# CRITICAL RESOURCES SECURES EXCLUSIVE OPTION TO EVALUATE NEXT-GENERATION SOLID STATE LITHIUM-ION BATTERY TECHNOLOGY

**Exclusive option to access and evaluate next-gen solid-state lithium-ion battery technology, to accelerate validation, prototype demonstration, and global licensing commercialisation.**

- CRR secures **exclusive option** to undertake a research evaluation program with the South Dakota School of Mines & Technology (SDM) on **solid-state lithium-ion battery technologies**, covering five granted US patents and one pending application.

- **Patents target solid-state lithium-Ion battery problem**, with engineered advancements in material applications to maintain sulphide-free, lithium-ion, solid-state electrolyte conductivity at elevated temperatures, widening the safe operating temperatures and performance of solid-state batteries in real world applications.

- **Scalable, lower-cost processing**: Microwave synthesis of solid-state lithium electrolytes provides a path to lower manufacturing cost, higher yield electrolyte production with improved manufacturing consistency at an increased production scale.

- **Improved safety for fast charge/discharge**: Exclusive cathode patent designed to support high-rate power charge/discharge, reducing gas formation under heat/voltage stress, reducing the leading cause of lithium-ion battery thermal runaway.

- **Non-sulphide solid-state electrolyte**: improving manufacturing yield and costs while reducing environmental risks, offering safer, cleaner production to meet stricter regulatory standards.

- **Focused strategy**: Complements CRR's critical minerals development plan and provides vertical integration optionality, creating value pathways from resource assets to advanced battery technologies.

- **Mavis Lake Lithium Project:** A strategically important asset for North America's lithium supply chain, strengthened by recent landholding expansions and sustained investment. Significant technical milestones and exploration programs since 2023 have positioned Mavis Lake for potential feedstock into to next-generation solid-state battery technology.

- **Real-world potential benefits of solid-state technologies** extend beyond the global EV markets and into the domestic and industrial energy storage market with the rapid expansion of data-centres.

**Critical Resources Limited** ('**Critical Resources**' or the '**Company**', **ASX**:**CRR**) is pleased to announce it has secured an exclusive option (Option) agreement with South Dakota School of Mines & Technology (SDM) in the United States of America (US) to access and evaluate a portfolio of advanced lithium-ion battery technologies.

**The portfolio consists of five granted US-patents and one US-patent under application to create safer, longer-life solid-state battery cells with superior performance at elevated temperatures, directly addressing heat-management limitations of liquid lithium-ion battery technology used in today's energy storage systems.** This agreement complements CRR's strategic critical mineral development focus with its leading lithium project, Mavis Lake, and push into battery technology, first initiated through its 2022 direct investment into Volt Carbon Technologies (TSX-V:VCT)(Volt Carbon) solid-state Li-ion battery research.

**Critical Resources Managing Director, Tim Wither, commented**: *'This option agreement marks an extension of our focused critical minerals strategy, enabling vertical integration and unlocking new value pathways from Critical Resources' mineral assets, capturing potential upside of our Mavis Lake Lithium Resource, to advanced battery technologies and global licensing opportunities. As global attention intensifies on critical minerals—with supply chain security and new US-Australia partnerships driving unprecedented investment and regulatory focus—we are positioning Critical Resources at the forefront of this transformation.*

*'Over the next 12 months, our research and development program will be milestone-based and overseen by a dedicated technical committee, ensuring disciplined progress and accountability. We see immense potential for these advanced technologies developed by Dr Smirnova and the South Dakota School of Mines & Technology to deliver real-world impact, creating safer, more efficient energy storage solutions that address the needs of electric vehicles, grid storage, data centres, and beyond. This is another step in our journey to deliver sustainable value for our shareholders and continue to help advance the global energy transition.'*

In 2022, Critical Resources made a strategic investment in Volt Carbon, giving the Company early exposure to next-generation solid-state battery materials and cell architectures under Volts Solid UltraBattery™ research. This established a downstream lithium focus technology, positioning the Company advancements into energy storage technologies rather than solely raw-material supply.

The exclusive option with the South Dakota School of Mines & Technology (SDM) deepens Critical's strategy by adding patented electrolyte, cathode and battery material technologies that directly target thermal stability, safety and cycle life, of which are key constraints in scaling high-performance solid-state lithium-ion energy storage systems as found across aerospace, transportation, domestic and industrial power grids, power-electronics and the rapidly expanding data centre markets.

## SOLID-STATE BATTERIES: THE NEXT FRONTIER IN ENERGY STORAGE

Solid-state batteries deliver a step-change in performance over conventional lithium-ion technology. By replacing flammable liquid electrolytes with solid electrolytes—such as ceramic or polymer separators—they offer a superior safety profile, virtually eliminating the risk of thermal runaway. This architecture enables the use of lithium-metal anodes, delivering dramatically higher energy density, longer driving ranges, and lighter packs.

Combined with ultra-fast charging capability, solid-state batteries are positioned as a future power source for advanced energy applications. Commercial-scale adoption has been limited by manufacturing complexity, cost, and durability challenges; however, SDM technology seeks to overcome these barriers through advanced material application, enhanced thermal resilience, and scalable electrolyte synthesis—paving the way for practical deployment.

## FOUR SOLID-STATE BATTERY TECHNOLOGY PILLARS, SIX PATENT PROTECTIONS

The five granted US-patents and one US-patent under application (**Appendix A**) comprise four complementary technology innovations targeting solid-state battery thermal stability, safety and increased cycle life performance. The option grants CRR exclusive worldwide evaluation rights in these technologies.

- **Lithium-halide antiperovskite Solid-State Electrolytes (SSE)** - *High-temperature capacity retention and dendrite suppression in a glass-ceramic lithium-halide antiperovskite Solid-State Electrolyte designed to improve safety versus liquid electrolytes; engineered to maintain charge capacity at elevated temperatures. These SSE patents are non-sulphide based, eliminating toxic gas emissions and reducing environmental risks.*

- **Microwave-enabled glass-ceramic synthesis (for SSEs)** - *Rapid, scalable, lower-cost processing with higher purity via microwave-assisted formation; process supports doped and inverse antiperovskite as well as oxyhalide variants and enables direct control of antiperovskite crystal formation for large-scale production.*

- **Polyoxometalate-functionalised cathode/interface architectures (POM)** - Mixed ionic/electronic conduction that reduces interfacial (performance) losses to support high rate charging, long-term durability, and a broad operating voltage window applicable to Lithium metal and Lithium-ion cells.

- **Self-organised PEDOT conductive-polymer nanocomposites** - Catalyst-free, clean-by-product process yielding robust, conductive PEDOT networks compatible with solid-state phases—well-suited to energy devices and sensing. PEDOT (poly(3,4-ethylenedioxythiophene)) is a breakthrough conductive polymer that enhances the safety, stability, and performance of next-generation solid-state batteries, supporting longer life cycles and environmentally safe energy storage

## SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY (SDM)

The South Dakota School of Mines & Technology (SDM) is a leading public STEM university based in Rapid City, South Dakota, USA. Established in 1885, SDM is renowned for its rigorous science, engineering, and technology programs, and is consistently ranked among the top engineering schools in the United States. SDM is nationally recognised for its collaborative approach with industry partners and participates in several major research centres, including the NSF Industry-University Cooperative Research Centre for Solid-State Electric Power Storage (CEPS), focused on the expansion of the solid-state battery supply chain, specifically battery recycling and eco-friendly lithium extraction technologies from natural mineral deposits.

SDM is home to a world-class Chemical and Materials Engineering research faculty dedicated to advancing the frontiers of innovation and partners closely with global companies, government agencies, and technology innovators to advance research in advanced materials and energy storage technology.

## PATENT INVENTOR

Dr. Alla (Alevtina) Smirnova is a distinguished Professor in the Chemistry, Biology, and Health Sciences Department at the South Dakota School of Mines and Technology, where she also holds the J. Ganes Professorship Endowment in the Materials Engineering and Science program. Dr. Smirnova serves as Director of the American National Science Foundation (NSF) Industry-University Cooperative Research Centre for Solid-State Electric Power Storage (CEPS).

Dr. Smirnova research expertise spans morphological, chemical, and electrochemical processes in advanced materials, with a particular focus on next-generation solid-state energy storage and holds ten patents or patent disclosures. Dr. Smirnova has led numerous projects funded by the National Science Foundation and is recognised for her commitment to sustainable innovation in battery technology.

***Figure 1 -*** *South Dakota School of Mines & Technology - Chemical & Biological Engineering / Chemistry (CBEC) facilities.*

## NEXT-GENERATION SOLID-STATE LITHIUM-ION BATTERY TECHNOLOGY

The SDM patents collectively offer a powerful partnership rather than replacement of existing battery technology. The solid-state electrolytes and advanced cathode designs by SDM can be engineered to work within familiar lithium-ion and lithium-metal battery architectures, giving manufacturers a way to step into solid-state performance without abandoning their cell infrastructure know-how. Simultaneously, the polyoxometalate-enhanced cathodes and PEDOT–silicon anodes are deliberately chemistry-compatible with today's lithium-ion systems, so they can be swapped into existing production lines as step-change improvements to energy density, safety and cycle life.

Combined with scalable processes like microwave synthesis, this suite of battery technologies provides interchangeable building blocks that allow current battery makers with incremental adoption of next-generation materials while leveraging their existing formats, equipment and supply chains.

In contrast to conventional sulphide-based solid electrolytes, this technology avoids several key hurdles for sulphide-based electrolyte systems. Sulphide electrolytes produce toxic by-products, pose handling and environmental issues, and are often unstable against lithium metal leading to higher manufacturing cost, lower manufacturing yield electrolyte, limiting battery cell production scale.

Sulphide-based electrolytes during normal battery charge and discharge cycles, react with carbon-based cathodes, leading to degraded conductivity and reduced cycle life. By shifting to non-sulphide halide and glass-ceramic electrolytes—paired with compatible cathode designs—these innovations significantly

improve chemical stability with lithium metal, eliminate harmful sulphur–carbon side reactions, and provide a cleaner, more sustainable platform for next-generation solid-state batteries.

## INCREASE THERMAL OPERATING RANGE DRIVES PERFORMANCE

In the context of commonly used liquid lithium-ion batteries, a core issue is lithium-metal dendrite (dendrite) formation which are needle-like formation of metallic lithium that reduce battery performance over a short period of time and can pierce separators or short-circuit between the anode and cathode (**Figure 2**).

Under high-demand operation, such as fast-charging or operation in **hot conditions dendrite propagation in liquid lithium-ion electrolytes dramatically increases which can lead to individual battery cell fires and then thermal runaway in large-multicell battery packs** such as found in EV and stationary energy storage.

The proprietary SDM solid-state battery technology seeks to address these existing problems with liquid lithium electrolytes through multiple facets:

- Propriety lithium-halide antiperovskite solid-state electrolyte provides a mechanically and chemically robust ion pathway that resists dendrite initiation.
- Polyoxometalate-modified cathodes creates lower interfacial resistance and smooth current distribution, reducing local hot spots.
- PEDOT nanocomposites form resilient, conductive interlayers that maintain contact and limit stress cracking allowing dendrites to form.

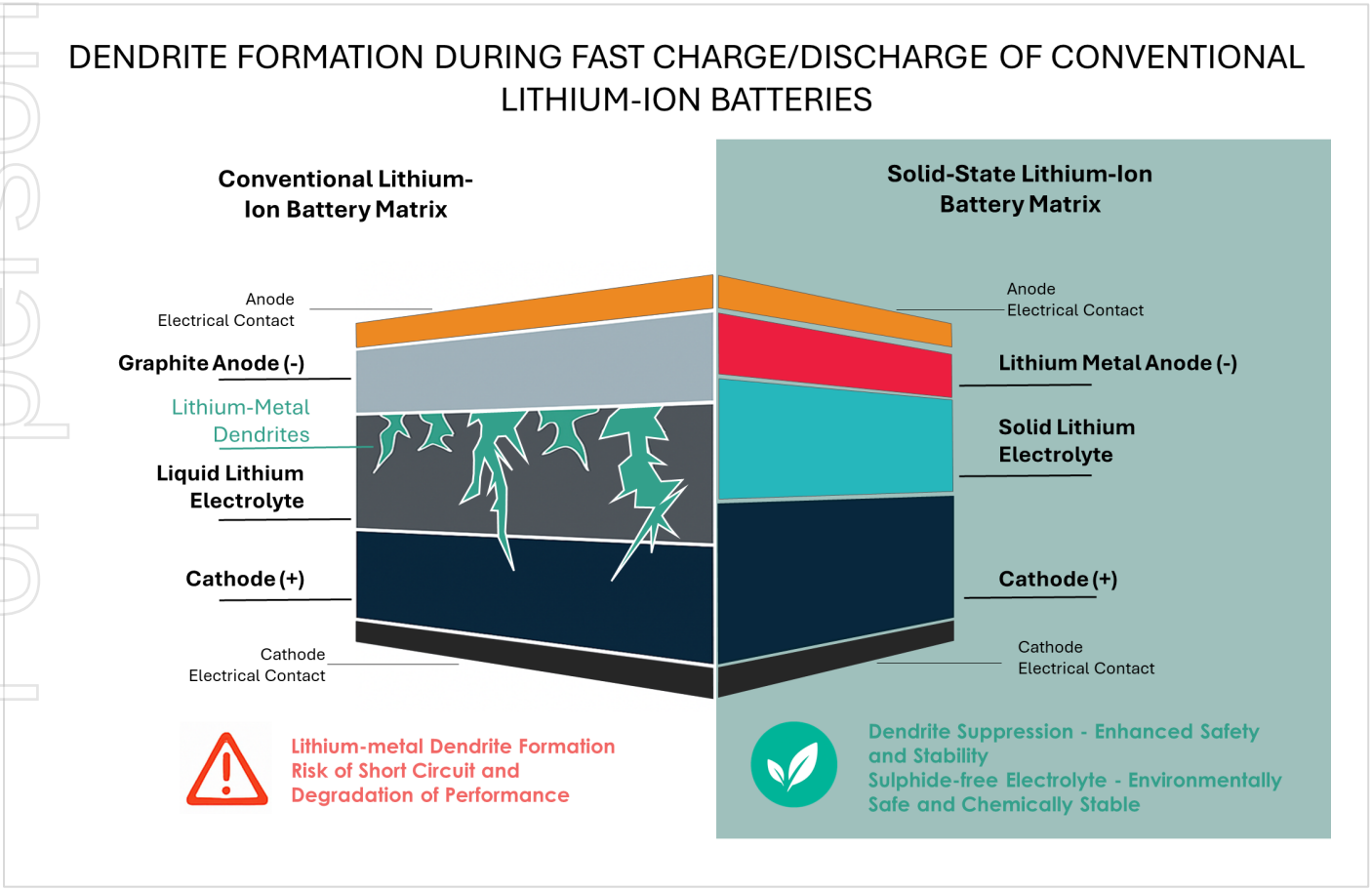


***Figure 2*** - *Dendrites are microscopic, needle-like lithium metal formations that can cause severe damage, including internal short circuits, capacity degradation, and safety risks like thermal runaway between battery cells.*

## WHY THERMAL STABILITY MATTERS

Lithium-ion battery cells work best within a narrow temperature band. Individual cells over-heat because of fast charging, high power draw or warm environments, the liquid electrolyte and cathode–electrolyte interface breaks down, internal resistance rises, and capacity fades faster. The SDM technology has engineered solid-state lithium-ion electrolytes to retain conductivity at elevated temperatures, widening the safe operating window.

In practice, that means battery cells stay efficient and predictable under heavy load, increasing the safety and performance and life cycle of the batteries with a real-world application for:

- Commercial and industrial grids
- High-density data centres
- Aerospace and transportation
- Communications and edge-computer systems
- Remote microgrids and more

## NEXT STEPS

Critical Resources' lithium battery strategy centres on validation of SDM's solid-state patents. The near-term program prioritises:

- **Validation:** replicate elevated-temperature performance and dendrite suppression against incumbent baselines.
- **Prototyping:** build coin/pouch cells combining the licensed electrolytes and interfaces; test high-rate/thermal duty.

During the option period, the Company will provide further details on the next steps for integrating SDM technology and collaborating with Dr Smirnova's team to advance this strategy.

Upon successful evaluation, the Company may advance negotiations for a licence agreement to secure access to the technology and accelerate its integration into future growth initiatives. This will run in parallel with the Company's Mavis Lake and other priority projects, reinforcing its commitment to innovation and delivering shareholder value through critical minerals development.

## KEY TRANSACTION TERMS

Critical Resources has secured a 12-month exclusive option with the South Dakota School of Mines & Technology (SDM) to evaluate and, subject to exercise, negotiate a licence to SDM's solid-state battery technologies. The option introduced through the Company's corporate advisor 62 Capital Pty Ltd, grants exclusive evaluation rights worldwide in the defined Option Technology (solid-state lithium battery nanocomposites, including polymer-ceramic hybrid electrolytes and related architectures) (**Appendix-A**) and prohibits SDM from licensing the Option Technology in that field and territory during the Option Period.

The option permits "make, have made and use" for evaluation only (no sale or import of Products) and requires the provision of data and any Derived Works to SDM; SDM retains ownership of the Option Technology and Derived Works. If the Company elects to exercise the option, the parties will have up to three months to negotiate a definitive licence on commercially reasonable terms.

The evaluation program is subject to standard confidentiality, export control and sanctions covenants, patent cost reimbursement during the Option Period, and U.S. Government Bayh-Dole Act where applicable.

Key commercial and operational safeguards include a single approved contract manufacturer route for "have made" activities (subject to SDM approval and confidentiality protection), Company liability for contractor acts, and a five-year post-term confidentiality period (trade secrets protected until no longer qualifying). Either party may terminate for material breach with a cure period; the agreement is governed by the laws of the State of South Dakota.

- **Option fee:** US$5,000 on signing for a 12-month Option Period and may be extended up to six-months.
- **Exclusivity**: The option grants exclusive evaluation rights worldwide. SDM will not license the Option Technology in the Option Field/Territory during the Option Period (subject to U.S. Government rights).
- **Evaluation rights**: Make/have made/use for evaluation only. No commercial sale/import permitted during the Option Period.
- **Data and ownership**: Company must deliver data and/or derived works to SDM. SDM retains ownership of the Option Technology and Derived Works.
- **Patent costs**: Company reimburses reasonable SDM patent prosecution and maintenance costs during the Option Period.
- **Compliance**: The Company covenants it is not a Restricted Party and must comply with applicable U.S. export control and sanctions laws; breach is a material breach. Any U.S. Government funding interest in inventions creates a government licence as required by U.S. law; licences will be subject to those rights.

**This announcement has been approved for release by the Board of Directors of Critical Resources.**

To receive alerts for ASX announcements and updates sign up at **www.criticalresources.com.au** or for further information please contact us directly at:

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## Appendix – A

South Dakota School of Mines & Technology - Intellectual Property (IP)

| Technology area | IP name (short) | Jurisdiction / Status | Identifier (grant / app no.) | Focus & benefit |
|---|---|---|---|---|
| Elevated-temperature solid-state electrolyte (SSE) | Lithium-halide / antiperovskite glass-ceramics | US (Granted) | US 10,991,976 B2 (from US16/413,290) | High ionic conductivity at heat; dendrite suppression; wider safe operating window |
| Elevated-temperature solid-state electrolyte (SSE) | Lithium-halide / antiperovskite glass-ceramics (companion) | US (Granted) | US 11,276,880 B2 (from US16/589,429) | Materials/processing claims reinforcing thermal stability and manufacturability |
| Scalable SSE processing | Microwave-enabled synthesis of antiperovskite glass-ceramics | US (Pending) | US 18/889,068 | Rapid, energy-efficient synthesis; higher purity; scale-ready processing |
| Cathode/interface engineering | Polyoxometalate-functionalised cathodes (POM) | US (Granted) | US 11,955,626 B2 (from US17/404,796) | Mixed ionic/electronic pathways; lower interfacial resistance; better high-rate performance |
| Conductive polymer composites | Self-organised PEDOT nanocomposites | US (Granted) | US 11,111,586 B2 (from US15/439,585) | Robust, conductive matrices for energy/sensing; thermal/chemical resilience |
| Conductive polymer composites (methods) | Catalyst-free fabrication / clean by-product removal | US (Granted) | US 11,905,609 B2 (from US17/394,711) | EHS-friendly, cleaner, scalable manufacturing; cost and yield advantages |

## ABOUT CRITICAL RESOURCES LIMITED

Critical Resources Limited (ASX:CRR) is a gold-antimony-lithium explorer with assets in Canada, Australia and New Zealand. The flagship Mavis Lake Lithium Project in Ontario-Canada anchors the battery metals focus, complemented by the Halls Peak gold-antimony and base metals projects in New South Wales-Australia and gold–antimony projects centered in the Otago region – New Zealand. This diversified portfolio positions the Company to create value through critical minerals supply chain, with exposure to the rising gold market.

The Company's Mavis Lake Lithium Project, located in Ontario, Canada has defined a maiden inferred resource of 8 million tonnes at 1.07% $Li_2O$, with significant potential to expand this resource.

The Halls Peak Base Metals Project is located ~87km south-east of Armidale, New South Wales, Australia. The Company has defined a maiden Inferred Mineral Resource of 884,000t @ 3.7% Zn, 1.5% Pb, 0.4% Cu, 30g/t Ag and 0.1g/t Au. The Halls Peak Project area includes two advanced antimony-gold prospects – Mayview and Amoco.

Halls Peak – Gibson Base Metals Project - Mineral Resource Estimate

| Halls Peak Project JORC Classification | Zn Cut-Off grade (%) | Tonnage (Mt) | Zn (%) | Pb (%) | Cu (%) | Ag ppm (g/t) | Au ppm (g/t) |
|---|---|---|---|---|---|---|---|
| Indicated | - | - | - | - | - | - | - |
| Inferred | 2.0 | 0.84 | 3.7 | 1.5 | 0.44 | 30 | 0.1 |
| **Total*** | **-** | **0.84** | **3.7** | **1.5** | **0.44** | **30** | **0.1** |

*Reported at a cut-off grade of 2% Zn for an open pit mining scenario. Estimation for the model is from the generation of a rotated block model, with blocks dipping 55° >330°. Classification is according to the JORC Code Mineral Resource categories. Refer to the ASX:CRR announcement 30 June 2023.

Mavis Lake Lithium Project - Mineral Resource Estimate

| Mavis Lake -Lithium Project JORC Classification | $Li_2O$ Cut-Off grade (%) | Tonnage (Mt) | $Li_2O$ (%) |
|---|---|---|---|
| Inferred | 0.3 | 8.0 | 1.07 |
| **Total*** | | **8.0** | **1.07** |

*Reported at a cut-off grade of 0.30% Li2O for an open pit mining scenario. Estimation for the model is by inverse distance weighting. Classification is according to the JORC Code Mineral Resource categories. Refer to ASX:CRR announcement 5 May 2023.

**PREVIOUSLY REPORTED INFORMATION**

This document contains information relating to the Mineral Resource estimate for the Mavis Lake Lithium Project, which is extracted from the Company's ASX announcement dated 5 May 2023 and reported in accordance with the 2012 JORC Code and available for viewing at criticalresources.com.au. The Company confirms that it is not aware of any new information or data that materially affects the information included in the original announcement and that all material assumptions and technical parameters underpinning the Mineral Resource estimate continue to apply and have not materially changed.

This information in this ASX Announcement that relates to the Halls Peak Mineral Resource Estimate is extracted from the ASX market announcement dated 30 June 2023 and reported in accordance with the 2012 JORC Code and available for viewing at criticalresources.com.au. The Company confirms that it is not aware of any new information or data that materially affects the information included in any original announcement and that all material assumptions and technical parameters underpinning the estimates in the original market announcement continue to apply and have not materially changed.

**FORWARD LOOKING STATEMENTS**

This announcement may contain certain forward-looking statements and projections. Such forward-looking statements/projections are estimates for discussion purposes only and should not be relied upon. Forward-looking statements/projections are inherently uncertain and may therefore differ materially from results ultimately achieved. Critical Resources Limited does not make any representations and provides no warranties concerning the accuracy of the projections and disclaims any obligation to update or revise any forward-looking statements/projections based on new information, future events or otherwise, except to the extent required by applicable laws. While the information contained in this report has been prepared in good faith, neither Critical Resources Limited or any of its directors, officers, agents, employees or advisors give any representation or warranty, express or implied, as to the fairness, accuracy, completeness or correctness of the information, opinions and conclusions contained in this announcement.