September 19, 2006	
					3.1(5) There is no section that	
					discusses the design criteria or	
					design constraints.	
					3.1(6) There are numerous	Confirm hardcopy on the public registry
					typo's, formatting problems and	signed and sealed by Dillon
					missing details [] to suggest that	·
					this is draft version, not a final	
					document. The Board should	
					insist that Dillon submit a	
	1				completed version, especially	
					considering that the report may	
					not be signed and sealed.	
					signed and obtailed.	
					3.1(7) In Section 4.1 there are	
					minor discrepancies with respect	
					to the design volume of sewage	
					to be treated. At he top of page	
					9, a value of 96,100 m3 is given,	
	1				Table 4.1 shows 96,047 m3 and	
1					at the bottom of the page it is set	
1	1				at 96,000m3.	
	1					

Cape Dorset			Compliation	. 100000		
ISSUE	INAC	GN	EC	AE	BGC	NWB
Qualitative and				p.9, Section 5 Qualitative and	3.1(8) In Section 5.4 Dillon noted	
Quantitative Effects of				Quantitative Effects of the	that chart 5.1 indicates a	
the Deposit of Waste				Deposit of Waste, 1st para.;	significant recharge component	
				states that "aquatic life in P Lake	to P Lake an that in this respect,	
				will be adversely affected but the	P Lake is not practical as a	
				report does not say how or why	sewage lagoon unless recharge	
				report does not say now or willy	water is directed away from the	
					proposed lagoon. Therefore the	
					use of ditching to divert recharge	
					water is carried forward in the	
					conceptual design development.	
					There is however, no further	
					discussion of this issue in the	
					rest of the design document, nor	
					are diversion ditches shown in	
					the drawing or mentioned in the	
					specifications It is noted that the	
					north and south berms are	
					intended to act as diversion	
					berms. However they are	
					constructed out of granular	
					materials of their effectiveness	
					needs to be demonstrated. BGC	
					also notes that use of ditches in	
					permafrost affected terrain in not	
					recommended.	
				clearly the applicant's	3.1 (9) The statements made in	
				responsibility to demonstrate,	Section 5.5 regarding	
				from an engineering and	groundwater movement from the	
				geotechnical perspective, that	lagoon are not supported. As	
				this proposed lagoon system	discussed later in subsequent	
				would retain effluent for the	section of this memorandum, the	
				prescribed retention period in	site investigation and analyses	
				order to achieve the required	completed to date do not support	
				treatment prior to being able to	the fact that the lagoon, as	
				safely release treated effluent	currently designed will hold	
				back to the environment. Given	water.	
					water.	
				the geotechnical concerns noted		
				in all of BGC Engineering's		
				comments on Dillon's and		
				AMEC's work to date, there are		
				reasons to be concerned that this		
				system may not be sufficiently		
				'water-tight' and therefore with		
				less retention time available, may		
				not treat the sewage as predicted		
				in this report.		
				On page 12, references for the		
				assumed temperatures and		
				treatment times are not indicated		
				in the report text. These		
				elements are fundamental and		
				critical in the use of this formula,		
				however treatment times of 70 to		
				90 days appear to be reasonable		
				in this case. Are there any typical		
1				temperatures available from other		
		i	1	NWT or Nunavut systems at this		
				latitude to verify the 7 dC		
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ISSUE	INAC	GN	EC	AE	BGC	NWB
				qualitative and quantitative		
				effects of the use of waters or the		
				deposit of waste (i.e. treated		
				sewage effluent) on the drainage		
				basin where the use is to be		
				undertaken and the		
				anticipated impact of the use or		
				deposit on other users.		
				report should go further in		
				providing the Board with more		
				information regarding the		
				system's treatment capability, in		
				the removal or reduction in		
				nutrients, additional treatment		
				capability of P Lake, the		
				downstream wetlands and		
				drainage course to Telik Inlet as		
				well as the possible impact on		
				fish and the environment in Telik		
				Inlet to satisfy the applicant's		
				responsibilities to meet this		
				responsibilities to meet this requirement of the Nunavut		
				Waters and Nunavut Surface		
				Rights Tribunal Act.		
				There is no mention in the report		
				of the effects of winter		
				temperatures on the operation of		
				the lagoon system – is the 0.5 m		
				allowance for sludge enough		
				depth to prevent the lagoon from		
				freezing to the bottom once it is		
				discharged to that elevation in		
				the fall ? If not it will freeze to the		
				bottom and result in sheet flow		
				freezing solid as sewage is		
				discharged from the truck down		
				the discharge flume. In the		
				spring then the entire lagoon		
				could be frozen and the possible		
				impact on the system's treatment		
				processes and capability should		
				be further examined.		
				05.0 11.44		
				p.25, Section 11 Assessment of		
				the Requirements of the Nunavut		
				Water Board; we do not believe		
				the applicant through this report		
				has fully investigated the		
				qualitative and quantitative		
				effects of the deposit of this		
				waste on the P Lake basin, or		
				more importantly, the Telik Inlet		
				environment. Further not all of		
				the possible adverse impacts of		
				this potential effluent release		
				have been fully identified or		
				investigated.		
				-		
				•		

Cape Dorset Compilation of Issues

ISSUE	INAC	GN	EC	AE	BGC	NWB
Talik under P-Lake			The proponent should provide			
Lame and i Lane			confirmation the presence of a			
			through talik under P-lake that			
			could result in contamination of			
			groundwater and facilitate the			
			transport of contaminants. If a			
			through talik is present, EC			
			recommends that the bottom of			
			the lagoon be lined with an			
			impermeable liner to prevent			
			contamination of the			
			groundwater. Movement of			
			sewage through ground water is			
			not to be used as a dilution			
			factor for treatment.			
			lactor for treatment.		0.0 (4) The constitution of the contract	
Technical					3.3 (1) The specification do not	
Specifications					seem to be properly updated: []	
			1		The Board must be satisfied that	l l
1			1		this supporting document to the	l l
1			1			l l
1			1		water license application reflects	l l
					the current plans.	
				· · · · · · · · · · · · · · · · · · ·	3.3(2) What is the revised	
					construction schedule?	
	The proponent should state			Has the requirement for a full	3.3(4) In section 02072	
	whether berm liners will extend			liner across the entire bottom and	"Geotextiles":	
	into non-fractured bedrock so as			sides of the pond to fully contain		
	to reduce the likelihood of			the treated effluent and achieve		
	subsurface water flow beyond the			the desired level of treatment		
	sewage lagoon footprint.			been examined and investigated		
				?		
					Part 1.3.1 define "GCL";	
					Part 2.1.1, 2.1.2 and 2.1.6,	
					and Tables 1523-3-1 and	
					1523-3-2 were not found.	
					Part 3.1.10 seems to be	
					written generically. The	
					Drawings do not show a	
					clay liner, a granular sub-	
					liner sampler blanket or a	
					geomembrane. The term	
					"geosynthetic clay liner" is	
1			1		introduced. If this means	
1			1		"GCL" then it is in conflict	
1			1		with the drawings, which	l l
					show "Granular Clay Liner"	
					3.3(5) Section 02315,	
					"Excavating, Trenching and	
1			1		Backfilling", Part 1.3.4,	l l
1			1			l l
					unsuitable materials should	
					include massive ice lenses.	
					3.3(6) Section 02316, "rock	
					Removal":	
	The proponent should state		Any stockpiled material should		Part 1,2,1 , not sure what	
1	which aggregate borrow sources		be stored above the high water		circumstances would	l l
1	it intends to exploit for the		mark of any water body and in		warrant a minimum rock	
	sewage lagoon's construction.		such a manner as to prevent		excavation of "50mm"	
	Furthermore, the proponent		sedimentation of surrounding			
	should identify the quantity of		water bodies.			
1	required aggregate resources by		1			
	grain size and whether the					
	extracted material will be					
			1			
1	processed to ensure that the					
1	lagoon is properly		1			l l
	constructed.		<u> </u>			

Cape Dorset			Compliation	i issues		
ISSUE	INAC	GN	EC	AE	BGC	NWB
					Part 3.2, the drawings do	
					not distinguish between	
					soil and rock, but show	
					excavated slopes (i.e. liner	
					trench) vertical, assuming	
					rock conditions. There is	
					no guidance with respect	
					to excavated slopes in	
					3.3(7) Section 02661, "Sewage	
					Storage Lagoons";	
					Part 2, in several locations	
					there is reference to a rip	
					rap specification. There is	
					no Section 02371 [] or	
					Section 02454 - Rip Rap.	
	The proponent should provide				Part 3.3.2, indicates that	
	justification that its frozen core				dike is to be constructed in	
	dyke concept is realistic.				the summer in unfrozen	
	Furthermore, the proponent				conditions. There is no	
	should explain whether a low-				statement regarding the	
	permeability soil cut-off wall				foundation condition,	
	designed for unfrozen				although summer	
	performance will be established		1		construction would	
	within the dyke and if or if not,		1		indicate that it too would	
	why?				not necessarily be frozen.	
	, .				Based on these	
					specifications, the berms	
					are not being constructed	
					as a frozen dam. As such	
					the GCL is the primary	
					liner. This is not the	
					normal application of a	
					GCL. The role of a GCL is	
					to act as a secondary liner	
					as would have been the	
					case if the berm was	
					designed and constructed	
					as a frozen dam. A HDPE	
					liner is considered to be a	
					primary liner and should	
					be backed up with a GCL	
					for secondary	
					Part 3.3.3 ASTM D 698	
			1		[application in question for	
			1		the type of material] For	
			1		this material, compaction	
			1		specifications should be	
			1		based on relative density,	
					as per ASTM D4253 []	
					and D 4254 []. The dike	
			1			
					fill is considered to be	
			1		structural fill and should be	
			1		places as dense as	
			1		possible, based on field	
			1		trials. Compaction of	
			1		granular fill should include	
			1		moisture conditioning to	
			1			
			1		improve density. The field	
			1		trials should establish the	
			1		maximum relative density	
			1		achievable using the	
			1		available equipment.	
					Part 3.5 Flexible Lining -	
			1		assume this is the same	
			1			
					as GCL. Terminology for	
					the liner should be	
			<u> </u>		consistent.	
						-

ISSUE INAC GN EC AE BGC NWB Part 3.5.1 requires that a layer of granular material in unfrozen condition be placed on the bottom and	
Part 3.5.1 requires that a layer of granular material in unfrozen condition be placed on the bottom and	
layer of granular material in unfrozen condition be placed on the bottom and	
in unfrozen condition be placed on the bottom and	
placed on the bottom and	
sides of the lagoon as	
indicated. Where is this	
detailed indicated?	
Normally there should be a	
layer of bedding sand on	
either side of the GCL.	
This is not shown. Note	
that the liner is shown	
being placed on a 1:1	
slope on Drawing 111.	
This slope appears too	
steep to safely work on	
and to carry out the	
installation procedures as	
specified and would also	
be too steep for placing	
any of the bedding	
material that has been	
omitted from the drawings,	
but alluded to in the	
specification (part 3.1.10).	
Compaction of the cover	
layer on a 1:1 slope would	
be difficult. Dillon should	
confirm if placing the liner	
on a 1:1 slope is in	
compliance with the	
manufacturer's	
Part 3.5.9 indicates that	
the liner sheets are to be	
cut to fit accurately around	
inlets, outlets, sleeves,	
concrete structures and	
other projections through	
the lining. There are no	
further details provided in	
either the specification or	
the drawings with respect	
to this critical component	
of the lagoon retention	
system.	
Part 3.7 Leakage Testing.	
This section is completely	
inadequate for the	
purpose intended and	
poorly conceived. The	
purpose of the lagoon is to	
retain water in order for	
the sewage to be treated.	
There is no way that the	
method given in the	
specification will yield any	
defensible data to	
determine that a leak	
exists or to conclusively	
direct the contractor to	
undertake repairs at no	
cost to the owner.	
Some of the major	
concerns with respect to	
Concerns with respect to	
the methodology provided	
are as follows: [refer to	
page 7 of the	
submission from BGC1	

Cape Dorset			Compliation of			
ISSUE	INAC	GN	EC	AE	BGC	NWB
Drawings	INAC also recommends that the NWB require the applicant to file final as-built designs that are stamped, signed, and dated by a qualified professional, prior to the lagoon's start-up operation date.				BGC was provided copies of drawings 101, 109, 111, and 112 to review. These copies were unstamped-presumably originals on file with the Board are stamped copies. If not, they should be.	NWB has stamped/sealed drawings "issued for tender March 2006"
				the access road, should be regulated as it is a key component to the success of the proposed sewage collection and treatment system and should be properly engineered and constructed under license terms and conditions.	It is assumed that other drawing pertain to the access road and were not included in the present submission. The Board should however be satisfied with the details and the as-built information with respect to the road, for completeness, in order to issue a water license for the entire facility.	
					Drawing 101: There is no information to show that the lateral extent of the GCL is sufficient to prevent end=run seepage around the ends of the liner at the abutments for both the east and west berms.	
					Drawing 109: The north berm is constructed using Type II granular material. It is also designed to act as a surface water runoff diversion berm. There is a minor fines component in this material, however it will not act as a seepage barrier, particularly since the steepest hydraulic gradient is straight through he berm. Therefore, some seepage into the lagoon can be expected. The same problem applies to the road on the south	
					side of the lagoon. Drawing 111 [Refer to submission from BGC page 8-9]	
Geotechnical Investigations				there is no mention in the report of any predictable thawing/settlement of the underlying permafrost, which could de-stabilize the lagoon berms/dyke, or necessary mitigation thereof. Is the underlying soil at this site thawstable?	Refer to submission from BGC Section 4/5 page 9-13	
Water Use	1					
Waste Disposal Sewage Effluent	The proponent proposes that the new sewage lagoon's effluent have a discharge criteria of 80 mg/L biological oxygen demand, 100 mg/L total suspended solids, and 10E fecal Coliforms.	For a marine discharge of 150- 600 liters per capita per day with a mixing conditions similar to a bay or fjord these standards are; BOD 120 mg/l and TSS 180 mg/l. Additionally as the proposed discharge point is close to local harvesting and recreational areas, criteria for fecal Coliform should also be applied;	Hamlet must ensure that any effluent discharged must be in compliance with Section 36(3) of the Fisheries Act.	This report is silent on whether or not the predicted quality of this effluent will not be toxic to fish in terms of nutrient reduction or removal.		

Cape Dorset			n of Issues			
ISSUE	INAC	GN	EC	AE	BGC	NWB
				Section 6 does not explain why		
				the regulation point, or more		
				correctly, the compliance point, is		
				at the edge of Telik Inlet as		
				suggested here, especially when the estimated effluent quality is		
				for the outlet of the lagoon. If the		
				two federal departments have		
				agreed that effluent meeting the		
				criteria set out in the Guidelines		
				for the Discharge of Treated		
				Municipal Wastewater in the		
				Northwest Territories, 1992, is		
				applicable to the Telik Inlet		
				location, this should be fully		
				referenced (who, how and when).		
				I would suggest that effluent		
				being discharged at this		
				compliance point should be non-		
				toxic to fish per the Fisheries Act		
				(as measured by an LC50		
				bioassay test) and this report is		
1				silent in this regard.		
1				p.13, Section 5.7 Fecal Coliform		
1				Reduction; the reference for the		
1				influent fecal Coliform figure is		
				text book and it would be		
				beneficial to confirm this with		
				some typical similar data from		
				other North of 60 communities.		
				The approach here may be		
				considered to be too generic an		
				application – can this be verified		
				with data from other northern		
				community lagoon systems?		
				Previously Dillon had stated that		
				a "design standard" of 10 4 for		
				Fecal Coliform coming out of the		
				constructed retention lagoon and		
				then P Lake was to be met. Is		
				that standard still to be followed		
				and if so what is that standard		
				based on ?		
				- 45 Castina 5 0 TOO		
1				p. 15, Section 5.8 TSS		
1				Reduction, 1 st para.; is the		
1				reference to 85% to 95%		
1				reduction in TSS in lagoons with		
1				detention times over 180 days for		
1				single celled lagoons or multi-		
1				celled lagoons as a comparison		
1				to this proposed single celled		
1				lagoon ?		
Solid Waste				indepoli i		
Hazardous Waste						
Waste Oil						
Spill Contingency Planning		DOE would like to ensure that as	The proponent should produce a			
opin contingency rialling			Spill Contingency Plan which			
1						
1			includes the new operations and			
1			infrastructure. The plan should			
1		the new facility	facilitate response to spills which			
			might occur during construction			
			and operation of the project. The			
			plan should include a list of			
			available spill response			
			equipment and the names of			
			trained personnel who will be on-			
			site and available in the case of			
1			a spill.			
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Cape Dorset Compilation of Issues

Cape Dorset			Compliation o			
ISSUE	INAC	GN	EC	AE	BGC	NWB
Operation and Maintenance		DOE requests that submission and approval of sewage disposal plan be a condition of the license.	An updated Operations and Maintenance Manual should be submitted for approval. The O & M Plan should include removal and disposal of sewage sludge. Estimates should be made of the quantities of sludge likely to be produced, the required frequency of extraction from the lagoons; and operational procedures developed for environmentally sound removal and disposal.			
Abandonment and						
Restoration						
Monitoring	The proponent should commit to monitoring the effectiveness of its sewage lagoon's treatment process. Developing a municipal wastewater effluent quality trend analysis for these three parameters and others of interest, such as pH, ammonia nitrogen, and total phosphorus, effluent temperature, and air temperature would be a useful. By doing this, the proponent can analyze colleted data and determine whether the timing of effluent discharge is adequate.	DOE would like to see the license specify a monitoring station at the last point of effluent control. With a likely fall discharge period of approximately 60 days, samples taken for the purposes of monitoring effluent quality should be collected on the first and last day of discharge, and 30 days after the first day of discharge.	the proponent monitoring the quality of the effluent being discharged at the outlet of the wetland treatment area, sampling be completed at the outfall of the lagoon, in order to understand treatment efficiency.	p. 15, Section 5.8 TSS Reduction, last para.; no details are provided for the suggested operational sequence of a fall discharge from the lagoon, such as start and end dates, rate of discharge, monitoring of effluent water quality and discharge flow rates, maximum flow rate to prevent rapid draw-down failure of the lagoon berms, etc.		
	The proponent should establish subsurface water quality monitoring wells down gradient of the proposed sewage lagoon to determine whether municipal wastewater effluent is seeping through the lagoon's base into the active layer, and if so, whether the quality of the subsurface water meets requirements set by the NWB.					
	The proponent should develop a detailed monitoring program for the NWB's consideration as it drafts municipal license terms and conditions. This is due to the proponent's familiarity with the project area. A monitoring program should specify sampling site locations by global positioning system coordinates, parameters to be analyzed at each sampling site, when samples are to be taken, who will collect the samples, whoe will collect the samples, and a quality assurance/quality control plan for sample collection procedures.			other than the reference to a general sampling program in a proposed sampling/monitoring program found in Table 9.1, there are no specifics in the report regarding the expected degree of nutrient removal and toxicity to fish with respect to the proposed treatment and disposal system.		

ISSUE	INAC	GN			BGC	NWB
				p. 12, Section 7 The Impact of		
				the Deposit of Waste; While the		
				text states that the deposit of		
				waste will adversely impact the		
				water quality of P Lake, the		
				report does not indicate how or		
				by how much or for what		
				parameters. And nothing is		
				indicated for the possible impacts		
				on the water quality of Telik Inlet.		
				o p.23, Section 9.1; Sampling		
				Protocol; we agree that the		
				proposed sampling locations are		
				appropriate, however no		
				sampling location was identified		
				for the compliance point located		
				just before the effluent would		
				enter Telik Inlet (unless the		
				applicant is saying that water		
				sampled at the end of the		
				wetlands is considered to be the		
				same water quality as that which		
				would enter Telik Inlet).		
				Individual effluent parameters to		
				be monitored should include		
				BOD, TSS, pH, Oil & Grease,		
				dissolved oxygen, Fecal		
				Coliforms, Total Coliforms,		
				toxicity to fish - Biosassy		
				Concentration (LC50), Toxic		
				Organic Substances,		
				Phosphorus and Ammonia		
		1	1			