De Beers Group

Gahcho Kué Mine

Geochemical Characterization Plan
Version 5.0

June 2024

PLAIN LANGUAGE SUMMARY

De Beers Canada Inc. (De Beers) initiated construction of the Gahcho Kué Mine (Mine) in the Northwest Territories (NWT) in September of 2014. Two years later, operations officially began on September 24, 2016. The mine will develop three open pits during its operation. The three pits, called 5034, Hearne, and Tuzo, will be mined in sequence.

The mine will operate for approximately 14 years, which will be dependent on reserve. About 428 million tonnes (Mt) of mine rock (host rock that is not economically viable) and 48.6 Mt of kimberlite ore (rock that contains diamonds) will be mined from the three open pits. Kimberlite ore is mined by blasting the surrounding country rock with explosives. After the mine rock is blasted, it is moved with rock-hauling trucks. Ore is processed at the Process plant.

Mine rock will either be placed in the mine rock piles, within the mined-out pits, or used for construction of dams, roads, rock pads, and lay down areas. Processed kimberlite (PK) is sorted within the process plant into two different size fractions: fine and coarse-grade. Coarse PK will be trucked to the Coarse PK Pile, or placed in the mine rock piles, or mined-out pits. Fine PK will be piped as a slurry to the Fine Processed Kimberlite Containment (PKC) Facility or deposited in the mined-out Hearne pit.

If not appropriately handled, some mine rock has the potential to form acid when exposed to air and water, and some rock contains metals that might dissolve in contact with water. De Beers is responsible for using and disposing of mine rock properly at the mine site. The mine has been planned so that all mine rock and PK that have acid generating potential and / or elevated metal leaching potential will be placed within the mined-out pits and covered with water or placed deep with the mine rock piles. Mine rock that is used for construction outside of the mine rock piles will have a low potential for acid generation and metal leaching. A mine rock verification program has been implemented as approved by the Mackenzie Valley Land and Water Board (MVLWB) to validate the quantities and storage locations of potentially acid generating rock.

This Geochemical Characterization Plan describes the methods used to collect and test mine rock and PK samples during mining so that they can be classified for use at the mine and/or where the rock can be stored. This Plan follows the guidelines in two geochemical guidance documents (MEND 2009; INAP 2010).

REVISION HISTORY

Version	Date	Notes/Revisions
Version 1	November 2013	Submitted with Water Licence and Land Use Permit application to the Mackenzie Valley Land and Water Board. Includes process for identifying, describing, classifying mine rock and processed kimberlite rock at the Gahcho Kué Project. Developed in accordance with applicable geochemical guidance documents.
Version 2	June 2014	Updated to reflect feedback from the permitting process and minor changes to the mine rock schedule, quantities and distribution by year, and includes action levels for adaptive management and a Standard Operating Procedure (SOP) that outlines a uniform method for the handling and placement of mine rock at the Gahcho Kué site.
Version 3	January 2015	Updated Version 2 of the Geochemical Characterization and Management Plan based on 11 December 2014 letter from Mackenzie Valley Land and Water Board (MVLWB), and updates made to the re-vegetation of overburden and the addition to reference to regulatory and community engagement. The MVLWB in accordance with Part G, Item 14 of Water Licence MV2005L2-0015. The MVLWB requires that De Beers re-submit the Geochemical Characterization and Management Plan in accordance with the comments made during this review, as summarized in MVLWB (2014; Table 1).
Version 4	February 2018	Updated to align with the 2018 Updated Project Description in support of the 2018 Water Licence (MV2005L2-0015) amendment application for the Mine. This document reflects changes associated with mine waste and water management plan, in particular the mine rock schedule and volume as a consequence of modifications to the pit development plan and schedule.
Version 4.1	January 2019	Updated as requested in the 26 November 2018 letter from MVLWB based on Board staff comment (ID-25) and De Beers' response in the amendment application review summary table. Specifically, Table 5 was revised with updated monitoring data, which included the total number of samples analyzed in 2017 and the proportion of samples with >0.1% sulphur.
Version 4.2	December 2020	Updated background information and references throughout the main sections of the plan. Updated operational ARD test grid size to 60 m x 60 m (Section 6.4). Updated Section 8.2.1 (seepage survey procedure) as requested in board directive.
Version 4.3	March 2021	Updated background information and references throughout the main sections of the plan. Section 1.2 updated list of management plans. Figure 2 replaced with updated site layout Section 3.2 (Mine Rock - use of the Coarse Processed Kimberlite and Mine Rock Pile as a contingency storage area for PAG) Section 4.3 and Table 5 (Updated mine rock sample summary) Section 5.1 (update mine rock pile development description) Section 6.4 and Appendix B (Change from V4.1 - Updated operational ARD test grid size to 60 m x 60 m, Appendix B added related to sample rationale) Section 6.6 (Physical Handling of Mine Rock - updating flagging protocols) Section 6.7 (Change from V4.1 - Tracking - documenting amount and placement of PAG material) Section 8.2.1 (updated seepage survey procedure as requested in Board directive). Section 10 and Table 7 (Response Framework – clarified that low response framework is provided and updated the management response column as requested by Board directive) Added Appendix B related to sample rationale

Version	Date	Notes/Revisions
Version 4.4	June 2021	Updates are made to address the Board Directives in the Interim Approval dated 19 May 2021: #1: Section 4 was updated to ensure all recent data is referenced for consistency in the document.
Version 5.0	June 2024	Updated background information and references throughout the main sections of the plan. Section 1.2 updated list of management plans. Figure 2 replaced with updated site layout Section 3 updated material quantities Section 4.1 update kimberlite characterization summary Section 4.2 and Table 5 (Updated mine rock characterization summary) Section 4.3 added Table 6 on ARD potential Section 5.1 (update mine rock placement criteria) Section 6.4 Updated operational ARD test grid size of 60 m x 60 m to include non-AG structures with no altered granite or diabase) Section 6.6 (Physical Handling of Mine Rock - updating flagging protocols) Section 6.7 (Change from V4.1 – PAG Material Tracking - documenting amount and placement of PAG material)

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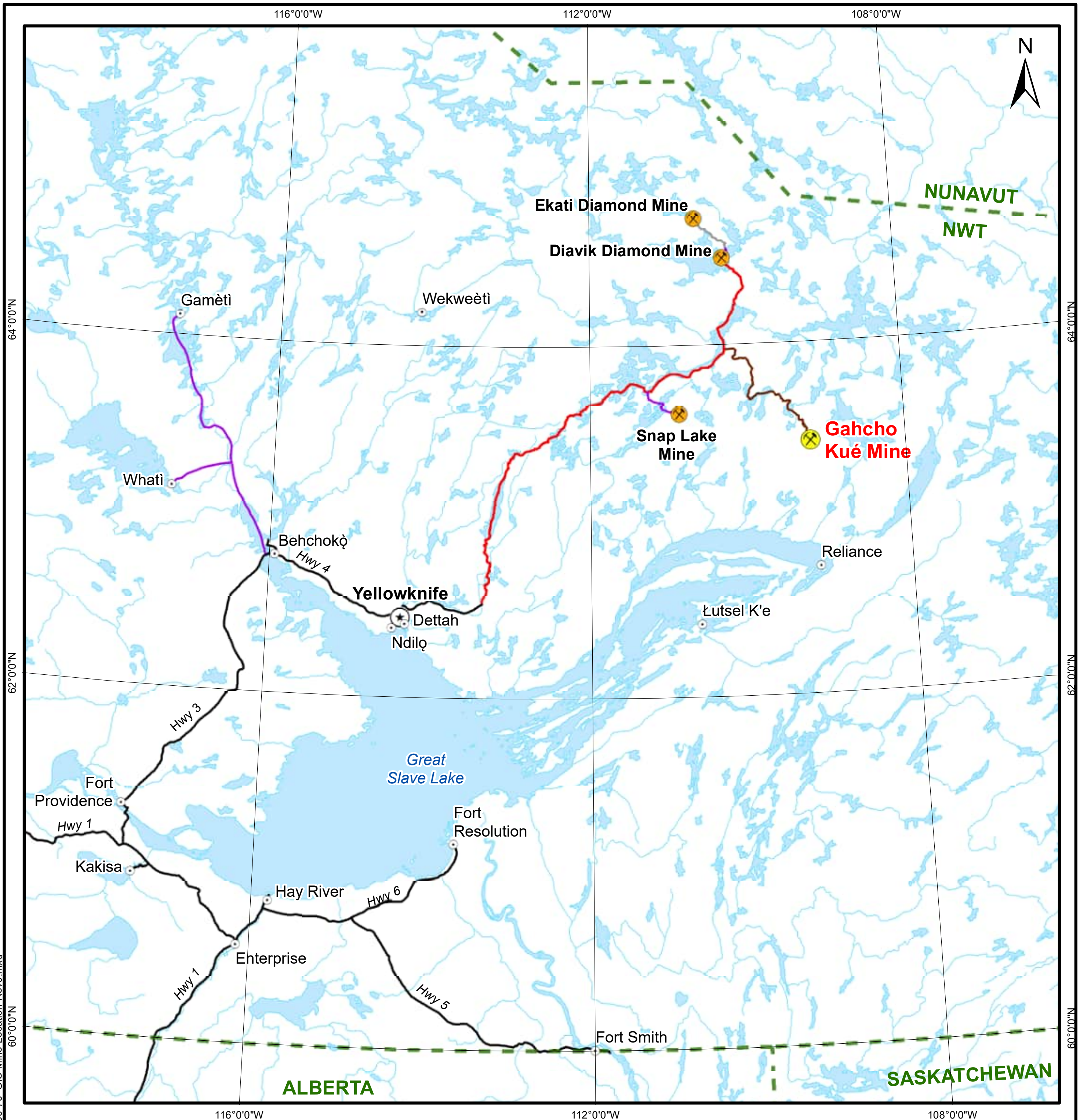
1 INTRODUCTION

De Beers Canada Inc. (De Beers) is conducting open pit mining, milling, and associated activities at the Gahcho Kué Mine (Mine), located approximately 280 kilometres (km) northeast of Yellowknife, Northwest Territories (NWT; Figure 1). The three phases of the life of mine (LOM) include construction (2+ years), operations (14 years), and closure (21+ years). Activities at the Mine will include:

- dykes and berms to facilitate the dewatering of Kennady Lake;
- open pit mining of the Hearne, 5034, and Tuzo kimberlite pipes;
- milling facilities and infrastructure;
- ore and low grade ore stockpiles;
- a Fine Processed Kimberlite Containment Facility (Fine PKC Facility);
- a Coarse Processed Kimberlite and Mine Rock Pile (CPKMRP);
- a West Mine Rock Pile;
- a South Mine Rock Pile;
- overburden stockpiles;
- deposition of mine rock into the Hearne and 5034 open pit;
- deposition of fine processed kimberlite (PK) into the Hearne open pit;
- the winter access spur road camp, and a mining camp;
- fuel, lubricant, and glycol storage facilities and laydown areas;
- explosives storage facilities and use of explosives;
- a landfarm;
- construction and operation of the winter access road;
- site facilities and infrastructure including but not limited to the water supply facility, sewage treatment plant, pipelines, incinerator, site roads, all-season airstrip and apron, power plant, electrical distribution, and material storage and sorting facilities; and
- use of equipment, vehicles, and machines.

Further details on Mine activities are provided in the 2020 Updated Project Description (De Beers 2020a).



LEGEND

- Gahcho Kué Mine
- Existing Mine
- Territorial Capital
- Populated Place
- Highway
- Access Road
- Existing Winter Road
- Gahcho Kué Winter Access Road
- Tibbitt to Contwoyto Winter Road
- Watercourse
- Waterbody
- Territorial/Provincial Boundary

NOTES

Source: Base Data Obtained From Geogratis, © Department of Natural Resources Canada. All Rights Reserved.

GAHCHO KUÉ MINE

Location of the Gahcho Kué Mine

PROJECTION:	DATUM:	
Canadian Lambert Conf. Conic	NAD83	DE BEERS GROUP
Scale: 1:3,500,000 30 15 0 30 Kilometres		
FILE No: 19128209-21100-70_GIS-Mine-Location-Rev0		DATE: December 15, 2020
JOB NO: 19128209	REVISION NO: 0	Figure 1
OFFICE: GOLD-CAL	DRAWN: AK	CHECK: KD

I:\CLIENTS\DE BEERS\19128209\Mapping\Products\General\19128209-21100-70_GIS-Mine-Location-Rev0.mxd

The Geochemical Characterization Plan (the Plan) is a supporting document to the Type A Water Licence MV2005L2-0015 in accordance with Part G, Item 1. The Plan underwent a review in November 2014 and the Mackenzie Valley Land and Water Board (MVLWB) met on 11 December 2014 and requested that the Geochemical Characterization Plan be updated and re-submitted to address comments made during the review process. The Plan (Version 3) was resubmitted to the MVLWB in January 2015 (De Beers 2015) and was approved by the MVLWB 10 February 2015. Version 4 and 4.1 of the Plan were updated as a component of the Water Licence (MV2005L2-0015) Amendment application for the Mine. An approved Version 4.4 of the Plan was implemented in accordance with the MVLWB directives included in the approval letter for 2018 Water Licence Annual Report, dated 3 September 2019 and comments received on the proposed Version 4.2 and 4.3. This Geochemical Characterization Plan Version 5.0 includes changes primarily related to updating the potentially acid generating (PAG) placement criteria for the West Mine Rock Pile.

The Geochemical Characterization Plan describes the geochemical characteristics of Mine materials that will be encountered in the study area during construction and operations, including mine rock, kimberlite, and PK. More specifically, Section 2 describes site geology and Section 3 details the anticipated quantity and distribution of Mine materials. Acid rock drainage (ARD) and metal leaching potential of kimberlite, PK, and mine rock are described in Section 4. Section 5 provides the geochemical criteria for management and placement of Mine materials. Section 6 describes the mine rock monitoring and testing plan, while overburden monitoring and classification are provided in Section 7. Performance monitoring is presented in Section 8 and describes the seepage monitoring associated with the bi-annual geochemical audit, the Surveillance Network Program (SNP), and field testing. Section 9 discusses review of mine rock classification and placement procedures. Section 10 describes the response framework associated with the Geochemical Characterization Plan, while the content of Section 11 outlines elements related to reporting.

The study area for the Geochemical Characterization Plan includes the open pits, Coarse PK Pile, Fine PKC Facility, kimberlite ore stockpile, West and South Mine Rock piles, roadways, rock pads, water management dykes and berms, and any other areas where rock will be disturbed or deposited (Figure 2). Geochemical classification criteria for Mine materials are presented in the context of the development plans for the Mine.

NOTES:

Satellite Image Provided by KARI and SIIS. Photo Date: October 2, 2020

GAHCHO KUÉ MINE			
SITE INFRASTRUCTURE LAYOUT			
PROJECTION: UTM Zone 12	DATUM: NAD83		DE BEERS GROUP
500 0 500 SCALE 1:30,000 METRES			
FILE No: ENG.EARC03068-Figure 2			DATE: March 3, 2021
JOB No: ENG.EARC03068	REVISION No: A		Figure 2
OFFICE: EDMONTON	DRAWN: EL	CHECK: HX	

Q:\Edmonton\Engineering\E141\Projects_GAHCHO_KUE\ENG EARC03068-10_WL Amendment\OWMP V6 2020\Figure for Infrastructure Layout 2020.dwg Mar 03, 2021 - 9:56am

1.1 OBJECTIVE AND SCOPE

The objective of the Geochemical Characterization Plan is to provide information that will allow De Beers to assess and manage ARD and potential metal leaching at the Mine during operations in accordance with Part G, Item 1 of the Water Licence (MV2005L2-0015). The information collected as part of the Geochemical Characterization Plan is compiled on an annual basis and compared to the geochemical dataset for the Mine, including the results of geochemical testing presented in Appendix 8.III (Metal Leach and Acid Rock Drainage Report) of the 2012 Environmental Impact Statement (EIS) Supplement (De Beers 2012a), the Gahcho Kué Project Metal Leaching and Acid Rock Drainage Report – 2013 Update (Golder 2014) and the 2024 Update - Metal Leaching and Acid Rock Drainage Report (WSP 2024).

The results of geochemical monitoring are evaluated to confirm that mine rock and PK management follows the protocols in the latest Processed Kimberlite and Mine Rock Management Plan, which states that non-acid generating (non-AG) rock will be used for construction of roads and site infrastructure and construction of a closure cover for the Fine PKC Facility, and PAG rock must be sequestered in designated areas of the mine rock pile or deposited in the mined-out pits. These results are also used to identify the need for adaptive management to meet the environmental objectives for the Mine.

Information referenced in support of the Geochemical Characterization Plan includes the:

- Appendix 8.III (Metal Leaching and Acid Rock Drainage Report) of the 2012 EIS Supplement (De Beers 2012a);
- 2020 Updated Project Description;
- Gahcho Kué Project Metal Leaching and Acid Rock Drainage Report – 2013 Update (Golder 2014);
- 2024 Update - Metal Leaching and Acid Rock Drainage Report - Gahcho Kué Mine (WSP 2024); and
- Processed Kimberlite and Mine Rock Management Plan – Version 8.

1.2 RELATED MONITORING AND MANAGEMENT PLANS

The Geochemical Characterization Plan makes reference to several monitoring and management plans for the Mine, including:

- SNP (Annex A of the Water Licence MV2005L2-0015);
- Groundwater Monitoring Program – Version 4.1 (or subsequently approved version);
- Operational Water Management Plan – Version 6.2 (or subsequently approved version)
- Quality Assurance and Quality Control Plan – Version 3 (or subsequently approved version)
- Waste Management Plan – Version 5.6 (or subsequently approved version); and
- Processed Kimberlite and Mine Rock Management Plan – Version 8 (or subsequently approved version).

The individual plans listed above should be referred to for specific details related to monitoring and management for that component.

1.3 COMMITMENTS

The Geochemical Characterization Plan serves to meet the requirements of the commitment table below (Table 1). The commitment table also indicates where these requirements are addressed in the plan or where approved changes or updates to commitments have been made.

Table 1 Summary of Commitments for Geochemical Characterization Plan

Commitment	Reference Document	Corresponding Section in Geochemical Characterization Plan and/or Other Document(s)
Less than 6% of the mine rock that will be excavated through open-pit mining will have to be managed as being potentially acid generating (PAG). This rock will be managed appropriately to avoid the generation of acidic leachate and limit the release of the metals and other elements. The management strategy will involve sequestering any PAG mine rock, as well as any barren kimberlite, within the interior (typically 2 m) of the mine rock piles. Till from on-going pit stripping will be used to cover PAG rock placed within the interior of the structure to keep water from penetrating into that portion of the repository. Further, the PAG rock will be enclosed within enough non-acid generating (non-AG) rock, such that the active zone will not extend into the enclosed material, and water runoff will occur on the non-AG rock cover areas. **De Beers will monitor for the effects of climate change on the Project. Thermistors will be installed to monitor temperatures within the Mine Rock Piles, the Coarse PK Pile and the Fine PKC Facility. The resulting information will be used to track the development and possible regression of permafrost within these structures. De Beers will also monitor the quality and quantity of the water passing through the operational water management system to verify the conclusions of the analysis outlined herein. Finally, De Beers will periodically review its operating procedures during the life of the Project, and adjust them, if and as required, to account for the influence of climate change.** **De Beers will use only non-reactive mine rock for mine site construction (roads, airstrips, dykes, berms, etc.).**	Gahcho Kué Project Updated Commitment List, April 22, 2014 (De Beers 2014a)	Section 5.1 Thermistors are referenced in the Processed Kimberlite and Mine Rock Management Plan (Attachment 7 of the 2018 Water Licence Amendment Application) – Sections 3.3, 3.4, 3.5, 6.1, and 6.2
DeBeers commits that non-AG rock will not be placed before test results are received to confirm materials are non-AG. This will be included in the operation procedures for construction material (IR # 9).	Gahcho Kué Project Updated Commitment List, April 22, 2014 (De Beers 2014a)	Section 6 and 7
De Beers commits to providing a detailed Standard Operating Procedure for placement of rock during operations - This will appear in the Geochemical Characterization Plan Update.	Gahcho Kué Project Updated Commitment List, April 22, 2014 (De Beers 2014a)	Section 6.2; Appendix A
De Beers commits to constructing field test cells during operations to confirm the geochemical properties of the mined materials (details to be determined and submitted under the Geochemical Characterization Plan Update).	Gahcho Kué Project Updated Commitment List, April 22, 2014 (De Beers 2014a)	Section 8.3; WSP 2024
Seepage Monitoring - As per De Beers response to AANDC Comment 21 following their review of the Type A Water Licence application, De Beers does not agree that low action levels are required for seepage quality monitoring from the mine rock piles, the Coarse PK Pile, and the Fine PKC Facility. As well as ongoing visual observations and inspections around the mine site (e.g., construction material, mine roads, rock pads, water management structures, mine rock piles, the Coarse PK Pile, and the Fine PKC Facility) for evidence of seepages, surface staining, or mineralization, which will be routinely completed by Mine Environment team, monitoring locations within the controlled area of the Mine have been proposed in downstream drainages from mine waste storage facilities (e.g., proposed SNP stations SNP 01-09, SNP 01-10, SNP 01-11, and SNP 01-12; refer to the proposed SNP monitoring locations in the draft WL submission to the MVLWB, submitted November 2013) that will be routinely monitored as a component of the SNP. The data from these SNP monitoring stations will also be supplemented with water quality monitoring data from locations within the Mine area if seepages are identified during the seepage and runoff survey components of the bi-annual geochemical audit. The results of water quality monitoring from the SNP and bi-annual geochemistry audits will be compiled in advance of the completion of the annual geochemistry report, and evaluated for indications of acid generation and metal leaching. The results will be considered in the context of existing baseline conditions, with respect to changes in concentration trends over time, and be used to inform management decisions.	Gahcho Kué Responses to Interventions to Water Licence Application MV2005L2-0015 & Land Use Permit Application MV2005C0032 (De Beers 2014b, EC_3.3)	Section 8
De Beers submitted a draft Geochemical Characterization Plan with the Type A Water Licence application in November 2013, which was developed in accordance with applicable geochemical guidance documents. This plan describes the geochemical characteristics of mine materials that will be encountered in the Mine area during construction and operations, including mine rock, kimberlite, and processed kimberlite. The Plan describes site geology and details the anticipated quantity and distribution of the various mine waste materials. The acid rock drainage and metal leaching potential of kimberlite, processed kimberlite, and mine rock are also described, as are geochemical classification criteria for identification of potential acid-generating (PAG) material, and its management and placement on site. Mine rock and overburden monitoring and testing plans are also presented. **The Plan provides information that will allow De Beers to assess and manage acid/alkaline rock drainage (ARD) and potential metal leaching at the Mine during operations. The information collected as part of the Plan will be compiled on an annual basis and compared to the geochemical dataset for the Mine, including the results of geochemical testing presented in the Metal Leach and Acid Rock Drainage Update Report submitted to the MVLWB registry in February 2014. The results of geochemical monitoring will be evaluated to confirm that mine rock and processed kimberlite management follows the protocols in the draft Processed Kimberlite and Mine Rock Management Plan submitted to the MVLWB in November 2013, which states that non-AG rock will be used for construction of roads and site infrastructure and construction of a closure cover for the Fine PKC Facility, and PAG rock must be sequestered in designated areas of the mine rock pile or deposited in the mined-out pits. Depending on the results of monitoring, mitigation would be possible, with the primary mitigation strategy being to adjust material placement strategies and/or locations. More active mitigation, if necessary, might include adjusting the closure plan to reduce mass loading from locations where monitoring indicates the most benefit could be attained.**	Gahcho Kué Responses to Interventions to Water Licence Application MV2005L2-0015 & Land Use Permit Application MV2005C0032 (De Beers 2014b, DKNF_18)	Geochemical Characterization Plan; WSP 2024

Table 1 Summary of Commitments for Geochemical Characterization Plan

Commitment	Reference Document	Corresponding Section in Geochemical Characterization Plan and/or Other Document(s)
De Beers proposes developing a mine rock monitoring and testing plan, which will be used to confirm that PAG rock is identified and appropriately managed or otherwise mitigated to prevent acid generation and associated metal leaching.	Geochemical Characterization Plan	Section 6
De Beers will establish a detailed geochemical quality assurance/quality control protocol as part of the standard operating procedures for the mine.	Geochemical Characterization Plan	Section 6.8
De Beers commits to completing bi-annual geochemical audit is an inspection of the storage areas of all solid-phase waste materials (e.g., mine rock, PK)	Geochemical Characterization Plan	Section 8.1
Established monitoring locations associated with the mine waste storage facilities (e.g., Fine PKC Facility, mine rock piles) within SNP will be routinely monitored by Environment Services	Geochemical Characterization Plan	Section 8.2
De Beers commits to continue seepage, runoff and SNP water quality monitoring after closure.	Geochemical Characterization Plan	Section 8.2
Overall, we believe that storing it -- encapsulating it within the mine rock pile, it'll be non-acid-generating. And we'll be monitoring according to the Geochemical Characterization Plan that we put on the record with the Application to ensure that anything that's coming out of the mine rock pile is monitored.	Public Hearing Day 1 Transcripts (May 6, 2014) page 74	Section 6 Section 7 Section 8
De Beers Canada Inc. to provide to the MVLWB an update to the Standard Operating Procedure for handling of the PAG and non-AG rock including placement and volumes in the blocks due May 9, 2014	Public Hearing Day 1 Transcripts (May 6, 2014) page 129	Section 6.2, and Appendix A
ENR recommends that the Board explicitly require an adaptive management – management response plan for the mine. The plan should include an overarching framework as well as action levels from other specific management plans such as the Geochemistry Monitoring Plan, the Dewatering Monitoring Plan, the Groundwater Mani -- Monitoring Plan, the Air Quality Watering -- Air Quality Monitoring Plan, and the Wildlife Effects Monitoring Plan, as well as the Wildlife and Wildlife Habitat Protection Plan, Explosive Management Plan, and the Erosion and Sediment Management Plan.	Public Hearing Day 1 Transcripts (May 6, 2014) pages 197 to 198	Section 10
The criteria for defining non-AG is material with less than 0.1% total sulphur, unless otherwise approved by the Board. The Board may consider other criteria for non-AG material if the Licensee demonstrates to the Board's satisfaction that the non-AG criteria has minimal potential for Acid Rock Drainage and Metal Leaching, and the Licensee submits a revised Geochemical Characterization Plan for reflect the new criteria. The revised Geochemical Characterization Plan shall be approved by the Board prior to any changes to the non-AG criteria.	Water Licence MV2005L2-0015	Section 11
The Licensee shall annually review the Plans referred to in Part G, item 3 (Waste Management Plan); Part G, items 4, 5, and 6 (Water Management Plans); Part G, item 12 (Erosion and Sediment Management Plan); Part G, item 13 (Explosives Management Plan); Part G, item 14 (Geochemical Characterization and Management Plan); Part G, item 15 (Dyke Construction and Management Plan) and Part G, item 16 (Processed Kimberlite and Waste Rock Management Plan) and make any necessary revisions to reflect changes in operations. Revised plans shall include a brief summary of the changes made, and shall be presented in a format consistent with the Mackenzie Valley Land and Water Board's Standard Outline for Management Plans. Revised Plans shall be submitted to the Board for approval at the following times: **a) At least sixty (60) days prior to any proposed changes to the requirements in the approved Plan; and** **b) Upon the request of the Board.**	Water Licence MV2005L2-0015	Summary of Changes Table page ii
A minimum of sixty (60) days prior to the commencement of Construction, the Licensee shall submit a revised Geochemical Characterization Plan to the Board for approval. The Plan shall meet the objectives listed in Part G, item 1 and detail how the Licensee will geochemically classify and manage Waste Rock, coarse and fine processed kimberlite, ore, and other materials in order to minimize Acid Rock Drainage and Metal Leaching. The Plan shall also satisfy the requirements of Schedule 5, item 7 and be in conformity with the approved SOP required under Part E, items 6, 7, and 8. The Plan shall address the Construction and Operation phases of the Project. The Licensee shall implement to draft Geochemical Characterization Plan Management Plan submitted on November 28, 2014 and updated on June 30, 2014 until the Board has approved the updated Plan.	Water Licence MV2005L2-0015	Geochemical Characterization Plan
The Licensee shall construct, operate, and maintain the South Mine Rock Pile, West Mine Rock Pile, the Fine Kimberlite Containment Facility, and the Coarse Kimberlite Containment Facility, and all other Waste storage facilities, to design specifications/engineering standards such that: **b) Any Seepage from the Waste storage facilities that occurs and does not meet effluent quality requirements, as specified in Part G, shall be prevented from entering the Receiving Environment;** **c) Any constructed facilities that are eroded are repaired immediately;** **d) Monitoring of the Waste storage facilities is sufficient to ensure that:**	Water Licence MV2005L2-0015	Section 6

Table 1 Summary of Commitments for Geochemical Characterization Plan

Commitment	Reference Document	Corresponding Section in Geochemical Characterization Plan and/or Other Document(s)
i. Performance design criteria, as described in the Final Detailed Design Plan documents referred to in Part E, items 9 and 10, are being met; **ii. Changes in management of the Waste storage facilities, including any necessary additional mitigations are identified; and** **iii. Material will be handled and stored within the Controlled Area based on its PAG or non-AG status, as characterized by geochemical testing as defined in the Geochemical Characterization Plan.** **e) Conditions for eventual closure and Reclamation of the Waste storage facilities are optimized; and** **f) Procedures are in place to ensure that the Licensee will take appropriate actions if defined Action Levels, as defined in the Processed Kimberlite and Waste Rock Management Plan, are exceeded.**		
The Licensee shall ensure that geochemical inspections of the Engineered Structures, ore stockpile areas, road fill, pits, and airstrip are in conformance with the approved Geochemical Characterization Plan.	Water Licence MV2005L2-0015	Section 8
A summary of results of any monitoring and the seepage surveys conducted in accordance with the approved Geochemical Characterization and Management Plan, required in Part G, item 14 of this Licence, undertaken during the previous calendar year, including: **i. A comparison of the annual quantities of the different types of Waste Rock generated to predictions made in the approved Geochemical Characterization and Management Plan;** **ii. A summary and interpretation of results from the geochemical monitoring performed under the approved Geochemical Characterization and Management Plan, referred to in Schedule 5, item 7;** **iii. A summary of results from investigations or activities related to field test cells;** **iv. A summary and interpretation of water quality monitoring results for each of the main source areas (Waste Rock piles, Open Pits, camp pad, and airstrip) and how these compare to predicted values;** **v. A summary of any exceedances of the Action Levels described in the Geochemical Characterization Plan;** **vi. A description of actions taken in response to any Action Level exceedances under the Geochemical Characterization Plan; and** **vii. Any geochemical inspections reports from the preceding year, as appendices to the Annual Water Licence Report.**	Water Licence MV2005L2-0015	Section 8.1
The Geochemical Characterization Plan referred to in Part G, item 14 of this Licence shall include, but is not limited to, the following: **a) A summary of findings from previous geochemical characterization (Acid Rock Drainage/Metal Leaching potential) on the Waste Rock, Fine and Coarse Processed Kimberlite, and Overburden including references and weblinks to previous reports;** **b) Criteria for defining PAG materials;** **c) Updated production schedules showing estimated volumes and tonnages of Waste Rock, Fine and Coarse Processed Kimberlite, and Overburden that will be produced each year over the duration of the Project;** **d) Details on the geochemical characterization of overburden that will be used in Construction or for Reclamation, including specific measures to ensure that this material meets or exceeds the geochemical cutoff criteria defined for non-AG;** **e) Information regarding geochemical inspections and supplemental monitoring program, including:** **i. Details on the geochemical site inspection, including visual inspections, and supplemental sampling and testing on each type of Waste Rock, Fine and Coarse Processed Kimberlite, and Overburden material;** **ii. Details on sampling and analysis results of any Seepage with runoff inputs to the Water Management Pond as well as any outside of the Controlled Area (including SNP stations 11-17), following the sampling frequency and sampling parameters defined for SNP stations 11-17, and including a description of the location where Seepage is observed and sampled. Results shall be compared to appropriate reference locations in unaffected areas.** **iii. Details on monitoring of the field test cells, including sampling frequency, field measurements and analytical parameters;** **iv. A description of the process that would be followed to change the proposed monitoring program, recognizing that any changes would require approval by the Board;** **v. Linkages to other monitoring programs required in this Licence; and** **vi. Any other information about the monitoring that will be performed to meet the objective in Part G, items 1 and 14 of this Licence.**	Water Licence MV2005L2-0015	Geochemical Characterization Plan

Table 1 Summary of Commitments for Geochemical Characterization Plan

Commitment	Reference Document	Corresponding Section in Geochemical Characterization Plan and/or Other Document(s)
f) Information regarding contingencies and responses to monitoring results: **i. A description of how the Licensee will link the results of monitoring to those corrective actions necessary to ensure that the objectives listed in Part G, item 1 of this Licence are met. This description shall include:** **a. Definitions, with rationale for Action Levels applicable to the performance of the Geochemical Characterization and Management Plan with respect to geochemical stability as well as Seepage and runoff quality and quantity; and** **b. For each Action Level, a description of how exceedances of the Action Level will be assessed and generally which types of actions may be taken by the Licensee if the Action Level is exceeded.** **ii. Action level exceedances and actions taken during the year shall be reported in the Annual Water Licence Report as per Part B, item 10 of this Licence and Schedule 1, Item 1.** **iii. Results shall be reported in the Annual Water Licence Report as per Part B, item 10 of this Licence and Schedule 1, item 1. This shall include:** **a. an overview analysis of major trends, site plans indicating the locations of Seepage, and summary of recommendations for future Seepage monitoring or management actions; and** **b. an interpretation of the results of all survey data collected since Project inception with site plans indicating the locations of Seepage and the quality assurance and quality control procedures used.**	Water Licence MV2005L2-0015	Geochemical Characterization Plan
December 11, 2014 MVLWB Review Process – Comments and Commitments		
De Beers will address revegetation of overburden in the Interim Closure and Reclamation Plan, as required in Part J. of the Water Licence. De Beers has and will continue to engage Aboriginal Parties and Regulators in the development of this Plan. All contemplated uses of overburden should be included as a component of the GCMP. The proponent shall update and resubmit the GCMP to the Board.	December 11, 2014 MVLWB	Section 3.3
De Beers will address revegetation of overburden in the Interim Closure and Reclamation Plan, as required in Part J. of the Water Licence. De Beers has and will continue to engage Aboriginal Parties and Regulators in the development of this Plan. To ensure consistency through the various plans, the Board recommends that all relevant components be included in each of the plans. **The proponent shall update and resubmit the GCMP to the Board.**	December 11, 2014 MVLWB	Section 4.3

2 SITE GEOLOGY

This section provides an overview of the geology and mineralogy of the main rock types at the Mine. This information has been summarized from Section 3 of the 2012 EIS Supplement (De Beers 2012a), as updated and presented in WSP (2024).

Three economic kimberlite ore bodies have been identified at Kennady Lake: the 5034, Hearne, and Tuzo deposits. These ore bodies comprise kimberlite pipes of varying grade of diamondiferous ore juxtaposed with each other and the mine rock. Some mine rock is interspersed within the ore bodies and consists mainly of granite with lesser amounts of altered granite, granodiorite, altered granodiorite, diabase, and diorite.

The ore bodies were located under the southwest portion of Kennady Lake, with the exception of a portion of the 5034 ore body, which extends under a peninsula (Figure 2). The ore bodies under the lake were covered with glacial till, sediment, and granite boulders.

2.1 KIMBERLITE

Several kimberlite facies have been recognized within the ore bodies, including hypabyssal kimberlite, transitional hypabyssal kimberlite, tuffisitic kimberlite, and tuffisitic kimberlite breccia. The Hearne pipe and Tuzo pipe are made up of tuffisitic kimberlite and hypabyssal kimberlite.

Kimberlite ore and PK consist primarily of kimberlitic material, typically pervasively altered to clay minerals, with varying amounts of chlorite, talc, and biotite, and lesser inclusions of granitic and basic rock fragments. Olivine, quartz, amphibole, plagioclase, phlogopite, microcline and K-feldspar were commonly identified in small amounts. Carbonate minerals, primarily calcite, were identified in trace amounts, and sulphide minerals including pyrite, chalcopyrite, and pyrrhotite are rare (WSP 2024).

2.2 MINE ROCK

In general, mine rock consists mainly of granite, with lesser amounts of altered granite, granodiorite, altered granodiorite, diabase, and diorite. The larger granite formation is intersected in some locations by fault structures and diabase dykes. The dominant minerals in granite samples are silicate minerals, including k-feldspar, quartz, biotite, plagioclase, muscovite-sericite, chlorite, magnetite, pyroxene, and olivine. Sulphide minerals are found in trace amounts, including pyrite, pyrrhotite, and chalcopyrite. Calcite was also identified in trace amounts. Sulphide minerals are generally associated with structural features, in particular altered granite and diabase. Detailed results of mineralogy and mineralogical proportion by rock type, as well as details regarding sulphide association with structure are provided in WSP (2024).

2.3 OVERBURDEN

The ore bodies lie beneath a layer of glacio-lacustrine sediments, including lake bottom sediment and till.

3 ANTICIPATED QUANTITY AND DISTRIBUTION OF MINE MATERIALS

This section provides an overview of the anticipated quantity and distribution of the mine materials that will be generated at the Mine, including: kimberlite and PK, mine rock, and overburden. A detailed discussion of the mine material management protocols is provided in the Processed Kimberlite and Mine Rock Management Plan Version 8.

3.1 KIMBERLITE AND PROCESSED KIMBERLITE

Approximately 48.6 million tonnes (Mt) of kimberlite ore will be mined from the three open pits. Ore will be processed at an annual rate of approximately 3.5 Mt per year.

Kimberlite material will be temporarily placed in a run-of-mine (ROM) kimberlite ore stockpile during operations (Figure 2). The ROM ore stockpile will serve as a staging area for 0.75 Mt to 1.3 Mt of ore to act as a buffer against the irregular flow of ore from the open pits to the processing facility. No kimberlite ore will remain in the ROM stockpile after closure.

Processed kimberlite is the material that remains after all economically and technically recoverable diamonds have been removed from kimberlite during processing. Processed kimberlite will be divided into two waste streams, which are defined by grain size. Coarse PK comprises material between 0.25 millimeters (mm) and 6 mm. Fine PK comprises the less than 0.25 mm grain size fraction.

The planned deposition of fine and coarse PK is summarized in Table 2. All PK material will be contained within the controlled area of the Kennady Lake watershed (the controlled area is the area of the Kennady Lake watershed, which is isolated by the placement of Dyke A to separate CP1 [Area 7] from Area 8 in Kennady Lake, and the establishment of diversion dykes in the upper watersheds A, B, D, and E during construction, operations, and closure). Fine PK is expected to comprise 35% to 49% by weight (wt%) of the PK streams depending on operational year.

Planned management of the fine PK fraction involves the following:

- deposition of fine PK into the Area 2 Fine PKC Facility (Years -1 to 8); and
- deposition of fine PK into the mined-out Hearne Pit (Year 8 to the end of the Mine life).

The timing of fine PK deposition into the Fine PKC Facility and/or into the mined-out Hearne Pit may vary according to operational requirements.

Coarse PK will have a weight fraction of 51% to 65% of the waste streams, depending on operational year. Planned management of the coarse PK fraction involves the following:

- placement of coarse PK in the Coarse PK and Mine Rock Pile;
- placement of coarse PK in the West Mine Rock Pile; and
- alternate placement of coarse PK in either mine rock pile or mined-out pits before or after on land Coarse PK Pile reaches capacity.

The disposal plan is designed to be flexible to allow for changes in the fraction of fine and coarse PK in the stream at any given time.

Table 2 Processed Kimberlite Deposition

Year	Fine Processed Kimberlite (Mt)			Coarse PK and Grits (Mt)			
	Total	Fine PKC Facility	Mined-out Hearne Pit	Total	Coarse PK and Mine Rock Pile	Dyke Construction and Reclamation	West Mine Rock Pile or 5034 Pit
-1(2016)	0.20	0.20	-	0.37	0.37	-	-
1(2017)	0.84	0.84	-	1.56	1.56	-	-
2(2018)	0.92	0.92	-	1.71	1.71	-	-
3(2019)	1.28	1.28	-	2.38	2.18	0.20	-
4(2020)	1.17	1.17	-	2.18	2.18	-	-
5(2021)	1.11	1.11	-	2.06	2.06	-	-
6(2022)	1.08	1.08	-	2.01	2.01	-	-
7(2023)	1.12	1.12	-	2.08	2.08	-	-
8(2024)	1.46	0.98	0.49	1.94	1.94	-	-
9(2025)	1.52	-	1.52	2.02	2.02	-	-
10(2026)	1.54	-	1.54	2.04	1.28	0.76	As required
11(2027)	1.77	-	1.77	1.84	1.08	0.76	As required
12(2028)	1.77	-	1.77	1.85	1.09	0.76	As required
13(2029)	1.75	-	1.75	1.82	1.06	0.76	As required
14(2030)	1.76	-	1.76	1.83	1.07	0.76	As required
15(2031)	0.81	-	0.81	0.84	0.84	-	As required
Total	**20.11**	**8.70**	**11.41**	**28.53**	**24.53**	**4.00**	-

Notes: Tonnages updated to reflect a revised ratio of fine/coarse PK of 35%/65% until 2023, 43%/57% until 2026, and 49%/51% to end of mine life. The actual split ratio may vary during Mine operations.

Mt = million tonnes; PK = processed kimberlite; PKC = processed kimberlite containment; - = no kimberlite to deposit.

3.2 MINE ROCK

Mine rock includes the excavated bedrock surrounding the kimberlite deposits. This material will be stored or used in one of the following locations as follows:

- mine rock will be placed in the West Mine Rock Pile, South Mine Rock Pile, and Coarse PK and Mine Rock Pile;
- some mine rock will be placed in the mined-out 5034 Pit, and the mined-out Hearne Pit (if necessary); and

- some rock from the mine rock piles will also be used for construction of roads, dykes, and dams, as well as reclamation activities.

Approximately 428.2 Mt of mine rock will be produced during the mining of the three open pits. About 89% of the mine rock will be deposited on the Mine Rock Piles. The remaining 11% will be deposited in the mined-out 5034 Pit. The estimated distribution of mine rock placement by mine year is shown in Table 3. Recent estimates are generally consistent with previous South Mine Rock Pile estimates however some materials (2.74 Mt) of clean rockfill cover have yet to be placed as identified in current estimates.

Table 3 Distribution of Mine Rock by Year

Year	5034 Mine Rock (Mt)			Hearne Mine Rock (Mt)			Tuzo Mine Rock (Mt)			
	Total Mined	To South Mine Rock Pile [a]	To West Mine Rock Pile [a]	Total Mined	To South Mine Rock Pile	To West Mine Rock Pile [a]	Total Mined	To 5034 Pit	To West Mine Rock Pile	To CPK/MR Pile[b]
-1(2016)	21.36	21.36	-	-	-	-	-	-	-	-
1(2017)	28.69	28.69	-	-	-	-	-	-	-	-
2(2018)	24.81	24.81	-	11.63	11.00	0.63	-	-	-	-
3(2019)	27.12	9.55	17.57	11.09	-	11.09	-	-	-	-
4(2020)	23.54	1.85	21.69	13.61	-	13.61	0.77	-	0.77	-
5(2021)	13.64	-	13.64	10.30	-	10.3	6.03	-	6.03	-
6(2022)	22.80	-	22.80	4.08	-	4.08	5.33	-	5.33	-
7(2023)	26.09	-	26.09	0.81	-	0.81	6.23	-	6.23	-
8(2024)	28.86	1.24	27.62	0.60	-	0.60	3.03	-	0.15	2.88
9(2025)	32.61	1.5	31.11	-	-	-	5.96	-	4.00	1.96
10(2026)	3.80	-	3.80	-	-	-	34.34	9.63[c]	16.14	8.57
11(2027)	-	-	-	-	-	-	37.29	20.38[d]	9.91	7.00
12(2028)	-	-	-	-	-	-	21.40	16.09[d]	-	5.31
13(2029)	-	-	-	-	-	-	2.35	0.91[d]	-	1.44
14(2030)	-	-	-	-	-	-	-	-	-	-
Total	**253.32**	**89.00**	**164.32**	**52.12**	**11.00**	**41.12**	**122.73**	**47.01**	**48.56**	**27.16**

Note: The timing, location, sequence, and volume of mine rock removal and deposition may vary according to operational requirements.

a) Portion of mine rock will be used for dyke, road construction, and closure cover (approximately 13.0 Mt total).

b) The quantities of mine rock to CPKMRP and schedule may be varied depending on the operational requirements.

c) Mine rock from Tuzo pit backfilled to the south portion of the 5034 pit.

d) Mine rock from Tuzo pit backfilled to the northern portion of the 5034 pit.

Mt = million tonnes; - = no deposit.

Recent updates of the acid generating materials on site (WSP 2024), show that less than 15 Mt of PAG mine rock (~3% of total mine rock) will be produced during the mine operation, with expected annual amounts varying between about 1.1% and 5.2%. For the purposes of mine planning, a value of 21.4 Mt of PAG mine rock (~5% of total mine rock) is assumed to require segregation. The PAG mine rock generated from 5034 pit during Year -1 was placed in the long-term submerged zone area (below the water level of 420.0 m) of the South Mine Rock or the areas consisting of the base layers of the interior water management dykes. A portion of PAG mine rock produced in Year 3 from 5034 was placed in the submerged base of the West Mine Rock Pile, to the extent practical. The remaining PAG mine rock produced from 5034 Pit to date has been segregated within the central portions of the mine rock piles. From Year 8, PAG mine rock produced from Tuzo pit will be backfilled into the mined-out 5034 pit. Coarse PK and Mine Rock Pile at Area 4 will serve as a contingency storage area for PAG material.

3.3 OVERBURDEN

Overburden includes the glacio-lacustrine sediments removed from the ore bodies prior to mining. Overburden will be used at the Mine as follows:

- To construct dykes and berms within the Kennady Lake sub-watershed areas.
- To regrade the dewatered lakebed to manage runoff.
- To cover material within landfills and in limited quantities to cover small areas of mine rock in the core of mine rock piles, if necessary, based on geochemical properties of the materials placed.

Overburden will be stockpiled within designated areas of the Mine (Figure 2); use of overburden includes re-vegetation activities. De Beers has made the commitment to develop a re-vegetation plan, which includes the use of overburden, as part of the Interim Closure and Reclamation Plan (De Beers 2024a), required by Part J of the Water Licence MV2005L2-0015.

Approximately 10.3 Mt of overburden will be excavated. The approximate quantities and locations of overburden placed on the site from pre-stripping through Year 6 are presented in Table 4.

Table 4 Deposition of Overburden from Pre-stripping and Destination

Year	Overburden Production (Mt)			Overburden for Construction of Dykes and Berms[b]	Overburden Deposition (Mt)	
	5034	Hearne	Tuzo		Overburden for Cap PAG Zone at Mine Rock Piles [b][c]	Placed in Overburden Stockpile or for Reclamation Uses[a]
-1(2016)	1.13	-	-	1.13	-	-
1(2017)	1.09	0.14	-	1.04	-	0.19
2(2018)	0.54	1.56	-	2.10	-	-
3(2019)	-	0.78	-	0.78	-	-
4(2020)	0.78	-	0.62	0.28	0.50	0.62
5(2021)	0.17	0.01	1.69	0.12	0.20	1.54
6(2022)	0.55	-	0.19	0.54	-	0.20
7(2023)	0.01	-	-	0.14	-	-0.13[a]
8(2024)	-	-	0.28	0.01	-	0.27
9(2025)	-	-	0.69	-	-	0.69
10(2026)	-	-	0.11	-	-	0.11
11(2027)	-	-	-	-	-	-
12(2028)	-	-	-	-	-	-
13(2029)	-	-	-	-	-	-
14(2030)	-	-	-	-	-	-
Total	**4.27**	**2.49**	**3.58**	**6.14**	**0.70**	**3.50**

a) negative value means removal from overburden stockpile for dyke construction.

b) the timing, location, sequence, and volume of overburden may vary according to operational requirement and detailed dyke design.

c) till capping of PAG zones at the mine rock piles is no longer required following the 2024 update.

Mt = million tonne; PAG = potentially acid generating; - = no deposit.

4 ACID ROCK DRAINAGE AND METAL LEACHING POTENTIAL

This section provides an assessment of the potential for acidic or alkaline drainage, and for metal leaching from the kimberlite ore stockpile and PK storage facilities during operations and after closure. It also provides a geochemical characterization of material that will be used for construction and reclamation.

The pre-development geochemical dataset for the Mine is robust, consisting of 508 samples of kimberlite, 61 samples of PK, and 1,242 samples of mine rock that were evaluated between 1996 and 2013 (De Beers 2012a; Golder 2014). The objective of the geochemical characterization program completed as part of the EIS was to evaluate the ARD and metal leaching potential of a representative dataset to develop an understanding of the geochemical characteristics of materials expected to be encountered under the range of conditions that may be realized during construction and operations.

The results of geochemical characterization of the main rock types are summarized in the following sections. Detailed results are presented in Appendix 8.III of the 2012 EIS Supplement (De Beers 2012a) and in the Gahcho Kué Project Metal Leaching and Acid Rock Drainage Report – 2013 Update (Golder 2014). Additional data are included in the WSP (2024) update.

Geochemical characterization of mine rock continues during operations at the Mine, according to the guidelines outlined in Sections 6, 7, and 8.

4.1 KIMBERLITE AND PROCESSED KIMBERLITE

Kimberlite ore consists primarily of kimberlite material typically pervasively altered to clay minerals, with trace amounts of chlorite, talc, and biotite, and lesser inclusions of granitic and basic rock fragments. Olivine, quartz, amphibole, and k-feldspar were identified in small amounts. Carbonate minerals were identified in trace amounts, and sulphide minerals including pyrite, chalcopyrite, and pyrrhotite are rare. During processing, coarse-grained PK (coarse PK) and fine-grained PK (fine PK) materials are produced. These PK materials are composed almost entirely of kimberlite ore; as such, they both have the same or very similar geochemical properties.

The acid generation potential of kimberlite was confirmed by the results of long-term leach testing (i.e., humidity cell tests) in the EIS. Neutral to alkaline pH values were maintained through the duration of the kimberlite kinetic tests. Initial metal concentrations were low and decreased over time after the first five weeks of testing, which represents the typical initial flushing period of the test sample.

The results of geochemical characterization of coarse PK and fine PK in the EIS were similar to those of kimberlite. Coarse PK is non-acid generating (non-AG), owing to the low concentrations of total sulphur relative to the carbonate content of the material. Coarse PK samples contained between <0.01 wt% and 0.06 wt% total sulphur, with an average total sulphur concentration of 0.03 wt%.

The mineralogical assemblage in fine PK samples was the same as coarse PK samples, with the exception of sulphide minerals. Sulphide minerals were not detected in fine PK samples. Fine PK samples contained between <0.01 wt% and 0.09 wt% total sulphur. Fine PK samples contained comparable neutralization potential to the coarse PK.

Long-term humidity cell tests (HCTs) and field cell results confirmed that PK is also non-AG. Metal concentrations were below or near analytical detection limits in the HCT leachates for the majority of parameters. Submerged column tests (SCTs), which were conducted to confirm the geochemical characteristics of saturated coarse PK, indicated that saturated coarse PK also has a low potential for acid generation and metals leaching.

Ongoing bi-annual audit results from 2015 through 2023 are consistent with expectations based on the EIS evaluation, and do not change the overall interpretation of the results for kimberlite or PK. The supplemental samples of fine PK and coarse PK are non-acid generating with substantial excess neutralization potential and are within the range of previously observed data. The net acid generation (NAG) pH values of all analyzed PK samples are above 4.5 pH units, confirming that the samples are non-acid generating. Leach results from laboratory static tests and from field cell tests indicate that PK has a low potential for metals leaching, consistent with observations made during the EIS.

No change is expected in the geochemical characteristics and classifications of the kimberlite and PK relative to that as presented in the EIS and Golder (2014), based on the data collected since 2014. Leachable parameters from kimberlite and PK have been considered within the context of the overall assessment of site water quality completed separately.

A comparison in Golder (2014) noted that, relative to other mines in the Northwest Territories, the leaching results of the kimberlite found at the Gahcho Kué Mine most closely resembles that of the Snap Lake Mine kimberlite and is least similar to the Diavik Diamond Mine kimberlite.

4.2 MINE ROCK

Detailed environmental geochemical characterization of mine rock is provided in:

- Appendix 8.III of the 2012 EIS Supplement (De Beers 2012a);
- Gahcho Kué Project Metal Leaching and Acid Rock Drainage Report - 2013 Update (Golder 2014); and,
- the 2024 Update - Metal Leaching and Acid Rock Drainage Report (WSP 2024).

Results of all the rock types with the exception of kimberlite (Section 4.1) are presented together to reflect their treatment as mine rock. Mine rock consists mainly of granite with lesser amounts of altered granite, granodiorite, altered granodiorite, diabase, and diorite. The dominant minerals in granite samples are silicate minerals, including k-feldspar, quartz, biotite, plagioclase, muscovite-sericite, chlorite, magnetite, pyroxene and olivine. In general, mine rock has low concentrations of total sulphur and sulphide sulphur and calcite. Sulphide minerals include pyrite, pyrrhotite and chalcopyrite.

A review of the available data as provided in WSP (2024) indicates that when only considering the EIS and bi-annual audit samples, approximately 7.5% of samples have total sulphur equal to or greater than 0.1%, and approximately 3.0% of samples have total sulphur equal to or greater than 0.2% (Table 5a,b). With respect to acid generation potential criteria (Table 6), when only considering the EIS and bi-annual audit samples: 9.3% of samples (137/1,480) have a Neutralization Potential Ratio (NPR) of <2; 2.0% of samples (5/244) have a NAG pH <4.5, and when combining these two criteria, only two of the 244 samples (0.8%) would be considered potentially acid generating.

A review of the neutralization potential (NP) of the mine rock samples indicates that carbonate minerals contribute about 34% of buffering capacity based on the Carbonate NP (CaNP) values of over 1,400 samples (WSP 2024). The CaNP generally exceeds the acid potential (AP) of most samples, resulting in excess overall carbonate buffering capacity on a large scale. Humidity cell test data from supplemental samples of granite, diabase and mixed materials with sulphide content ranging from 0.103 to 0.233 wt% have remained neutral with low metal concentrations over the current testing period (35 to 70 weeks; WSP 2024).

Overall, when reviewing acid base accounting (ABA) results in light of NAG pH, it is considered that somewhere between 0.8% and 2% of samples analyzed have the potential to generate acidity. The mine rock is expected to have low metal leaching potential when considering available CaNP and results of humidity cell testing.

Table 5a Summary of Sulphur Content for EIS, Bi-Annual Audit and Operational Monitoring for Mine Rock by Rock Type

Rock Type	Total Number of Samples	≥0.1 wt% Sulphur		≥0.2 wt% Sulphur	
	n	n	Percent (%)	n	Percent (%)
EIS Results + Bi-Annual Audits					
Granite	1,415	74	5	28	2.0
Altered granite	10	7	70	7	70
Diabase	13	5	38	0	0
Diorite	1	1	100	0	0
Gneissic granite	9	2	22	1	11
Granodiorite	16	6	38	4	25
Altered granodiorite	16	16	100	4	25
Total - Baseline + Bi-Annual Audits	**1,480**	**111**	**7.5**	**44**	**3.0**
Operational Monitoring Results					
Operational Monitoring – 2016	2,805	252	9.0	130	4.6
Operational Monitoring – 2017	2,613	116	4.4	30	1.1
Operational Monitoring – 2018	3,058	193	6.3	49	1.6
Operational Monitoring – 2019	3,344	230	6.9	60	1.8
Operational Monitoring – 2020	2,560	200	7.8	49	1.9
Operational Monitoring – 2021	2,425	222	9.2	39	1.6
Total number of Operational Monitoring Samples (2016 to 2021)	**16,805**	**1,213**	**7.2**	**357**	**2.1**
Total Combined	**18,285**	**1,324**	**7.2**	**401**	**2.2**

Sources: De Beers 2012a, 2016, 2017, 2018, 2019, 2020b, 2021, 2022.

Notes: Duplicate samples removed from database, including seven duplicate samples originally included in the EIS database.

EIS, bi-annual audit, and operational monitoring results collected on a generally regular 20 m x 20 m grid spacing between 2016 and 2021 are presented and expected to be representative distribution of expected materials.

EIS = Environmental Impact Statement; n = sample size; ≥ = greater than or equal to; wt% = percent by weight.

Table 5b Summary of Operational Monitoring for Mine Rock by Rock Type, 2022 to 2023

Rock Type	Total Number of Samples	≥0.1 wt% Sulphur		≥0.2 wt% Sulphur	
	n	n	Percent (%)	n	Percent (%)
Operational Monitoring – 2022[(a)]	2,199	391	17.8	115	5.2
Operational Monitoring – 2023[(a)]	2,202	224	10.2	76	3.5

Sources: De Beers (2023, 2024b).

Note: Operational monitoring results based on De Beers operational database samples available between 2022 and 2023.

a) Samples from 2022 and 2023 do not reflect regular grid spacing and are more focused on deformation structures observed in the pits with higher expected sulphide content.

n = sample size; ≥ = greater than or equal to; wt% = percent by weight.

Table 6 Proportion of Mine Rock with Potential for Acid Generation based on Different Evaluation Criteria

Evaluation Criteria	Total Samples	# PAG	%PAG
EIS + Bi-Annual Audit Samples			
NAGpH (<4.5)	244	5	2.0
ABA (CaNPR<1) and NAGpH (<4.5)	244	5	2.0
ABA (NPR<1) and NAGpH (<4.5)	244	0	0.0
ABA (NPR<2) and NAGpH (<4.5)	244	2	0.8

ABA = acid base accounting; CaNPR = Carbonate Neutralization Potential Ratio; NPR = Neutralization Potential Ratio; NAG = net acid generation; PAG = potentially acid generating; < = less than.

4.3 CLOSURE CONDITIONS

Closure and reclamation are expected to take place progressively throughout the operation period as summarized below:

- Overburden and soils will be stockpiled and used for construction and/or reclamation activities. As progressive reclamation occurs, any overburden and soils not required for construction at the Mine will be recovered from stockpiles and spread over reclaimed areas that may benefit from additional soil cover.
- The re-vegetation plan will be developed under a commitment within the Interim Closure and Reclamation Plan as required by Part J of the Water Licence MV2005L2-0015.
- A layer of non-AG mine rock will be located (either operationally or placed at closure) on the upper and outer surface of the mine rock piles. The piles will not be otherwise covered or mitigated.
- The Fine PKC Facility will be reclaimed during Mine operations. The Fine PKC will be progressively covered with a layer of non-AG mine rock and coarse PK, depending on material availability.
- The Coarse PK Pile will be shaped and covered with a 1 m layer of non-AG mine rock.
- The 5034 Pit will be backfilled with mine rock during the mining of the Tuzo Pit.
- The Hearne Pit will be backfilled with fine PK progressively during mining, and then allowed to re-flood with runoff water, pit water, and decant water from the fine PK. Mine rock and coarse PK may also be deposited in the Hearne Pit.
- The Tuzo Pit will be allowed to flood after the completion of the operations phase.

It is expected that at closure, any materials exposed at the Mine site will be non-AG and will release low concentrations of dissolved metals.

5 GEOCHEMICAL CRITERION FOR MANAGEMENT AND PLACEMENT OF MINE MATERIALS

5.1 MINE ROCK

The protocols in the Processed Kimberlite and Mine Rock Management Plan Version 8 state that non-AG rock may be used for construction of roads and site infrastructure and construction of a closure cover for the PKC, and PAG rock must be sequestered in designated areas of the mine rock piles or placed within mined-out pits. As discussed in Section 4.2, small portions of each mine rock lithology are potentially acid generating; however, operational monitoring of over 20,000 sulphur analysis has shown that sulphur minerals are generally associated with observed structures such as faults and dykes especially with the altered granites and diabase materials. Although it is not possible to classify rock as PAG or non-AG based strictly on lithology, the association with structures allows a more focused program to better define acid generation. Sampling will continue on a regular grid pattern that may be relaxed in areas not associated with altered granite or diabase structures as outlined in the Processed Kimberlite and Mine Rock Management Plan.

Generally, visual classification based on observation of sulphide mineral deposits is not a recommended method for geochemical classification of mine rock, as it is difficult to quantify the presence of fine-grained disseminated minerals on a consistent basis. Therefore, total sulphur analysis on-site using the LECO analysis method with quality assurance samples conducted biannually will continue to be used as per the Processed Kimberlite and Mine Rock Management Plan.

Based on multiple methods used to determine ARD potential as described in WSP (2024), including humidity cell testing, it is considered reasonable and appropriate to adjust the segregation criteria for the Project to classify PAG rock as rock containing greater than 0.2 wt% total sulphur. This is further supported when it is considered that on a larger scale there is sufficient carbonate buffering capacity to neutralize any potential acidity produced. Conservatively, mine rock with ≤0.1 wt% total sulphur will be used for construction, covers, or the edges of the rock pile. Table 7 provides the updated segregation criteria for mine rock on the Mine site.

Some of the key factors in supporting classifying PAG rock as rock containing greater than 0.2 wt% total sulphur are:

- Considering NAG-pH and ABA data for the EIS and annual data sets where both are available (n=244), there are no PAG samples and only three "uncertain" samples. Of the three "uncertain" samples, all have total sulphur content of over 0.25 wt% S) and would be appropriately segregated using 0.2 wt% sulphur as a cutoff criteria for general placement of rock within the main waste rock areas of the pile.

- Carbonate minerals contribute about 34% of buffering capacity based on CaNP on over 1,400 samples, which generally exceeds the AP of most samples, resulting in excess overall carbonate buffering capacity on a large scale.
- Humidity cell test data from supplemental samples of granite, diabase and mixed materials with sulphide content ranging from 0.103 to 0.233 wt% have remained neutral over the current testing period (35 to 70 weeks) with low metal leaching potential.

Table 7 Recommended Operational Segregation Criteria for Mine Rock at Gahcho Kué Mine

Definition	Placement	Classification (PAG or non-AG)
Mine rock ≤0.1 wt% total sulphur	Construction rock. Place anywhere on site including mine rock piles, roads, pads etc.	Non-AG
Mine Rock > 0.1 wt% total sulphur	Place in mine rock piles >15 m from the edge.	Non-AG
Mine rock >0.2 wt% total sulphur	Segregated in mine rock piles. Place in designated areas >15 m from the edge.	PAG

Notes: As a general consideration, PAG rock “designated areas” should be of a reasonable size to not impact operations and allow for appropriate mine and closure planning, while maximizing distance from the receiving environment (e.g., lakes and discharge zones) to the degree practicable.

PAG = potentially acid generating; non-AG = non- acid generating; < = less than; ≤ = less than or equal to; > = greater than; wt% = percent by weight.

Confirmation samples will be collected for the purpose of Mine material classification using the geochemical criterion. Section 7 presents detailed procedures for Mine material classification.

Use of mine rock in site development plans will be based on geochemical classification of mine rock as non-AG or PAG as follows:

- Non-AG mine rock of less than or equal to 0.1 wt% S will be used to construct site facilities (i.e., roads, building foundations, and airstrip), filter dykes, granular cover on rock piles, outer slopes of rock piles.
- Non-AG mine rock with less than or equal to 0.2 wt% S, or otherwise not required for use in construction, will be stored in the South Mine Rock Pile, the West Mine Rock Pile, and the mined-out 5034 Pit (once this facility becomes available). After the 5034 Pit is full, non-AG rock will continue to be placed in the West Mine Rock Pile.
- PAG mine rock with more than 0.2 wt% S, as well as any barren kimberlite, will be sequestered within the interior of the mine rock piles in designated areas located away from the pile edge or placed within a pit.
- The PAG designated segregation areas in the waste rock piles should be of a reasonable size to not impact operations and allow for appropriate Mine and closure planning, while maximizing distance from receivers (e.g. lakes and discharge zones) to the degree practicable.

- The PAG rock placed in a pit will be flooded as Kennady Lake is re-filled. Flooding of PAG rock will also limit exposure to oxygen and reduce the potential for sulphide oxidation and acid generation.

5.2 OVERBURDEN

Overburden will be tested and classified as described in Section 5.1, with exception that all overburden containing greater than 0.1 wt% total sulphur will be classified as PAG. Overburden classified as PAG will be handled in the same manner as PAG mine rock, as described in Section 5.1. Non-AG overburden will be used for site construction, deposited in designated areas within the mine rock piles (e.g., cover of landfills within the mine rock piles as they are closed out), or stockpiled and used for reclamation and closure planning, where appropriate (e.g., possible re-vegetation purposes), as identified within the Interim Closure and Reclamation Plan (De Beers 2024a).

6 MINE ROCK MONITORING AND TESTING PLAN

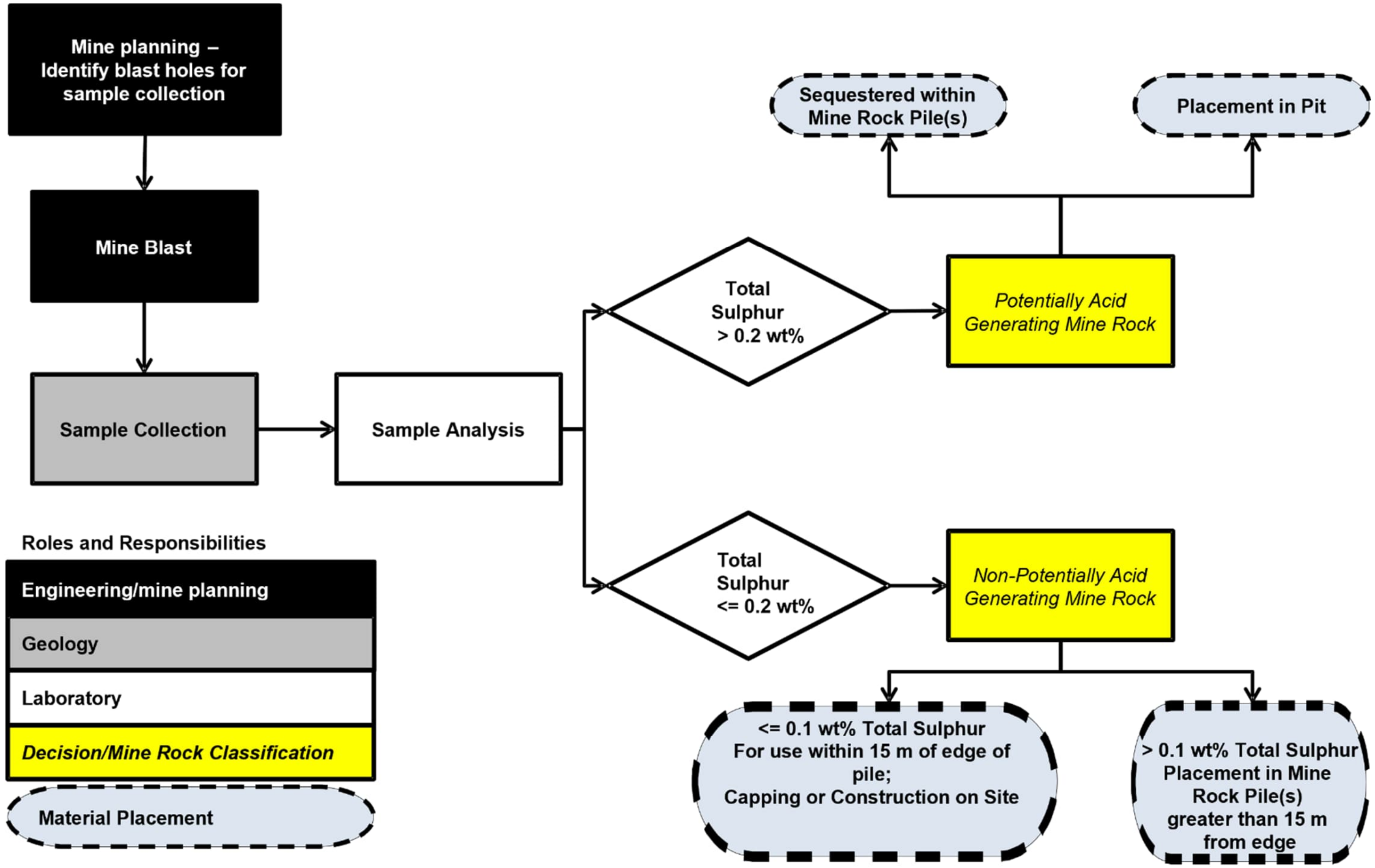
A mine rock monitoring and testing plan is required to ensure the placement of mine rock, as described in Section 5. The objective of the mine rock monitoring and testing plan is to confirm that PAG rock is identified and appropriately managed or otherwise mitigated to prevent acid generation and associated metal leaching.

The mine rock monitoring and testing plan will include the following components:

- Roles and Responsibilities;
- Monitoring and Testing Procedures;
- Planning;
- Sample Collection and Analysis;
- Evaluation and Comparison to Criteria;
- Physical Handling of Mine Rock;
- PAG Material Tracking; and
- Quality Assurance / Quality Control.

Figure 3 outlines the main components of the mine rock monitoring and testing plan.

Figure 3 Mine Rock Monitoring and Testing Plan



Notes on Sample Collection Frequency:
Sample frequency may be mandated in the Water Licence. However, a minimum sample frequency will be required to capture the geotechnical variability of the mine rock, and will be a function of the spacing and depth of blast holes.

Sample frequency will be determined in consultation with De Beers based on the tonnage of rock that is represented by each blast hole, and the minimum sample frequency required to delineate PAG mine rock.

6.1 ROLES AND RESPONSIBILITIES

The responsibilities outlined in the mine rock monitoring and testing plan will involve several departments at the Mine, including Technical Services, Mine Engineering, Mine Operations, Site Services and Environment.

6.2 MONITORING AND TESTING PROCEDURES

The mine rock monitoring and testing plan requires the implementation of standard operating procedures, including:

- mapping of rock type limits by trained geological personnel;
- sample collection, including identification of blast holes for sample collection and collection of blast hole cuttings for geochemical testing (De Beers 2012b);
- sample analysis; and
- material flagging and relocation.

A Standard Operating Procedure (SOP; updated in 2024) detailing a uniform method for the handling and placement of mine rock at the Gahcho Kué Mine site is documented in Appendix A. This SOP includes a description of the collection rate of appropriate samples, responsibilities for sampling and data analysis, criteria for identification of PAG rock, placement of PAG rock in designated areas, and the requisite sampling and analysis of mine rock material. The results of the testing program for sample collection and analysis will verify the approach for characterization of the mine rock and its handling and placement.

If required, the SOP will be updated. Updates to the SOP will be documented in revisions to the Geochemical Characterization Plan, which will be submitted to the MVLWB for approval.

The SOPs will be maintained by the Site Environmental Manager or appropriate services supervisor. Copies will be provided to the Construction Manager, Mining Manager, and Technical Services Manager. Standard operating procedures will be reviewed on a routine basis, as necessary based on site conditions under the Mine's Environmental Management System (EMS).

6.3 PLANNING

A mine rock development plan will be routinely prepared (e.g., monthly) by Mine Planning as a component of the operational mine plan in consultation with Technical Services. The development plan will include:

- an estimation of the amount of mine rock to be mined at each location prior to mining;

- a compilation of the analytical results of mine rock sample analysis to identify potential zones of PAG mine rock;
- preparation of maps showing the available geochemical data and estimated rock type designation (PAG or non-AG) based on the available results of geochemical analysis in the area; and
- identification of blast holes for sample collection.

Technical Services (Mine Geology) will complete a geologic review prior to the sample collection. The purpose of this review will be to identify the geologic conditions and setting of the rock, and the presence of visible sulphide mineralization in the mine rock. The sample collection plan for each area will be confirmed on the basis of the visual review by the Mine Geologist.

6.4 SAMPLE COLLECTION AND ANALYSIS

The Mine Geologist will inspect and map the active face to confirm the visual characteristics of the rock in the muck pile. The face mapping will record the location of structures or zones in which sulphide minerals are observed. The Mine Geologist will collect blast hole cutting samples from development zones in the open pits prior to blasting.

Initially, a sample frequency of eight (8) samples per 100,000 tonnes (t) of rock was used during construction and early operations (assuming a 20 m x 20 m grid with a bench height of 12 m). Based on operational monitoring, the analysis of the acid generating potential for each rock type in the dataset and the spatial distribution relative to structural elements and/or alteration as observed in the operational data (WSP 2024), it is reasonable and appropriate to reduce of the number of samples collected for geochemical characterization from homogeneous rock units (i.e., granite, pink granite, and white granite) or in structural units demonstrated to be non-acid generating. This sampling strategy allows focus of resources on areas and zones where PAG rock types (i.e., altered granite and diabase rock types) are more likely to occur, and is expected to improve the efficiency and effectiveness of mine rock management at site.

Based on the observed distribution of ARD results from greater than 20,000 operational samples demonstrating the association of sulphur with observed altered granite and diabase structures, the sampling frequency will be reduced in areas of homogeneous rock (including structures not associated with altered granite or diabase that are known to be non-acid generating), to a grid spacing of no greater than 60 m x 60 m, with a bench height of up to 14 m. This results in a sample frequency of 1 sample per 15,000 t where a 20 m x 20 m grid is used (in areas where altered granite or diabase structure is encountered or are historically known to have PAG materials), and 1 sample per 130,000 t where a 60 m x 60 m grid is used (in non-AG areas).

Sample collection will take place daily following the guidance as provided in Appendix A. In summary, daily sample frequency will be adjusted adaptively based operational monitoring results, the presence or absence of structure, historical sampling, the face mapping information and will be at the discretion of the on-site geology team. Where altered granite or diabase structure or PAG materials are present or expected based on available data, a sample grid of 20 m x 20 m will be used. In areas expected to be non-AG, a maximum sample grid size of 60 m x 60 m will be used. Where the sample spacing is relaxed to a larger grid spacing, the 20 m x 20 m grid points location will continue to be recorded in the database with a designation “no sample – expanded grid” to properly track and weight sample results.

Blast hole cutting samples are submitted for total sulphur analysis on site using a LECO furnace analyser, with QA verification of samples provided by an off-site, accredited laboratory, as reported in the bi-annual geochemistry audit report. Total sulphur content will be analyzed at the retained accredited laboratory using an appropriate sulphur analytical technique (e.g., LECO furnace analyser). Analytical methods are calibrated to achieve results at a detection limit suitable for classification according to the geochemical criterion presented in Section 5.1.

6.5 EVALUATION AND COMPARISON TO CRITERIA

The results of the analysis of mine rock samples will be provided to the Mine Geologist and the Mine Geologist will compare the analytical results to the geochemical classification criteria in Section 5.1. The results of comparison and evaluation will be used to classify the material in a blast round as PAG or non-AG with appropriate use and placement as described in Table 7 and Section 5.1.

The Mine Geologist will identify PAG and non-AG zones at each working area, which will be communicated to the mine planning and mine operations team as outlined in Section 6.6.

6.6 PHYSICAL HANDLING OF MINE ROCK

The Mine Geologist will confirm the properties of mine rock at each working zone. The area to be demarcated will be based on the boundary of the closest non-AG samples immediately adjacent to the PAG samples, and will be set at roughly half the distance between the PAG sample and the non-AG sample locations. Where rock is required for construction on-site, capping of the pile, or placement within 15 m of the pile edge, non-AG samples will be further subdivided to define rock with less than or equal to 0.1 wt% sulphur. This protocol will be reviewed and updated as required as the database of available information increases during operations.

Classification boundaries are entered into the loading equipment onboard digital system (Mineware) to ensure hauling of the correct material to the correct pile. The operators will be made aware of the material designations and corresponding assigned areas for proper material placement. The mine operations team will be responsible for monitoring the loading of mine rock after blasting to ensure that PAG material is being dispatched to the assigned PAG area.

A detailed outline of this procedure will be prepared for the purpose of operator training, including the parties responsible for proper placement of material and tracking of material placement. The procedures will be developed as a component of the operational management system for the Mine, and refined during operations in accordance with the requirements of the EMS.

6.7 PAG MATERIAL TRACKING

The amount of PAG material (i.e., truck loads/t) placed on each level of the mine rock piles will be recorded by Mine Planning and provided to the Mine geologist. This information will be provided to the Project geochemist in advance of the bi-annual geochemical site inspection for the purpose of inspection planning. This information will be documented in the Water Licence Annual Report to evaluate the overall acid generation potential of the mine rock pile.

6.8 QUALITY ASSURANCE / QUALITY CONTROL

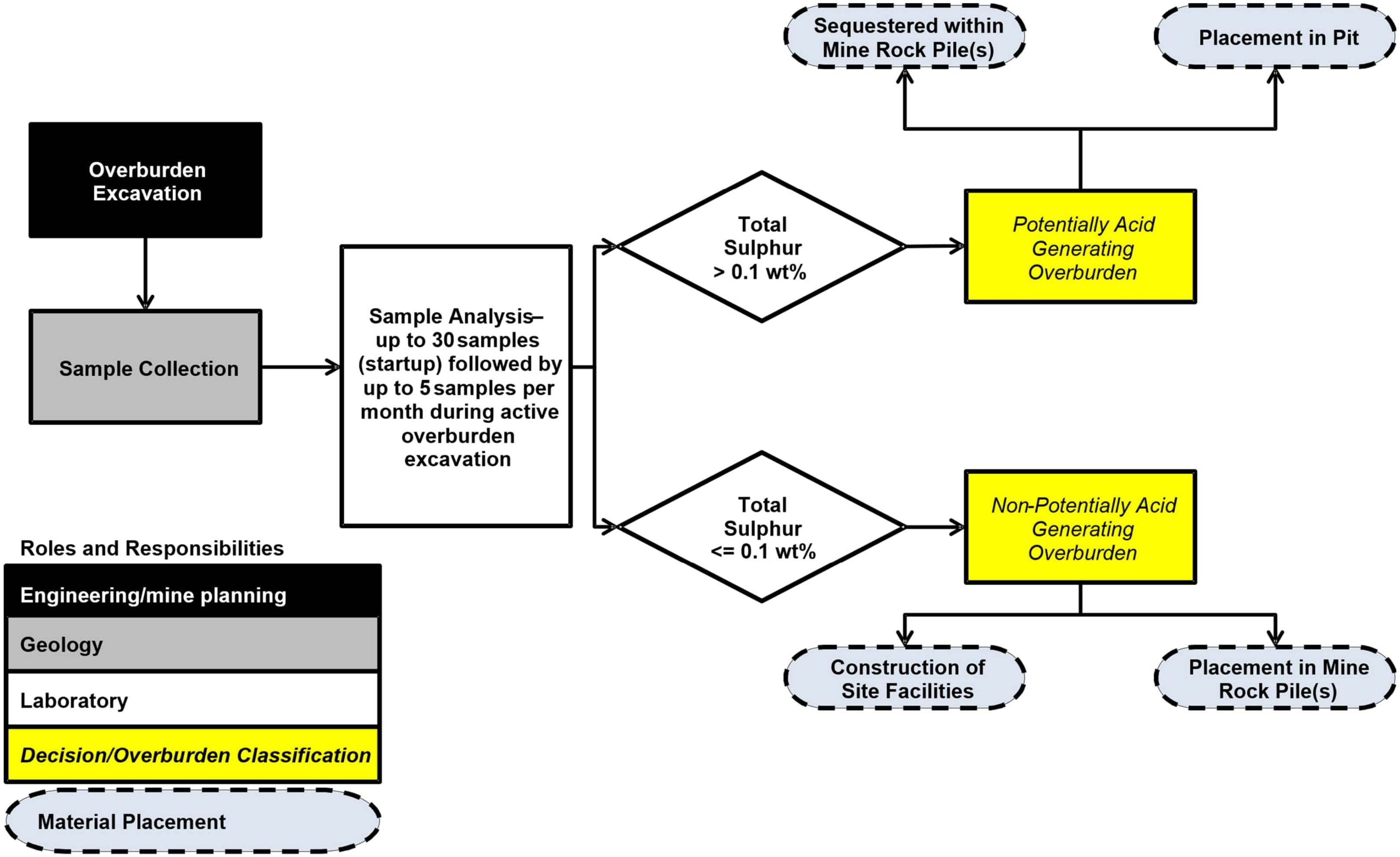
The quality assurance/quality control protocol established as part of the standard operating procedures for the Mine includes the following:

- selection of an accredited laboratory for the analysis of samples;
- use of standard collection, and handling and preservation of samples prior to analysis;
- laboratory-specific procedures for analysis;
- collection of duplicate samples;
- confirmation of sampling and analysis; and
- routine inspection of the classification and placement of mine rock by a Professional Geologist of NWT. This will involve review of the data collected, visual inspection of the rock placed on-site, and collection of supplemental samples for geochemical analysis.

7 OVERBURDEN MONITORING AND CLASSIFICATION

Overburden samples will be collected during the onset of overburden excavation at the beginning of construction to confirm the geochemical characteristics of overburden (Figure 4). Overburden samples will be submitted for total sulphur analysis according to the procedures outlined in Section 6.4. The distribution of overburden reporting greater than 0.1 wt% total sulphur will be considered in determining the classification as PAG or non-AG, and will be handled according to the procedures for PAG mine rock outlined in Section 6.6. Sediment classified as PAG or metal leaching, based on the classification developed for mine waste, will not be used for construction purposes (De Beers 2012c).

Figure 4 Overburden Monitoring and Testing Plan



Notes on Sample Collection Frequency:
Sample frequency may be mandated in the Water Licence. The sample frequency will be decreased after a sufficient dataset has been gathered as to confirm the characteristics of overburden that will be excavated from each ore deposit.

8 PERFORMANCE MONITORING

Three monitoring components are required for this Plan: the bi-annual geochemical audit, the SNP, and construction and monitoring of field cells.

- The bi-annual geochemical audit is an inspection of the storage areas of all solid-phase waste materials (e.g., mine rock, PK), which focuses on testing of material to confirm their acid-generating potential (i.e., are the materials stored appropriately) and the sampling and analysis of any observed seepage or runoff around these storage facilities. The site inspection will be conducted under the supervision of a Professional Geologist of the NWT.
- Within the SNP, there are established monitoring locations associated with the mine waste storage facilities (e.g., Fine PKC Facility [SNP 13], Coarse PK Facility [SNP 14], mine rock piles [SNP 11 and SNP 12]). These locations will be routinely monitored by Environment Services.
- Field tests have been constructed at the Mine site using samples of mine rock and PK representative of the materials that will be placed in the mine rock piles, open pits, Fine PKC Facility, and Coarse PK Pile. These tests will continue to be monitored routinely and reported on in the annual geochemistry report.

8.1 BI-ANNUAL GEOCHEMICAL AUDIT

A bi-annual geochemical audit takes place immediately after the spring freshet, and in late summer before freeze up. The frequency of the audit may be reduced following closure of the storage facilities. The audit includes:

- Geochemical inspection of areas of mine rock deposition or disturbance for signs of incipient acid generation and collection of supplemental mine rock samples.
- Inspection for seepage from mine waste storage areas (e.g., dam faces of water management dykes and berms, mine rock piles, Coarse PK Pile, Coarse PK/Mine Rock Pile, Fine PKC Facility, ROM kimberlite ore stockpile, roadways, rock pads, water management dykes and berms). If seepage is identified, then samples will be collected for analysis. This survey excludes in-pit seepages, which are monitored as part of the Groundwater Monitoring Program.
- Inspection for runoff in bogs and receiving waters down-gradient of site facilities. If seepage is identified, then samples will be collected for analysis.

Each component of the bi-annual geochemical audits is described below.

8.1.1 Site Inspection

A visual inspection of construction material, mine roads, rock pads, water management structures, mine rock piles, the Coarse PK Pile, Coarse PK/Mine Rock Pile, and the Fine PKC Facility will be completed under the supervision of a Professional Geologist of the NWT. During this inspection, rock will be observed for visible signs of weathering, such as iron staining, and visible sulphide mineralization. In addition, supplemental samples will be collected for geochemical characterization to confirm that rock is being placed according to the protocols in the Processed Kimberlite and Mine Rock Management Plan. The supplemental sample collection program is outlined in Table 8.

Samples collected during the geochemical audit will be submitted for static testing. The analytical program will make use of static test methods for assessment of ABA characteristics to confirm that the samples fall within the range identified, tested and described in Appendix 8.III of the 2012 EIS Supplement (De Beers 2012a), and the 2024 Update - Metal Leaching and Acid Rock Drainage Report (WSP 2024). The results of analysis of supplemental geochemical characterization samples collected during the geochemical site inspection will be compared to the geochemical criteria for mine rock management (Section 5.1) to confirm that only non-AG rock with less than or equal to 0.1 wt% total sulphur is being used for construction of site infrastructure.

The data will be evaluated using a weight of evidence approach in the context of the entire site to determine what action is required. For example, a single sample with limited acid generating potential within an area with a large amount of buffering capacity would not be expected to generate appreciable acidity or metal leachate, and would not merit removal and mitigation. However, continued monitoring of any seepage or runoff from its placement area would be undertaken. If visible surface staining is evident, and the pH of any seepage or runoff is low, further evaluation of the cause of the low-pH waters may be warranted, potentially resulting in removal and subsequent mitigation of the material generating this low-pH water.

Table 8 Summary of Sampling and Analysis Schedule for Characterization of Rock

Material	Description	Total Number of Samples	Analyses					
			Visual Classification[(b)]	Acid Base Accounting (ABA)	Net Acid Generation (NAG) Testing	Short-Term Leach Extraction Tests	Comprehensive Analysis of NAG Leachates	Mineralogical Analysis
Mine rock [(a)]	mine rock originating from the open pits	up to 30 samples per year	all	all	all	10	10	10
Processed kimberlite	fine and coarse PK	up to 10 confirmatory samples per year	all	all	all	5	5	5

a) Samples of mine rock that were used for construction material will be analyzed for rapid turnaround such that rock with potential for acid generation can be removed from roadbeds and building pads, as necessary.

b) Visual classification refers to classification of individual samples through observation of sulphide-type/exposure, alkali-type/exposure, grain size elements, and slaking characteristics. Site observations (e.g., seeps, colour of pile, venting) will also be recorded on a monthly basis.

ABA = acid base accounting; NAG = net acid generation; PK = processed kimberlite.

8.1.2 Seepage Survey

The seepage survey will include a visual inspection of water management structures and/or the base of waste stockpiles to identify seepage zones. If actively flowing water is present, a minimum of one seepage sample and one reference sample from a nearby location will be collected and analyzed for the following parameters:

- Field measurements – electrical conductivity (conductivity), temperature, turbidity, dissolved oxygen, pH, and redox (Eh).
- Chemistry – hardness, total dissolved solids, major anions and cations (including calcium and chloride), nutrients (e.g., phosphorus), and dissolved metals (including low-level mercury).
- Radionuclides – uranium, thorium, and radium-226 may be included. The necessity for analysis for these parameters will depend on results as determined through routine monitoring results from the Groundwater Monitoring Program.

Seepage samples will only be collected and reported for areas of active seepage from the mine rock, Coarse PK Pile or dykes as defined by visibly flowing surface water emanating from the materials and will not include samples of nearby stagnant or standing water. The list of parameters may vary depending on necessity for analysis as determined through routine monitoring of analytical results.

8.1.3 Runoff Survey

Bogs in the vicinity of key mine facilities will be inspected to identify potential non-point source runoff and seepage flow paths from the main site facilities. Some bogs may be selected for ongoing sample collection. If water is present, a minimum of one seepage sample and one reference sample from a nearby location will be collected and analyzed for the parameters listed above for the seepage survey.

8.2 WATER QUALITY MONITORING WITHIN THE CONTROLLED AREA

Monitoring locations within the controlled area of the Mine will be established in downstream drainages from mine waste storage facilities, and will be routinely monitored as a component of the SNP (e.g., SNP 11 to 17, refer to Annex A of the Water Licence MV2005L2-0015). The data from these SNP monitoring stations will be supplemented with water quality monitoring data from locations within the Mine area identified during the seepage and runoff survey components of the bi-annual geochemical audit (Sections 8.1.2 and 8.1.3).

The results of water quality monitoring from the SNP and bi-annual geochemistry audits will be compiled in advance of the completion of the annual geochemistry report (Section 10), and evaluated for indications of acid generation and metal leaching. The results will be considered in the context of existing baseline conditions, with respect to changes in concentration trends over time.

Seepage, runoff and SNP water quality monitoring will continue after closure. The results of water quality monitoring will be reviewed for the presence of metals and/or parameters indicative of signs of incipient acid generation and metal leaching.

8.3 FIELD TESTS

Field tests consist of large-scale samples (tens to hundreds of kilograms [kg]) of mine rock or PK that are contained but exposed to ambient environmental conditions at the Mine site. The objective of field scale tests is to evaluate long-term chemical and physical weathering properties of materials to confirm the rate of acid generation and/or metal leaching in site-specific conditions. The results of field test monitoring are used to update the geochemical dataset and confirm the geochemical classification criterion.

Field tests were constructed at the Mine. Tests were established with materials that are representative of the mine wastes that will be produced during construction and operations, including mine rock and PK. Supplemental field tests may also occur later in operations should new materials be identified or should monitoring trends indicate additional testing is warranted or required.

Field tests are monitored during the initial operation period until such time that the results do not add value to the geochemical monitoring dataset. The results of field test monitoring are summarized as a section in the Bi-Annual Geochemical Audit reports, for the purpose of confirming or identifying refinements to the geochemical classification criterion.

9 REVIEW OF MINE ROCK CLASSIFICATION AND PLACEMENT PROCEDURES

The results of sample analysis conducted as a component of the Geochemical Characterization Plan will be incorporated into the existing geochemical dataset after the completion of the bi-annual geochemical audits. The geochemical dataset will be evaluated in the context of identifying revisions that can be made to the mine rock classification criteria and mine rock management practises at the Mine.

The results of this evaluation and recommendations with respect to PK and mine rock management will be provided as a section of the Bi-Annual Geochemical Audit Report.

10 RESPONSE FRAMEWORK

Adaptive management is undertaken in the Geochemical Characterization Plan through monitoring effects (i.e., operational mine rock management monitoring and bi-annual site inspections), and the setting of Action Levels. Table 9 outlines the expected Low Action Levels associated with the Geochemical Characterization Plan. Objectives were defined that align with mitigation strategies, which link measurable monitoring metrics with the Low Action Level provided.

Action Levels trigger a management response. The Action Levels are often assigned varying thresholds (Low, Moderate and High) and each corresponding management response builds upon the previous level's response (WLWB 2010). In the case of the Plan, the response framework provided in Table 9 provides a Low Action response level. Responses are specific to the effected components, the likely causes of the observed effects, and the magnitude of the effects. At this stage of the project, it would be difficult to develop applicable and appropriate Moderate and High Action Levels as they will vary depending on the extent and nature of the exceedance. Given the large and varied nature of the site, that the monitoring metrics are internal to the site, and the expectation that the project will not exceed the Low Action Level, upper levels (Moderate and High) have not yet been developed for this aspect of the project but would be developed on an as required basis. Moderate and High Action Levels will be progressively developed and implemented as necessary to prevent significant adverse effects to the environment as a result of the Mine.

Action Level exceedances and response actions taken during the year shall be reported in the Water Licence Annual Report.

Table 9 Low Action Levels Associated with the Geochemical Characterization Plan

Objective	Mitigation Strategies	Metrics	Low Action Level	Management Responses
To prevent the formation of acid rock drainage	use non-AG rock for construction of site facilities	visual observations made during bi-annual site inspections	granite with visible staining observed on rock used to construct site facilities **OR**	• alert staff in site inspection trip report • note location of stained and / or sulphide bearing rock • estimate dimensions of affected area • collect confirmation sample to determine solid phase composition of material • Develop Moderate Action Levels and responses on an as needed basis, depending on the nature and magnitude of low level exceedance and results of initial responses.
			granite containing visible sulphide minerals is observed in rock used to construct roads, building foundations, the airstrip or filter dykes	
		composition of confirmation samples collected during bi-annual site inspections	sample contains greater than 0.1 wt% sulphide sulphur	• initiate geochemical follow up investigation to determine potential for acid generation or metal leaching and report result in next annual report. • Depending on follow-up investigation results, conduct follow-up testing to determine the extent of the exceedance • Depending on results of follow-up testing, establish down gradient seepage or runoff monitoring location • consider if supplemental mitigation options • review policies to reduce likelihood of PAG rock being used to construct site facilities • Develop Moderate Action Levels and responses on an as needed basis, depending on the nature and magnitude of low level exceedance and results of initial responses.
	confirm that mine rock being encountered and placed during mining falls within the predicted range of characteristics in the EIS	composition of blast hole cutting samples, and placement location	greater than 5% of the blast hole cutting samples collected in one month contain greater than 0.2 wt% total sulphur; material is appropriately placed.	• geology to review location of samples relative to the mine plan to identify geochemical trends outside the expected range of values • confirm the availability of space in the mine rock piles to sequester PAG rock • initiate geochemical follow-up investigation to determine implications of greater than anticipated amount of PAG rock and report in annual report • Develop Moderate Action Levels and responses on an as needed basis, depending on the nature and magnitude of low level exceedance and results of initial responses.

Table 9 Low Action Levels Associated with the Geochemical Characterization Plan

Objective	Mitigation Strategies	Metrics	Low Action Level	Management Responses
Minimize the potential for discharge of acidic drainage or seepage that could cause a significant environmental effect	manage non-point source seepage and runoff to predicted levels in EIS	volume of seepage and / or runoff	Volume and location of active seepage significantly larger than previously observed	• conduct review of sources of seepage or runoff • identify location for collection of seepage or runoff water quality sample • Develop Moderate Action Levels and responses on an as needed basis, depending on the nature and magnitude of low level exceedance and results of initial responses.
		composition of seepage and / or runoff	pH below 5 or greater than 9 from one seepage location in both monitoring events during the bi-annual survey. **OR** concentration measured outside normal range, or divergence in trends relative to water quality predictions from one seepage location in both monitoring events during the bi-annual survey [(a)]	• Confirm accuracy of results and that seepage source is from actively flowing seepage representative of the intended materials [(b)] • for differences in pH, review test procedure, collect and analyze follow up confirmation sample • additional water quality monitoring samples will be collected to confirm measured result • if the measure is confirmed to be resulting from acid mine drainage, a geochemical investigation will be implemented to understand implications of exceedance and reported in the annual report • Develop Moderate Action Levels and responses on an as needed basis, depending on the nature and magnitude of low level exceedance and results of initial responses.

a) “Normal Range” is to be developed for each component, but may be defined as the data used to develop inputs for water quality model outlined in the Water Quality Modelling Appendix of the EIS and more recent water quality model updates, as appropriate, for measurement endpoints. To be reviewed and adjusted over time based on the range of composition of monitoring data.

b) Confirmatory sample will be collected during the subsequent bi-annual monitoring event.

non-AG = non-acid generating; EIS = Environmental Impact Statement; PAG = potentially acid generating; wt% = percent by weight.

11 REPORTING

Mine rock management activities will be summarized as part of the Bi-Annual Geochemical Audit Report, which will be included as an appendix to the Water Licence Annual Report. A selection of the same dataset will be included in the main body of the Water Licence Annual Report as required under the Water Licence.

Data summaries will include the following:

- recorded mine material volumes;
- descriptions of mine material placement during the past year;
- results of the bi-annual geochemical site audit;
- results of mine material sample collection and analysis;
- a factual summary of the results of geochemical characterization of PK and mine rock samples collected during the monitoring period;
- evaluation of the results of geochemical characterization relative to the existing geochemical characterization dataset;
- summary of water quality, and evaluation of any trends, at SNP water quality monitoring locations relevant to the Geochemical Characterization Plan and bi-annual geochemistry audit sampling locations;
- any Action Level exceedances and response actions taken during the year; and
- information regarding contingencies and responses to monitoring results.

The Bi-Annual Geochemical Audit Report will provide the following recommendations, if necessary:

- recommendations for additional monitoring based on observations made during the bi-annual geochemical audits, and/or trends in ARD monitoring data and seepage quality data; and
- recommendations with respect to the protocols as described in the Processed Kimberlite and Mine Rock Management Plan, based on the results of geochemical monitoring during that year.

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13 ACRONYMS AND GLOSSARY

13.1 ACRONYMS AND ABBREVIATIONS

ABA	acid base accounting
AP	acid potential
ARD	acid rock drainage
CaNP	Carbonate NP
CPKMRP	Coarse Processed Kimberlite and Mine Rock Pile
De Beers	De Beers Canada Inc.
EIS	Environmental Impact Statement
EMS	Environmental Management System
HCT	humidity cell test
LOM	life of mine
Mine	Gahcho Kué Mine
MVLWB	Mackenzie Valley Land and Water Board
n	sample size
NAG	net acid generation
Non-AG	non-acid generating
NP	neutralization potential
NPR	Neutralization Potential Ratio
NWT	Northwest Territories
PAG	potentially acid generating
PK	processed kimberlite
PKC	processed kimberlite containment
ROM	run-of-mine
SCT	submerged column test
SNP	Surveillance Network Program
SOP	Standard Operating Procedure

13.2 UNITS OF MEASURE

%	percent
<	less than
>	greater than
≤	less than or equal to
≥	greater than or equal to
kg	kilogram
km	kilometre
m	metre
mm	millimetre
Mt	million tonnes
t	tonnes
wt%	percent by weight

13.3 GLOSSARY

Acid Base Accounting (ABA)	Acid base accounting; a set of static analyses that defines the amounts, and relative balance, or potentially acid-generating and acid-neutralizing (or base) minerals in a sample
Acid mine drainage	A variation on acid rock drainage, mine site drainage with an acidic pH due to the oxidation of sulphide minerals exposed by mining activity
Acid potential	The acid potential represents the bulk amount of acidity that can be produced by a material. The acid potential is calculated from the sulphide content and assumes that all sulphide minerals occur as pyrite.
Acid rock drainage (ARD)	Acidic pH rock drainage due to the oxidation of sulphide minerals that includes natural acidic drainage from rock not related to mining activity; an acidic pH is defined as less than 6.0.
Acidic drainage	A general term applied to any drainage with an acidic pH; an acidic pH is defined as a value less than 6.0.
Alkaline mine drainage	Mine site drainage with an alkaline pH; an alkaline pH is defined as a value greater than 8.5.
Altered	A rock that has undergone changes in chemical or mineralogical composition usually produces by hydrothermal solutions or weathering.
Biotite	A mineral of the mica group $K(Mg, Fe+4)_3(Al, Fe+3)Si_3O_{10}(OH)_2$. It is black in a hand specimen, brown or green in a thin section, and has perfect basal (001) cleavage.
Column test	Column tests are a kinetic test method that provides neutral drainage data that can be compared to the acid rock drainage and primary weathering data obtained from humidity cell testing.
Diabase	A medium grained basaltic intrusive rock composed primarily of pyroxene, and plagioclase feldspar; approximate medium grained equivalent of gabbro.
Diorite	A dark, coarse grained plutonic rock composed primarily of plagioclase feldspar, hornblende, and pyroxene; intrusive equivalent of andesite.

Drainage chemistry	Concentrations of elements and other aqueous parameters in mine site drainage from mine site components through surface or subsurface pathways.
Glacio-lacustrine	Sediments that were deposited in lakes that formed at the edge of retreating glaciers; commonly laminar deposits of fine sand, silt, and clay.
Gneiss	A coarse crystalline metamorphic rock in which there are bands of light and dark minerals of widely varying origin and mineralogy.
Granite	A coarsely crystalline igneous intrusive rock composed of quartz, potassium feldspar, mica, and/or hornblende.
Granitoid	Rocks with a composition the same or similar to granite.
Granodiorite	A coarse-grained plutonic rock composed primarily of quartz, potassium feldspar, hornblende, and pyroxene; similar to granite with less alkali feldspar.
Humidity cell	A type of kinetic test in which a small sample (about 1 kg) is placed in an enclosed chamber in a laboratory, alternating cycles of moist and dry air is constantly pumped through the chamber, and once a week the sample is rinsed with water; chemical analysis of rinse water yield concentrations of elements and other parameters used to calculate reaction rates.
Hypabyssal	Igneous rocks forming minor, small scale, intrusions at relatively shallow depths in the crust; medium to fine-grained.
Kinetic test	A geochemical procedure for characterizing the chemical status of a sample through time during continued exposure to a known set of environmental conditions, such as humidity cell tests; see also static test.
Loading	Concentration multiplied by a flow, providing a mass per unit time flowing through or from a mine site component.
Metal leaching	The release of a metal from its solid-phase mineral into mine site drainage described by concentrations in static test and by metal release rates obtained from kinetic tests.
Mine rock	The rock surrounding an ore body.
Mine rock pile	A general term referring to any accumulation of rock at a mine, including waste rock piles, ore and low-grade ore stockpiles, roads, heap leach piles, and building foundations.
Mine site drainage	Water that runs off or flows through a mine site component, including surface and subsurface (groundwater) flow; see also acid mine drainage, neutral mine drainage, alkaline mine drainage, and drainage chemistry.
Neutralization potential	The neutralization potential represents the bulk amount of acidity that the sample can potentially consume or neutralize.
Overburden	A general term referring to all soil and broken rock, lying above ore and waste rock, that can usually be removed without blasting; as mines in soft sedimentary rock, like coal, overburden can be synonymous with waste rock.
Potentially acid generating (PAG)	Rock with a neutralization potential/acid potential ratio less than 3 as determined by static tests.
Processed kimberlite	The material that remains after all economically and technically recoverable diamonds have been removed from the kimberlite during processing.
Processed kimberlite containment	On-site storage facility for storing processed kimberlite.
Static test	A procedure for characterizing the physical and/or chemical status of a sample at one point in time, such as acid base accounting.
Submerged column test (SCT)	Submerged column tests are kinetic tests designed to address the influence of submerging a material underwater. Sample charges with a weight of 3 kg were placed in a PVC column, which was inundated with an initial volume of distilled water f approximately 2.5 L. Each week, samples of water are collected from the base ("bottom") of the column and the water overlying the top of the column ("top"). Additional distilled water is added to the top of the column to replace the volume of water collected each week.

Sulphide oxidation	Oxidation of chemically reduced sulphur, such as sulphide (S_2^{2-}) and elemental sulphur to a partially oxidized form, such as sulphate (SO_4^{2-}). Generally used to refer to oxidation of pyrite (FeS_2).
Sulphide sulphur	A part of acid base accounting that provides the sulphide content of a sample, expressed as %S.
Total sulphur	A part of acid base accounting that provides the total sulphur content of a sample, expressed as %S; see also sulphide sulphur, total sulphate sulphur.

APPENDIX A: SOP V.3.0

PRELIMINARY STANDARD OPERATING PROCEDURE – GEOCHEMICAL CLASSIFICATION FOR SEGREGATION OF MINE ROCK

A1 OBJECTIVE, SCOPE AND APPLICABILITY

The objective of this guideline is to establish a uniform method for the handling and placement of mine rock at the Gahcho Kué Mine. This includes the collection rate of appropriate samples, responsibilities for sampling and data analysis, criteria for identification of PAG rock, placement of PAG rock in designated areas, and ongoing analysis of results.

A2 MANAGEMENT OF MINE ROCK

The overall protocol for identification and handling of mine rock is as follows:

1. Sample locations are identified by the Mine Geologists prior to drilling and the drill cuttings are then sampled and analyzed by the Mine Geologists.
2. Samples will be analyzed onsite for the Total Sulphur content by an on-site LECO Sulphur Analyzer.
3. The threshold for the definition of PAG material is a total sulphur content greater than 0.2 wt% sulphur. Any sample or cluster of samples exceeding this threshold will be demarcated as "PAG material".

   The threshold for the definition of non-AG material suitable for use in construction is a total sulphur content less than or equal to 0.1 wt% sulphur. When construction rock is required, these locations will be demarcated as "non-AG Construction material".
4. The demarcated area is defined as half the distance between the target area and zone outside of target area (e.g., PAG and nearest non-AG sample). This protocol will be reviewed and updated as required as the database of available information increases during operations.
5. Results of the on-site analysis will be available prior to the removal of rock from the pit and placement in the appropriate areas.
6. The target area (e.g., PAG zone or Construction rock zone) will be demarcated by the mine surveyor using survey stakes and flagging, or other means after the blast. This will define the area to be loaded as PAG material or Construction material.
7. The mine operations team will be responsible for monitoring the loading of mine rock after blasting and survey staking to ensure that material is being dispatched to the assigned area.
8. Non-AG material with less than or equal to 0.1 wt% sulphur will be used for construction on land as well as within the basin of Kennady Lake above the original high-water mark.
9. PAG material will be placed as follows:
   - Within the submerged zones of either the South or West Mine Rock Piles;
   - Within a segregated PAG "designated area" of either the South or West Mine Rock Pile. PAG designated areas will be demarcated to ensure that there is a minimum horizontal distance of 15 m from the pile's edge. PAG rock designated areas should be of a reasonable size as to not impact operations and allow for

appropriate mine and closure planning, while maximizing distance from receivers (e.g., lakes and discharge zones) to the degree practicable.

- Within the mined-out Hearne and 5034 pits.
- Within internal dykes below the original high water mark of Kennady Lake.

10. The amount of PAG material (i.e., truck loads/tonnes) placed on each level of the mine rock piles in the submerged zones, within the basin of Kennady Lake, or within the mined-out pits, will be recorded by Mine Planning and provided to Technical Services.
11. An annual report identifying geochemical trends with any follow-up actions will be completed. The report will be included within the MV2005L2-0015 Annual Water Licence Report

A3 SAMPLING AND ANALYSIS (SAMPLE IDENTIFICATION, SHIPPING, AND TURNAROUND TIMES)

Sampling and analysis of mine rock will be undertaken where there is potential for mine rock to be used for construction, or placed above the final water level in Kennady Lake.

Field Sampling at Pits (Operational Monitoring)

- Sampling will take place following a regular pattern or grid spacing as defined by the Mine Geologists.
- Samples will consist of drill cuttings collected as composite grab samples from each hole prior to loading of explosives.
- No specific particle size fraction will be selected. Rock will be ground up by the drill prior to sampling.
- Samples will be uniquely identified, by blast hole designation, and the location and results of samples will be recorded using a site database managed by the Mine Geologist.
- Sampling will occur at a minimum frequency of one (1) sample per 130,000 t, where rock is not expected to contain sulphide (equating to a grid spacing of 60m x 60 m with an assumed bench height of 14 m). In areas where altered granite or diabase structure is encountered or are historically known to have PAG materials, the grid spacing will be reduced to 20 m x 20 m which equates to 1 sample per 15,000 t of rock, assuming a bench height of 14 m. In both instances, a rock density of 2.6 tonnes per cubic metre (t/m^3) is assumed.
- Where the sample spacing is relaxed to a larger grid spacing, the 20 m x 20 m grid location points will continue to be recorded in the database with a designation “no sample – expanded grid” in order to properly track and weight sample results.

Field Sampling at Mine Infrastructure

- During the bi-annual geochemical audit, mine rock placed in mine rock piles, roads, and other infrastructure is sampled as per Section 8.1.1 of the Geochemical Characterization Plan.
- Samples of mine rock are collected from areas in which ROM has been placed in the last 6 months, typically, mine roads, rock pads and mine rock piles.
- Sample rock is selected at each location by examining rock fragments characteristics (e.g., colour, grain size, texture, visible minerals, etc.) and selecting a sample representative of the dominant rock type at each location.
- If required, during the bi-annual audit, a sample will be collected from the conveyor at the mobile crusher.
- Sample rock is shipped to an off-site lab for further analysis.

Lab Analysis of pit samples

- For the purpose of Total Sulphur analysis, samples are dried and finely crushed to better than 70% passing a 2 mm screen (Tyler 9 mesh, US Std. No.10).
- A split of up to 250 g is taken and pulverized to better than 85% passing a 75 micron (µm) screen (Tyler 200 mesh, US Std. No. 200).
- A minimum of 5% of mine rock samples/year will be split and submitted to an accredited laboratory under a chain of custody protocol as a quality assurance/quality control measure.