Radiography incident in Belgium

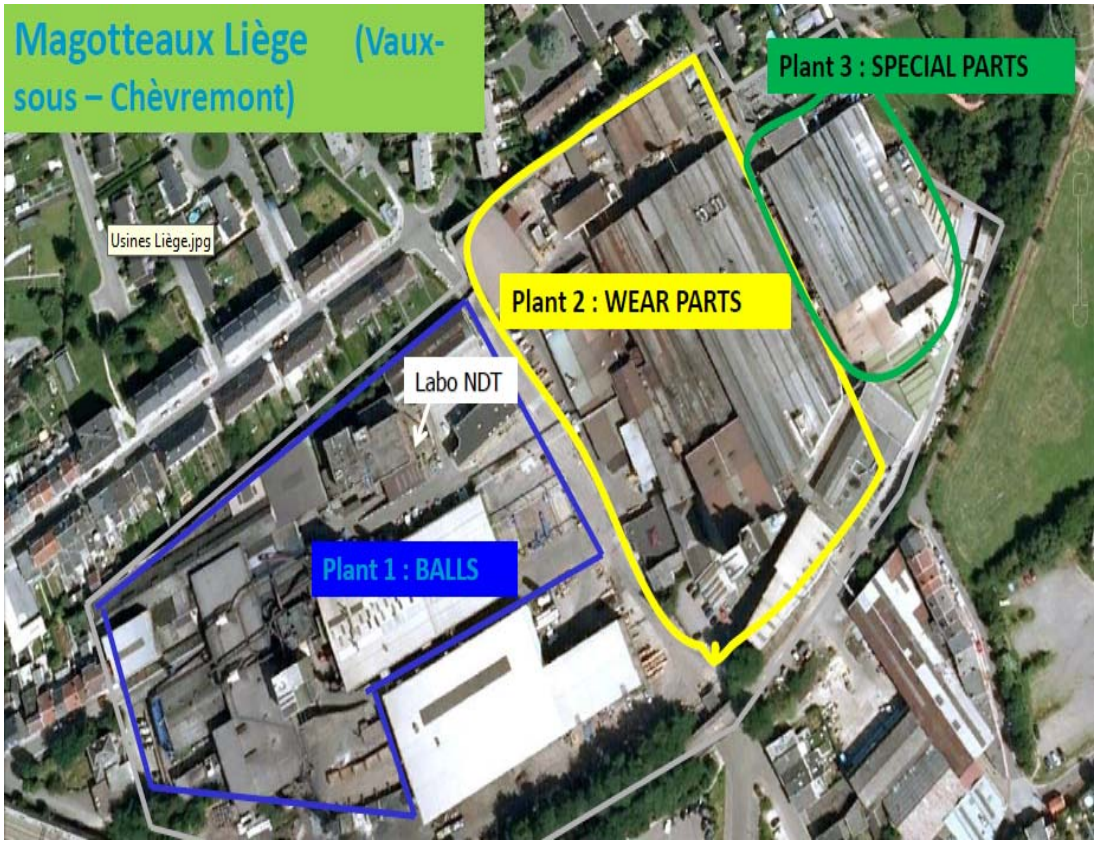
Recovery of a Co-60 source in a foundry

Rutger Berden

FANC AFCN

Magotteaux Liège

Part of an international group



Metal casting company: grinding bodies, wear parts, industrial products.

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Non destructive testing lab

Use of radioactive sources and X-ray equipment for quality control of pieces:

- Bunker 114 with 1 ^{60}Co HASS with nominal activity of 3,7 TBq in GammaMat TK 100 (current activity: 1,37 TBq)
- Bunker 113 with 1 ^{192}Ir HASS 1,5 TBq GammaMat TI (source depleted)
- Bunker 112 with 1 Balteau Baltographe TDS 320 (320 kV)

Control stations: room 109

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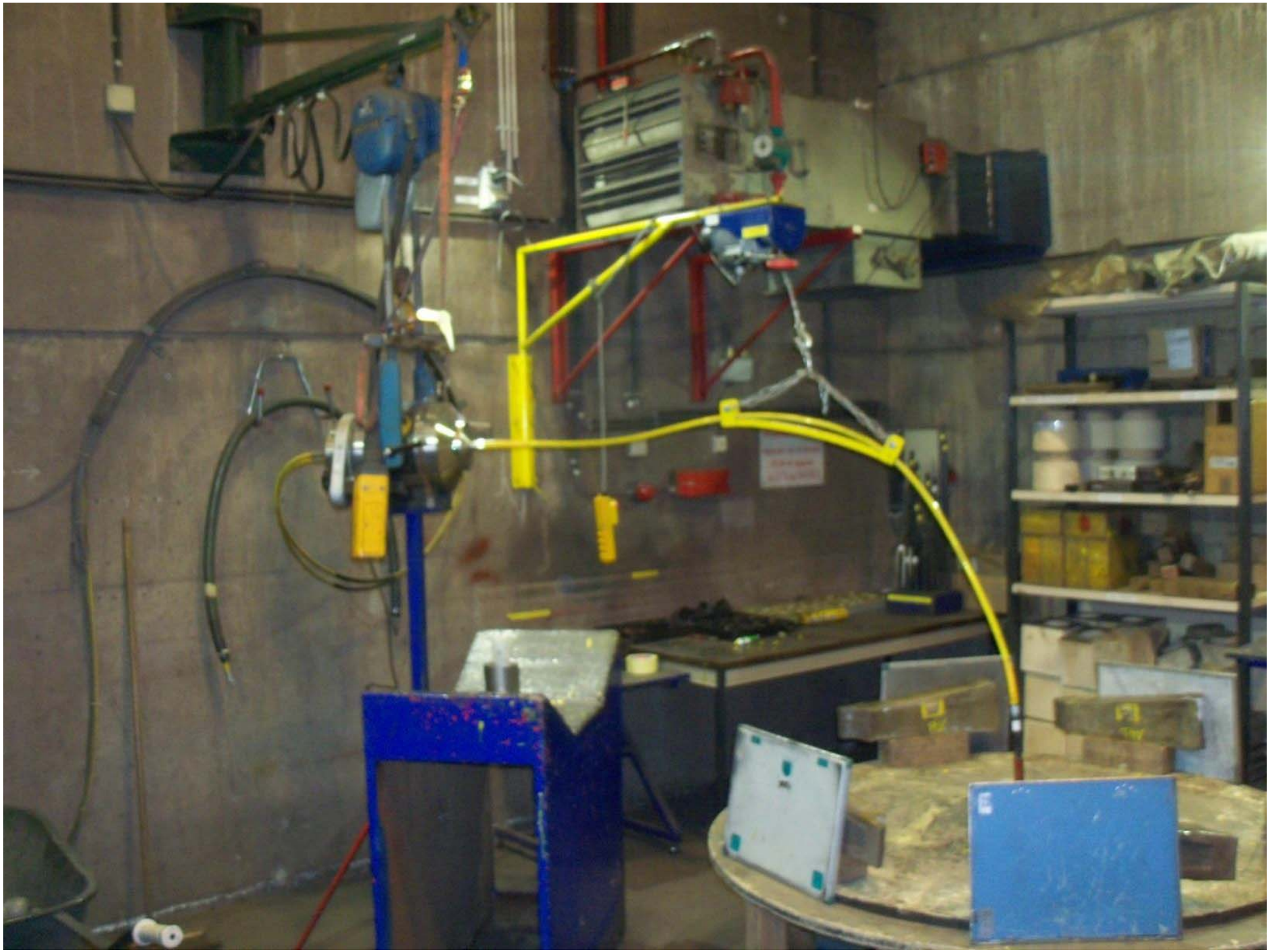
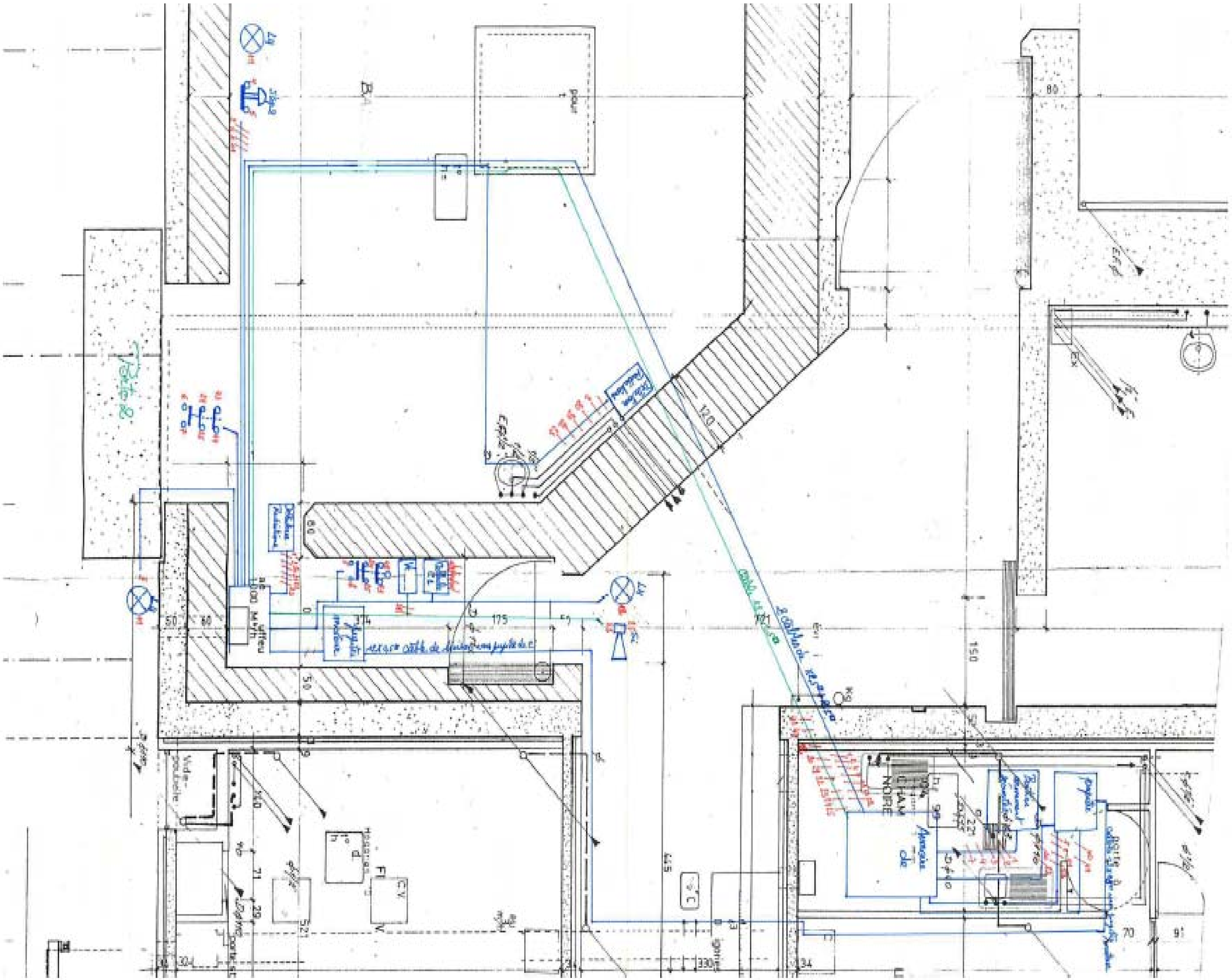


Replacement of ^{60}Co source and container

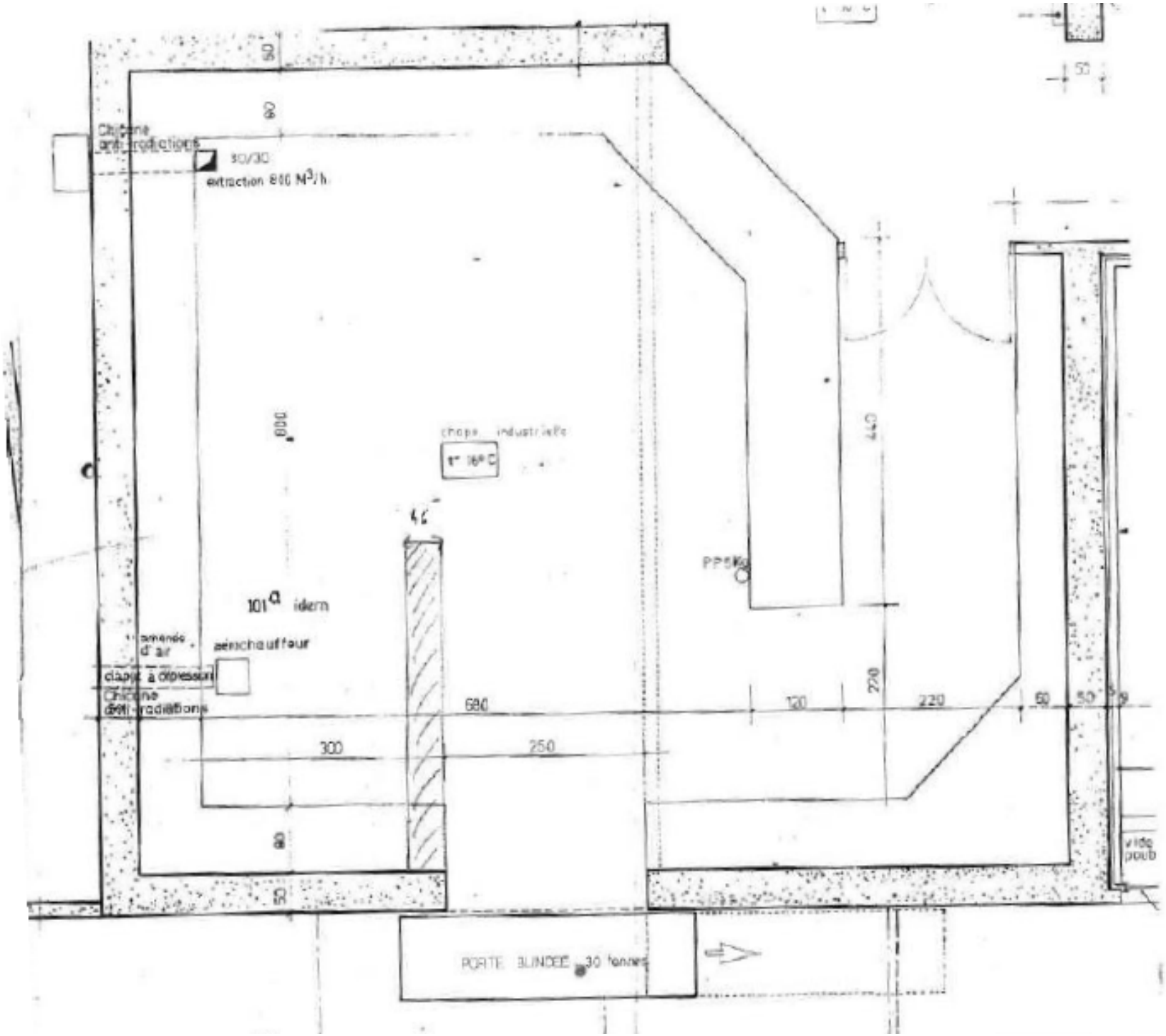
1 September 2014:

- New licence for additional ^{60}Co HASS with nominal activity of 3,7 TBq in SENTRY 330 (QSA Global)
- Replacement for old GammaMat TK 100
- Use in bunker 114
- Storage of GammaMat TK100 with ^{60}Co (and GammaMat TI with depleted ^{192}Ir) in bunker 113

approved by inspection organisation



Vide-poubelle
NOIRE
Armoire
pupitre
80
120
60
50
175
150
445
330
70
91


Chicane anti-radiations
sol/30
extraction 800 M³/h
chape industrielle
idem
amenée d'air
aérochauffeur
clapet à dépression
Chicane anti-radiations
PORTE BLINDEE 30 tonnes
vide pour


RQ
RADIOACTIVE II
7

Automatic wind in/out

- Installation 15 January 2015
- Automated manipulation of the source

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Friday 10 April 2015

- ✓ 10h30: source blocked outside the container
- ✓ No exposure of operators or public
  - ➡ security devices worked properly

First intervention to retrieve the source under supervision of certified organism and with the help of manufacturer with a camera and a long pole with a gripper.

- ➡ Ejection sheet unblocked, but source remained outside container.
- ✓ 15h22: Notification FANC


35 µSv/h
350 µSv/h


DELL

Monday 13 April 2015

Second intervention: similar to first but with new dome camera for better view.

- Cable unblocked and partially returned but source remained outside container.
- Further interventions not allowed by inspection organisation and FANC

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12.1X

What now?

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Resolving issue

Synergie between

Exploiting company Magotteaux

Manufacturer NDT material: QSA Global

DOVO (part of Belgium National Defense)

Civil Protection

Federal Agency for Nuclear Control

Certified organism AIB Vinçotte Controlatom

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Preparation phase
13 April - 11 May 2015

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Action plan

- Need to establish a unique protocol to retrieve the source: directed by Magotteaux and Controlatom
  - ➡ Approved by FANC
- Use of military grade robot, used for mine clearing purposes
- Renting of storage container Sentinel QSA 680 from Applus RTD (Netherlands)
- Cold test on real size mock-up of irradiation vault

15/04/2015

Town hall Chaudfontaine

Information sharing

Mayor Chaudfontaine, Police Chaudfontaine, Fire Department Chaudfontaine, Belgian Defence, Civil Protection, DOVO, AVC, Magotteaux, FANC

- Description of incident.
- No risk to public or workers.

Incident provisionally scaled as INES 1

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16/04/2015

Magotteaux factory

Information sharing and discussion of open questions

Belgian Defence, Civil Protection, DOVO, AVC, FANC, QSA, Magotteaux

- No damage to source (no contamination)
- Source can be pushed out, not retracted
- Possibility of deployment of robot?
- Performance of robot?
- Compatibility of material?

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Testing
12 May 2015

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Robot moving the container that will house the source

-

Undercarriage fabricated for source retrieval

-

Tests showed that undercarriage needed to be modified

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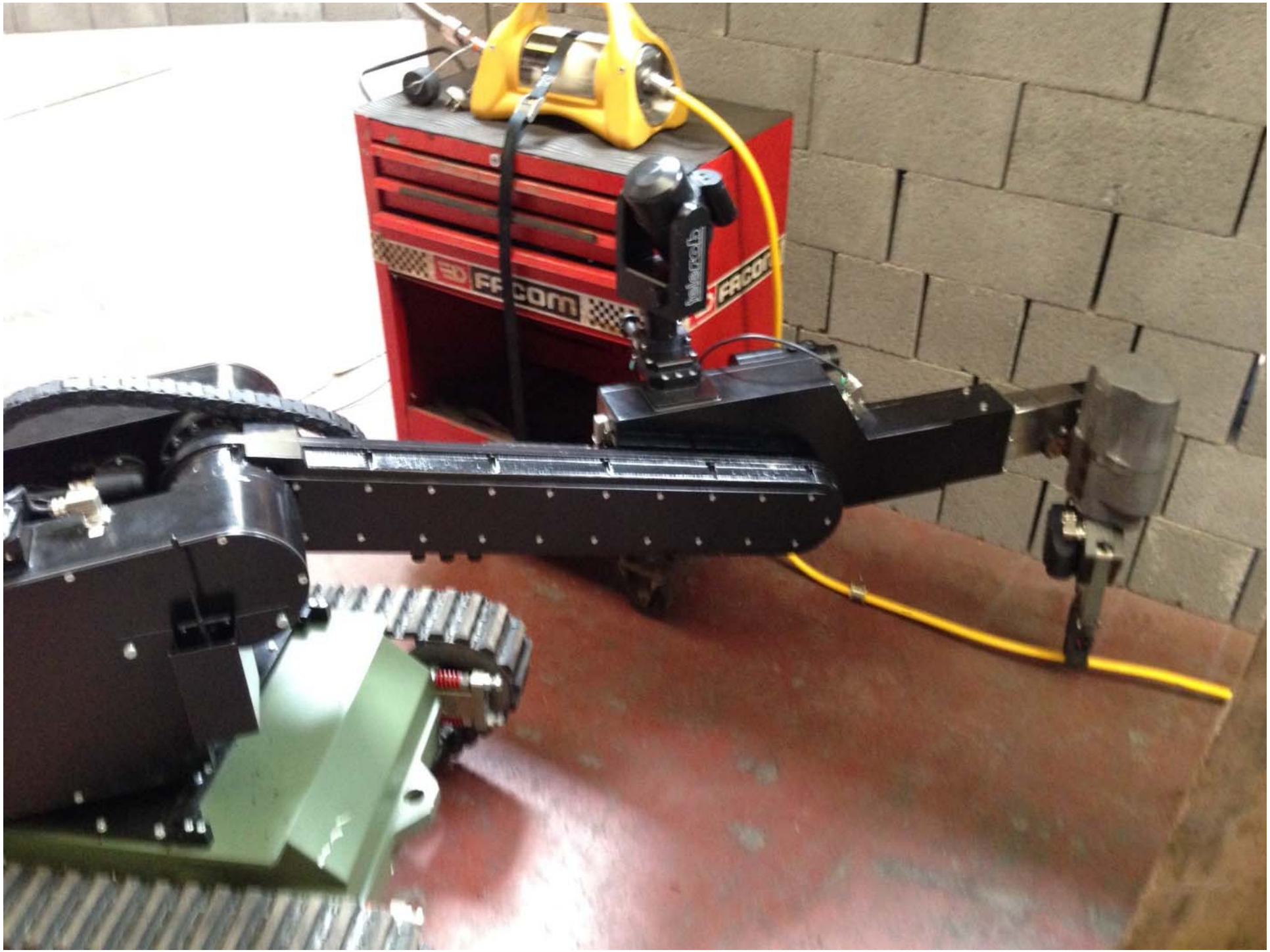
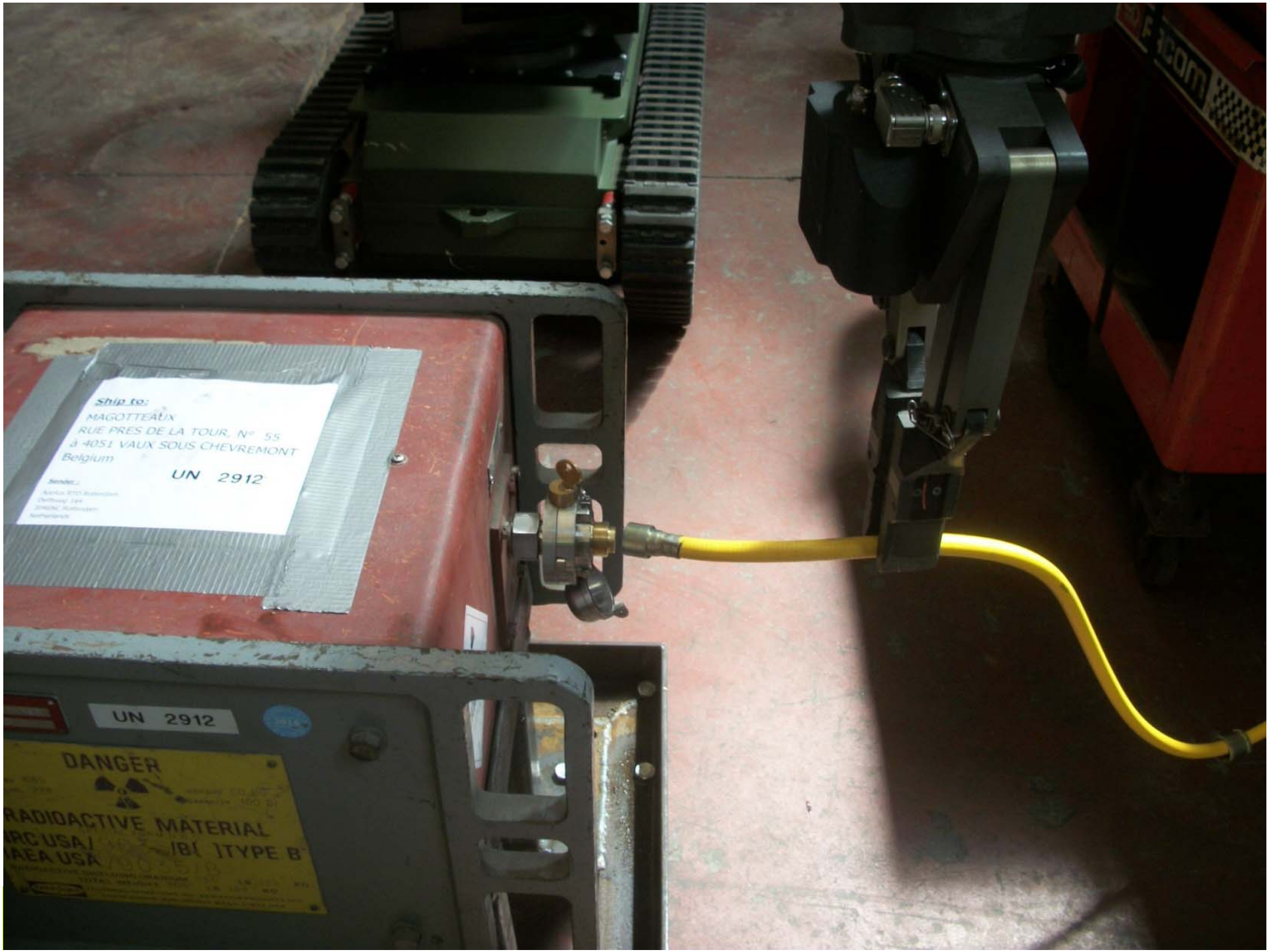

FACOM
FACOM


Ship to:
MAGOTTEAUX
RUE PRES DE LA TOUR, N° 55
à 4051 VAUX SOUS CHEVREMONT
Belgium
UN 2912
UN 2912
DANGER
RADIOACTIVE MATERIAL
NRC USA/
DOE USA
(B) TYPE B

Test source entered in container

–

safely interlocked

–

success of the test

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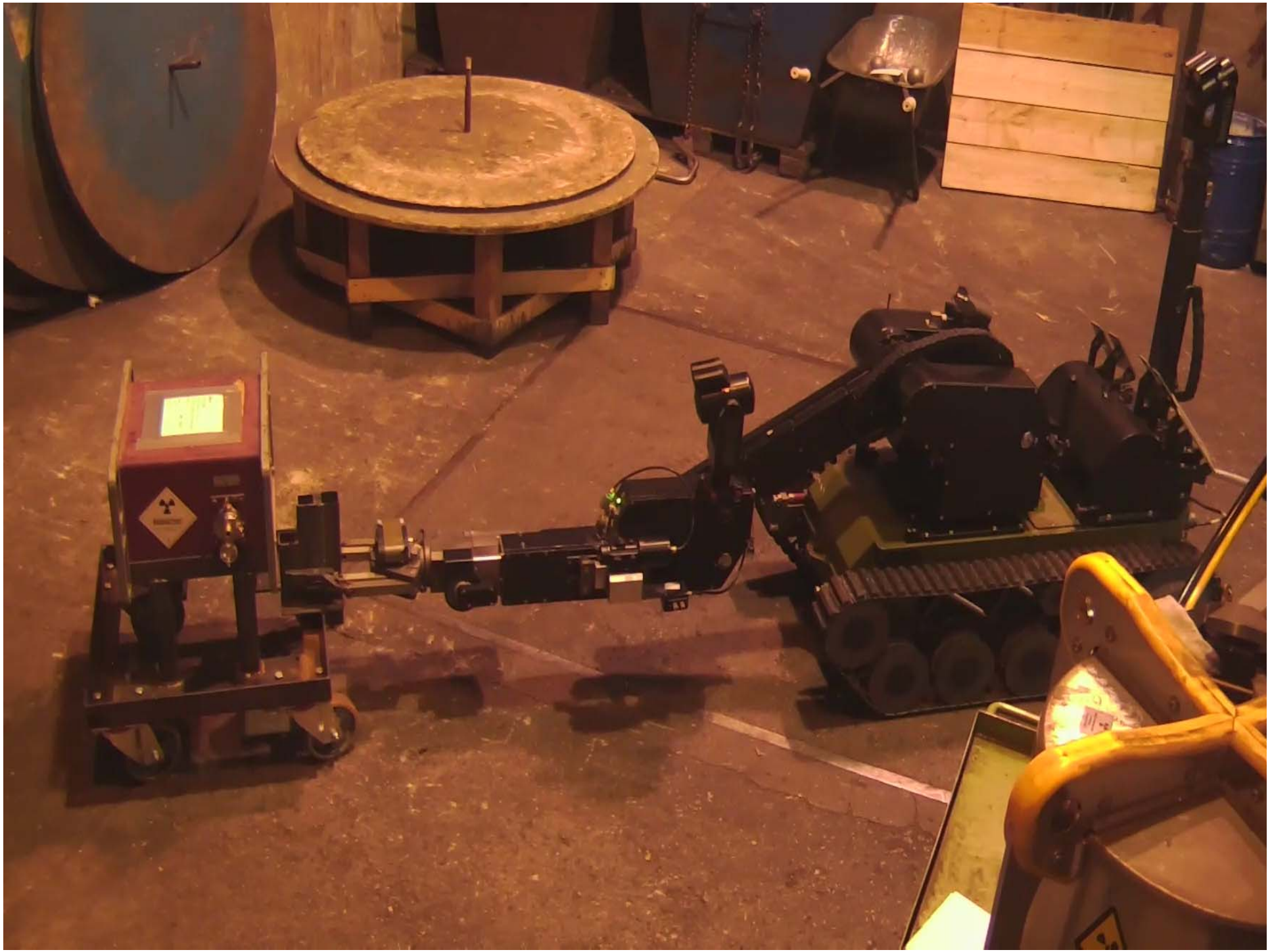
Intervention
12 May 2015

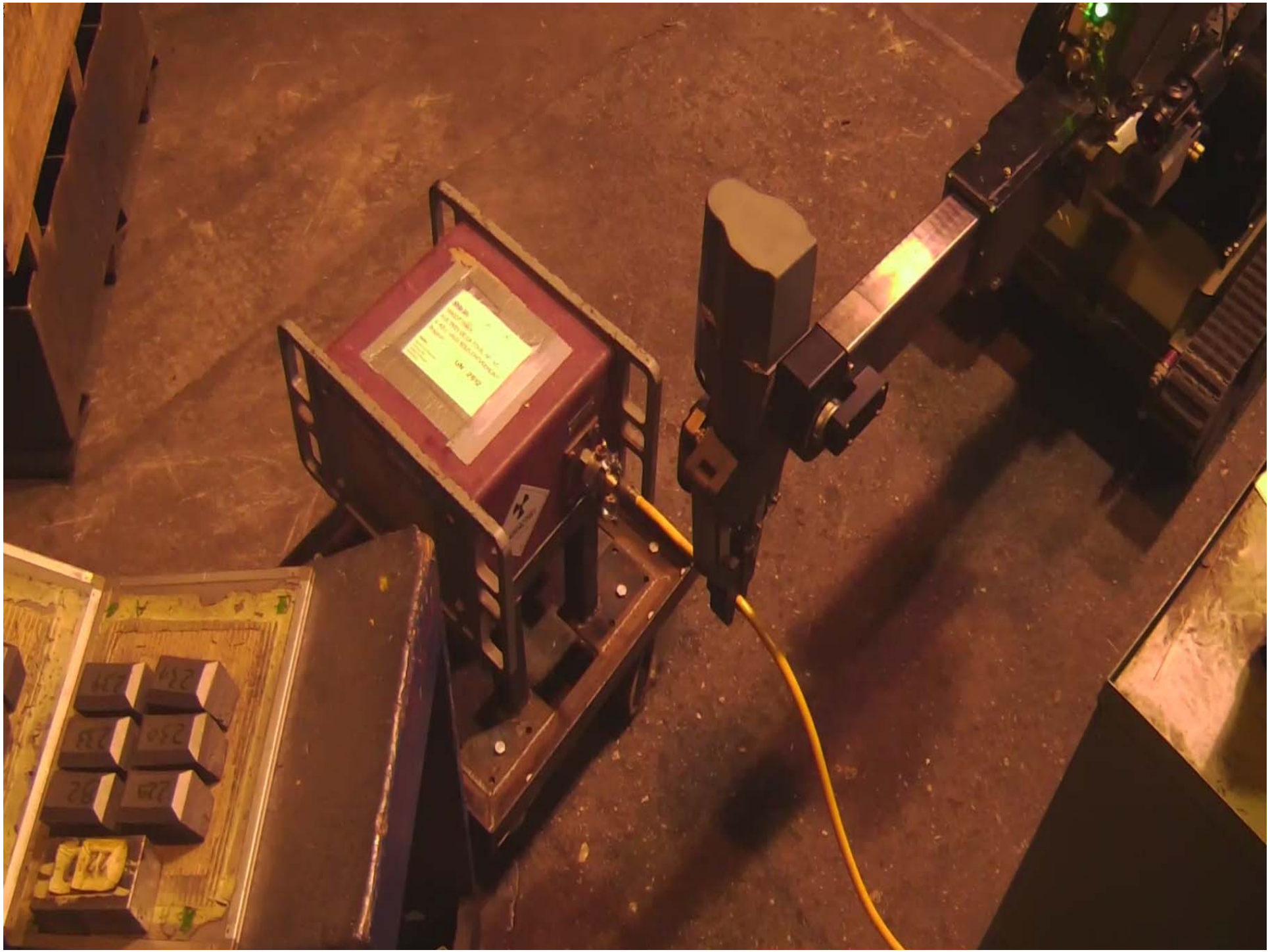
FANC AFCN

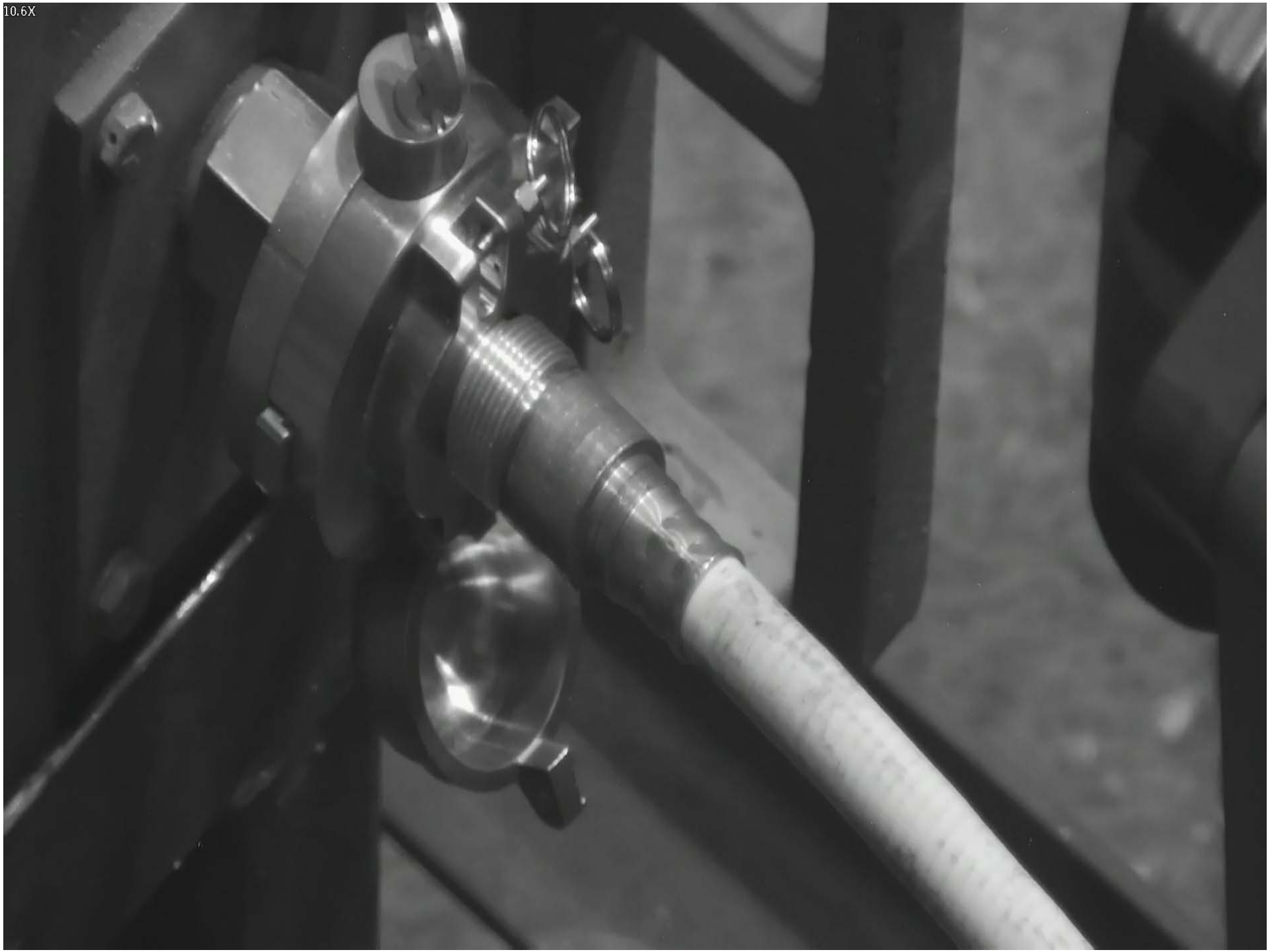
Preparation of retrieval

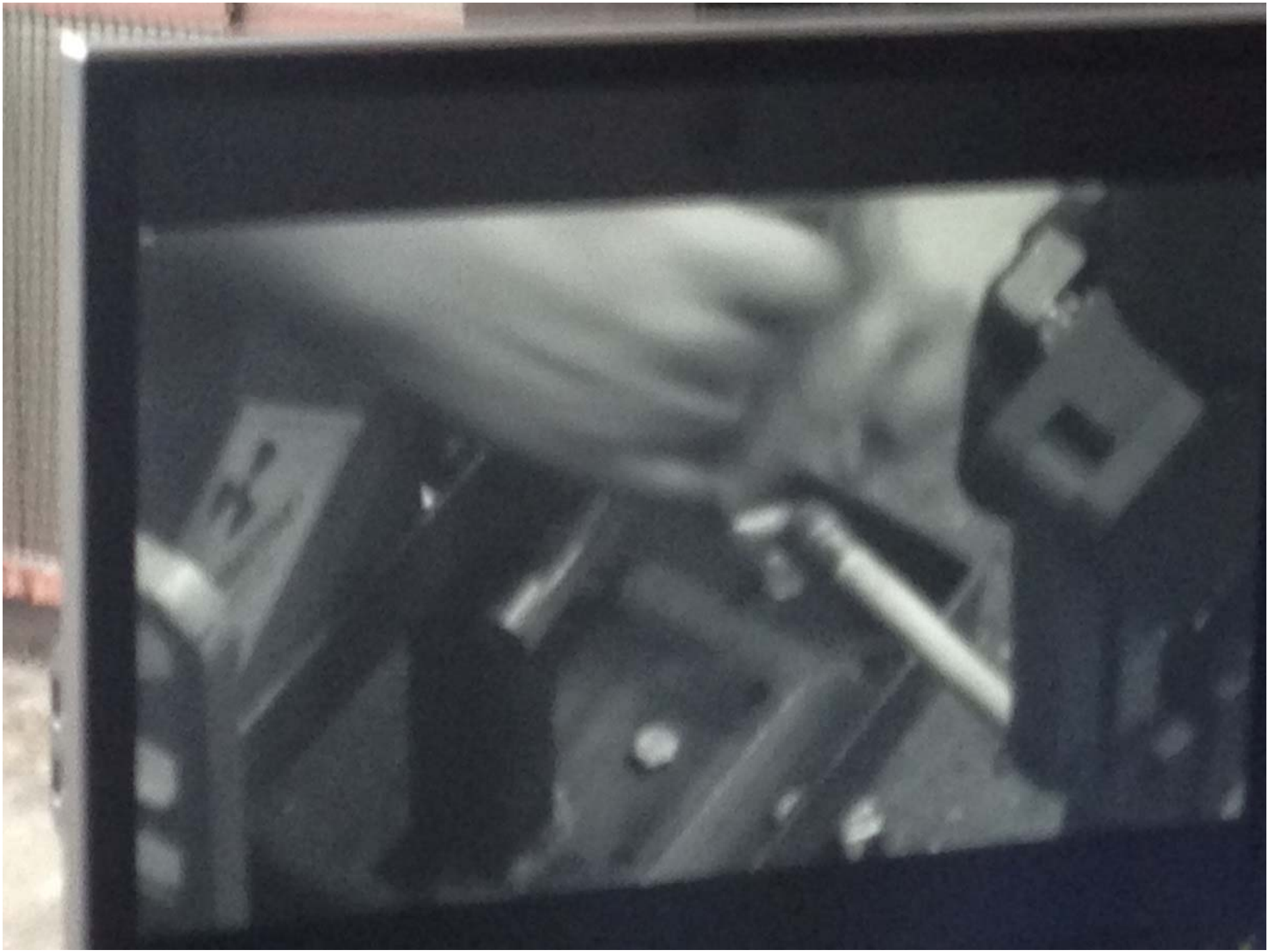
–

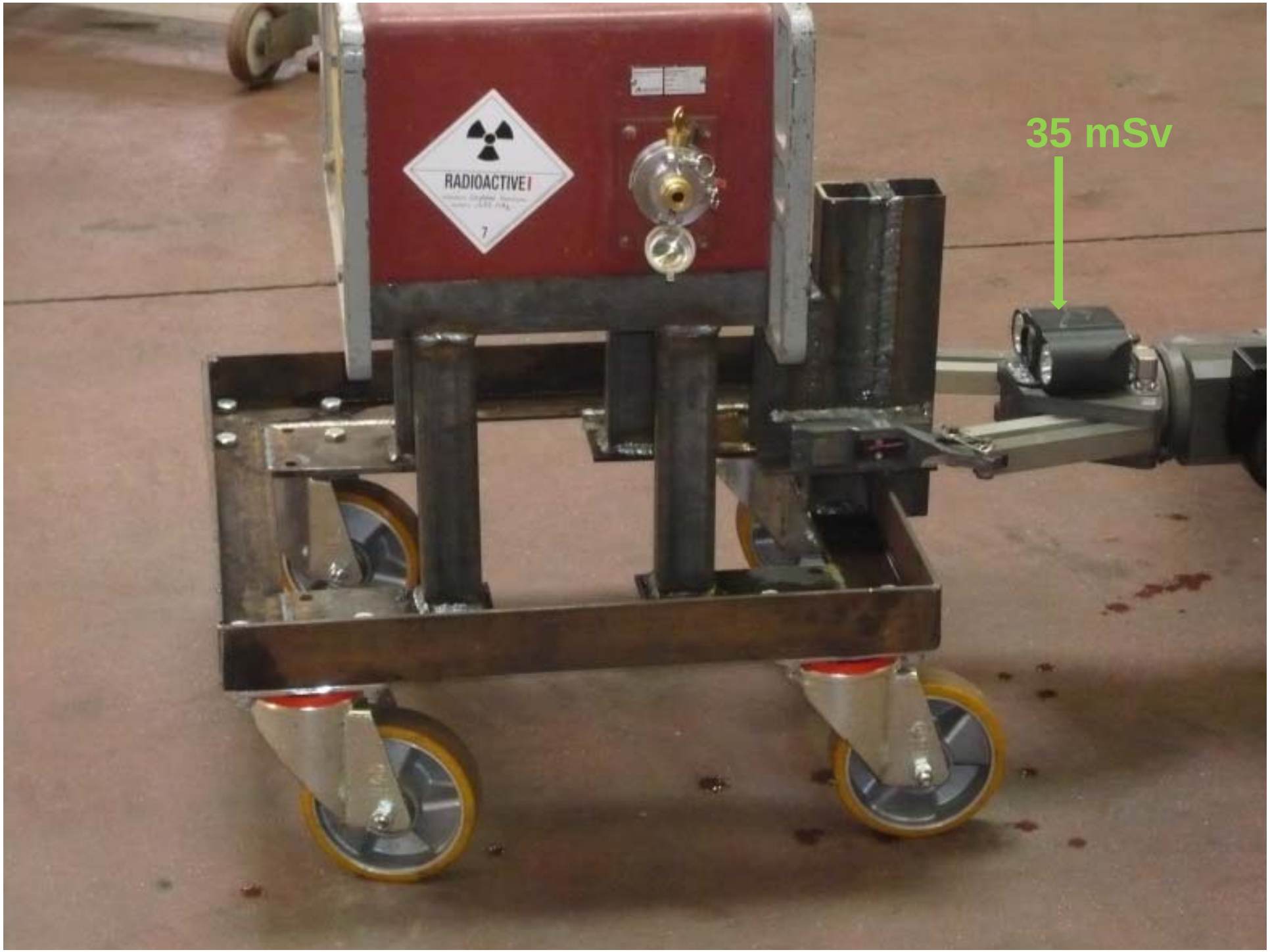
Robot entering the irradiation vault






10.6X




RADIOACTIVE I
35 mSv

CAUSE:

Preliminary risk assessment & human error

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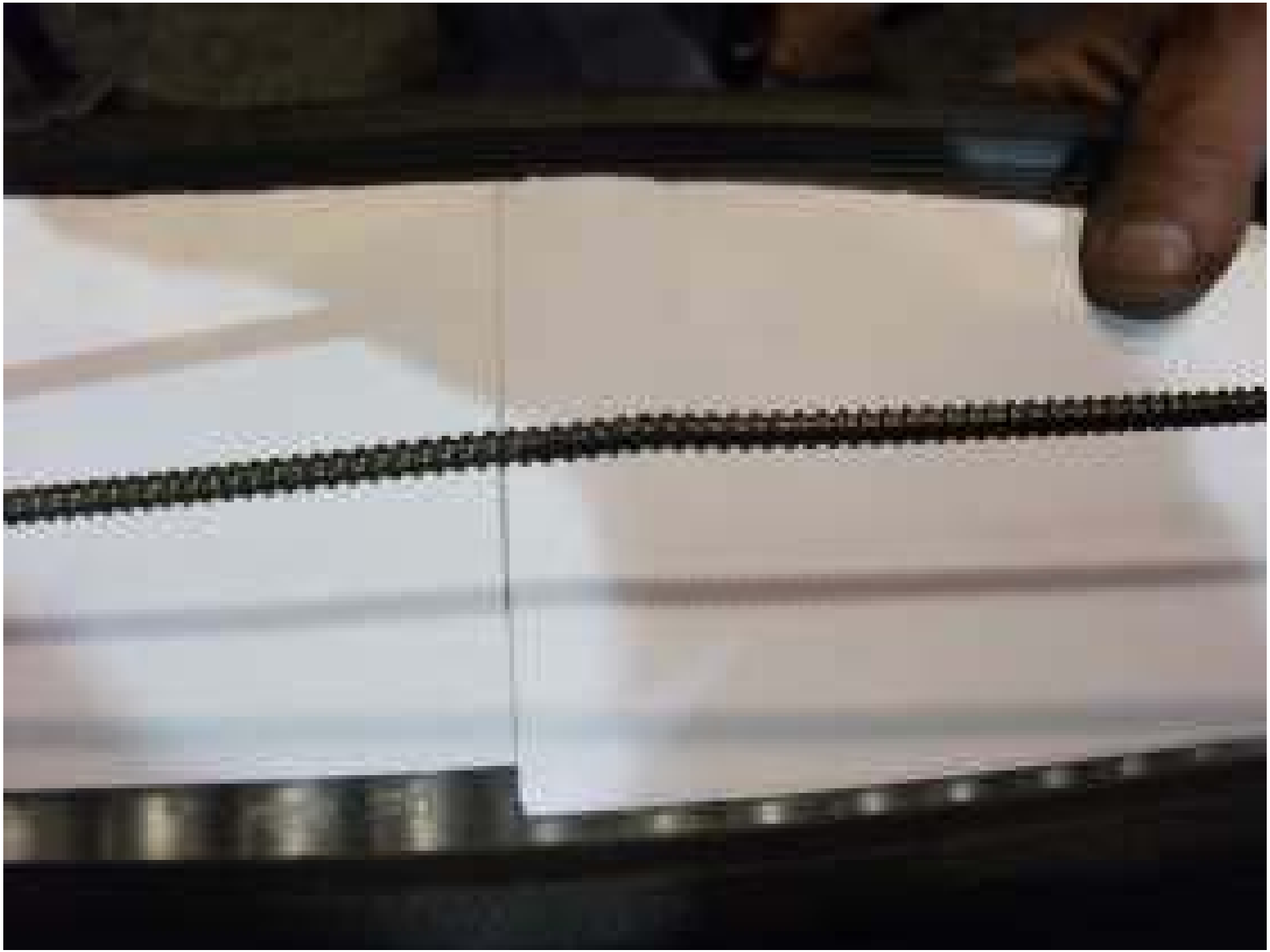

Operations to put installation back into service 12 – 18 May 2015

1. Complete maintenance of SENTRY 330 container (certificate QSA)
2. Replacement of drive cable
3. Use of new one piece ejection sheets with lock on the SENTRY 330 container
4. Extensive cold tests
5. Coupling of source holder on new cable and reintegration of source in SENTRY 330

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Installation in service
18 May 2015

- Testing of security devices.
- Approval of new work procedure
- Completion of incident report

By certified organism

- Confirmation INES 1 (29/05/2015)

By FANC

Dosimetry

All intervenants present during the source retrieval wore an OSL dosimeter provided by AVC

All read-outs were below threshold.

Costs

	Cost (€)
Interventions external counterparts	
Controlatom, QSA, Army	42.000
FANC	FREE
Internal service	
IT, general building service (construction mock-up bunker, and scaffolding), maintenance personnel	10.000
Extra equipment	
Caméras , scaffoldings, long tongs, mock-up bunker,...	5.000
Immobilisation of industrial gammagraphy for 1 month	8.000
Total	65.000

Questions

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