Memorandum:

Ministry of Climate and Enterprise:

To re-enable the extraction of

uranium

KN2024/02540

November 2024

Content

Main content of the memorandum

Uranium

Uranium is a weakly radioactive, metallic element, which occurs naturally in rock, soil and water. Uranium is often found together with other metals. The radiation properties of uranium in the bedrock are used in connection with exploration and mapping of other metals and minerals. Like most other metals, uranium is mined and extracted using conventional methods in open-pit mines or in underground mines.

Suggestion

This memorandum proposes amendments aimed at enabling the extraction of uranium as a concession mineral:

1. It should be possible to extract uranium in Sweden. The prohibition in the Environmental Code against the extraction of uranium is to be removed.
2. Uranium is to be a concession mineral under the Minerals Act.
3. The holder of a uranium mining concession must keep a record of the exploration work and processing.

Amendments are also proposed to clarify when nuclear installations are to be covered by the Government's mandatory admissibility assessment:

4. Only nuclear facilities that are subject to the Government's licensing obligation under the Nuclear Activities Act shall be subject to the Government's mandatory admissibility assessment.

- All nuclear facilities that are examined by the Government under the Nuclear Activities Act shall be subject to the Government's mandatory admissibility assessment.

The proposal to enable the extraction of uranium as a concession mineral

The current prohibition in Chapter 9, Section 6 of the Environmental Code against granting a permit for mining or mining facilities for mining, test mining, processing or physical or chemical enrichment of uranium-containing material if the mining operation or mining facility constitutes a nuclear facility that requires a permit under the Nuclear Materials Act (1984:3) Technical activities risk preventing effective exploration of the bedrock and efficient utilisation of existing resources in the form of metals and minerals. The ban makes it more difficult for Sweden to contribute to a goal of greater self-sufficiency in critical metals and minerals and to contribute to the green transition, including the establishment of new nuclear power.

The proposal enables Sweden to maintain its role as an attractive mining nation that can drive the development of the green transition forward. The proposal also allows for a more efficient use of natural resources, as it opens up the possibility of extracting uranium as a by-product in addition to primary extraction and developing secondary extraction of uranium.

The prohibition also means that certain mining operations may be "squeezed" between living up to requirements linked to Chapter 5, Section 4 of the Environmental Code and the prohibition on the extraction of uranium. The operator is thus put in a difficult situation where measures to reduce the impact on the environment, in this case water, may be prohibited.

The proposal means that operators who do not intend to handle the uranium other than as waste can continue with the activity without risking ending up in the situation that it is prohibited. The proposal also simplifies for operators to develop effective purification techniques for handling uranium.

Sweden has good potential when it comes to the metals that play a key role in Europe's industrial processes. The proposal makes it possible for uranium, which occurs everywhere in the Swedish bedrock and

together with other metals and minerals, can be handled in the same way as other minerals that are industrially useful, which with some probability occur in Sweden to such an extent and in such a way that extraction appears meaningful and which require systematic exploration and investigation to be demonstrated.

The proposal to clarify when nuclear installations are to be covered by the Government's mandatory admissibility assessment

The purpose of the Government's admissibility assessment under Chapter 17 of the Environmental Code is to enable the Government to exercise political control over certain decisions within the framework of applicable legal rules and to take political responsibility for large or otherwise important activities that are of importance to community planning in general.

The current wording of the provision in Chapter 17, Section 1, first paragraph, paragraph 1 of the Environmental Code is unclear. This is because the activities under the second part of the provision, facilities for mining substances that can be used for the production of nuclear fuel, in full-scale mining operations are such nuclear facilities that the Government examines under the Nuclear Activities Act (1984:3) and which are thus covered by the first part of the provision. This contributes to the provision being unclear and can be perceived as difficult to understand.

However, facilities for mining substances that can be used for the production of nuclear fuel also include smaller mining operations where uranium in lower concentrations is handled and which, according to nuclear legislation, are tested by the Radiation Safety Authority or which are completely exempt from the licence requirement.

The proposal means that the scope of the provision corresponds to the stated purpose of the Government's admissibility review, a political responsibility for large or otherwise important activities that are important for community planning in general. It also means that ambiguities and double regulation are avoided.

The proposal has an impact on the area of when the approval of the municipal council is required for the government to allow an activity, the so-called municipal veto. In light of the fact that in practice it only entails a minor change in the scope of application of Chapter 17, Section 1, first paragraph, paragraph 1, the proposal has been deemed to be limited to what is necessary to achieve the purpose of the Government's admissibility review.

1. Legislative proposal

1. Proposal for an Act amending the Environmental Code

It is hereby stipulated with regard to the Environmental Code that Chapter 9, Section 6 of Section [1] shall be repealed and *that* Chapter 17, Section 1 shall be worded as follows.

Current wording	*Proposed wording*
Chapter 17.	
1 §[2]	
The Government shall examine the admissibility of new activities of the following kinds:	
1. *Facilities for nuclear activities* that are examined by the Government in accordance with the Nuclear Activities Act (1984:3) *and facilities for mining substances that can be used for the production of nuclear fuel*	1. *Nuclear facilities* that are examined by the Government in accordance with the Nuclear Activities Act (1984:3);
2. public waterways, and	
3. geological storage of carbon dioxide, if the activity does not relate to: storage for research purposes of less than 100,000 tonnes of carbon dioxide.	
Notwithstanding the first paragraph 1, the Government shall not examine the admissibility of activities prohibited pursuant to Chapter 9. 6 of the Act.	

[1] Latest version 2018:641.
[2] Latest version 2018:641.

This Act shall enter into force on 1 January 2026.

1. Proposal for an Act amending the Minerals Act (1991:45)

It is hereby stipulated that Chapter 1, Section 1 of the Minerals Act (1991:45) shall be worded as follows.

Current wording	*Proposed wording*
Chapter 1.	
1 §[1]	
This Act applies to the exploration and processing of deposits on one's own or another person's land of the following mineral substances (concession minerals):	
1. Antimony, arsenic, beryllium, lead, cesium, gold, iridium, iron present in bedrock, cobalt, copper, chromium, mercury, lanthanum and lanthanides, lithium, manganese, molybdenum, nickel, niobium, osmium, palladium, platinum, rhodium, rubidium, ruthenium, silver, scandium, strontium, tantalum, tin, titanium, thorium, vanadium, bismuth, tungsten, yttrium, zink och zirkonium,	1. Antimony, arsenic, beryllium, lead, caesium, gold, iridium, iron present in bedrock, cobalt, copper, chromium, mercury, lanthanum and lanthanides, lithium, manganese, molybdenum, nickel, niobium, osmium, palladium, platinum, rhodium, rubidium, ruthenium, silver, scandium, strontium, tantalum, tin, titanium, thorium, *uranium,* vanadium, bismuth, tungsten, yttrium, zink och zirkonium,
2. Andalusite, apatite, brucite, fluorspar, graphite, kyanite, clays refractory or clinker, magnesite, magnetite pyrite, nepheline syenite, sillimanite, rock salt or other salt present on similar way, pyrite, tungspar and wollastonite, and	
3. diamond.	

This Act shall enter into force on 1 January 2026.

[1] Latest version 2022:728.

1. Proposal for a Ordinance amending the Minerals Ordinance (1992:825)

It is hereby stipulated that Section 51 of the Minerals Ordinance (1992:825) shall be worded as follows.

Current wording	*Proposed wording*
	51 §[1]
A person who holds a mining concession for thorium must keep a record of the exploration work and processing. The Geological Survey of Sweden may issue more detailed regulations on record keeping.	A person who holds a mining concession for thorium *or uranium* must keep a record of the exploration work and processing. The Geological Survey of Sweden may issue more detailed regulations on the The S&P S&

This Regulation shall enter into force on 1 January 2026.

[1] Latest version 2022:729.

1. Case

1. The Inquiry's mandate

Within the Ministry of Climate and Enterprise, an internal inquiry was appointed to assist the ministry in analysing and submitting the proposals needed to re-enable the extraction of uranium (CN 2024:A).

The aim is to enable the utilization of Sweden's potential in terms of the critical metals and minerals that are important for Swedish industrial processes, and that modern investigations of the bedrock can be initiated.

At present, it is not possible to grant either an exploration permit, a processing concession or an environmental permit for uranium. Uranium mining will in future be tested in accordance with relevant environmental legislation, but it will not be prohibited.

The Inquiry's mandate has been to:

1. investigate what legislative amendments are needed to enable and clarify the prerequisites for the extraction of uranium as a concession mineral under the Minerals Act,
2. analyse and propose how the provision on the Government's admissibility assessment in Chapter 17, Section 1, first paragraph, paragraph 1 of the Environmental Code can be amended so that only facilities for nuclear activities that are examined by the Government under the Nuclear Activities Act (1984:3) are subject to requirements for the Government's admissibility assessment, and
3. submit the necessary legislative proposals.

Meetings to consult and gather information have been held with the Swedish Radiation Safety Authority, the Geological Survey of Sweden and the Geological Survey of Sweden.

The Swedish Environmental Protection Agency, the investigations Nuclear Power Assessment Inquiry (KN 2023:04) and Assignment to analyse, propose and prepare proposals for a new law on nuclear activities (KN 2024:B), the industry organisation Svemin and certain major mining companies, the Swedish Farmers' Association and the Swedish Association of Local Authorities and Regions.

1. Delimitations of the assignment

1. Other ongoing investigations

On 2 November 2023, the Government appointed the Nuclear Power Review Inquiry (CN 2023:04). The assignment includes assessing whether it is appropriate and can lead to faster examination with a changed instance order, and in particular considering whether the Swedish Radiation Safety Authority should be able to decide to a greater extent than today on licences for nuclear activities under the Nuclear Activities Act and whether the Radiation Safety Authority's decisions under the Nuclear Activities Act should: be reviewed by a body other than the Government. The aim is to achieve the government's goal that Sweden will have 100 percent fossil-free electricity production by 2040 at the latest , nuclear power is an important part of achieving that goal. The requirements for radiation protection and nuclear safety shall remain high.

Furthermore, on 10 April, the Ministry of Climate and Enterprise appointed the inquiry "Assignment to analyse, propose and prepare proposals for a new law on nuclear activities" (KN 2024:B) to, among other things. analyse the proposals made by the Inquiry into the Nuclear Activities Act in the report New Nuclear Activities Act with Clarified Responsibility (SOU 2019:16) and the proposals for amendments to the Nuclear Activities Act, and

the Ordinance that the Swedish Radiation Safety Authority has reported on behalf of the Government on the development of regulations and other measures for existing and future nuclear power and which is not already included in the Nuclear Power Review Inquiry. The purpose of the assignment is to create good conditions for both existing and future nuclear power and new reactor technology. The requirements for radiation protection and nuclear safety shall remain high and the proposals shall be compatible with

Sweden's international obligations.

The present investigation is considered to be closely related to the above-mentioned investigations in the part relating to the Government's admissibility assessment and amendments to Chapter 17, Section 1, first paragraph, paragraph 1 of the Environmental Code. Since the assignment in question only relates to:

the formulation of the provision in order to create greater clarity, it is not part of the mandate to propose amendments to the nuclear legislation that aim to influence which activities are covered by the Government's admissibility assessment.

1. Need for further investigation

During the course of the inquiry, the need to create structures that provide incentives to strengthen the understanding of both uranium and mining activities at the local level has been highlighted by several actors with whom the inquiry has been in contact.

In the same way, industry players have highlighted the need to review the circumstances under which established mining operations should be covered by nuclear legislation. That question is not included in the assignment either.

2. Words and concepts

Below is a list of explanations of certain words and concepts that are used repeatedly in the investigation. Several of the concepts are defined in the Ordinance (2013:319) on extractive waste.

Utvinning	Activities involving mining, drilling or blasting in the earth's crust or in any other way detaching material from the earth's crust for the purpose of extracting a deposit or substances or materials from a deposit from the earth's crust.

Secondary Mining	Extraction of metal or mineral from a residual product from mining and mineral extraction. Included in this account of the concept of ”utvinning”.

Recycling of metal or mineral	Recovery of metal or mineral from a residual product from mining and mineral extraction, but also recycling of end-of-life products.
Prospecting	Included in this account of the concept of ”utvinning”. sampling, drilling, deep excavation or other systematic search for a deposit that has an economic value, but not activities necessary to prepare for the extraction of a deposit or activities directly related to ongoing extraction;
Processing	Activities aimed at separating or concentrating substances or materials from extracted materials or from previously disposed extractive extractive waste by means of a mechanical, chemical, biological or other thermal process, or a combination of such processes, but not smelting or heating processes other than lime burning and no metallurgical processes.
Fysikalisk eller kemisk anrikning	Enrichment activities that occur at mining activities, unlike the isotope enrichment to increase the proportion of uranium-235 that takes place at a later stage of the process of producing nuclear fuel.
Uranium-containing material	Includes both uranium and compounds containing uranium .
Naturally occurring	Uranium that contains it in nature the prevalent mixture of isotopes (see

Recycling of metal or mineral	Recovery of metal or mineral from a residual product from mining and mineral extraction, but also recycling of end-of-life products. Included in this account of the concept of ”utvinning”.
Prospecting	sampling, drilling, deep excavation or other systematic search for a deposit that has an economic value, but not activities necessary to prepare for the extraction of a deposit or activities directly related to ongoing extraction;
Processing	Activities aimed at separating or concentrating substances or materials from extracted materials or from previously disposed extractive extractive waste by means of a mechanical, chemical, biological or other thermal process, or a combination of such processes, but not smelting or heating processes other than lime burning and no metallurgical processes.
Physical or Chemical Enrichment	Enrichment activities that occur at mining activities, unlike the isotope enrichment to increase the proportion of uranium-235 that takes place at a later stage of the process of to produce nuclear fuel.
Uranium-containing material	Includes both uranium and compounds containing uranium .
Naturally occurring uranium	Uranium that contains it in nature the prevalent mixture of isotopes (see Section 1 of the Nuclear Ordinance.

Product Materials that are deliberately produced in a manufacturing process, i.e. when the purpose of the production process is the production of the product in question.

Residue Materials that are inadvertently produced or arise as a result of or in a manufacturing process of a product.

By-product A substance or object that has arisen in a production process where the main purpose is not to produce the substance or object shall be considered a by-product instead of waste if:

1. it is ensured that the substance or object will continue to be used;
2. the substance or object can be used directly without any working other than the processing that is normal in industrial practice;
3. the substance or object has been produced as an integral part of the production process, and
4. The use referred to in paragraph 1 is not contrary to law or regulation and does not result in generally adverse effects on the environment or human health.

(See Chapter 15. Section 1, second paragraph, of the Environmental Code)

Waste Any substance or object that the holder discards or intends or is obliged to discard (see Chapter 15, Section 1, first paragraph of the Environmental Code).

1. Metals and minerals as a strategic climate and security issue

1. Climate neutrality objectives and the EU Green Deal

Launched by the Commission in 2019, the European Green Deal consists of a package of policy initiatives aimed at making Europe the world's first net-zero climate-neutral continent by 2050. It emphasizes the need for raw materials from a strategic perspective, based on how Europe's industry needs to be mobilized:

> Access to resources is also a strategic security question for Europe's ambition to deliver the Green Deal. Ensuring the supply of sustainable raw materials, in particular of critical raw materials necessary for clean technologies, digital, space and defence applications, by diversifying supply from both primary and secondary sources, is therefore one of the pre-requisites to make this transition happen.[5]

The Green Deal includes a number of initiatives, including the EU Industrial Strategy6. The EU's objective is to make its industries more competitive globally and to strengthen their independence and resilience. The EU relies on industry's leadership role in the transition to climate neutrality, as well as on its digital leadership. EU industry will be a driver of change, innovation and growth.[7] The strategy states, among other things, that the issue of access to raw materials, a diversified supply to strengthen the EU's security of supply

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[5] COM (2019) 640 final, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions; The European Green Deal.
[6] COM (2020) 102 final, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions; A new industrial strategy for Europe.
[7] Europeiska rådet, Europeiska unionens råd, 2024, EU:s industripolitik, https://www.consilium.europa.eu/sv/policies/eu-industrial-policy/, hämtat 2024-05-09.

and promoting recycling and the use of secondary raw materials contribute to reducing dependency on raw materials outside the EU.

1. European Critical Raw Materials Act, CRMA

Since 2011, the Commission has published several summaries of critical materials and raw materials under the EU Raw Materials Initiative. Critical raw materials are raw materials – such as metals, minerals and natural materials – of great economic importance to the EU, with a high risk of supply disruption due to the concentration of sources and the availability of good and affordable substitutes.[On 8 October 194]

In the latest compilation, published in 2023, the Commission has identified 34 minerals and metals that are assessed as critical and/or strategic for our society and for our well-being (Annex II to the proposal for a Regulation of the European Parliament and of the Council establishing a framework for ensuring the security and sustainability of supply of critical raw materials and amending Regulations [EU] 168/2013, [EU] 2018/858, 2018/1724 and [EU] 2019/1020). These raw materials are included in key technologies to secure the green transition, digitalization, as well as for the space industry and defense.

In March 2024, the European Council adopted the European Act on Critical Raw Materials (European Critical Raw Materials Act, CRMA). The aim of the act is to increase and diversify the availability of critical raw materials in the EU, strengthen circularity, including recycling, and to support research and innovation on resource efficiency and the development of substitutes. The new rules will also strengthen Europe's strategic autonomy.[On 9 October 201]

The Act sets three benchmarks for the EU's annual consumption of strategic raw materials: 10% to be sourced from local extraction, 40 % to be processed in the EU and 25% to be taken from recycled materials.

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[8] European Council, Council of the European Union, 2024, An EU Act on Critical Raw Materials for the EU's Future Supply Chains, https:// www.consilium.europa.eu/sv/infographics/critical-raw- materials/, retrieved 2024-05-09.

[9] A.a.

1. The Government's climate action plan

The Government's climate action plan (Skr 2023/24:59), which the Government is required to produce every four years under the Climate Change Act (2017:720), shows that the Government's assessment is that the process for exploration and extraction of concession minerals should be streamlined and made more predictable. This is in light of the fact that the mining industry is highlighted as crucial both for Sweden and for the EU's competitiveness and ability to adapt and produce goods in times of crisis or war. Furthermore, it is emphasized that Sweden has an opportunity to reduce the EU's dependence on third countries and at the same time can contribute ethically, environmentally and legally sustainable raw materials to the digital and green transition.

The climate action plan also states that a secure and sustainable supply of raw materials for Swedish companies should be ensured, both with regard to metals and minerals that are critical and strategic according to the European Critical Raw Materials Act and that are necessary in the production of e.g. wind turbines, batteries, food and transport infrastructure. The circular use of innovation-critical metals and minerals should be strengthened.

2. An increasing need for metals and minerals for the green transition

Society is, and has been for a long time, dependent on metals and minerals. Demand has increased exponentially over the past 100 years.[10] The climate and energy transition is largely taking place through increased electrification of road transport and increased expansion of renewable energy sources. Several metals and minerals have become innovation-critical because they are needed for the manufacture of fuel cells, light engines, wind turbines, solar panels, batteries and energy storage, for example. Important metals and minerals are, for example, indium, cobalt, lithium and graphite, but base metals such as copper and aluminium as well as iron are also needed in these technologies. The need for rare earth elements has also increased sharply over the past 20 years.On October 11, 2019,

[10] Krausmann, S. Gingrich, N. Eisenmenger, K.-H. Erb., 2009, Growth in global materials use, GDP and population during the 20th century. Ecol Econ, 68, pp. 2696–2705.

[11] Geological Survey of Sweden and the Swedish Environmental Protection Agency, 2023, RR 2023:01, Sustainable extraction and recycling of metals and minerals from secondary resources, p. 12.

According to the OECD, despite improvements in material composition and resource efficiency, global use of metals and minerals will more than double, from 79 billion tonnes in 2011 to 167 billion tonnes in 2060. For critical metals and minerals, demand is expected to increase by 150 percent over the same time period, from 8 to 20 billion tons.[12] Extensive demand combined with limited supply affects price developments.

There are reports that demand for important raw materials for the climate and energy transition will increase over time. Exactly how big the shortage will be is unclear since estimated demand is based on forecasts. However, it has been noted that there will be a great need both within and outside the EU for increased resource efficiency, increased recycling and increased primary production to cover demand due to the climate and energy transition.On October 13, 2019,

The EU has a good supply of primary mineral resources. Europe's geological environments include mineral fields with high potential for exploration of critical raw materials, including battery and other strategic minerals. For example, one estimate shows that 5 to 55 percent of Europe's projected demand for metals in 2030 could come from European mines, depending on the metal in question. Especially for lithium and rare earth metals, the potential is considered good.On October 14, 2019,

The EU has potential in recycling, but there are not enough products to recycle. For this reason, the EU remains heavily dependent on primary mining to meet the growing demand for critical metals and minerals.On October 15, 2019,

The changed security situation, with Russia's invasion of Ukraine, has brought new urgency to the issues of security of supply and reduced dependence.

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[12] OECD, 2019, Global Material Resources Outlook to 2060. Economic drivers and environmental consequences, s. 3–4.
[13] Gregoir, L., & van Acker, K, 2021: Metals for Clean Energy: Pathways to solving Europe's Raw materials challenge. KU Leuwen on behalf of Eurometaux, 2021-04
[14] A.a. and the Geological Survey of Sweden and the Swedish Environmental Protection Agency, RR 2023:01, p. 16.
[15] Geological Survey of Sweden and the Swedish Environmental Protection Agency, RR 2023:01, p. 15.

1. The importance of critical and rare earth elements for the development of green technology

Rare earth elements are made up of a group of 16 elements, all of which are metals. The rare earth elements can be used to manufacture strong magnets for use in electric motors, for use in industry or automotive. Such magnets are also used in electric generators, which are needed for electricity generation in various types of power plants. They are also used as catalysts in chemical reactions, for example in refineries in the oil industry. Fuel cells and specialized batteries provide additional uses, as well as glass and ceramics for specific applications.[16] On October 16, 2019,

Growth Analysis analysed 201717 five relevant technologies that the agency assessed to have continued great potential for technology development aimed at reducing environmental impact through increased resource efficiency, renewable energy and through the recycling of raw materials. These were permanent magnets, batteries, special alloys, fuel cells and solar cells. All of them are technologies that are necessary for the development of information and communication technologies, modern electronics, vehicles and renewable energy supplies. Permanent magnets, where rare earth elements are needed, have a special position in this context because they are a fundamental technology in all the end products.

Several rare earth elements could be extracted in Sweden. This means that there is a geological potential in Sweden that is interesting for the rapidly growing demand for permanent magnets, among other things. The geological potential is not only found in new mines, but also in mining waste.[17] On October 18, 2019,

2. Uranium and the link to critical raw materials and rare earth elements

Deposits of rare earth elements are sometimes associated with elevated levels of uranium. Uranium concentrations in rare earth mineralisations vary extremely widely from case to case and are governed by

[16] Geological Survey of Sweden,2023,Rare earth metals, https://www.sgu.se/mineralnaring/kritiska-ravaror/lree/, retrieved 2024-05-09.

[17] Growth Analysis, 2017, Report 2017:03, Innovation critical metals and minerals from

mining to product – how can the state support development?
[18] A.a., p. 7.

what geological process is behind the individual deposit.[On October 19, 2019,

It happens that the rare earth metal, such as yttrium, is bound in the same mineral as uranium. During the physical or chemical enrichment, aqueous solutions with more or less pure uranium may occur (Government Bill 2017/18:212, p. 13).

Mining is a capital-intensive business that often needs to be conducted on a large scale in order to be profitable and financially sustainable. In the case of deposits of rare earth metals and other critical metals and minerals, the question of simultaneous extraction of uranium as a by-product or from extractive waste can therefore be central to the profitability of the operation.

[19] Geological Survey of Sweden, 2023, Rare earth metals.

1. Uranium Presence and Extraction

1. About uranium

Uranium is a weakly radioactive, metallic element, which occurs naturally in rock, soil and water. The substance is found in low concentrations in the earth's interior and in higher concentrations in the earth's crust. Uranium occurs both in bedrock and in younger rocks. When the rock contains an unusual amount of a substance, it is usually referred to as a deposit. The Swedish known uranium deposits are found in alum shale and in bedrock, where the former have uranium concentrations of 50–400 grams per tonne.[20] However, high concentrations can also be found in other rocks. Uranium is often associated, i.e., occurs together, with other metals such as iron, copper, gold, and vanadium and zirconium.On October 21, 2019,

The radiation properties of uranium in the bedrock are used in connection with exploration and mapping of other metals and minerals . This can be expressed as uranium showing the way to other deposits (Bill 2017/18:212, p. 7).

Mining of uranium ore currently takes place in about 20 countries, where Kazakhstan, Canada and Australia together account for about 60 percent of production. Today, Sweden imports 1500–2000 tons of uranium every year from Canada, Australia, Namibia and Kazakhstan.On October 22, 2019,

[20] Geological Survey of Sweden,2024 , "Uranium", https://www.sgu.se/samhallsplanering/energi/uran/, hämtat 2024-05-13.
[21] Höglund, LO, 2010, Knowledge Situation on Environmental Consequences of Exploration, Extraction and Processing of Mineral Resources of Uranium, p. 5.
[22] Geological Survey of Sweden, Periodical Publications 2016:2, Mineralmarknad 2015

Theme: Energy Metals, p. 5.

1. Uranium price development and economic profitability

The price of uranium rose by more than 40 percent in 2023 and at the end of 2023 was at a twelve-year high. Demand for uranium has increased as a result of renewed interest in nuclear power as a fossil-free energy source. Access to uranium is becoming a global challenge as new reactors have been put into operation, many existing reactors are extending their permits and old reactors have been restarted. Kazakhstan, Uzbekistan and Russia together control just over half of global uranium extraction. Russia holds almost 45 percent of the global market for isotope enrichment of the raw material.On October 23, 2019,

In the past, domestic mining of uranium has been deemed economically unprofitable.[24] Mineral extraction is a capital-intensive activity which is sensitive to the development of commodity prices. In light of the increased demand for critical metals and minerals, including rare earths, the interest in the extraction of so-called multi-metal deposits have increased (see, inter alia, SOU 2022:56 p. 107). Uranium is often an associated mineral to such metals and at present there are exploitation companies that assess that profitability would also exist for the extraction of uranium.On October 25, 2019,

2. Uranium as a nuclear fuel

Natural uranium consists of three isotopes: uranium-238 (99.28 percent of all uranium), uranium-235 (0.71 percent), and uranium-234 (0.0058 percent).On October 26, 2019,

In general, the faster the decay and the shorter the half-life of an isotope, the more radiation is emitted. The amount of radiation also depends on the type of decay that occurs and how energetic the radiation is. The very long half-lives of naturally occurring uranium mean that pure uranium in the form of metal, oxide or some other compound does not have such high ionizing radiation.

[23] Geological Survey of Sweden, 2023, Increased demand and price increase for uranium during the autumn, https://www.sgu.se/om-sgu/nyheter/2023/november/okad-

efterfragan-och-price-increases-on-uranium-dur-autumn/, retrieved 2024-05-06.
[24] Se bl.a. prop. 2017/18:212 s. 8, Sveriges geologiska undersökning, 2016:2, s. 12 samt jfr OECD, 2016, Uranium 2016, Resources, Production and Demand, s. 436–437.
[25] Information from the mining company Aura energy, 2024-04-05.
[26] Geological Survey of Sweden, 2016:2, p. 7.

Uranium, for example, can be stored and transported in ordinary steel barrels.On October 27, 2019,

In order to get a functioning nuclear fuel in commercial light-water reactors (as opposed to heavy-water reactors), the proportion of uranium 235 needs to be increased to 3-5 percent. This is done through
so-called isotope enrichment, which is a different process than physical or chemical enrichment of processed ore.

There are different methods for isotope enrichment, but the dominant technique today is with the help of gas centrifuges. In the past, diffusion was also used, but this technology is very energy-intensive.

From the point of view of nuclear proliferation, isotope enrichment technology can be a sensitive activity as it can be used to enrich
uranium-235 to very high concentration, so-called highly enriched uranium, which can be used as nuclear weapon material. In Sweden, there is no isotope enrichment activity.

In order to enrich the uranium in centrifuges, it needs to be converted into a gaseous form that has the chemical form uranium hexafluoride (UF6). After isotope enrichment, the uranium can be used for fuel production. In fuel production, the uranium hexafluoride is first converted into uranium dioxide. The uranium is then "baked" into small cylindrical pellets (~1 centimeter in diameter) at high temperature into a ceramic substance that can withstand high temperatures and is insoluble in water. These pellets are then placed in pipes of zirconium, which in turn are assembled in bundles of so-called fuel elements.On October 28, 2019,

1. Impact on health

When uranium decays, the noble gas radon, which is a radioactive substance, is formed. Radon is always present where there is uranium and can enter the body via air or water. It is the decay products of radon (radon daughters) that are particularly dangerous for both animals and humans. The largest radiation doses to which the general public in Sweden is exposed come from

naturally occurring radon daughters in the

[27] Geological Survey of Sweden,2023,Properties ofuranium, https://www.sgu.se/samhallsplanering/energi/uran/egenskaper-hos-uran/, retrieved 2024-05-06.

[28] Höglund, 2010, Knowledge situation on environmental consequences of exploration, extraction and processing of mineral resources of uranium, Kemakta AR 2010-07, p. 14 and Bill 2017/18:212 s. 7–8.

decay series from uranium-238 and thorium-232, elements found in our bedrock.

Uranium is also chemically toxic. The effects uranium can have on humans, animals and plants are similar to those of lead. Uranium is absorbed in plants to a very varying degree – in some plants it stays mainly in the root system, in others the uranium goes up into the leaves. Smaller amounts can be stored in meat. Some uranium is thus ingested with food. Often, however, the intake of uranium from water is greater.

Most of the uranium that enters the body is expelled relatively quickly. However, a small part can be stored. Uranium in water is absorbed in the gastrointestinal tract, distributed to blood cells, kidneys and bones, and probably also to hair, and excreted in the urine. In the skeleton, the half-life is in the order of years. Since uranium is released from the bones in connection with the reformation of the bones, the concentration in the kidneys will accumulate during the corresponding time. Elevated levels of uranium can be dangerous because it can affect the function of the kidneys in particular .

The Finnish Food Authority has issued recommendations to limit the uranium content in drinking water to 30 micrograms of uranium per litre, which is in line with the World Health Organization's (WHO) provisional guideline value. This is based on the effects of the chemical properties of uranium, not the radiation properties. High uranium concentrations in drinking water are found in many places in Sweden, due to the fact that uranium occurs naturally in our soils and rocks.

Uranium mining takes place in the same way as other ore mining and the mining can take place both in open-pit (above ground) and in underground mines. It is important to have protective equipment, monitoring , control and ventilation to avoid harmful exposure to radon in particular. The exposure to uranium mining workers is as low as exposure to natural radon in the atmosphere. However, when mining high-grade ore, greater exposure

can occur. In general, underground mines pose a higher risk of radiation than other types of mines, due to ventilation difficulties in confined spaces and at great depths.

Dust during uranium mining can cause both radon daughters and more persistent alpha-emitting particles to enter the respiratory tract. For modern mining, several studies have shown that the radiation dose is very low,

only one fraction of the limit value for exposure to the general public, which is 1 mSv/year. On October 29, 2019,

1. Extraction of uranium

1. The extraction process

Like most other metals, uranium is mined and extracted using conventional methods in open-pit mines or in underground mines. Open-pit mining occurs when the ore bodies are relatively shallow. They usually have lower uranium concentrations, but usually large volumes. The more expensive underground mining requires that the uranium concentrations are higher or that the uranium is mined as a by-product.

In some mines with high uranium concentrations in Canada, for example, automated or remote-controlled mining occurs. Uranium is also extracted through so-called in situ leaching, where solutions that can leach uranium are pumped into uranium-bearing rocks and then pumped up a bit from there, whereupon the uranium is extracted from the solution. The method requires that the uranium-bearing rock is permeable to the leachate solutions, such as coarse sandstone, and that it is surrounded by dense rocks, such as shale, that do not allow the leachate solutions to pass through. This extraction method places great demands on the operator so that the solutions, with or without uranium content, do not escape into groundwater and watercourses or otherwise pollute the environment.

In situ leaching is common in Kazakhstan, the United States and Uzbekistan, but is also found in Australia and Russia. Almost half of the world's uranium is currently extracted through in situ leaching.

Chemical or physical enrichment means that the uranium ore from underground mining or open-pit mining is crushed and ground to a suitable size, and then the uranium content is leached with sulphuric acid. In some cases, other solutions are used.

Uranium is then extracted from the solution through so-called ion exchange technology or liquid-liquid extraction.

In situ leaching, there is no need for crushing and grinding of the ores, but the solutions go directly to the extraction steps.

[29] National Food Agency, 2024, Uranium, https://www.livsmedelsverket.se/livsmedel-och content/undesirable substances/metals1/uranium, retrieved 2024-05-07, and Geological Survey of Sweden, 2023, https://www.sgu.se/samhallsplanering/energi/uran/egenskaper-hos-uranium/, retrieved 2024-05-07.

The final product is called yellowcake and corresponds to slig or concentrate at, for example, a copper or iron mine. This product then needs to be further purified, isotope-rich, in order to be used as nuclear fuel. Isotope enrichment should not be confused with the chemical or physical enrichment.On October 30, 2019,

1. Extraction of uranium in Sweden

In Kvarntorp in Örebro County, about 60 tonnes of natural uranium were extracted between 1953 and 1963. In Ranstad in Västra Götaland County, uranium was mined during the years 1965–1969. A total of about 200 tonnes of natural uranium were extracted there. Uranium mining in Ranstad was gradually completed during the 1970s, since then there has been no mining of uranium in Sweden. Nor has there been any extraction of uranium as a by-product of the extraction of other metals or minerals.On October 31, 2019,

During the years 1984 and 2009, Ranstad Mineral AB (RMA) used part of the Ranstad plant for the recovery of uranium from process waste from the production of nuclear fuel, but all operations have now been discontinued.[32]

Since the ban on uranium extraction was introduced in 2018 and uranium as a concession mineral was thus removed, there is no possibility of obtaining a permit under the Environmental Code for uranium extraction, which includes the extraction of uranium as a by-product and the recycling of extractive waste.

There are currently no valid exploration permits under the Minerals Act where uranium is specifically mentioned.[33]

2. Uranium as a by-product and extractive waste

Uranium, as described in section 4.1, is often associated with other minerals such as vanadium and zirconium.[34] There are also rare earth elements bound in the same mineral as the

[30] Geological Survey of Sweden, 2016:2, pp. 26–27, and Höglund, 2010, pp. 11–14.
[31] Geological Survey of Sweden, 2016:2, p. 38 and Government Bill 2017/18:212, p. 8.
[32] Swedish Radiation Safety Authority,2024,Ranstadsverket , https://www.stralsakerhetsmyndigheten.se/omraden/karnkraft/avveckling-av-karntekniska-facilities-in-sweden/decommissioned-facilities/ranstadsverket/, retrieved 2024-05-07.
[33] According to information from the Mining Inspectorate 2024-04-22.
[34] Höglund, 2010, p. 5.

uranium, whereupon it is only during physical or chemical enrichment that the substances can be separated from each other (Government Bill 2017/18:212, p. 13). The increased demand for metals and minerals entails a risk of future shortages in relation to, among other things, critical raw materials, including innovation-critical metals such as cobalt and lithium as well as rare earth metals. This entails a need for increased primary increased resource efficiency and increased recycling.[35]

There may be a commercial potential for the extraction of resources from mining waste. However, the ability to provide an environmentally friendly, cost-effective method of recycling is an important factor in the use of secondary resources such as raw materials36

In cases where uranium is associated with other minerals or is found in the ore that is mined, there is a practical possibility of commercializing the uranium as well. The uranium-containing mineral can then, under the specified conditions, be considered a by-product (see Chapter 15, Section 1, second paragraph, of the Environmental Code). If it is not a by-product, it is otherwise waste that must be handled in accordance with the provisions of the Ordinance (2013:319) on Extractive Waste.

1. Impact on the environment

Many of the environmental problems that can arise in the extraction of uranium are similar to those in the extraction of base metals, precious metals and iron.[37] This includes the risk of the formation of acidic and metallic leachates as a result of weathering of sulphide minerals, which also normally occurs together with uranium deposits in e.g. alum shale.[38] The following is therefore a description of the environmental problems which mining

activities, in particular their waste, may cause. The description is based on information from Höglund's knowledge compilation on the environmental consequences of exploration, extraction and processing of mineral resources of uranium, as well as the Geological Survey of Sweden and the Swedish Environmental Protection Agency's report "Proposal

[35] Gregoir, L., & van Acker, K, 2021: Metals for Clean Energy: Pathways to solving Europe's raw materials challenge. KU Leuwen on behalf of Eurometaux, 2021-04 and the Geological Survey of Sweden and the Swedish Environmental Protection Agency, 2023, Report on government assignments: Sustainable extraction and recycling of metals and minerals from secondary resources (SGU RR 2023:01/NV-03617-21), p. 12.
[36] Geological Survey of Sweden and the Swedish Environmental Protection Agency, 2023, p. 16.
[37] Höglund, 2010, p. 16.
[38] Höglund, 2010, pp. 16–17, and information from the Swedish Environmental Protection Agency 2024-04-25

to the strategy for the management of mining waste – report on a government assignment".[39]

Mining waste management

The mines account for the majority of waste in Sweden. In 2020, households and businesses generated a total of 152 million tonnes of waste, of which 116.3 million tonnes came from the mining industry.[40] The quantities as such are inherently problematic from an environmental perspective.[The 41st Infantry Division]

Since metals are elements, they do not break down but can stay in our environment or in our bodies for a long time. Most substances have a negative effect on our health in sufficiently high concentrations. The concentration that is hazardous to humans depends on the substances and is often limited by so-called limit values in laws or guidelines.

Mining waste management is an environmentally hazardous activity that gives rise to emissions to water and soil. The potentially contaminants generated by mining waste vary depending on the composition of the bedrock, extraction method, processing, and the handling of the mining waste. Whether and where the environmental impact occurs depends primarily on the properties of the mining waste and how it is handled, but is also affected by the conditions of the environment, such as the sensitivity of the recipients and the topography, climate and geology of the areas in question.

The operator must have knowledge of the current and future effects of its activities on people and the environment.[42]

Impact on water

Mining waste can give rise to leachate, i.e. water passing through a landfill, with high levels of metals and/or other substances and low pH values that spread to the environment and contaminate watercourses and groundwater, if mismanaged.

In summary, the substances in leachate that can have negative effects on the aquatic environment are:

[39] Höglund, 2010, and the Swedish Environmental Protection Agency and the Geological Survey of Sweden, 2017, Proposal for a strategy for the management of mining waste – report of a government assignment.
[40] Swedish Environmental Protection Agency, 2022, Waste in Sweden 2020 Origin and treatment, Report 7048.
[41] Information from the Swedish Environmental Protection Agency 2024-04-25.
[42] The Swedish Environmental Protection Agency and the Geological Survey of Sweden, 2017, p. 102.

1. Metals: such as arsenic, cadmium, cobalt, copper, nickel, lead, uranium, zinc
2. Anions: sulphate, phosphate, nitrogen compounds (nitrite, nitrate,
3. ammoniak/ammonium)
4. Chemicals from the enrichment such as xanthines

Emissions from extractive waste facilities affect recipients downstream. The impact on a specific recipient depends on its size and properties, the amount of water supplied from the operation, and the content and amount of discharged substances. The resulting concentrations in the recipient also depend on the water flow in the recipient. Naturally occurring metal concentrations in rock and soil also contribute to the concentrations in recipients, so-called background deposits.

Environmental quality standards are used to assess the status of surface water and groundwater bodies that describe the condition or quality that a water must have at a given time. The assessment basis for environmental quality standards may, for example, be a concentration of a substance that must not be exceeded. In general, discharges must not result in the environmental quality standards for water not being met in recipients downstream of operations during operation or after closure.

Today, there are exceedances of environmental quality standards related to diffuse leakage and controlled discharges of a number of substances at mining operations despite precautions

taken and that operations are conducted in accordance with applicable conditions. Even for substances for which there are no assessment criteria for environmental quality standards, there are high levels of diffuse leakage and controlled emissions, which can lead to unacceptable environmental effects arising if the emissions are not regulated.

Exceedances of environmental quality standards will in all likelihood also occur in the future. The emissions can be tested even if they are not regulated in terms or orders. It also happens that existing terms and conditions are not updated based on current knowledge or practice.

Lakes, streams and groundwater reservoirs are affected by both diffuse and point emissions from mining activities. Getting an overall picture of the environmental impact of a specific mining operation can be further complicated by the fact that there may also be diffuse emissions,

> from, for example, waste warehouses, waste dumps, or contaminated areas, which are more difficult to measure. In some areas where mining has also been carried out for hundreds of years, it can also be difficult to distinguish between the environmental impact that comes from mining waste from historical operations and modern mining.[43]

Metals

> Mining waste containing certain minerals can weather in contact with air and water, which means that metals can leach to a greater or lesser extent. The weathering processes driven by oxidation occur at different speeds and with different weathering products as a result, depending on the composition of the material. If measures are not taken to stop the weathering process, leaching of metals can continue for a very long time.[44]

Sulfidmineral

> Sulphide minerals are minerals in which sulphur and one or more metals form a compound. Sulphide minerals are formed under reducing conditions, i.e. oxygen-poor environments, and continue to be stable as long as the conditions are oxygen-free. Several sulphide minerals are important ore minerals. During mining, the rock

decomposes into smaller particles that are taken up to the earth's surface and exposed to ice, air, water, biological activity and differences in pressure and temperature. When the sulphide minerals are exposed to oxygen in air and water, they are no longer stable, which causes them to weather. In practice, this means that the bond between metal and sulphur is broken and more soluble and reactive products are created. These weathering products, in the form of sulphate and metal ions, can be transported further by water.

Thus, when sulphides weather, sulphur is released, which together with water forms sulphuric acid, which leads to a gradual reduction in the pH value. A declining pH value causes weathering to accelerate as the most effective weathering reactions are dominant at low pH values. Most metals also dissolve more easily and stay dissolved in water with a lower pH, and they can thus be transported out of circulation. The pH value thus has a major impact on the weathering process and its effects on the surrounding environment.

[43] The Swedish Environmental Protection Agency and the Geological Survey of Sweden, 2017, pp. 102–104.
[44] A.a., p. 104.

Mining waste can also contain minerals and rocks that counteract acidification, such as calcite. These are called buffering minerals and neutralize the acid the sulphur forms and raise or maintain the pH value at a certain level.

Oxidation of sulphide minerals can also occur with oxidizing agents other than oxygen. During the weathering described above, iron ions, Fe3+, are also formed, which can act as an oxidizing agent. This means that for already weathered mining waste, weathering, as well as leaching of metals, can continue even if the mining waste is covered to achieve oxygen-free conditions, i.e. secondary weathering.

Sulphide-containing minerals have a high propensity to weather. Weathering of sulphide minerals leads to the formation of acid at the same time as metals are released, which can then leach out. It can be iron, arsenic, lead, cadmium, copper, zinc, and more. In some cases, the mining waste may contain buffering minerals in excess that can neutralize the acid. Otherwise, acidic and metallic leachate will form. Metallic leachate can also form in some cases, even though the leachate is not acidic.

The geological conditions for weathering and the formation of

metal-containing and often acidic leachate are different at each deposit and mine. There are general features of certain types of ore and waste rock, but the combination of available metals, other elements and the resulting pH of water varies greatly.

Waste rock and tailings from sulphide ores generally weathers quickly and generates high metal concentrations in often acidic leachate. Other types of ore that contain significantly lower levels of sulphides, such as the iron ores in Norrbotten, do not cause metallic and acidic leachate to the same extent, although it does occur.[45]

Other Topics from Enrichment

Different chemicals are used in the enrichment of different types of ore, for example in flotation collectors and foam-formers. In some cases, the chemicals contain more hazardous substances in addition to those mentioned above. An example of this is xantat. Residues of these chemicals

[45] A.S., pp. 104–105.

accompanies the tailings as it is pumped out onto the reservoir together with the process water and can reach recipients via diffuse or point emissions.[46]

Uranium and weathering of uranium minerals

Weathering of non-sulphide-containing minerals, such as uranium minerals, can also occur. Uranium is widespread in Swedish bedrock and some forms weatherize if it comes into contact with oxygen, similar to sulphide minerals. It can then transition to a form that has high mobility in both acidic and alkaline environments and can be transported long distances in groundwater and surface water. Uranium can be oxidized and mobilized even at neutral pH values. The risks of uranium dispersion are thus not limited to materials that exhibit traditional acidification problems in mines with rock containing sulphides.[47]

Even if low concentrations of uranium occur, high concentrations of uranium can occur in aqueous solution depending on the dissolution rate (SOU 2020:71, p. 130).

A further problem in relation to uranium may be the

presence of other radioactive substances together with the uranium, such as thorium, radium and radon, which remain in the waste and require special consideration when designing measures and solutions.[48]

Uranium as a particularly polluting substance

In general, a discharge to water must not result in the deterioration of the aquatic environment in violation of an environmental quality standard or jeopardise the possibility of achieving an environmental quality standard (Chapter 5, Section 4 of the Environmental Code).

Uranium is also a substance that is now monitored in recipients in connection with mining operations. It is a so-called particularly polluting substance, SFÄ, in lakes and watercourses according to the Swedish Agency for Marine and Water Management 's regulations (HVMFS 2013:19) on classification and environmental quality standards for surface water (Appendix 2, section 7).

[46] A.S., p. 107.
[47] Höglund, 2010, p. 16 and SOU 2020:71, Extraction from alum shale, p. 130.
[48] A.a.

The regulation specifies the assessment criteria for the uranium concentration in water and concentrations higher than the assessment basis have been measured in certain recipients in connection with mining operations. The concentrations of uranium in both controlled emissions and diffuse leakage at mining operations therefore need to be taken into account in the testing and supervision of mining operations.[49]

[49] Swedish Environmental Protection Agency, 2023, https://www.naturvardsverket.se/vagledning-och-stod/branscher-and-activities/mines/uranium---occurrence-at-mining-and-extraction-ban/, retrieved 2024-05-09.

1. Permit processes – from exploration to mining

The system for assessing the possibility of extracting minerals requires several stages of assessment under different legislations. The fact that the review process is divided into different stages is primarily motivated by the special conditions of the mining industry and the actors' need to attract venture capital. An examination that gradually provides greater certainty for the prospector to know that he or she may ultimately process a deposit enables financing to be added to the project gradually in order for exploration work to be carried out, environmental assessments to be carried out, applications to be produced and concession and permit examinations to be carried out. The underlying purpose of the Minerals Act is thus to promote exploration and knowledge building while taking reasonable account of opposing private and public interests. (Government Bill 1988/89:92 p. 45 et seq. and Government Bill 1991/92:161 p. 6)

The key steps in the process from exploration to mining are exploration permits, mining concessions, environmental permits, land allocation, and building and land permits. In order to handle uranium, a permit is generally also required under the Nuclear Activities Act (1984:3), hereinafter referred to as the Nuclear Activities Act. Three separate permits, decided under three different legislations, would thus be required to mine uranium. An environmental impact assessment must be attached to an application under all three pieces of legislation. The Environmental Code, the Minerals Act (1991:45) and the Nuclear Activities Act apply in parallel with each other.

The handling of uranium-containing material may also entail a requirement for a permit under the Radiation Act (1988:220) if the activity in the material exceeds a certain level.

1. The examination under the Minerals Act

1. Exploration

The Chief Mining Inspector, who decides on matters under the Minerals Act, decides on exploration permits and work plans (see Chapter 8, Section 1). The Mining Inspectorate, which is headed by the Chief Mining Officer, handles the application case.

Exploration work (prospecting) may be carried out within the framework of an exploration permit. Exploration refers to work with the aim of proving a deposit of a concession mineral and to ascertain the probable economic value of the deposit and its nature in general, to the extent that such work involves an infringement of the rights of the landowner or other rightholder (Chapter 1, Section 3). Certain types of investigative work, such as block searching, measuring with various instruments, etc., can be carried out on the basis of the right of public access and do not require a permit (Government Bill 1988/89:92 p. 84). Test mining is to be regarded as part of the exploration work and can thus take place within the framework of an exploration permit (test mining does, however, require a permit under the Environmental Code, see section 5.2 below).

An exploration permit under the Minerals Act entitles, also in relation to landowners, the exclusive right to map the bedrock geology within an area in order to find out whether there is a deposit, how it is constituted and its size and possible mineworthiness (see Chapter 1, Section 4). An exploration permit also gives priority to a mining concession for the potential deposit (see Chapter 4, Section 3). Despite the name , however, an exploration permit does not give any right to start exploration work immediately. In order to conduct investigative work , a work plan is also required (see Chapter 3, Section 5).

2. Processing concession

The Chief Mining Officer also decides on permits for processing (mining concessions). The purpose of the proceedings is to assess whether the deposit found is likely to be economically exploitable, and the location and nature of the deposit do not make it inappropriate for the applicant to be granted the requested concession. For the processing of concession minerals in alum

shale, the applicant must also demonstrate that it is suitable for such processing

(Chapter 4, Section 2, second paragraph). The main part of the application therefore consists of a so-called ore evidence and an environmental impact assessment.

The decision on the mining concession determines who has the right to extract minerals that are in the area, the person who holds the extraction concession has the exclusive right to extract the minerals covered by the decision within the area in question. Operations may only commence after land allocation has taken place (see Chapter 5, Section 1).

The Chief Mining Officer shall also refer matters concerning the granting of a mining concession to the Government, e.g. if the Chief Mining Inspector considers the issue of a concession to be particularly important from a general point of view. The Chief Mining Inspector shall investigate and attach his or her own statement in matters referred to the Government for consideration (Chapter 8, Section 2).

1. The review under the Environmental Code

Mining activities are environmentally hazardous activities that are subject to a permit pursuant to Chapter 9 of the Environmental Code. The Land and Environment Court examines questions concerning permits for mining, processing and enrichment, unless it is a question of test mining, rusting or sintering for test purposes or extraction of asbestos (see Sections 11, 14–15 of the Environmental Assessment Ordinance [2013:251]). Permits for these activities and permits for processing or enrichment of ores and minerals other than roasting and sintering are examined by the County Administrative Board's Environmental Assessment Delegation.

Facilities for nuclear activities that are examined by the Government under the Nuclear Activities Act and facilities for mining substances that can be used for the production of nuclear fuel must be examined by the Government (Chapter 17, Section 1, first paragraph, 1 of the Environmental Code). This means that the court or the review authority must hand over the case to the government, which will then examine whether the activity can be permitted. In the explanatory memorandum to the Environmental

Code, it was stated that the admissibility decision should be binding in the subsequent permit examination and that it is the responsibility of the ordinary review authority to establish more detailed conditions and grant permits, but not to examine the admissibility issue further (Government Bill 1997/98:45 Part 1 p. 436 and 443 and Government Bill 1997/98:45 Part 2 p. 203).

Despite this, the Government shall not examine the admissibility of activities that are prohibited pursuant to, among other things, Chapter 9. 6 of the Environmental Code (Chapter 17, Section 1, second paragraph, of the Environmental Code).

The Government may only permit the operation if the municipal council of the municipality where a deposit is to be developed has approved this (Chapter 17, Section 6 of the Environmental Code).

1. The examination under the Nuclear Activities Act

1. Permit requirement as a general rule

By its nature, the Nuclear Activities Act is a safety act, i.e. it is specifically aimed at safeguarding the safety of activities in the nuclear energy sector as well as the supervision and transparency of such activities (Government Bill 1983/84:60, p. 31).

The main rule in the Nuclear Activities Act is that a licence is required to conduct nuclear activities (Section 5). Nuclear activities refer to, among other things, the construction, possession or operation of a nuclear facility (Section 1(1)). A nuclear facility is defined in Section 2. According to paragraph 1(c), the term means, among other things, a facility for the extraction, production, handling, processing, storage that is intended to become permanent (final storage) or other storage (storage) of nuclear material. Nuclear material means, among other things, uranium, plutonium or other substance that is used or can be used for the extraction of nuclear energy (nuclear fuel) or a compound in which such a substance is contained (section 2, section 2 a).

The Nuclear Activities Act replaced the previous Atomic Energy Act (1956:306). The relationship between the Minerals Act and the permit requirement in the Atomic Energy Act with regard to the mining of uranium was developed in the preparatory

work for the Nuclear Activities Act (Government Bill 1983/84:60, pp. 68–69). It was stated that the permit requirement under the Atomic Energy Act applies to both processing and exploration concessions for the processing or utilisation of uranium-containing material exceeding the limits specified in the Announcement to the Atomic Energy Act. It was further stated that material that is extracted from a mine during mining or test mining, but which has not been processed by the concessionaire, is also considered to be such a possession or position with material as referred to in the Atomic Energy Act and which therefore required a permit under the Nuclear Activities Act.

As a general rule, the Government examines licensing issues under the Nuclear Activities Act. The Swedish Radiation Safety Authority examines questions concerning licences to possess, process or otherwise take possession of natural uranium and licences to construct, possess or operate facilities for activities necessary for such activities if the radioactivity in the total amount of waste from the activities is below certain limits. The activity shall not exceed 10 TBq at any time, of which no more than 10 GBq of alphaactive substances. (see Section 16 of the Ordinance (1984:14) on Nuclear Activities, hereinafter referred to as the Nuclear Ordinance).

1. Exemptions from the permit requirement

However, there are several exceptions to the main rule on the requirement for a licence in the Nuclear Ordinance and the Swedish Radiation Safety Authority's regulations.

Section 11 of the Nuclear Ordinance states that any person may acquire, possess, transfer, handle, process, transport or in any other way take possession of or bring into Sweden a substance whose content of natural or depleted uranium or thorium does not exceed 200 grams per tonne.

The Swedish Radiation Safety Authority has provided for further exemptions from the licensing requirement in the Swedish Radiation Safety Authority's regulations (SSMFS 2018:4) on naturally occurring radioactive material. Naturally occurring radioactive material refers to material that contains naturally occurring radioactive substances and which:

1. is in its natural state, or
2. have only been processed or enriched for purposes other than the extraction of these substances and which are also not intended to be processed for the use of the radioactive, fissile or fertile properties of the material (Section 2).

The regulations, which entered into force on 1 June 2018, state that the provisions of the Nuclear Activities Act do not apply to naturally occurring radioactive material provided that the material is not under international control pursuant to Commission Regulation (Euratom) No 302/2005 of 8 February 2005 on the implementation of Euratom nuclear safeguards (Section 3).

Naturally occurring uranium exceeding 1 000 ppm is subject to international control (see Article 2(4) of Commission Regulation (Euratom) No 302/2005, Article 197(4) of the Treaty establishing the European Atomic Energy Community and Regulation No 9 fixing the ore grades referred to in Article 197(4) of the Treaty establishing the European Atomic Energy Community). This means that naturally occurring uranium that does not exceed 1,000 ppm is exempted from the Nuclear Activities Act in its entirety.

The Swedish Radiation Safety Authority may decide in individual cases that the Nuclear Activities Act shall apply notwithstanding what is stated in section 3 (section 17).

1. The current ban on uranium mining

1. A permit under the Environmental Code may not be granted for activities subject to a permit for the extraction of uranium

On 1 August 2018, amendments to the Environmental Code introduced a provision in Chapter 9, Section 6 which means that a permit may not be granted to mining operations or mining facilities for mining, test mining, processing or physical or chemical enrichment of uranium-containing material if the mining operation or mining facility constitutes a nuclear facility that requires a permit pursuant to the Nuclear Activities Act (1984:3). below the Nuclear Activities Act. At the same time, uranium was removed as a concession mineral from the Minerals Act (1991:45) (Chapter 1, Section 1).

In the preparatory work for the ban on the extraction of uranium (Bill 2017/18:212, pp. 13–15), it was stated as a reason for the introduction that all municipalities that had commented on the referred proposal were in favour of the prohibition being introduced and that an explicit ban should be introduced, even if it is unlikely that a mine whose main purpose is to extract uranium will be granted a permit under the Environmental Code. It was not considered sufficient that the municipality can stop uranium mining or that, if the municipality approves extraction, the government has the opportunity to stop the extraction through a negative decision on the admissibility issue.

It was also assessed that the proposal did not affect the 14 metal mines that were in production at the time, in light of the fact that they were not assumed to use the uranium for its radioactive, fertile or fissile properties and that they were therefore covered by the Swedish Radiation Safety Authority's

regulations (SSMFS 2011:4) on naturally occurring radioactive material, which exempted such material, NORM, from the licensing requirement under the Nuclear Activities Act. Proposal

For the same reason, it was also not considered to affect the possibilities of extracting rare earth metals. This is also in cases where physical or chemical enrichment is required to separate uranium and the rare earthmoving metal from each other, provided that the aqueous solutions containing uranium would form waste.

As regards whether the prohibition should extend to uranium exploration, it was further stated that uranium is a metal that occurs in all geological environments and that its concentration and form of occurrence provide clues to the geology of an area, which facilitates both bedrock geological investigations and exploration. A ban would probably cause problems for exploration of other metals that occur together with elevated levels of uranium, and it would be a difficult task to supervise exploration activities to ensure that they do not prospect for a purpose that is not permitted. In contrast to the early phases of exploration, it was deemed necessary that test mining is covered by the prohibition, with reference to the fact that it is associated with certain environmental impacts and therefore subject to a permit under the Environmental Code.

1. From concession minerals to landowner minerals

Uranium was before 2018 a concession mineral in the Minerals Act and from 1945 until 2018 uranium was covered by current legislation on the exploitation of mineral deposits; firstthrough the so-called Coal Act (1886:46), then by the Act (1960:679) on the Right to Investigate and Process Deposits of Uranium-containing Minerals and the Act (1974:890) on Certain Mineral Deposits (the Old Minerals Act). In connection with the introduction of the prohibition against extracting uranium in the Environmental Code, the element was removed from the Minerals Act, where it had been included in the list in Chapter 1, Section 1, Section 1 of the minerals covered by the Act. This means, among other things, that it is not possible to grant either an exploration permit or a mining concession for uranium. Therefore, uranium may currently be explored on the same terms as land and landowner minerals, and permission is

required from the landowner in cases where a prospector wants to carry out exploration that cannot be carried out with support of the right of public access.

In the preparatory work for the prohibition on the extraction of uranium (Bill 2017/18:212 p. 17), it was stated as a reason for the proposal that, in light of the prohibition in the Environmental Code, there is no economic interest in extracting the substance uranium per se and that the only real reason to prospect for uranium is for the purpose of investigating the presence of other minerals. e.g. rare earth elements. It was emphasised that these minerals are concession minerals and that no valuable minerals other than uranium would be at risk of being lost by the proposal.

Furthermore, it was assessed that, in relation to the protection of property expressed in Chapter 2. 15 of the Instrument of Government, there was no longer a sufficiently strong public interest to justify the special position that the status of a concession mineral confers in relation to the landowner.

1. Experiences of the ban

1. Sweden as an attractive mining nation

Sweden has long had the position of a strong mining nation, where it is attractive to have a mine in operation because there is good physical potential, a relatively low effective tax rate and strong input factors, such as access to energy, transport infrastructure and expertise (see, e.g., SOU 2022:56 p. 189). At the same time, during the years 2016–2020, Sweden lost its attractiveness in the annual ranking of mining companies that the Fraser Institute has made since 1997, which is largely considered to be due to uncertainties related to the trial processes (Fraser Institute and SOU 2022:56 p. 181 ff.).

It is not clear whether the attractiveness has been affected as a result of the introduction of the ban on uranium extraction. Sweden increased slightly in attractiveness again in 2021, after which figures for Sweden are missing due to too low a response rate to the survey that forms the basis for the ranking.[50]

[50] Fraser Institute Annual Survey of Mining Companies 2022, s. 4

1. Existing mining operations in production may be affected

In the preparatory work for the production ban, it was assumed that existing mining operations in production will not be affected in view of the fact that the Swedish Radiation Safety Authority's regulations (SSMSF 2011:4) completely exempt naturally occurring radioactive material from the permit requirement (Government Bill 2017/18:212, p. 13).

Since the introduction of the prohibition provision, the area subject to a permit for the management of NORM has been expanded through new regulations in the area. On 1 June 2018, new regulations entered into force (SSMSF 2018:4) limiting exemptions from the provisions of the Nuclear Activities Act to materials that are not under international control pursuant to Commission Regulation (Euratom) No 302/2005 of 8 February 2005 on the implementation of Euratom nuclear safeguards. Nuclear materials, including uranium containing the isotope mixture present in nature (see definition in Article 197(3) of the Treaty establishing the European Atomic Energy Community), are subject to international control with a few exceptions, including a general exemption for ores containing uranium with a content of less than 1 000 ppm (Article 2(4) of the Commission' s Atomic Energy Act).Regulation (Euratom) No 302/2005, Article 197(4) of the Treaty establishing the European Atomic Energy Community and Regulation No 9 fixing the ore grades referred to in Article 197(4) of the Treaty establishing the European Atomic Energy Community).

This means that the handling of uranium in a mining operation may be subject to a permit under the Nuclear Activities Act, regardless of whether it is for the purpose of using the radioactive, fissile or fertile properties of uranium. In other words, the handling can be subject to a permit regardless of whether the uranium is extracted as a main/by-product or is waste if the limit value is exceeded.

In dialogue with actors in the mining industry, it has emerged that the ban is therefore difficult to relate to, there is also a habit of assessing one's own operations based on nuclear legislation. The scope

of application of Chapter 9, Section 6 of the Environmental Code has thus been expanded in a way that was not foreseen at the time of its introduction.

1. Mining operations in production may be caught between two bans

Both operators who run existing mining operations and the Swedish Environmental Protection Agency have stated in dialogue during the investigation that the ban on extracting uranium puts the operators in a difficult situation. This is when requirements for purification of uranium from process water are set in order not to exceed the limit values for uranium that apply according to the Swedish Agency for Marine and Water Management's regulations (HVMFS 2019:25) on classification and environmental quality standards for surface water. Operators are "squeezed" between two prohibition provisions; Chapter 5, Section 4 of the Environmental Code on the prohibition of permits if there is a risk of deterioration of the aquatic environment and the prohibition on the extraction of uranium.

An authority or a municipality may not allow an activity or measure to be started or changed if, despite measures to reduce pollution or disturbance from other activities, this gives rise to such increased pollution or disturbance that means that the aquatic environment deteriorates in an unlawful manner or that is of such importance that it jeopardises the possibility of achieving the status or potential that the water must have according to an environmental quality standard (Chapter 15, Section 4 of the Environmental Code). As described in section 4.2.4, uranium is one such particularly polluting substance, SFÄ, where the environmental quality standard is regulated in the Swedish Agency for Marine and Water Management's regulations on classification and environmental quality standards for surface water.

The operators describe that knowledge about uranium and the handling of the substance has increased in recent years and that, since uranium was classified as a particularly polluting substance, activities have been carried out to find purification techniques to prevent the concentration of uranium in the process water from exceeding the limit values. The problem may arise in the event of successful purification, when the concentrations of uranium may be so high that the operation may be assessed as a nuclear facility subject to a permit under the Nuclear Activities Act. This is

because the activity in such cases is prohibited by Chapter 9. 6 of the Environmental Code.

The situation is not unique to mining operations. During the course of the work, the Inquiry has also been made aware that the same problem can also be raised with regard to water treatment plants.

A similar situation with the handling of uranium in concentrations that require a permit under the Nuclear Activities Act is expected to occur in the extraction of, for example, rare earth metals in cases where the substances, including uranium, can only be separated during physical or chemical enrichment and uranium in high concentrations thus occurs.

1. The Government's admissibility assessment under the Environmental Code

1. The Government's admissibility assessment under the Environmental Code

Chapter 17 of the Environmental Code regulates the cases in which the Government is to examine the admissibility of a certain activity. The activities that require a mandatory admissibility assessment are regulated in Chapter 17. 1 of the Environmental Code. However, the Government may refrain from examining such an activity if there are special reasons (Chapter 17, Section 2 of the Environmental Code). According to the preparatory work for the Environmental Code, such special reasons may be if the activities are of a smaller scope or of a less intrusive nature, or if it otherwise appears unnecessary to have an examination by the Government (Government Bill 1997/98:45, part 2, p. 217 et seq.).

The Government may also reserve the right to an admissibility review for certain activities (Chapter 17, Section 3 of the Environmental Code). In the same way, the Government shall, at the request of the municipal council, reserve the admissibility assessment of a new activity of certain types (Chapter 17, Section 4a of the Environmental Code). Following a legislative amendment in 2005, there are activities that were previously covered by Chapter 17. Section 1, but which has no longer been deemed to need to fall under the mandatory admissibility test (see Bill 2004/05:129).

1. The purpose of the admissibility test

Provisions on government review of certain industrial and similar

activities were introduced in 1972 in the Building Act. The provisions formed part of a reform aimed at bringing about a functioning national spatial planning. The state would have better opportunities to control the location of industries of importance from

> national planning point of view. The idea of the government review was to carry out an early and comprehensive but at the same time comprehensive examination of the location of such industrial activities that take up or change the character of natural resources of which there is a particular shortage and which are or can be expected to be subject to competing claims (Government Bill 1972:111, Appendix 2, pp. 301 and 360 et seq.). In 1987, the provisions of the Building Act on government review were transferred to the new Act on the Management of Natural Resources (1987:12), the Natural Resources Act. Chapter 4. there was a list of the types of new installations that could not be carried out without permission from the government. As before, the Government could also reserve the examination of other installations if they could be assumed to be of a significant scope or to be of an intrusive nature. The provisions were coordinated with the assessment under the Environmental Protection Act, the Solid Fuels Act and the Water Act. It was considered natural that the Government had influence over and took political responsibility for the creation and location of industrial and similar establishments, with a major environmental impact and which were of great importance for employment or for others important public interests (Government Bill 1985/86:3, p. 125).

The preparatory work for the Environmental Code (Bill 1997/98:45 part 1, pp. 436–437) describes the reasons for retaining the government review of certain new facilities. All in all, it is stated that it is still important that the Government is able to exercise political control over certain decisions within the framework of current legal rules, and that there should continue to be political responsibility for large or otherwise important activities that are important for community planning in general. Furthermore, it is stated that the Government should have the best conditions to make the general and overall suitability considerations that are required, within the framework of established standards:

> The Government should examine the admissibility of activities that constitute important public interests, while at the same time those that risk harming human health, entail major environmental impacts or major interventions in the environment and use valuable natural resources.

/…/

In this context, the Government would like to remind you that common to the activities that may be considered for government review is that they generally have a significant environmental impact, while at the same time

Competing or conflicting interests must be weighed together to reach the best solution. Almost all permit examinations under the provisions of the Environmental Code do indeed mean that different considerations must be taken into account and weighed against each other. This balance of different interests is particularly marked in the type of activities that are relevant for government review. The examination of what impact on the environment can be tolerated in these cases often includes social issues that should be resolved from a national perspective. The assessments to be made involve extremely political positions. Often, individual interests can be set against public interests or different public interests against each other. The assessment must be designed so that as comprehensive a balance as possible can be achieved of various considerations. The Government should be in the best position to make the general and overall suitability considerations required in these special cases within the framework of the established standards.

1. Testing of the admissibility of nuclear installations and mining facilities for the production of nuclear fuel

Chapter 17, Section 1, first paragraph, paragraph 1 of the Environmental Code states that the Government shall examine the admissibility of facilities for nuclear activities that are examined by the Government under the Nuclear Activities Act (1984:3), hereinafter referred to as the Nuclear Activities Act, as well as facilities for mining substances that can be used for the production of nuclear fuel. The second paragraph states that, notwithstanding the first paragraph 1, the Government shall not examine the admissibility of activities that are prohibited pursuant to Chapter 9, Section 6 of the Environmental Code. The municipal council's approval is required in order for the Government to permit an activity referred to in Chapter 17, Section 1, Section 1 of the Environmental Code (Section 6, first paragraph, 1 of the Environmental Code).

The provision consists of two parts, the first with the connection to the Nuclear Activities Act listed above. The second stage is aimed at facilities for mining substances that can be used for the production of nuclear fuel. Such facilities are themselves covered by the

definition of nuclear facilities in Section 2(1)(c) of the Nuclear Activities Act, "facilities for the extraction, production, handling, processing, storage intended to become permanent (final disposal) or other storage (storage) of nuclear material", and thus fall under the application of the first paragraph. It is therefore possible to ask whether there is any real difference between the two parts of the provision, or whether they relate to the same thing.

In the legal literature, the second part has been perceived as unnecessary for that very reason.[51]

Before provisions on government review were introduced in Chapter 4, Section 1 of the Natural Resources Act (1987:12), the Natural Resources Act, activities relating to uranium that did not constitute nuclear power plants and facilities for the reprocessing of nuclear fuel had been examined by the Government following a decision in each individual case. In the preparatory work for the Natural Resources Act, it was stated that it is not reasonable for the obligation to review to apply to all nuclear installations covered by the provisions of the Nuclear Activities Act, as that Act regulates even very small facilities, e.g. premises where nuclear materials or radioactive preparations are stored. Requirements for permits under the Natural Resources Act would therefore not apply to facilities for which the Government had delegated the right to decide on permits under the Nuclear Activities Act. (Bill 1985/86:3 pp. 130–131)

It was also stated that as part of uranium management, mining includes the mining of uranium-containing material or other substances that can be used for the production of nuclear fuel, and that such activities usually involve extensive claims on land and water and can cause significant environmental disturbances. It was stated that uranium mining in Sweden is not relevant for Swedish nuclear power production in view of the Riksdag's decision to phase out nuclear power, but if uranium mining were to become relevant in Sweden despite this, the Government should of course examine the issue. It was therefore considered that a mandatory obligation to examine should be laid down for installations for mining uranium-containing material or other substances that can be used for the production of nuclear fuel (Government Bill 1985/86:3, p. 131).

In the preparatory work for the prohibition on the extraction of uranium, it was stated that the expression "facilities for mining uranium-containing material or other substances that can be used for the production of nuclear fuel", on the basis of the statements in the preparatory works to the Natural Resources Act, may be understood

as mining activities that involve the mining, processing or physical or chemical enrichment of, among other things, uranium *for the purpose* of producing nuclear fuel (Government Bill 2017/18:212 p. 12).

This means that the treatment of uranium as waste is not covered by the second part of the provision, i.e. when the purpose is not to use the

[51] Bengtsson et al., The Environmental Code - a comment, 1 June 2023, version 22, JUNO, The commentary to Chapter 17. 1 §.

radioactive, fissile or fertile properties for the production of nuclear fuel.

With regard to the exemption from the permit requirement in Section 11 of the Ordinance (1984:14) on Nuclear Activities, hereinafter referred to as the Nuclear Ordinance, it is reasonable to assume that the concentration of no more than 200 grams of natural uranium per tonne will be exceeded. It is not clear whether and how average value formation can take place from the total activity that is mined, but based on the purpose of the activity in extracting nuclear material, it can be assumed that such opportunities to circumvent the legislation may be considered limited.[52]

The limit value that applies to the Radiation Safety Authority's decision on the issue of licences pursuant to section 16, second paragraph, of the Nuclear Regulations corresponds to the extraction of the order of 100 kg uranium. With 200 ppm uranium in mined ore, this in turn corresponds to about 500 tonnes of ore.[53]

The Swedish Radiation Safety Authority has emphasised that it could be the authority that, according to section 16 of the Nuclear Ordinance, examines the issue of licences for, for example, test mining of uranium and cases where uranium to a lesser extent would be purified and precipitated from the process water. However, test mining falls outside the scope of the second stage (cf. Government Bill 2017/18:212 p. 15, where a distinction is made between test mining and other mining activities. Test mining is also distinguished from mining activities in terms of permits, see Chapter 4. Section 15 of the Environmental Assessment Ordinance [2013:251]).

It should also be recalled here that the extraction of uranium from process water requires the purpose of producing nuclear fuel in

order to be covered by the second part of the provision.

1. Municipal self-government

Chapter 1, Section 1 of the Instrument of Government states that Swedish democracy is realised through a parliamentary system of government and through municipal self-government. According to Chapter 8, Section 2, a restriction of municipal self-government must be made by virtue of law, and according to Chapter 14, Section 3, a restriction should be proportionate.

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[52] Swedish Radiation Safety Authority, 2013, Legal investigation on the conditions for uranium mining in Sweden, p. 10.
[53] A.a., p. 17.

Municipal competence consists partly of the provisions in which the municipal powers in various areas are regulated, and partly of the general municipal competence in Chapter 2, Section 1 of the Local Government Act (2017:725). The general municipal competence means that municipalities themselves may take care of matters of public interest that are related to the area of the municipality or region or their members.

Restrictions on municipal self-government should therefore not go beyond what is necessary. It appears from the preparatory work that the main purpose of the provision in Chapter 14, Section 3 of the Instrument of Government is to clearly take into account the impact on municipal self-government in the preparation of proposals, but that it is ultimately up to the Riksdag to decide whether the proportionality requirement is met and that no legal review of the issue should be made retrospectively (Government Bill 2009/10:80 p. 213)

In addition to the national regulation, Sweden has also ratified the European Convention on Local Self-Government. According to Article 2 of the Convention, municipal self-government means the right and opportunity of municipalities to regulate and manage a substantial part of public affairs within the limits of the law in the interests of the local population. Article 4(3) states that public tasks should normally be exercised primarily by authorities that are as close as possible to the citizen. In the Swedish bill in which the Riksdag is proposed to approve ratification, the Government consistently emphasised that Sweden's order met the requirements of the Convention.

The approval of the municipal council is required in order for the Government to be allowed to permit some of the activities covered by the Government's admissibility assessment pursuant to Chapter 17, Sections 1, 3 and 4 of the Environmental Code (see 17 cap. 6 § miljöbalken).

The so-called municipal veto was already introduced in the Building Act (1947:385), where approval was always required of the municipality to which the activities were intended to be located in order for the government to be able to grant permission for location. When the provision on government review of industrial activities was introduced in 1972, the review covered industrial or similar activities that are of significant importance for the management of the country's total land and water resources. In view of the intrusive impact on the district that such activities can entail, the requirement for the approval of the municipal council was introduced (Bill 1985/86:3, p. 137).

In the preparatory work for the Natural Resources Act, it was considered that the basic view that the municipalities should be guaranteed a strong influence over the local environment should characterise the provisions on the municipalities' influence over the creation of such industrial establishments, etc., that were to be examined under the Act. Therefore, the municipalities would have retained considerable influence (see Government Bill 1985/86:3, p. 137).

After an investigation by the so-called veto committee (SOU 1989:105), exceptions to the right of veto were introduced in the Natural Resources Act that applied to certain activities specified in the law; Facilities for the interim storage or final storage of nuclear material or nuclear waste, large incineration plants, large wind power group stations, large natural gas storage facilities and large plants for the treatment of environmentally hazardous waste. The exception to the veto rule could not be applied if another municipality could be assumed to accept a suitable site for the facility or if another location was deemed to be more suitable (see Government Bill 1989/90:126, pp. 19 and 21–22 and Chapter 4, Section 3, second paragraph, of the Natural Resources Act).

The same exceptions are introduced in the Environmental Code, see Chapter 17, Section 6 of the Environmental Code. Water activities and traffic facilities have also been exempted from the right of veto (Government Bill 1997/98:45, p. 451 et seq.).

1. Need to re-enable the extraction of uranium as a concession mineral

1. It will no longer be forbidden to mine uranium

Proposal: It should be possible to extract uranium in Sweden. The prohibition in the Environmental Code against the extraction of uranium is to be removed.

As a result, the reference to the prohibition in the provisions on the Government's admissibility review is to be removed.

1. Need to increase the supply of critical metals and minerals

In the light of the EU's strategy for strategic raw materials and the adopted European Critical Raw Materials Act, there is a clear objective of greater self-sufficiency in critical metals and minerals. This also includes the goal of increasing the secondary extraction of metals and minerals in order to be able to meet the increased needs that exist. The need for increased security of supply has become increasingly urgent in view of the deteriorating security situation in Europe with Russia's war of aggression against Ukraine. There is thus a problem picture linked to the current ban in the Environmental Code on the extraction of uranium.

Access to critical metals and minerals is central to driving through the green transition, where, for example, the electrification of vehicles is dependent on certain metals and minerals.

Sweden is a strong mining nation that can play a major role

occurs naturally in the bedrock and is often associated with other minerals . Some of the highest concentrations of uranium have also been measured where deposits of critical metals and minerals are found.

The current ban on uranium mining risks preventing effective exploration of the bedrock and the efficient utilisation of existing resources in the form of metals and minerals. Against this background, the prohibition does not appear to be appropriate.

It is also assessed that the ban counteracts the opportunities for secondary extraction, which is necessary in the somewhat longer term to meet the increased need for uranium.

As the price of uranium has increased in recent years as a result of a renewed focus on the expansion of nuclear power in a number of countries, it is also reasonable to assume that uranium is economically valuable and that the extraction of uranium in Sweden can be economically profitable.

Under such conditions, the Inquiry's assessment is that the current ban on uranium mining should be repealed. The proposal enables Sweden to maintain its role as an attractive mining nation that can drive the development of the green transition forward. The proposal also allows for a more efficient use of natural resources, as it opens up the possibility of extracting uranium as a by-product in addition to primary extraction and developing secondary extraction of uranium.

1. The proposal addresses undesirable effects of the current ban

It is clear from the preparatory work for the prohibition on the extraction of uranium that the legislature did not envisage that mining operations in production, which were not intended to handle uranium other than as waste, would be covered by the prohibition provision. However, it has turned out that this is not the case, as the Swedish Radiation Safety Authority's regulations (SSMFS 2018:4) on naturally occurring radioactive material were amended at about the same time and the handling of uranium with a concentration above 1,000 ppm is subject to a permit.

It has also emerged that certain mining operations may be "squeezed" between living up to requirements linked to Chapter 5, Section 4 of the Environmental Code and the ban on the extraction of uranium. The operations are preparing processes to

purify process water from uranium in order not to exceed the limit values for uranium that are so-called special

pollutant as set out in the Swedish Agency for Marine and Water Management's regulations, but the treatment itself risks concentrating the amount of uranium in such a way that the limit values for when the activity becomes subject to a permit under the Nuclear Activities Act are exceeded. The operator is thus placed in a difficult situation where measures to reduce the impact on the environment, in this case water, may be prohibited. There is also a risk that water treatment plants will be affected by the problem.

It is particularly important that attention is paid to this type of problem, as it can lead to penalties or other sanctions for the operator for violating the provisions of the Environmental Code on, among other things, the permit requirement.

The proposal means that the risk of carrying out illegal acts is eliminated. Furthermore, it means that operators who do not intend to handle the uranium other than as waste can continue with the activity without risking ending up in the situation that it is prohibited.

The proposal also simplifies for operators to develop effective purification techniques for handling uranium.

1. Need for consequential amendment to Chapter 17, Section 1, second paragraph of the Environmental Code

As a consequence of the proposal above, the limitation in Chapter 17, Section 1, second paragraph, of the Environmental Code, that the Government shall not examine the admissibility of activities prohibited under Chapter 9, Section 6 of the Environmental Code, is no longer necessary and should therefore be removed. See also section 9.2.

1. Uranium to be reintroduced as concession mineral

Proposal: Uranium should constitute a concession mineral according to the Minerals Act.

The holder of a uranium mining concession must keep a record of the exploration work and processing.

1. Uranium as a concession mineral

Uranium was a concession mineral under the Minerals Act before the current ban on extraction was introduced. According to the preparatory work for the Minerals Act, the Act shall cover those minerals that are industrially useful and that with a certain probability occur in Sweden to such an extent and in such a way that extraction appears meaningful and that require systematic exploration and investigation in order to be demonstrated (Government Bill 1988/89:92, p. 50).

Exploration is the basis for building safe and sustainable value chains for metals and minerals that are necessary for the functioning of society and for the climate transition. Demand for metals and minerals will increase in the future, among other things, because these are necessary for the development of green energy, the defence industry, new environmental technologies and environmental innovations. Sweden has good potential when it comes to the metals that play a key role in Europe's industrial processes. It is therefore important that uranium, which occurs everywhere in the Swedish bedrock and together with other metals and minerals, can be handled in the same way as other metals and that uranium is not subject to special legislation that risks complicating or delaying these value chains.

The special status of an operator who is granted a permit under the Minerals Act in relation to the landowner, whose rights to explore and process any deposits may be suspended, facilitates exploration and commercial extraction.

Under such circumstances, it is reasonable to assume that uranium will be covered by the Minerals Act. This is provided that the mineral meets the qualifying criteria set for concession minerals.

The assessment at the time of the introduction of the ban on uranium mining was that as a result of the ban, there was no longer any economic

interest in extracting uranium itself. The situation is now different. Both the demand and the price of uranium have increased in recent years. There is no reason to believe that this picture will change at least in the medium term. During the investigation, an exploitation company has also stated that it sees that the extraction of uranium as a by-product can take place profitably. Since uranium is again proposed to be possible to extract, it follows from the above that the element is such that it meets the criteria for being covered by the Minerals Act.

Uranium should be included in Chapter 1. 1 § 1 of the Minerals Act, which is the point where elements that make up concession minerals are gathered.

1. Consequential amendment to the Minerals Decree

As a consequence of the fact that uranium is proposed to be a concession mineral, it is proposed that the requirement for record-keeping in section 50 of the Minerals Ordinance applies to those who hold a processing concession for uranium.

2. The proposal is compatible with the protection of property

The protection of property under the Instrument of Government and the European Convention on Human Rights

The protection of property is regulated in Chapter 2, Section 15 of the Instrument of Government. The first paragraph states that everyone's property is secured by the fact that no one can be forced to relinquish his or her property to the public or to any individual through expropriation or any other such disposition or tolerate the public authorities restricting the use of land or building except when it is necessary to satisfy urgent public interests.

The use of land that takes place on the basis of the provisions of the Minerals Act (e.g. land allocation) has been deemed to be covered by constitutional protection (see, inter alia, SOU 1993:40 Part A p. 63). See also NJA 2023 p. 350). There has also been much to suggest that a concession to take minerals or similar on someone else's property falls under the section.[54] Since the proposal means that uranium is to be covered by the provisions of the Minerals Act, the question arises as to whether it is necessary in

order to:

[54] Bengtsson, B, 1991, Ersättning vid offentliga ininterventions 2, p. 81 and SOU 1993:40 Part A, p. 47.

meet important public interests and whether the proposal is proportionate to the landowner's rights.

As a general rule, no one should be forced to relinquish property through expropriation or any other such disposal. The term expropriation or other such disposition means that a property right, i.e. a property right or other right with an economic value, is forcibly transferred or seized. Legislation that enables such interventions can be found in the Expropriation Act (1972:719) but also in other legislation. As mentioned above, the use of land that takes place on the basis of the provisions of the Minerals Act is considered to be such legislation.

According to the wording, restrictions on the protection of property may only be made to satisfy urgent public interests. In the preparatory work for the provision (Bill 1993/94:117 p. 48) the following is stated, among other things, about the situations in which such a restriction may be justified :

> The individual's property cannot be unconditionally secured by the public authorities. Society's need for land for nature conservation and environmental interests, total defence purposes and for housing construction, traffic routes, recreation and other similar purposes must of course be met. For such particularly urgent purposes, there must be the possibility, as a last resort, of compulsorily seizing another's property or restricting the owner's ability to use his property freely. [...] It is not possible to describe in detail the precise meaning of the expression 'urgent public interest'. [...] What is an important public interest must ultimately to some extent be subject to a political evaluation where consideration must also be given to what is acceptable from the point of view of legal certainty in a modern and democratic society. It should also be emphasised that the expression is related to what applies with regard to the protection of property under the European Convention on Human Rights.

There are a limited number of decisions on what may constitute an important public interest. In the Supreme Administrative Court's decision, RÅ 1999 ref. 76, the court came in a normative examination pursuant to Chapter 11 of the Constitution in force at the time. Section 14 of the Instrument of Government until the implementation of an early nuclear phase-out as part of a restructuring of the energy system was to be regarded as an

> important public interest within the meaning of the then constitutional provision on the protection of property.
>
> That the issue of nuclear decommissioning was politically controversial and that there were different views on the appropriateness of an early

Winding-up did not change the assessment. As a consequence of that assessment, the law was also not considered to be contrary to the protection of property in Article 1 of the First Additional Protocol to the ECHR.

In the above-mentioned decision, the Supreme Administrative Court further examined whether the specific decision on the start date and closure of Barsebäck 1 was in accordance with the principle of proportionality.

The fact that the protection of property in Chapter 2, Section 15 of the Instrument of Government requires that a proportionality assessment must be made in each individual case is also evident from several other decisions from the Supreme Administrative Court and the Supreme Court (NJA 2018 p. 753 "The Park Property" and decisions cited therein). The background is that, according to the case-law of the European Court of Human Rights, the protection of property includes a requirement that interventions must be proportionate (NJA 2013, p. 550, p. 11).

The European Convention on Human Rights applies as Swedish law (the Act [1994:121] on the European Convention for the Protection of Human Rights and Fundamental Freedoms) and according to Chapter 2, Section 19 of the Instrument of Government, laws or other regulations may not be promulgated in contravention of Sweden's obligations under the European Convention on Human Rights.

Article 1 of the First Additional Protocol to the Convention contains a provision on the protection of the property of individuals:

> Every natural or legal person shall have the right to respect for his or her property. No one may be deprived of his or her property except in the public interest and under the conditions laid down by law and by the general principles of international law .
>
> However, the above provisions do not prejudice the right of a State to implement such legislation as it deems necessary to regulate the use of property in accordance with the public interest or to ensure payment of taxes or other levies or of fines and periodic penalty payments.

In the case-law of the European Court of Human Rights, it has been made clear that the article contains three rules of law, the principle of respect for the right to property (första stycket första meningen), villkoren för berövande av egendom (första stycket andra meningen) och förutsättningarna för att göra inskränkningar i rätten att utnyttja egendom (andra stycket). Enligt domstolen har de tre reglerna ett visst samband med varandra på så sätt att de två sista reglerna avser särskilda fall av

interference with property rights and that they must therefore be interpreted in the light of the general principle set out in the first rule (see, for example, Sporrong-Lönnroth v. Sweden, judgment of 23 September 1982, no. 7151/75 and others, and James and Others v. the United Kingdom, judgment of 21 February 1986, no. 8793/79).

In order for someone to be deprived of ownership of their property, it is required , among other things, that the deprivation of property is carried out in the public interest. The term is broad in its meaning. It is primarily the national bodies, i.e. the Government and the Riksdag or equivalent, that have to make this assessment.

When examining whether an infringement of property rights is justifiable, the European Court of Human Rights thus makes an assessment according to the principle of proportionality. The result of this is decisive for the question of whether the article has been violated or not. In order for the right to property to be restricted, there must be a reasonable balance between the different interests. Nor must the interference impose a disproportionate burden on the individual (see, for example, Holy Monasteries v. Greece, judgment of 9 December 1994, No 13092/87 and Others).

When assessing whether the intervention is proportionate, it is of great importance whether the individual is awarded compensation in some form.

As regards the question of the right to compensation, the European Court of Human Rights has held that compensation for expropriated or nationalised property must normally be paid and that deprivation of property without compensation cannot be considered proportionate. However, it is not required that full compensation be paid in all circumstances.

Assessment

During the investigation, it has emerged that uranium can be

used economically in Sweden. Enabling the extraction of uranium means advantages for Sweden and Europe's ability to be self-sufficient in critical raw materials. The proposal is based on energy and climate policy considerations and on special security considerations. An important public interest that is met by restricting land use for landowners thus exists (cf. RÅ 1999 ref. 76).

Questions about landowners' right to compensation for damage and encroachment are regulated in Chapter 7. of the Minerals Act, where the Expropriation Act (1972:719)

Provisions apply mutatis mutandis to determine compensation and ransom (Chapter 7, Section 4).

When balancing the interests of the public and the interests of the individual , the proposal is deemed to be justifiable on the basis of the above.

1. A clearly defined scope of application for the Government's admissibility review

Proposal: Only nuclear facilities that are subject to the Government's licensing obligation under the Nuclear Activities Act shall be subject to the Government's mandatory admissibility assessment.

All nuclear facilities that are examined by the Government under the Nuclear Activities Act shall be subject to the Government's mandatory admissibility assessment.

1. The scope of the Chapter 17. Section 1, first paragraph, paragraph 1 of the Environmental Code

1. A clear scope of application for larger operations

Chapter 17, Section 1, first paragraph, paragraph 1 of the Environmental Code states that the Government shall examine the admissibility of facilities for nuclear activities that are examined by the Government under the Nuclear Activities Act (1984:3), hereinafter referred to as the Nuclear Activities Act, as well as facilities for mining substances that can be used for the production of nuclear fuel.

When comparing the areas of application of the two parts of the provision, only the second part covers the nuclear installations that are examined by the Swedish Radiation Safety Authority under the nuclear legislation or that are completely exempt from the licensing obligation.

There is thus support for the view that has emerged in the literature that it is superfluous to regulate

Testing the admissibility of facilities for mining substances that can be used for the production of nuclear fuel.

The purpose of the Government's admissibility test is to enable the Government to exercise political control over certain decisions within the framework of current legal rules and that there should correspondingly be political responsibility for large or otherwise important activities that are of importance to community planning in general, see section 7.1.1. Such an assessment has been made when the admissibility assessment in relation to the Nuclear Activities Act has been qualified to refer to activities that the Government examines under that legislation.

Nuclear legislation focuses on the transparency of such activities by society and on ensuring that the safety of nuclear activities is as high as possible. Even if it serves other purposes, the considerations regarding when the Government's review is required under that legislation may provide some guidance as to how the area of the Government's admissibility assessment under the Environmental Code is to be perceived in relation to facilities for mining substances that can be used for the production of nuclear material. It is clear that it is only for activities of a smaller scope that the Government has delegated the licensing process. This suggests that only the larger activities should be subject to the Government's admissibility assessment also under the provisions of the Environmental Code.

In the same way that the first part of the provision is limited to major nuclear activities, it is therefore assessed that there is support for mining activities where the extraction of uranium takes place should be treated in the same way.

In light of the above, it is reasonable that the Government should not examine the admissibility of smaller mining operations where uranium is extracted. The proposal is in accordance with the stated purpose of the Government's admissibility review.

Although there is a possibility for the Government under Chapter 17, Section 2 of the Environmental Code to waive the admissibility assessment for smaller activities, it is considered to be an unnecessary and complicated step for both operators and for courts, authorities and the Government.

The fact that plants for mining substances that can be used for the production of nuclear fuel refer to activities that are carried out *for* the purpose of producing nuclear fuel reinforces the view that the regulation is largely a duplication of what already follows from the

first part of the provision. This contributes to the provision being unclear and can be perceived as difficult to understand.

In the light of the above, it is appropriate that the second part of the provision should be deleted. The proposal means that only nuclear installations that are subject to the Government's licensing obligation under the Nuclear Activities Act shall be subject to the Government's mandatory admissibility assessment.

1. The proposal affects the area of the municipal veto

The proposal, which thus entails a restriction in relation to the current scope of application regarding smaller mining operations, entails a corresponding restriction of the area where the municipal council's approval for the Government to permit an activity is required (see Chapter 17, Section 6 of the Environmental Code).

The proposal makes it possible for the Government's admissibility assessment to be reserved for activities that constitute important public interests, while at the same time risking harming human health, entailing major environmental impacts or major interventions in the environment and using valuable natural resources. As regards these activities, the proposal is not considered to entail any restriction of the municipal veto. It is not considered to be justified to veto small mining operations, especially also in light of the fact that the Government, through the provision in Chapter 17, Section 2 of the Environmental Code, already has the possibility of waiving the admissibility test for such activities , with the consequence that the requirement for the municipal council's approval is not relevant. In these cases, the municipality can exert influence through planning and building legislation to minimise influence and take into account different interests.

In light of the above, the proposal is therefore considered to be limited to what is necessary to achieve the purpose of the Government's admissibility review.

The proposal is also considered necessary to avoid confusing legislation and create clarity.

The consequences of the proposal for municipal self-government are discussed further in the report, see section 10.4.1.

1. Linguistic change to "nuclear facility"

The term "facilities for nuclear activities" in Chapter 17, first paragraph, paragraph 1 refers to "nuclear facilities" as defined in Section 2, Section 1 of the Nuclear Activities Act. It is therefore proposed that the wording of the provision be amended to bring the text of the Act into line with the definition in the Nuclear Activities Act.

2. The government will re-examine the admissibility of uranium mining

As stated in section 8.1, it is proposed that the prohibition on the extraction of uranium in Chapter 9, Section 6 of the Environmental Code be removed. As a consequence, the limitation in Chapter 17, Section 1, second paragraph, of the Environmental Code is no longer necessary and must therefore be repealed. This means that mining operations or mining facilities for mining, test mining, processing or physical or chemical enrichment of uranium-containing material that exceeds the limit values and which thus constitute a nuclear facility that is subject to a permit examination by the Government under the Nuclear Activities Act, shall be subject to the Government's mandatory admissibility assessment under the Environmental Code.

1. Fallout

1. Problem description and what is to be achieved

As described in section 6.3, the current ban on uranium mining has the effect of hampering or hindering the extraction of other metals and minerals, in particular those associated with uranium.

It can also stand in the way of efficient management of resources of both extracted ore and mining waste, as secondary extraction alongside primary production will be required to meet Europe's need for metals and minerals that are required for a secure supply of raw materials and for the green transition.

Furthermore, the ban poses a problem for Sweden as an attractive mining nation where modern mining operations can be conducted, as players in the mining industry have found the ban difficult to handle even for established mining operations in light of changes in the permit requirement for the handling of naturally occurring radioactive material and requirements for purification of uranium from process water.

The ban has also meant that uranium needs to be treated as waste when it could instead be disposed of.

The aim is for the extraction of uranium to be tested in accordance with relevant environmental legislation, but it should not be prohibited. In the long run, this contributes to enabling the utilization of Sweden's potential in terms of the critical metals and minerals that are important for Swedish industrial processes and to enable modern investigations of the bedrock.

1. Consequences of non-implementation of the proposals

1. Enabling the extraction of uranium and uranium as concession minerals

It has been the Inquiry's mandate to make proposals aimed at

enabling the extraction of uranium and the reintroduction of uranium as a concession mineral.

Alternative solutions that have been considered have been to limit the scope of the extraction ban to cases where uranium is extracted as a main or by-product, or to exempt from the ban the handling of uranium that takes place in order to live up to current environmental quality standards. With regard to uranium as a concession mineral, the alternative of allowing uranium to continue to be a landowner mineral has been raised in the event of a reintroduction of the possibility of obtaining a permit under the Environmental Code for the extraction of uranium. However, it has been assessed that the alternative solutions do not achieve the objectives of enabling efficient extraction of critical metals and minerals and of enabling modern investigations of the bedrock where uranium is not separately regulated.

The zero alternative to relate to is that the ban remains unchanged. As highlighted above, this alternative is considered to have a negative impact on the possibility of working for a secure supply of raw materials that is required for the green transition and to reduce Sweden 's and the EU's dependence on imports in light of the deteriorating security situation in Europe.

The zero alternative would also mean that operators continue to risk being "squeezed" between the provisions of Chapter 5, Section 4 and Chapter 9, Section 6 of the Environmental Code. This is because requirements for water purification of uranium as a prerequisite for being able to obtain a permit for the activity mean that the handling constitutes such processing of uranium that is prohibited and may never be granted a permit.

2. Chapter 17. Section 1 of the Environmental Code, a clear scope of application

The proposal that has been presented is expected to lead to increased clarity when the Government's admissibility assessment is required for the handling of uranium.

Alternative solutions that have been considered are to establish a qualification basis for when the extraction of uranium is to be covered by the mandatory admissibility test by means of quantitative criteria, or that:

specify the types of nuclear installations that should be subject to the

mandatory admissibility test. However, the proposals have been judged to be complicated and more intrusive than the proposal that has been presented.

The proposal that is recommended is thus considered to be the alternative that is clearest to relate to and that is the least intrusive for both operators and municipalities, courts and authorities.

In the case of the zero alternative, i.e. that the proposal is not implemented, there would still be uncertainty for both courts and authorities as well as operators as to when the provision will be applicable. Smaller mining operations would continue to be covered by the mandatory admissibility test, which is not in accordance with the stated purpose of the admissibility test under the Environmental Code.

1. Socio-economic consequences

Sweden has an important role to play in strengthening the EU's security of supply by having natural resources in the form of important raw materials for green technology and a sustainable mining industry with high environmental requirements.

The proposals are expected to contribute to maintaining the perception of Sweden as an attractive mining nation and they enable the mining of uranium as well as other critical metals and minerals.

The proposals to remove the ban on uranium mining and to reintroduce uranium as a concession mineral provide incentives for exploration activities, which is a necessary condition for the future of the mining industry – when the economic and technical conditions for extraction may have changed – and it contributes to increased knowledge of the national geological conditions and the presence of metals and minerals, regardless of whether they lead to mining activities.

In the short term, the proposals have a limited effect on the Swedish economy in light of the fact that uranium extraction has not taken place since the 1970s, nor is there yet any extraction of critical raw materials, such as rare earth metals.

Against this background, the consequences of the proposals are difficult to assess, as they are complicated by the fact that potential activities are subject to a permit under a number of legislations and require the approval of the municipal council in order to be realised. This entails a

uncertainty in the assessment of what the future extraction of uranium and critical raw materials will look like.

In the longer term, it is possible that the proposals will result in increased mining in Sweden, which is considered to lead to increased employment at the local level.

The proposals mean an increased opportunity to utilise metals and minerals as by-products in mining operations instead of handling them as waste. This can contribute to increased resource efficiency that is positive for the national economy.

1. Analysis of costs and effects on companies

Enabling the extraction of uranium and uranium as concession minerals

For both established mining operations and activities focused on exploration and new establishments, the proposals provide an opportunity to exploit uranium's economic potential, also in connection with exploration and extraction of other metals and minerals. For multi-metal mines, the proposals mean a greater opportunity to achieve economic profitability in operations. The proposals mean that test mining of uranium is once again possible, which has a positive impact on the operators' opportunities to obtain a complete basis for the assessment of the bedrock's continued potential and planning of future activities.

The proposals also mean that it is possible for mining operations to introduce purification of uranium in process water without the risk of the activity being prohibited. This effect of lifting the ban should also have an impact outside the mining sector, such as requirements for treatment in water treatment plants.

Chapter 17. Section 1 of the Environmental Code, a clearer scope of application

The proposal is not expected to have a major impact on the companies in the mining sector as it does not affect the practical scope of the government's admissibility review other than marginally.

1. Consequences for the public sector and for authorities

The proposal to remove the ban on the extraction of uranium and to

reintroduce uranium as a concession mineral means that the Mining Inspectorate may have to deal with applications for exploration permits and processing concessions relating to uranium. In light of the fact that historically there has been no interest in extracting uranium and there is currently only one known company that has shown interest in uranium mining, the proposal is not considered to entail an increased burden and thus increased costs for the Mining Inspectorate or other review authorities.

It is also considered that the clarification of when the Government's admissibility assessment under the Environmental Code becomes relevant contributes to greater clarity for courts and authorities and thus simplifies the processing of permit cases.

1. The proposed amendment to Chapter 17, Section 1 of the Environmental Code may entail a future restriction of the scope of the municipal veto in the environmental permit process

The proposal means that the second part of Chapter 17. Section 1, first paragraph, paragraph 1 is deleted. This in turn means that the municipal council's approval, the
so-called municipal veto, is not required for the activities that would fall outside the scope of application after its introduction.

The identified activities that are only affected by the second part of the provision are small-scale extraction of uranium from process water, provided that the radioactivity in the waste is below the activity limit set out in Section 16, second paragraph, of the Nuclear Ordinance.

The conclusion is therefore that under the current conditions, the proposal entails a minor restriction of the area where the municipality has the right of veto and that it entails a marginal change in relation to the zero alternative. As stated in section 9.1.2, the Inquiry has assessed that the proposal is necessary with regard to the purpose.

In light of the above, the proposal is not considered to have any direct consequences for municipal self-government or entail negative consequences for municipalities or regions.

Actual consequences of the amendment are instead dependent on changes being made to or in relation to the Nuclear Activities Act that affect which activities are subject to the Government's review under

that Act.

In the event that restrictions were to be introduced on which activities are to be covered by the Government's review under the Nuclear Activities Act, either through a change in the definition of a nuclear facility or if the scope of the Government's licensing review is limited, this could mean that the area of the municipal veto is limited and that municipal self-government is adversely affected.

At present, an investigation is underway that may include making proposals that affect the actual scope of application of Chapter 17, Section 1, first paragraph, paragraph 1 of the Environmental Code. The Inquiry into Nuclear Power Assessment has the task of assessing, among other things, whether it is appropriate and can lead to faster review with a changed instance order, and in particular consider whether the Swedish Radiation Safety Authority should be able to decide to a greater extent than today on licences for nuclear activities under the Nuclear Activities Act, and whether the Radiation Safety Authority's decisions under the Nuclear Activities Act should be reviewed by a body other than the Government (Dir. 2023:155).

There is therefore reason to analyse and assess the impact on municipal self-government in relation to Chapter 17, Section 1, first paragraph, paragraph 1 of the Environmental Code.

1. Consequences for landowners and other rights holders

The proposals to re-enable the extraction of uranium will enable further mining activities in Sweden, which means that new areas of land will be used in such cases. The fact that uranium is proposed to become a concession mineral also means that developers with priority over landowners will be given the right to exploit the land for extraction purposes. It thus has a negative impact on the landowner's disposal of his own land.

Several of the deposits where uranium occurs in higher concentrations are found in the alum shale. Alum shale occurs both in areas where reindeer husbandry is carried out and in areas with active agriculture

and in some cases forestry. The proposals therefore mean that different land use interests may be pitted against each other. This entails a risk that the extractive activities may have an impact on reindeer husbandry, agriculture and forestry.

Several of the areas where mining activities are conducted are located in reindeer herding areas. The proposals may therefore mean that the Sami people will be particularly affected in cases of exploration and extraction of uranium on reindeer grazing land. The conditions for reindeer husbandry are already affected in many ways by both new industrialization and societal transformation, and further impact therefore requires well-balanced and substantiated decisions.

According to Section 2 of the Act (2022:66) on Consultation in Matters Concerning the Sami People, there is an obligation for the Government, state administrative authorities, regions and municipalities to consult Sami representatives before decisions are made in matters that may be of particular importance to the Sami people. If exploration work concerns land that is of central importance for reindeer husbandry, it may be considered to be of such special importance to the Sami that the obligation to consult should apply already at the exploration permit stage. It may be added that if an application for an exploration permit relates to an area used for reindeer husbandry, the Sámi Parliament shall be given the opportunity to comment on the application. A case concerning an application for a processing concession that covers an area where reindeer herding is carried out should be considered to be of particular importance to the Sami people and the Sami village concerned (see Bill 2021/22:19 p. 64).

1. Impact on the environment

The environmental quality objectives that are primarily relevant in the inquiry are Limited climate impact, Non-toxic environment, Groundwater of good quality and Living lakes and watercourses.

The known environmental risks associated with uranium mining are multiple and are consistent with those of mining in general, especially where sulphide minerals are present. These are mainly risks linked to the mining waste, where the quantities themselves are a risk, such as acidic and metal-containing leachate, which risk spreading to nearby environments.

It is not possible to determine the actual effects on the environment that the proposal entails, they depend on the conditions in the individual case, as both the number and type of new mining operations, location, choice of technology and the conditions established for the activities are decisive. A thorough investigation of the environmental impacts in the individual case will continue to be central and crucial for the effects on the environment.

Future extraction of critical metals and minerals, including rare earth metals, can be expected to take place in alum shale through open-pit mining. It is in the alum shale that uranium reaches its highest concentrations in the Swedish bedrock. Open-pit mining involves the use of large areas of land, which in itself entails greater interventions in nature with risks affecting ecosystems and affecting biodiversity in the area in question.

1. Assessment of expected climate and environmental benefits

As stated in section 8.1.1, the proposals are considered to enable and thus have a positive impact on a secure supply of raw materials in Europe and on the opportunities for the utilisation of innovation-critical substances of importance for green energy and other high-tech transitions. A reduction in imports can lead to fewer transports and the fact that mining operations are located in Sweden can have positive effects on the environment globally compared to extraction in countries with lower requirements for sustainable and environmentally acceptable extraction. These circumstances indicate that the expected climate benefit of the proposals is positive. However, the assessment depends on how many mining operations are started and the circumstances of the individual cases. For example, location, choice of green technology, process methods, permit conditions for reduced emissions, the need for transport are factors that may affect the outcome of the overall climate benefits of the proposals.

It is conceivable that on a global level, it has a positive impact on the environmental benefits that the extraction of both uranium and critical metals and minerals takes place in Sweden, as opposed to countries with less developed environmental legislation. At the national level, factors such as the number of newly established mines, the possibility of secondary extraction and where mining operations are located, as well as the permit conditions

that applies to reduce the impact on the environment for both operation and decommissioning and remediation how the environmental benefits are assessed. It is therefore not possible to assess the generally expected environmental benefits of the proposal.

Lifting the ban on uranium extraction means that both established mining operations and actors outside the mining sector can effectively purify uranium from process water without the risk of the activity being banned. This is expected to have a positive effect on the environmental benefit, as it enables limit values for uranium in water not to be exceeded, which in turn is positive for the environment and health.

It also enables the extraction of what is otherwise to be regarded as mining waste, where efficient management of resources and utilisation of the metals and minerals available in already existing mining is expected to contribute to increased environmental benefits. by not expanding the areas already exploited for mining activities.

1. Compatibility with Union and other international law

The proposals are considered to be compatible with EU law and with other international law, see section 8.2.3 for special considerations on the protection of property under the ECHR.

The proposed changes are not such that the actors concerned need time to adapt. The proposed amendments are therefore considered to be able to enter into force as soon as possible. During the course of the investigation, 1 January 2026 has been assessed as the appropriate date for entry into force. There are currently no applications for or approved exploration permits or mining concessions involving uranium. The proposals thus do not entail any disadvantage for mining companies that have submitted an application for an exploration permit or mining concession. There is therefore no need for any special transitional provisions in connection with the entry into force of the provisions. There is no need for specia. information efforts.

12 Statutory comments

1. The proposal for an Act amending the Environmental Code

Chapter 17.

1 §

The Government shall examine the admissibility of new activities of the following kinds:

1. *nuclear facilities* that are examined by the Government in accordance with the Nuclear Activities Act (1984:3);
2. public waterways, and
3. geological storage of carbon dioxide, if the activity does not involve storage for research purposes of less than 100,000 tonnes of carbon dioxide.

The section deals with the activities that must always be assessed for admissibility by the Government. The considerations can be found in section 9.1.

In *the first paragraph 1,* a linguistic change is made to achieve consistency between the text of the Act and the concept of a nuclear facility in the Nuclear Activities Act.

The first paragraph 1 is also amended so that the second part of the provision is deleted. In this way, it is made clear that only the nuclear facilities that are examined by the Government under the Nuclear Activities Act (1984:3), hereinafter referred to as the Nuclear Activities Act, are to be covered by the Government's admissibility assessment. This means that nuclear installations that are subject to licensing by the Swedish Radiation Safety Authority pursuant to Sections 16–19 of the Ordinance (1984:14) on Nuclear Activities are not covered by this paragraph.

1. Proposal for an Act amending the Minerals Act (1991:45)

Chapter 1.

1 §

This Act applies to the exploration and processing of deposits on one's own or others' land of the following mineral substances (concession minerals):

1. antimony, arsenic, beryllium, lead, caesium, gold, iridium, iron present in bedrock, cobalt, copper, chromium, mercury, lanthanum and lanthanides, lithium, manganese, molybdenum, nickel, niobium, osmium, palladium, platinum, rhodium, rubidium, ruthenium, silver, scandium, strontium, tantalum, tin, titanium, thorium, *uranium,* vanadium, bismuth, tungsten, yttrium, zinc and zirconium;

2. andalusite, apatite, brucite, fluorspar, graphite, kyanite, clays refractory or clinker, magnesite, magnetite pyrite, nepheline syenite, sillimanite, rock salt or other similarly occurring salt, pyrite, tungspar and wollastonite, and

3. diamond.

The section deals with which mineral substances constitute concession minerals. The considerations can be found in section 8.2.

The first paragraph is amended so that uranium is added to the list of substances covered by the Minerals Act.

The change means that uranium is once again a concession mineral. This means that it is possible to apply for and, under certain conditions, obtain an exploration permit and a processing concession for uranium.