

28 Dose Reduction¹

28.1 BWR Repetitive High-Dose Job - Dose Reduction Data Sheets

<u>Sheet No.</u>	<u>Job Title</u>
1	CRD Removal/Rebuild and Replacement
2	Fuel Shuffle, Sipping, and Inspection
3	In-Service Inspection
4	Instrumentation Repair and Calibration
5	Insulation Removal and Replacement
6	Jet Pump Inspection and Repair
7	Main Steam Isolation Valve Repair and Inspection
8	Operations-Surveillance, Routines, and Valve Lineups
9	Plant Decontamination
10	Primary Valve Maintenance and Repair
11	Radwaste System Repair, Operations, and Maintenance
12	Reactor Assembly/Disassembly
13	Recirculation Pump Seal Replacement
14	Refueling Pool Decontamination
15	Residual Heat Removal System Repair and Maintenance
16	Safety Valve Repair and Inspection
17	Scaffold Installation/Removal
18	Snubber Inspection and Repair
19	TIP/SRM/IRM Calibration, Repair, and Maintenance
20	Torus Repair, Inspection and Modifications
21	Turbine Overhaul and Repair

¹B.J. Dionne and J.W. Baum, Occupational Dose Reduction and ALARA at Nuclear Power Plants: Study of High-Dose Jobs, Radwaste Handling, and ALARA Incentives, NUREG/CR-4254, 1985, Superintendent of Documents, U.S. Government Printing Office, P.O. Box 37082, Washington, DC 20013-7982.

**EXAMINATION OF BWR REPETITIVE HIGH-DOSE JOB
DOSE-REDUCTION DATA SHEET**

JOB TITLE: CRD Removal/Rebuild and Replacement

JOB DESCRIPTION:

Control rod drive overhaul includes electrical disconnect; unlatching of CRDs vessel or under vessel; CRD removal, and transfer to rebuild room; control rod drive decon, rebuild, inspection, replacement and reconnection. Excludes CRD friction testing and CRD or hydraulics modifications.

<u>OUTAGE COLLECTIVE DOSE:</u> REACTOR SUPPLIER	MINIMUM man-rem	MAXIMUM man-rem	AVERAGE man-rem
General Electric	6.3	230	60

DOSE REDUCTION TECHNIQUES:

Dose-Rate-Reduction Techniques:

- Use lead pig to shield spud end or shielded transfer cart
- Use TV monitor for remote HP coverage and supervision under the vessel and in CRD rebuild room
- Rinse off drive and remove spud filters underwater or with remote tools as soon as possible
- Shield and periodically hydrolyse CRD rebuild room drain line
- Provide stainless steel sloped drain line in CRD rebuild room
- Store spud filters and CRD waste in shielded drums or shielded high level storage area
- Remove CRD waste as soon as possible
- Decon ultrasonic sinks and CRD flush tanks periodically
- Flood and shield reactor sump under the vessel
- Shield CRD storage racks or drives with lead blanket during storage outside rebuild room
- Transfer drives from undervessel to CRD rebuild room during periods of low traffic

Time-saving Techniques:

- Unlatch control rods from refuel floor instead of from under the vessel
- Have mockup of the bottom of the vessel and train on removal and installation of CRDs
- Perform mockup training of rebuilding using new CRDs
- Use testing rig to pretest rebuilt CRD before replacing
- Provide large and efficiently laid out rebuild room
- Use electric hoist with quick disconnect lifting rigs to transfer CRDs
- Use pneumatic wrenches to remove drives
- Use two shielded transfer carts...one for the drywell, the other from drywell to rebuild room
- Install monorail in rebuild room

Contamination-Reduction Techniques:

- Use enclosed and ventilated CRD rebuild room
- Use CRD transfer and containment cart
- Place CRD contamination control bag on spud end
- Put plastic and/or paper along CRD transfer path
- Enclose CRD rebuild room and CRD storage area with plastic or aluminum wall

- Rebuild drives in a CRD "doghouse" containment or in an underwater rebuild tank
- Use glove bags to remove spud filters
- Use ultrasonic sinks or flush tanks to clean drives
- Use long gloves and plastic suit for removing drives from under vessel
- Ventilate disassembly table, spray CRDs, and decon table periodically

28.2 PWR Repetitive High-Dose Job - Dose-Reduction Data Sheets

<u>Sheet No.</u>	<u>Job Title</u>
1	Cavity Decontamination
2	Chemical, Volume, and Control System Repair and Maintenance
3	Fuel Shuffle, Sipping, and Inspections
4	In-Service Inspection
5	Instrumentation repair and calibration
6	Insulation Removal/Replacement
7	Operations-Surveillance, Routines, and Valve Lineups
8	Plant Decontamination
9	Pressurizer Valve Inspection, Testing, and Repair
10	Primary Valve Maintenance and Repair
11	Radwaste System Repair, Operation, and Maintenance
12	Reactor Assembly/Disassembly
13	Reactor Coolant Pump Seal Replacement
14	Residual Heat Removal System Repair and Maintenance
15	Scaffold Installation/Removal
16	Secondary Side of Steam Generator Inspection and Repair
17	Snubbers, Hangers, and Anchor Bolts Inspection, and Repair
18	Steam Generator Eddy Current Testing
19	Steam Generator Manway Removal/Replacement
20	Steam Generator Tube Plugging/Sleeving