European Spallation Source
Hotlab 2019
Active Cells Facility Update

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The ESS journey
Delivering the world’s leading facility for research using neutrons

- 2003: European design of ESS completed
- 2009: Decision to site ESS in Lund
- 2012: ESS design update phase complete
- 2014: Construction starts on green field site
- 2019: Start of initial operations phase
- 2023: Start user program
- 2025: Construction phase complete

60%
A global organisation
Building on diversity

505 Employees

56 Nationalities

> 100 Collaborating Institutions
Target Monolith
- 11 meter diameter cylinder with steel and concrete shielding
- Rotating Solid Tungsten Target – 36 sectors – Helium Cooled – 11 tons
- Moderators with liquid hydrogen @ 17K – and room temperature water – 18 tons
- Proton Beam Window and beam diagnostics

Remote handling systems
- Large active cells for safe storage and processing of spent radioactive target components
- Shielded casks for transfer of spent components from monolith to active cells

Target Station
Cut section of the D02 building

Transport hall
High bay
130 m
22 m
37 m
Active cells
Utilities block
Target monolith
Beam expander hall
Active Cells Facility - High level schedule
UKAEA / RACE In-kind delivery to ESS

- Concept design: 2016-2018
- Main Tendering: 2017-2019
- Detailed design: 2018-2019
- Manufacture: 2019-2020
- Installation: 2020-2021
- Commissioning: 2021-2022
- Integrated commissioning: 2021
- Acceptance trials: 2022
- Training: 2022

- Majority of the procurement is completed
- Entering into manufacturing phase
The Active Cells Facility System
Current procurement status

Cross-Section of the ESS Active Cells

Main Features:
- Built to handle waste in kSv/h range
- 30x15x12 (LxHxW)
- 1.3 m High Density Concrete
- No windows
- Process Cell
- Maintenance Cell
- Waste storage
- Waste shipment
Floor Valves
Current Status

Contract placed with Ansaldo Nuclear for design, build and installation. Currently in the detailed design phase.

- Detailed Design Complete: October 2019
- Factory Acceptance Test: October 2020
- Site Acceptance Test: March 2021

Confinement plate, removed for cask docking

600 mm steel shielding

Electric Motor drives shield door

Hand Pump to close door for recovery
Floor Valve Function
Current Status

When Cask has docked –
FV shielding can open

Confinement plate is taken off

Hot Waste can be introduced to the ACF

When Cask has docked –
FV shielding can open
Intrabay doors (Upper and Lower)

Current Status

Contract placed with Ansaldo Nuclear for design, build and installation. Currently in the detailed design phase.

- Detailed Design Complete: October 2019
- Factory Acceptance Test: October 2020
- Site Acceptance Test: March 2021

750 mm shielding (Lower Door)

150 mm shielding (Upper Door)

Manual through-wall recovery drive

Lower Door Electric Drive Motor
Upper Intrabay Door Drive System

Current Status

Upper Door driven from outside the cell
Robotic Handling System
Current Status (including 25 ton crane not visible in picture)

Contract placed with James Fisher Nuclear for design, build and installation. Currently in the preliminary design phase.

- Detailed Design Complete: April 2020
- Factory Acceptance Test: January 2021
- Site Acceptance Test: July 2021
Shaft Cutting Station
Current Status

Contract placed with Aquila for design, build and installation. Currently in the preliminary design phase.

- Detailed Design Complete: September 2019
- Factory Acceptance Test: May 2020
- Site Acceptance Test: September 2021

Turnover feature to allow reorientation of components

Configurable, modular support stands

Electrically driven diamond wire saw

Wire saw is lifted by crane and moved to cut locations
Component Transfer Hatch

Current Status

Contract placed with IDOM for design, build and installation. Currently in detailed design phase.

- Detailed Design Complete: November 2019
- Factory Acceptance Test: October 2020
- Site Acceptance Test: March 2021
Component Transfer Hatch
Current Status

- Electrically driven rack & pinion
- Glove Box containing cold side shield door
- Transfer tunnel containing
  - Actuated receipt tray
  - Gamma monitor
Photos from site
Inside of the cell and angled penetration for the Upper Intrabay Door wire
Photos from site

Ceiling details

Ceiling Floor Valve Penetration

Upper Intrabay Door Hinge
Anchor Plate

Ceiling Stainless Steel beams and plates prior to casting
Photos from site
Rebars around Floor Valve penetration and last concrete pour
Site view 2019-09-06
D02 Building