

Final

Technical Memorandum

To	Linda Kirchner	Client	Northern Star Resources
From	Alison Hendry, Claire Linklater	Project	DEG003
Cc	Erin Lee	Date	29 January 2026
Subject	Hemi Gold Project kinetic column updated interim results – January 2026		

1 Background

Fourteen waste rock samples from the Hemi Gold Project were submitted for kinetic column leach tests. The objectives of a kinetic testing program are to measure:

1. the rate of sulfide oxidation and hence acid production
2. concurrent rate of acid neutralisation
3. solute release rates.

Results may be used to predict the time to consumption of the acid generating and acid neutralising minerals respectively, providing an indication of whether or not acidic conditions could develop in the future.

The samples were selected to cover a range of lithologies, sulfur contents and sample classifications from the available core materials within the Hemi geochemical program sample set. The composition of the samples was confirmed via static testwork (SRK, 2022) prior to the samples being submitted for kinetic testwork.

2 Kinetic testwork program schedule summary

The kinetic testing program has been carried out in accordance with the methodology outlined in the AMIRA test handbook (AMIRA, 2002). The duration of kinetic tests is determined on the basis of trends observed in leachate chemistry. When leachate chemistry is stable, i.e. no longer showing variability between leach events, then a decision can be made to terminate the test. An operational summary of the kinetic column testwork program is given in Table 2.1.

The 14 samples selected for kinetic column tests were submitted in two batches. The first five samples (batch one) were submitted for kinetic column testing in January 2022 and were subject to 12 (4-weekly) leach events. The last leach event for the batch 1 samples (leach event 12) took place in December 2022.

A further nine samples (batch two) were submitted for testing in May 2023, and 12 leach events were completed. Following completion of 12 leach events, six of the columns were terminated. The testing schedule for the three remaining columns (BLSH_8, BLSH_9 and SDST_1) was extended as the leach chemistries from these columns had not stabilised.

Table 2.1: Kinetic column testwork program operational summary

Sample ID	Pit	Oxidation class	Column test batch	Leach events completed	From	To	Operational or terminated	Geochemical (AMIRA) classification (based on static testwork)
BLSH_3	FALCON	FR	1	12	Jan-2022	Dec-2022	Terminated	NAF
FIRK_1	AQUILA	FR	1	12	Jan-2022	Dec-2022	Terminated	NAF
IIRK_13	FALCON	FR	1	12	Jan-2022	Dec-2022	Terminated	UC (NAF)
MIRK_35	DIUCON	FR	1	12	Jan-2022	Dec-2022	Terminated	NAF
SLST_5	AQUILA	FR	1	12	Jan-2022	Dec-2022	Terminated	NAF
BLSH_8	AQUILA	POx	2	44	May-2022	Ongoing	Operational	PAF
BLSH_9	AQUILA	POx	2	42	May-2022	Ongoing	Operational	NAF
IIRK_9	BROLGA	FR	2	12	May-2022	April-2023	Terminated	NAF
IIRK_17	DIUCON	FR	2	12	May-2022	April-2023	Terminated	NAF
IIRK_22	FALCON	POx	2	12	May-2022	April-2023	Terminated	NAF
MIRK_43	AQUILA	POx	2	12	May-2022	April-2023	Terminated	NAF
SDST_1	AQUILA	FR	2	23	May-2022	June-2024	Terminated	PAF-LC
SLST_4	AQUILA	FR	2	12	May-2022	April-2023	Terminated	NAF
SLST_14	AQUILA	POx	2	12	May-2022	April-2023	Terminated	NAF

Notes:

PAF – potentially acid forming; PAF-LC – PAF low capacity; UC – uncertain; NAF – non-acid forming.

There was a hiatus in the leaching of column BLSH_9 between June 2023 and August 2023 due to laboratory error, resulting in two less leach events being performed on BLSH_9 (42) compared with BLSH_8 (44).

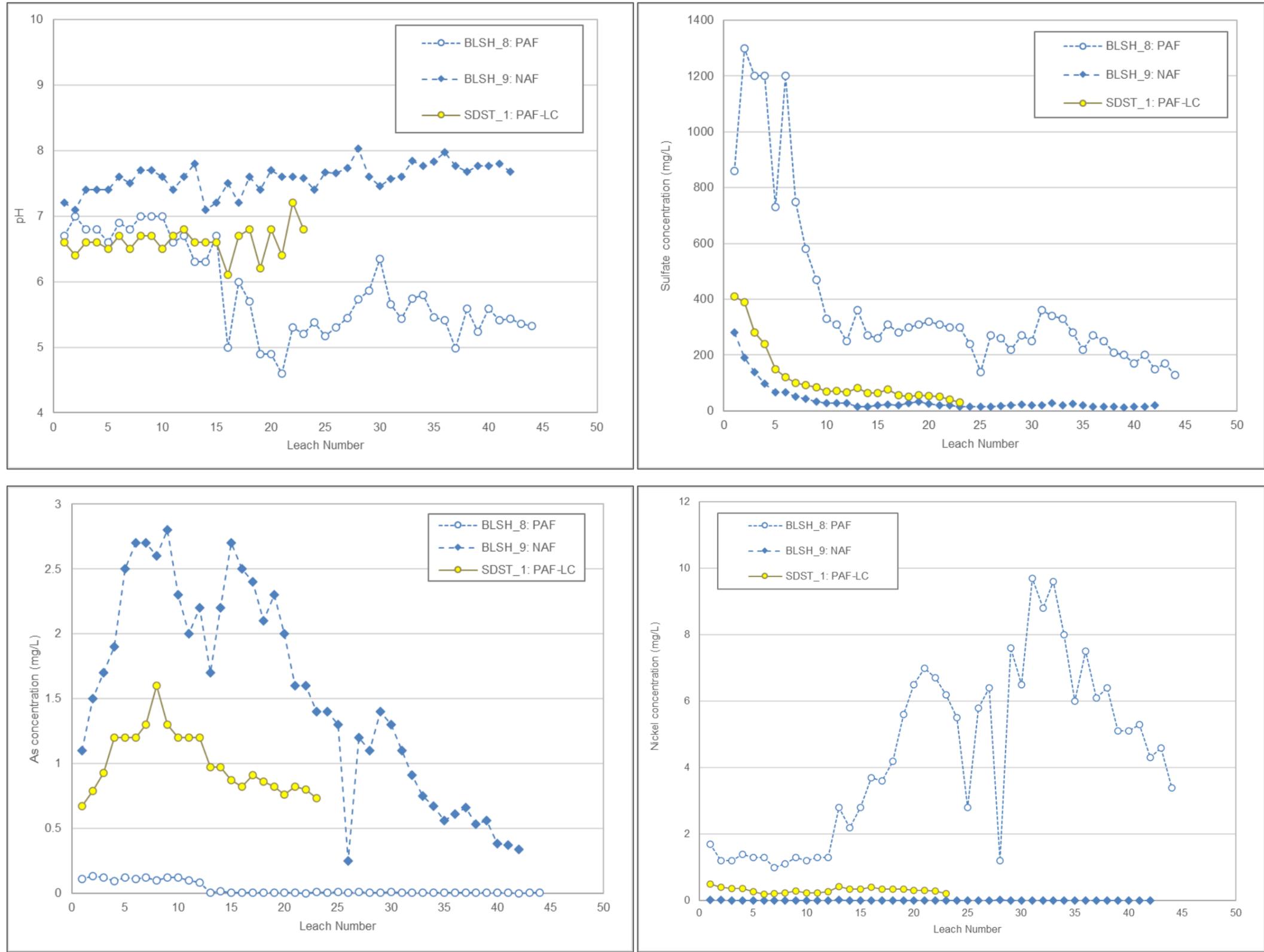
Plots showing the pH values, and dissolved sulfate, arsenic and nickel concentrations measured in the leachates recovered from the three longer running columns are given in Figure 2.1.

The SDST_1 column remained operational until June 2024 (following 23 leach events), when it was terminated after a stable arsenic release rate was achieved (0.06 mg/kg/wk).

The BLSH-8 and BLSH-9 columns have not yet generated stable leach chemistry. The pH has not stabilised in the leachates generated from BLSH-8. Arsenic concentrations (and release rates) have not yet stabilised in the BLSH_9 leachates and continue to trend down; the BLSH_9 sample has the highest arsenic release rate of the column samples (SRK, 2023). Nickel concentrations (and release rates) show a similar trend in the BLSH_8 leachates. If the current trends continue over the next few leach events it may be warranted to terminate the columns.

The kinetic column testing results were previously reported by SRK (2023) in October 2023. It is planned that an updated report will be prepared once the two remaining operational columns are terminated. A further review to determine whether the BLSH_8 and BLSH_9 columns should be extended is proposed for April 2026.

Figure 2.1: Updated selected parameter results (pH, SO₄, As, Ni) results for AMIRA columns with extended operational durations



3 Summary and conclusions

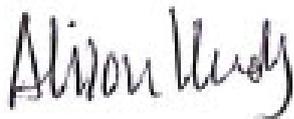
The majority of the columns (11 of 14) reached stable conditions following 12 leach events and were terminated in December 2022 (batch 1 columns) or April 2023 (batch 2 columns). The SDST_1 column (batch 2) remained operational until the arsenic release rate was stable (after 23 leach events). The BLSH_8 and BLSH_9 columns (also batch 2) have not yet generated stable leach chemistry (after more than 40 leach events).

For NAF and UC (NAF)-classified materials (12 of 14 samples), the leachate pH was near-neutral, consistent with the sample classification. For the remaining two samples, the PAF-LC sample (SDST_1) generated near-neutral leachates throughout the prolonged testing period of 23 weeks. The test involving PAF-classed sample BLSH_8 is ongoing, generating variably acidic leachates (pH range 4.6–5.5).

Under the near-neutral pH conditions of most tests, the trace element leaching was typically low and dissolved concentrations often close to or below detection. Exceptions include arsenic in the leachates from BSLH_9 and nickel in the leachates from BLSH_8.

Although two tests are ongoing, it is considered that the kinetic dataset as a whole is sufficiently advanced to complement existing static datasets and inform assessment of geochemical risks (acid and metalliferous drainage and solute release).

Regards
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References

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