SECTION A. Project Title: Demonstration of an Idaho Based Antimony Trisulfide Domestic Supply Chain

SECTION B. Project Description and Purpose:

The Department of Defense (DoD) has initiated this project to establish a domestic supply chain for antimony trisulfide, which is crucial for defense applications. Advanced Technology International (ATI), managing the Defense Ordnance Technology Consortium (DOTC), issued a request for proposal to Perpetua Resources Idaho, Inc. (Perpetua Resources) to include the shipment, assembly, commissioning, and operation of a flexible, modular pilot plant. This pilot plant would validate the technology and ability to produce streams of concentrate such as antimony trisulfide for antimony sulfide and pyrite concentrate that contains gold from stibnite ore. Stibnite ore is sourced domestically through Perpetua Resources Idaho, Inc. Stibnite ore is the primary source of antimony trisulfide, a sulfide mineral containing a significant amount of antimony. Establishing a domestic supply chain for antimony trisulfide is important for national security. Additionally, a secondary pyrite concentrate stream containing gold for Department of Energy (DOE) National Laboratory partnership in supporting United States industry to establish stable domestic supplies of critical materials.

This Idaho National Laboratory (INL) project will collaborate with Perpetua Resources (lead organization) to verify and validate the pilot plant and the technology to generate a pyrite concentrate and an antimony sulfide concentrate. The pilot plant consists of rock crushing/comminution equipment, a froth flotation circuit, and associated infrastructure such as Conex containers to process stibnite ore and produce concentrates of interest. There are no known radioactive components in the ore.

Location:

The project will require 0.5 - 1 acre of land to place the Conex containers that will hold the pilot plant operations. The project will find an existing pad/site that requires no disturbance of soil or vegetation. Potential locations within the INL site for the project include:

- Figure 1: CF-664 Storage Building.
- Figure 2: Location west of IF-663.
- Figure 3: Location north of IF-603 or INL Research Center (IRC).
- Figure 4: IF-685 or Energy Systems Laboratory (ESL) Backyard.

Figure 1. CF-664 Storage Building

Figure 2. Location west of IF-663.

Figure 3. Location north of IF-603.

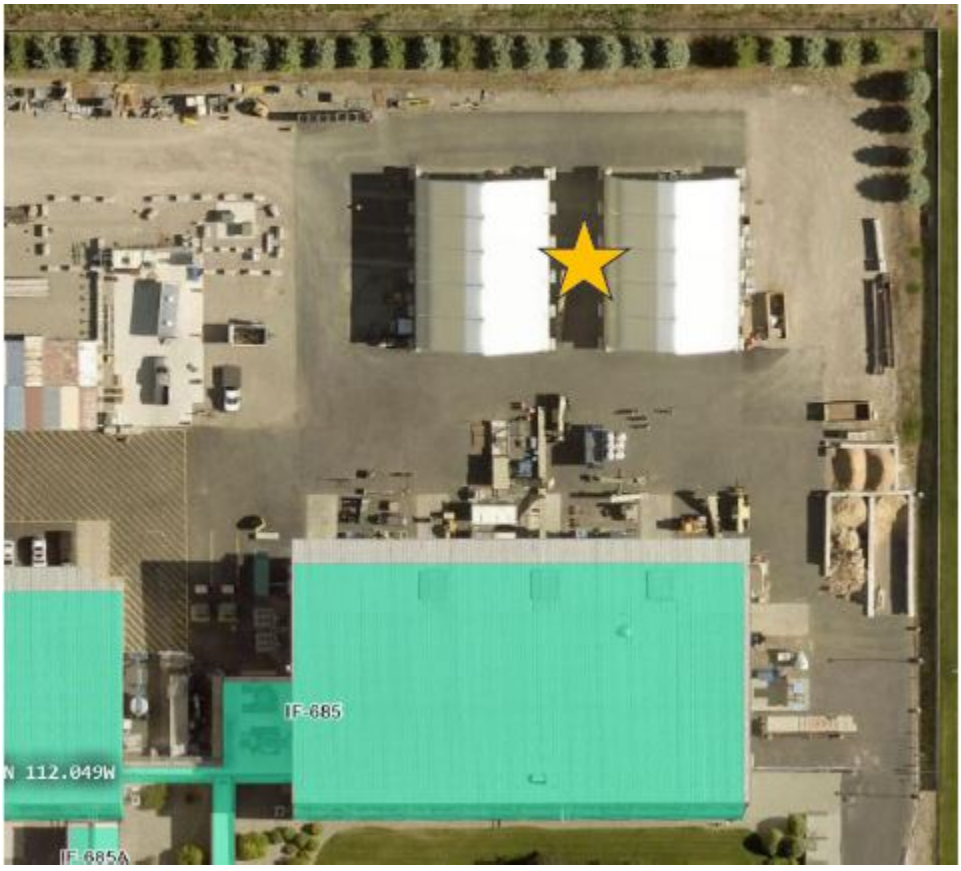

Figure 4. IF-685 Backyard.

The final location will be determined based on project requirements and site suitability.

Equipment Purchases:

INL will purchase one 10-yard container and sufficient supersacks and containers to package all byproducts for shipment back to Perpetua Resources. A fabric tent structure may also be purchase depending on the final location. A diesel generator will be rented for power.

Project Tasks:

Task 1. INL Perform Site Preparation and Permitting

- Obtain and maintain all necessary permits (local, state, federal) for on-site work.
- Rearrange existing equipment to create space for the pilot plant and ancillary equipment at the chosen site.
- IF ESL is selected for location, INL will use the existing asphalt pad and shelter at the ESL site for winter operations. If ESL is not a viable location, INL will perform at the CFA site locations and operate with a fabric structure for winter.
- Power will be supplied via a diesel-powered generator.

Task 2. Prototype Pilot Plant Assembly and Commissioning

- INL will receive purchased CONEX containers and rent heavy equipment and a diesel-powered generator.
- INL staff and subcontracted services will be responsible for unloading both the components of the pilot plant and the raw stibnite ore that will be processed in the modular plant.
- INL will receive 110-120 cubic yards of stibnite ore solids from Perpetua Resources in the form of drill cores to be comminuted (ground and processed) in the pilot plant (grinded). Drill cores are intact, cylindrical solids that result from drilling into an ore body. The assay data from the drill cores determined that there were no Uranium (U) and Thorium (Th) reported.
- INL will not receive Mine tailings or any Resource Conservation Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) materials for the project.
- INL will commission the modular pilot plant to produce four concentrate byproduct streams from Stibnite ore:
    - Antimony-rich stream that contains 90-95% antimony sulfide for Perpetua Resources to further process via liquation to produce antimony sulfide product for DOD United States Army. The process stream will be shipped back to Perpetua.

- Pyrite stream containing the pyrite fraction which includes the critical material gold. This stream will be shipped back to Perpetua Resources.
- Processed ore material (gangue) will be filter pressed, stored in supersacks or other suitable containers and shipped back to Perpetua.
- Process water which will be captured and shipped back to Perpetua.

The Stibnite Ore bench composite analysis is shown in Figure 1 below. There was no reported mercury. Soluble arsenic was present but it is tied up in the crystalline structure of the ore. Further process materials include the following:

- Lime (25 kg)
- Sodium Cyanide (20 kg)
- Methyl Isobutyl Carbinol (MIBC) (5 kg)
- Copper Sulfate (30 kg)
- Potassium Amyl Xanthate (PAX) (20 kg)

13183 Bench Composite Head Analysis

HRI	Sample ID	Analysis								
		Sb		Fe	Pb	S	As	Au		
		%						mg/kg		
56238-1	Pilot Composite	2.8	2.7	1.28	<0.005	2.05	0.164	2.67	2.69	2.69

Note: Au assayed in triplicate, Sb duplicate

Figure 1. Pilot Composite Head Assays of Stibnite Ore.

Task 3. Prototype Pilot Plant Validation

- INL will perform continuous runs to concentrate, analyze samples using X-ray Fluorescence (XRF), and process the ore. The modular pilot plant will use chemicals (e.g., sodium hydroxide, frothing agent, sodium cyanide at ~2 mM to 200 mM concentrations, etc.). Primary chemical containers will be stored in secondary containment. Reagents will be pumped from primary containers to the modular pilot-plant using in-line chemical pumps integral to the modular pilot-plant.
- INL will manage byproduct streams and process water according to regulations.
- Most byproducts/samples will be shipped to Perpetua Resources to study, analyze, and then be dispositioned for off-site evaluation.
- INL will use the rest of the samples to be re-used in the modular pilot plant.

Task 4. Prototype Pilot Plant Decommissioning and Removal

- INL will decommission and remove the pilot plant after successful runs.

Waste Generation:

INL:

- **Industrial Waste**: Incidental PPE and wipes (non-hazardous materials only) estimated at <150 lbs.
- **Hazardous Waste**: Potential chemical waste, estimated at <300 lbs. dry solids and <55 gallons liquids.
- **PPE and Wipes**: Non-hazardous PPE and wipes disposed of in non-hazardous trash.
- **Radioactive Waste**: None anticipated.
- **Other Waste**: No low-level, mixed, or TRU waste expected.

Emissions:

- The project will emit exhaust from the diesel-powered generator and heavy equipment (skid steer and telehandler). The diesel-powered generator will operate for 6 months, 5 days a week and 24 hours.

- The rock comminution will operate daily with 1 ton/24 hours. The stibnite ore will be ground to approximately 50 microns on average in the crusher unit. WestPro Mining providing the Conex containers will need to include dust suppression technology for dust emissions. The process of dust mitigation is unknown currently.

Power/Energy Usage:

- For power, using the diesel generator is preferred to avoid complications with the Idaho Fall's, ID city's North Loop energy usage that is maxed-out and the challenges of extending power to ESL. If another location is chosen at the INL site, power needs will be sourced to CONEX containers or the generator will be utilized.
- For water, poly tanks will store water with a projected usage of 10 GPD, sufficient for a few weeks before refilling via a water tender. The plan is to recycle process water using a catch tank and solids settler. If recycling is not feasible, 1,500 to 1,800 gallons of water will be captured and returned to Perpetua.

Discharge of Water:

- Once the ore is ground, it is mixed with water and chemicals to create a 35% slurry. During the froth flotation process, chemicals cause certain minerals to float to the top as "soap suds," which are then collected. The leftover ore, called gangue, and the concentrated minerals are dewatered using a filter press. The water used in the process is recycled, but some is lost to evaporation and within the solids. After the final processing, the remaining water and solids are collected, with the water being containerized and stabilized for shipment back to Perpetua. There will be no discharges at ESL as plant solids/liquids will be captured, and staff will use existing ESL facilities. If project is operated at the INL site locations, staff trailers will necessitate addressing sanitary sewage and infrastructure.

INL waste will be managed by Waste Generator Services in accordance with laboratory procedures.

Perpetua Resources:

- No waste expected besides shipping waste.

Activities at Perpetua Resources are performed according to the facilities compliance management and environmental protection requirements (https://perpetuaresources.com/wp-content/uploads/ESG-Policy.pdf).

All off-site partners will comply with their local procedures and state/federal regulations as identified in contract agreements.

SECTION C. Environmental Aspects or Potential Sources of Impact:

Air Emissions

The project will emit exhaust from the diesel-powered generator and heavy equipment (skid steer and telehandler). The diesel-powered generator will operate for 6 months, 5 days a week and 24 hours.
The rock comminution will operate daily with 1 ton/24 hours. The stibnite ore will be ground to approximately 50 microns on average in the crusher unit. WestPro Mining providing the Conex containers will need to include dust suppression technology for dust emissions. The process of dust mitigation is unknown currently.

Discharging to Surface-, Storm-, or Ground Water

NA

Disturbing Cultural or Biological Resources

Cultural: A preliminary assessment of the scope of work provided for this undertaking determines that the CRMO does not have adequate scope to assess effects for this proposed undertaking and cannot complete the Section 106 process at this time. However, conducting nondestructive project planning activities before completing Section 106 is not prohibited, as long as such actions do not restrict the subsequent consideration of alternatives to avoid, minimize or mitigate the undertaking's adverse effects on historic properties (36 CFR 800.1(c)). See Hold Points for additional information.

Generating and Managing Waste

When wastes are generated, how they are disposed can adversely affect the environment. Managing wastes appropriately and responsibly and implementing recycling or reuse practices, where feasible, during project activities can reduce the potential impact on the environment.

Releasing Contaminants

When chemicals are used during the project there is the potential for spills that could impact the environment (air, water, soil).

Using, Reusing, and Conserving Natural Resources

Project activities have the opportunity to reduce the impact on our natural resources by recycling or diverting materials from disposal in the landfill.

SECTION D.	**Determine Recommended Level of Environmental Review, Identify Reference(s), and State Justification:** Identify the applicable categorical exclusion from 10 Code of Federal Regulation (CFR) 1021, Appendix B, give the appropriate justification, and the approval date.

References: B1.15 "Support buildings", B3.1 "Site characterization and environmental monitoring"

For the DOE procedures regarding categorical exclusions, including the full text of each categorical exclusion, see 10 CFR 1021.102 and Appendix B to 10 CFR Part 1021, and also Section 5.4 (Applying one or more categorical exclusions to a proposal) and Appendices B and C of DOE's National Environmental Policy Act Implementing Procedures (June 30, 2025).Requirements and guidance in 10 CFR 1021.102 and DOE's NEPA Implementing Procedures: (See full text in regulation and in Implementing Procedures)
The proposal fits within a class of actions that is listed in Appendix B to 10 CFR Part 1021 or Appendix B and C of DOE's NEPA Implementing Procedures (June 30, 2025).To fit within the classes of actions listed in Appendix B to 10 CFR Part 1021, or Appendix B of DOE's NEPA Implementing Procedures, a proposal must satisfy the conditions that are integral elements of the classes of actions in Appendix B of both 10 CFR Part 1021 and DOE's NEPA Implementing Procedures.
There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal. DOE or an applicant may modify the proposal to avoid reasonably foreseeable adverse significant effects such that the categorical exclusion would apply.
The proposal has not been segmented to meet the definition of a categorical exclusion. [Note: For proposals that fit within the categorical exclusions listed in Appendix C of DOE's NEPA Implementing Procedures, see DOE's notice of adoption for the subject Appendix C categorical exclusion for additional considerations. DOE notices of adoption for other agency categorical exclusions may be found on DOE's Section 109 webpage.]
Based on my review of the proposed action, as NEPA Compliance Officer, I have determined that the proposed action fits within the specified class(es) of action, the other requirements and guidance set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

Approved by Robert Douglas Herzog, DOE-ID NEPA Compliance Officer on: 6/25/2025