G8 – Rock Piles and Open Pits Closure Plan

List of Comments/Questions/Topics Which Need Further Clarifications
Questions Compiled by R. Halim – April 8, 2004
Responses Compiled by CanZinco Ltd. – May 17, 2004

ID	Description	Reference	Comments/Questions	Response
01	Executive Summary	p. i	The volume of waste rock already reclaimed (178,000 m3), and remaining volume (69,641 m3) may need to be revised (see ID 05)	See response to question ID 05 below.
02	Executive Summary – How the remaining waste materials to be reclaimed	p. ii	The executive summary states the reclamation objectives for waste materials, the risk classification, the approaches for reclamation, and how to do it. But it does not provide a summary of what needs to be done for each of the areas, or how the risk classes affect the selection and decision for the reclamation methods.	The approach to preparing the Executive Summary was to balance the need to keep the summary concise and accessible while providing adequate information for an understanding of the approach to reclamation of the rock piles and open pits. Readers can then refer to specific areas of the report for additional detail regarding their specific areas of interest.
			G16 - Report of Waste Disposal Plan states that most of waste rock will go into the open pits and buried (as also described in Section 4.5 of this report). May need to state this in the Executive Summary, and explain that the risk classes will be used to determine on which waste materials will go the bottom/deepest section of the piles during reclamation.	The risk classification described in the (G8) report was developed simply to gain a better understanding of the materials requiring reclamation. The risk classification does not result in a ranking of material from various rock piles for differential placement in the open pits. All of the waste rock placed in the open pits will be reclaimed by freezing into permafrost, regardless of its location within the pile.
			The arguments/justifications whether the high risk waste materials should go	As described above, there is no preferential disposition of waste rock

			into the open pits or go to underground may need to be discussed in the Technical meeting.	based on the risk classification. As discussed at the Technical Meeting, all waste rock areas are proposed to be reclaimed by freezing into permafrost either in-place or consolidated into an open pit or the underground mine and the risk classification did not play a role in this approach. We feel that reclamation of waste rock by either covering in an open pit or by placement underground provides the same level of environmental protection, given that the waste rock will be frozen into permafrost in both situations.
03	Executive Summary – slope cover in open pits	p. ii Main Report, p. 28	How does Twin Lakes sand and gravel stand with time with slope of 3H:1V? Will the cover be eroded from water runoff during rainfalls over the years? Note that vegetation will not likely grow here, and the slope will be the final and ultimate landscape for the site. Note also that some of the finish slope will be large, up to 30m high and without any benches (Fig. 4) The West Twin Lake dike will be 3.7H:1V, which is flatter than the proposed cover slopes in this report.	We have verified, as described in Section 4.4.1 of the (G8) report, that the Twin lakes sand & gravel is anticipated to be durable and erosion resistant and possesses acceptable gradation/filtration properties to meet its the design objectives for the maximum design slope angle of 3H:1V. The commitment for contingency inspection and repairing of erosion of the cover is also provided. Agreed. However, you will be aware that the approved closure slope angle for the West Twin Dike is 3H:1V, the same maximum allowable slope angle proposed for rock piles and open pits.

04	Main Report – Table 1	Table 1 p. 2	For consistency with other reports – last row (G22): 2010 terms instead of 2007?	The terms of Reference for the Comprehensive Review are required in 2007, per Part G, Item 22 of the Water License. The Comprehensive Review would then be carried out according to the Terms of Reference as they are approved by the Water Board. This may involve data review and may include additional field studies. CanZinco is proposing that the Comprehensive Review will be finalized and reported on, inclusive of the work described in the Terms of Reference, by 2010 such that appropriate actions can be implemented at the end of CanZinco's proposed monitoring period.
05	Main Report – Table 2	Table 2 p. 5	Annual total for 2002 does not add up. Where does 86,186 m3 come from?	The volumes of waste rock previously relocated are presented simply to provide additional context for understanding the current status of the various piles. The precise volumes that have been previously relocated do not affect the proposed reclamation measures, which are based on the current status of the piles. Further, the Waste Disposal Plan demonstrates that there is abundant storage space in the underground mine to accommodate any inaccuracies inherent in the estimated volume of waste rock. The specific numbers

				quoted in Table 2 (of Report G8) were taken from the annual waste rock reports that were filed with the NWB on an annual basis through the life of the mine.
			Volume calculations based from tonnage and adjustment with SG of 2.61 (instead of typical density of waste rock) may not be accurate. Actual volumes will end up 30-50% higher.	Volume calculations based on tonnage conversions were used to determine the progressive (historic) reclamation volume (Table 2). This is a function of mine production records which were based on tonnes in-situ. Therefore Table 2 correctly includes the following footnote: *"Where necessary, volumes were calculated from tonnage using a specific gravity of 2.61".* The inclusion of the same footnote in Table 3 is an inadvertent error from using the "cut and paste" function to duplicate the table format. The volume given in Table 3 has been determined by survey and does not need to consider the Specific Gravity of the material. With this in mind the volumes shown are accurate.
06	Main Report – Table 3	Table 3 p. 6	East adit – is the 36180 m3 volume for the 39S area only or both 39S and 39N areas? h	The volume presented is intended to represent the 39S rock pile only. The 39N rock pile has been completely relocated and consolidated into the area designed to be covered with the 2.2 m thick thermal barrier cover.

			Is there still 10,300 m3 of waste rock in Area 14 to be reclaimed? Wasn't the reclamation work in this area completed a long time ago? Table 6 of G16 Report shows of only 300 m3 hydrocarbon contaminated soil only, no waste rock.	Area14 requires some final reclamation of waste rock as described in the (G8) report. A large portion of the site was previously reclaimed under the test cover of 2m of shale. The residual waste rock will be consolidated adjacent the existing pile and the consolidated (i.e., entire) pile will be reclaimed with the 2.2 m thick thermal barrier cover. We draw your attention to the general comment that there is abundant natural surface mineralization in the area and that CanZinco's liability extends only to that area where mining activities increased the environmental risks over the natural conditions. The 300 m3 of hydrocarbon contaminated soil is separate from the waste rock and will be reclaimed by relocation into the underground mine for freezing into permafrost.
07	Main Report – Rock Piles	p. 6	As discussed in Section 3.3.8 (pp. 16-17), it is necessary to provide some information about remnants of DMS rejects at the end of the section 2.2.1 Rock piles (Similar to the discussion about the ESA in 2002/2003, which identified approx. 5000 m3 materials that need to be reclaimed in the	Any residual volume of DMS rejects in the West Adit area will be reclaimed as part of the area. That is, the DMS rejects will be utilized as backfill for the West Open Pit. A large portion of the rejects have been previously relocated into the underground mine such that the residual quantity on

			Oceanview area). An estimate should also be provided	surface is relatively small.
08	Main Report – Acid Rock Drainage Potential	Section 3.2, pp. 9-12	A figure showing locations of the waste rock stockpiles, open pits would be useful at the beginning of the discussion. (Figure similar to the one shown in G.3 FCRP Fig. 2, or the one shown in App. B of this report, Fig. 2).	Thank you for the suggestion. In future reporting we can provide a figure of this nature. We would also draw your attention to Figure 13 (East Trench Detail), Figure 14 (Oceanview Detail), Figure 15 (Area14 Detail), Figure 16 (K-Baseline Detail) which all show an inset location map.
09	Main Report – Description of Rock Piles and Open Pits	Sect. 3.3 and 3.4, pp. 12-20	Having the ARD risk classified in Section 3.2 (5 categories from highest risk to lowest risk), descriptions on the ARD risk should consistently be applied in the discussions in Sections 3.3 and 3.4.	The risk classification described in the (G8) report was developed simply to offer a better understanding of the relative risks of the materials requiring reclamation. The risk classification does not play a direct role in determining appropriate reclamation measures – in that all identified waste rock (Table 3) will be reclaimed by freezing into permafrost (except the West Adit access road which is proposed to undergo further characterization).
10	Main Report – K Baseline	Sect. 3.3.1, p. 12	What is the estimate quantity for the remnants of waste rock in K Baseline area?. What is the plan for this residual mineralized material? See ID/Question 22.	See response to question ID 22 below.

			Disposal Plan G16 identified 7400m3 hydrocarbon contaminated soil (G16, p.10). Is this waste rock or contaminated soil? No S1 material was identified. Please confirm.	Following from discussions at the Yellowknife Technical Meeting, CanZinco's response to Information Requests (May 14, 2004) included an amended table that provides a complete listing of the estimated source volumes of contaminated soil and demolition debris with the available storage volume in the designated disposal locations.
11	Main Report – DMS Rejetcs	Sect. 3.3.8 p. 17	Estimate quantities ?	See response to question ID 07 above.
12	Main Report – Final cover design	P 24	The argument of using 1.7m + 0.5m = 2.2m thick cover (p. 24) vs. the description about the existing 2.0-2.1m cover in Area 14, and the need to add 0.5m on top of this cover (p. 23) need to be discussed.	This issue was discussed at the Yellowknife Technical Meeting and we trust that it was satisfied there.
13	Main Report – Cover design: Infiltration	Sect. 4.4.1 p. 24	In the long run, a rich layer of ice will develop within the ice cover. What about in short time? During thaw period every year, will the water within the waste rock melt and leach through the cover if the slope is 3H:1V? How to prevent this in the early years of the reclamation period, **before** the waste rock will all be permanently frozen, and freeze and thaw will only occur in the upper 1.7m of the cover?	Some seepage through the cover into the underlying waste rock will occur in the short term as described in your question. However, the cover is anticipated to reduce the contact between runoff water and waste rock even in the short term due to surface runoff and storage within the cover. The steeper sloped areas (up to 3H:1V) will be anticipated to exhibit proportionally greater surface runoff within the cover materials as compared to flatter areas with lower gradients.
14	Main Report – Cover	Sect. 4.4.1	Section describing the durability of Mt,	We apologize that this section was not

	design: durability	p.25	Fuji Shale vs. Twin Lake Shale is confusing. Was the intention of the text is that the laboratory tests indicated Mt. Fuji shale has higher loss than Twin Lakes Shale. However, field experience as observed at the Test Cell area indicates that after 12 years, Mt. Fuji shale shows little loss and therefore is durable?	clear. Your understanding as expressed in the question is correct. The single poor durability result for the Mt. Fuji shale was attributed by Golder Associates, at the time of testing, to be unrepresentative due to the nature of the sample provided for testing. The proposal to conduct additional durability testing of shale in 2004 is intended to verify this observation and to clearly demonstrate the general durability of the shale.
15	Main Report – Cover design – slope stability	P 28, last portion of paragraph	Statement does not appear to be correct : reduction in internal friction angle could be 24 degrees. Will the residual friction angle drop to 6 degrees? If it does, 3H:1V will not likely be stable! Should it mean that in the long term, the friction angle would drop from 30 to 24 degrees, as a result of material breakdown? Is there a concern, that in the short term (in the first 5 years) the freeze and thaw will penetrate into the shale, causing breakdown of the shale particles. Residual strength of the shale will be very low, and with a 3H:1V slope, the 'weathered" shale will act as a "weak" layer beneath the Twin Lake sand and gravel, and fail?	Your understanding is correct. The reduction in friction angle might be in the order of 6 degrees; in this case the effective friction angle would be reduced from 30 degrees to 24 degrees. The discussion of slope stability, durability, erosion, infiltration and gradation/filtration in Section 4.4.1 of the (G8) report provides verification that the material as specified in the report will meet the design objectives in both short term and long term. We also draw your attention to the response provided to question ID 14 above, which refers to the additional

				durability testing of the shale that is planned for 2004 and the commitments to inspection and contingency repair of minor erosion or other occurrences.
16	Main Report – Construction consideration	Sect. 4.4.3 p. 29	Need to provide the time for the construction. This construction should occur during the summer months only.	The design of the thermal barrier covers does not specify a seasonal schedule. This work can be carried out on a schedule that complements the general activities underway at the site, the scheduling of contractors, logistics of supplies and personnel or other operational factors. The design criteria and material specifications are provided to ensure that the work is completed to the design standards, regardless of seasonal timing, and the monitoring program is provided to ensure that the work was effective.
17	Main Report – Reclamation activities	Sect. 4.5.1 p.30 , 1st paragraph	Need to include DMS rejects (as per p. 21).	See response to question ID 07 above.
18	Main Report – Backfilling of the west Open Pit	p. 31	What happens if there is water in the pit? Will the water be removed and reclaimed first? How will it be reclaimed?	Any standing water in the Pit will be pumped underground prior to backfilling.
19	Main Report – Geology Mapping of the North Wall	p. 32	What is the area covered for the proposed mapping work? Can it approximately be shown in Figure 3?	The area proposed for investigation is the subvertical north wall of the West Open pit, containing the 00 and 01 portal entrances to the underground

				mine.
20	Main Report – Geochemical Assessment	P 32-33	Confirm that this section only deals with the roadway between the Industrial Complex and 09 Portal? Why the criteria for the NP/AP is different from the one shown in Table 4? (Table 4 uses NP/AP=3 instead of 4). Are we following the British Columbia approach for ARD (NP/AP=4), which is more stringent than DIAND 1992 guide?	So confirmed. Yes, the intention is to utilize the most appropriate ARD assessment guidelines. The development of ARD assessment guidelines in British Columbia post-dates the 1992 DIAND guide and is considered a more relevant guideline to adopt. The 1992 work is northern-specific and all relevant aspects relating specifically to an Arctic environment will also be brought forward.
20	Main Report – Backfilling of East Trench	p. 35	Same question as 18 What happens if there is water in the pit? Will the water be removed and reclaimed? How?	See response to question ID 18 above.
21	Main Report – Backfilling of Ocean View trench	p. 36	Same question as 18 What happens if there is water in the pit? Will the water be removed and reclaimed? How?	The Oceanview open pit has already been reclaimed to the point where there is positive drainage from the pit.
22	Main Report – K Baseline	p. 38	Residual waste rock is estimated at 4000 m3. G16 – Waste disposal plan only identifies 7400m3 **hydrocarbon contaminated** soil, but no waste rock (S1). Please explain.	Yes. Waste rock is not incorporated into the volumes of "contaminated soils" (S1 per the Waste Disposal Plan).

			Why is the estimate (4000 m3) not included in Table 3, and mentioned in the last paragraph of Section 2.2.1, p. 6?	In Table 3, a "remnant" quantity waste rock is listed. This is taken from the annual water rock reports that have been filed with the NWB. Upon inspection through the Phase 3 ESA process, the updated volume of 4,000 m3 was estimated. We agree that the residual volume could have been mentioned in Section 2.2.1 as you suggest.
23	Main Report – Physical Stability	Sect. 4.6.4 p. 41	During reclamation period, there should be additional walkover inspections by the site staff (when weather permits). A once a year inspection by a geotechnical engineer is acceptable.	Agreed. This could have been mentioned in Section 4.6.4 (of Report G8), as you suggest. Section 6.1 of the Monitoring Plan (Report G9) does include the general provision for more frequent inspections for physical stability by site personnel or trained technicians from Arctic Bay. This would include constructed covers over rock piles and open pits.
24	Drawing – West Adit Area	Figure 3	Title should read : West Adit Area – Section Location Plan Approximate location of the Main access Road inthis figure would be useful.	Agreed. This was an inadvertent typographical error. We note your suggestion for incorporation into future reporting.
25	Drawing – West Adit Area – Section A	Figure 4	Drawing shows 30m high fill (el. 290 toi over 320). Would benches be required to cover such high fill area?	This issue was discussed at the Yellowknife Technical Meeting where we expressed our view that benches are not required, in our view. We trust that that discussion resolved this question.
26	Drawings – Sections B and C	Figures 5 and 6	Are these figures required?	We included these figures simply to provide additional information

				regarding the area under consideration. We note your suggestion for future reporting.
27	Drawings – East Open Pit	Figures 8 and 9	Key plan or approximate location of the Main Access road would be useful.	So noted for future reporting.
28	Drawings – Sections E,F and G	Figures 10, 11 and 12	It is not clear on the difference between existing ground (grey line) and mined surface (blue line). Why the mined surface is higher than the existing ground?	This issue was discussed at the Yellowknife Technical Meeting. The indicated higher "mined surface" line may be related to the subsequent removal of loose waste rock during progressive reclamation of the area. We trust that that discussion resolved this question.
29	Drawing – Ocean View detail	Figure 14	Where is the Ocean View pit in relation to this map?	Figure 14 depicts the current state of the Oceanview pit, which has been largely reclaimed through progressive reclamation efforts. We note your question and will endeavour to provide clear indications in future reporting.
30	Drawing – Area 14 Detail	Figure 15	Is there a "blocked/buried " portal in this area? Its location should be shown on the map.	So noted for future reporting.
31	Drawing – K baseline detail	Figure 16	The location of the underground access portal should be shown on the map (buried)	So noted for future reporting. Note that the K-Baseline portal is safely secured but has not undergone final reclamation by covering or similar means. Final closure of the K-Baseline portal will be included in the engineering report for closure of underground openings that is scheduled to be field with the NWB by the end of November 2004, per

				CanZinco's response to Information Requests dated May 14, 2004.
32	Appendix B	Table 2	East Adit Treatment Facility. Confirm that monitoring of Sta.159-12B is not required by the license, and Sta. 159-12A is required.	You are correct, we have reversed the License reporting requirement for these two stations. Regardless of the License requirement however, we have included both stations in the monitoring plan at identical frequencies and for identical parameters.
33	Appendix B	Table 5	5th column – On each line: The first "M" means monthly. But no description note for the second 'M". Is this supposed to be "T"?	Yes, the "second M" is intended to be a "T", representative of analysis for total metals. This was an inadvertent typographical error.