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RISØ

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Plans for the Risø Hot Cell Facility.

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BACKGROUND.

The Hot Cell facility at Risø has now been in use for 25 years. During that time several types of nuclear fuels have been handled:

- test reactor fuel pins from the Danish reactor DR3, the Norwegian Halden reactor, etc.
- power reactor fuel pins from several foreign reactors, including plutonium enriched pins
- HTGR fuel from the Dragon reactor

All kinds of non-destructive and destructive post irradiation physical and chemical examinations have been performed.

Besides, different radiotherapy sources have been produced, mainly cobalt sources.

As nuclear power in Denmark has been excluded from our energy plans, the interest in hot cell work has decreased. Accordingly, we are now planning a decommissioning of our Hot Cell facility, which mainly involves a thorough decontamination. This work was started in 1990, when all ongoing experimental work was finished; it is expected to last up to four years.

OBJECT AND SCOPE.

The general object of the decommissioning programme for the Hot Cell facility is to obtain a safe condition for the total building that does not require the special safety provisions which were necessary for the operation of the building as a hot cell plant. As a result the hot cell building will be usable for other purposes after completion of the decommissioning.

The facility comprises six concrete cells, lead cells, glove boxes, a shielded unit for temporary storage of waste until shipment, frogman area, decontamination areas, workshops, various installations of importance for safe operation of the plant, offices, etc. A drawing of the facility is shown in Figure 1.

The various decommissioning tasks comprise e.g. removal of all irradiated fuel items, removal of other radioactive items, removal of contaminated equipment and decontamination

of all the cells and rooms. Our goal is to decontaminate all the cells to a degree where no loose contamination exists in the cells, and where the radiation level in the cells is so low, that total removal of the cell structures can be done at any time in the future without any significant dose commitments.

We plan to maintain an active area in the building, housing
- research on active metals for fusion reactors
- fabrication of minor radiotherapy sources
- possibly nuclear waste handling, presently undefined
- possibly fuel element production to the Danish DR3 reactor (currently being done in another building)

At time of writing it is not clarified whether or not two concrete cells will be maintained as standby. None of the cells will be demolished.

The existing installations for ventilation, air filtration, entrance facilities etc. will be modified for the new facility, and the main control equipment will be modernised.

A number of non-nuclear activities will be transferred to the formerly active areas of the building after extensive cleaning up and structural rebuilding.

The decommissioning work has been accepted as a research project of the Commission of the European Communities within the research programme "Decommissioning of Nuclear Installations (1989-1993)".

WORK PROGRAMME OF THE DECOMMISSIONING.

Removal of Fissile Material.
All fissile material from the cells and boxes must be conditioned and packed in storage containers, which will be either exported if possible or transferred to the waste treatment plant for temporary storage at Risø.

Removal of Large Contaminated Equipment.
All large items from the cells and boxes, such as the power-manipulator, the cell crane and all experimental equipment, will be transferred to the decontamination rooms, where decontamination will be performed as far as possible. However, the effort should be justified by the dose commitments. This task will be structured according to the actual

needs and the expected costs and doses. It is not possible beforehand to estimate the extent of this task.

Removal of Large Contaminated Facilities.
All lead shielded steel boxes and gloveboxes for experimental work must be emptied and decontaminated.

The shielded storage facility in the frogman area must be emptied and decontaminated.

The conveyer running through the total concrete cell line must be removed. We know, however, that it is highly contaminated, probably by some tiny active cobalt particles. We foresee major problems in performing this task.

The microscope cell must be removed completely; it is only slightly contaminated.

Decontamination of Concrete Cells.
After having removed all contaminated equipment from the cells, the radiation level in the cells will be mapped remotely. Then the cells will be vacuum-cleaned and conventionally washed where possible. All surfaces will then be cleaned by high pressure water jetting. A remapping of the radiation level in the cells will show the actual levels of remaining radiation, and measurements before and during this coarse cleaning will provide information on the probable benefits from further coarse cleaning. The radiation as well as the contamination levels must at this stage be reduced sufficiently, so that the final cleaning by conventional methods as well as by further high pressure water jetting can be done by persons in frogman suits directly in the cells. Based on our experience from the cell fire in 1971, the need for person access to the cells has been estimated to an order of magnitude of 40 persons performing in total 60 entrances.

We expect problems at the decontamination of the large, but narrow housings above the shutters between the cells, if these housings require decontamination.

Our goal is obviously 100% clean cells. Realistically, we aim at cell surfaces free of any loose contamination and with acceptable low radiation levels. It may be necessary to remove hot spots in the paint layer on the inside surfaces of all cells. Perhaps special techniques must be developed in order to achieve this.

Finally, the outer surfaces of the cells not to be used in the future will be sealed. An appropriate system for maintaining subatmospheric pressure in the cells will be established as a safety provision.

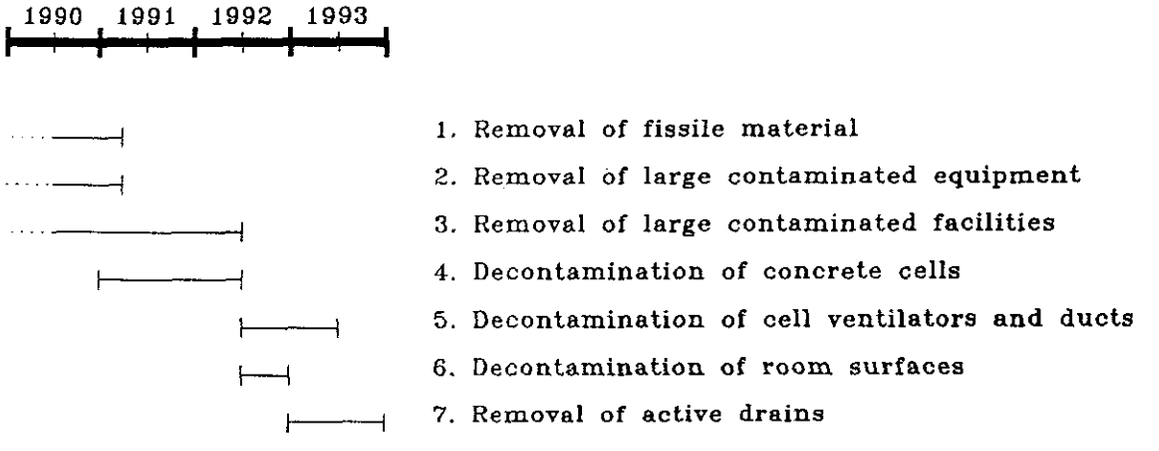
Decontamination of Cell Ventilators and Ventilation Ducts.
At a late stage all the ventilators and the ventilation ducts from the cells will be examined and decontaminated if necessary.

Decontamination of Room Surfaces.
The rooms no more needed for active work will be checked and decontaminated if necessary.

Removal of Active Drains.
The last step in the decommissioning process will be removal of all active drains from the various facilities.

TIME-TABLE.

The programme will be carried out according to the following time-table.



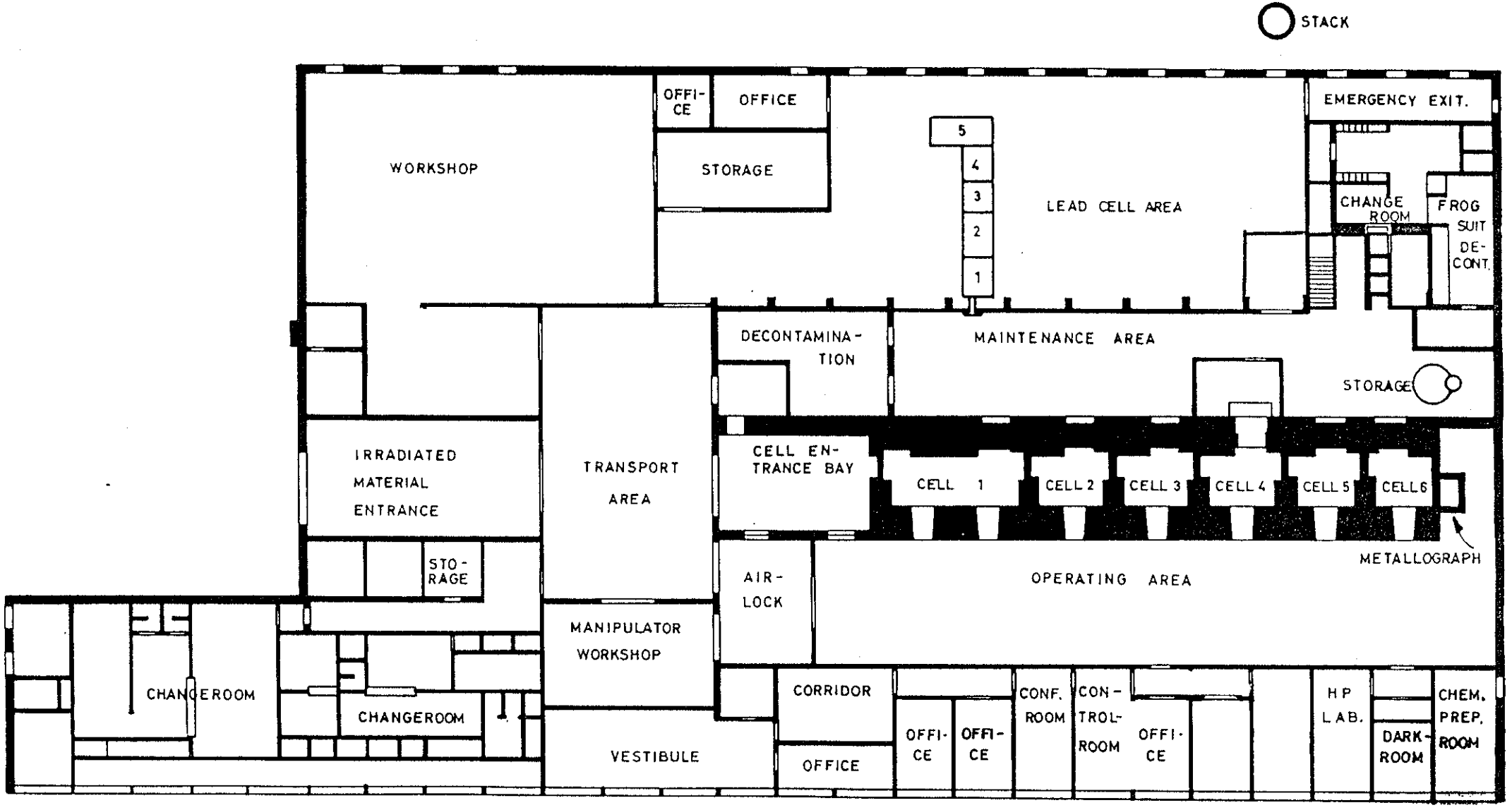

STACK
WORKSHOP
OFFI-CE
OFFICE
STORAGE
5
4
3
2
1
LEAD CELL AREA
EMERGENCY EXIT.
CHANGE ROOM
FROG SUIT DE-CONT.
DECONTAMINA-TION
MAINTENANCE AREA
STORAGE
IRRADIATED MATERIAL ENTRANCE
TRANSPORT AREA
CELL EN-TRANCE BAY
CELL 1
CELL 2
CELL 3
CELL 4
CELL 5
CELL 6
METALLOGRAPH
STO-RAGE
AIR-LOCK
OPERATING AREA
MANIPULATOR WORKSHOP
CHANGEROOM
CHANGEROOM
CORRIDOR
OFFICE
VESTIBULE
OFFI-CE
OFFI-CE
CONF. ROOM
CON-TROL-ROOM
OFFI-CE
H P LAB.
DARK-ROOM
CHEM. PREP. ROOM

FIG. 1