Sample and User Laboratory Facility Update

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European Spallation Source ERIC
Date

STAP: Users & Samples, Lund, April 2nd, 2019

OVERVIEW

- Update:
  - Personnel + Projects
  - Budget
- preparation for installation of on-site labs,
- fit-out and move to site
- Equipment/chemicals – operations in MV

SULF– what do we cover during construction/initial operations/operations?

ESS-Labs: Preparation for installation of on-site labs, fitout, move to site, equipment+ lab drawings, safety, operations

Medicon Village Labs: operations, commissioning of equipment, training of users, ordering/waste removal…

Safety: establish/extend rules&regulations for lab, obtain licenses to work with chemicals/equipment (X-ray), chemical inventory,…

CF-Interface: Design Reviews, change requests, hand-over review meetings, utilities & gases, HVAC (chemical/conventional)

Collaborations (internal/external): support for Science, Target, Accelerator; support for local neutron users/local industry; grants

SSM: Participation in application to the Swedish Radiation Safety Authorities from NSS-side (Accident analysis, core team meetings)

SULF team: who, what how ?

ESS labs

MV labs

Safety

CF Interface

Collaborations

SSM

- Katrin Michel – laboratory technician (**100%** SULF)

Soft matter (bio), nanomaterials, microscopy

- Melissa Sharp – laboratory scientist (**50% SULF**, 50% CF Interaction)

soft matter (polymers), small angle/light scattering

- Monika Hartl – laboratory scientist/GL (**70% SULF**, 20% SSM, 0-10% VESPA)

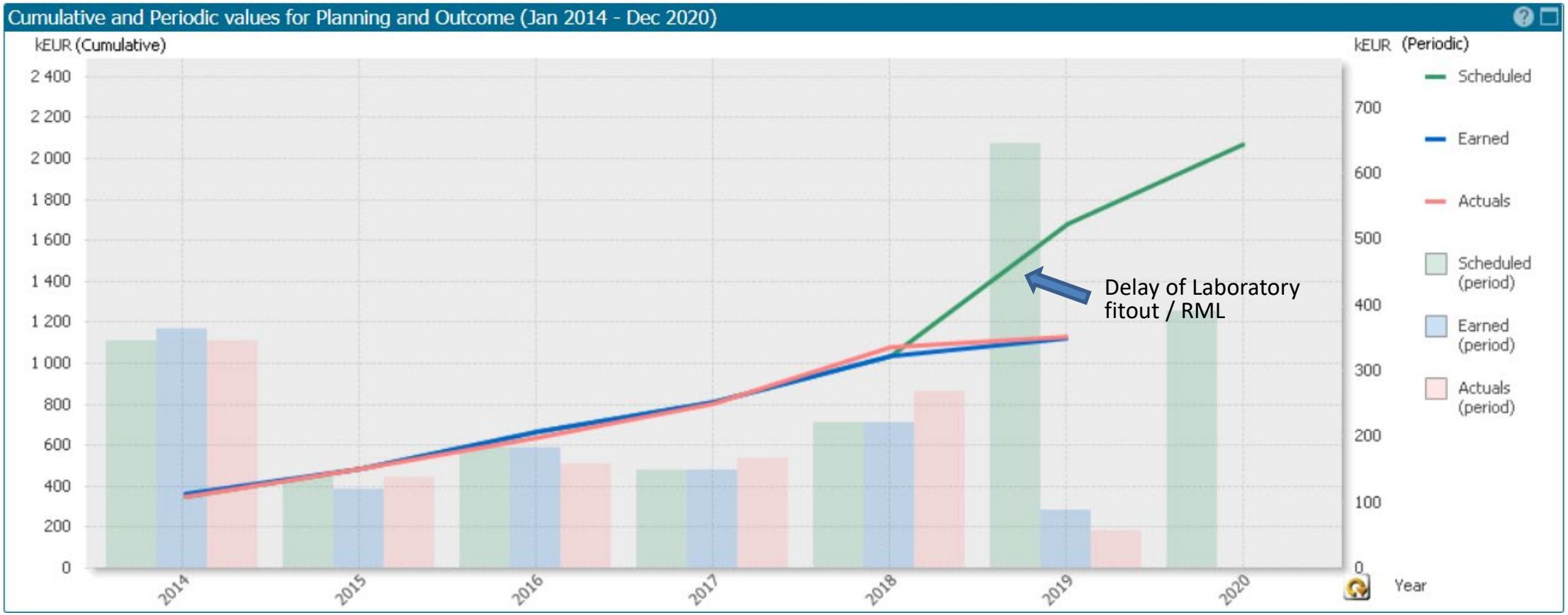
chemistry, spectroscopy, analytical chem, diffract.

- Future: laboratory technician FLUCO (50% FLUCO, **50% SULF**) Q3/2019

spectroscopy, electrochem.

+3.5 laboratory technicians (1x radiol. Chemistry, 1.5x chemistry, 1x soft matter/bio

Remaining Budget for Construction



- Money left for equipment: 30k€ (soft matter, e.g. Light scattering, Fluorescence spectrometer)

Preparation for installation of on-site laboratories

SULF will be busy during preparation for installation of on-site labs (now), laboratory fitout (starting Jan. 2020) and move to site (mid 2020):

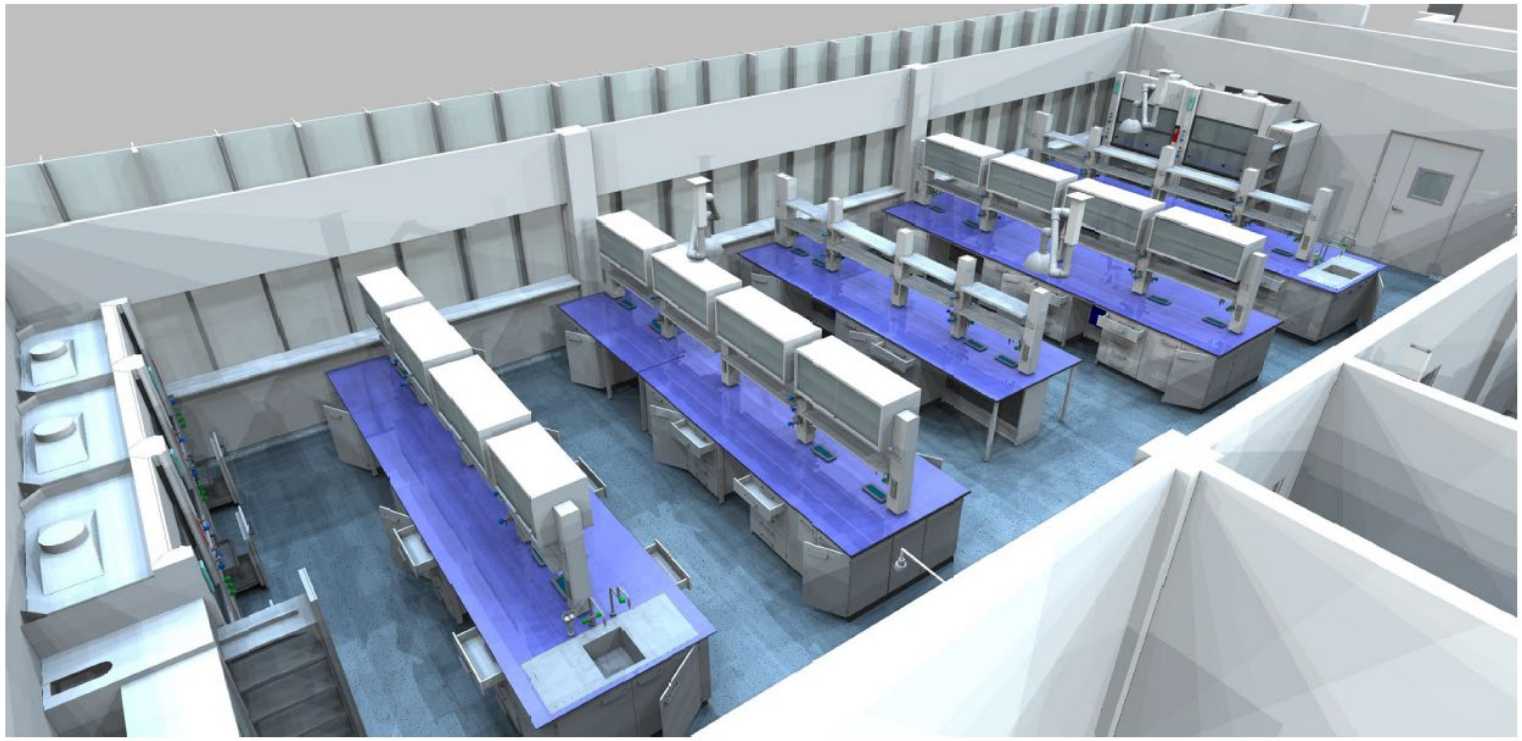
2019

- Installation preparation meetings with Sanber, CF and SKANSKA
- Installation binder for laboratory fitout (see Antonio's talk)
- Procurement/sole source justification for installation of all labs (and SE workshops)
- Instrument interactions (chemical/containment ventilation and instrument specific labs)

2020

- Coordination/supervision during fit-out (together with NSS integration engineer)
- Logistics organization (together with NSS integration engineer)
- Organization of move from MV to ESS site
- Setup of chemistry labs

In-kind STFC laboratories to be fitted out



Due to the VAT problem: the in-kind will include the furniture Procurement from Kötterman (no VAT for procurement) while we will pay for installation (no VAT for ESS) from Sanber (current consultant for labs)

E04: level 100

- Large LS&SCM laboratory with appliance room and fridge/freezer room (4 FC, 2 extraction points)
- Physical Characterization with cutting& polishing lab

E04: level 110

- Large Chemistry Laboratory (4 FC, 4 extraction points)

D04: level 100/110

- Large chemistry laboratory with appliance room, instrument room and fridge/freezer room (5 FC, 4 extraction points)

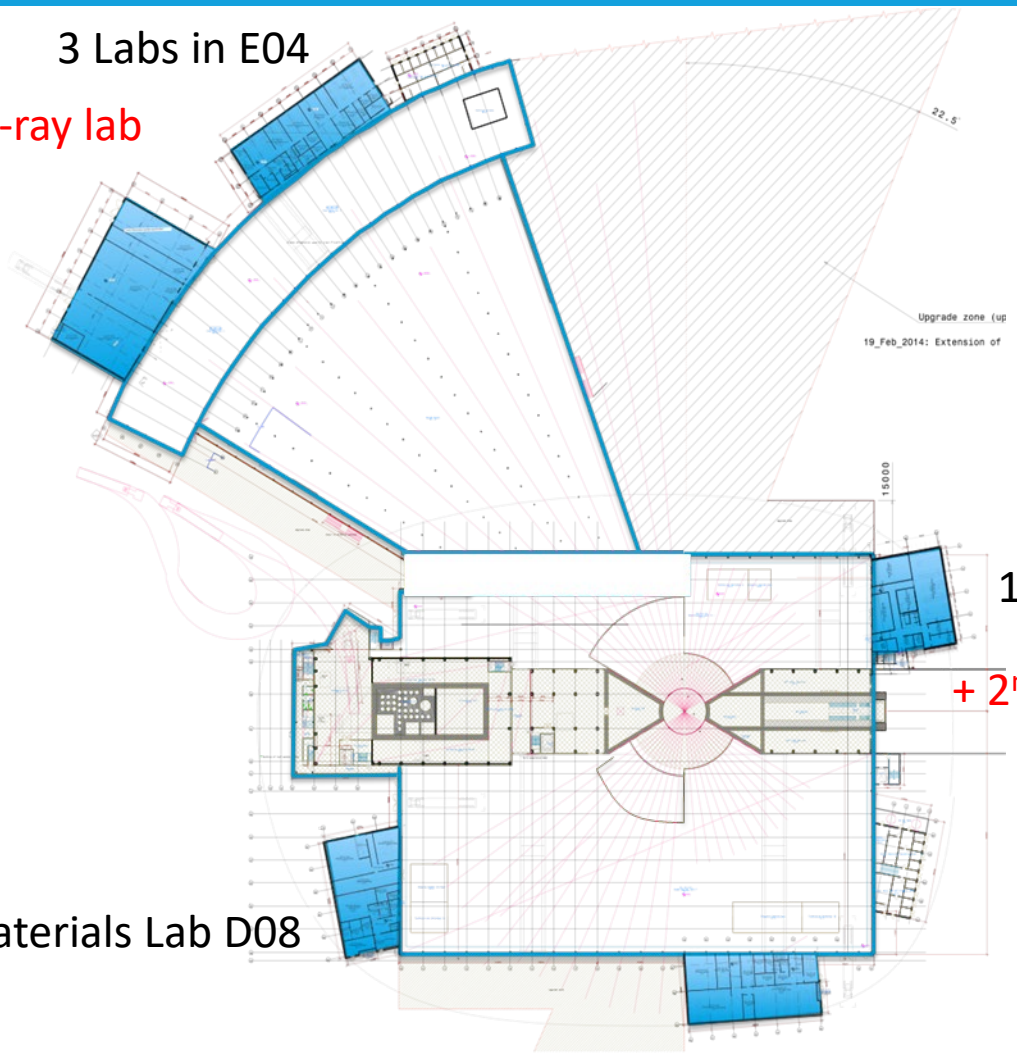
D08:

- Radiological Materials Laboratory (4 FC)

Change-request to Technical Annex: As installation is removed from in-kind to ESS, we can fit-out one more lab

3 Labs in E04

+ installation X-ray lab



1 Lab in D04

+ 2nd large lab in D04

Radioactive Materials Lab D08

Labs not fitted out:

D07:

-large chemistry laboratory with appliance room and fridge/freezer room

-SAXS lab

D08:

-large laboratory with appliance and instrument room

-furnace room

-glass blowing lab

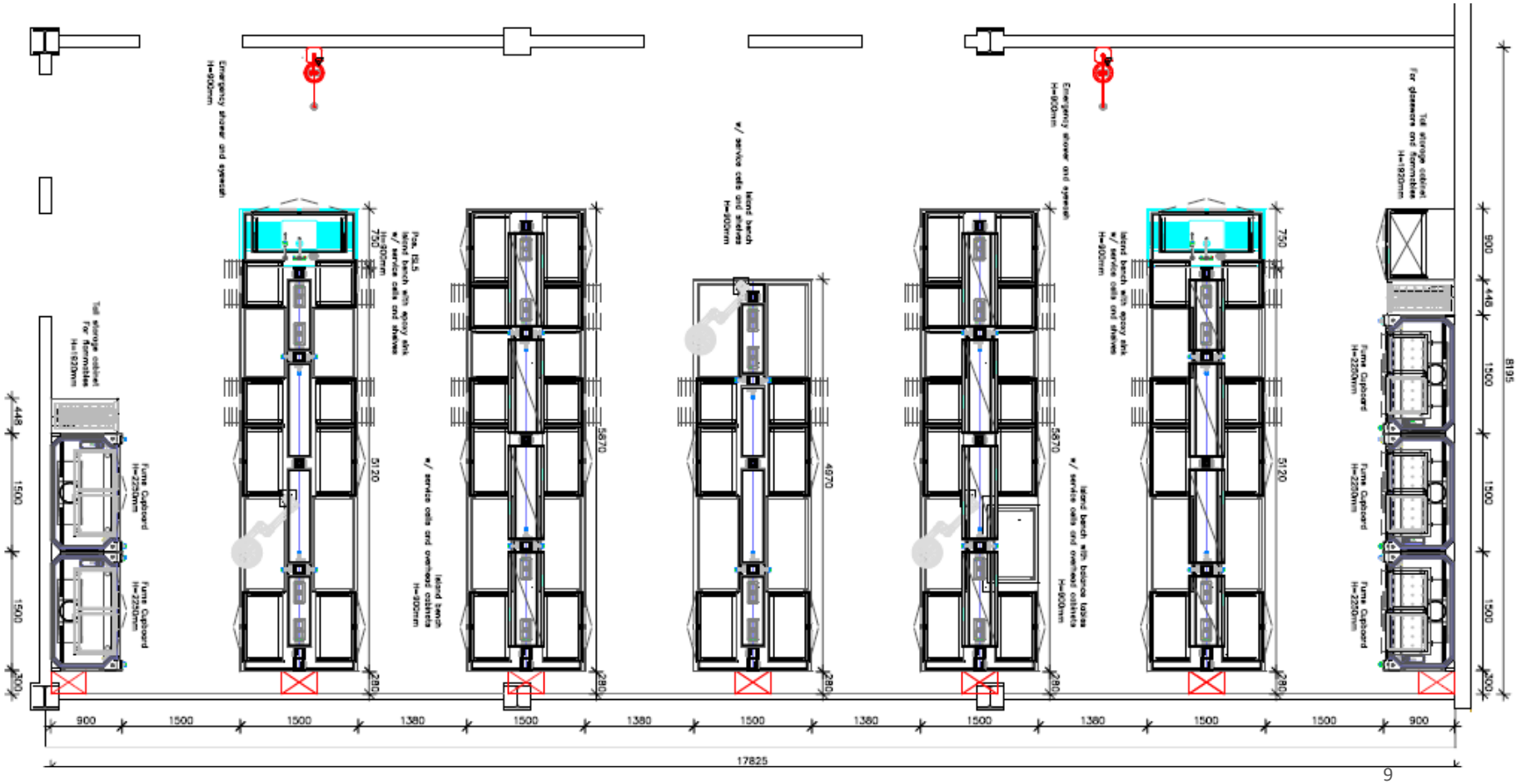
-thin film preparation

BUT all drawings exist and plans are made

Principle of large lab fit-out

Same layout:

- fume hoods on walls with chemical storage underneath
- overhead extraction for some of the middle benches
- dishwasher/ice machine
- weighing table (granite)
- eye wash
- emergency showers



E04 – what we will fit out first

- Jan.-May 2019: final design review of drawings between STFC (in-kind)/ESS and Sanber
  - Good news –enough money out of lab consulting phase left to keep Marek Jura involved as support in ESS lab fitout
- June-December 2019: Installation preparation
  - Installation meetings with SKANSKA/CF services and NSS installation engineer to prepare,
  - measuring of “as-built” components vs. “for construction” drawings
  - Training and site access permission, logistics/storage issues
- January- April 2020: Lab fit-out in E04
- June 2020: sample environment lab fitout and potentially other labs for technical groups. SULF supports and coordinates.

- 2021: Fit-out of Radiological Materials Lab (partial access) and D04 labs

SULF strategy for procurement of large equipment

* equipment owned by other groups

Procurement of equipment is tailored to the first three instruments and with view of the next five

= cover basics of soft matter, material science and general chemistry

- Large scale equipment (procured or in process): LOKI, DREAM (ODIN) , Target Division (TD) and Accelerator Division (AD), Science Directorate (SD) support
  - Spectroscopy: RAMAN+CCR(10K)*, UV/VIS, FT-IR+ATR - identification of organics, isotope shift (D/H,^{10}B/^{11}B), quantification of materials in solution
  - Thermal Analysis: DTA/DSC - water content, phase transitions, glass transitions, decomposition
  - BET surface area analysis: surface area, adsorption measurements
  - Gas pycnometer: density of solid materials/powders
  - X-ray: single crystal (used) - crystal check (not for macrocrystals! Cu/Mo X-ray tube), crystal structure
  - XRF (used) - elemental analysis
  - Autolab/Metrohm Potentiostat and cell – cyclovoltammetry/potentiostatic voltammetry, redox processes, oxidation states -> collaboration with FLUCO (impedance spectroscopy) and project to use in-situ on instruments
  - Optical Microscopes (1x regular, 1x metallurgical with micro-indenter, used)
  - Scanning Electron Microscope (SEM/EDX)*
  - Benchtop glove box

SULF strategy for procurement of chemicals

WHY? Our colleagues are starting to come to us for support – we have to establish that they can get fast, efficient support for basic needs in-house rather than having to go outside

- We started to procure a set of basic chemicals – to be able to perform basic synthesis and analytical chemistry
  - common inorganic salts so we have a lot of the common “elements” available in form of a salt
  - some elements (I_2, Na, Mg, graphite,…), ozone generator (O_3)
  - basic organic solid compounds (solid acids, urea, amino acids, acetates,…) and reagents (LiAlH4, NaH, Grignard,…)
  - acid/bases
  - common solvents (alcohols, alkanes, ethers, CH_xCl_{4-x}, ..) and some other more rarely used ones (benzene, acetonitrile,..)
  - some common analytical reagents, indicators and dyes

Chemical Inventory system - Klara

- Chemical inventory system has been chosen: KLARA (used in research facilities in Sweden, e.g. MaxIV, Lund University)
- Status: about to go online, training within the next 1-2 months
- Setup:
  - several administrators for adding/removing users
  - several super-users (enter chemicals, remove chemicals) – SULF will be part of that (DEMAX as well)
  - general users (can read MSDS sheets, can find chemicals and location of chemicals)

NORDIC PORT
– We link environment to business –

KLARA

	A	B	C	D	E	F	G	H
1	**SURF Chemical List** Chemical name	Formula	Amount (usually) present in lab	CAS	purity	manufact	price	Aldrich # product number
41								
42	bases and salts of bases							
43	Ammonium hydroxide	NH4OH	500mL	1336-21-6	ACS reagent	Sigma Aldrich		320145-500ML
44	potassium hydroxide	KOH	1kg	1310-58-3	for analysis	Merck		1.05029.1000 (Merck)
45	potassium hydroxide	KOH	500g	1310-58-3	85%	Sigma Aldrich		221473-500G
46	sodium hydroxide	NaOH	500g	1310-73-2	>=98%	Sigma Aldrich		S5881-500G
47	sodium hydroxide	NaOH	1kg	1310-73-2	>=98%	Sigma Aldrich		71690-1KG
48	diethylamine	(C2H5)2NH	500 mL	109-89-7	>=99.5%	Sigma Aldrich		471216-500ML
49	triethylamine	(C2H5)3N	500mL	121-44-8	>=99%	Sigma Aldrich		T0886-500ML
50	hydrazine monohydrate	N2H4*1H2O	100 g	7803-57-8	reagent grade 98%	Sigma Aldrich		207942-100G
						Sigma		

Sheet1 Sheet2 Sheet3

SULF's current chemicals inventory in Excel

SULF strategy for procurement of small scale laboratory equipment

- Small scale laboratory equipment
  - centrifuges (micro, macro) – procure one more macro (100 ml, 14k RPM, cooling)
  - tip sonicator, sample concentrator – procure US bath and water bath
  - orbital shaker – procure one more shaker (roll shaker)
  - rotary evaporator – procure more evaporators
  - 2x pH meter, 2x conductivity meter – procure oxygen meter
  - muffle furnace, tube furnace, vacuum oven – procure drying oven, small turnable tube furnace (horiz./vert.)
  - Vacuum pumps (3 small + 2 large)
  - Scales (microscale, analytical scale, lab scale)

- “Consumables”
  - Eppendorf micropipettes (manual and electric, 0.5 ul – 5 ml), glass pipettes (1-50 ml)
  - 2x burettes, columns, glassware
  - Schlenk-line, sample prep for BET
  - heating mantles/heating tape + regulators

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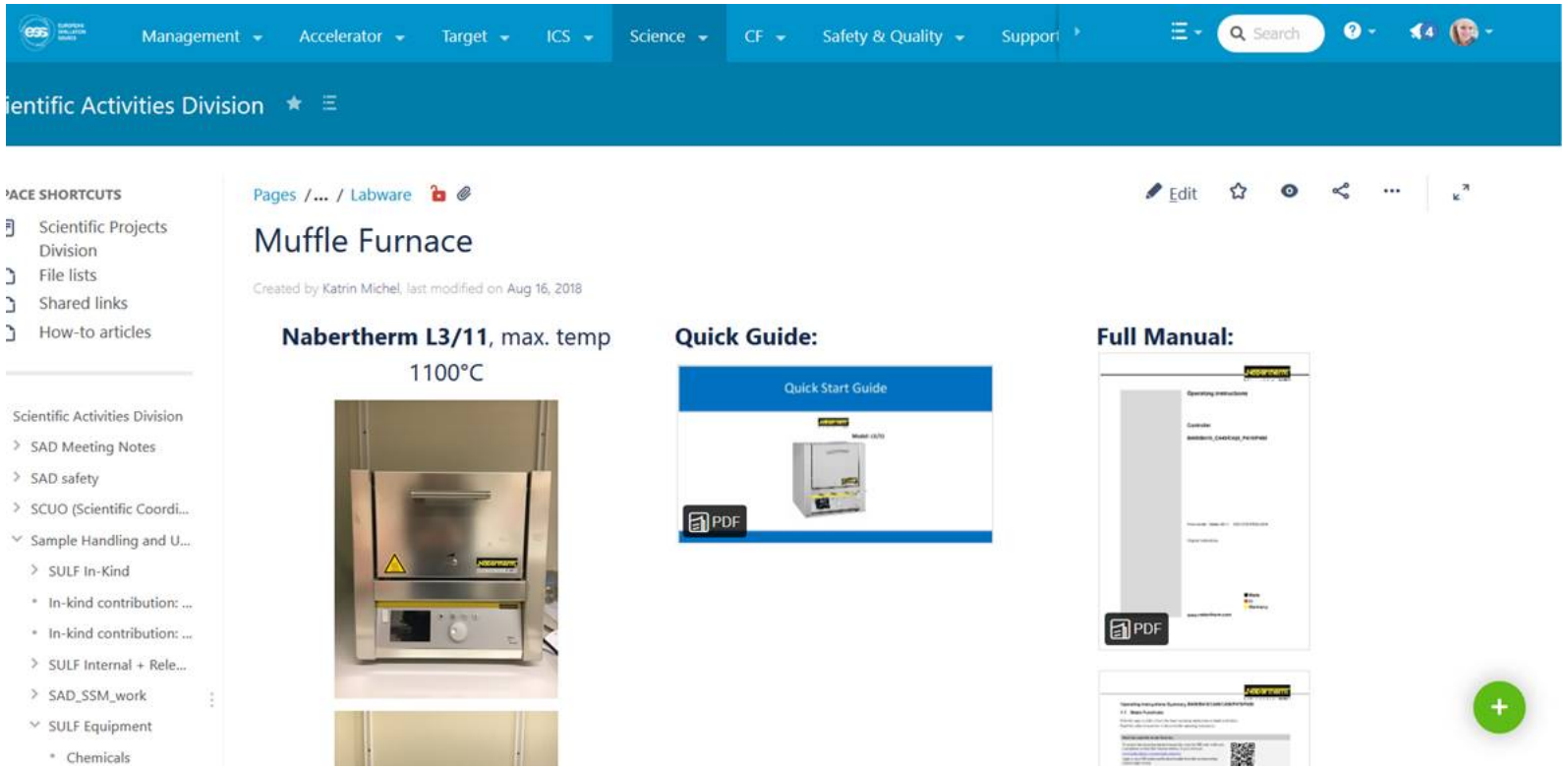
How we prepare for on-site operations

Confluences pages in preparation for operation:

- List of equipment with manuals and quick guides
- SULF tasklists for communication
- Utgård glassware storage established
- Consumables procured and kept as stock in Utgard (pipettes, sample vials, …)
- Due to projects we are involved in, we are procuring lots of small equipment, essential but often forgotten.



Thank you for your attention

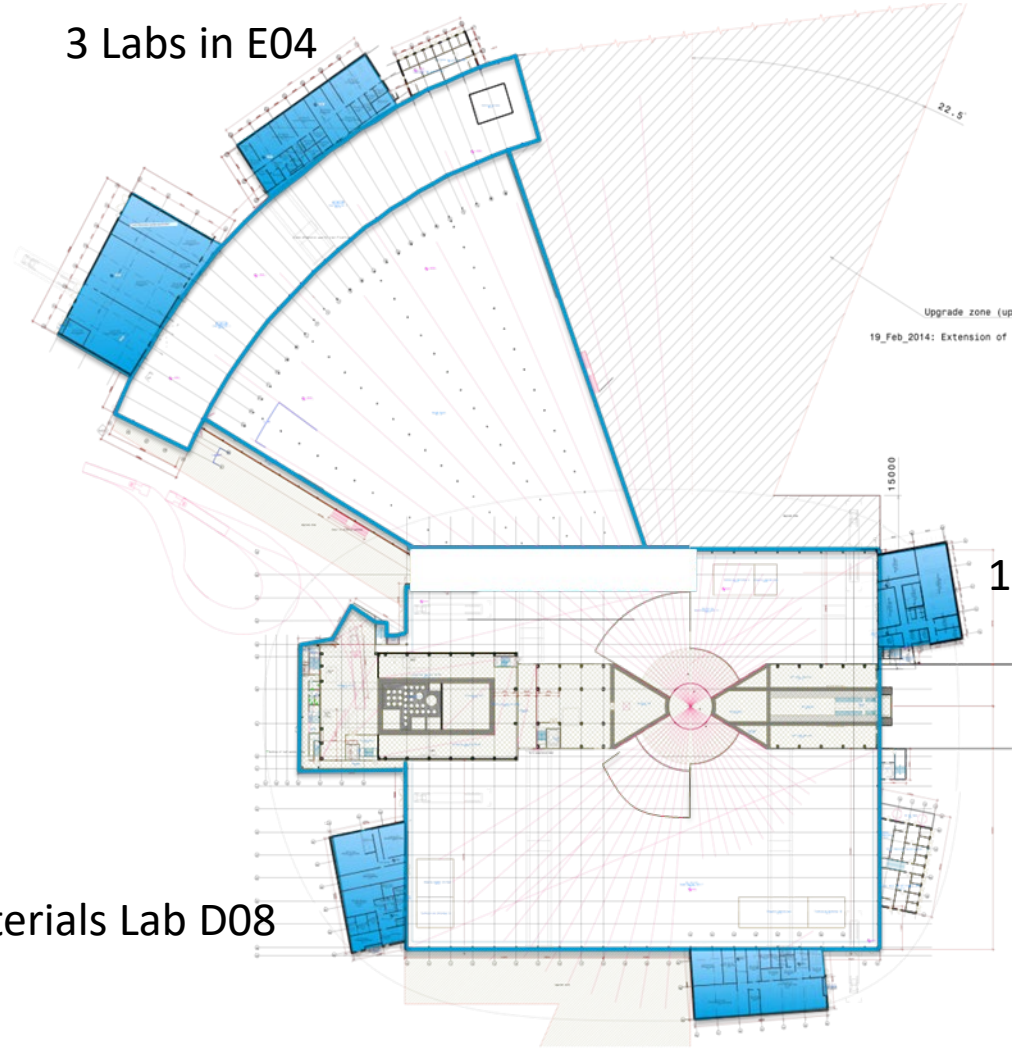
SULF Team winter 2018

Kick-Off Labs Feb2019

Additional slides in case of interest in fitout details

Location of current Labs procured in tender

3 Labs in E04

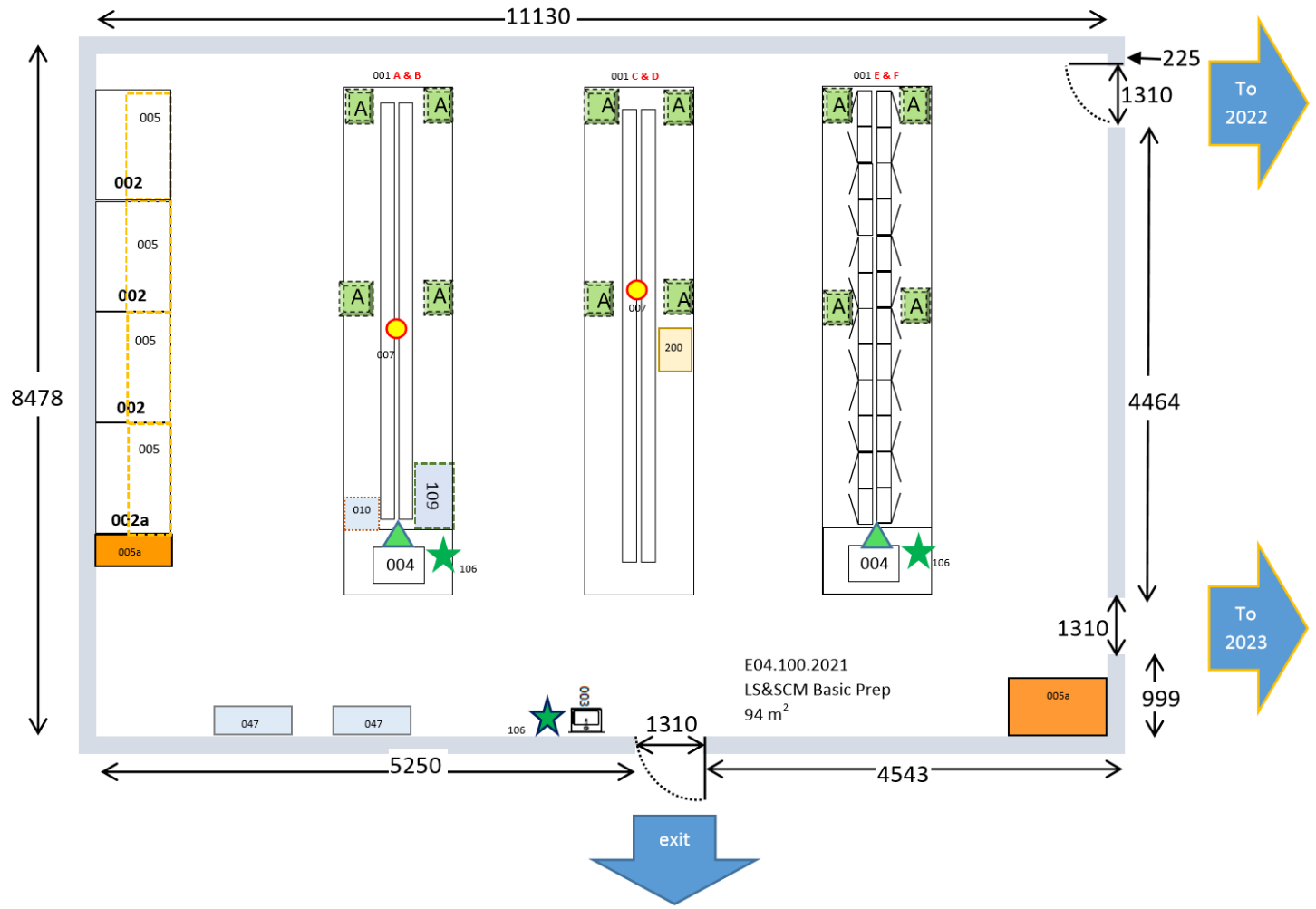


1 Lab in D04

Radioactive Materials Lab D08

- E04.100.2021(22,23)
  - Large Chemistry lab with appliance room and fridge/freezer room
  - 4 F/C, 2 Extract points
- E04.100.2032(35)
  - Physical Characterisation lab with cutting & polishing room
  - 3 F/C, 6 Extract points
- E04.110.2021
  - Large Chemistry lab
  - 4 F/C , 4 Extract points

E04.100.2021


11130
8478
225
1310
To 2022
4464
1310
To 2023
999
1310
5250
4543
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001 A & B
001 C & D
001 E & F
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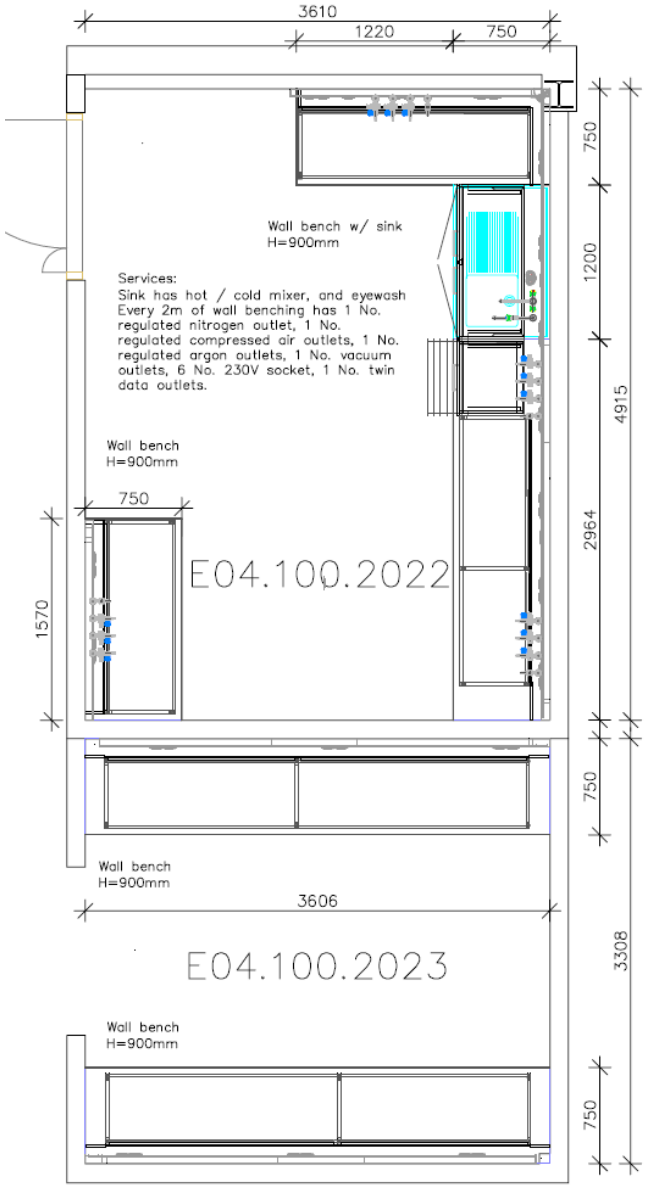
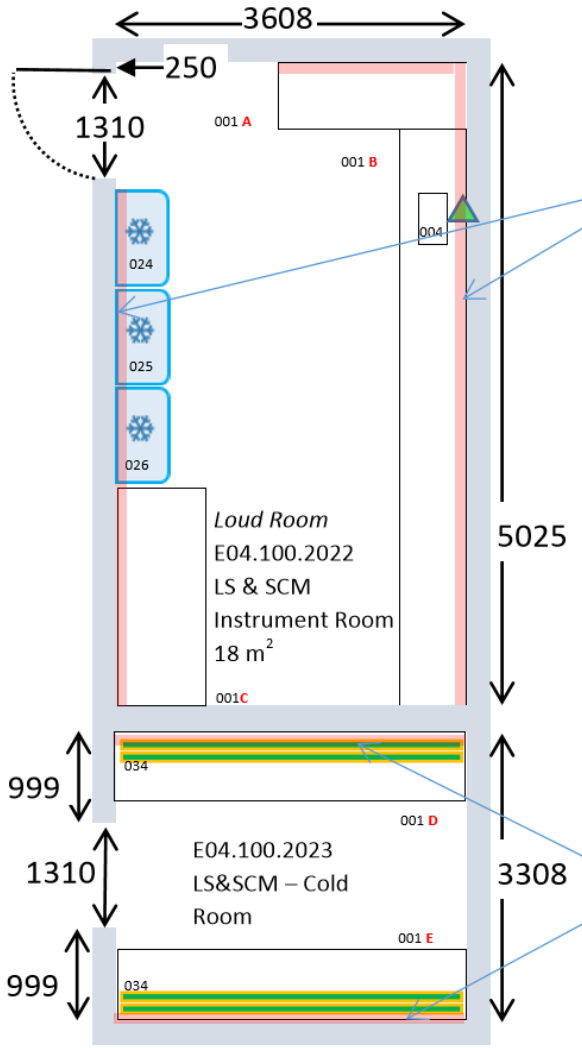
002
005
002
005
002
005
002a
005a
007
007
010
109
004
004
106
106
200
047
047
003
E04.100.2021
LS&SCM Basic Prep
94 m2
005a

E04.100.2022&2023





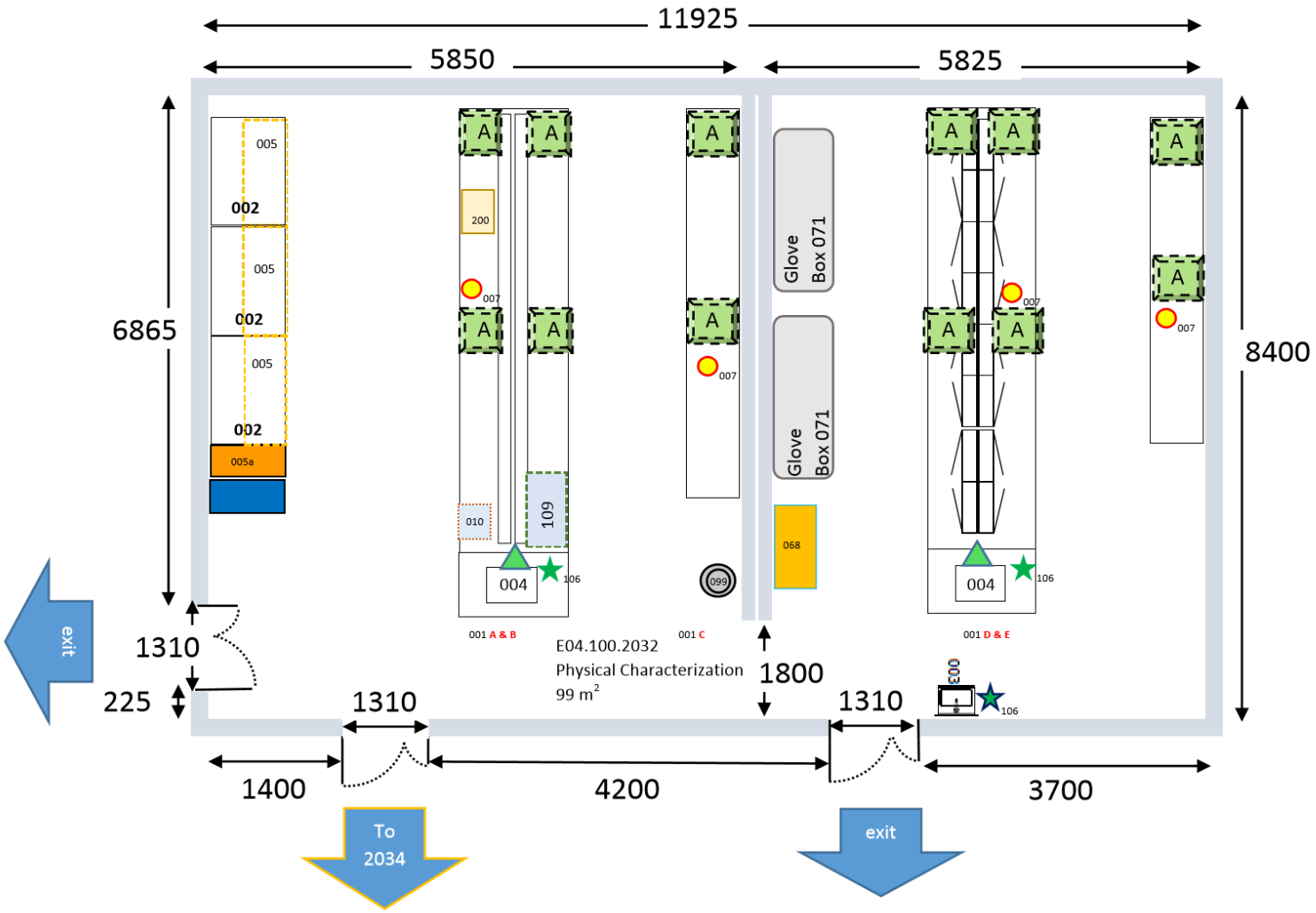
Utilities (red box):

- DI water, cooling water, N_2, Ar, vacuum and comp air on benches every 2 m
- 6-16 A single phase outlets (230 V/data) and 2x IT ethernet ports every 2m on walls

Utilities (red box):

- 6-16 A single phase outlets (230V)

E04.100.2032


11925
5850
5825
6865
8400
005
002
005
002
005
002
005a
200
007
010
109
004
106
099
001 A & B
001 C
001 D & E
Glove Box 071
Glove Box 071
068
E04.100.2032
Physical Characterization
99 m²
1800
1310
225
1310
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4200
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To 2034
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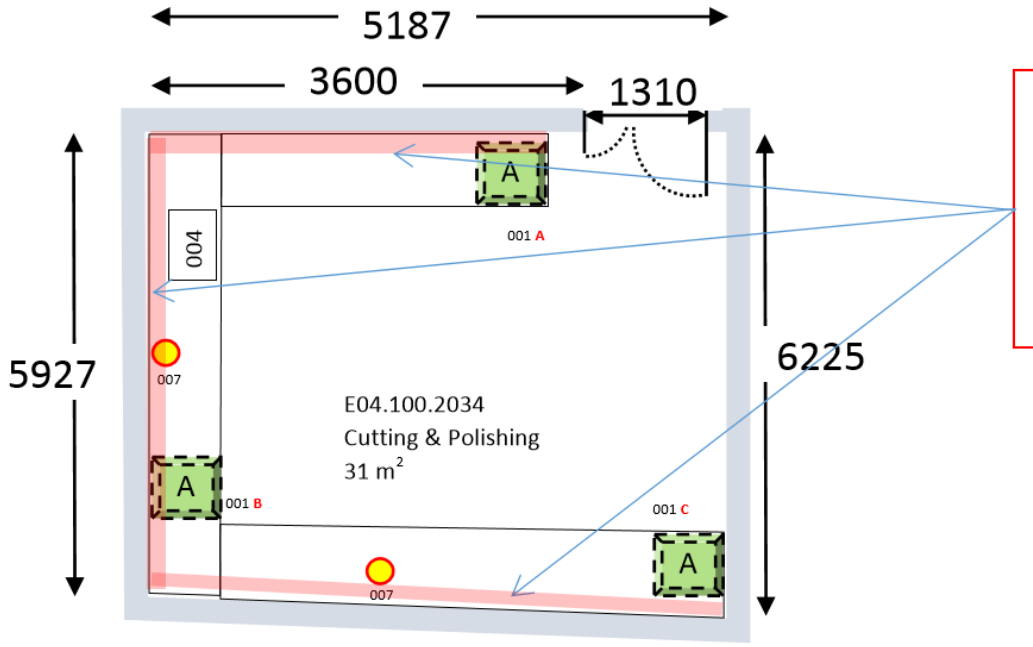
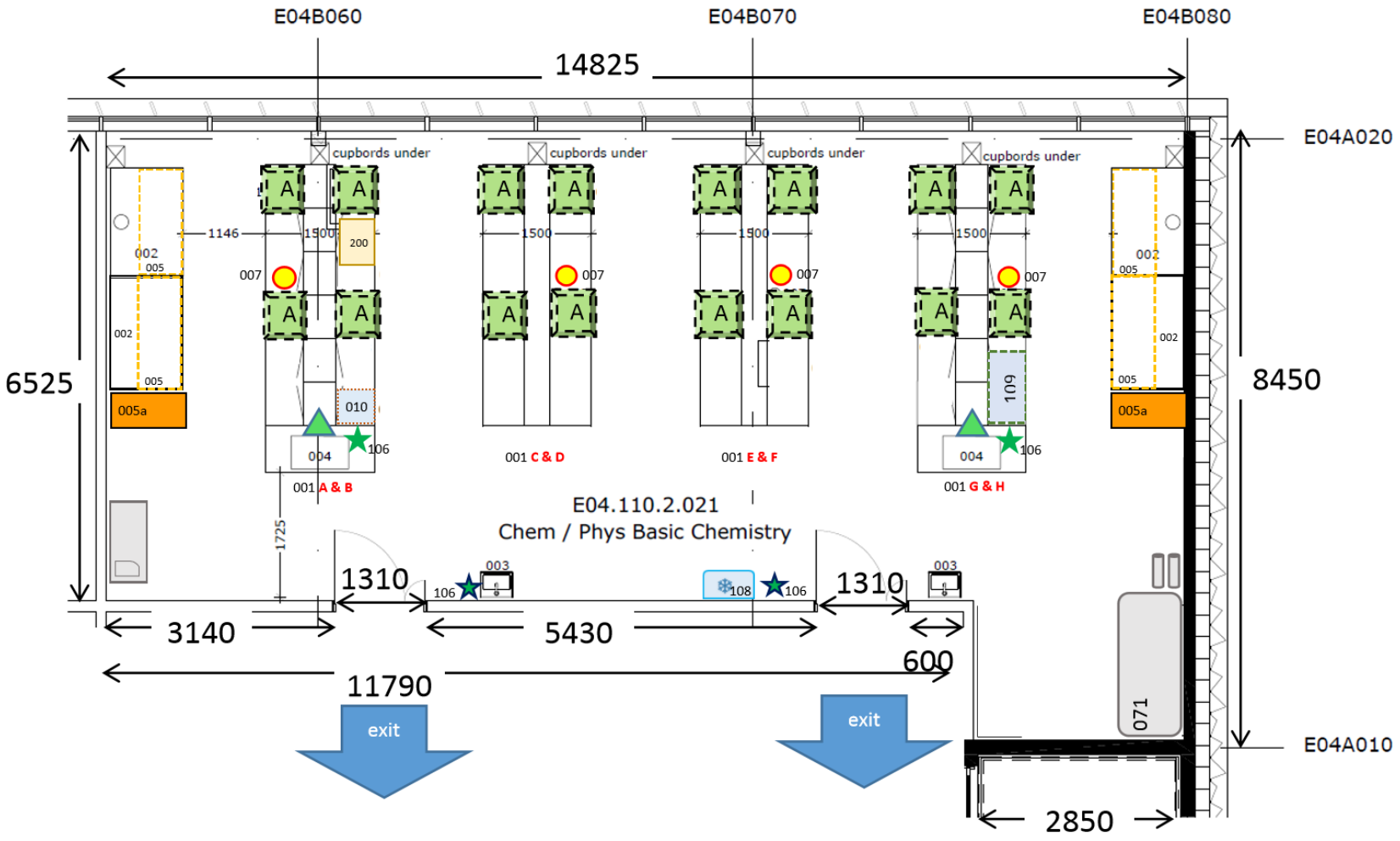
E04.100.2034



Utilities (red box):

- vacuum, DI water, cooling water, N_2, Ar, vacuum and comp air on benches every 2 m
- 6-16 A single phase outlets (230 V/data) and 2x IT ethernet ports every 2m on walls

E04.110.2021


E04B060
E04B070
E04B080
14825
E04A020
E04A010
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A
1146
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005a
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001 G & H
109
E04.110.2.021
Chem / Phys Basic Chemistry
1725
1310
003
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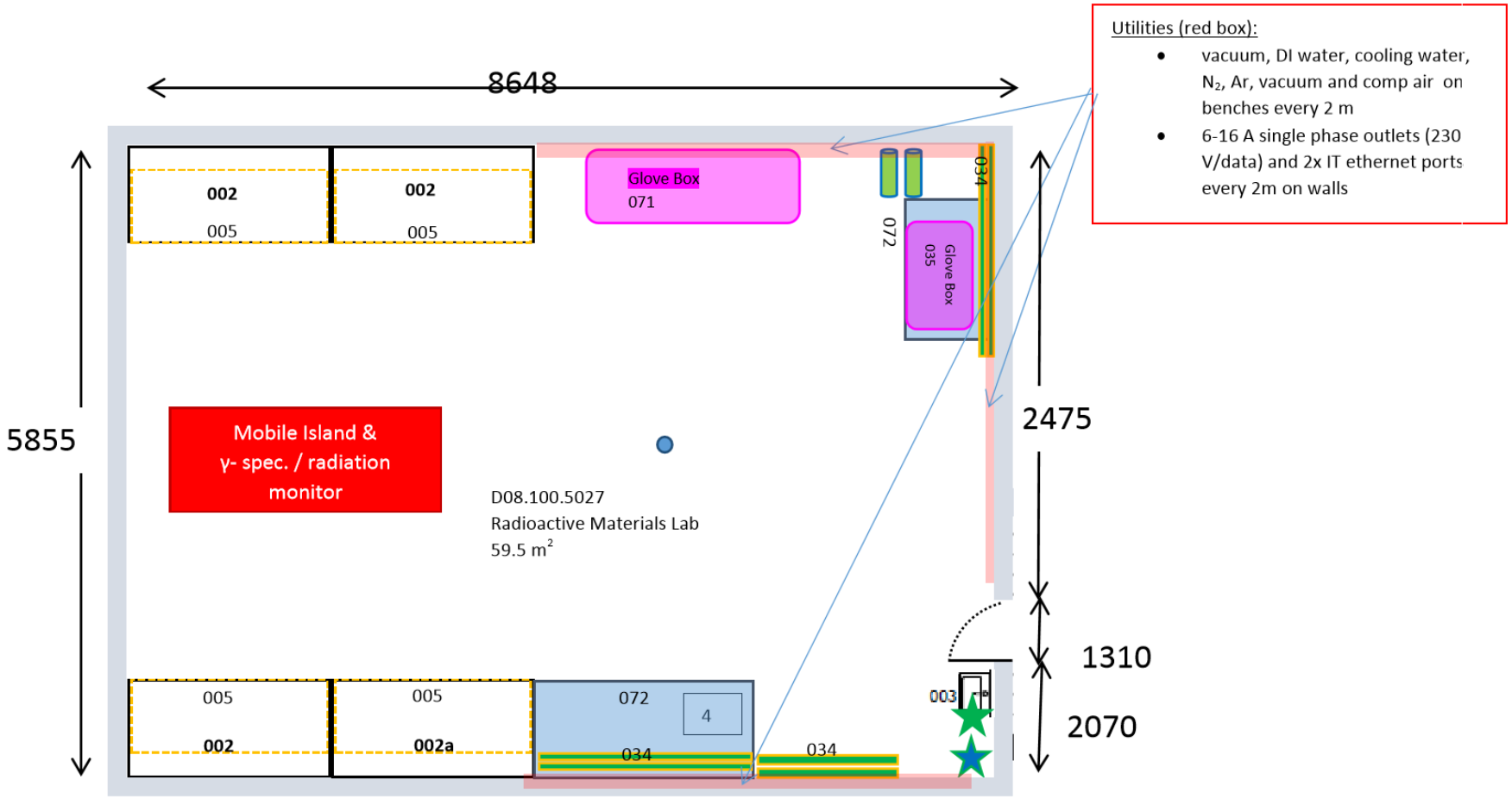
108
1310
003
3140
5430
600
11790
exit
exit
071
2850

- D08.100.5027
  - Radioactive Materials Lab
  - 4 F/C
- D04.100.2027(23,24,25)
  - Large Chemistry lab with appliance room, instrument room & fridge/freezer room
  - 5 F/C, 4 Extract points

D08.100.5027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1310
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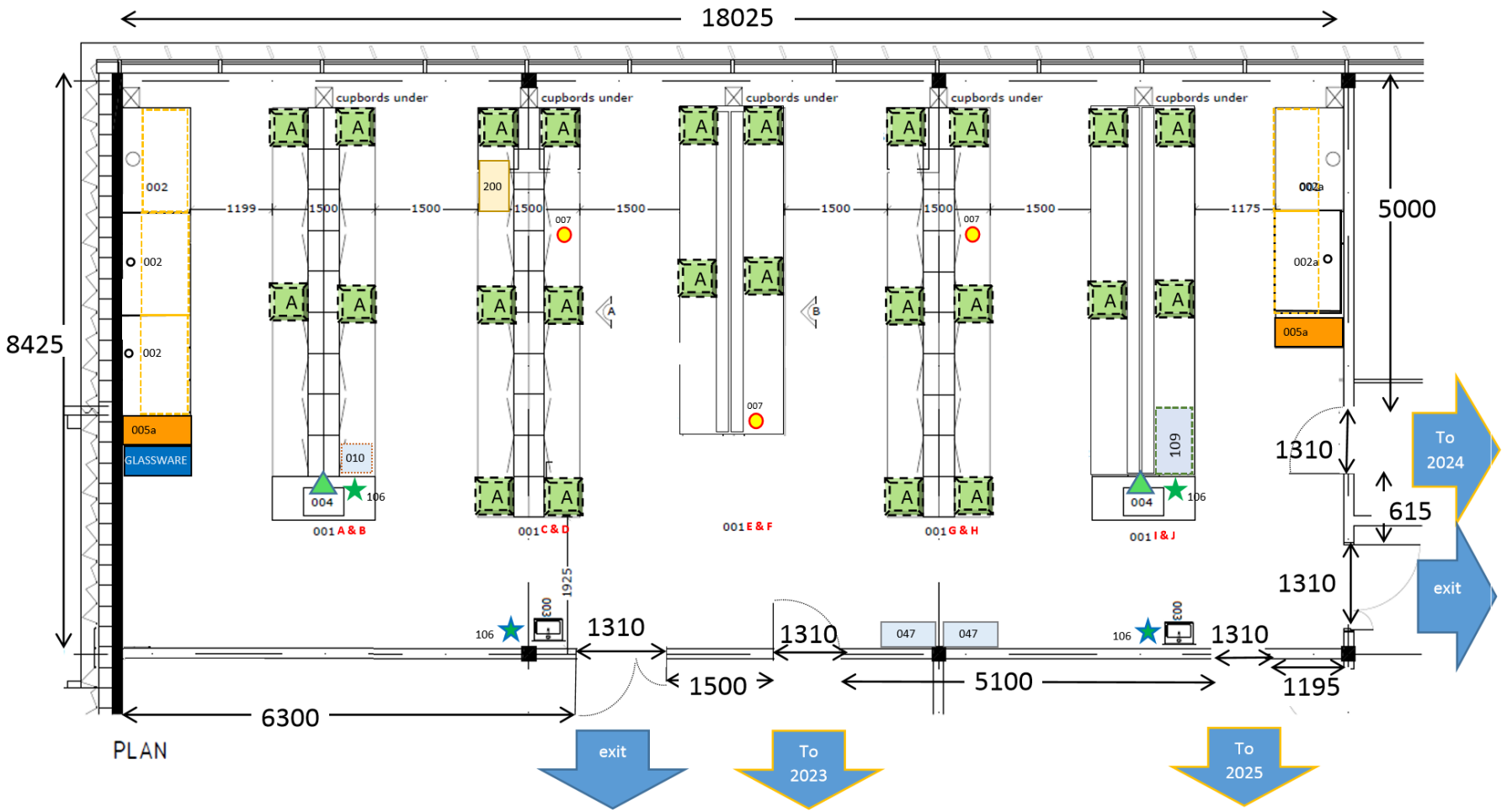
Glove Box
071
034
072
Glove Box
035
Mobile Island &
γ- spec. / radiation
monitor
D08.100.5027
Radioactive Materials Lab
59.5 m²
005
002
005
002a
072
4
034
034
003
Utilities (red box):
vacuum, DI water, cooling water, N₂, Ar, vacuum and comp air on benches every 2 m
6-16 A single phase outlets (230 V/data) and 2x IT ethernet ports every 2m on walls

D04.100.2027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GLASSWARE
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1500
1500
200
1500
1500
1500
1500
1500
1500
1175
007
007
007
002a
002a
005a
010
004
106
001 A & B
001 C & D
001 E & F
001 G & H
004
106
109
001 I & J
A
B
1310
To 2024
615
1310
exit
1925
600
106
1310
1310
047
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1195
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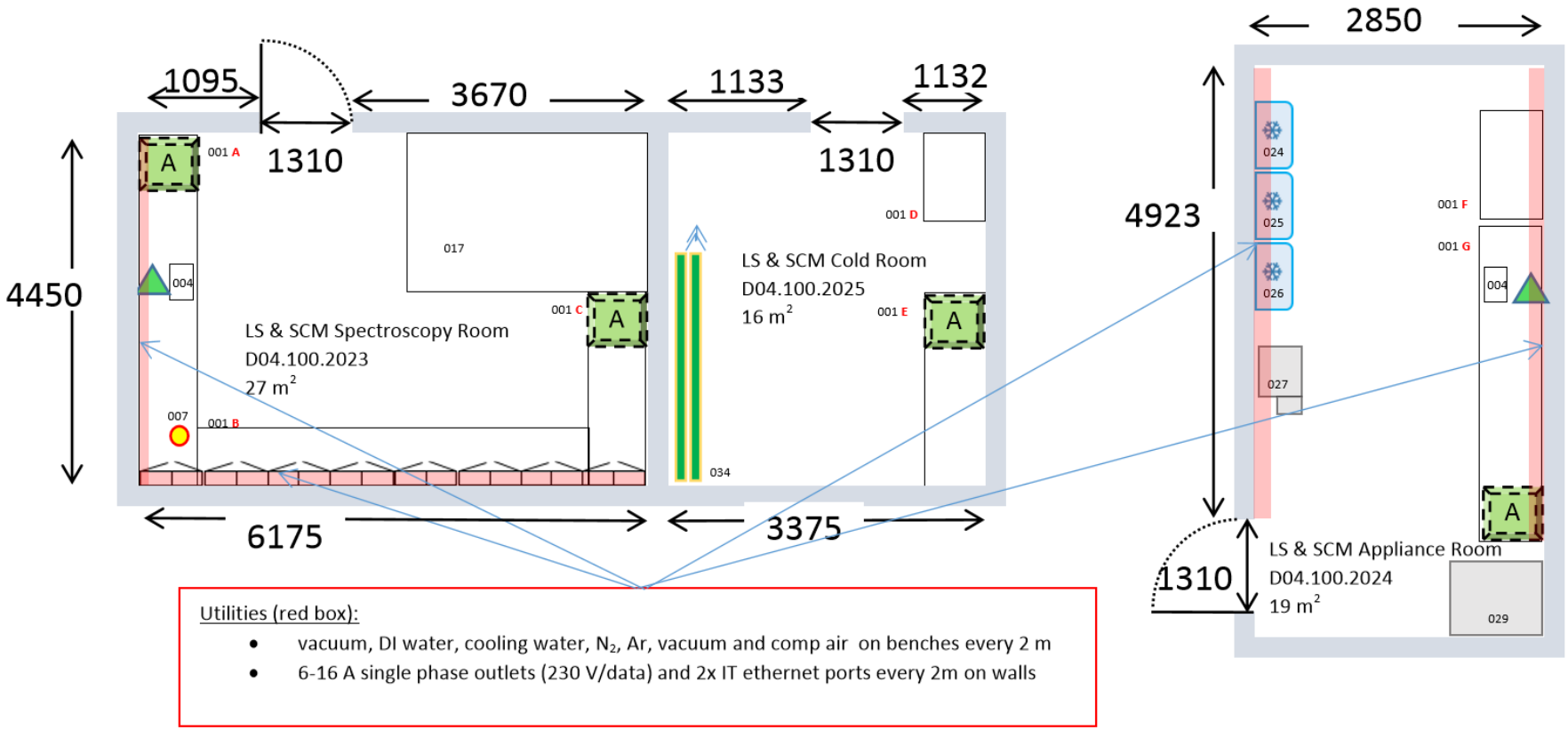
exit
To 2023
To 2025

D04.100.2023(24&25)



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