



Strål  
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Swedish Radiation Safety Authority

# **Review of LOT experiment at the Äspö laboratory phases A3 and S2: Meeting with MKG, SSM and Galson Sciences 30/09/2020**

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# Contents of presentation

- Objectives SSM review
- Background quality assurance and quality management
- Two SSM projects
- Example of LOT issues
- Way forward



# SSM objectives with LOT review

- to ensure that SKB's quality assurance and quality work in general meet SSM's expectation
  - Previous shortcomings will be followed up to ensure that SKB works with constant improvements. Any remaining deficiencies need to be identified and analyzed.
- to examine significance of LOT results as part of a service obligation to decision-makers involved in the final repository program
  - Including consideration of MKG's input
- S2 and A3 review formally part of RD&D program reviews
  - Already completed LOT phases addressed in SSM's licence application review (SSM 2018:07)



# Formal requirements and standards

- SSM regulations specify need for sufficient QA, primary and independent safety review – but no detailed requirements and they strictly apply only to facilities with a licence
- ISO 9001:2015 Quality management systems
  - Clearly relevant for questions, but cannot be used to define formal SSM requirements
  - Examples 1) scope of quality management 2) leadership 3) organisational roles 4) planning and risk management 5) competence and organisation knowledge 6) control of external services 7) non-conformances 8) internal audits 9) continual improvements
- SSM cannot be involved in primary quality assurance of SKB work, but can review SKB approaches and outcomes



# Previous projects explicitly targeting QA 1(2)

- General QA issues in safety assessment (SKI Report 99:57), e.g. SR-97, SR-Can
- Review of SKB site investigations (2002-08)
  - Need to review implementation of Method Descriptions to understand data reliability
  - Field technical reviews – not formal quality revisions – QA in conjunction with subject oriented aspects
  - "Field technical review" (SKI-INSITE TRD-03-03, SKI-INSITE TRD-04-07, SKI-INSITE TRD-05-04, SKI-INSITE TRD-06-01)
- SKB quality assurance program to be implemented in SR-Site (SSM 2009:19)



# Previous projects explicitly targeting QA 2(2)

- Review of Code documentation and data traceability Galson Ltd. (SKI 2005:05; SSM Technical note 2012:36, Technical note 2014:46)
- Review of QA in SKB's field and corrosion experiments Galson Ltd.
  - SKI report 2007:11 (Clay Technology's experiments on bentonite swelling pressure and hydraulic conductivity, LOT, LASGIT, TBT, and PRE experiments)
  - SSM report 2010:17 (LOT, MiniCan)
  - SSM 2015:29 (MiniCan, LOT experiments, corrosion in oxygen gas free water, real time corrosion measurements, atmospheric corrosion)



# Two SSM projects

- External review carried out by Galson Sciences Ltd.
  - Focus on quality assurance issues
  - Separate SSM report with disclaimer
  - Draft report ready 30<sup>th</sup> of November
  - Option in contract for extension of project
- SSM's internal review
  - Summarising QA status using Galson report as a basis
  - Subject oriented review: Implication for copper corrosion in SKB's safety assessment
  - Goal for memorandum to be ready before end of the year



# Some QA-related themes related to LOT

- Status of LOT phases
- SKB's quality assurance plans and procedures
  - Specification, execution and documentation
- Status of QA plans and work carried out by SKB's contractors
- Sufficiency and credibility of scientific approaches
  - Consideration of scientific background
  - Comparison with previous LOT phases
  - Completeness
  - Publication in scientific journals
- Documentation of decommissioning, sampling and analytical methods





# Some more subject-oriented themes

- Corrosion in the absence and presence of oxygen
  - Total extent of corrosion and corrosion reactions
  - Pitting corrosion
- Experimental conditions
  - Extent of oxygen exposure during the experiments, e.g. microbial processes
  - Water saturation and thermal evolution
- Corrosion products
  - Presence and absence of corrosion products such as tenorite (CuO) and cuprite (Cu<sub>2</sub>O) and paratacamite (Cu<sub>2</sub>(OH)<sub>3</sub>Cl)
  - Other corrosion products?
- The heated copper tube
  - Metallographic images
- State and composition of buffer samples



## **MKG's requests to SSM in order to improve confidence:**

- Provide an early opportunity for the environmental organizations, mainly MKG, and researchers related to KTH, for example, Peter Szakálos and Christofer Leygraf, to present views on what can be important to take into account in a review; and
- Express the wish that SKB gives the authority (SSM) an opportunity to carry out independent analyzes of essential copper samples



# Way forward

- Going through available material from SKB
  - Translation of SKBdoc
- Preparation of questions to SKB
- Skype meetings with SKB
  - Written questions will be sent to SKB in advance
- Report writing
  - option of asking SKB for additional clarifications
  - SSM review of draft Galson report
- Visits at SKB facilities planned but may not take place due to Covid situation