

AN UPDATE ON THE REFURBISHMENT OF THE ACTIVE HANDLING AREA AT
BERKELEY NUCLEAR LABORATORIES

- by -

G F Hines, A Jones and V J Haddrell
CEGB, Berkeley Nuclear Laboratories

and

J S White
CEGB, Generation Construction and Design Division

CEGB

For presentation to the plenary meeting of the EEC Hot Laboratories
Committee to be held at Jülich on the 28th and 29th September 1988.

JULY 1988

1. INTRODUCTION

The refurbishing scheme at Berkeley Nuclear Laboratories covers the decontamination and re-equipment of the cave system, the construction of two new cell lines and renewal of the flask receipt and dispatch systems and also of the ventilation plant serving the active area. In addition, the inactive and low active laboratories, change rooms and entry facilities have been substantially modified. Design work began at the end of 1986 and about half of the contracts had been let by mid-1987. In planning the work, an essential requirement was that the refurbishment be arranged to allow existing research programmes to continue.

A general description of the work associated with the preparation of the caves for man entry was presented to the 1987 meeting of the Hot Laboratories Committee (ref 1) and the present paper sets out progress since that time.

2. CURRENT POSITION

At the end of June 1988, the first new cell line (for the examination of graphite samples) was complete and commissioning had just started. Man entries into the cave line began in May 1988 and the first cave (Cave 6, see fig. 1) is now completely stripped out and decontamination of the walls is well advanced. An outline of the contractors' view of this work is given elsewhere (ref 2).

Civil work associated with the refurbishing of the laboratories (item H, fig. 1) and change rooms (item I, fig. 1) is nearly complete and the second phase of the work has just started. This involves the preparation of the new flask entry facilities (items E and F, fig. 1) and preparation of the area in which the second line of new cells will be located (item C, fig. 1).

Replacement of the active area ventilation plant is in its early stages and careful planning has been essential to ensure that loss of use of caves, cells and active laboratories as a consequence of this work is kept to a minimum.

A plan of the area in which the refurbishing work is being carried out is shown in fig. 1 and the important points that have emerged during the course of this work are set out below.

3. EXPERIENCE GAINED TO DATE

3.1 Graphite Cells

Before erection of the new cells (item A, fig. 1) could begin, it was necessary to remove the existing facilities which had been in operation for about 12 years and which were of lead brick construction. Although it was originally planned to scrap all this material as active waste, pressure to reduce the volume of active waste led to a review of this plan. Trials showed that the lead bricks and window units could be readily decontaminated by wiping with trichlorethylene and then filing away any residual spots of fixed contamination. It proved relatively easy to clean ~95% of the material to background levels so that it could either be re-used or disposed of as non-contaminated items. The inner containment boxes had proved to be efficient in reducing the spread of contamination during service. In fact, much of the contamination was the result of cross-contamination in waste containers after dismantling. If the decontamination procedure had been adopted prior to dismantling, it would have been possible to ensure a rigorous segregation of the more highly contaminated components.

As in previous practice, shielding of the new cells was achieved by bolting together steel plates. The complete cell line was assembled at the manufacturers' works to ensure that all sections interlocked correctly, with the result that re-erection at Berkeley proceeded without difficulty.

3.2 Cave Line

The cave layout (see fig. 1, item B) was such that the first entries took place in the most highly contaminated cave where the cutting of uranium fuel rods had been carried out (cave 6). Some success with the in-cave cleaning of equipment and fixed bench plates was achieved with a fluorocarbon decontamination unit. The main problems experienced were the need for a high integrity filter to prevent activity returning to the cave face with reclaimed fluorocarbon and the provision of a suitable in-cave pump to recirculate the fluorocarbon liquid. The first of these difficulties was solved by use of granules of activated carbon but the second had not been resolved by the time that man entries began. High level cleaning was carried out with a chemically active foam injected by lances inserted through access points in the cave roof. Further cleaning of the bench was also achieved by this means. Unfortunately, this method

of cleaning had to be stopped when some of the foam reached a cave floor drain. The primary outlet pipe from the drain was not fully sealed and this led to activity leaking into the secondary containment outside the cave. At the completion of the remote decontamination operation, the general level of activity in the cave was 2-3 mSv, although some local areas associated with the inter-cave transport system (a railway) were ten times greater. As the adjacent caves were operable, it was possible to release the railway during the first man entries and take it into the other caves (4 and 5) for size reduction and disposal by remote means.

The first entries revealed that the cave floor was covered with a thin layer of hydraulic oil that was not detectable on the remote TV survey. In the refurbished cave line, all hydraulic pipe lines will be visible to allow easy leak detection.

Over a period of 6 weeks, the cave was stripped of all shuttering, light fittings and services and the floor and walls cleaned to a height of $\sim 1\frac{1}{2}$ metres. This reduced the general background to ~ 2 μ Sv so that entries were no longer dose limited. The next step will be to size reduce the bench plates and supports with a plasma arc cutter before high level cleaning takes place.

This point of the refurbishment programme has progressed well but not as quickly as planned. It has taken time for the contractor's staff to assimilate the working methods demanded by our local safety rules. Additionally, there was concern in the early stages that activity variations within the cave might inadvertently expose the operators to an excessive dose. Because of this concern, there were regular stoppages to enable personnel doses to be measured. Now that the contractors staff are more experienced and dose levels are reduced, it is possible to consistently achieve in-cave working times of $2\frac{1}{2}$ to 3 hours. Although it was originally intended to carry out two entries per day, it was found that the support services such as dosimetry, suit cleaning and health physics monitoring were insufficient to achieve this within a normal working day.

3.3 Civil Works

This covers the rebuilding of laboratories (items H and K, fig. 1) and change rooms (item I, fig. 1) and the construction of roads, flask access bays (items E and F, fig. 1) and additional laboratory and office accommodation (item G, fig. 1). Most of the day to day problems have arisen from this work as it generates a considerable amount of debris and

noise and makes access to and between buildings difficult. The requirement to re-route services makes heavy demands on in-house labour and disrupts long term experimental work.

Although the associated nuclear hazard is minimal, the difficult working conditions that are created in adjacent areas make it essential that the work is carefully planned and that adequate supervision exists to ensure that appropriate changes can be authorised when delays occur.

4. DISCUSSION

The decision to carry out a major refurbishing programme whilst maintaining the operational capability of the facility has placed a heavy demand on the operators. It became apparent at an early stage that much time would have to be spent co-ordinating the requirements of research staff, contractors and the refurbishment team to avoid costly delays. Although there have been many difficult periods, the attention paid to this aspect and the staff resources deployed have been fully justified.

Another difficulty was the availability of Health Physics staff. Problems in this area were made more difficult by the introduction of the new Ionising Radiation Regulations in 1987, the effect of which was to increase the paperwork associated with each operation. These problems could only be overcome by recruiting additional staff.

At present, 5 sets of contractors are working on the refurbishment project and most of these employ sub-contractors. The number of people working within the area has almost trebled as a consequence, which in turn has put pressure on supporting facilities e.g. laundry, change barriers, dosimetry services etc. Constant supervision is essential to ensure that working areas are kept clean and tidy and that unforeseen hazards do not occur. Fortunately the number of accidents have been small despite the large number of people involved and the extent of the work. At present, two people have been slightly injured as a result of falling into trenches exposed by the removal of duct covers and one sustained a contaminated cut when removing redundant equipment from the cave during an entry.

At present, much thought is being given to the rebuilding of the ventilation plant in order to avoid a prolonged shut down of the area. It appears that by demolishing and rebuilding the plant in stages and the provision of temporary exhaust stacks it will be possible to reduce the period of total shutdown to 3 weekends. If this can be achieved disruption to existing work programmes will be minimal.

The final phase of the work will involve the building of a line of new cells for chemistry work and these will include a Shielded Scanning Electron Microscope (item C, fig. 1). The existing receipt pond (item D, fig. 1) will be drained and refurbished, the elevator transfer system to the caves will be rebuilt, and the flask crane which serves the pond hall (item L, fig. 1) will be refurbished. The final stages of the civil works will include the building of new flask transfer bays and additional office and workshop accommodation.

Despite the various problems that have been encountered, construction of the new cells for graphite examination was achieved to programme. We are still on target for returning the pond and the first leg of the cave system to active use by the end of 1989 which will enable the refurbishing of the remaining caves to begin.

5. ACKNOWLEDGEMENT

This paper is published by permission of the Central Electricity Generating Board.

REFERENCES

1. Waste Treatment in UK Research Establishments.
J Stiff, G F Hines and W D Curren
EEC Hot Laboratories, Ispra, 1987, paper C.1, part 2.
2. Nuclear Decommissioning - Practical Experience of the Private Sector.
A W Brant
To be presented to the Conference on Decommissioning of Major
Radioactive Facilities, Institute of Mechanical Engineers, London,
October 1988.

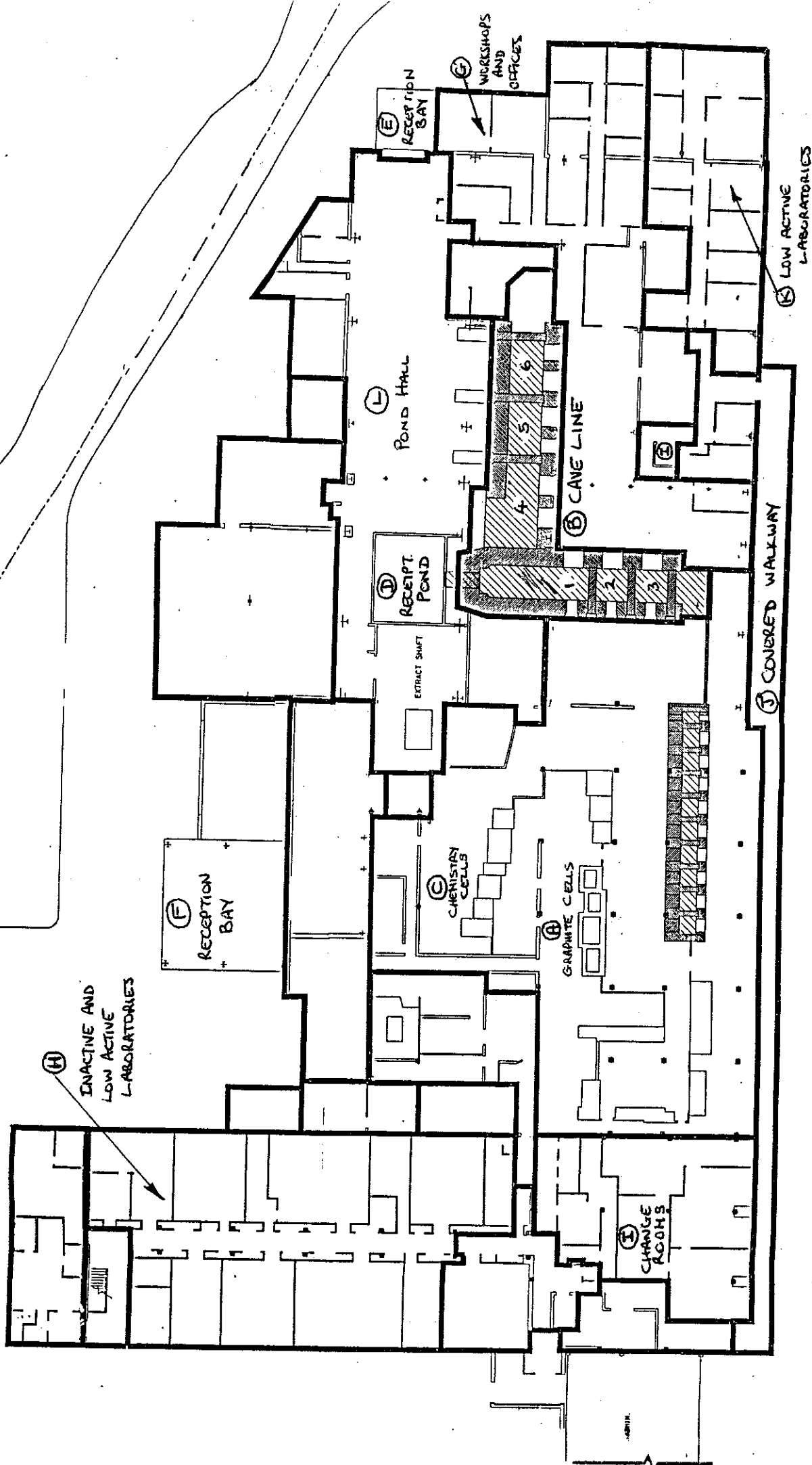


FIG.1 LAYOUT OF SHIELDED AREA

