

ASX PRE-QUOTATION DISCLOSURE

Temas Resources Corp (ASX: TIO, CSE: TMAS, OTCQB: TMASF) ("**Temas**" or the "**Company**"), provides the following information in respect of its admission to the Official List of the Australian Securities Exchange ("**ASX**") and quotation of its securities.

Unless otherwise defined, capitalised terms in this announcement have the meaning given to them in the prospectus issued by the Company and lodged with the Australian Securities and Investment Commission ("**ASIC**") on 29 August 2025 ("**Prospectus**") and where an amount is expressed as in A\$ and C\$ the conversions are based on the following indicative exchanges rate of A\$1.00 = C\$1.12 , respectively.

COMPLETION OF THE OFFER

The Company confirms the close of the Offer made under the Prospectus and completion of the issue of 55,000,000 Chess Depositary Interests ("**CDIs**") over ordinary shares in the capital of the Company ("**Shares**") at an issue price of A\$0.20 per CDI under the Offer. Each CDI represents one (1) Share.

DEED POLL OF UNDERTAKING – ROYALTY

The Company confirms that it and Cronin Capital Corp entered into a deed poll of undertaking to undertake that while the Company remains admitted to the official list, the Company will not exercise the right to buy back the royalty contemplated in section 9.2.4 of the Prospectus.

ORF OPTION AGREEMENT

The Company confirms that it has not exercised the option to acquire the remaining 50% of ORF that it doesn't already own. This is expected to occur shortly after the Company lists, with the Company to pay C\$637,500 to exercise the Option.

Refer to Section 9.3 of the Prospectus for further details of the ORF Option Agreement.

JOINT LEAD MANAGERS

The Company confirms that it has issued 4,500,000 CDIs to the Joint Lead Managers (or their respective nominees).

NO IMPEDIMENT

The Company confirms that there are no legal, regulatory, statutory or contractual impediments to Temas entering the sites associated with the La Blache and the Lac Brule Project (the "**Projects**") and carrying out exploration activities such that Temas will be able to spend its cash in accordance with its commitments for the purposes of Listing Rule 1.3.2(b).

JORC INFORMATION

Additional information (including JORC table 1s) on each of the Projects are set out in Annexure A.

UPDATED CAPITAL STRUCTURE

The Company's capital structure as at the date of Admission is as follows:

SECURITY	NUMBER
Shares ¹	38,166,257 ²
CDIs quoted on ASX ³	55,000,000 ⁴
Options currently on issue ⁵	3,496,500 ⁷
Warrants currently on issue ⁶	14,017,031 ⁸

Notes:

1. The material rights and liabilities attaching to the Shares are summarised in Section 10.4 of the Prospectus.
2. As at the date of the Prospectus, 36,916,269 Shares were on issue. Following lodgement of the Prospectus, as set out in Notes 6 and 7 below, the exercise of 1,250,000 Options and Warrants increased the number of Shares on issue to 38,166,257. From the date of the Prospectus, Shares increased by 1,249,988 being the 1,250,000 Options and Warrants which were exercised (noted above) minus 12 Shares which were originally overstated in the Prospectus due to a reconciliation error with the Company's registry.
3. Each CDI represents one (1) underlying Share. The material rights and liabilities attaching to the CDIs are summarised in Annexure A of the Prospectus. This number includes some restricted securities (see below), which will not be quoted on ASX until the relevant escrow period has expired.
4. This amount does not include the 4,500,000 unquoted CDIs issued to the Joint Lead Managers, which are escrowed 24 months from the date of quotation.
5. Refer to Annexure G of the Prospectus for the terms of the Options.
6. Refer to Annexure H of the Prospectus for the terms of the Warrants.
7. As at the date of the Prospectus, 3,511,500 Options were on issue. On 15 September 2025, 15,000 Options were exercised which reduced the number of Options on issue to 3,496,500 Options.
8. As at the date of the Prospectus, 15,751,892 Warrants were on issue. On 12 September 2025, 1,235,000 Warrants were exercised and 499,861 Warrants expired on 31 August 2025. Accordingly, the number of Warrants currently on issue is 14,017,031 Warrants.

RESTRICTED SECURITIES

The following securities will be subject to restriction pursuant to the ASX Listing Rules for the period outlined below.

CLASS	NUMBER	RESTRICTION PERIOD
Shares	9,393,407	24 months from the date of quotation
Options	2,721,500	
Warrants	5,676,847	
Shares	2,138,029	12 months from the date of quotation
Options	650,000	
Warrants	3,006,667	

DIRECTOR REMUNERATION

Details of the Directors' remuneration (including superannuation) for the current financial year (on an annual basis) are set out in the table below:

DIRECTOR	POSITION	PROPOSED REMUNERATION FOR YEAR ENDING 31 DECEMBER 2025 ⁴
Kyler Hardy	Executive Chairman	\$87,000
Timothy Fernback	Director and Chief Executive Officer	\$125,000
David Robinson	Director and Chief Financial Officer	\$120,000
Véronique Laberge	Non-Executive Director	Nil
Kobi Ben-Shabat ¹	Non-Executive Director	Nil

Notes:

1. Appointed on 14 July 2025.
2. All remuneration in this table is in Canadian Dollars.

The Company confirms that the total aggregate amount of directors' fees (as that term is defined under the Listing Rules) payable per annum to non-executive Directors shall initially be no more than A\$300,000.

STATEMENT OF WAIVERS AND CONFIRMATIONS

ASX has granted the Company waivers from the following Listing Rules:

ASX LISTING RULE	SCOPE OF GRANT
1.1 Condition 2	To the extent necessary to permit the Company's articles of incorporation ('Articles') not to comply with the Listing Rules insofar as the Articles provide that the Company may do the following: (a) issue non-voting shares; (b) impose fees for the registration of transfer of securities; (c) issue preference shares on terms inconsistent with the Listing Rule; and (d) determine the remuneration of the directors and increase directors' fees in a manner inconsistent with Listing Rule 10.17, subject to the following conditions: (i) that the Company gives to ASX an undertaking (executed in the form of a deed) that it will not do any of these things while it remains listed on ASX and while those matters remain prohibited by the Listing Rules and that the Company will use best endeavours to promptly align its Articles with the Listing Rules; and (ii) that the Company confirms the total aggregate amount of directors' fees payable to all of its nonexecutive directors as pre-quotation disclosure.
1.1 Condition 6	To the extent necessary to permit the Company to apply for quotation only of those securities in its main class (to be settled on ASX in the form of CHESS Depositary Interests ('CDIs')) issued into the Australian market, on condition that the Company releases details of this waiver as prequotation disclosure.

ASX LISTING RULE	SCOPE OF GRANT
1.1 Condition 12	To permit the Company to issue or have on issue: (a) 2,585,000 options with an exercise price of less than AUD\$0.20 ('Options'); (b) 2,298,000 warrants with an exercise price of less than AUD\$0.20 ('Warrants'), on the condition that the full terms and conditions of the Options are clearly disclosed in the prospectus document.
2.4	To the extent necessary to permit the company to apply for quotation only of those securities in its main class (to be settled on ASX in the form of CDIs issued into the Australian market, on condition that the Company releases details of this waiver as pre-quotation disclosure.
2.8	To the extent necessary to allow the Company not to apply for quotation of fully paid common shares in the Company transferred to the Australian subregister as a result of holders wishing to hold their securities in the form of CDIs, within 10 business days of issue of those CDIs
4.2A	To the extent necessary to permit the Company not to lodge half yearly accounts, subject to the following conditions: (a) the Company lodges with ASX the half-year financial statements and interim Management's Discussion and Analysis ('MD&A') that the Company is required to lodge with the Canadian securities regulatory authorities in accordance with its obligations under the relevant Canadian laws ('Canadian Reporting Requirements') at the same time that the Company lodges those documents with those Canadian securities regulatory authorities; and (b) if the Company will not be able to provide the half-year financial statements and interim MD&A on the date required by the relevant Canadian laws ('Canadian Reporting Requirements'), the Company notifies ASX at least one business day before that date (and in any event as soon as the Company becomes aware that it will not be able to provide the half-year financial statements and interim MD&A on the required date).
4.2B	To the extent necessary to permit the Company to not lodge half yearly accounts, subject to the following conditions: (a) the Company lodges with ASX the half-year financial statements and MD&A that the Company is required to lodge with the Canadian securities regulatory authorities in accordance with its obligations under the Canadian Reporting Requirements at the same time that the Company lodges those documents with those Canadian securities regulatory authorities; and (b) if the Company will not be able to provide the half-year financial statements and interim MD&A on the date required by the Canadian Reporting Requirements, the Company notifies ASX at least one business day before that date (and in any event as soon as the Company becomes aware that it will not be able to provide the half-year financial statements and interim MD&A on the required date).
4.10.9	To the extent necessary to permit the Company not to disclose the names of any objecting beneficial owners that are included in the list of the 20 largest holders of the Company's quoted securities if disclosure of their names is not permitted under the law of the Company's place of incorporation.

ASX LISTING RULE	SCOPE OF GRANT
5.3	To the extent necessary to permit the Company not to lodge quarterly activity and expenditure reports as required by the Listing Rules subject to the following conditions: (a) the Company lodges with ASX the quarterly Financial Statements and interim MD&A that the Company is required to lodge with the Canadian securities regulatory authorities in accordance with Canadian Reporting Requirements at the same time that the Company lodges those documents with those Canadian securities regulatory authorities; and (b) if the Company will not be able to provide the quarterly Financial Statements and interim MD&A on the date required by the Canadian Reporting Requirements, the Company notifies ASX at least one business day before that date (and in any event as soon as the Company becomes aware that it will not be able to provide the quarterly Financial Statements and interim MD&A on the required date).
5.5	to the extent necessary to permit the Company not to lodge quarterly activity and expenditure reports as required by the Listing Rules subject to the following conditions: (a) the Company lodges with ASX the quarterly Financial Statements and interim MD&A that the Company is required to lodge with the Canadian securities regulatory authorities in accordance with Canadian Reporting Requirements at the same time that the Company lodges those documents with those Canadian securities regulatory authorities; and (b) if the Company will not be able to provide the quarterly Financial Statements and interim MD&A on the date required by the Canadian Reporting Requirements, the Company notifies ASX at least one business day before that date (and in any event as soon as the Company becomes aware that it will not be able to provide the quarterly Financial Statements and interim MD&A on the required date).
6.10.3	To the extent necessary to permit the Company to set the “specified time” to determine whether a shareholder is entitled to vote at a shareholders meeting in accordance with the requirements the requirements of the relevant Canadian legislation
14.2.1	To the extent necessary to permit the Company not to provide in its proxy form for holders of CDI to vote against a resolution to elect a director or to appoint an auditor, subject to the following conditions: (a) The Company complies with the relevant Canadian laws as to the content of proxy forms applicable to resolutions for the election of directors and the appointment of an auditor. (b) The notice given by the Company to CDI holders under ASX Settlement Operating Rule 13.8.9 makes it clear that holders are only able to vote for the resolutions or abstain from voting, and the reasons why this is the case. (c) The Company releases details of the waiver to the market as pre-quotation disclosure and the terms of the waiver are set out in the management proxy circular provided to all holders of CDIs. (d) Without limiting ASX's right to vary or revoke its decision under listing rule 18.3, the waiver from Listing Rule 14.2.1 only applies for so long as the relevant Canadian laws prevent the Company from

ASX LISTING RULE	SCOPE OF GRANT
	permitting shareholders to vote against a resolution to elect a director or appoint an auditor.
15.7	To the extent necessary to permit the Company to give information that is for release to the market simultaneously to both ASX and CSE.
15.12	To the extent necessary to permit the Company's articles of incorporation ('Articles') not to contain the provisions required by Listing Rules 15.12.1 to 15.12.5 inclusive, on condition that the Company provides an undertaking to the satisfaction of ASX, in the form of a deed poll executed by the Company and each of its directors in favour of ASX, that the Company will: (a) use its best endeavours to promptly amend its constitution to meet the requirements of Listing Rule 15.12; and (b) ensure, to the satisfaction of ASX, that the terms of its restricted securities are consistent with Listing Rule 15.12 and are as enforceable as if the requirements of Listing Rule 15.12 were incorporated into the Company's Articles.

NATURE & EFFECT OF THE WAIVERS AND THE COMPANY'S REASONS FOR SEEKING THE WAIVERS

On 22 May 2025, Temas Resources Corp. (the **Company**) made application to ASX seeking waivers and confirmation in respect of ASX Listing Rules 1.1 condition 2, 1.1 condition 6, 1.1 condition 12, 4.2A, 4.2B, 4.10.9, 5.3, 5.5, 6.10.3, 14.2.1, 15.7 and 15.12 (each a **Waiver**, together, the **Waivers**) for the purposes of its admission to the Official List of the Australian Securities Exchange (**ASX**). The Waivers were subsequently granted by the ASX on 13 October 2025.

ASX considered the ASX Listing Rules being the subject of the Waivers only and made no statement as to the Company's compliance with other ASX Listing Rules.

The Waivers are granted on the condition that the Company releases an announcement to the market that discloses the nature and effect of the Waivers and the Company's reasons for seeking the waiver as pre-quotations disclosure.

Listing Rule 1.1 Condition 2

This Listing Rule requires that an entity has a constitution consistent with the Listing Rules or that includes the provisions of Appendix 15A or Appendix 15B to the Listing Rules,

Reason for seeking the waiver

The Company is incorporated in Canada, is regulated by Canadian law and is listed on CSE. The Company's articles of incorporation (**Articles**) were developed prior to the Company contemplating listing on ASX, and do not strictly comply with specific and limited ASX Listing Rule requirements that have been identified by the Company.

Nature and effect of the waiver

This waiver permits (to the extent necessary) its Constitution not to comply with the Listing Rules insofar as the Constitution provides that the Company may do the following:

- (a) issue non-voting shares;
- (b) impose fees for the registration of transfer of securities;
- (c) issue preference shares on terms inconsistent with Listing Rules 6.3;
- (d) permit the board to determine the remuneration of the Company's directors and increase directors' fees in a manner inconsistent with listing rule 10.17,

on the following conditions:

- (e) that the Company gives to ASX an undertaking (executed in the form of a deed) that it will not do any of these things while it remains listed on ASX and while those matters remain prohibited by the Listing Rules and that the Company will use best endeavours to promptly align its Articles with the Listing Rules; and
- (f) that the Company confirms the total aggregate amount of directors' fees payable to all of its non- executive directors as pre-quotation disclosure.

Listing Rule 1.1 Condition 6

ASX Listing Rule 1.1 Condition 6 provides that for an entity to be admitted to the official list of ASX, the entity must apply for and be granted permission for quotation of all the securities in its main class of securities (except restricted securities and, if the entity so chooses, securities issued under an employee incentive scheme that are subject to restrictions on transfer).

Reason for seeking the waiver

The Company is a company regulated by Canadian law and listed on the CSE. The Company intends to issue CHES Depositary Interests (**CDIs**) by way of an initial public offer. Securities of Canadian entities must settle on ASX in the form of CDIs. This waiver was sought to allow only those common shares represented by CDIs to be quoted on ASX, as this represents the number of shares available to be traded and settled in the Australian market.

Nature and effect of the waiver

This waiver permits (to the extent necessary) the Company to apply for quotation of only of those securities in its main class (to be settled on ASX in the form of CDIs issued into the Australian market.

Listing Rule 1.1 condition 12

ASX Listing Rule 1.1 Condition 12 provides that for an entity to be admitted to the official list of ASX, the exercise price for any options on issue in the entity must be at least 20 cents (**Minimum Exercise Price Rule**). The Minimum Exercise Price Rule applies in respect of all forms of convertible security (not just options).

Reason for seeking the waiver

The Waiver was sought to allow for pre-existing options and warrants listed on the CSE with an exercise price of less than AUD \$0.20 (further details set out below) to be on issue.

Nature and effect of the waiver

This waiver permits the Company to issue or have on issue:

- (a) 2,585,000 options with an exercise price of less than AUD\$0.20; and
- (b) 2,298,000 warrants with an exercise price of less than AUD\$0.20,

on the condition that the full terms and conditions of the options set out in (a) above are clearly disclosed in the prospectus document.

Listing Rule 2.4

ASX Listing Rule 2.4 provides that an entity must apply for quotation of all securities (except restricted securities and securities issued under an employee incentive scheme that are subject to restrictions on transfer) if they are in a class of securities that is already quoted, or that is intended to be quoted, on ASX.

Reason for seeking the waiver

The Company was incorporated under the laws of British Columbia, is regulated by Canadian law and is listed on the CSE. Its common shares are not eligible to be settled directly in the CHES system, so transactions in the Company's securities on ASX's market will be settled through the use of CDIs created over common shares. CDIs will not be created over all of the Company's common shares.

Nature and effect of the waiver

This waiver permits the Company (to the extent necessary) to apply for quotation only of those securities in its main class (to be settled on ASX in the form of CDIs) issued into the Australian market, on condition that the Company releases details of this waiver as pre-quotation disclosure.

Listing Rule 4.2A and 4.2B

Listing Rules 4.2A and 4.2B require listed entities to lodge half year reports. The financial information required in the half year report is based on the *Corporations Act 2001* (Cth) requirements for half yearly financial reports by Australian entities, and for foreign entities must include the equivalent financial reports required by the law of the place of incorporation. There is additional information required to be given in a prescribed format. The prescribed format is intended to facilitate the ready understanding of information and comparison of information provided by different entities. The due date for lodgement of half-year reports with ASX is 2 months after the end of the accounting period (or 75 days, for mining exploration entities).

Reason for seeking the waiver

The Company is incorporated in Canada, is regulated by Canadian law and is listed on CSE. Section 4.4 of National Instrument 51-102 provides that for reporting issuers, interim financial reports are to be filed on or before the earlier of 45 days after the end of the interim period or the date of filing in a foreign jurisdiction. There would be duplication if the Company were required to lodge both Australian and Canadian form half yearly accounts.

Nature and effect of the waiver

This waiver from Listing Rule 4.2A and 4.2B permits the Company (to the extent necessary) not to lodge an Appendix 4D – Half Year Report on condition that:

- (a) the Company lodges with ASX the half-year financial statements and interim Management's Discussion and Analysis (**MD&A**) that the Company is required to lodge with the Canadian securities regulatory authorities in accordance with its obligations under the relevant Canadian laws (**Canadian Reporting Requirements**) at the same time that the Company lodges those documents with those Canadian securities regulatory authorities; and
- (b) if the Company will not be able to provide the half-year financial statements and interim MD&A on the date required by the Canadian Reporting Requirements, the Company notifies ASX at least one business day before that date (and in any event as soon as the Company becomes aware that it will not be able to provide the half-year financial statements and interim MD&A on the required date).

Listing Rule 4.10.9

ASX Listing Rule 4.10.9 requires that an entity include in its annual report the names of the 20 largest holders of each class of quoted securities, the number of securities each holds and the percentage of capital each holds. It is considered this information is useful to investors.

Reason for seeking the waiver

The Company is incorporated in Canada, is regulated by Canadian law and is listed on CSE. In Canada, beneficial shareholders are generally classified as either objecting or non-objecting beneficial owners. Disclosure would not provide useful information to investors given names of objecting beneficial owners are not able to be disclosed.

Nature and effect of the waiver

The waiver permits the Company to not disclose the names of objecting beneficial owners to the extent necessary to comply with Canadian law.

Listing Rules 5.3 and 5.5

Listing Rules 5.3 and 5.5 require a mining exploration entity to complete a report concerning each quarter of its financial year and give it to ASX. The information to be provided is prescribed and enhances the continuous disclosure regime by requiring disclosure of mining exploration activities and a summary of the expenditure incurred on those activities. The quarterly activities report and Appendix 5B must be provided within one month of the end of each quarter.

Reason for seeking the waiver

The Company is incorporated in Canada, regulated by Canadian law and is listed on the CSE. The Company is required to lodge quarterly reports under Canadian regulations. The Canadian quarterly reporting requirements give a longer time frame after the quarter end for lodgement. Canadian reports are required to be lodged within 45 days of the end of each quarter, which amounts to an extension of approximately 15 days.

There would be duplication if the Company were required to lodge both Australian and Canadian form quarterly reports.

Nature and effect of the waiver

This waiver permits the Company (to the extent necessary) not to lodge quarterly activity and expenditure reports as required by the Listing Rules on condition that:

- (a) the Company lodges with ASX the quarterly Financial Statements and interim MD&A that the Company is required to lodge with the Canadian securities regulatory authorities in accordance with Canadian Reporting Requirements at the same time that the Company lodges those documents with those Canadian securities regulatory authorities; and
- (b) if the Company will not be able to provide the quarterly Financial Statements and interim MD&A on the date required by the Canadian Reporting Requirements, the Company notifies ASX at least one business day before that date (and in any event as soon as the Company becomes aware that it will not be able to provide the quarterly Financial Statements and interim MD&A on the required date).

Listing Rule 6.10.3

Listing Rule 6.10 prohibits an entity from removing or changing a security holder's right to vote in respect of particular securities, except in certain limited cases. This supports shareholder democracy by preventing listed entities from interfering arbitrarily with the voting rights of voting securities. One of the cases for which the rule makes an exception is where the person became the holder of the securities after the time determined under the Corporations Act 2001 (Cth) as the "specified time" for deciding who held securities for the purposes of the meeting. The exception recognises the primacy of the Corporations Act, which has made a specific provision in relation to this particular element of determining the constituency of voting security holders at a meeting.

Reason for seeking the waiver

The Company is formed under Canadian law. That law, rather than the Corporations Act, provides the method of determining whether a shareholder is entitled to vote at a shareholders' meeting.

Nature and effect of the waiver

This waiver permits the Company (to the extent necessary) to set the "specified time" to determine whether a shareholder is entitled to vote at a shareholders meeting in accordance with the requirements of the relevant Canadian legislation.

Listing Rule 14.2.1

Listing Rule 14.2.1 requires notices of meeting to include a proxy form which must provide for the security holder to vote for or against each resolution.

Reason for seeking the waiver

The Company is incorporated in Canada, is regulated by Canadian law and is listed on CSE. The Company will be an issuer of CDIs. The law of the Company's home jurisdiction does not provide for the casting of votes against certain types of resolution (election of directors, appointment of auditors). Canada has an alternative legislative scheme for security holders to contest the reappointment of directors and auditors.

Nature and effect of the waiver

This waiver permits the Company (to the extent necessary) not to provide in its proxy form for holders of a CDI to vote against a resolution to elect a director or to appoint an auditor, on the following conditions:

- (a) The Company complies with the relevant Canadian laws as to the content of proxy forms applicable to resolutions for the election of directors and the appointment of an auditor.
- (b) The notice given by the Company to CDI holders under ASX Settlement Operating Rule 13.8.9 makes it clear that holders are only able to vote for the resolutions or abstain from voting, and the reasons why this is the case.
- (c) The Company releases details of the waiver to the market as pre-quotation disclosure and the terms of the waiver are set out in the management proxy circular provided to all holders of CDIs.
- (d) Without limiting ASX's right to vary or revoke its decision under listing rule 18.3, the waiver from Listing Rule 14.2.1 only applies for so long as the relevant Canadian laws prevent the Company from permitting shareholders to vote against a resolution to elect a director or appoint an auditor.

Listing Rule 15.7

Listing Rule 15.7 requires that an entity must not release information that is for release to the market to any person until it has given the information to ASX and received an acknowledgement that ASX has released the information to the market.

Reason for seeking the waiver

The Company is incorporated in Canada, is regulated by Canadian law and is listed on the CSE. Different time zones cause trading periods to vary between ASX and CSE. The Company will be required to release information to the market immediately on CSE under the exchange's rules. The waiver is granted to permit information for release to the market to be given simultaneously to CSE and ASX.

Nature and effect of the waiver

This waiver permits the Company to give information that is for release to the market simultaneously to both ASX and the Canadian Securities Exchange.

Listing Rule 15.12

An entity's constitution must contain certain provisions dealing with restricted securities. These provisions are set out in Listing Rules 15.12 and are intended to ensure that the listed entity that issued the restricted securities has the power to take steps to prevent the transfer of restricted securities during an escrow period, and to ensure that, during a breach of the restriction agreement or of the Listing Rules relating to restricted securities, the holder of those securities does not receive any dividends or distributions, or voting rights, in respect of those securities.

Reason for seeking the waiver

The Company is incorporated under the laws of British Columbia, is listed on the CSE, and is subject to the British Columbia (as amended) and any applicable Canadian law. The CSE rules do not have any analogous rule to Listing Rule 15.12.

Nature and effect of the waiver

This waiver permits the Company's Articles (to the extent necessary) to not to contain the provisions required by Listing Rules 15.12.1 to 15.12.5 inclusive, on condition that the Company provides an undertaking to the satisfaction of ASX, in the form of a deed poll executed by the Company and each of its directors in favour of ASX, that the Company will:

- (a) use its best endeavours to promptly amend its constitution to meet the requirements of Listing Rule 15.12; and
- (b) ensure, to the satisfaction of ASX, that the terms of its restricted securities are consistent with Listing Rule 15.12 and are as enforceable as if the requirements of Listing Rule 15.12 were incorporated into the Company's Articles.

The Board of Teras has approved this announcement and authorised its release.

ANNEXURE A TO PRE-QUOTATION DISCLOSURE ANNOUNCEMENT

Supporting Technical Information Annexures and Appendices

All figures, drill plans, and tabular data referenced above are appended to this announcement as Annexures A, B and C should be read together with the Independent Technical Assessment Report prepared by Malcolm Castle (Agricola Mining Consultants Pty Ltd, 28 August 2025).

ANNEXURE A – LA BLACHE PROJECT

A1. Drill Plan Map

The La Blache Project comprises three primary deposit areas tested by modern drilling programs (2010 and later): Farrell-Taylor, Hervieux East, and Hervieux West. The main block of La Blache tenements (shown in green) includes red-shaded zones representing airborne electromagnetic (EM) highs interpreted to reflect shallow magnetic sources. Bright red zones within these EM highs correspond to mapped outcrops and sub-cropping vanadium-titanium-magnetite (VTM) massive oxide (MO) mineralisation.

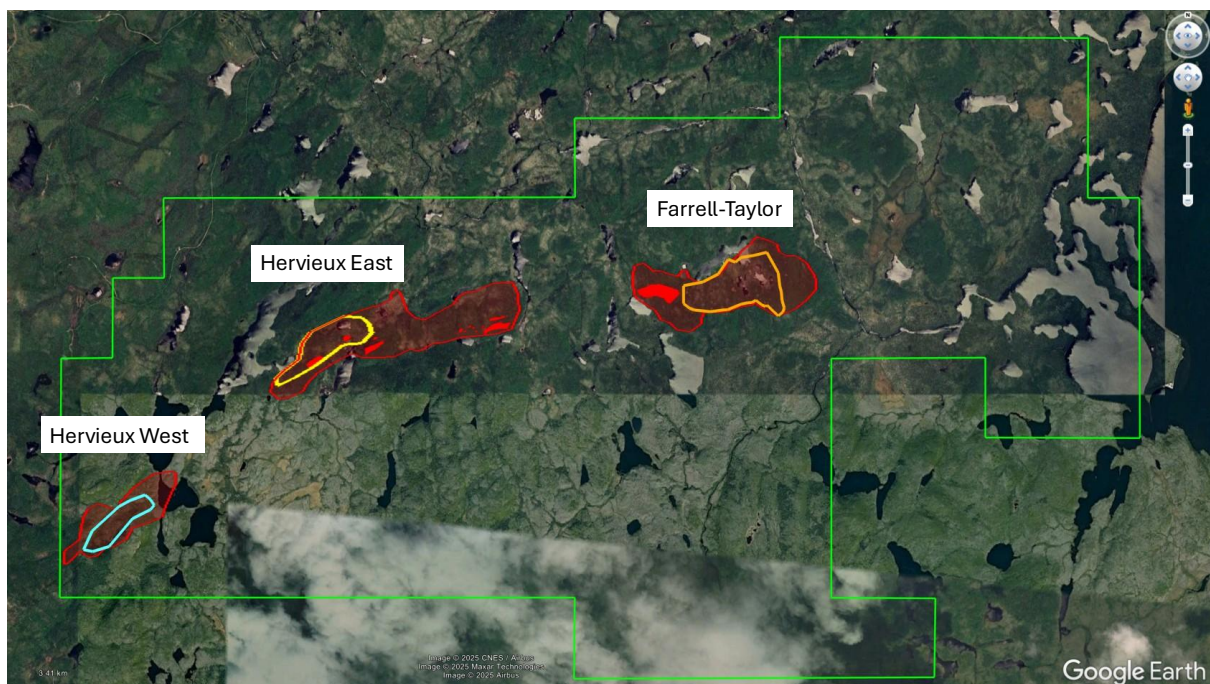


Figure A1 – La Blache Project drill plan showing tenement block and EM anomalies

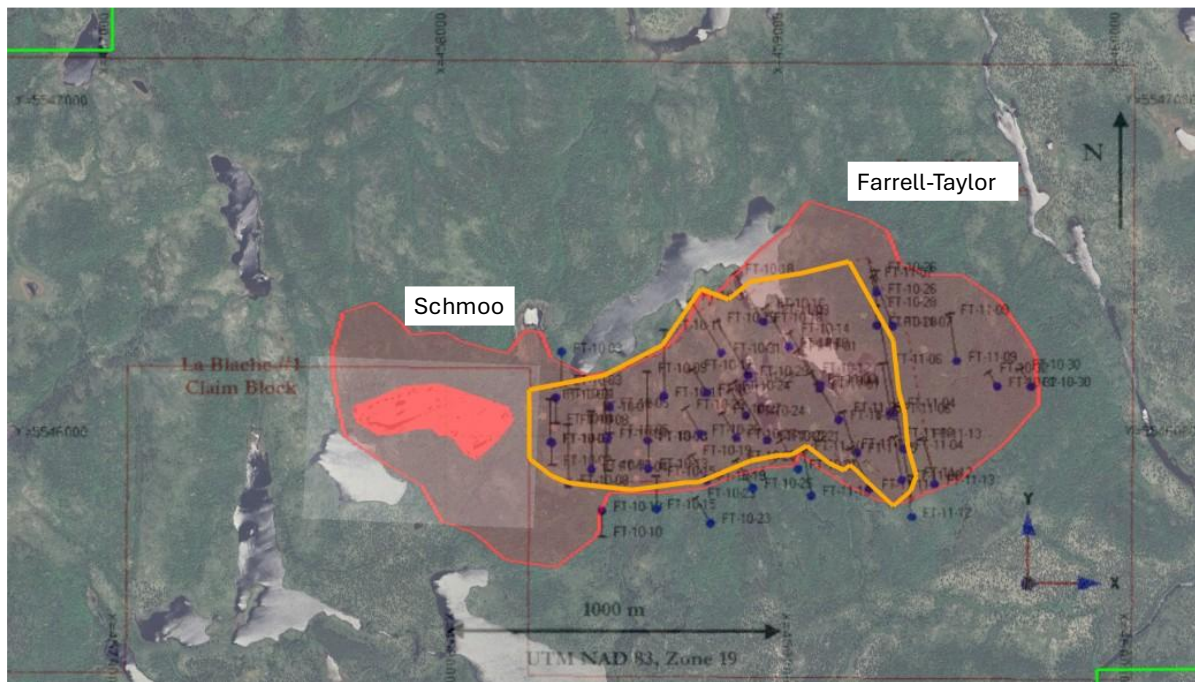


Figure A2 – Farrell-Taylor drill plan overlay and Schmoo extension

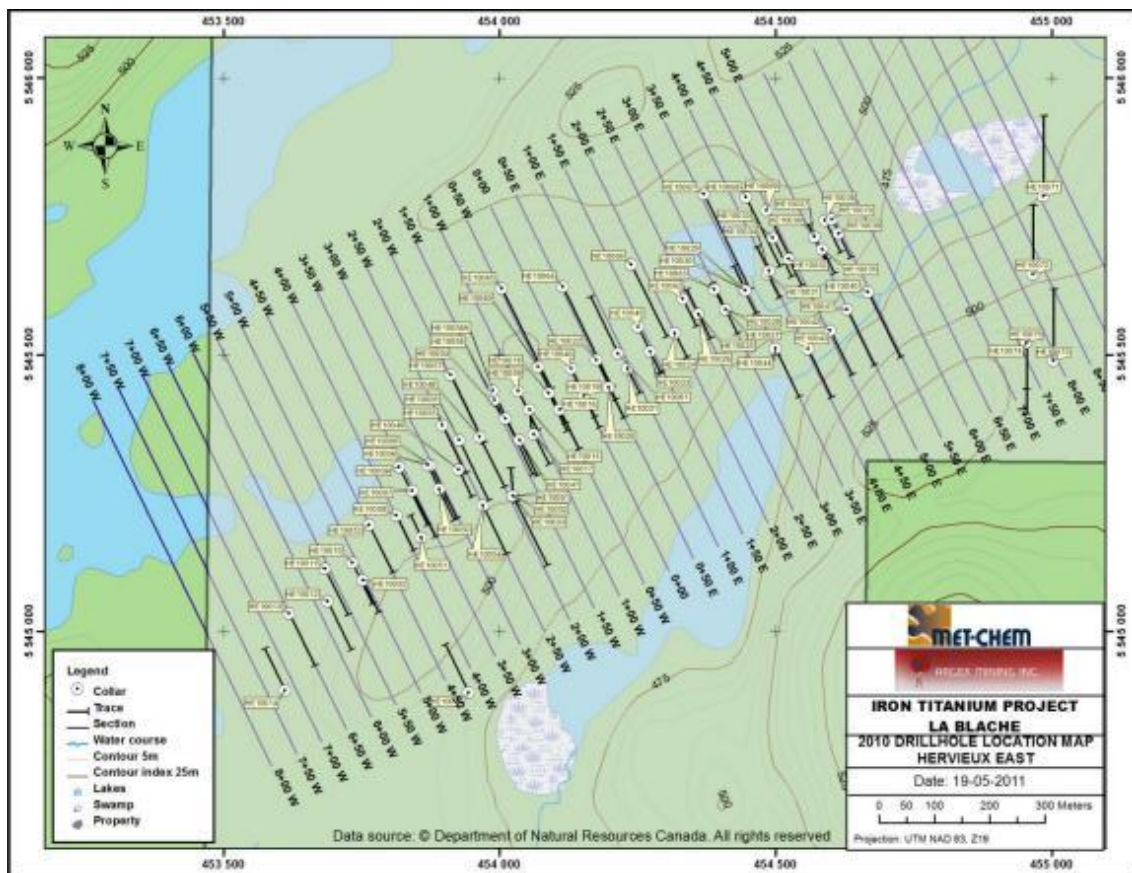


Figure A3 – Hervieux East drill plan views

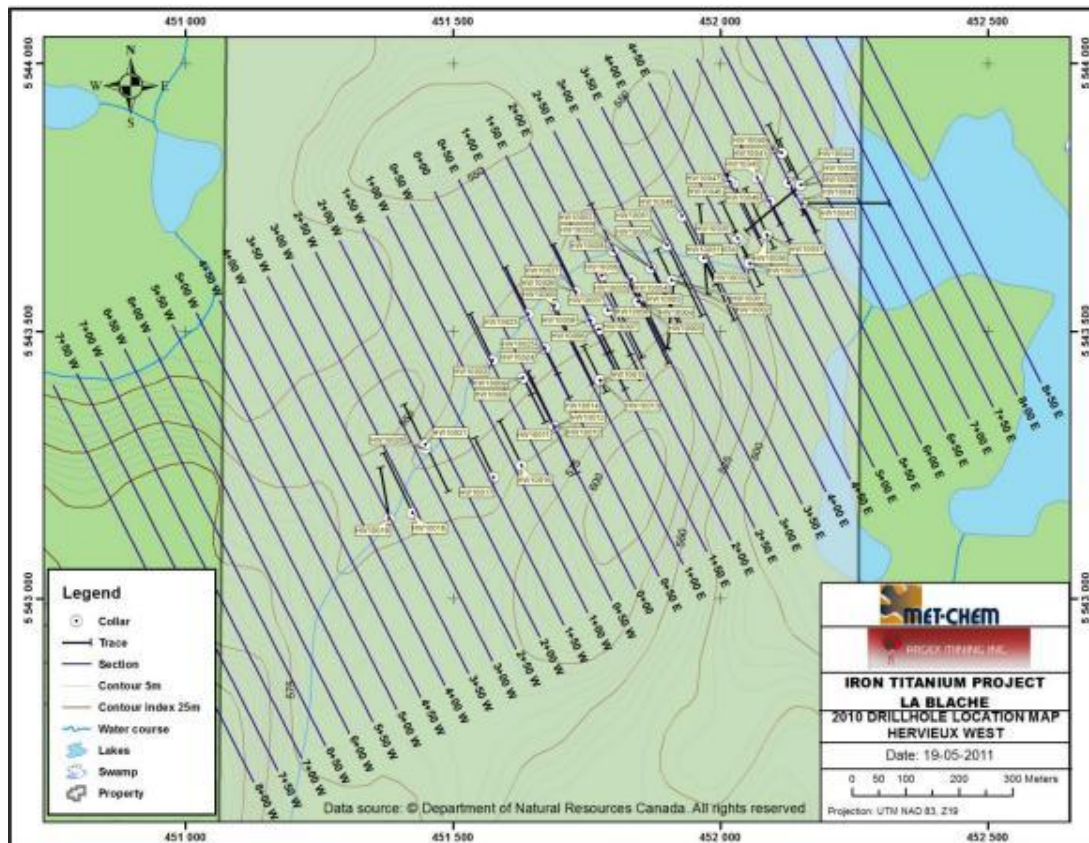
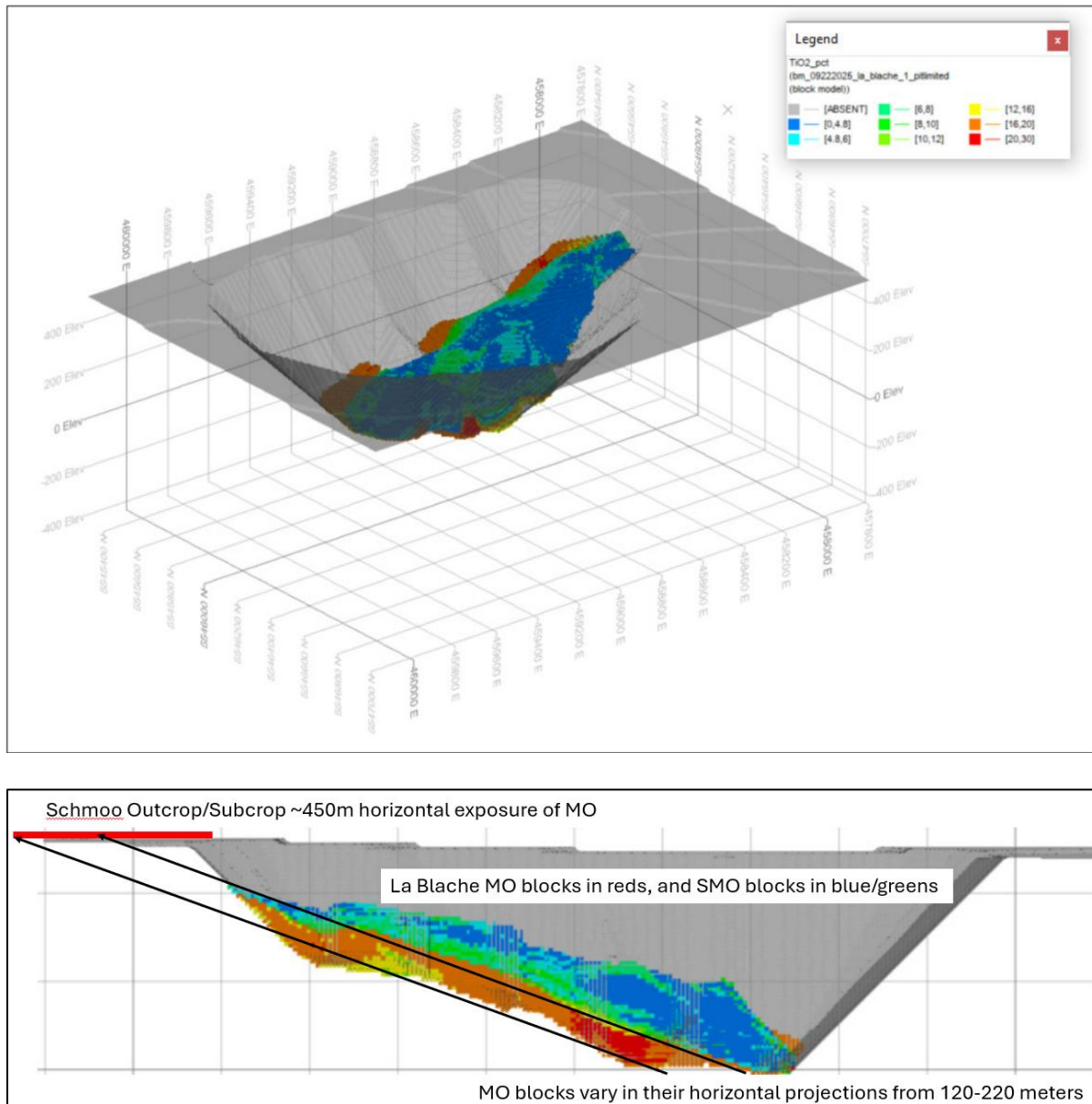


Figure A4 – Hervieux West drill plan views

A2. Drilling Cross Sectional View and map of drill hole locations

Cross-sections through the Farrell-Taylor and Hervieux East deposits are included in Figures A4–A6. These sections are oriented looking north (east to the right), displaying grade shells for Massive Oxide versus Semi-Massive Oxide mineralisation, based on the NI 43-101 database and verified in the ITAR (Agricola, 2025).



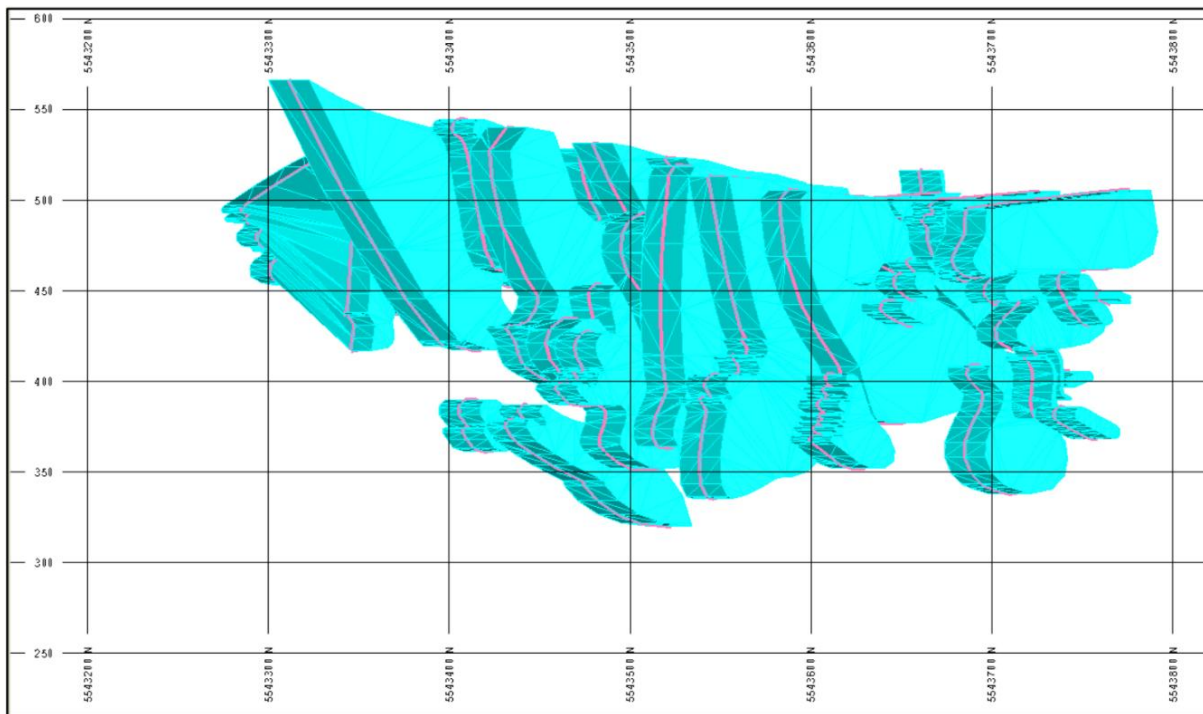
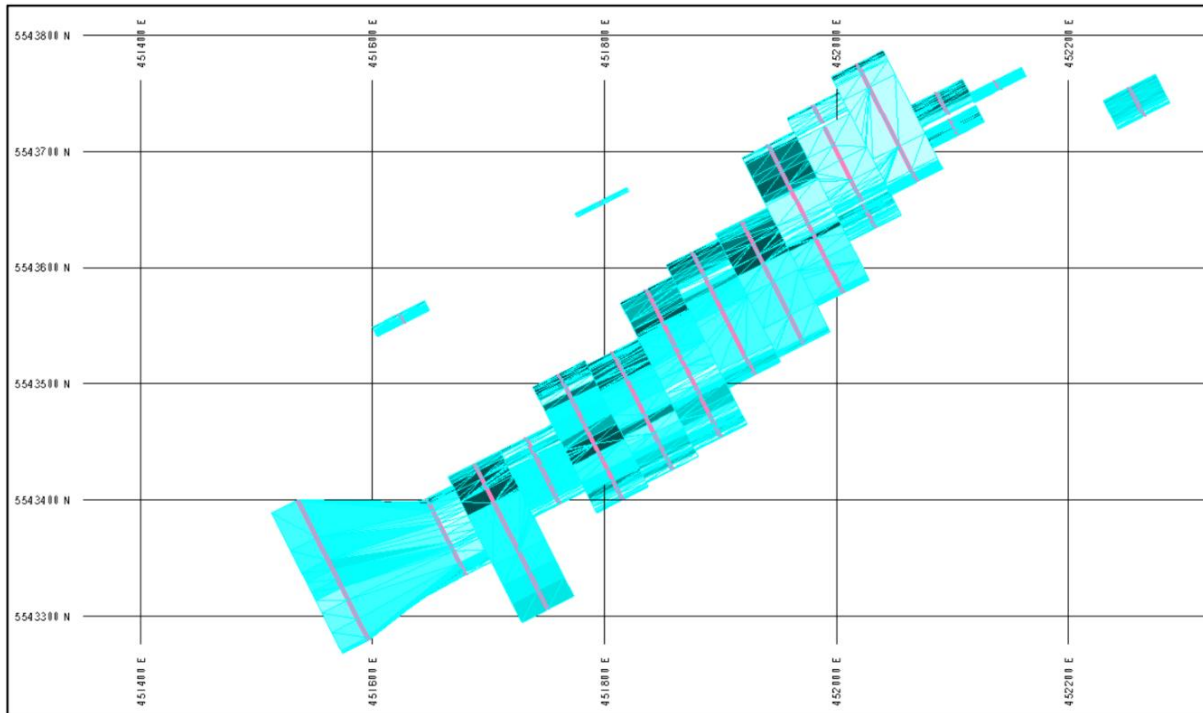


Figure A6 – Hervieux East plan and sectional view of MO. Plan view of MO wire frame is provided in the top image. The previous operator did not model the SMO, and the host rock is all anorthosite. Bottom image is a 3D view as the previous operator did not publish representative cross sections.

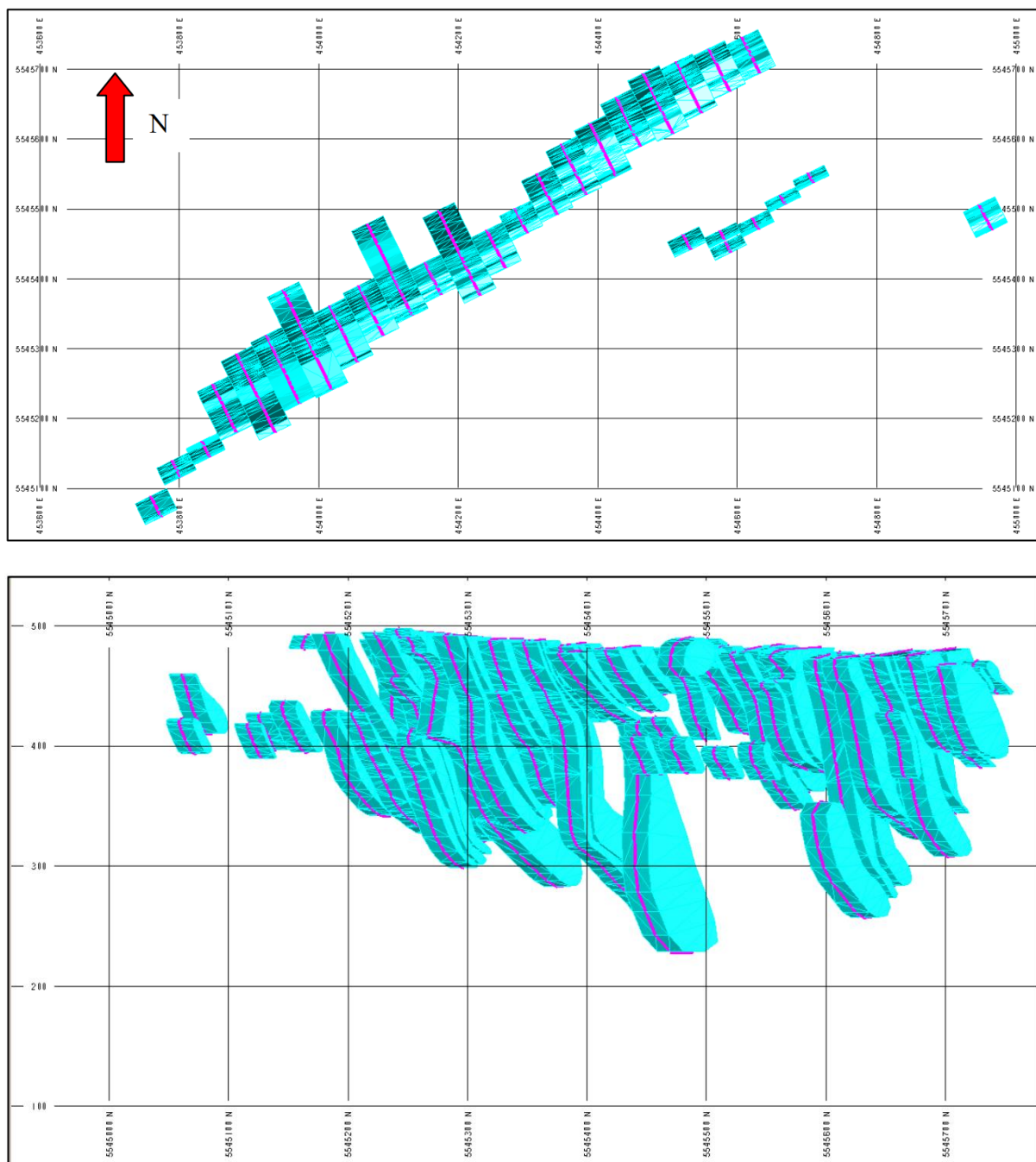


Figure A7 – Hervieux West plan and sectional view of MO. Plan view of MO wire frame is provided in the top image. The previous operator did not model the SMO, and the host rock is all anorthosite. Bottom image is a 3D view as the previous operator did not publish representative cross sections.

A3.1. Information regarding the location of test samples and test procedures followed for Metallurgical Testwork

Metallurgical Testwork Bench-scale and pilot metallurgical testwork were completed on composite samples from the Farrell-Taylor zone. Sample locations and test procedures are described in Section 13 of the Preliminary Economic Assessment (PEA) appended to the 43-101 report. Refer to Annexure D for the full Mineral Processing and Metallurgical Testing Section of the PEA

Testing included:

- Magnetic separation and grind optimisation;
- Reduction roasting and leach recovery trials;
- Pilot-scale beneficiation tests confirming the potential for high-grade iron and titanium concentrate production.

A representative composite sample of the massive oxide (MO) (~ 90% vanadium titanomagnetite plus ilmenite) was aggregated for detailed bench and pilot plant tests to optimize process parameters and to produce TiO_2 product for market evaluation. The sample was prepared from bulk rejects from assay preparation and consisted of 11 individual sample locations spread throughout the Hervieux East and West deposits.



Figure A8 – Metallurgical testwork samples from bulk rejects from core assay preparation.

Process Flow Summary

A two-phase test program was implemented to process ≈ 830 kg of La Blache ilmenite material to recover high purity TiO_2 product at Process Research ORTECH's (PRO) facility in Mississauga, ON Canada. This program was conducted from September 2021 to June 2022.

PRO has worked on the development of ORF's innovative process for the production of high purity TiO_2 directly from ilmenite material. The ORF process is protected by several patents in North America and abroad (US Patent No. 7,803,336 B2, Canadian Patent No. 2,513,309 and Australian Patent No. 2004291568). The process consists of atmospheric chloride leach followed by solvent extraction of Fe and Ti successively. A high purity Ti bearing strip solution is produced and can be used to produce Ti products dependent on the end market use such as high purity TiO_2 for pigments, pharmaceutical and food industries. Other products that can be obtained from the process are Fe_2O_3 which is of high purity and can be used for pigment or iron production.

A test program between Temas Resources Corporation and PRO was established to produce a quantity of TiO_2 product from pilot operation for market evaluation. The program was divided into 2 phases:

Phase 1 – Bench & Mini-Pilot Operation:

Phase 1 of the Temas La Blache program involved a bench scale and mini-pilot test program to first evaluate the material available at the La Blache Property and its amenability to recovery using ORF's chloride process. The following work elements were performed in this phase:

Preparation of a representative sample from a material stockpile at PRO's facility and confirmation of the grades of the sample.

Determination of mineral composition, mineralogy, and liberation size of value minerals specifically ilmenite.

Suite of PRO chloride leach tests to determine leach conditions for Ti extraction and solution quality for subsequent solvent extraction (SX) separation steps.

Preliminary SX separations for Fe and Ti to construct McCabe-Thiele isotherms to establish operation conditions for mini-pilot operation.

Operation of a mini-pilot circuit to confirm the SX design criteria for Fe and Ti established in the bench scale work.

Phase 2 – Pilot Operation:

Phase 2 of the program involved pilot processing of the material using the process design criteria established in the Phase 1 - Bench & Mini-pilot operation. The main work elements in this pilot phase of the program consisted of the following work elements:

Commissioning and operation of the pilot circuit for processing La Blache ilmenite at a throughput of $\approx 15\text{L/hr}$ PLS.

The diagram illustrates the production process for iron and titanium pigments from ilmenite ore. The process begins with **La Blache Ilmenite Ore**, which undergoes **Grinding & Crushing**. The resulting material is then processed in two stages of leaching: **PRO Stage 1 Leach** and **PRO Stage 2 Leach**. Both stages use **HCl** and **MgCl₂** as reagents. The output of Stage 1 is **Stage 1 PLS** (Process Liquid Stream), which is combined with **Combined PLS** and sent to an **Oxidation** column where **O₂** is added. The resulting **Oxidized PLS** is then processed in a **Fe Preg Strip** (Fe SX) unit. The output of this unit is **Fe Raffinate**, which is sent to a **TI Preg Strip** (TI SX) unit. The output of the TI Preg Strip is **TI Raffinate**, which is then sent to a **Raffinate Evaporation** unit. The output of the Raffinate Evaporation unit is **Regen. HCl**, which is recycled back to the leaching stages. The output of the Fe Preg Strip is **Fe SX**, which is then processed in a **Pyrohydrolysis** unit to produce **Fe₂O₃** (iron pigment). The output of the TI Preg Strip is **TI SX**, which is then processed in a **Thermal Precipitation** unit to produce **TiO₂** (titanium pigment). The process also includes a **Settling Tank** and a **Flocculant C496** input. The output of the Settling Tank is **Residue**, which is sent to a **Stage 2 PLS** unit. The output of the Stage 2 PLS unit is **Tailings**, which are sent to a **Bleed Control** unit. The output of the Bleed Control unit is **Concentrate MgCl₂**, which is recycled back to the leaching stages.

A3.2. Comprehensive Drillhole collar table

Drillhole Collar Table A comprehensive drillhole collar table for all holes drilled at La Blache is maintained in the Company's exploration database (Access database, Teras Dataroom). The table includes:

- Hole ID, easting, northing, elevation, depth, azimuth, dip, and end-of-hole coordinates;
- All modern drilling (2010–2012) used in the NI 43-101 resource estimate;
- Historical 1950s–1960s holes excluded from resource estimation due to lack of QA/QC data.

Hole ID	Easting	Northing	Elevation	Dip	Azimuth	Depth
LB-22-01	458892	5546063	495	-90	0	351
LB-22-03	458538	5546127	495	-90	0	276
LB-22-04	458488	5546089	491	-90	0	234
LB-22-05	458442	5545996	504	-90	0	291
LB-22-06	458505	5545952	511	-90	0	265
LB-22-07	458428	5545903	525	-90	0	282
LB-22-08	458516	5545900	508	-90	0	252
LB-22-09	458841	5545923	516	-90	0	375

Table A1 – La Blache Project drillhole collar summary

A3.3. Basis for Metal Equivalent Calculation (JORC Clause 50)

Metal-equivalent grades for Fe-Ti-V were calculated in accordance with Clause 50 of the JORC Code, using average metal prices and recoveries consistent with those applied in the NI 43-101 estimate (see ITAR pp. 115–117).

Formula: $\text{FeEq (\%)} = \text{Fe} + (\text{TiO}_2 \times \text{factor}_1) + (\text{V}_2\text{O}_5 \times \text{factor}_2)$

Factors reflect the relative economic contribution of recoverable Ti and V from metallurgical testwork and assumed recoveries of 85–90% Fe, 80% TiO_2 , and 75% V_2O_5 .

Parameters	Value	Unit
Sales Revenue		
Price Fe ₂ O ₃	125	USD/t
Price TiO ₂	2200	USD/t
Price V ₂ O ₅	14200	USD/t
Operating Costs		
Mining Cost	5	USD/t
Processing Cost	25	USD/t feed
G&A Cost	5	USD/t feed
Shipping Cost	35.5	USD/t feed
Metallurgy		
<i>Massive Oxide</i>		
Recovery Fe ₂ O ₃	92.1	%
Recovery TiO ₂	71.8	%
Recovery V ₂ O ₅	75	%
<i>Semi-Massive Oxide</i>		
Recovery Fe ₂ O ₃	85	%
Recovery TiO ₂	65	%
Recovery V ₂ O ₅	70	%

Table A2 – Parameters used in metal-equivalent calculation

In order to give appropriate weight to the value of each product in the calculation of the optimised cut-off, a TiO₂ equivalent grade equation, as used in the SGS Geostat 2012 MRE was applied.

Recovery of V₂O₅ was included in the TiO₂ Eq calculation of the Resource estimate in order to assess the full potential of the mineralization although not included in the economic analysis of the project.

Titanium Equivalent Grade Equation:

$$TiO_2Eq\% = TiO_2\% + (Fe_2O_3\% \times Price_{Fe_2O_3} \times Rec_{Fe_2O_3} + V_2O_5\% \times Price_{V_2O_5} \times Rec_{V_2O_5} / Price_{TiO_2} \times Rec_{TiO_2})$$

A3.4. Listing Rule 5.12 Statements

- LR 5.12.3 – Relevance and Materiality:
The NI 43-101 mineral resource estimate for the La Blache Project (February 2024) provides a relevant and material foreign estimate supporting Temas's exploration strategy.
- LR 5.12.4 – Reliability:
The foreign estimate was prepared by independent Canadian Qualified Persons under NI 43-101 standards. While methodologies differ from the JORC Code, the criteria applied (sampling, QA/QC, verification, data integrity) are broadly comparable and considered reliable for disclosure.
- LR 5.12.6 – More Recent Data:
No material new exploration results have been reported subsequent to the 2024 NI 43-101 update. Temas confirms that the Projects remain materially consistent with the data presented in that report.

A3.5. Inclusion in replacement JORC Table of Section 2 and Section 3

Section 2 – Mineral tenement and land tenure status, Exploration done by other parties, Geology.

Section 3 – Environmental factors or assumptions.

Refer to Annexure C - JORC Table I for La Blache Mineral Resource Estimate

ANNEXURE B – LAC BRÛLÉ PROJECT

B1. Drill Plan Map

The 2018 drilling campaign at Lac Brûlé targeted high-contrast EM anomalies within the anorthosite-hosted ilmenite-magnetite complex. The red outlines in Figure B1 denote strong EM contrasts, while the black footprint outlines the 2018 block model used for drill planning and resource projection (see ITAR Section "Lac Brûlé Project – Technical Summary").

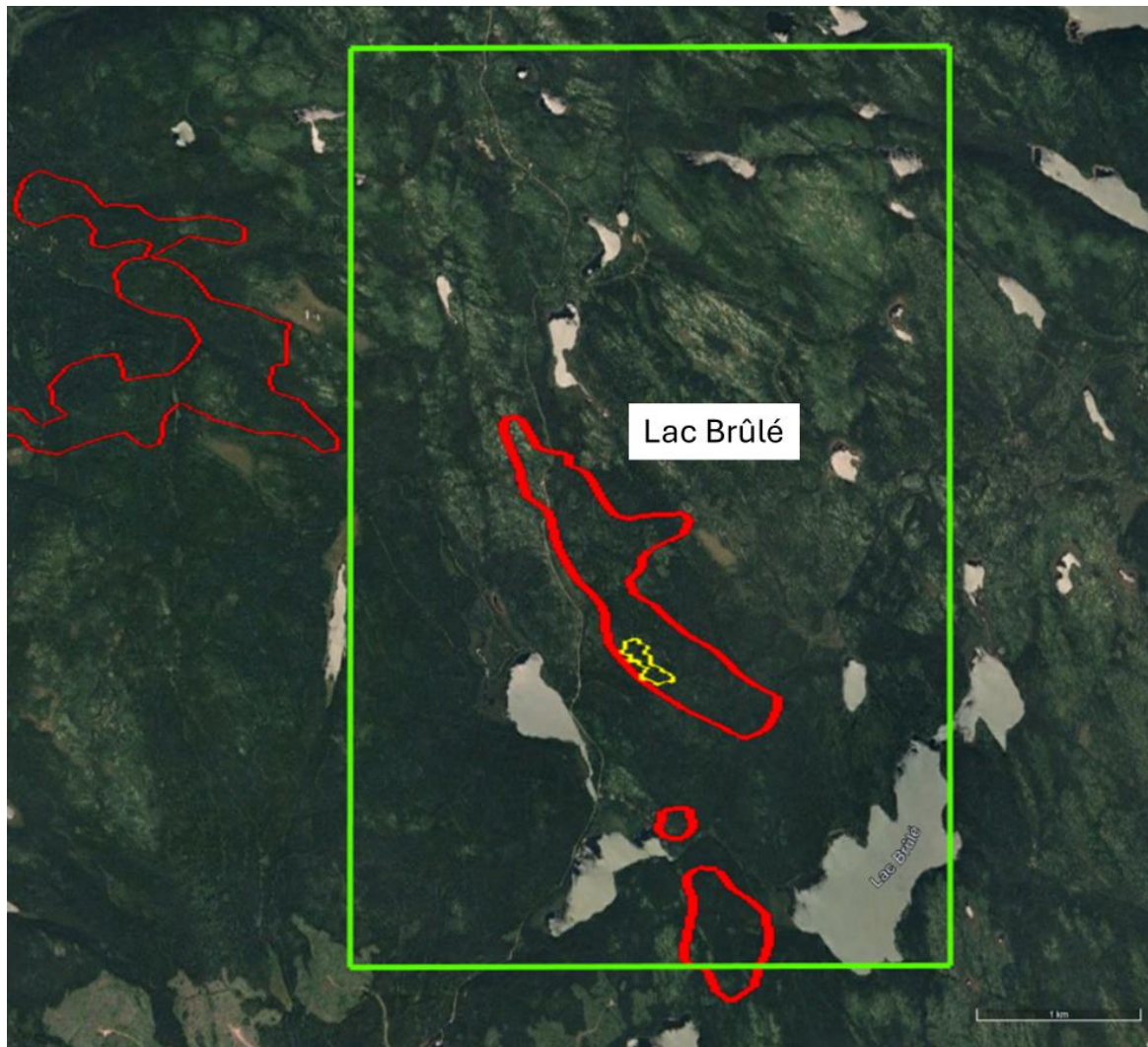


Figure B1 – Lac Brûlé Project drill plan and EM anomaly footprint

B2. Drilling Cross Sectional View and map of drill hole locations

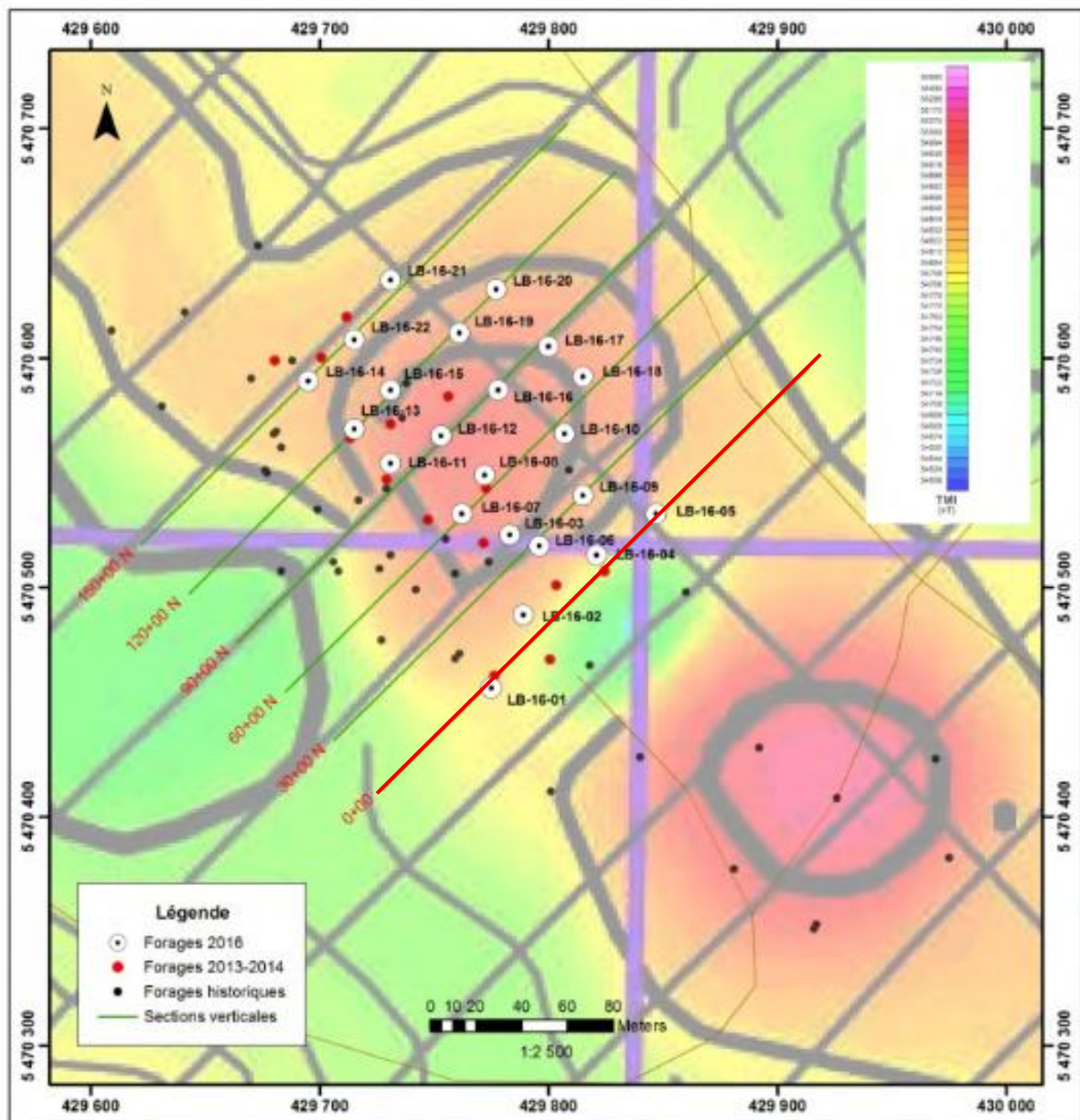


Figure B2 – Map of drill hole locations with over Total Magnetic Intensity (TMI). Note section 0+00 in red for following cross sectional view.

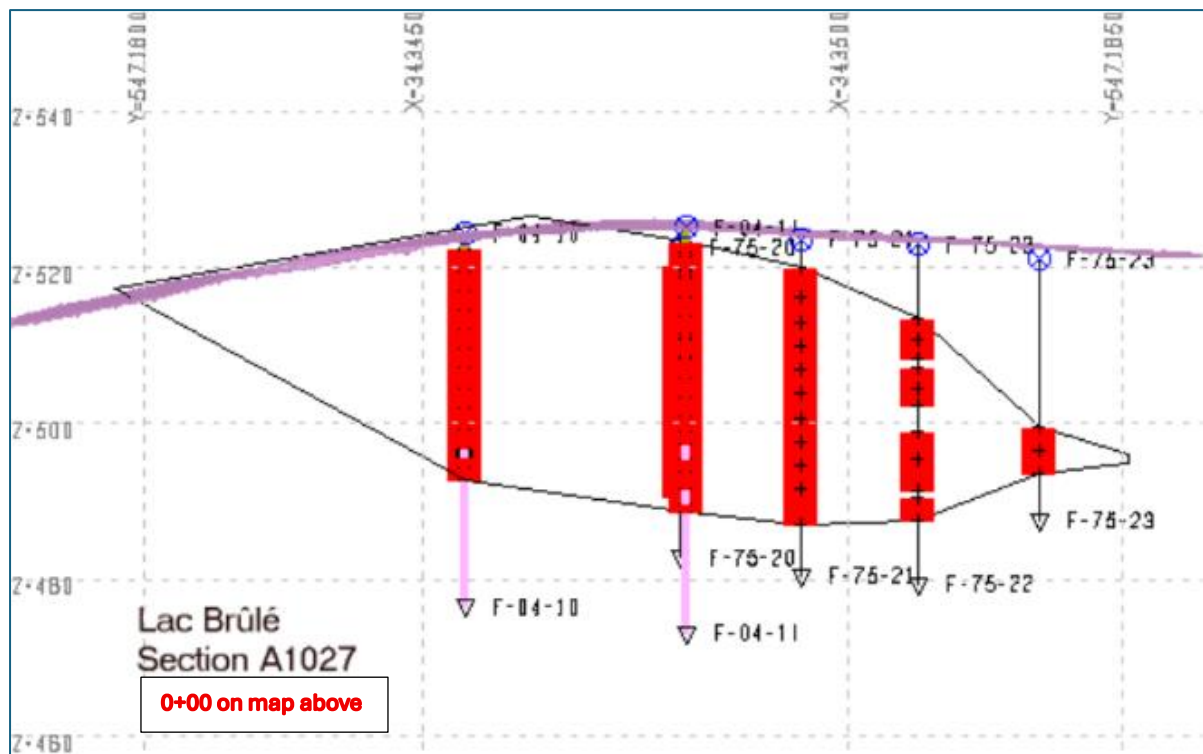


Figure B3 – Representative Lac Brûlé Project cross sectional view along 0+00 looking to the northwest.

Annexure C

JORC Table I for La Blache Mineral Resource Estimate

Converted from NI 43-101 data released to the TSV.

JORC (2012) TABLE 1		
Criteria	JORC Explanation	Response
SECTION 1 – SAMPLING TECHNIQUES AND DATA		
Sampling techniques	Nature and quality of sampling (e.g. cut channels, random chips, core). Measures taken to ensure representivity.	Diamond core drilling; HQ and NQ size. Sampling by halving core; intervals based on geological boundaries.
Drilling techniques	Drill type (e.g. core, reverse circulation) and core diameter.	HQ and NQ diameter diamond drilling using standard core barrels.
Drill sample recovery	Method of recording and assessing core/chip sample recoveries.	Core recoveries logged and calculated per run. Most zones >90% recovery.
Logging	Whether logging was qualitative or quantitative; total length logged.	All core logged geologically and geotechnically; includes lithology, structure, and mineralisation.
Sub-sampling techniques and sample preparation	Method of sample splitting and preparation. Measures to ensure representivity.	Half-core samples collected; prepared at accredited lab with pulverisation to 85% passing 75µm.
Quality of assay data and laboratory tests	Nature, quality and appropriateness of the assaying and QA/QC procedures.	Assays by ALS Canada using XRF and ICP-MS; CRMs and blanks inserted every 20 samples.
Verification of sampling and assaying	The verification of significant intersections by alternative personnel or methods.	Re-assays, duplicates, and independent data reviews confirm original results.
Location of data points	Accuracy and quality of surveys used to locate drillholes and topography.	Collars surveyed with differential GPS. Downhole surveyed with single-shot tools.

Data spacing and distribution	Spacing of data and whether it is sufficient for resource estimation.	100m x 100m spacing considered sufficient for Inferred classification.
Orientation of data in relation to geological structure	Whether sample orientation is biased due to geological structure.	Drilling oriented perpendicular to mineralised zones where possible to minimise bias.
Sample security	Chain-of-custody protocols and storage details.	Samples transported securely in sealed polybags with full chain-of-custody.
Audits or reviews	The results of any audits or reviews of sampling techniques/data.	Independent consultant reviewed procedures; found compliant with industry standards.
SECTION 2 – REPORTING AND EXPLORATION RESULTS		
Mineral Tenement Status		The La Blache Property consists of 122 non-contiguous, map-designated mining claims covering a total area of approximately 6,926.95 hectares. The Tenement status was reviewed by an Independent Professional Geologist as part of the NI 43-101 Mineral Resource Estimate and considered to be in good standing.
Geology		The La Blache Property is dominated by igneous lithologies associated with the La Blache Anorthosite Complex that forms an almost circular batholith approximately 35 km by 20 km within a larger intrusive suite spanning 100 km long and up to 20 km wide. The anorthosites are cut by granites and pegmatites varying from a few centimetres to several metres, with multiple orientations.
Drillhole Information	A summary of all material drillhole information.	40 drillholes including 2022 infill holes. Locations, dips, azimuths recorded.
Data Aggregation Methods	Methods used for compositing and any top cuts applied.	1m composites used. Top cuts applied selectively to reduce grade bias.

Relationship Between Mineralisation Widths and Intercepts	Whether the orientation of sampling has introduced bias.	Drillholes oriented to intersect mineralisation perpendicular to dip.
Diagrams	Maps and sections showing distribution of mineralisation.	Plan views and cross-sections included in ITAR.
Balanced Reporting	Reporting of both high and low-grade results.	All significant intercepts reported; no selective disclosure.
Other Substantive Exploration Data	Geophysical, geochemical, and geological data relevant to the project.	Mapping and airborne magnetics used to support geological model.
Exploration done by other parties		The La Blache Property saw renewed exploration in the late 2000s when junior miners recognized its Fe-Ti-V potential. Argex Silver Capital (later Argex Mining/Argex Titanium) acquired claims in the Lac La Blache area and undertook systematic exploration. A NI 43-101 technical report in 2008 compiled historical data and outlined targets at the Hervieux zones and others. In 2010 Argex launched diamond drilling on the Hervieux Ouest zone, with a 16-hole, 3,400 m program starting in February 2010. This drilling (and subsequent campaigns totalling over 13,000 m by mid-2010) returned strong intercepts of massive magnetite-ilmenite and was aimed at delineating a maiden compliant resource. By 2011, Argex had defined an initial NI
Further Work	Nature and scale of planned further exploration work.	Infill drilling, metallurgy, and baseline studies planned.
SECTION 3 – ESTIMATION AND REPORTING OF MINERAL RESOURCES		
Database Integrity	Measures taken to ensure data integrity and validation.	Validated with QA/QC, database audit, and software checks.
Site Visits	Details of site visits by Competent Person.	Site visited by Competent Person in 2022 during drilling.
Geological Interpretation	Basis for interpretation including confidence in continuity.	Model based on lithology, logging, and magnetic signatures.

Dimensions	Extent of mineralisation in 3D.	17 km strike length, thickness varies from 20–100 m.
Estimation and Modelling Techniques	Interpolation method, parameters and software used.	ID2 method in Leapfrog Edge using litho-domains.
Moisture	Basis of tonnage reporting (dry or wet).	Reported on dry tonnage basis.
Cut-off Parameters	Basis for selecting cut-off grades.	Economic cut-offs of 4.4% and 4.8% TiO ₂ equiv.
Mining Assumptions	Mining methods assumed.	Open-pit mining with low strip ratio anticipated.
Metallurgical Factors	Summary of metallurgical testwork supporting the model.	Bench-scale tests support high Ti, Fe, V recovery.
Environmental factors		<u>Environmental and Indigenous Considerations:</u> No material environmental liabilities have been identified on the Property. The region is traditionally used by Indigenous communities, and future exploration and development will require consultation and agreements in line with provincial and federal requirements.
Bulk Density	Basis for assigning bulk density values.	Assigned from core SG; average 3.4 t/m ³ .
Classification	Basis and confidence for classification.	All classified as Inferred due to limited spacing.
Audits or Reviews	External reviews of estimation process.	Independent review confirmed compliance with NI 43-101 and JORC.
Relative Accuracy/Confidence	Discussion of uncertainty in the estimate and its use.	Global estimate robust; local confidence lower due to sparse spacing.

JORC Table I for Lac Brûlé Project Drilling Program.

Converted from NI 43-101 data released to the TSV.

JORC (2012) TABLE 1		
Criteria	JORC Explanation	Response
SECTION 1 – SAMPLING TECHNIQUES AND DATA		
Sampling techniques	Nature and quality of sampling (e.g. cut channels, random chips, core). Measures taken to ensure representivity.	Diamond core drilling; HQ and NQ size. Sampling by halving core; intervals based on geological boundaries.
Drilling techniques	Drill type (e.g. core, reverse circulation) and core diameter.	HQ and NQ diameter diamond drilling using standard core barrels.
Drill sample recovery	Method of recording and assessing core/chip sample recoveries.	Core recoveries logged and calculated per run. Most zones >90% recovery.
Logging	Whether logging was qualitative or quantitative; total length logged.	All core logged geologically and geotechnically; includes lithology, structure, and mineralisation.
Sub-sampling techniques and sample preparation	Method of sample splitting and preparation. Measures to ensure representivity.	Half-core samples collected; prepared at accredited lab with pulverisation to 85% passing 75µm.
Quality of assay data and laboratory tests	Nature, quality and appropriateness of the assaying and QA/QC procedures.	Assays by ALS Canada using XRF and ICP-MS; CRMs and blanks inserted every 20 samples.
Verification of sampling and assaying	The verification of significant intersections by alternative personnel or methods.	Re-assays, duplicates, and independent data reviews confirm original results.
Location of data points	Accuracy and quality of surveys used to locate drillholes and topography.	Collars surveyed with differential GPS. Downhole surveyed with single-shot tools.
Data spacing and distribution	Spacing of data and whether it is sufficient for resource estimation.	Variable spaced exploration drilling determined by geological mapping. Not yet sufficient for resource estimation

Orientation of data in relation to geological structure	Whether sample orientation is biased due to geological structure.	Drilling oriented perpendicular to mineralised zones where possible to minimise bias.
Sample security	Chain-of-custody protocols and storage details.	Samples transported securely in sealed polybags with full chain-of-custody.
Audits or reviews	The results of any audits or reviews of sampling techniques/data.	Independent consultant reviewed procedures; found compliant with industry standards.
SECTION 2 – REPORTING OF EXPLORATION RESULTS		
Mineral tenement and land tenure status	Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings. The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.	Temas completed the acquisition of 36 mineral claims in Quebec in September 2021 - the Lac Brûlé property. The Lac Brûlé Project is comprised of 36 claims, covering 2,017.19 hectares within the Labrieville Anorthosite Complex.
Exploration done by other parties	Acknowledgment and appraisal of exploration by other parties.	Prior to Temas' acquisition, exploration activities were limited. However, Temas initiated a systematic exploration program, including geological mapping, sampling, and geophysical surveys to delineate mineralized zones. The Company also plans to integrate its proprietary ORF Processing Technology to process the Fe-Ti-V mineralization efficiently and environmentally friendly.
Geology	Deposit type, geological setting and style of mineralisation.	The geological setting is characterized by anorthositic rocks hosting Fe-Ti-V mineralization. The mineralization is primarily in the form of massive and semi-massive titaniferous magnetite and ilmenite lenses. These lenses are typically tabular, with thicknesses up to 50 meters, and are aligned along structural

		trends within the anorthosite complex. The mineral assemblage includes titaniferous magnetite, ilmenite, and minor amounts of vanadium-bearing minerals. The deposit style is analogous to other Proterozoic anorthosite-hosted Fe-Ti-V oxide deposits in the Grenville Province.
Drill hole Information	A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes: ○ easting and northing of the drill hole collar ○ elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar ○ dip and azimuth of the hole ○ down hole length and interception depth ○ hole length. If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.	13 drillholes including 2022 infill holes. Locations, dips, azimuths recorded.
Data aggregation methods	In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated. Where aggregate intercepts incorporate short lengths of high grade results and longer lengths of low grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.	1m composites used. Top cuts applied selectively to reduce grade bias.

	The assumptions used for any reporting of metal equivalent values should be clearly stated.	
Relationship between mineralisation widths and intercept lengths	These relationships are particularly important in the reporting of Exploration Results. If the geometry of the mineralisation with respect to the drill hole angle is known, its nature should be reported. If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (eg 'down hole length, true width not known').	Drillholes oriented to intersect mineralisation perpendicular to dip.
Diagrams	Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.	Plan views and cross-sections included in ITAR.
Balanced reporting	Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.	All significant intercepts reported; no selective disclosure.
Other substantive exploration data	Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock	Mapping and airborne magnetics used to support geological model.

	characteristics; potential deleterious or contaminating substances.	
Further work	The nature and scale of planned further work (eg tests for lateral extensions or depth extensions or large-scale step-out drilling). Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.	Infill drilling, metallurgy, and baseline studies planned.

13. MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 INTRODUCTION

A two-phase test program was implemented to process ≈ 830 kg of La Blache ilmenite material to recover high purity TiO_2 product at Process Research ORTECH's (PRO) facility in Mississauga, ON Canada. This program was conducted from September 2021 to June 2022.

PRO has worked on the development of ORF's innovative process for the production of high purity TiO_2 directly from ilmenite material. The ORF process is protected by several patents in North America and abroad (US Patent No. 7,803,336 B2, Canadian Patent No. 2,513,309 and Australian Patent No. 2004291568). The process consists of atmospheric chloride leach followed by solvent extraction of Fe and Ti successively. A high purity Ti bearing strip solution is produced and can be used to produce Ti products dependent on the end market use such as high purity TiO_2 for pigments, pharmaceutical and food industries. Other products that can be obtained from the process are Fe_2O_3 which is of high purity and can be used for pigment or iron production.

A test program between Temas Resources Corporation and PRO was established to produce a quantity of TiO_2 product from pilot operation for market evaluation. The program was divided into 2 phases:

1. Phase 1 – Bench & Mini-Pilot Operation: Phase 1 of the Temas La Blache program involved a bench scale and mini-pilot test program to first evaluate the material available at the La Blache Property and its amenability to recovery using ORF's chloride process. The following work elements were performed in this phase:

Preparation of a representative sample from a material stockpile at PRO's facility and confirmation of the grades of the sample.

Determination of mineral composition, mineralogy, and liberation size of value minerals specifically ilmenite.

Suite of PRO chloride leach tests to determine leach conditions for Ti extraction and solution quality for subsequent solvent extraction (SX) separation steps.

Preliminary SX separations for Fe and Ti to construct McCabe-Thiele isotherms to establish operation conditions for mini-pilot operation.

Operation of a mini-pilot circuit to confirm the SX design criteria for Fe and Ti established in the bench scale work.

Phase 2 – Pilot Operation: Phase 2 of the program involved pilot processing of the material using the process design criteria established in the Phase 1 - Bench & Mini-pilot operation. The main work elements in this pilot phase of the program consisted of the following work elements:

Commissioning and operation of the pilot circuit for processing La Blache ilmenite at a throughput of $\approx 15\text{L/hr}$ PLS.

Processing of ≈ 830 kg of material through the pilot circuit (Small and Large pilot combined).

Monitoring impurity build up and assessing impact on pregnant strip solutions of Fe and Ti.

Producing a quantity of TiO_2 product from pilot operation (est. ≈ 90 kg) for market evaluation.

13.2 SAMPLE PREPARATION AND CHARACTERISATION

A composite sample for detailed bench and pilot plant tests to optimize process parameters and to produce TiO₂ product for market evaluation was prepared from samples selected from crates at PRO's facility in Mississauga and consisted of 11 individual samples. A composite weighing ~830 kg was generated by combining these samples and homogenized by the cone and quarter method and split into representative test charges.

13.2.1 CHEMICAL ANALYSIS

Chemical analysis of the composite head sample was performed and is shown in Table 13-1.

TABLE 13-1 ELEMENTAL ANALYSIS OF COMPOSITE ILMENITE HEAD SAMPLE

Sample Description	C	Al	As	Ca	Cd	Co	Cr	Cu	Fe	Ga	K	Li
	%											
La Blache Composite HEAD SAMPLE	0.33	2.59	<5	0.18	<5	<5	0.11	<5	41.06	—	<5	<5
Sample Description	Mg	Mn	Mo	Na	Ni	Pb	S	Sb	Si	Ti	V	Zn
	%											
La Blache Composite HEAD SAMPLE	2.22	0.20	<5	-	<5	<5	<5	<5	1.16	10.61	0.18	<5

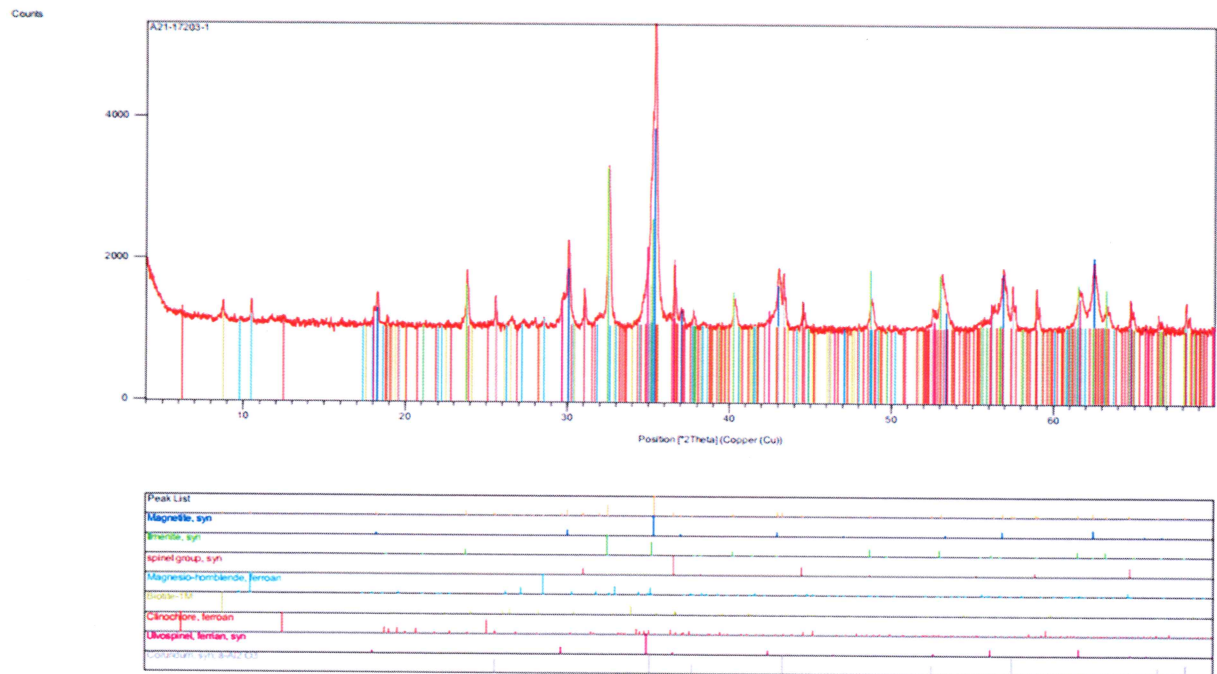
13.2.2 MINERALOGICAL ANALYSIS

Representative samples of the material were pulverized and sent for X-ray diffraction (XRD) analysis to an accredited laboratory of Activation Laboratories Ltd. in Ancaster, ON. Figure 13-1 shows the X-ray diffraction pattern of the ilmenite material, whereas Table 13-2 highlights the mineral abundances (wt%) in the material. It is determined that the majority phases are magnetite and ilmenite. It should be noted that compounds with <5% composition may not be shown in the XRD pattern.

TABLE 13-2 MINERAL ABUNDANCES (WT%) IN LA BLACHE ILMENITE MATERIAL

Mineral	wt%
Magnetite	23.0
Ilmenite	11.9
Spinel	6.0
Ulvospinel	3.4
Amphibole	3.0
Biotite	1.4
Chlorite	0.7
Amorphous	50.6

FIGURE 13-1 XRD PATTERN OF THE LA BLACHE ILMENITE MATERIAL



13.3 PHASE 1 - LABORATORY SCALE TESTWORK

Laboratory scale testwork was initially performed to confirm the process conditions to be used in the mini pilot and pilot programs. This included leaching and solvent extraction test work. The overall process flowsheet for the processing of La Blache ilmenite to produce market grade TiO₂ is shown in Figure 13-2.

13.3.1 LEACH TESTING

Leach testing was first conducted on the bench, and it was found that a single stage of leaching was not sufficient for the extraction of Ti with an extraction of approximately 60-65% of the contained Ti. A 2-stage leach process was adopted to attain an overall Ti recovery of ~ 80%. The first stage of leaching yielded between 60-65% recovery of Ti and 90% recovery of Fe. The residue after solid-liquid separation of the first stage was then re-leached in the second stage of leaching, which provided an additional 45-55% recovery of Ti and Fe. Thus, the overall Ti and Fe recovery was between 80-85% and 95%, respectively. The respective leaching parameters from both stages are presented in Table 13-3 and were used in subsequent pilot operation.

The diagram illustrates the production process for iron and titanium pigments from La Blache Ilmenite Ore. The process is divided into several stages:

- Grinding & Crushing:** The raw ore is fed into a grinding and crushing unit.
- PRO Stage 1 Leach:** The crushed ore is leached with HCl and MgCl₂ in a stirred tank reactor.
- Settling Tank:** The leach slurry is sent to a settling tank where Flocculant C496 is added. The residue is sent to Stage 1 PLS (Pulverized Leach Slurry).
- PRO Stage 2 Leach:** The residue from Stage 1 is leached again with HCl and MgCl₂ in another stirred tank reactor.
- Stage 2 PLS:** The leach slurry from Stage 2 is sent to Stage 2 PLS. The tails are sent to a bleed control point.
- Combined PLS:** The PLS from Stage 1 and Stage 2 are combined and sent to an oxidation column where O₂ is added.
- Oxidation:** The combined PLS is oxidized in a column reactor.
- Oxidized PLS:** The oxidized PLS is sent to a Fe Preg Strip (Fe SX) unit.
- Fe Raffinate:** The raffinate from the Fe SX unit is sent to a Ti Preg Strip (Ti SX) unit.
- Ti Raffinate:** The raffinate from the Ti SX unit is sent to a Raffinate Evaporation unit.
- Pyrohydrolysis:** The Fe SX unit is connected to a pyrohydrolysis unit where Water is added, producing Fe₂O₃.
- Thermal Precipitation:** The Ti SX unit is connected to a thermal precipitation unit, which produces TiO₂.

The final products are Fe₂O₃ and TiO₂.

Leaching Stage	Particle Size (Solid Feed)	Pulp Density	HCl Concentration	MgCl ₂ Concentration	Temperature	Duration
Stage 1	- 65 Mesh (90% Passing)	10%	5.8N	220 g/L	70°C	2h
Stage 2	Residue from Stage 1	0.15	5.8N	220 g/L	70°C	3h

During the bench scale studies, there were issues with solid-liquid separation of the slurry after stage 1 leaching. The filtration of these bench scale tests by a Buchner funnel took several hours for <1L of slurry. Hence, extensive flocculant testing was performed. It was found that improved settling and filtration of the flocculated supernatant and settled solids was achieved using Kemira Superfloc C496, a cationic flocculant. Various dosages were tested and an optimal addition of 600 ppm C496 per litre of slurry was established.

13.3.3 IRON SOLVENT EXTRACTION

Preliminary bench scale solvent extraction tests were first performed to determine the organic composition which selectively extracted iron from the PLS and the composition ultimately used for the mini-pilot is shown in Table 13-4. The respective Fe extraction and stripping isotherms (McCabe-Thiele diagrams) were also constructed to determine the number of stages required with the estimated number of stages presented in Table 13-5.

TABLE 13-4 FE SOLVENT EXTRACTION ORGANIC COMPOSITION

Component	Volume Fraction
2-Tridecaone (2TDN)	0.2
2-Octanol	0.2
Exxal-13	0.2
Cansol D80	0.4

TABLE 13-5 FE CIRCUIT STAGES FOR PHASE 1

Circuit Section	Initial # of Stages	Final # of Stages
Extraction	5	8
Scrubbing	1	2
Stripping	8	8

13.3.4 TITANIUM SOLVENT EXTRACTION

Bench-scale solvent extraction tests were first performed to determine the organic composition which extracted and subsequently stripped titanium. The organic composition for extracting titanium is shown in Tables 13-6 and 13-7. The respective Ti extraction and stripping isotherms (McCabe-Thiele diagrams) were also constructed. Based on the isotherms, around 5 extraction and 7 stripping stages are estimated. The bench-scale test work also recommended the use of temperature (30-35°C) to help improve the phase separation during the operation of the mini-pilot.

TABLE 13-6 TI SOLVENT EXTRACTION ORGANIC COMPOSITION

Component	Volume Fraction
Cyanex 923	0.2
Exxal-13	0.2
Cansol D80	0.6

TABLE 13-7 TI CIRCUIT STAGES FOR PHASE 1

Circuit Section	Initial # of Stages	# of Stages
Extraction	5	5
Scrubbing	0	2
Stripping	7	8

13.4 MINI-PILOT SCALE TESTING

Pilot scale testing was conducted using the criteria established from the bench scale and mini-pilot operation.

13.4.1 MINI PILOT LEACHING

As per the conditions established in the bench scale testing, batch mini-pilot scale leaching was conducted in 50L mixing tanks fitted with a water-cooled condenser, scrubbing unit, air powered agitator, and 3kW Teflon coated immersion heater. A total of 12 first stage leaches (600L) and 4 second stage leaches (80L) were conducted for this phase, resulting in ~ 680 litres of PLS for solvent extraction circuits. Thus, a total of 4 batches of PLS were generated and the metal concentrations from each batch are shown in Table 13-8. The average Ti and Fe concentrations of the combined PLS solution before proceeding to oxidation were ~ 7 g/L and ~ 40 g/L, respectively. In addition, the average free acid was 1.5N and 13 g/L Fe²⁺ in the PLS solution.

TABLE 13-8 PHASE 1 LEACHING ANALYSIS

Sample Description	Liquid Analysis (mg/L)								
	Ag	Al	As	Ca	Cd	Co	Cr	Cu	Fe
Batch 1 PLS	< 5	672	< 5	3012	< 5	< 5	87.5	7.5	38540
Batch 2 PLS	< 5	1024	< 5	3090	< 5	< 5	87.0	< 5	43840
Batch 3 PLS	< 5	760	< 5	3054	< 5	< 5	85.0	< 5	36620
Batch 4 PLS	< 5	977	< 5	2944	< 5	< 5	85.9	< 5	36220
	Ga	Ge	K	Li	Mg	Mn	Mo	Na	Ni
Batch 1 PLS	< 5	< 5	823.0	< 5	48340	169.6	< 5	1042.6	33.8
Batch 2 PLS	< 5	< 5	761.2	< 5	53360	172.8	< 5	1018.6	23.4
Batch 3 PLS	< 5	< 5	876.2	< 5	43440	174.9	< 5	970.6	21.8
Batch 4 PLS	< 5	< 5	699.4	5.8	44920	175.1	< 5	911.4	21.5
	Pb	S	Sb	Si	Ti	U	V	Zn	
Batch 1 PLS	30.9	109.8	< 5	7.7	6472	< 5	187.5	64.5	
Batch 2 PLS	13.0	75.9	< 5	< 5	7186	< 5	176.4	17.6	
Batch 3 PLS	8.4	75.6	< 5	< 5	7032	< 5	180.4	22.0	
Batch 4 PLS	< 5	92.9	7.7	< 5	6744	< 5	188.9	25.6	

13.4.2 MINI PILOT PLS OXIDATION

Pregnant leach solution (PLS) generated was oxidized in a mini-pilot column setup (45L total volume per column) which sparged O₂ for the conversion of Fe²⁺ to Fe³⁺. The O₂ gas flowrate was set at 4L/min with samples taken at regular intervals to determine the extent of oxidation. Based on the results it required ~ 34 hours for complete oxidation to take place. Following the oxidation step, the solution was pumped out of the columns and through a polishing filter with a 1µm cartridge filter to remove any fine particulates in preparation for the solvent extraction stage.

13.4.3 MINI PILOT IRON SOLVENT EXTRACTION

The mini-pilot solvent extraction for iron was setup according to the staging requirements identified in the bench scale isotherms with final actual staging after operation of the circuit shown (Table 13-5) where an additional 3 stages of extraction were added to ensure that the concentration of iron in the Fe raffinate solution was as low as possible (<5ppm Fe) before moving to the subsequent Ti circuit. The circuit was operated for 162 hours using PLS produced from the two-stage leaching process. A synthetic scrub solution was first used with a concentration of ~ 80 g/L Fe, ~ 100 g/L MgCl₂ and a free acid of 0.5N HCl until pregnant strip solution was produced from the circuit. An additional scrub stage was added to help with phase separation as aqueous entrainment was observed. Dilute HCl at 0.05N was employed as the stripping agent. The operating conditions for the Fe circuit are highlighted in Table 13-9.

TABLE 13-9 FE CIRCUIT OPERATING CONDITIONS FOR PHASE 1

Stream	Flow-rate (mL/min)	Organic: Aqueous (O:A) Ratio
Organic	40	-
PLS Feed	32	0.000704
Scrub Feed	3.6	0.459028
Strip Feed	11.5	3.5 : 1

The average operational profiles of the solutions in the Fe SX circuit for Phase 1 are presented in Table 13-10. Fe was selectively extracted from the PLS with an average of ~ 64 ppm in the raffinate solution. A pregnant strip solution with an average composition of 75,164 mg/L Fe ~ 75 g/L Fe was also produced.

TABLE 13-10 FE SX SOLUTIONS – PHASE 1 AVERAGE ELEMENTAL ANALYSIS

Sample Description	Liquid Analysis (mg/L)								
	Ag	Al	As	Ca	Cd	Co	Cr	Cu	Fe
Fe Feed PLS	< 5	966	< 5	2851	< 5	< 5	83.6	6.5	34948
Fe Raffinate	< 5	962	< 5	2919	< 5	< 5	86.9	10.1	64.2
Fe Preg. Strip	< 5	54.1	< 5	13.4	< 5	< 5	< 5	< 5	75164

Sample Description	Liquid Analysis (mg/L)								
	Ga	Ge	K	Li	Mg	Mn	Mo	Na	Ni
Fe Feed PLS	< 5	< 5	757.8	< 5	43154	163.1	< 5	1021.6	31.9
Fe Raffinate	< 5	< 5	775.3	< 5	43864	168.8	< 5	1048.2	34.1
Fe Preg. Strip	< 5	< 5	< 5	< 5	190.5	< 5	< 5	5.6	< 5
Sample Description	Pb	S	Sb	Si	Ti	U	V	Zn	
Fe Feed PLS	26.0	124.3	< 5	< 5	6261	< 5	176.4	54.4	
Fe Raffinate	27.8	137.6	< 5	30.2	6369	< 5	182.4	65.0	
Fe Preg. Strip	< 5	< 5	8.0	< 5	< 5	< 5	< 5	6.9	

13.4.4 MINI PILOT TITANIUM SOLVENT EXTRACTION

The Fe raffinate solution from the Fe circuit proceeded to the Ti SX circuit. The Ti circuit was operated for 105 hours. The Ti circuit staging for the mini-plant is presented in Table 13-12. Heaters in the vicinity of the Ti circuit were installed to ensure that the temperature was around 30-35°C to ensure adequate phase separation in the SX cells. Titanium rich solution was produced using 2N HCl. The operating conditions for the circuit are highlighted in Table 13-12.

TABLE 13-11 TI CIRCUIT STAGES FOR PHASE 1

Circuit Section	# of Stages
Extraction	5
Scrubbing	2
Stripping	8

TABLE 13-12 TI CIRCUIT OPERATING CONDITIONS FOR PHASE 1

Stream	Flow-rate (mL/min)	Organic: Aqueous (O:A) Ratio
Organic	30	-
PLS Feed	30	0.042361
Scrub Feed	3	0.417361
Strip Feed	7.5	0.167361

The average operational profiles of the solutions in the Ti SX circuit for Phase 1 are presented in Table 13-13. Ti was extracted with an average of ~ 102 ppm in the raffinate solution. A pregnant strip solution with an average composition of 32,503 mg/L Ti ~ 33 g/L Ti was also produced and used for the production of TiO₂.

TABLE 13-13 TI SX SOLUTIONS – PHASE 1 AVERAGE ELEMENTAL ANALYSIS

Sample Description	Liquid Analysis (mg/L)								
	Ag	Al	As	Ca	Cd	Co	Cr	Cu	Fe
Ti Feed	< 5	1022	< 5	3105	< 5	< 5	92.9	11.4	23.8
Ti Raffinate	< 5	1037	< 5	2975	< 5	< 5	93.2	< 5	< 5
Ti Preg. Strip	< 5	30.7	< 5	570	< 5	< 5	< 5	6.3	16.8
	Ga	Ge	K	Li	Mg	Mn	Mo	Na	Ni
Ti Feed	< 5	< 5	827	< 5	46636	182.2	< 5	1113	39.1
Ti Raffinate	< 5	< 5	1116	< 5	46801	175.6	< 5	1160	39.9
Ti Preg. Strip	< 5	< 5	593	< 5	9065	32.3	< 5	244	< 5
	Pb	S	Sb	Si	Ti	U	V	Zn	
Ti Feed	31.6	150.0	< 5	12.8	6580	< 5	197.0	57.1	
Ti Raffinate	28.6	135.6	< 5	< 5	102.3	< 5	175.8	< 5	
Ti Preg. Strip	< 5	25.3	17.2	< 5	32503.33	< 5	44.6	< 5	

13.5 PHASE 2 – LARGER SCALE PILOT PROCESSING

Phase 2 of the metallurgical program involved additional larger scale pilot processing compared to the mini-pilot operation to further confirm process design criteria and generate a quantity of TiO₂ product.

13.5.1 PILOT LEACHING

Leaching for the larger pilot plant was conducted in 350L mixing tanks which were fitted with a water-cooled condenser, scrubbing unit, air powered agitator and 3kW Teflon coated immersion heater. Operating conditions for the two-stage leaching process were the same as in Phase 1 of the mini-pilot, highlighted in Table 13-3. A total of 17 first stage leaches were performed producing ~ 5310 litres of PLS. The average recovery of Ti and Fe after the first stage of leaching was ~ 60% and ~ 88%, respectively. The cationic flocculant, Kemira Superfloc C496, was added during the solid-liquid separation of the first stage leach to improve filtration. The residues from the first stage were then subsequently re-leached in the second stage. The second stage leaches produced ~ 825 litres of PLS with a total generation of combined PLS from Phase 2 of ~ 6,135 litres. The overall average leach recoveries were ~ 75% Ti, ~ 93% Fe and ~ 99% V. This was slightly lower than the recoveries achieved in the mini-pilot of Phase 1 which had ~ 80-85% Ti, ~ 95% Fe and 100% V. This was mainly due to lower observed leach extraction in the re-leach stage and was attributed to increases in the pulp density used during some of the batches while being deficient in the required acid. The average Ti and Fe concentrations of the combined PLS solution before proceeding to oxidation were ~ 7.2 g/L and ~ 38 g/L, respectively. In addition, the average free acid was 1.4N and 20 g/L Fe²⁺ in the PLS solution.

13.5.2 PILOT OXIDATION

Oxidation of the PLS in Phase 2 was performed in 4 pilot oxidation columns with each having a capacity of ≈ 50 L. Complete conversion of Fe^{2+} to Fe^{3+} took between 48-72 hrs for each batch with the longer processing time associated with a leak in one of the columns resulting in lower oxidation efficiency and was rectified.

13.5.3 PILOT IRON SOLVENT EXTRACTION

Large-scale custom polypropylene solvent extraction cells were fabricated for the Phase 2 pilot iron solvent extraction, as a larger throughput of solutions was desired through the SX circuits. Each solvent extraction cell includes a mixer box and settler stage, and two sizes were used for the circuit, as highlighted in Table 13-14. Apart from the Fe stripping circuit, the SX cells had a settler volume of 22.5L and mixer box volume of 9.26L.

TABLE 13-14 MIXER SETTLER DESIGN FOR PHASE 2

Circuit	Square Mixer Box Length (in)	Square Mixer Box Width (in)	Mixer Box Volume (L)	Settler Length (in)	Settler Width (in)	Settler Surface Area (in ²)	Settler Volume (L)
Fe Extraction	8.0	8.0	9.3	20.0	8.0	160.0	22.5
Fe Stripping	5.0	5.0	2.2	16.0	5.0	80.0	6.9
Ti Extraction and Scrubbing	8.0	8.0	9.3	20.0	8.0	160.0	22.5
Ti Stripping	8.0	8.0	9.3	20.0	8.0	160.0	22.5

In Phase 2, the solvent extraction (SX) iron circuit was in operation for a cumulative total of ≈ 654 hours. The primary operational conditions including the extractant organic composition to selectively extract Fe and the stripping agent, were not changed from those used in Phase 1. The circuit staging for the large pilot operation is presented in Table 13-15 and the initial operating conditions are presented in Table 13-16. In contrast to the mini-pilot operation, the scrubbing stage was removed from the Fe SX, as the main objective was to produce quality Fe Raffinate solution (i.e., <5 ppm Fe) which would be processed in the Ti circuit. Fe strip solution quality was not a priority in the operation.

The average operational profiles of the solutions in the Fe SX circuit for Phase 2 are presented in Table 13-17. Fe was selectively extracted from the PLS with an average of ≈ 85 ppm in the raffinate solution. For the majority of the circuit operation, Fe was readily being extracted from the PLS and producing raffinate containing <5 ppm Fe. Initial operation of the circuit with high levels of Fe in the raffinate (as high as 4 g/l Fe) skewed the average raffinate composition to the higher value.

TABLE 13-15 FE CIRCUIT STAGES FOR PHASE 2

Circuit Section	# of Stages
Extraction	7
Stripping	8

TABLE 13-16 FE CIRCUIT OPERATING CONDITIONS FOR PHASE 2

Stream	Flowrate (mL/min)	Organic : Aqueous (O:A) Ratio
Organic	500	-
PLS Feed	250	0.084028
Strip Feed	150	3.3 : 1

TABLE 13-17 FE SX SOLUTIONS – PHASE 2 AVERAGE ELEMENTAL ANALYSIS

Sample Description	Liquid Analysis (mg/L)								
	Ag	Al	As	Ca	Cd	Co	Cr	Cu	Fe
Fe Feed PLS	< 5	964.3	< 5	2916	< 5	< 5	85.3	< 5	34476
Fe Raffinate	< 5	1017	< 5	3145	< 5	< 5	94.5	< 5	85.4
Fe Preg. Strip	< 5	8.3	< 5	88.9	< 5	< 5	< 5	< 5	57162
	Ga	Ge	K	Li	Mg	Mn	Mo	Na	Ni
Fe Feed PLS	< 5	< 5	492.1	< 5	44028	162.8	< 5	738.6	21.1
Fe Raffinate	< 5	< 5	558.5	< 5	47183	177.3	< 5	828.7	23.2
Fe Preg. Strip	< 5	< 5	7.5	< 5	119.2	< 5	< 5	24.8	< 5
	Pb	S	Sb	Si	Ti	U	V	Zn	
Fe Feed PLS	< 5	135.3	6.2	< 5	6874	< 5	175.9	24.9	
Fe Raffinate	< 5	148.7	6.2	< 5	7399	< 5	194.4	25.4	
Fe Preg. Strip	< 5	20.2	< 5	< 5	56.9	< 5	< 5	< 5	

13.5.4 PILOT TITANIUM SOLVENT EXTRACTION

The Pilot Titanium Solvent Extraction circuit was in operation for a cumulative total of ≈ 581 hours for Phase 2 of the program. Similar to the Fe SX, the primary operational conditions including the organic composition to extract Ti and the stripping agent were not changed from those used in the Phase 1 Mini pilot. The Ti circuit stages for the Phase 2 pilot operation is presented in Table 13-18 and the initial operating conditions are presented in Table 13-19.

TABLE 13-18 TI CIRCUIT STAGES FOR PHASE 2

Circuit Section	# of Stages
Extraction	5
Scrubbing	2
Stripping	7

TABLE 13-19 TI CIRCUIT OPERATING CONDITIONS FOR PHASE 2

Stream	Flowrate (mL/min)	Organic : Aqueous (O:A) Ratio
Organic	225	-
PLS Feed	225	0.042361
Scrub Feed	22.5	0.417361
Strip Feed	60	3.75: 1

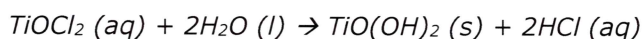
The average operational profiles of the solutions in the Ti SX circuit for Phase 2 are presented in Table 13-20. Ti was extracted from the PLS with an average of ≈ 463 ppm in the raffinate solution. A Ti pregnant strip solution with an average composition of 30,423 mg/L Ti ≈ 30.5 g/L Ti was also produced.

TABLE 13-20 TI SX SOLUTIONS – PHASE 2 AVERAGE ELEMENTAL ANALYSIS

Sample Description	Liquid Analysis (mg/L)								
	Ag	Al	As	Ca	Cd	Co	Cr	Cu	Fe
Ti Feed	< 5	1025	< 5	3143	< 5	< 5	94.7	< 5	19.5
Ti Raffinate	< 5	1027	< 5	3187	< 5	< 5	96.1	< 5	< 5
Ti Preg. Strip	< 5	7.0	< 5	808.2	< 5	< 5	< 5	10.3	< 5
	Ga	Ge	K	Li	Mg	Mn	Mo	Na	Ni
Ti Feed	< 5	< 5	512.1	< 5	47538	178.3	< 5	786.0	23.4
Ti Raffinate	< 5	< 5	547.6	< 5	47994	173.5	< 5	828.5	27.1
Ti Preg. Strip	< 5	< 5	162.7	< 5	12118	31.0	< 5	220.6	15.1
	Pb	S	Sb	Si	Ti	U	V	Zn	
Ti Feed	< 5	149.8	6.1	< 5	7470	< 5	194.6	22.7	
Ti Raffinate	< 5	169.2	< 5	< 5	463.2	< 5	185.4	< 5	
Ti Preg. Strip	< 5	42.6	21.5	< 5	30423.13	< 5	45.8	< 5	

13.6 TiO₂ PRODUCT PRECIPITATION

Titanium present in the pregnant strip liquor from the Titanium SX circuit underwent thermal precipitation to produce the desired product of TiO₂. The process can be represented by the following reaction:



After repetitive filtering and washing, the product was oven dried and then calcined at 800°C, in order to transform the TiO(OH)₂ into TiO₂, as shown by the following reaction:



Initial pretreatment of the Ti rich pregnant strip solution was performed to remove any entrained organic. The aqueous was allowed to settle in a separatory vessel and additionally was filtered through a carbon filter.

Bench scale tests highlighted that a duration of 7 hours was required for the thermal precipitation to reach a reasonable level of < 1 gpl Ti in the filtrate.

Washing of the Ti precipitate was performed in two stages with the first stage consisting of an HCl wash and the second stage involving a water wash to remove any free chlorides. The resulting solids were first dried and then charged into a tube furnace for calcination at 800°C and a residence time of 2 hours.

A total of 14 precipitation batches were performed and most of these batches processed 144 litres of Ti pregnant strip, totaling 1798 litres for the overall process. The total amount of calcined product generated in the pilot was 88 kg.

13.6.1 TiO₂ PRODUCT CHARACTERIZATION

The precipitate before and after calcining was sent for X-ray diffraction (XRD) analysis to Activation Laboratories, an accredited analytical lab located in Ancaster Ontario. Table 13-21 identifies the mineral abundances as wt.% fractions in the TiO₂ product before and after calcination.

Table 13-22 shows the composition of the final TiO₂ product after calcination. The Ti concentration is provided as a percentage (%), whereas the other elemental analysis is provided as mg/L. The overall impurities present in the final product, expressed as oxides range between 0.08% and 0.26%.

TABLE 13-21 MINERAL ABUNDANCES (WT%)

Fraction	Before Calcining	Calcined Product
Anatase	23.4	38.2
Rutile	16.5	30.9
Brookite	12.3	Not detected
Amorphous	47.8	30.9

TABLE 13-22 TIO₂ FINAL PRODUCT ANALYSIS

Precipitation Batch	Ti	V	Al	Ca	Cu	Fe	K	Mg	Mn	Na	S	Cr	Sb	Zn
	mg/L													
Batch 1	65.3	612.5	0.0	0.0	0.0	0.0	0.0	478.7	0.0	0.0	0.0	0.0	266.3	0.0
Batch 2	54.5	423.6	0.0	41.6	0.0	0.0	124.8	116.5	0.0	0.0	0.0	49.9	292.9	0.0
Batch 3	56.9	283.0	0.0	0.0	0.0	0.0	0.0	145.8	0.0	0.0	0.0	0.0	131.2	0.0
Batch 4	54.9	289.5	0.0	0.0	0.0	0.0	0.0	375.2	0.0	0.0	0.0	0.0	126.5	0.0
Batch 5	52.1	288.3	0.0	0.0	0.0	0.0	0.0	271.7	0.0	0.0	0.0	0.0	539.9	0.0
Batch 6	55.2	282.8	0.0	0.0	0.0	0.0	0.0	291.0	0.0	0.0	0.0	0.0	542.4	0.0
Batch 7	53.6	298.3	0.0	0.0	0.0	0.0	0.0	345.1	0.0	0.0	66.8	0.0	523.2	0.0
Batch 8	57.3	560.0	0.0	0.0	0.0	0.0	0.0	481.7	0.0	0.0	0.0	0.0	452.8	0.0
Batch 9	55.2	340.7	0.0	56.4	0.0	0.0	0.0	338.4	0.0	0.0	112.8	0.0	399.4	0.0
Batch 10	58.3	356.5	0.0	105.6	0.0	0.0	0.0	281.7	0.0	0.0	176.1	0.0	412.9	0.0
Batch 11	54.2	341.9	0.0	32.3	0.0	0.0	0.0	371.0	0.0	0.0	161.3	0.0	406.5	0.0
Batch 12	43.1	407.4	0.0	0.0	0.0	0.0	0.0	49.4	0.0	0.0	0.0	0.0	175.0	0.0
Batch 13	52.3	304.3	0.0	0.0	0.0	0.0	0.0	521.3	0.0	0.0	254.6	0.0	488.6	0.0
Batch 14	57.3	503.3	0.0	0.0	0.0	0.0	0.0	256.8	0.0	0.0	0.0	0.0	228.0	0.0
Min	43.1	282.8	0.0	0.0	0.0	0.0	0.0	49.4	0.0	0.0	0.0	0.0	126.5	0.0
Max	65.3	612.5	0.0	105.6	0.0	0.0	124.8	521.3	0.0	0.0	254.6	49.9	542.4	0.0
Average	55.0	378.0	0.0	16.9	0.0	0.0	8.9	308.9	0.0	0.0	55.1	3.6	356.1	0.0



13.7 METALLURGICAL TESTING SUMMARY

Bench and pilot testing was conducted for the development of a process flowsheet for the extraction and recovery of titanium in the form of TiO_2 from the La Blache ilmenite material

After extensive test work, a flowsheet was developed using ORF's chloride process. The flowsheet consists of crushing, grinding, two-stage leaching in mixed chloride lixiviant, solvent extraction, followed by precipitation and calcination to obtain high purity TiO_2 product. The two-phase test program processed ≈ 830 kg of ilmenite material with ≈ 6815 litres of PLS produced for the solvent extraction circuits. In Phase 1, the Fe and Ti circuits were operated for ≈ 162 hours and ≈ 105 hours, respectively. Whereas, in the larger pilot operation of Phase 2, the Fe circuit was run for ≈ 654 hours (completing 120 organic turnovers) and the Ti circuit was run for ≈ 581 hours (completing 30 organic turnovers). Stability of the organic extractants used for the Fe and Ti circuits was demonstrated over the course of the pilot operation. The Ti-rich pregnant strip liquor underwent thermal precipitation; thorough washing stages to remove the presence of impurities and the final step of calcination at 800°C . A total quantity of 88 kg of TiO_2 was produced with an average composition of over 99.8% purity in the two-phase test program.