In 2021, **CANADA** developed a list of 31 MINERALS AND METALS deemed critical to developing a low-carbon economy, maintaining domestic industry and security, and providing exports to our global partners. Called "critical minerals" these minerals and metals are, or can be, produced in Canada. They are necessary for:

- Renewable Energy Technologies
- Manufacturing
- Aerospace and Defence
- Information and Communications Technology
- Agriculture
- Health and Life Science Applications
- Infrastructure

7b- 4Λ 2021 65ρ4·, 6αC δρβαλα"Φ 31 νσ54·λσ' Γα 9~σ⁺νοβυρ² ΡΓ⁺ΔρΔ·δΓσ⁴, Γα ΓΣΓCL9Lbρ² ΓϤϧ∾Δ·ϹLΔ·Ϲ· ϧΔ·ϹͽΡΓϽϤ··. ΔʹͿσϧͶϤ·϶ ϧϷϹ<ΠͰϤ·· νσσιτο', Þ9·σσι' νστσιτο' Γο Λσιλου, συς Γο CPPC ▷ΛՐԵՍՎՉ ΘαC Ϥ"Ρ'. CP Δα<ΓΓΕΝΙΦΟ C":</p>

- ΛΓΥΔ·σ9Δ·α) Γα αCLζΔ·) • Δ·CL9Δ·) Γα LΓΡϽΔ·α) ϧΡΓΦΦΡΙϧρ
- bUdV· dqσ₂
- Γροδο σσυρόδος συργού
- Γις Οισοροίο

Mining Makes It Happen! 42694.6, PULPS CPULULP94.1

MADE IN CANADA **P**ወር **4"**b, **bbLb\underline{\under**

TAKE TO THE SKIES AUNTY PAGSALPOUY

BEFORE AN AIRCRAFT TAKES TO THE SKIES. EXPERTISE GOES INTO ITS DESIGN, CONSTRUCTION, AND OPERATING AND SUPPORT SYSTEMS

According to the Aerospace Industries Association of Canada, Canadian companies' cutting-edge innovation and technology have that covered.

Critical minerals are essential to the aerospace industry, going into the wide range of products made in Canada, including regional, business, and firefighting aircraft; helicopters; and satellites.

Also produced are numerous aircraft parts, including engines, navigation systems, specialty alloys, landing gear, air traffic control systems and equipment, computer equipment and software, defence systems, simulation and modelling technologies, and more.

Aluminum, Antimony, Chromium, Cobalt, Copper, Graphite, Gallium, Germanium, Indium, Lithium, Magnesium, Manganese, Molybdenum, Nickel, Platinum Group Metals, Scandium, Tantalum, Tin, Titanium, Tungsten, Vanadium, Zinc

 $d\sigma L\cdot 4$ $\Lambda\Gamma \wedge \Delta \cdot \rangle$ $\Delta \omega Lb \wedge \Delta^{\upsilon} \Lambda \Gamma \wedge ,$ $\Lambda \omega L$ $\sigma b \rangle$ $b \rho q C \wedge d \cdot \neg$ **Ρ**Cσ dቦጋα

ΓΟ' ΤΡΟΦ- ΔΙ ΒΛΟΙΦ- ΛΓΥΔ. ΛΙΡΦΦ. ΡΓΓΦΡΟΤΦ- ΡΓ ΡΦΟ. δοΠὸ^ο ΡCΦΡ^ο δρορCΙα⁻⁻ Δ·αα· ΡΡ9Cαα· 9√Ρ√Οα⁻⁻.

 $\text{LLAU-VAG POC 4...P PCNDNLPD'}, \ \text{LLAU-CALP}, \ \text{LLAU-C$

dddbρρα<<0.000 Γα βαλασουρίουρο βλουρού, Γα βλλο ασώντι.

<5PTQC, <1>PLYSC, <2PTYC, L>bση, L.<Δ'Uας, Δ.Ληρωσλ, bLυbΔ.Λβρν ΛΔ.Λαν, ηδνΠλς, CνC<δς, Πν, CνUσλς, כאיטראי, <פרואלי, אאי

A CLEAR MESSAGE <>U A.CL9A.

THE 21ST CENTURY HAS SEEN AN **EXPLOSION OF INFORMATION AND** COMMUNICATIONS TECHNOLOGY (ICT) **USAGE AROUND THE WORLD**

Numerous critical minerals go into the equipment that transmits and receives communication and data signals. From cables to broadcast towers to networks that send radio signals, critical minerals are integral to their makeup. The electronic devices designed to receive those signals comprise numerous critical minerals that enable high-speed performance and data, along with vivid, high-resolution screens.

Aluminum, Cesium, Cobalt, Copper, Gallium, Indium, Lithium, Magnesium, Manganese, Nickel, Platinum Group Metals, REEs, Tantalum, Tellurium, Tin, Tungsten, Zinc

らさくてい しょ∆・PL

Δ·σηγιστρ, Γυδοσό, Γσ σιστάσιος, Μυσιστάσιος, Γσ Κοδυρσό ΓΦ ΓΡΓΑΡΦΟΡΊΡΟ ΦΟΚΙΑΟ ΑΝΤΙΡΘΟΊ, ΑΓ ΡΦΟΦΑΟ ΒΡΟΚΠΙΑΟ ΑΦΡΑΙΤΟΎ A< LLP ALLOYOUS LS becomes an appropriate the contraction of the co Γ<>υαδιρι ΕναυνγοαΛοί.



Industry contributed

76· 2020 65ρ4·, 65Ω5? ΛΓ4Δ·σ9Δ· $dop\Delta \cdot \sigma' p$

OVER \$22 BILLION TO CANADA'S GDP

√√√ \$22 ∧≤Δ√ bac

OVER 207,000 JOBS TO THE CANADIAN ECONOMY

96/ **207,000** 40P"AV.0.0 PDCCLPDQO DL POC





According to the Canadian Wireless Telecommunications Association, in 2020, that industry contributed

 $b\nabla b \Delta d \cdot \nabla \partial \partial \cdot \nabla d \cdot \nabla \partial \partial \cdot \nabla d \cdot \nabla \partial \partial \cdot \nabla d \cdot$ LΥΡΟΔ·Φ) PLLΦ·ΦPCTΦ-. 1P--2020. ⊳Р<Р∩ФФ∢•

UP TO \$70.7 BILLION TO CANADA'S GDP

Δdσ,

\$70.7 ∧≤∆>> bac ~σ59Δ· <9·σ9Δ·



600,000 doρΔ·α)

PEDAL TO THE METAL **DCくつり βΡΓΡ**Δ"ΔC•

₽⊅∪ን ∾۵۶۵∇・۵

THE CANADIAN ECONOMY

1,358,657 VEHICLES The Canadian Vehicle Manufacturers' Association stated this number of vehicles was produced in Canada in 2020, contributing over \$16 billion to the GDP.

AUTOMOTIVE MANUFACTURING IS VITAL TO

1,358,657 **▷C<ō५**`

Γσσ' bρρν"ΔC· DC<σ5' DL baC 4"P' 76- 2020, ∇ρρρ Δ·Λ"Δ∇·ԿLb' ⊲⊲·Λ" \$16 Λ<Δ>> ~σ>٩Δ· <9·σ9Δ·.

OVER 500,000 JOBS

The auto industry is responsible for direct and indirect jobs across Canada. Vehicles are Canada's second largest export by value.

«م٠۵٩مه 500,000 ۲۵۰ه

 $\mathsf{bP}\mathsf{\Gamma}\mathsf{L}\mathsf{bP} \mathsf{\Gamma}\mathsf{r}\mathsf{\nabla}\mathsf{\cdot}\mathsf{b}\mathsf{\Gamma} \mathsf{'} \mathsf{bac}. \; \mathsf{DC}\mathsf{<}\mathsf{a}\mathsf{'}\mathsf{b} \mathsf{'} \mathsf{bp}\mathsf{J}\mathsf{''}\Delta\mathsf{c}\mathsf{\cdot} \; \mathsf{DL} \; \mathsf{bac} \; \mathsf{d}\mathsf{''}\mathsf{P} \mathsf{'} \; \mathsf{\sigma}\mathsf{J}\mathsf{'}\mathsf{a}$ Ld- ΓC"∆ <<b d"P b▷Ր~σታb⊅d·\.

The automobile industry relies on critical minerals. Transitioning to environmentally friendly vehicles demands lighter auto bodies and parts using high-strength steel and aluminum alloys. Cleaner transportation uses electric or hybrid vehicle batteries, which require numerous critical minerals.

Aluminum, Antimony, Chromium, Copper, Graphite, Lithium, Magnesium, Manganese, Nickel, Platinum Group Metals, REEs, Scandium, Tellurium, Tin, Vanadium, Zinc

ΦC<Φ5' bΦΓΦΛ"ΔC· ΦΓΦ<ΓΓΒΟΦΘ ΒΡC<CΠΖΦ- ~σ5ΦΖΦ'.</p> Γ ΛϤ·Λⅆ϶. ∇ϧ ϧϪ·ϭ<ϞϥͰϼϧͽ ͼϒͰϒΠϦͽ ϭϹ<Φ ϒͰϟϔ·ϭ϶ Ϥ<Ϧϧϯ Δυσυ αις βαζληνες. σσελί, δρ. ΔΕ δρι βν. Δε. α α β bPC<CNYd™ ~σ>dYdYo\.

ΦΕΡΓΦς, ΦΌΠΡΟ, ΝΕΡΓΡΟ, ΒΕΡΕΝ, ΝΕΦΕΡΙΘΟ, ΕΝΘΕΡΙΘΟ, ΕΝΘΕΡΙΘΟ, ΦΕΡΓΡΟΘΟΣ, bLºb⊲·Λbρ> Λ⊲·Λσ>, ∇b αΛ⁻ bCb·ρ> ⊲"ρ\, ^b>∩>ς, U≤>≥Δ>ς, ∩>,





CANADA'S MINERALS AND METALS SECTOR CONTRIBUTES, NOT ONLY TO THE SUCCESS OF OUR OWN ECONOMY, BUT ALSO TO ECONOMIES AROUND THE WORLD. Natural Resources Canada states that the sector supplies ores, concentrates, and semi-fabricated and fabricated metal and mineral products to over 100 countries.

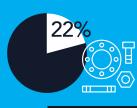
bac ላ"ף\ \sim σታላ \cdot ታσ $^{\prime}$ Γα Λ \cdot Λ \cdot Λ $^{\prime}$ bbr $^{\prime}$ 2bup> br<የበσ6ሀ, $^{\prime}$ 6 $^{\prime}$ 7C rbrг $^{\prime}$ 24 $^{\prime}$ 4 $^{\prime}$ 5 $^{\prime}$ PΔΡϽϤ·\ ÞΛΓ<ΡΠΦΦϤ· ϤͰΦ' ϷϷΓ ∾ΦΫΡΘΦΦΦ', ϷϷͳΓΡΥΓΡΟΤΡΟ Fa b>r>√rbup ∧4·∧∂ Fa 4/σb' b>nσbup ∇·n 44·√7 100 < 4"P).

OF CANADA'S TOTAL \$582 **BILLION OF EXPORTS IN 2021,**

\$127 BILLION were metal and mineral products.

bac 4"P\ Fod\ \$582 **4**σ**94**C**4**·**U**P),

\$127 ∧<∆>> c5·∧\ **4** ላሪ የተመሰው የተመ



CANADA'S PRINCIPAL TRADING PARTNERS FOR MINERAL COMMODITIES IN 2021: bac d"P' Lbc **ρ∇-C**δ**ΓΓα- ΓΓαρ-СС**ΕΩ**Ο-αν ΣΓ να-ν**

Kingdom States Γσσ' Δ≥ΝΑΡ b>Cc ⊲PFb, taky aprb,

Other significant markets for Canadian metals and minerals include China, Japan, South Korea, Germany, Norway, and Switzerland.

dCb>, pplacl∆·d·_ pr pσc va·va, lσ aha, Δ·U ^ινα, ι<>, ω•>Δ>, ι<σ, α.>∇· Γα °Δ.>σ"ρ».

CANADIAN CRITICAL MINERALS 60050 6PC<074- 0054.70

Canada produces and supplies domestic and global markets with a variety of critical minerals. Canada is the leading global producer of potash and ranks amongst the top five global producers for aluminum, cobalt, indium, niobium, palladium, platinum, tellurium, titanium concentrate and uranium. Canada also hosts many advanced mineral projects, including for key commodities such as rare earth elements, lithium, and vanadium.

ρσς Δ"Ρ, Ρυσροσή, Δρυρλ"Δς. Εσ ρυςΓροσή ΡΓ Λ%- Εσ ΕλΔ.ΡΕ, <.C" Γα Φραραγγρό αγού γιδριν ρουργιρουν α≤ργας, α<.€/, Δυργς, ακλγς, «Α"Ρ\ ΡΓΥΔΕΝΟΘΌ ΓΛΌ·\ ΛΟ·Λάδα Φαρλός) Γα Δοίσού Ελε 9άαν δααναβύθη Ͻϧͻ Δρ σν- ρλδο, ≼∇υλς Γσ <συλς.

CANADA ALSO MANUFACTURES AND EXPORTS PRODUCTS THAT INCORPORATE CRITICAL MINERALS bac 4"P' Fa Drdsrbudo Fa 46LP' **ላ** ወይ የተመሰው የተመሰ

Vehicles were Canada's second largest export by value in 2020, totalling \$42.9

PC<05' PL bac 4"P' **βΡΡΓΡ**Λ"ΔC∙ σ∞• σβσLβ³ **ዻ**ላይ የተመሰው የ ¬ь•¬ 2020, LL°

\$42.9 A=A>> C5.A> የ∾**σ**ኑ٩Lbን



<ኮን **ძ"**ף\ ხσ**ኦር**ላ•UPን Δ•CL9Δ•ን La TL60749 PPL40blPbb 1P-2021 PNG79Lb2

\$9.7 ∧≤Δ50 ς5.Λ\

Relating to zero-emission goals, a 2021 ranking by Bloomberg's clean energy, new predicts that Canada will be in fifth place in the global lithium-ion battery supply 2026 chain by 2026.

The Canadian aerospace manufacturing

industry exported over 75% of Canadian

aerospace products to 186 countries

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ΔL 6 ΦΙΕΡΔ· ΠΥΡΘΔ·Φ"ΡΟ ΤΕ- 2020.

9da> bpb/rbup> p/A·rbu4> 186 4"pb\

across 6 continents in 2020.

∇Ь∙ ▷∇∙ ∇Ь ΓΔ∙σΓ9LЬ՝ <"U ЬЬ9∙UΛσЬU`, 7b- 2021 ΔL '≤><>> bPN<PP9<> ∇b bΔ·σP9LbP> ▷⁰₽Ϥ<∩Րϧϭͻ Ϲϭ ϷϭϭϹΫ∙ ϧϤϧϼϦϧ ϷϤ<Ϲϧͻ DL bac 4"P sta. PLa94s bac Γ 2 ∇ .b Γ 1 PDLPP = PDLP =



CARING FOR THE PLANET

 Δ P σ Δ ·CP· $, \Box$ D

CLIMATE CHANGE IS CONSIDERED ONE OF THE BIGGEST THREATS FACING OUR WORLD 60 AS ADSCO' ACTO VOBEL LOT OF 6 ασλοσCΓΔ·∇Lb\ ΦρΥ

To fight that threat, Canada, along with over 120 countries, has committed to reach net-zero GHG (Greenhouse Gas) emissions by 2050. Canada is already a world leader in the production of clean electricity, with 82% of electricity generated coming from non-GHG-emitting sources, including hydroelectricity, nuclear power, and wind and solar PV (Photovoltaic) power installations. But more power will be needed, especially as we move to cleaner transportation. The transition to a net zero future depends on the availability of critical minerals.

 $\text{Pof-Uncals} \quad \forall b \text{ Pcb-s' GHG } (b \land \text{Psc-Pglb'}) \text{ and } b \land \text{Psc-Pgls}) \text{ and } b \land \text{Ps$ bac 4"p' 46 sbsld Vryrbu' b5b' Δ "du bryprlb', fsd' 82% Δ "du brysbu' Vb $b\Delta \cdot \sigma \cap \ell b'$ by by GHG, $\rho < b'' \Delta b \sigma'$ bradelb' $\Delta' d U$, fr and fr $\Lambda \wedge J'$ bradelb' $\Delta^{\nu}dU <<>_{\Delta}\Delta^{\prime}d) \ bd<<\rho^{\circ} \ (PV). \ \nabla b \cdot \omega d^{-} \ \rho f \wedge^{-} \ dd \cdot \sqrt{1} \ \ ac\nabla \cdot Cb^{\circ} \ \Delta^{\nu}dU, \ \Delta L \ Ld^{-} \ d\Lambda \ d\sigma d< C^{\circ}$ Γ ΓCb⋅P) bPC<CP) ~σ♭√√σ¹.</p>

 $\nabla b \cdot C^{\vee}$ rppbrbu' $P \nabla \cdot b \sigma \sigma r b'$, bac $A \sigma^{-}$ fa dcpb 120 $A \circ A^{\vee}$ representation



HYDROELECTRIC POWER, produced by turbine blades turned by flowing water, is reliable and cost-effective. It is the world's largest source of renewable electricity generation, and Canada was the world's fourth largest hydropower producing country in 2020. Hydropower from Canada's rivers provide nearly 60% of our electricity. Copper, Aluminum, Zinc

Ρ<•'"Δοσ' δρισοριδ' Δ"dU, Δι διγδοριδο δίδι. Δραδισικό Λιισικό δρισορίος, δν"Δ ΔρΡΕΡΣ ΓΦ ΡΟΥΣ ΓΕΊΔ ΓΦΡΟΥ. ΓΙΊΡΟΥ ΕΦΙΤ ΦΓΡΟΥ ΦΙΡΟΥ ΡΕΝΤΙΘΕΡΙΚΑ ΑΥΘΟΙ bbradplb', Fa bac 4"p' sa. drobslb' dl Fsa' b\large La- Δ Fs' bac 4"p' sa. bdradplb audu to- 2020. Dl bdradpl audu bac dγλγ drlb 9b′ 60% p<"Δbσ' bPraplb' ΔudU. Pta·Λ', d≤Plac, γγ



WIND TURBINES use the power of the wind to generate electricity. Between 2011 and 2021, global wind energy capacity nearly quadrupled. In 2021, Canada ranked ninth in the world for installed wind energy capacity. According to the Global Wind Energy Council, the world needs to install wind power three times faster over the next decade to meet our net-zero goals. Copper, Molybdenum, Aluminum, REEs, Zinc

Ե৮ΛСЬГЬ\ ԵΡϤ<ΓϽϤ- Ρσυαλίνα 96/ Ϥϭ ϤϤ·Ϳͳ σ"Կ· ΡΡΓαΡϤ<ΓΓΕΝΙΑΫ. Τυ- 2021,</p> Dr pac apy, bolapard, phyco, pu, pololupin, ∇_{α} an. bylpa dr ly Δ_{γ} bl, pu, $\texttt{PDCP} \texttt{NPU'} \ \Delta^{\vee} \texttt{AU} \ \texttt{Pd} \texttt{PDCJd} \cdot \texttt{-}, \ \texttt{F} \texttt{F} \cdot \texttt{PbC'} \ \texttt{aC} \texttt{F} \cdot \texttt{Cb} \cdot \texttt{P} \cdot \texttt{Pbc} \cdot \texttt{a} \cdot \texttt{a} \cdot \texttt{Pbc} \cdot \texttt{a} \cdot \texttt{Pbc} \cdot \texttt{a} \cdot$ D54·Λ\. L.<Δ'Uac. <<DΓac. ∇b aΛ bCb·ρ> 4"ρ\. γ>\



SOLAR PHOTOVOLTAIC (PV) TECHNOLOGY converts the sun's energy to electricity. Solar PV provided 3.1% of global electricity generation in 2020, the third-largest renewable electricity technology behind hydropower and onshore wind. In 2020, Canada ranked 22nd in the world for installed solar energy capacity. Copper, Gallium, Germanium, Indium, Molybdenum, Titanium, Platinum, Tellurium, Zinc

 $\begin{picture}(10,0) \put(0,0){\line(0,0){\wedge}} \put(0,0){\line(0,0){\wedge ρρυαρη, ρδΔ·γ<ω, γ_αηη ρρ_ωανηρρ, αν₋ ν₃ δ<_πγρα, ρρ_ωανηρρ, ισ δαρ_ισλ_υρα, <code>bDՐ</code>Φρ<code>Lb</code>Υ Δ^νdU. ¬b- 2020, <code>bac</code> ΔΡγΛγδγ 22 ΔL Γγ∇·bΓΥ <code>bΛ</code>ΔΟ· ΔΥ·σΥ <<>αΛθγ b



NUCLEAR ENERGY is an important part of Canada's economy and energy mix. Nineteen Canadian CANDU reactors provide 15% of Canada's non-GHGemitting sourced electricity in 2019. About 440 nuclear power reactors around the world provide 10% of the world's electricity; over 50 reactors are under construction. The International Atomic Energy Association expects world nuclear generating capacity to double by 2050 to meet the net-zero emissions goal. Copper, Iron, Nickel, REEs, Uranium

ΡΓ<Ργοσ Δυσυ Lat- PC<Cን DL bac ~σ59Δ·σ` Γα Δυσυσ<ργρος' . «ργω' δοηρο CANDU PP<P>bo Dan Lland ("Apo) Dedandar 12% Lag, por De Partena 12% Lag, por De Partena 12% Lag, por Deserva 12% Lag, po □ 2019. ◁◁∙✓□ ◘᠈ᢗ 440 ₽Ր<₽∤Ь♂ Δ∀₫∪ЬГ∂ን Γ∤∇∙ЬΓ\ ◁ታ◁•ን ∇▷Րታ<С₽> 10% ▷ՐС!٩ĿЬ Γρσα<⊂Ρ 2050 ασρρα∙ Γυλσου` Το ΓΔ∙σΓ9Δο δοθ∙υλσου`. ρ∖α∙λ∙, α♭≫, δα∙λ∙δλο∙, Το ΦV_ PCP·b3 4"b, 4≥432c



ZERO-EMISSION VEHICLES (ZEVs) are the way of the future. Canada aims to have ZEVs make up 100% of new cars registered by 2035. According to the International Energy Association, there were 10 million electric cars operating globally at the end of 2020, but 230 million by 2030 are needed to meet zero emission goals. Those vehicles rely entirely on batteries; lithium-ion batteries currently power most electric vehicles. Antimony, Cobalt, Graphite, Lithium, Nickel, Magnesium, Platinum, REEs, Tantalum, Tellurium, Tin, Vanadium, Zinc

δρα ΓΛ"ΔC· ÞυρC<α' ΔΛ ∇·Π 2035 Δ"ΡΔ·'. ΡΔΡϽΔ·' ΓΤ∇·δΓ' δΔ·δΔ·Lδ' LLΔ·ΔΡΔ·). ΡϤϧϤ· 10 Γ≤Δϧͽ ∇6 665σΔ·"ΔC+ ΦC<σ5' ΡΛϧ<Γ"ϤϤ· 6σ>σ5' 2020, ∇6+ 6σ 230 Γ≤Δτο CΦCΔ·C9τοι, Δν 3030 δατροι, μπνι δρ υσιστίστος δρισδί σρισδί σρισδί συν δες στι \^ᢌፈነ⊲ᢣ′, ₹Δ∩ኑና, bዺ∙Λ^bለbነ, Lነσґኑና, !₹ፈበҩና, ∇b ҩለ⁻ bCb·ዖን ⊲"ዖ`, CንC<▷ና, U<▷>᠘ኑር, በን, <ҩ∩ኑና, ґን`







Molybdenum L≤△∨>C⊂ [Mo]

A silvery-grey metal derived from the mineral

It contributes corrosion resistance, strength,

for pipelines, jet engines, wind turbines,

Nickel 4·^^~ obd·^ [Ni]

BC, MB, ON, OC, NL, AB, ON, OC, NL, YT

A hard, ductile metal, nickel occurs in minerals

such as garnierite and pentlandite. It largely

ends up in stainless steel, used in numerous

kitchen appliances to aircraft and automobile

construction. It is also used as an alloying agent,

for electroplating, and in both nickel-cadmium

applications, from medical equipment to

batteries and lithium-ion batteries.

Lυρα·Λρὸ Γσ σςργδις, α·Λυδναρσφαν, δυαρη σΓ ρ≥σ≥αρ,

ΓΦ Λολεφος. ΤΕ Γρε Φλα<ιιρη βρνιρη, βα∙νυβνρ,

Niobium oマヘケc (Nb)

Derived from the minerals columbite and

ductile metal. Niobium strengthens steel

and makes it more corrosion resistant. Alloys

and rockets, beams and girders for buildings

used in superconducting magnets for particle

containing niobium are used in jet engines

and oil rigs, and oil and gas pipelines. It is

accelerators and MRI scanners.

 $\rho \nabla \rho \Gamma \rho$, VLA $\nabla \sigma$, VA·V9, $\rho \rho < C \rho$, $\rho \rho \nabla L \rho \Gamma \rho$, $\rho \nabla \rho \rho \Gamma \rho$

√ιβος Γα √αΓρι, ρησ...Υρη, νιη δυνγνος

Platinum Group Metals (PGMs)

MB, ON, QC, ON, QC, BC, YT, NU

converters for automobile exhaust systems to reduce tailpipe

devices, including cell phones and computers, contain circuitry

'<<0∩o, <<0∩bc (Pt), <<0∩bc (Pd), >>∩bc (Rh), >>∩obc (Ru), △>△∩bc

δΔυγρο αλαρο ορο α·Λορυδ «αγα·ν» Γσ δρα·ν». δο·ααο

A group of minerals and chemicals that contain

potassium, potash is an important ingredient

in fertilizer, which supports plant growth, increases crop yield and disease resistance,

βΡΓΙΙΔ·γΡ Λ**Δ·Λ**Φ Γα **βΔΛ**C**β**Γσ**β**UP

Rare Earth Elements (REEs)

 $\Delta \rho \ \sigma V_- \ \rho C \rho \cdot b > Q_n b$

A group of 15 lanthanide elements, along with

the Earth's crust but not in large concentrations.

yttrium and scandium, REEs are abundant in

The most abundant source is the mineral

bastnäsite, followed by monazite. Usually

and enhances water preservation.

(Ir) Fa \triangleright^n Fyc (Os) FDs $bL^{\upsilon}bA\cdot \wedge bP$ $\wedge A\cdot \wedge d$? \triangleright^n FLLA+ \flat Lb?

 $\land d \cdot \land d \Rightarrow \Delta \mathcal{L} + \langle C \rangle = C \cdot \nabla \cdot \langle \Box \Delta b \Rightarrow \nabla C \cdot \langle \sigma \rangle \Rightarrow \nabla C \cdot \langle \sigma$

Γα LՐΡϽΔ·σζν Γα b¢ΛϽ≥η, Γα b⊳ΓLΓ∇·<"Δ9Lbρν '≤∢Πας.

Potash < • ⊂ ∪ [K]

>C+Y $^{\circ}$, $D\nabla \cdot < \cdot$ C $^{\circ}$ L $d \cdot ^{\circ}$ PC<C $^{\circ}$ bd\$\(\sigma \text{b}\sup \text{r}\) b\(\text{D}\text{D}\text{U}\)

ON, BC, QC, NB, NT, YT

high-lustre silver, silvery-white, or grey metals, REEs are used

of cell phones and other electronic devices, and of energy

storage and clean energy technologies such as solar cells,

high-density batteries, and wind turbines.

mostly to make permanent magnets. They are key components

▷ο·σ◊· 15 ₹◊᠈ᢗ᠈᠘γ΄ ٩dω>, Γω Δο·σ◊· ◊·۶/≥Δγς Γω [^]b›Πγς,

ΛΦ.ΛΦ. ΝΟΙΘΕΙΘΙΑΙ ΔΑΚΕΡΙΚΑΙ ΑΙΘΕΙΚΑΙ ΑΙ

 Δ^{\vee} dua- acaginate acura, la paugua-luri la De

ργ-σιάΓρω αζιίρας Ορι γιηρ, ρριασίΓρω, ριρσδα-

Scandium ^b>A>C [Sc] (C

lighting, and radioactive isotopes.

«Πρ' 96' Υνρώ Δναρώ Γα Γρου ΔL Λα·Λα ρενριώριρρ»,

Often classified with REEs because of similar

properties and found in the same ore bodies.

scandium is principally used for solid oxide fuel

cells and high-performance aluminum-scandium

alloys used in the auto and aerospace industries.

Other uses include ceramics, electronics, lasers,

 $\forall \Gamma'' \triangleright \nabla \cdot \ \Gamma^{\sigma} \ \ \Delta \nabla \cdot \sigma \rho \Gamma' \ \ \triangleright \Delta \cdot \ \ \Delta \rho \ \ \sigma \nabla_{-} \ \ \rho C \rho \cdot \delta \rho$

emissions, helping to improve air quality. Most electronic

bLupa.∨pb i≤aUoc[bims]

Platinum (Pt), palladium (Pd), rhodium (Rh),

ruthenium (Ru), iridium (Ir), and osmium (Os)

make up the platinum group metals. PGMs

usually occur together in the same mineral

deposits, mostly associated with nickel and

copper. PGMs are largely used in catalytic

 $\rho \nabla \sigma \nabla \rho \nabla \cdot \rho \cap \rho$ Lo VLN. $\nabla \Gamma$ Lo $\nabla \nabla \rho \wedge \rho \cap \rho \cap \rho$

ρσινισιρ, δυσσίκιρος το ακίκρος.

▷ን∩σ6U Λ∢∙Λάν 6・≷∢<<>ν Γα '◊ν≥▷ν≤◊≥, ▷∇∙ σ₹Λγς

 $\forall A \cdot V$, $\forall A \cdot V$, Lo $P \nabla \cdot A \cdot CPL VP \cdot VP_n P$, A < ULP P

ρανυφρηώ ακνλι σλλος δυνιλού δυ σηνι

pyrochlore, niobium is a lustrous, grey,

ON, QC, BC, NT

 $\Lambda4\cdot\Lambda'$, aab $4<\Gamma\Gamma ba^3$, $3b^3$ $L^{\Psi}PP$ $4<\Gamma\Gamma ba^3$ Γa $P\Gamma U>$

α<Λ9٢°6α), Γα ΔL ΦσΓΡΥ 6ΡΥ"ΔC.

pharmaceutical and chemical mills, tanker

toughness, and hardness to steel alloys used

molybdenite, molybdenum is usually extracted

as a by-product of copper and tungsten mining.

BC, ON, NB, YT

trucks, and drills.

Φυντική της προσφορίας στο προσ

ρηαρο ρια·να, ισ ερυυρ ρραιασα·ν-. ∇·υλοιρο Δρ

 $\ \ \, \text{$\Gamma$} \Delta \cdot \Delta \cdot \nabla b \cdot \nabla b$

ΛΦ·ΛΦ ΒΡΛΓΒΟΡΟ ΛΕΛΡΥΓΒΦΟ, ΦΛ·Υ', ΕΨΡΡΔ· 9ΦΦΟ ΓΦ

bϤͿʹϹϧϹϼͰΩϷ϶, ΛΓU ϧΔͿʹ>ϯʹͰϧϤϷ϶ Σ<<σ', Γα <σΛ>Γβα³.

Molybdenite

/⊀۵∪۵ک۰

Garnierite

b≥σ4≥**⊲**♭/

Columbite

b·<**▷**<'

Pentlandite

V2/≤<22C>/

with PGMs.

Potash

<•Cu

Bastnäsite

<^/ ሲ

 $\Gamma \sigma > LbP$ $\Gamma \circ \nabla b \Gamma < UP$.

Mined / Processed / Potential Deposits



CRITICALLY CANADIAN PC<C> bonb



Bauxite

< 14/

Aluminum <<⊳ra> Cac[Al] BC, QC

A lightweight, silvery metal refined from imported bauxite, aluminum is durable and resists corrosion. Easily shaped, cast, and machined, it is used extensively in the automotive and aircraft industry, as well as in construction, electronics, and packaging.

babhb', $bd\cdot h^bhb'$ $bpph^a$ ⊳Δ∙ ⊲≤⊳Lσς ρ∇∙) ι⊲∙∂νρ∙νδςΓρ, ισ ΔͿʹͻ<Ο ΡΟζος Γα ΛΓΊΔιας ΒΡΛΟΒΟΡς, Γα Φιθ"Δ9Δισή. Δυσυλικον Γα δλα"Δδυρο 9σαο.



Stibnite ילםי∩ף

Antimony ▷? L·σ (Sb) NL, NB

A lustrous, grey metalloid sourced mainly from the minerals stibnite and jamesonite, antimony is widely used as a flame retardant. It is an important alloy metal in lead-acid and lithiumion batteries, multiple military applications, and tungsten steel. It goes into semiconductors, circuit boards, electric switches, fluorescent lighting, and high-quality clear glass.

 Γ a· Λ Pr, Λ · Λ \" Δ LbU Λ · Λ Pr ∇ Ja"D- Δ L bD Π σ - \sim σ 5 Λ - Λ 1 $^{\circ}$ $^{\circ}$ ΡϹ<Ϲ? Þ∇· ΛΦ·Λ' ΔΙ ΒΡΥ"ΔΟ· ΦσΓΡΥ', ΔΠσ9Δ· Φ<ΓΓΒΦ? Γα C²'^Π² Λα·Λα'. ΔL Δ*Υ*²/<C² LΓ²-<"Δbα², b²CC²-dσbU' Δ^{ν} dU, Δ^{ν} dU C Δ^{ν} d Δ^{ν} , bP Δ^{ν} d Δ^{ν} P $\Delta^{$ $\omega < \cdot U + \Lambda$.



Bismuthinite

 $\Lambda^{\Omega}L'\Omega \Phi^{\gamma}$

Bismuth ^^L' (Bi) BC, NT

A crystalline, white metal that oxidizes to multiple colours, bismuth is found in the minerals bismuthinite and bismite, but mostly recovered as a by-product of lead processing. It is used in medicine, cosmetics, low-melting alloys, fire detection/extinguishing systems, and in bullets. Bismuth also substitutes for lead in non-toxic alloys.

 $bd\cdot \nabla_{P} \nabla_{P}$ Γοσιδο ΔΙ οδύλλ- Λοιποίν Γο Λοινί, Γο δησορο $\mathsf{L}^\mathsf{UPP},\ \mathsf{d}\cdot \nabla\cdot \mathcal{I}^\mathsf{UP}),\ \mathsf{Vb}^-\ \mathsf{b}\sigma\mathsf{P}\mathsf{UP})\ \land \mathsf{d}\cdot \mathsf{\Lambda}\mathsf{d}),\ \mathsf{b}\Delta\cdot \mathsf{P}\mathsf{qLb}'\ \mathsf{qd})\ \mathsf{b}\mathsf{UPU'},$ $\Lambda 4 \cdot \Lambda d < \Gamma \Gamma b a^3$.



Pollucite

><▷5/

Cesium トントc (Cs) MB, ON

Silvery gold, soft, and ductile, cesium is extremely rare globally. It is found in granite pegmatites containing the minerals pollucite and lepidolite. Used in drilling lubricants and radiation monitoring equipment, it is also vital for atomic clocks, key to mobile networks, GPS, and the Internet.

 $\Gamma \triangle \Theta \wedge G = \Gamma \wedge G =$ Δ√Γρ√ο √γορ' Λ,Γς,,υ ρ√υ,ρ_ ∽Ωρ√ι, >≤ρ/ρ, ∟σ <∇Λ⊃<Φ'. ΔL ΔΥ'><Π' <Φ"Δbσ >\Λρσba) Γα ω<.ν'><</p> \forall CPP σ ', \forall b· Γ a· PC<PPbU \forall C· Γ ' \land PD σ ' \lor DPP σ " \land C·, LΓΡϽΔ·α) 6ΡΓΡΥΓ6UP), ΡΡΦΥΦΔ·α) GPS Γα LLC4·ΛΦ $bD\Gamma d_D PLbP$).



Chromite \>⊳L>/

Chromium \>⊳୮৮< (Cr) BC, ON A lustrous, hard metal, chromium occurs mainly

in the mineral chromite. It is tarnish resistant and takes a high polish. Chromium goes into stainless steel, highly resistant to corrosion and discolouration. Chromium alloys are used to plate auto parts and appliances and as superalloys in jet engines. Chromium is also a component of pigments used in paints, dyes,

₫∙∿ᢣለ₽Კ, Lº७₫∙ለ₽Კ ᠈ᡷ▷ΓϧϤ ΔͿʹϧΛ Γ⊲ν6·Λρυσ- Γα ⊲·∿γΛργ. ١≥⊳Γγο δΔ•ν $\Gamma d \cdot \partial b \cdot \Lambda P^{\nu} b^{\nu} \Lambda d \cdot \Lambda^{\nu}$, $b \Delta \cdot \partial \Gamma d \cdot Q d \partial b \cdot \Lambda P C L b^{\nu} \Gamma d$ $\rho \nabla \phi$ Labla ϕ , $\rho \Gamma$ $\rho \rho L \rho \lambda L \rho \rho \Lambda \phi$ **βΡΓΡΛ"ΔΟ· ΡΟ<σΥ΄ Γα ΦΟΡΡΟΙΟΝ ΡΓΛΓΥΔ·** ΛΓ<σΓοα. ΔL Γα ΔΛ><C> 60ΛΓ6UP $\mathcal{S} \sim \mathsf{VP} \Delta \mathsf{PP}$, $\mathsf{PP} \sim \mathsf{PP}$.



Cobaltite

d<·≤C>/

Cobalt <>< (Co) ON, QC, NL, AB, ON, NL, BC, SK, MB, NB, YT, NT

A bluish-white, lustrous, hard metal, cobalt is permanently magnetic and produced primarily as a by-product of nickel and copper mining. The leading use of cobalt is in the electrodes of rechargeable lithium-ion batteries. It is also used to produce magnetic, wear-resistant, and high-strength alloys, such as those used in gas turbine aircraft engines, and goes into electronic devices and batteries.

Δα<ΠΖ d<Δα<ΠΖ d<<!/l>Γο ΔL Δ<ΓΓβαΛσ) Σου θη ΡσονανΓραν ΛΓΥΔ· ΛΓ<νΓβαν Γα</p> b▷√ՐbUΡ LLC⊲·ΛԺ Γα σσΓΡς'.

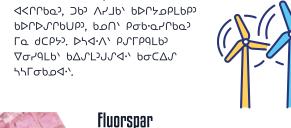


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Copper ⊳১<.\`(Cu) BC, MB, ON, QC, NL, ON, QC, NL, SK, MB, NB, YK, NU, NT

A soft, reddish-orange metal, copper is derived from several minerals, including chalcopyrite and chalcocite. With high ductility, malleability, conductivity, and corrosion resistance, it is a major industrial metal. It goes into electrical wires, plumbing, industrial machinery, and construction materials, as well as clean technologies, such as solar cells, wind turbines, and EVs. Copper surfaces have been found to kill infectious microbes in high-touch areas.

ΦΥΡΥ. Γ⁰dΡΥΔ·Υ. ΔΦ· ΡΥΔ·Λ¹ ΙΦ"ΔΡΥ ΦΦΡ «σΡΔ·Υσρ¹. ΔΩb≤b·Λ≥Ϥϧʹ ΓΦ ρ≤q┦ϧʹ. ρΦ∙3 ΓΦ•θΛqΛq, ΦηqΠΦ·ργνρΠρΩ Γα δΔ-ν Γανδιασή, Γ"ΡΟν Λαιλή Εαιτ ΓΟ"Δ δλοΟή αρραισή. Δ^{ν} du Δ^{ν} Δ^{ν} Prdurbua?, Fa and aab alappina? Fa ⊲.6"Δ9 <β<ββα. Γα. 6<ββρ?





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A non-metallic mineral also known as fluorite, fluorspar occurs in numerous colours. It is used in the metallurgical, ceramics, and chemical industries. It is key to producing hydrofluoric acid, a commonly used commercial chemical; to processing uranium and aluminum; and to manufacturing enamels, glass, and fibreglass, as well as steel and Portland cement.

δΦ∘ Γαγσα•, δΦ∿αρΠ, ι≤▷≥αρ, ι≤▷>υ<> σ C Δ ·PLb $^{\circ}$ aab Δ a $^{\prime}$ a $^{\prime}$. Δ L Δ \mathcal{S} ><C $^{\circ}$ ΛΦ:Λα Γιών Ας Γιρών, Φινρών Ας Γρών, Γα Cb·bΓσbα) bCJDJCbUP). Γ"DL L50

ΔΛΟΡΓΩΡΟΣ, ΡΡΓ Φ.Δ.Λ."ΔΟ. Υ≥ΦλΑς Γσ Φ≤ΡΕΦς Εσ b▷Ր▷√ՐԵ∪Ρ) <<.∪>Λο), <<.∪>Λο) Γα οΥΛοοΛορ), Γα ρΓ₀ρα·γρ, γα·γ, Lσ αςαρ.



Bauxite

Germanium J≥4♂♭C [Ge] BC, NS, NT

Gallium b≤△♭⊂ (Ga) ON, BC, SK, MB,

A soft, silvery metal obtained from bauxite

and zinc ores, gallium is used in high-tech

applications such as 5G wireless networks,

smartphones, laser diodes, semiconductors,

solar energy magnetic materials, and military

devices. It is also useful in high-temperature

and nuclear medicine tests.

thermometers, barometers, pharmaceuticals,

OC. NB. NS. NT

A hard, lustrous, grey-white, brittle metalloid, germanium is mostly produced as a by-product of zinc mining, but is also found in the minerals germanite and argyrodite, and in silver, lead, and copper ores. Its most common use is in semiconductors, and it is also used in optical lenses, fibre optics, and solar cells.

Λ⊲·Λ`, Ϳ≥Ϥσϧͼ Φυρολ ΔΕ τον βΦρ J>La>' Fa d>\>DC>', Fa bd\A^bAP2-, <\\' ΓΦ ΡΥΦΥΝ ΦΥΦΥ. ΔΕ ΔΥΡΚΠΗ ΒΡΥΓΙΟΡΡΙ LՐ∇<"Δba>, Γα b▷√ՐbUP> ▷υΡ√dba>, LLC4·Ad2.



Germanite

JLQ⁵/

Graphite \≥<<>' (C) QC, BC, ON, QC

A soft, crystalline form of carbon, graphite occurs in metamorphic rocks such as schist and gneiss. Major uses include high-temperature lubricants, brushes for electrical motors, brake linings, gaskets, crucibles, electrodes, batteries, and fuel cells.

Φ<u>Υ</u>ΡΥ ΔΥΦΔ•Λν, ΡΔ•ΛυΒ <ΛΛιν_ ΣΡΣ ινν $\Gamma a a^{50}$. $\sigma C \Delta J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C | J > C |$ \mathcal{L}^{0} \mathcal{L}^{0} ⊲γ⊲·Γρσγα), Δυσ∪∇·<"Δρσ), ⊲σΓργ' Γσ</p> Δ ^udU Δ σ Γ P5 \cdot .



Uraninite √ځ0کځ۷

Helium "△<△≻< (He) SK A colourless, odourless gas, helium

is produced by the natural radioactive decay of elements such as uranium and thorium. It acts as a coolant for superconducting magnets and satellite instruments, and it provides an inert protective atmosphere for making fibre optics and semiconductors, and for arc welding.

 $\rho \nabla \cdot \rangle$ Lop., $\rho \nabla \cdot \rangle$ Lop., $\rho \Delta \cdot \rangle$ δριδλ... ρΓρ, ρ<... φσΓρι, ρ∇ιαρη,</p> óΦσ5ς ΓΦ C∙≥Φ2ς. ΦΦ<C> ΦΔ∙ C6406 ρσινιστρώ το σηνι, ργσημρώ $d<\Gamma\Gamma ba$, Γa $\Delta \cdot \Gamma\Gamma GLb$ $\nabla D\Gamma$ a CL9Lbβρλιρης γα·γαργο Γσ ασρ·γασρσο Γσ 44679Δ·σ).

Indium △>∩৮⊂ (In) ON, BC, NS, YT



Sphalerite ^<<▷≥</

A silvery-white, lustrous metal, indium is produced mainly as a co-product of the zinc smelting process. Malleable and ductile, with a low melting point, it acts as a superconductor below a certain temperature. It is used in semiconductors, alloys, and solders. It is also used to make indium tin oxide, key to touch screens, flatscreen TVs, and solar panels.

bσργ·ροΔ·-. σιρι Γσ ργι Γοι ργι σιρι-, ΔΓ γιρισρο Δ $^{\prime}$ $^{\prime$ ԵΡΓΛΓΕΟΙΡΊ ΦσΕΛΑΘσΕΩΊ, ΛΦΙΛΟΊ ΓΩ Φ
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Spodumene

^>СГσ

The lightest metal, lithium occurs in minerals such as spodumene and lepidolite and in lithium chloride salts dissolved in brine pools. Its most important use is in rechargeable batteries for cell phones, computers, EVs, and energy storage produced by solar panels and wind turbines. Lithium makes alloys lighter and stronger. Aluminum-lithium alloys are used in aircraft and high-speed trains. In medicine, lithium is used to treat depression and bipolar disorder.

Lithium ≤△∩♭⊂ [Li] MB, AB, SK, ON, QC

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Magnesium Lvoィケ(Mg) BC, AB, QC

A light silvery-white metal, magnesium is found in the minerals magnesite and dolomite, but much is produced from seawater. One-third less dense than aluminum, it reduces the weight of many products. Alloyed with aluminum, it goes into aircraft and automobile construction. Other uses include electronic devices, power tools, medical applications, and construction.

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Manganese Lobor (Mn) NB. NL

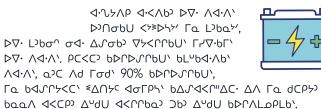


Pyrolusite

<>>>▷<▷5>

A silvery-white metal derived from the minerals

pyrolusite and manganite, manganese is the fourth most widely used metal in the world. It is essential to steelmaking, which uses 90% of production, and to lithium-ion batteries for EVs and other renewable energy applications such as electricity grid storage.





C>C≤

Tantalum C>C≤<C[Ta] MB. BC. ON. OC. NT

A rare, blue-grey, very hard metal, tantalum is almost always found with niobium in the minerals columbite and tantalite and is also obtained as a by-product of tin extraction. About half of all tantalum produced is used by the electronics industry, making electricity storage possible in miniature capacitors used in aviation electronics, computers, and other

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Tellurium U≤⊳≥△♭⊂ [Te] ON, ON,

Mainly a by-product of copper-bearing mineral processing, tellurium is a silvery-white metalloid. It has applications in solar panels, rubber production, electronics, and more. Ultra-high purity tellurium can be used for semiconductor technologies used in medical imaging, advanced security and military systems, and for next generation solid-state batteries.

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Cassiterite PLU27

Tin ∩⊃ (Sn) QC, NB, NS

A silvery-white metal derived from the mineral cassiterite, tin has multiple uses. It is used for plating, coating, and polishing; solders; flat panel displays; alloys such as bronze and pewter; battery electrodes; dental applications; marine applications; window glass making in electric vehicles, solar energy systems, 5G telecommunications, heat harvesting, hydrogen production and in carbon capture catalysts.

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Titanium C>UG>C[Ti] QC, QC

A hard silvery metal derived from the minerals ilmenite and rutile, titanium is lightweight, corrosion resistant, and able to withstand extreme temperatures. Most titanium is turned into titanium dioxide, used to improve whiteness in products from toothpaste to paint to food products. Lightweight titanium alloys are widely used in the aerospace industry. As metallic biomaterials, titanium and titanium alloys are used for dental implants, hip replacements, and heart pacemakers.



Γ_ρα·νδη α·νυρνδη να·ν, ρρυα_ ΦΓ Δ≤7Φγ ΓΦ ≯ΡCΥ≤, ΦΡ· CγΠΦλς Φρνν. bΔ·> Γ</ri>ΓΓΓ</td $\Lambda d \cdot \Lambda'$ $\Gamma C d \cdot '$, $\Gamma d \cdot C'$ $P + 1 \Lambda U \sim '$ $\Gamma d \cdot C P'$ $\Delta \Omega'$ LLF3. $P\sigma_3P$, $P\Delta$ - Vq-V, $\nabla \mathcal{L}$ 2C3 $PP\mathcal{L}$ PP, ΔυΛΓ΄ βΔωμβρι ΛΓηΔιαί. Γα Δοισσί άζρλι $\Lambda \text{d} \cdot \Lambda \text{d}' \text{ 9de} \rightarrow \text{PPP} \text{LPD} \rightarrow \text{PP} \text{ $\Delta \cdot \Lambda \cap \text{Pe}'$},$ ρνα·ναιρη, δορ, ισ δημα νηπρ.

Tungsten COCO [W] MB, NB, NS, NL, YT, NT A dense, silvery-white, lustrous metal, tungsten is

Scheelite **√**≤</

derived mainly from the minerals wolframite and scheelite. It mostly goes into tungsten carbide, ideal for cutting and wear-resistant applications in construction, metalworking, mining, and oil and gas drilling. It also goes into alloys and specialty steels; aerospace and defence applications; electrical, electronic, heating, lighting, and welding applications; and various chemical applications.

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Uraninite

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One of the densest materials known, occurs in the minerals uraninite uranium and brannerite. It is silvery white, malleable, ductile, and radioactive and is mostly used in the nuclear power industry to generate electricity. It also powers nuclear submarines and goes into nuclear weapons.

Uranium マ≥マのケc[U] SK, ON, NL

ΛΦ·Λ' β√γΓβ' Κ≥ΦΦ' Κ≥Φ' ΓΦ '≥Φ≥Φ'. Δ Co proposed Δ and pordupour al La deduction **L**PDbГР, bL

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Vanadium <¬∩→c |V| ON, QC

A soft, shiny, silvery-white metal, vanadium occurs in crude oil and numerous minerals, including vanadinite and carnotite. Produced mainly as a by-product, its main use is in highstrength steels for construction, auto parts, heavy equipment, industrial tools, medical devices, turbine engines, and military vehicles. Emerging vanadium redox flow battery (VRFB) technology is a promising way to store energy from renewable sources.

\≥D\ \LD Lơ σσρ \\Q\2\4\4\Q\, \Q_ <\DU\\\ Lơ \\S\2\2\1\. $dq\sigma$ DLD $LP\Pi d$ Φ $\nabla \Delta \cdot \Gamma d$ - $P\Gamma \cap Pq \cdot \cdot$ $Vq \cdot V$ PDL⊳√ρυρ ⊲∙ρ"Δ9Δ∙σ`, ⊳<<α` δ⊳√"Δ<, δά√δ∙ρ δ∧ΓΛυρ $\mbox{d}_{\mbox{D}}\mbox{P}\mbox{d}_{\mbox{D}}\mbox{P}\mbox{d}_{\mbox{D}}\mbox{P}\mbox{d}_{\mbox{D}}\mbox{D}_{\mbox{D}}\mbox{d}_{\mbox{D}}\mbox{$ Γα ΦΠσ9 ΦC<σ5', Γ"ΦL Γα ΦΦΓ ΦΛ"ΔC· ΦσΓΡ5' (VRFB)



^<**₹**▷≥**₫**⊁/

Zinc いっ (Zn) BC, MB, ON, QC, NB, YT, BC, MB, ON, QC, SK, NS, NL, NT A blue-grey, metallic element, zinc is found

primarily in the mineral sphalerite. Most zinc is used to galvanize metals to prevent rusting. Galvanized steel is used in many industries, including agriculture, solar, automotive, construction, and telecommunication. Zinc goes into alloys for die-castings in the automobile,

electrical, and hardware industries, and into brass, bronze, and nickel silver. About 30% of worldwide zinc production comes from secondary or recycled zinc from such sources as scrap galvanized steel and batteries.

 $P \sim q \cdot P \cdot P \cap q < Vq \cdot V, P \Delta \cdot S, V = P \cdot UQP P P P V = P \cdot V = P$ $PUdV \cdot Q'$, VYT, PDUDVUPU, $\nabla_{A}QU$, $PC < QdV \cdot A \cdot P_{A}QV \cdot A \cdot$ Γα LΥΡΟΔ·σ9Δ. Γα Δο·σσ. 60/"Δς. DC<υ\', ΔυdU9Δο, Γα Λα·Λαβο ΦρβΓσ Γα Ρζα·Λ΄ Γα Φ·ΛηβΛ΄. Φ) \text{Vq 30 >>\range\chi' \range\chi' \ra Γα ΦΓΡΥ'.









PHOTO CREDITS: Metal/Mineral Photos Courtesy of: R.Weller/Cochise College: Bauxite, Bismuthinite, Chalcocite, Chromite, Dolomite, Fluorite, Garnierite,

<^^CQʰ/, bៅጋ፮◁ʰ/, ᲡቼᲡለ፮◁ʰ/, ὑቼϤ<ሩʰ/, ጋጀЬګ̞/, Јጀګګ̞ት/, ८ˀᢗངժʰ/, ८²ᢗᢏ٩ʰ/, ८ˀᢗᢏ٩ʰ/, ८ˀګ٠٠, ১٠٠٠ አታላተσ٩Δ٠٠ አጋዮ٩Δ٠٠ አጋዮ٩Δ٠٠ (‹Ըʰ. V>> ०σ৮ላተσ٩Δ٠٠); < \\ \alpha \\ \bar{\chi} \\ \alpha \\

Tantalite

Hedenbergite

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electronic devices.

