Transfer Radioactive Waste Material in Hotcell 101 Radiometalurgi Via Transfer Channel Towards Interim Storage for Spent Fuel

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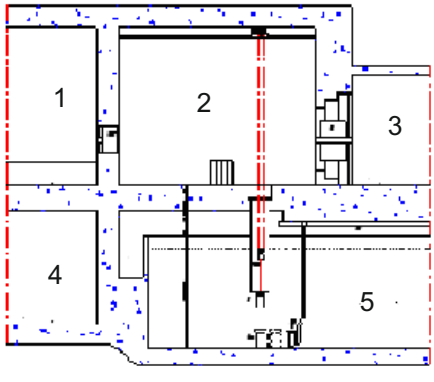
1. Abstract / Introduction

Radiometallurgical Installation (RMI) is a nuclear facility for testing after irradiation of nuclear fuel or commonly called PIE (Post Irradiation Examination) and handling other post irradiation materials such as target foil activities. In RMI, there are thirteen hot cells to handle post-irradiation material and one of them is hotcell 101 which functions as a hotcell for the reception / delivery (transfer) of post irradiation test material (radioactive material). Hotcell is a closed room with thick walls as a radiation shield equipped with manipulators, cranes, conveyors and so on to deal with radioactive radiation from outside the hotcell (operating area). Based on the design, HotCell 101 can receive / send radioactive material in the form of a research reactor plate type bundle Material Testing Material Reactor (MTR-fuel) and Candian Deuterium Uranium (CANDU) and one fuel rod Pressurized Water Reactor (PWR)) or other radioactive material such as Mo-target. In addition to functioning as a recipient hotcell, hotcell 101 is also used for sending material from post-irradiation handling tests to other facilities, such as Interim Storage for Spent Fuel (ISSF) for used fuel storage or Radioisotope Production Installation for Mo-target processing activities. There are two ways to transfer radioactive material after irradiation at HotCell 101, which is via ball-lock with MTR-fuel Transfer Cask (MTC) and through the Transfer Channel (KH) of IPSB3, as presented in Figure 1. Transfer using MTC is done through a hole in wall between hotcell 101 and Room 113 (entrance hall), while transferring via TC and IPSB3 through a hole on the hotcell 101 floor.



1. Hotcell 102
2. Hotcell 101
3. Entrance Hall 113
4. Hotcell 001
5. TC towards ISSF

Figure 1. Hotcell 101 IRM section that is connected to TC-ISSF[2]

In this paper, the implementation of the transfer of two used MTR fuel bundles after a long test is found in the IRM hotcell via hotcell 101 to the ISSF. The purpose of this paper is to share experiences so that the transfer process (delivery) of used fuel in the future (the same activities) from IRM to ISSF can be done by other personnel well, smoothly, secure and safely.

2. Result and Discussion

In the process of transferring two used fuel bundles on hotcell 102, the two bundles were moved one by one to hotcell 101. The transfer of the bundle from hotcell 102 was assisted by a hand manipulator through a hole available on the wall between the two hotcells. Hotcell 101 bundles that are handled by hand manipulators, incell cranes and roller conveyors are operated from the operating area. The procedures associated with hotcell 101 operations and work facilities (manipulators, incell cranes and roller conveyors) in them are applied. The crane crane is used to open the hotcell 101 connecting hole to the TC. Before opening all other transfer holes on Hotcell 101 must be closed.

At the same time personnel from PTLR prepared a Material Testing Unit (MTU) and MTR-fuel basket available on the canal. MTU and MTR-fuel basket are positioned just below the canal hole in the form of a 30 inch diameter pipe which is partially filled with ISSF pond water as shown in Figure 2. Thus there is no direct air contact between the rooms inside hotcell 101 with ISSF room so that it can be prevented contamination from hotcell 101. When the MTR-fuel MTU and basket are ready to receive a fuel bundle, the bundle is lowered to TC using an incell crane and chain through a pipe at the bottom of the hotcell floor 101 until the bundle enters the MTR-fuel basket. When the process of lowering, the operator who is in the TC must step aside to a place that is protected from the radiation of the bundle of fuel because there is no radiation shield around the hole (pipe). Communication via intercom between hotcell operators and TC operators is very necessary, especially at the time of the drop in the fuel bundle so that it can be known when to take refuge.

The fuel bundle that has been placed in the MTR-fuel basket is the end of the hotcell operator's duties and responsibilities in handling fuel bundles. Furthermore, the fuel bundle is handled by the operator TC-ISSF. The same treatment in handling the transfer of the fuel bundle as above is done again for the second bundle transfer. After the second bundle has been moved, the hole on the hotcell 101 floor is closed again.

The next handling of the fuel bundle by the TC-ISSF operator is to move the bundle from MTR-fuel basket to the storage pool. To facilitate handling, the MTR-fuel basket position which is initially just below the hole (pipe) is shifted from the position. When the bundle is in the MTR-fuel basket and in the water, then the radiation exposure is not too large due to its radiation shielded. The TC-ISSF operator moves the fuel bundle with a hook stick and brings the bundle to the storage pool. The position of the hook stick is connected to a rail to guide the transfer to the storage pool. During the transfer process the bundle is always in the water position. Then the fuel bundle is placed into fuel shelves at the bottom of the pool using the crane facilities in the ISSF.

3. Conclusion

The implementation of used nuclear fuel transfer in HotCell 101 IRM through TC-ISSF managed to move two fuel bundles smoothly, safely and safely. This success is inseparable from good planning and coordination between the senders of used fuel (Hotcell 101) and recipients (ISSF). Especially for the transfer process carried out by hotcell operators, preparation to the field, training / coaching and transfer procedures that are clear and easy to understand greatly help smooth the task.

References

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