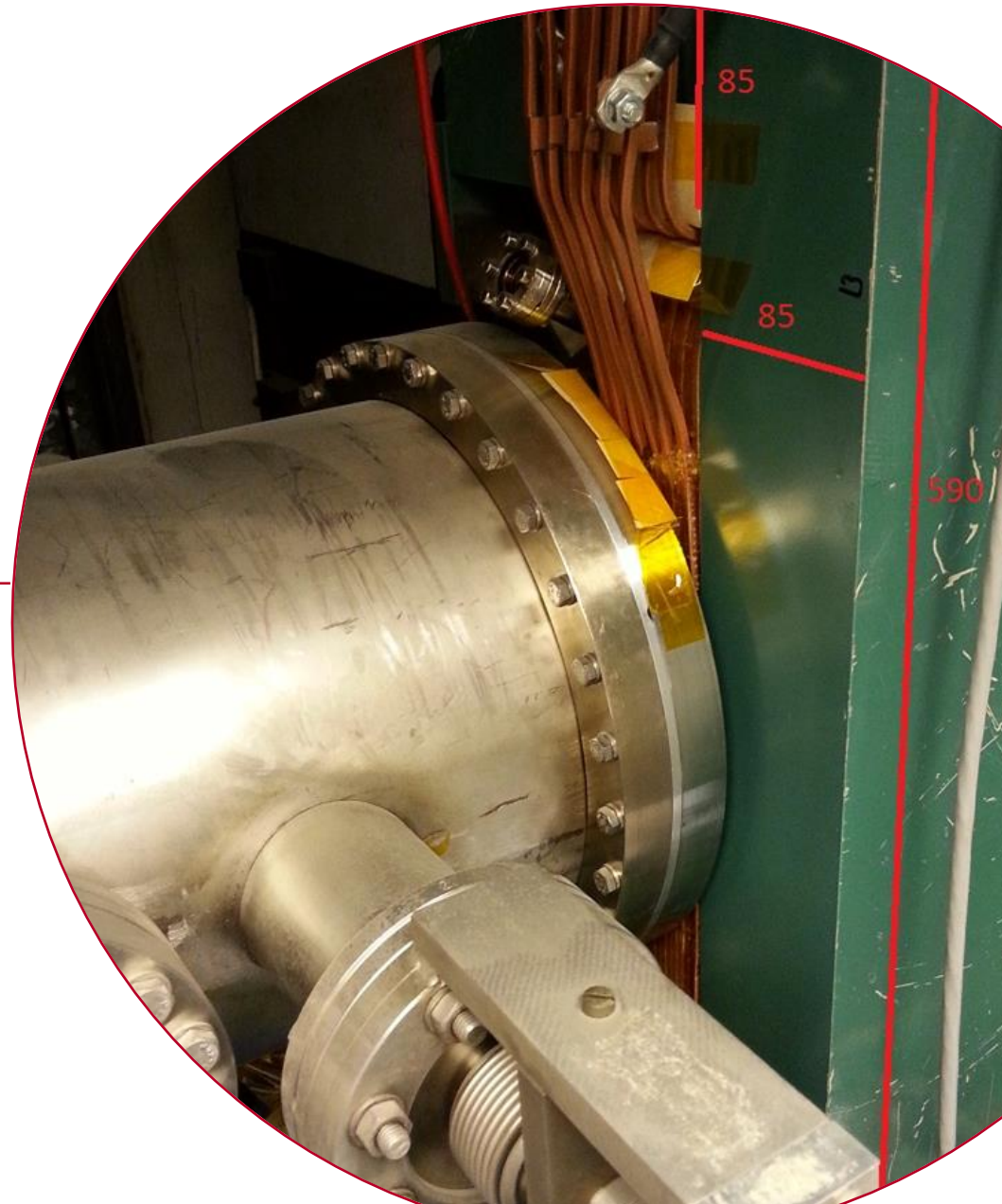


Studsvik

Implementing Waste Led Decommissioning in Practice - Experiences from a Research Facility

2017-02-07

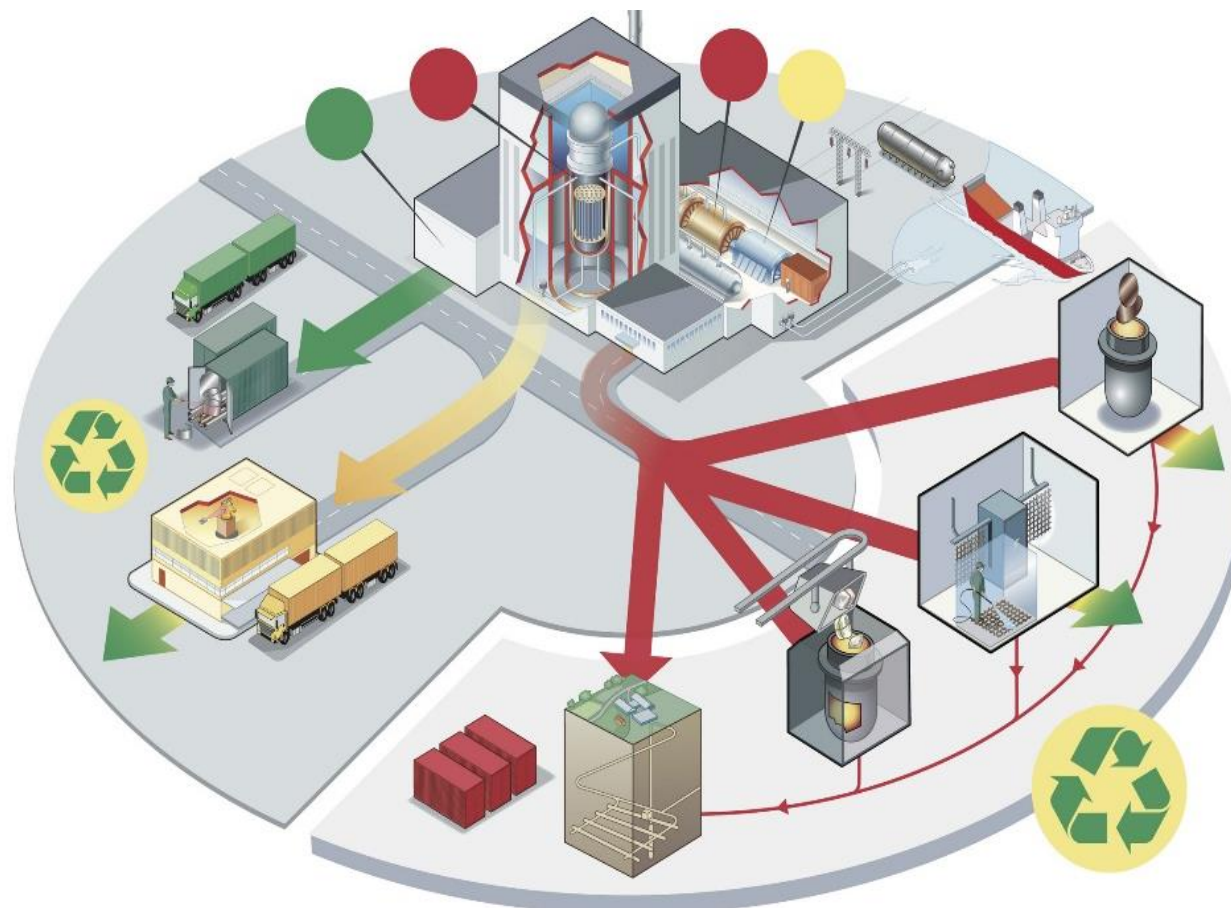
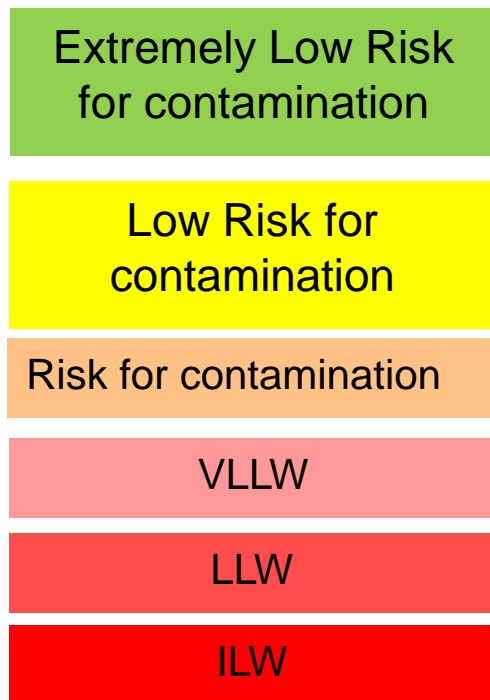
Per Lidar and Karin Strid, Studsvik
Magnus Hörling, MAX IV Laboratory, Lund
University
Arne Larsson, Cyclife



Agenda

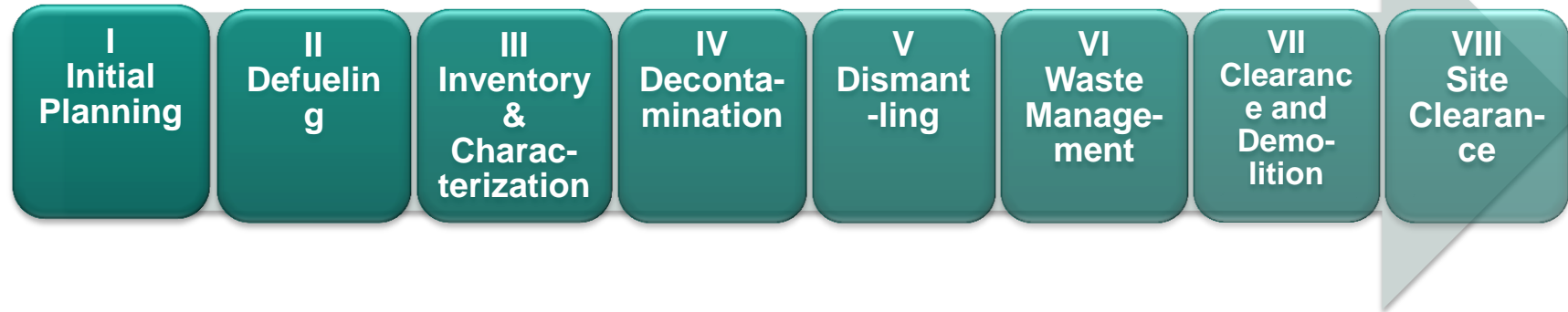
1. Introduction
2. Decommissioning of a facility with a special challenge
 - a. MAX-lab (induced activity)
3. Summary
4. Questions

Overview - material and waste during decommissioning

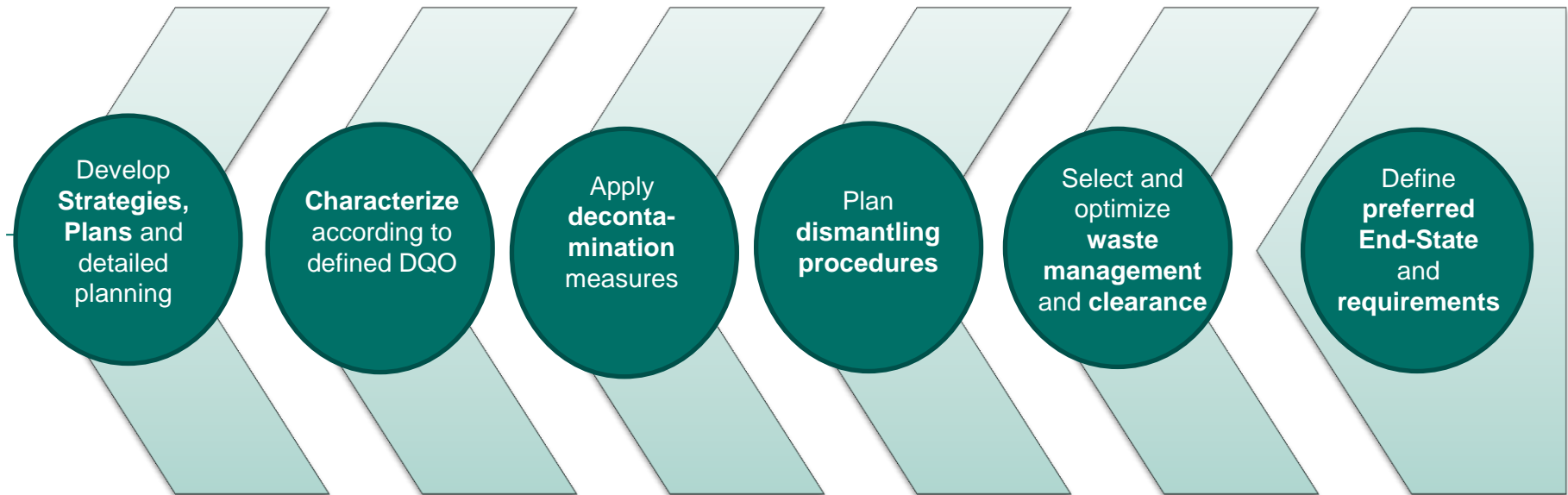


More than 95% of decommissioning waste material belong to Extremely Low Risk or Low Risk

Decommissioning – a stepwise process A-Z



Planning for decommissioning – a stepwise process Z-A



MAX-lab: Facility overview

- National laboratory hosted by Lund University
- Operates accelerators producing synchrotron light of very high intensity and quality
- A new high capacity facility, MAX IV, has been built at a new site
- The entire MAX-lab facility at the University was shutdown late 2015 for immediate decommissioning
- Induced activity but no loose contamination
- Up to 29 y of operation (NP, LINAC, MAX I, II, and III)
- Non-nuclear facility
- 1 500 m² controlled and protected area

MAX-lab: Decommissioning schedule

- Radiological survey: Jan. – Sept. 2015
- Preparation for decommissioning: Oct. – Dec. 2015
- Operation stops: Dec. 13, 2015
- Decommissioning at MAX-lab: Dec. 7, 2015 – June 10, 2016
- Clearance measurements / waste treatment at Studsvik site: Jan. – Sept. 2016
- Reporting and facility clearance application to SSM: Jan. – Oct. 2016
- SSM approves facility clearance: Dec. 14, 2016

MAX-lab: Project overview

1. Handling of radioactive and potentially radioactive material:
 - Initial risk assessment and later re-categorisation
 - Radiological survey and nuclide vector determination,
 - Material flow planning from dismantling to clearance or off-site transport
2. Radiological support during decommissioning
3. Dismantling, packing, and transportation of material / waste to Studsvik site
4. Dismantling, measurements, clearance of material at MAX-lab / Studsvik site
5. Waste treatment at Studsvik site
6. Measurements before clearance of the facility
7. Documentation (radiological survey, dismantling and clearance)
8. Support for license application for facility clearance

MAX-lab: Implementing decommissioning

Traceability of objects over time

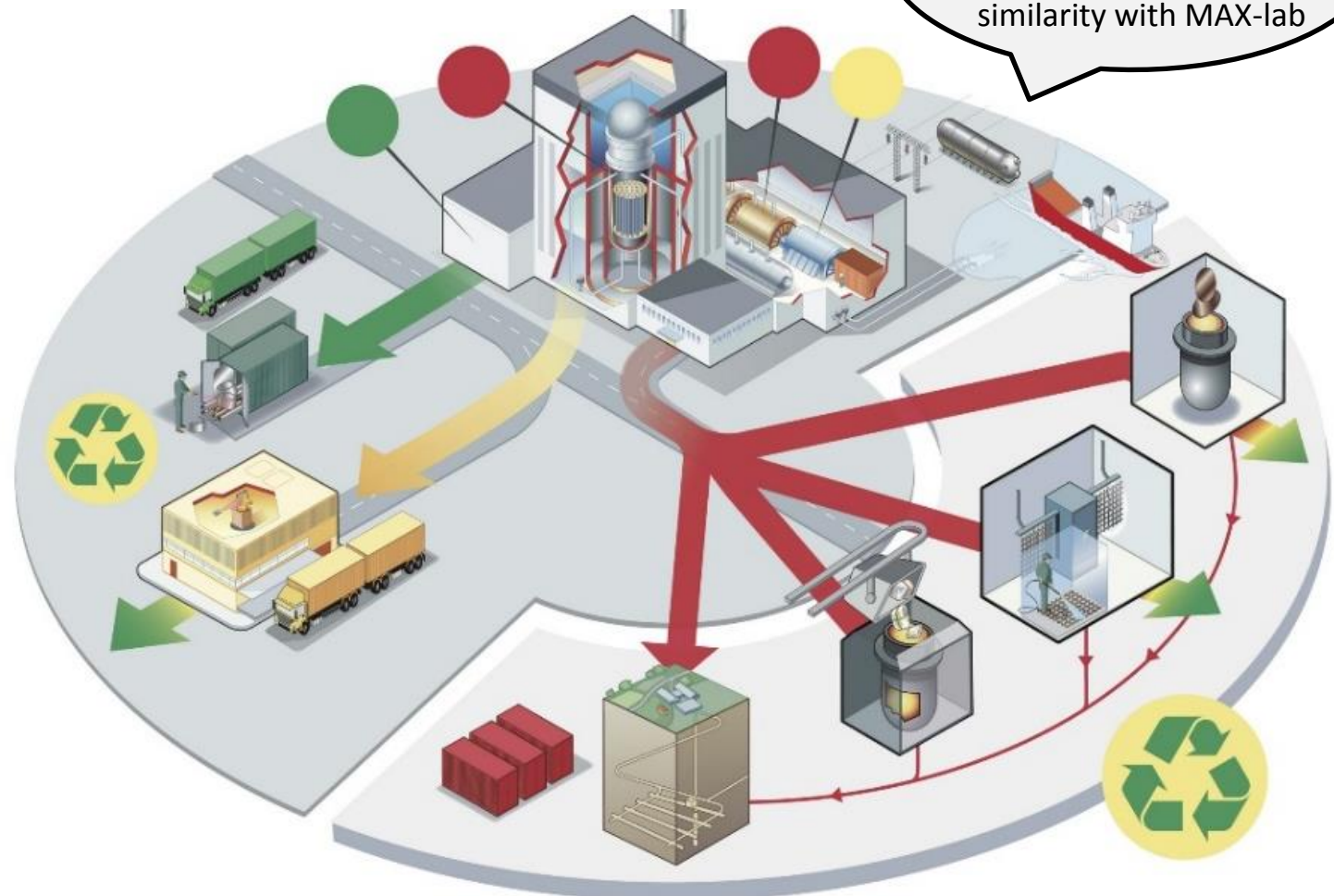
- Risk based categorisation based on survey results using unique naming convention and ID marking with bar codes
- Personal login for registration, measurements and handling
- Data base SVALA used for documentation:
 - Dismantled material
 - Analysis results
 - Transport
 - Waste treatment
 - Clearance
- **Material – clearance on-site at MAX-lab**
Concrete blocks and wall filling material for free use
- **Material – handling at Studsvik**
Metal, incinerable, cable, etc.
 - Low Risk and Risk material for clearance measurements
 - Scrap metal for melting with the aim of clearance (RP 89)
 - Sources
- **Facility clearance at MAX-lab**
 - Measurements for facility clearance for free use
 - Reporting
 - Application to SSM

MAX-lab: Implementing decommissioning

Note: Picture only to illustrate waste category flows, no other similarity with MAX-lab

Local contractor
Locally (>5000 t)

Studsvik
Locally and off-site
(430 + 133 t)



Studsvik
Off-site (95 t)

SFR
(<2 t)

MAX-lab: Results

Material clearance:

- Activity measured or MDA determined for all packages
- Clearance for free use possible (SSMFS 2011:2)



Waste treatment:

- Conditional clearance possible (RP 89) directly or after decay storage



MAX-lab: Results facility clearance

- Surface model used for calculations
- Clearance for free use (SSMFS 2011:2) possible after removal of a few sections with activity above the clearance limits
- Comparison made with RP 114 (four scenarios)
- Check against material performed with a volume model



MAX-lab: QA, documentation and traceability

- Documentation
 - Project specific instructions
 - Photos
 - Packing lists
 - Four reports
- SVALA data base
 - Unique naming convention and bar codes
 - Rad. Survey 1 000 objects
 - Dismantling 4 800 objects
 - Traceability from dismantling to measurements, transport and handling



Namn	Data	Typ	Registrerat	Reg. av
M0320BTA01	Obehandlat	90:0	2016-06-07 ...	Fargo, Kent / CYC
material	Betong Induc	1 kg	2016-06-07 ...	Fargo, Kent / CYC
material total		1 kg	2016-06-07 ...	Fargo, Kent / CYC
risk	Risk		2015-02-12 ...	4A, Admin / VA
producent	SN (Studsvik Nuclear)		1950-01-01 ...	System, Converting / ...
ägare	SN (Studsvik Nuclear)		1950-01-01 ...	System, Converting / ...
kategori	Betong, inducerat och även ytko...	535	1950-01-01 ...	System, Converting / ...
beh. form	Obehandlat	90	1950-01-01 ...	System, Converting / ...
inducerat			2016-06-07 ...	Fargo, Kent / CYC
lager	Radiologisk kartläggning Nuclear		2016-06-09 ...	System, Converting / ...
total aktivitet	Co-58	2.63E+2Bq (2016-06-07)	Ej detekterad	2016-06-28 ...
total aktivitet	Co-60	4.85E+3Bq (2016-06-07)	Uppmätt	2016-06-28 ...
total aktivitet	Cs-134	3.26E+2Bq (2016-06-07)	Uppmätt	2016-06-28 ...
total aktivitet	Cs-137	2.84E+3Bq (2016-06-07)	Ej detekterad	2016-06-28 ...
total aktivitet	Eu-152	3.64E+3Bq (2016-06-07)	Uppmätt	2016-06-28 ...
total aktivitet	Eu-154	4.48E+2Bq (2016-06-07)	Ej detekterad	2016-06-28 ...
total aktivitet	Eu-155	6.45E+2Bq (2016-06-07)	Ej detekterad	2016-06-28 ...
total aktivitet	K-40	1.90E+5Bq (2016-06-07)	Uppmätt	2016-06-28 ...
total aktivitet	Mn-54	2.57E+3Bq (2016-06-07)	Uppmätt	2016-06-28 ...
total aktivitet	Na-22	9.39E+3Bq (2016-06-07)	Uppmätt	2016-06-28 ...
total aktivitet	Ra-226	2.89E+3Bq (2016-06-07)	Uppmätt	2016-06-28 ...
total aktivitet	Sc-46	2.77E+2Bq (2016-06-07)	Ej detekterad	2016-06-28 ...
total aktivitet	Th-232	3.82E+3Bq (2016-06-07)	Uppmätt	2016-06-28 ...
dokument	M0320BTA01.bt	0.8 kB	bt	2016-06-28 ...
dokument	M0320BTA01.bt	0.8 kB	bt	2016-06-13 ...

MAX-lab: Summary

Decommissioning of a facility with a special challenge have been performed

- 24 month from project start to approved facility clearance
- Risk based approach for handling material, waste and facility
- Fast and effective mix of local and off-site material clearance

Questions?

Thank you for your attention!

Studsвик