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GUIDELINES FOR REPORTING ON MINERAL EXPLORATION IN FINLAND

Finnish Safety and Chemicals Agency

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Business ID 1021277-9

Introduction

This document contains instructions on annual and final reporting on exploration permits. The requirement to report is based on provisions in the Mining Act of Finland (621/2011), and the Finnish Government Decrees on Mining Activities (391/2012) and Safety in Mining (1571/2011).

Contact information

Delivery address for reports
Finnish Safety and Chemicals Agency (Tukes), Rovaniemi
Valtakatu 2
FI-96100 Rovaniemi

or in digital format:

Kaivosraportti@tukes.fi (Miningreport@tukes.fi)

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An up-to-date version of these guidelines and reporting templates is available on the Tukes website at http://www.tukes.fi/fi/Toimialat/Kaivokset/.

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1 General

Under the Mining Act of Finland (621/2011), Tukes is the competent authority responsible for permits and supervision.
The related street address is Valtakatu 2, FI-96100 Rovaniemi.

Tukes decides on applications filed for permits and rights pursuant to the Mining Act, and maintains Finland's mining register. It also supervises mining activities through reporting, enquiries, surveillance visits and based on initiatives by the relevant actors.

Holders of exploration permits and claims must submit a report to the mining authority on an annual basis, on any exploration activities carried out and the main results (annual report). For exploration areas, an exploration work report (final report) must be submitted within six months, and for claims no later than within one year, of the permit's expiry or cancellation.

The purpose of annual and exploration work reports is to promote the exploration of minerals and ensure progress in the mining authority's supervision tasks.

These guidelines, which are based on the Mining Act of Finland (621/2011) and the Finnish Government Decree on Mining Activities (391/2012), are updated when necessary. The guidelines are available on the Finnish Safety and Chemicals Agency's website:
http://www.tukes.fi/fi/Toimialat/Kaivokset/

2 Annual report

The report must be submitted in digital format, using the templates provided by the mining authority. The annual report contains two sections: part 1 (costs and investments), to be submitted to the mining authority in **February,** and part 2 (geological surveys), to be submitted in **June**.

2.1 Exceptions to the deadlines for reports

If less than six months have passed since the entry into force of a legally valid exploration permit or claim decision, the first report for the area in question must be submitted by the specified deadline in the following calendar year.

Should the holder of a exploration area or claim area wish to reduce the size of the area to which the permit applies, by applying for a further permit for part of the original area only, an exploration work report pursuant to the Mining Act must be submitted on the area no longer used. However, if a mining permit is sought for the area in question, the area will be processed as a mining area in the future and information must be provided on any mining area to enter into force, as specified in section 18(2) of the Mining Act.

2.2 Reports on the costs and investments of exploration

The first part of the annual report must be submitted using an electronic template provided by the mining authority. Such a template must be sent at the end of each year to companies engaged in exploration. The terms on which permits are granted include efficient exploration activities and investments, and the mining authority monitors the fulfilment of these terms via the annual reports. Information submitted annually by companies to the mining authority is considered confidential and will remain in the possession of the authority. Summary reports compiled on the basis of the material are published, but all individual data pertaining to the companies will remain confidential.

2.3 Reports of geological surveys

Part 2 of the annual report must be completed using the electronic templates provided by the mining authority. These templates are available on the Finnish Safety and Chemicals Agency's website. Reporting must be done by permit area. The annual submission of exploration materials forms the main focus of geological reporting. If the submitted material is found to be incomplete, the mining author-

ity may request additions to it. Annual reporting and the submission of material on geological surveys forms the basis for the final report provided for the exploration or claim area. The materials submitted will remain confidential and be retained in the possession of the mining authority only until the expiry or cancellation of the exploration permit or claim.

2.4 The contents of a geological annual report

2.4.1 Title page and summary (Template 1)

- Report head title and type, author(s)
- Report code, date, number of pages
- Exploration permit code
- Name of project and/or site
- Permit holder and contact information
- Permit holder's signature/signatures
- Summary, including the following:
    - Basic information on the permit area: geographical location, size of the area and special conditions, if any (nature reserves etc.)
    - A brief geological description of the exploration area, whose main focus is on new information collected
    - Summary of explorations performed and their results.
    - Recommendations and plans for further exploration
- Number of appended files, and names of files

2.4.1.1 Exploration material to be submitted

I. The material must be submitted through the EPSG:3067 –coordinate system (ETRS89-TM35FIN).
II. The completed template must be named as follows: explorationareanumber_ templateno_reportingdate.xlsx
III. The information collected will be added to the template
IV. Any separate analysis files should be named as follows: explorationareanumber_analysisdata_reportingdate_consecutivenumber.xlsx
V. If the table file provided by the laboratory includes metadata and detection limits for the analyses, the separate metadata tab in the template need not be completed

VI. Any separate ground geophysics files submitted should be named as follows: explorationare-anumber_method_mapsheet_year_consecutivenumber.XYZ
VII. Any separate airborne geophysics files should be named as follows: explorationare-anumber_method_mapsheet_year_consecutivenumber.GDB
VIII. Drill core sample photographs should be named as follows: explorationare-anumber_coreid_incipient_metricmeasure_k1 (dry core), explorationare-anumber_coreid_incipient_metricmeasure_k2 (wet core)

2.4.2 Bedrock mapping and boulder tracing (Template 2)

- All survey and boulder findings within the same permit number area should be saved on a single template
- Grab sample analyses should be delivered in the table file submitted by the laboratory
- The template includes a specific tab for saving the petrophysical data related to grab samples

2.4.3 Geophysical and petrophysical surveys (Templates 2, 3, 4 and 6)

- Ground geophysical survey data must be submitted in separate Geosoft xyz files
- Airborne geophysical survey data must be submitted as a Geosoft geodatabase
- Metadata on ground geophysical surveys must be saved in template number 3. All surveys within the same permit number area must be saved in one template.
- Metadata on airborne geophysical surveys must be saved in template number 4 by measurement area. The technical report related to airborne geophysical surveys must be appended to the annual report
- Borehole geophysical survey data and petrophysical survey data on rocks, including systematic susceptibility surveys, must be saved in specific tabs in templates 2 and 6

2.4.4 Surficial Geochemical surveys (template 5)

- All sample data and observations within the same permit number area must be saved in one template
- Materials to be submitted: geochemical surveys, including mineral, organic and snow and water samples (for example, the geochemical surveys of till and weathered bedrock, geochemical material collected from test trenches and heavy mineral survey data and data on weak leach/selective extraction methods)
- Geochemical analyses must be included in the table file submitted by the laboratory
- Mineral analyses must be submitted in free table format

- If there are no observation data related to sampling, only the template's sample tab needs to be completed

2.4.5 Exploration drilling and channel samples (Template 6)

- The results of all bedrock drilling and channel samples within the same permit number area must be saved in one template
- Analyses must be delivered in the table file submitted by the laboratory
- The template includes a specific tab for saving the borehole geophysical and petrophysical survey data related to exploration drilling
- If the drill cores were photographed, the photographs in question must be appended to the annual report.
- Hyperspectral logging, if performed

3 Exploration work report (final report) of exploration permit and claim

Within six months of the expiry of an expiration permit, the permit holder must provide the mining authority with a report on the explorations carried out in the permit area. This exploration work report must summarise the explorations carried out while the permit was valid and should serve as a summary report. The exploration work report must cover the entire permit area, including the previous stages of exploration in the exploration area, if no report on these has previously been submitted. If the permit areas form a uniform entity, one exploration work report may be provided for them as a whole. The report must be submitted to the mining authority in electronic format, in accordance with the instructions provided below. The report may be in Finnish, Swedish or English, but all captions, legends for tables and summary must also be provided in English.

The exploration work report, with appendices, will be public after its submission to and approval by the mining authority. At the same time, the annually submitted geological survey material for the permit area will be made public and available for general use. Exploration materials will be submitted to the Geological Survey of Finland (GTK), responsible for the archiving and delivery on of the material. Drill cores must be submitted to GTK's national drill core archive for archival.

The areas for which a mining permit application is pending form an exception: they are processed confidentially and reported to the mining authority in accordance with section 18(2) of the Mining Act.

The exploration work report referred to in section 15(1)(2) of the Mining Act comprises the **report and a digital data record**

3.1 Contents of the final report

Material produced during the course of the exploration must be handed over as part of the final report. The final report must be submitted to the mining authority in loose sheet format on paper, and as a PDF file. A digital data record, on a DVD or USB stick, should be appended to the paper version. The digital report file must be named as follows: explorationareanumber_reportingdate.pdf.

3.1.1 Title page and summary (Template 1)

- Report head title and report type, author(s)
- Report code, date and number of pages
- Exploration permit code
- Name of project and/or site

- Permit holder and contact information
- Permit holder's signature/signatures
- Summary, including the following:
    - Basic information on the permit area: geographical location, size of the area and special conditions if any (nature reserves etc.)
    - A geological description of the exploration area, whose main focus is on new information collected
    - summary of the explorations presented below
- Number of appended files, and names of files

3.1.2 Introduction

- Location of the exploration area, connections and infrastructure. These may be provided in picture or map format
- Land ownership in the permit area, and protected areas. These may be provided in picture or map format
- Previously conducted explorations, with references if available
- A geological description of the area, including a general description of the bedrock and surficial geological background, taking account of the new information collected from the area. Illustrative maps may be appended.

Explorations performed

3.1.3 Bedrock mapping and boulder tracing (Template 2)

- A report on the explorations performed in the area and results thereof, with index maps and pictures
- key findings in a table
- any bedrock maps prepared

3.1.4 Geophysical and petrophysical surveys (Templates 2, 3, 4 and 6)

- A report on the geophysical and petrophysical surveys performed in the area and the results thereof, with index maps: 1) geophysical ground surveys, 2) airborne geophysical surveys and 3) borehole geophysical surveys, petrophysical laboratory analyses of rock samples, and field surveys of magnetic susceptibility

3.1.5 Surficial geochemical surveys (template 5)

- A report on the geochemical surveys conducted, including mineral, organic, snow and water samples (for example, geochemical surveys of moraine and weathered bedrock, geochemical material collected from test trenches, heavy mineral survey data and data of weak leach/selective extraction methods), plus the results thereof with index maps and pictures
- Stratigraphic profiles drawn of the surficial geology in test trenches, with pictures, sample data, till-fabric analyses and observations of grooves.

3.1.6 Exporation drilling, channel samples and test trenches (Template 6)

- A report on the explorations performed and results thereof, with index maps and pictures
- For exploration drillings, the key cross-sections or individual drill holes, accompanied by details of analysis results and rock types.
- A detailed map indicating the location, concentrations (analysis) and rock types of channel samples must be presented in relation to test trenches and exposed rock.

3.1.7 Petrological, geochemical and other geological surveys

- A report of the surveys conducted and results thereof. The most significant results must be presented e.g. in geochemical diagrams
- A report on the factors controlling mineralisation, including geological structures, alteration/metamorphosis of the rocks and stratigraphic position etc. These can be visualised on maps
- Potential 3D models and structural interpretations

3.1.8 Ore beneficiation tests, mineralogical and metallurgical analyses

- A brief verbal report of the surveys and analyses conducted and the results thereof
- Test results must be enclosed with the report
- Thin-section surveys and results thereof
- Mineral analyses are submitted in free table format

3.1.9 Other significant results

- All information thought to be of significance in terms of current or future research, or for the exploitation of the deposit, such as theses completed on the area and publications in international journals
- Mineral resource estimates (in compliance with recognised reporting standards; all standards of CRIRSCO)
- Feasibility studies

3.1.10 Summary and conclusions

- Summary of surveys performed and their results.
- Recommendations for further surveys

3.1.11 References

- A list of references used in the report

3.1.12 Contents of the digital record

The electronic data record, a DVD or USB stick in practice, containing the final report and appended reports in full, in electronic file format and the geological, geophysical and geochemical material referred to in the report, saved in the templates and file formats specified by the mining authority. All pictures and maps produced during reporting are to be included as separate files on the record. Interpretations based on the measurement, observation and analysis material, including rasters, grids, maps and various 3D models, are to be included in the data record. The data record must include sufficient metadata in order to facilitate the appropriate further use of each constituent of the material. The record must be given a name which includes the number of the exploration permit, the name of the permit area, the holder of the exploration permit and the date. The data record must be of sufficient technical quality in order to remain functional for at least five years. The record may not include viruses or be protected with a password or an encryption software. The record may be write protected if necessary.

The data material submitted must cover the entire permit number area, including the previous stages of exploration in the area, unless these were included in previous reports. Data material, related to explorations that have already been reported on, need not be resubmitted.

Templates are available for downloading from the mining authority's website**.** The material must be submitted in the EPSG:3067 –coordinate system (ETRS89-TM35FIN).

The data material must be submitted in Finnish, Swedish or English. The mining authority would like to receive additions to the data material if such material fails to comply with the instructions provided.

The digital record must include the sections specified in the instructions for the final report in ***Surveys performed***:

1) Texts
   - The exploration work report in full in PDF format. The file must include the title page, summary, table of contents, text section, list of references and all appendices. The electronic report file must be named as follows: oreexplorationare-anumber_reportingdate.pdf.
   - Meta data reference documents. Meta data reference documents refer to a separate file that includes information essential to the further use and quality of the material
2) Pictures, maps and graphics
   - Map of the exploration area
   - Geological, geophysical and geochemical maps
   - Index maps indicating the location of the exploration sites and sampling sites
   - The key pictures and tables embedded in the text
   - Picture material must be submitted in jpeg, tiff, pdf, png or ecw formats, with a minimum resolution of 300 dpi
   - The files must be readable, of good quality and include sufficient colours
   - The geographical location, the coordinate system used and the scale must be indicated on the map images
   - GIS data files must be submitted in ESRI, MapInfo or AutoCAD file format
   - Raster data must be submitted in grid format, Geosoft grd or ERDAS img
3) 3D models, structural models and interpretations
   - 3D models, structural models and interpretations must be submitted in the format used by the permit holder, e.g. Datamine, Earth Vision, GemCom, GoCAD, Micromine, Surpac or Vulcan.
4) Bedrock mapping and boulder prospecting
   - Template 2 and related analysis files
5) Geophysical and petrophysical surveys
   - Templates 3 and 4 and the related Geosoft xyz files and geodatabases
   - Technical reports related to airborne geophysics surveys
6) Surficial geochemical surveys
   - Template 5 and the related analysis files

7) Exploration drilling, channel samples and test trenches
   - Template 6 and the related analysis files
   - Drill core photographs
   - Hyperspectrale logs
8) Petrological, geochemical and other geological surveys
   - Separate reports and tables related to the surveys
9) Ore beneficiation tests, mineralogical and metallurgical analyses
   - Separate reports and analysis tables related to the surveys
10) Other significant surveys
   - Including separate reports and tables related to the mineral resource estimate

Template number	Contents
Template 1	Summary
Template 2	Bedrock mapping and boulder tracing
Template 3	Ground geophysics
Template 4	Airborne geophysics
Template 5	Surficial Geochemisurveys
Template 6	Exploration drilling, channel samples and test trenches

Table 1. Templates for submitting exploration material

The files must be systematically named in accordance with the model below. File names may not include Scandinavian characters, special characters, spaces, points, commas or other punctuation marks. In this context, .xxx refers to the file format, for instance .pdf, .tif, .jpg
The completed template must be named as follows:
explorationareanumber_ templateno_reportingdate.xlxs
Any separate analysis files submitted must be named as follows: explorationare-anumber_analysisdata_reportingdate_consecutivenumber.xlxs
Any separate ground geophysics files submitted must be named as follows: explorationare-anumber_method_mapsheet_year_consecutivenumber.XYZ
Any separate airborne geophysics files must be named as follows: explorationare-anumber_method_mapsheet_year_consecutivenumber.GDB
Graphics files and GIS data must be named as follows:
explorationareanumber_datatype_consecutivenumber_reportingdate.xxx
For example: M2011_0321_mapappendix_2_2015_05_31
M2011_0321_table_3_2015_05_31
M2011_0321_bedrockmap_2015_05_31.tab (+ auxiliary files)

4 Archiving of drill cores and other material samples

4.1 Purpose of the guideline

Pursuant to the Mining Act of Finland (621/2011, section 15; the repealed Mining Act 503/1965, section 19), once an exploration permit has expired or been cancelled, the holder of the exploration permit or claim right shall, within six months, provide the mining authority with an exploration work report, the digital data material pertaining to the exploration, and a representative set of drill cores. The Finnish Safety and Chemicals Agency (Tukes) serves as the mining authority.

Tukes has prepared these guidelines order to clarify the requirements of the Mining Act (621/2011, section 15; repealed Mining Act 503/1965, section 19) and the Government Decree (391/2012, section 6) on submitting digital data material and the archiving of drill cores. In these guide, Tukes presents the general principles and detailed instructions for preparing a proposal concerning the archiving of core samples, other sample materials and the related exploration data materials, and for submitting the material to the core sample archive.

These guidelines can also be applied to channel samples to be archived, and other geological samples fit for archiving, which result from the exploration.

4.2 Legal validity of the guideline

These guidelines are intended to apply to the permit holder once an exploration permit has expired or been cancelled.

Pursuant to the Mining Act (621/2011, sections 14 and 15 §), the exploration permit holder shall provide Tukes with an exploration work report, the digital data material pertaining to the exploration, and a representative set of drill cores within six months of the permit's expiry or cancellation.

Under the repealed Mining Act (503/1965, section 19), the claim rights holder shall submit the corresponding data material to Tukes within one year of the expiry or cancellation of the claim right.

4.2.1 Preparation of drill core archiving proposal

The purpose of archiving is to ensure that valuable data material gained during exploration is saved in order to facilitate its further use in later explorations, if necessary. In practice, Tukes refers sample

material for archival in the national drill core archive maintained by the Geological Survey of Finland (GTK). Pursuant to the relevant Government decree (391/2012, section 6), the permit holder must submit a proposal to Tukes on the archival of samples to be saved and those to be destroyed.

The selection and saving of samples complies with the following principles specified by Tukes:

1) Individual drill cores and drilling profiles will be archived.
2) As a rule, all drill cores that intersect ore deposits and mineralisation zones should be archived, with the exception of deposits for which several representative cross-sections or main profiles are available.
3) Drill cores and drilling profiles considered geologically representative and unique will be archived.
4) Drill cores from the inventory and production drilling of ore deposits will not, as a rule, be archived unless they fall into the aforementioned categories (1-3).
5) Only a representative sample will be archived from drilling profiles that are comparable and originate close to one another in the exploration area.

The material is to be submitted in a condition fit for archiving, in accordance with the following instructions by Tukes:

1) Samples should be in archivable containers.
2) The containers must be submitted in numerical order. Numbers must be displayed on the sides and top of containers.
3) The drill hole code, drill hole coordinates, map sheet, drilling direction and dip must be marked on the first container. Moreover, the containers should indicate the initial and end dates of drilling and the name of the person who performed the drilling.
4) Depth interval numbers must be clearly legible and any deviations, such as the rocks being placed in a disorderly manner in the containers, should be marked on the containers.
5) A list of the material submitted must accompany the material delivered for archiving. The list can be submitted to the drill core archive in digital format.
6) Material for archiving must be clearly specified in the report submitted to the mining authority and in the accompanying tables.

Tukes may decrease the archived material on the basis of the proposal by the permit holder, or request that the permit holder reduce the number of samples and update the proposal for the further storage and destruction of drill cores. Tukes may use the expert services of GTK in support of decisions on the archiving of sample material.

On the basis of the proposal for archiving drill cores, Tukes may require that the permit holder rectify any errors and deficiencies in the submitted material that may affect archiving. Tukes may also require further information on the material submitted.

Once Tukes has approved the proposal for archiving drill cores and GTK has indicated its support for the proposal, the permit holder will submit the material for archival, at its own cost, to GTK's national drill core archive in Loppi, unless otherwise agreed.

The material must be submitted no later than within six months of the archiving proposal having been approved. The permit holder will contact the drill core archive prior to the delivery of the drill cores approved for archiving, and agree on delivery arrangements in accordance with GTK's instructions.

The archiving proposal related to drill cores and other sample materials must be submitted to Tukes at:
kaivosraportti@tukes.fi

Appendices

Template 1	Report description page
Template 2	Bedrock mapping and boulder prospecting
Template 3	Ground geophysics
Template 4	Airborne geophysics
Template 5	Surficial geochemical surveys
Template 6	Exploration drilling and channel samples

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